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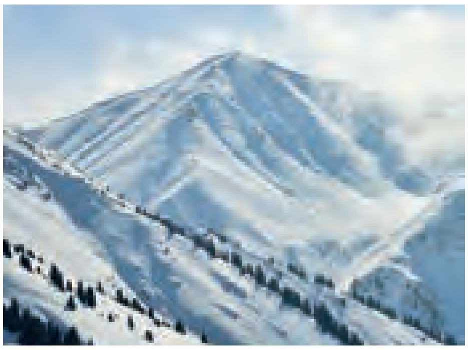
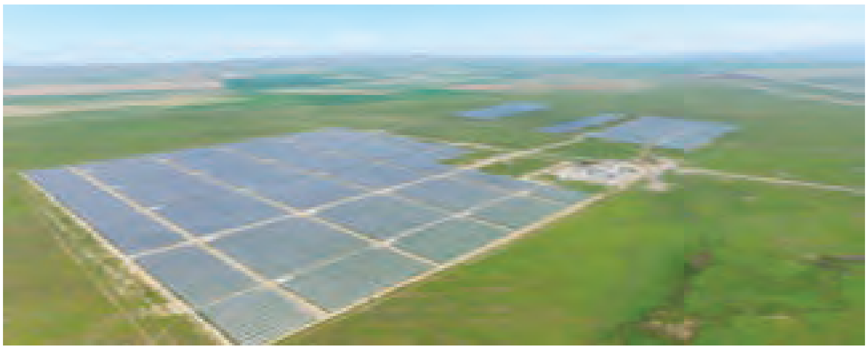
Environmental Performance Reviews

Third Review





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ENVIRONMENTAL PERFORMANCE REVIEWS

KAZAKHSTAN

Third Review

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The United Nations issued the second Environmental Performance Review of Kazakhstan (Environmental Performance Reviews Series No. 27) in 2008.

This volume is issued in English and in Russian.

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Foreword

This third Environmental Performance Review (EPR) of Kazakhstan has special significance for the United Nations Economic Commission for Europe (ECE) as it is the fiftieth EPR organized by ECE. It builds on the substantial experience accumulated by ECE and its member States in using this tool to regularly assess progress achieved in reconciling national economic and environmental objectives. Over two decades, EPRs have resulted in stronger institutions for environmental management, improved financial frameworks for environmental protection, advanced environmental monitoring and information systems, better integration of environmental concerns into sectoral policies, strengthened public participation and increased international cooperation. They bring together good practices and a wealth of experience from all ECE member States in a mutually-enriching learning exchange.

In recent years, Kazakhstan has become one of the frontrunners in adopting the green economy approach. In 2013, Kazakhstan made green economy a clear policy objective by adopting an aspirational Concept on Transition to Green Economy. Nevertheless, scaling up the mining and fossil fuel sectors is also a national priority. This EPR allows learning from the experience of Kazakhstan – a country rich in oil, coal and mineral resources – in finding its way to long-term growth based on climate-friendly technologies, energy efficiency measures and the sustainable management of natural resources. It features both successes and setbacks in this respect.

This review is also special since it has coincided with the process of setting up the institutional mechanism and defining the national indicators for implementation and follow-up of the 2030 Agenda for Sustainable Develoment in Kazakhstan. Consultations and meetings under the EPR process have informed and contributed to the national process in Kazakhstan that resulted in the establishment, in 2018, of the comprehensive institutional mechanism centred around the Coordination Council on the Sustainable Development Goals. This EPR equips the Government and interested stakeholders in Kazakhstan with recommendations to inspire future work on the achievement of the goals and targets of the 2030 Agenda and the national climate change commitments under the Paris Agreement.

I trust that this third review will serve as a powerful tool to support policymakers and representatives of civil society in their efforts to improve environmental management and achieve the Sustainable Development Goals in Kazakhstan. ECE wishes the Government of Kazakhstan further success in carrying out the tasks involved in meeting its environmental objectives, including through the implementation of the recommendations in the third review. I also hope that the lessons learned from the peer review process in Kazakhstan will benefit other countries throughout the ECE region.

Olga Algayerova

Executive Secretary
Economic Commission for Europe

Preface

This third EPR of Kazakhstan takes stock of progress made by Kazakhstan in the management of its environment since it was reviewed for the second time in 2008 and assesses the implementation of the recommendations made in the second review. It covers legal and policy frameworks, greening the economy, environmental monitoring, public participation and education for sustainable development (ESD). Furthermore, the EPR addresses issues of specific importance to the country related to air protection, biodiversity and protected areas, as well as water, waste and chemicals management. It also examines the efforts of Kazakhstan to integrate environmental considerations into its policies in the energy, industry, agriculture and health sectors. The review further provides a substantive and policy analysis of the country's climate change adaptation and mitigation measures and its participation in international mechanisms. The review has an additional thematic angle on the Sustainable Development Goals: it includes an assessment of relevant targets and recommendations related to the achievement of Sustainable Development Goals.

This EPR of Kazakhstan began in November 2017 with a preparatory mission to agree on the structure of the report and the schedule for its completion. A team of international experts took part in the review mission on 12–20 March 2018. In October 2018, the draft report was sent to Kazakhstan for comments. In December 2018, it was submitted to the ECE Expert Group on Environmental Performance Reviews for consideration. During its meeting on 9–10 January 2019, the Expert Group discussed the draft report with a delegation from Kazakhstan, focusing on the conclusions and recommendations made by the international experts. The recommendations, with suggested amendments from the Expert Group, were then submitted for peer review to the ECE Committee on Environmental Policy at its twenty-fourth session on 30 January 2019. A high-level delegation from Kazakhstan participated in the peer review and the Committee adopted the recommendations in this report.

The Committee and the ECE secretariat are grateful to the Government of Kazakhstan and its experts who worked with the international experts and contributed their knowledge and expertise. ECE would also like to express its deep appreciation to the German Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety and the German Federal Environment Agency for their support by providing funds through the Advisory Assistance Programme, and to Norway and Switzerland for their financial support to this review. Furthermore, this review received support from the European Union (EU)-funded project "Supporting Kazakhstan's Transition to a Green Economy Model".

Sincere thanks also go to Germany, Hungary, Italy, Portugal, the United Nations Environment Programme (UNEP), the World Health Organization Regional Office for Europe (WHO-Europe) and the Organisation for Economic Co-operation and Development (OECD) for having provided their experts to this review. Furthermore, ECE is grateful to the United Nations Development Programme (UNDP) for its support of this review.

ECE also takes this opportunity to thank Germany, Norway, Portugal and Switzerland and the EU for their financial support to the EPR Programme in 2018 and expresses its deep appreciation to Belarus, Estonia, Georgia, Germany, Hungary, Italy and Switzerland for having provided their experts for the ECE Expert Group on Environmental Performance Reviews, which undertook the expert review of this report.

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Saiga – "ЛИВЕНЬ. Living Asia";
Solar power plant "Burnoe" – Ministry of Energy.

KEY ABBREVIATIONS AND ACRONYMS

ACBK	Association for the Conservation of Biodiversity of Kazakhstan
BAT	best available technique
BREF	(EU) Best Available Techniques Reference Documents
CBD	Convention on Biological Diversity
CEIP	Centre on Emission Inventories and Projections
CFC	chlorofluorocarbon
CHP	combined heat and power
CIS	Commonwealth of Independent States
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CSR	corporate social responsibility
CWPI	Complex Water Pollution Index
CWR	Committee on Water Resources
EBRD	European Bank for Reconstruction and Development
EEA	European Environment Agency
EEU	Eurasian Economic Union
EIA	environmental impact assessment
EITI	Extractive Industries Transparency Initiative
ELVs	emission limit values
EMAS	Eco-Management and Audit Scheme
EMEP	European Monitoring and Evaluation Programme (under CLRTAP)
ESD	education for sustainable development
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FDI	foreign direct investment
GDP	gross domestic product
GEF	Global Environment Facility
GHG	greenhouse gas
GM	genetically modified
GMO	genetically modified organism
GPP	green public procurement
GRP	gross regional product
HCFC	hydrochlorofluorocarbon
HPP	hydropower plant
IACEP	RSE "Information and Analytical Centre of Environment Protection"
IAEA	International Atomic Energy Agency
IUCN	International Union for Conservation of Nature
IFAS	International Fund for saving the Aral Sea
ILO	International Labour Organisation
INDC	intended nationally determined contribution
IPPC	integrated pollution prevention and control
ISL	in-situ leaching (technology)
KazETS	Kazakhstan's Emissions Trading System
LULUCF	land use, land-use change and forestry
MAC	maximum allowable concentration
MCI	monthly calculation index
MDG(s)	Millennium Development Goal(s)
MoU	memorandum of understanding
MSW	municipal solid waste
NBSAP	National Strategy and Action Plan on Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan
NDC	nationally determined contribution
NGO	non-governmental organization
ODS	ozone-depleting substance(s)

OECD	Organization for Economic Co-operation and Development
OSCE	Organization for Security and Co-operation in Europe
POP	persistent organic pollutant
PCB	polychlorinated biphenyl
PRTR	pollutant release and transfer register
R&D	research and development
RBC	responsible business conduct
RES	renewable energy source(s)
SAICM	Strategic Approach to International Chemicals Management
SCNR	state cadastre of natural resources
SCP	sustainable consumption and production patterns
SEA	strategic environmental assessment
SEE	state ecological expertise
SEEA	System of Environmental-Economic Accounting
SEIF	State Environmental Information Fund
SEIS	Shared Environmental Information System
SIUPWR	scheme of integrated use and protection of water resources
SMEs	small and medium-sized enterprises
SNCA	state nature conservation area
SNNP	state national nature park
SNR	state nature reserve
SNS	state nature sanctuary
SoER	state of the environment report
SPRTR	State Pollutant Release and Transfer Register
SPZ	state preserved zone
TFC	total final energy consumption
TPP	thermal power plant
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
uPOP	unintentional persistent organic pollutant
USSENRM	Unified State System for Environmental and Natural Resources Monitoring
WTO	World Trade Organization
WWTP	wastewater treatment plant

SIGNS AND MEASURES

..	not available
-	nil or negligible
.	decimal point
€	euro
US$	United States dollar
cap	capita
eq.	equivalent
g	gram
Gg	gigagram
GWh	gigawatt-hour
ha	hectare
kg	kilogram
km	kilometre
km^2	square kilometre
kt	kiloton
ktoe	kiloton of oil equivalent
kW	kilowatt
kWh	kilowatt-hour
l	litre
m	metre
m^2	square metre
m^3	cubic metre
Mg	megagram
MW	megawatt
pkm	passenger kilometre
t	ton (1,000 kg)
tkm	ton kilometre
toe	ton of oil equivalent
TWh	terawatt-hour

CURRENCY CONVERSION

Exchange rate (period average)
Monetary unit: Tenge

	NCU per US$	NCU per Euro
2007	122.55	167.91
2008	120.30	177.06
2009	147.50	205.64
2010	147.36	195.54
2011	146.62	203.98
2012	149.11	191.69
2013	152.13	202.07
2014	179.19	238.04
2015	221.73	245.61
2016	342.16	378.61
2017	326.00	368.45

Source: ECE Statistical database. Accessed on 7.9.2018.
Note: NCU: national currency unit

Executive summary

Sustainable Development Goals

In 2018, an institutional framework for the implementation and monitoring of the Sustainable Development Goals was formed in Kazakhstan. This framework is to be led by the Coordination Council on Sustainable Development Goals, headed by the Deputy Prime Minister and supported by five intergovernmental working groups and a secretariat. Overall coordination of the implementation of Sustainable Development Goals is vested with the Ministry of National Economy. The Ministry of Energy is leading one of the intergovernmental working groups.

As of 2018, Sustainable Development Goals are mentioned in two strategic documents: the 2018 Strategic Plan for Development until 2025 and the 2017 Main Directions of the State Policy on Official Development Aid for the period 2017–2020. While there is a fair amount of common coverage between the national and sectoral plans and the 2030 Agenda for Sustainable Development, no systematic effort has yet been applied to explicitly integrate the Sustainable Development Goals into sectoral programmes and plans.

Under the leadership of the Committee on Statistics under the Ministry of National Economy, a draft national Sustainable Development Goals indicator framework consisting of 257 indicators has been prepared. In late 2018, a section on reporting on the Sustainable Development Goals became operational on the Committee's website.

Kazakhstan is advanced on some targets of the 2030 Agenda for Sustainable Development. For example, with regard to target 3.1 (By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births), Kazakhstan has already made remarkable progress in reducing the maternal mortality ratio (MMR). Maternal mortality shows a decline by 2.46 times, from 31.2 per 100,000 live births in 2008 to 12.7 per 100,000 live births in 2016.

With regard to target 7.1 (By 2030, ensure universal access to affordable, reliable and modern energy services), universal access to energy services is almost achieved in the country. The level of electrification reached 100 per cent, but in some rural areas supply of electricity is not reliable. At the same time, more than 1,400,000 people in Kazakhstan still use polluting fuels for cooking.

Addressing persistent regional differences is crucial for the achievement by Kazakhstan of the 2030 Agenda for Sustainable Development. For example, Kazakhstan shows steady progress in reducing infant mortality. In 2016, the average under-5 mortality rate was 10.79 per 1,000 live births. However, there are differences between regions, from 13.55 per 1,000 live births in Kyzylorda Oblast to 7.86 per 1,000 live births in the capital.

Similar regional differences are observed with regard to target 11.6 (By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management). The coverage by regular waste collection ranges from more than 90 per cent in the capital city, Almaty City and Atyrau Oblast to less than 50 per cent in Akmola, Kostanay, South Kazakhstan[1] and North Kazakhstan oblasts.

Another crucial aspect for the achievement of the 2030 Agenda for Sustainable Development is to leave no one behind. With regard to target 4.a (Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all), in 2017, 49.3 per cent of schools in Kazakhstan had decentralized sanitation and 9.7 per cent had a decentralized water supply. Of all schools, 86 per cent provided hot meals to their pupils and 9.7 per cent had to transport drinking water to prepare meals. No studies are available on gender aspects of equitable access to water and sanitation.

[1] In June 2018, South Kazakhstan Oblast was renamed Turkistan Oblast with Turkistan as an administrative centre. Shymkent – the former administrative centre of South Kazakhstan Oblast – was given the status of city of republican significance and was administratively separated from Turkistan Oblast. In this document, the term "South Kazakhstan Oblast" is used when data and information refer to the situation prior to June 2018.

Legal, policy and institutional framework

In 2014, the Ministry of Environment and Water Resources was abolished, and the Ministry of Energy was designated as the governmental authority on environmental protection, with many other competences related to the environment allocated to the Ministry of Agriculture and some other governmental bodies. This major institutional restructuring has had an impact on the development and implementation of environmental policy in the country.

The scope of issues covered by the five environment-related departments in the Ministry of Energy is quite limited, in terms of ensuring the comprehensive and systematic development of environmental policy. The subordination of the key regulatory and enforcement authority in the environmental area (i.e. the Committee of Environmental Regulation and Control) to the ministry responsible for one of the major polluting sectors limits the independence of environmental regulation and enforcement.

Environmental legislation has seen many important developments, such as the introduction of extended producer/importer responsibility, improvement of access to information and public participation procedures and measures to strengthen nature protection. Nevertheless, some advanced concepts of environmental legislation (e.g. integrated permitting, environmental audit or environmental insurance) introduced a decade ago, do not yet work properly.

The 2007 Environmental Code is the only example of an accomplished codification of environmental legislation in the post-Soviet geopolitical area. Despite the criticism about a significant number of amendments introduced into the Code, this codification attempt has been rather successful. Codes in Kazakhstan have a higher legal value than laws, which brings an undisputable value to this codification effort. As of 2018, a new environmental code is under development.

Since 2010, the policy framework has been characterized by a trend of reducing the number of strategic documents by integrating their issues into larger documents. Planning in the environmental area has clearly suffered from this trend.

In the absence of other strategic documents on environmental protection, the 2013 Concept on Transition to Green Economy has become a "rescue boat" for the environmental sector. The Concept and its Action Plan have prompted important environmental actions in economic sectors and on the ground. However, the Concept does not cover many environmental issues.

The integration of environmental requirements into sectoral policy documents has started. However, the lack of strategic environmental assessment (SEA) prevents systematic, coherent and comprehensive integration of environmental measures and requirements into sectoral policies. Key challenges for the introduction of SEA include poor understanding of the instrument and lack of training and expertise.

There is a good system of training and advanced training on environmental issues under the auspices of the Information and Analytical Centre of Environment Protection (IACEP) under the Ministry of Energy. However, except for a single case, employees of other sectoral ministries do not receive training in the Centre.

Regulatory and compliance assurance mechanisms

Since 2008, significant improvements have been introduced into the permitting system. On the other hand, persistent challenges to restructuring the permitting system, the best example being the absence of issued integrated environmental permits, constitute a clear weakness that is not conducive to better environmental performance on the part of the operators. Companies do not fully understand how to follow the best available technique (BAT) path.

Since 2012, Kazakhstan started to introduce new procedural requirements for inspections driven by the overall trend of reducing the pressure on business, along with improving the planning of inspections on the basis of risk assessment. However, the apparent correlation between the reduction in the number of inspections and the number of identified environmental violations raises concerns about the true extent of the occurrence of environmental non-compliance in the country.

Data and information about the performance of the environmental regulatory and compliance assurance system are publicly available. However, they are scattered throughout various sources and not presented in a form that would allow for assessment and identification of trends.

The legislation includes the notion of environmental liability and environmental damage. However, in most cases in Kazakhstan, environmental damage is not remedied, despite the polluter being identified and paying for the damage done.

Kazakhstan has no specific legal provisions about transboundary environmental impact assessments (EIA) and the implementation of the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention). There are also inconsistencies between Kazakhstan's national legislation and the obligations arising from the Espoo Convention and the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention). One such example is the delegation of the responsibility for conducting the EIA procedure from the public authorities to the developer (initiator) of the proposed activity.

The environmental management systems are not widely used, although their use is higher in sectors that are more exposed to international markets. In 2017, a total of 140 ISO 14001 certificates were valid in Kazakhstan, which is an extremely small number, given the size of the regulated community. Incentives for the use of ISO 14001 are practically unavailable.

The concept of corporate social responsibility (CSR) has undoubtedly gained prominence in Kazakhstan in the last 10 years. However, current efforts are not sufficient if Kazakhstan wishes to have the business community more profoundly engaged in adopting behaviours that lead to sustainable development and support the attainment of the Sustainable Development Goals. Kazakhstan does not have a comprehensive policy to promote CSR.

Green economy and trade

The 2013 Concept on Transition to Green Economy (under revision in 2018) outlined the path to long-term growth based on climate-friendly technologies, energy efficiency measures and the sustainable management of natural resources. The Concept provided a foundation for mainstreaming environmental considerations into broader policy frameworks and prompted progress on several targets. Nevertheless, environmental pollution remains at a high level and there is still a lack of incentives for economic actors to reduce environmental pollution.

Despite considerable progress in reducing the administrative burden, fundamental issues remain in terms of the effectiveness of the country's environmental payment system, provision of incentives for pollution reduction and compliance with the polluter pays principle. Kazakhstan still follows fault-based concepts for monetary damages that tie liability to exceeding a predetermined limit in an emissions permit.

Kazakhstan subsidizes the use and production of fossil fuels, such as coal, gas and oil, as well as electricity, which are consumed directly by end users or as inputs to electricity generation. It is among the 15 countries with the highest subsidies in the world but is number one in subsidizing coal. The Government undertook some reform of subsidies: most of the direct support for electricity and heat consumers was eliminated, while the Government still provides indirect support by maintaining electricity and heat tariffs at low rates.

Current expenditure and investments for environmental protection as a percentage of GDP declined from 1.03 per cent in 2009 to 0.42 per cent in 2016. The changes in environmental current expenditure and investments do not reflect the rate of GDP growth. Such a low share can be a barrier to pursuing many Sustainable Development Goals and targets. Expenditure on environmental protection varies substantially among regions.

Environmental taxes and penalties collected at the local level are generally not effectively used for improving environmental conditions and promoting a green economy. Only about 30 per cent of revenues from environmental charges are spent on environmental protection measures.

Kazakhstan's public financial institutions have invested in green projects, but the share of green projects in the total portfolio remains low. Green finance mobilization is not part of the investment criteria of these financial institutions.

The efficiency and transparency of the public procurement system has improved substantially over the past 10 years. However, legal frameworks to support green public procurement are still limited.

Environmental monitoring, information, public participation and education

Good progress in the development and expansion of the monitoring infrastructure run by Kazhydromet has been made since 2008. The air quality and surface water quality monitoring networks have been expanded. There has also been a substantial increase in the online provision of environmental monitoring data and information collected by Kazhydromet.

Progress has been made in terms of the development of databases and environmental information management systems, in particular the State Cadastre on Waste and the State Pollutant Release and Transfer Register (SPRTR). The establishment a Unified State System for Environmental and Natural Resources Monitoring is still work in progress.

The annual national state of the environment report (SoER) is regularly produced. In 2018, an online interactive version of the 2016 edition was prepared to increase outreach to the public.

Kazakhstan has a solid system for the production of environmental statistics and indicators. Opportunities remain for further improving application of the Shared Environmental Information System (SEIS) principles of open access to environmental data.

Since 2008, Kazakhstan has improved access to environmental information by amending its legislation and starting to put it into practice. The main challenge is to set up effective user-friendly mechanisms that will meet the public's actual needs.

The country is progressing with ensuring public participation in environmental matters. However, the effectiveness of advisory public councils in terms of ensuring adequate representation of public interests is not sufficient. Other challenges include enabling effective public participation in decision-making on projects and providing opportunities for public participation in decision-making related to genetically modified organisms (GMOs).

Access to justice on environmental matters is prominently promoted by the Supreme Court. It still has to be advanced further to cover the entire judicial system in the country. Very few judges specialize in environmental cases. Courts do not have environmental experts.

Environmental education is integrated well into preschool and overall secondary education. Recent updates of the education curricula, which now include education for sustainable development (ESD) issues to some extent, are a good foundation for further work towards achieving targets 4.7 and 12.8 of the 2030 Agenda for Sustainable Development. Integration of ESD into vocational training and higher education is still insufficient.

The weak links for advancing ESD are on the institutional side. ESD is not explicitly mentioned in the mandate of the Ministry of Education and Science, which is responsible for the overall education system. Neither is it clearly mentioned in the mandate of the Ministry of Energy, which is vested with important environment-related responsibilities. The country does not have an ESD coordination mechanism.

Climate change

Kazakhstan ratified the Kyoto Protocol in 2009 and the Paris Agreement in 2016. CO_2 emissions per US$1,000 of GDP have almost halved, decreasing from 1.34 tons in 2000 to 0.73 tons in 2015.

The achievement by Kazakhstan of its unconditional intended nationally determined contribution (INDC) target to reach a reduction of 15 per cent of greenhouse gas (GHG) emissions by 2030 compared with 1990 would make a strong contribution to global progress with Sustainable Development Goal 13 (Take urgent action to combat climate change and its impacts). The mitigation scenarios developed for Kazakhstan show that only with current and additional measures would Kazakhstan be able to achieve the unconditional target.

The country is one of the most carbon-intensive economies in the world, with the energy sector being the major CO_2 emitter (82.4 per cent of GHG emissions, on average, for the period 1990–2015). However, Kazakhstan has high potential to decrease its footprint as a global GHG emitter. A shift from coal and oil to gas and renewable energy sources (RES) would decrease GHG emissions.

Kazakhstan's Emissions Trading System (KazETS) was introduced in 2013–2014. In 2016–2017, KazETS was suspended to allow for improvements in the monitoring, reporting and verification system to be introduced. The interruption of KazETS was not beneficial in terms of stimulating large emitters to undertake consistent emissions reductions. One important consideration in the new phase of KazETS is to allow any KazETS revenues in the future to be reinvested in further GHG mitigation instead of being absorbed into the state budget, as is currently the case.

As of 2018, KazETS covers all major companies in the energy, oil and gas sectors, and the mining, metallurgical, chemicals and processing industries. It does not include other sectors contributing to GHG emissions, such as urban areas, housing and waste management.

As of 2018, Kazakhstan does not have legislation to specifically address climate change, nor a specific policy document on this issue. While climate change is of a cross-sectoral nature, it is still perceived to be a separate topic that must be managed by a specific authority designated as being in charge of climate change issues. This is echoed in the lack of integration of climate change concerns into various policy documents and the limited coordination on climate change issues.

Kazakhstan lacks a disaster risk reduction strategy in line with the Sendai Framework. Taking into account the recurrence of extreme weather events in Kazakhstan and the current and future climate conditions, a disaster risk reduction strategy would support Kazakhstan in the implementation of targets 1.5, 11.b and 13.1 of the 2030 Agenda for Sustainable Development.

Taraz City in Zhambyl Oblast joined the Covenant of Mayors in 2013 and developed its Sustainable Energy and Climate Action Plan. Eight other Kazakh cities signed the Covenant in 2013–2014 but have not submitted their respective action plans.

Air protection

The annual mean concentration of PM_{10} is higher in many cities in Kazakhstan than the EU and WHO standards. The daily mean concentration of PM_{10} in many cities in Kazakhstan in 2017 is also higher than the EU and WHO standards. Further, the daily mean concentration of $PM_{2.5}$ in many cities in Kazakhstan in 2017 is higher than the WHO standard. This makes the 2030 Agenda's target 11.6 on the adverse per capita environmental impact of cities, and target 3.9 on reduction of the number of deaths and illnesses from air pollution, particularly relevant for Kazakhstan.

In 2016, 40 per cent of the emissions of SO_2 and 60 per cent of the emissions of NO_x from stationary sources in the country were caused by the electrical power plants. Reduction of the high emissions of SO_2, NO_x and particulates from power plants can be achieved by a change of fuel from coal to natural gas, in combination with combustion improvement and selective catalytic reduction to remove NO_x, or by installing adequate desulphurization and dedusting equipment.

At present, emission limit standards for large combustion plants in Kazakhstan are far less stringent than in the EU. Furthermore, existing emission limit standards in Kazakhstan are different for existing plants and new plants. They are quite relaxed for existing plants not undergoing any modernization, more stringent for existing plants that undergo modernization and most stringent for new plants. Existing plants continue to apply for and receive new permits with the lowest emission limit standards.

The transport sector in Kazakhstan causes almost 40 per cent of the CO emissions, 17 per cent of the NO_x emissions, 20 per cent of the NMVOC emissions and an estimated 35 per cent of the emissions of particulate matter ($PM_{2.5}$). Measures to upgrade domestic refineries to produce cleaner fuels have been taken. However, the transport fleet is aged (70 per cent of private cars are 10 years old or older). Urban areas with heavy smog do not apply such solutions as alternating driving days for cars with even- and odd-numbered licence plates or banning old cars in the city centre.

Besides the industrial and car emissions, during the long heating season, emissions from private households have a considerable impact on the air pollution levels in the cities. Coal is used for space heating – up to 30 per cent in cities, but especially in rural areas, where it accounts for more than 70 per cent. Improvement of energy efficiency in the residential sector would have a strong influence on air quality.

Kazakhstan has no national policy on air protection, nor does it have specific air quality programmes. The general policy directions of air quality assessment and air quality management may be identified from other policy documents. There is also no specific national air quality legal framework.

The consumption of hydrochlorofluorocarbons (HCFCs) has been reduced considerably in the last few years, with the exception of 2013. Nevertheless, Kazakhstan is delayed in meeting its compliance obligations under the Montreal Protocol (4.96 actual vs. 4 demanded ODP tons in 2016).

Water management

The policy framework has clear targets in the water sector with regard to increasing water efficiency and water reuse and recycling, and expanding coverage of the population by water supply and sanitation systems. These national targets make Kazakhstan generally well prepared to achieve Sustainable Development Goal 6, but adequate investment is indispensable for achieving actual progress on the targets.

Kazakhstan has significantly progressed in operationalizing river basin management. Basin inspections and basin councils have been established and basin agreements have been concluded. At the same time, insufficient staffing, poor technical equipment and weak organizational and institutional potential of basin inspections does not allow them to completely fulfil their tasks.

Kazakhstan pays increasing attention to the need to adapt to climate change impacts in the water sector. The main measures for adaptation to climate change currently undertaken include the construction of new reservoirs for seasonal regulation, introduction of drip irrigation systems and conduct of soil conservation measures.

The total volume of crude industrial wastewater decreased. Nevertheless, a significant amount of wastewater from industrial enterprises, including thermal power plants (TPPs), comes directly to municipal wastewater treatment facilities that are not intended for the treatment of industrial wastewater.

One of the priority goals is to provide urban and rural settlements with safe drinking water. Access to sanitation is also an important goal, though it features less prominently in the policy documents than does water supply. Water supply in rural areas is still worse than in cities, despite the progress made.

The process to define the borders of water protection zones and belts for all water bodies is not completed yet. There is often failure to comply with water protection zone regimes. There are instances of illicit allocation of land for construction within water protection zones.

The weak links of the current architecture in the water sector are in the institutional domain. There is insufficient cooperation among various institutions that are in charge of different water infrastructure, as well as inadequate sharing and exchange of information. The advisory Interagency Council on Water Resources Management created by the Government in 2015 to strengthen interministerial coordination does not meet regularly.

Waste and chemicals management

The collected amount of municipal solid waste (MSW) has decreased since 2011, but this was not caused by fewer services being provided. Rather, this reflects the actual decrease of MSW generation as it correlates with the development of the real wage index in Kazakhstan. The growth of real income would cause a further increase in the generation of MSW in the future.

The lack of modern disposal capacities is the key problem for modernization of municipal waste management and the main challenge for Kazakhstan to reduce the adverse per capita environmental impact of cities (target 11.6 of the 2030 Agenda for Sustainable Development). A typical disposal site in the country does not have impermeable layers for protection of groundwater and has no control of leachate, and scavenging for recyclables occurs frequently.

Central governmental authorities define strategies and goals on waste management, but implementation is fully on the shoulders of municipalities and the private sector. Development of modern controlled landfilling is an expensive project and municipalities cannot afford allocation of the investment from their own budget. Without a cost-based gate fee, the private sector is not interested in investing in landfill development.

Kazakhstan aims to increase the share of recycling. MSW sorting plants were developed in eight regions, including Almaty City and the capital, with an estimated total annual capacity of 1 million tons of MSW. However, the output of recyclables from these MSW sorting plants is very small. Waste fees do not provide sufficient funds for the operation of sorting plants. Investments in this infrastructure are close to being pointless.

As the domestic capacities for reprocessing recyclables are scarce, the majority of recyclables is exported. This situation makes separation and sorting of waste vulnerable to price fluctuation on the world market of recyclables.

Kazakhstan started to implement extended producer/importer responsibility. This important development is not yet covered by appropriate changes in waste reporting and statistics.

Waste from the energy sector remains a critical issue. Approximately 4 tons of ash and slag is produced for every 10 tons of coal burned. To date, more than 300 million tons of waste have been accumulated in ash dumps.

Radioactive waste is one of the priorities and receives appropriate attention. The decommissioning of BN-350, a sodium-cooled fast reactor located at Aktau Nuclear Power Plant, started in 1999 and ended in 2010. During decommissioning, 3,000 spent fuel assemblies were packed into 60 containers and transported to a temporary storage site developed near Baykal-1. The final decision on the fate of this radioactive waste has not yet been made.

Persistent organic pollutants (POPs) waste includes obsolete pesticides, equipment containing POPs and industrial use of POPs, including production of capacitors. As there is no suitable facility for destruction of polychlorinated biphenyls (PCBs) in Kazakhstan, more than 230 tons of PCB oils and equipment were exported to France. It is estimated that about 220 tons of capacitors requiring disposal remain in Kazakhstan.

Medical waste management has improved. In 2017, more than 20 organizations provided services in the treatment of medical wastes, located in all oblasts. The number of special installations for the destruction of medical waste has grown from 91 in 2011 to 158 in 2017. But this is still insufficient to satisfy needs. The most problematic sites are small hospitals in towns and rural areas. The regional approach to medical waste management is lacking.

Biodiversity and protected areas

Populations of globally threatened key ungulate mammal species free-ranging in Kazakhstan are either stable or constantly growing in numbers. This is the case for the critically endangered (CR) saiga antelope and European mink, vulnerable (VU) Bukhara deer, goitered gazelle, Siberian musk deer, snow leopard and Menzbier's marmot, as well as the near threatened (NT) Asiatic wild ass and five local subspecies of the argali sheep.

One of the reasons for the success in conservation of several key mammal species is that protected rare and endangered animal species are not hunted in Kazakhstan. Simultaneously, applied anti-poaching measures are quite effective. However, the saiga antelope is still listed as a game species, while the moratorium on its hunting is valid only until the end of 2019.

Kazakhstan is a refuge for large populations of other, non-threatened wild species of flora, fungi and fauna. Data for the period 2008–2016 show that the population of many game species increased in number over this short period. This is proof that, within the reporting period, the annual hunting quotas were kept at a very reasonable level. Beginning from 2014, no data on game fowl species' population numbers are available in the official statistics.

Kazakhstan conducts intensive afforestation works aimed at mitigating the adverse effects of the shrinking Aral Sea and increasing the forest cover share from the current 4.7 per cent to 5 per cent of the country by 2030. Most recently, the Government started to encourage private land users to undertake afforestation initiatives. Progress towards sustainable forest management (indicator 15.2.1 under target 15.2 of the 2030 Agenda for Sustainable Development) over recent years is obvious. Nevertheless, the achievement of 5 per cent forest cover would require the trebling of efforts and related expenditure in the coming years.

Kazakhstan has established an extensive network of protected areas, encompassing 243,750 km^2. However, the current share of protected areas in the country's overall territory (8.94 per cent) is well below the globally recommended levels. The existing network adequately covers neither all main natural ecosystem types representative of Kazakhstan, nor habitats of all important threatened wildlife species. The most effective protected areas (having legal entity status and their own personnel) account for only 2.58 per cent of the country's territory.

By the designation of the large state preserved zone (662,630 ha) in the northern part of the Caspian Sea, the coverage of protected areas in relation to marine areas in Kazakhstan is well above the level expected in target 14.5 of the 2030 Agenda (By 2020, conserve at least 10 per cent of coastal and marine areas). However, little information about this state preserved zone and the effectiveness of the protective regime is available.

Kazakhstan aims to develop a functional ecological network (including the recent designation of the first ecological corridors linking protected areas). Since 2008, Kazakhstan has designated an additional eight new Ramsar sites and successfully nominated its first two "natural" sites inscribed by UNESCO on the World Heritage List.

The Government has not endorsed the 1999 National Strategy and Action Plan on Conservation and Sustainable Use of Biological Diversity (NBSAP). As a result, Kazakhstan has no policy instruments in force with a special focus on biodiversity conservation and/or protected area network development, and these issues are not integrated into other sectoral policies.

Energy and environment

Kazakhstan has significant fossil fuel resources. It is a world leader in uranium production and ranks tenth in world coal production and twentieth in oil production.

Energy intensity is much higher in Kazakhstan than in developed countries, but steps are being taken by the Government to reduce energy intensity. By 2017, the energy intensity of Kazakhstan's GDP, expressed in toe per US$1,000 in 2000 prices, had decreased by 18.18 per cent from the 2008 level.

Around 87 per cent of the installed power capacity comes from TPPs that use fossil fuels. While TPPs combust mainly coal, the sector is gradually switching to gas consumption. The capacity of gas turbines has increased by more than 700 MW in the period 2008–2017.

Kazakhstan has set targets for the development of renewable energy. The share of renewable energy should reach 3 per cent in 2020 and 50 per cent in 2050. The recent developments show Kazakhstan's good intention to develop renewable energy: in 2017, wind and solar sources together provided 0.43 per cent of generated electricity, a 13 per cent increase from 2016. However, a clear roadmap to achieve the renewable energy targets is not available.

Energy efficiency has become one of the national policy priorities. A recent achievement is the decline in the market share of incandescent light bulbs, from 74 per cent to 18 per cent of the total number of bulbs between 2012 and 2016. However, there are many other energy saving measures and energy efficiency technologies that could improve energy efficiency in the energy, industry, transport and residential sectors.

The extraction of fossil fuels continues to have impacts on the environment. For underground coal mines, the environmental-impact-related problems are mine water drainage, methane emissions and fugitive dust. For surface mines, the main environmental problems are large-scale land use, overburden removal and disposal, disturbance of hydrology, acid mine drainage and fugitive dust. The overburden is dumped in piles around the mines, which are exposed to weather conditions that lead to environmental hazards.

The volume of flared gases from oil extraction declined from 3.1 billion m^3 in 2006 to 1 billion m^3 in 2016, due to the prohibition of gas flaring introduced in 2004. Companies have constructed gas refinery plants to use gas for their internal energy needs and/or proceeded to conduct gas injection into soil. However, a huge amount of gas is still flared.

Oil and gas industries continue to threaten the Caspian Sea basin, which holds 90 per cent of the world's sturgeons and the endemic Caspian seals. Since 2008, there have been several cases of accidental contamination. With oil and gas production expected to increase in the coming years, the risk of oil spills and other leakages would increase. A particularly alarming point is that oil and gas operations have been developed in protected areas in West Kazakhstan, endangering the fauna and flora.

Industry and environment

In 2017, the total share of industry in GDP was 26.8 per cent. The mining and quarrying industry accounted for 13.3 per cent of GDP and manufacturing industry for 11.2 per cent. The Government's objectives are to ensure Kazakhstan's industry becomes more competitive and diverse and sufficiently integrates innovations into production processes.

Industry accounted for 50.5 per cent of all energy consumption in 2016. Energy use in industry grew by 19.3 per cent in the period 2008–2016. All industrial enterprises, with the exception of some new projects, have significant capacities for energy savings.

Despite the fact that industrial air emissions have been decreasing since 2008, they are responsible for significant air pollution, notably in urban centres such as Termitau, Karaganda, Pavlodar and Aktobe. Many of the largest enterprises are investing in new technologies to reduce air emissions and installing automated systems for emissions monitoring, though these are not widespread. Technological developments are lagging behind in small and medium-sized enterprises (SMEs).

Most industrial enterprises do not have wastewater treatment facilities on their premises or do not carry out preliminary treatment. Industrial wastewater is often discharged directly into rivers or urban sewerage systems.

The Government has made efforts to set up a policy and legal framework for the transition to a green economy. However, there is a lack of mechanisms, such as financial incentives, to facilitate the introduction of green technologies in all industry branches. Another barrier to the shift to green technologies concerns the generally limited access of SMEs to financing.

Domestic expenditure on research and development (R&D) has been on the rise and reached almost 69 billion tenge in 2017, accounting for 0.13 per cent of GDP. Nevertheless, this is low compared with OECD Member countries, where the share was 2.35 per cent of GDP in 2016. This makes Kazakhstan less prepared to achieve progress on target 9.5 of the 2030 Agenda for Sustainable Development referring to innovation.

During recent years, measures to prevent major industrial accidents and reduce risks have been strengthened. These measures relate mainly to supervision over compliance with industrial safety requirements, accident investigations and emergency training at hazardous facilities. As a party to the Convention on the Transboundary Effects of Industrial Accidents, the country still has to identify hazardous activities that could cause a transboundary effect in the event of an accident and notify potentially affected countries.

Agriculture and environment

Despite huge agricultural potential, the country has remained a net agricultural importer. Agriculture is the smallest major sector of the economy, accounting for less than 5 per cent of GDP. In recent years, the Government has made efforts to increase the performance of the sector.

The Government's crop diversification policy aims to reduce the area planted in wheat and increase the area planted in "priority" crops, including forage crops, oilseed crops, barley and corn. Higher subsidies are offered for "priority" crops.

In the period 2008–2017, the decline in the area of cotton cultivation was 43,000 ha or 24 per cent. This has important environmental effects in terms of water saving.

The use of fertilizers is at a very low level. On average, in the period 2011–2015, about 110,000 tons of mineral fertilizers were applied annually in active substance content, whereas the annual requirement of Kazakh agriculture for mineral fertilizers is 1 million tons in active substance. The low consumption level is caused by the high costs of mineral fertilizers (due to low domestic production), despite the subsidies that the Government provides to farmers.

Manure is predominantly used as an organic fertilizer. However, the supply is not sufficient to cover needs. Neither the use of mineral nor organic fertilizers is sufficient to restore soil fertility.

The use of pesticides is also low, although, between 2008 and 2017, it more than tripled, from 0.2 kg/ha to 0.63 kg/ha. The very low pesticide consumption is determined by its high costs and the land ownership structure, by which smallholders and households use practically no pesticides, but enterprises use them exclusively.

Organic agriculture is recognized by the Government as one of the most promising agricultural subsectors. Although the 2015 Law on Organic Production is in place, the by-laws for setting the national standards, certification and labelling of organic products are not yet adopted. The appointment of the certification bodies is pending.

Agriculture is by far the biggest user of water resources. Approximately two thirds of both the abstracted and used waters is used by agriculture, mostly (70–100 per cent, depending on the year) for irrigation. About 11–15 per cent of the abstracted water is lost during transport, mostly due to the obsolete irrigation infrastructure and methods.

Beside the obsolete irrigation system, the other main reason for losses is the low cost of water supply. The low cost does not encourage the use of effective technologies and does not allow the full maintenance and repair of irrigation systems. In addition, current tariffs provide a uniform rate regardless of the change in consumption amount.

Since 2010, there has been large growth in the expansion of water-saving technologies, which have increased from 2–3 per cent to 13–15 per cent of the irrigated area. Sprinkling technology is the most popular, being used on around 100,000 ha, and drip irrigation is used on about 80,000 ha.

Conservation agriculture techniques (minimal soil disturbance, permanent soil cover and crop rotation) are rapidly spreading. It is estimated that 3 million ha of cultivated land is under no-tillage cultivation and 9 million ha of land is under minimal-tillage cultivation, while 5 million ha remains under conventional tillage.

Agriculture is the second biggest emitter of GHGs after the energy sector, although its GHG emissions are about 11 times lower than those of the energy sector. On the adaptation side, there are several positive trends. However, the lack of a coordinated and systemic approach hinders the country's ability to increase its resilience to the effects of climate change as required for the implementation of target 2.4 of the 2030 Agenda for Sustainable Developement.

Disposal of obsolete pesticides remains a critical issue. In many cases, obsolete pesticides are stored at sites that are not suitable for this purpose.

Health and environment

Since 2008, Kazakhstan has achieved progress in increasing life expectancy and decreasing infant and maternal mortality. Mortality and morbidity from communicable diseases has been reduced. But the country faced a large and growing burden of non-communicable diseases.

Since 2008, morbidity from non-communicable diseases, which could potentially be linked to environmental quality, has been increasing in children, who are generally more sensitive to environmental hazards than adults. In 2016, 2.6 times more children in comparison with 2009 were diagnosed to have asthma. Total morbidity from cancer in children increased by 60 per cent in the period 2009–2016. Chronic bronchitis remains at a high rate. The rate of congenital disorders is growing: from 604.1 per 100,000 population in 2008 to 999.0 per 100,000 population in 2015.

Several studies report the negative health impact of unsound chemicals management: high levels of lead were registered in children's blood in some oblasts of Kazakhstan, there were incidents of poisoning at workplaces, and children's toys were withdrawn due to their hazardous chemicals content. The mandates of different agencies in the context of sound chemicals management are not clearly defined. Chemical legislation is not in line with the best international practice. Improvement of chemicals management is critical for the achievement by Kazakhstan of target 3.9 of the 2030 Agenda for Sustainable Development.

The control of microbiological and sanitary-chemical indicators (lead) in premises is mandatory only in medical settings. In the premises of schools, only mercury content (in the case of spills) and carbon monoxide (furnace heating) are measured. Systematic collection of information on the quality of indoor air in the schools, kindergartens and other public settings for children, and in households, is not carried out.

Kazakhstan produces chrysotile asbestos and asbestos-containing materials. The average production in the period 2008–2017 was 216,020 t/y. Around 5,000 people are employed by the company engaged in extraction, ore treatment and asbestos production. However, Kazakhstan does not register mesothelioma as a separate nosology. Neither a national asbestos profile nor a plan for the prevention of asbestos-related diseases has been approved.

In 2017, Kazakhstan reported 2,086 deaths from road traffic accidents. The number of fatalities is decreasing compared with the growth in vehicle numbers. However, the WHO-estimated rate of road mortality in Kazakhstan (24 fatalities per 100,000 population) is much higher than in other countries in the WHO-Europe Region, to which Kazakhstan belongs. Stronger enforcement of road safety measures is needed to achieve target 3.6 of the 2030 Agenda for Sustainable Development.

Medical institutions are a significant consumer of energy, and the reduction of their energy consumption is a policy priority. However, actions to improve the energy efficiency of the health sector are not funded through the national programmes. In the majority of cases, the replacement of equipment is done through international projects or using hospitals' own budgets.

Successes in the past decade and priorities for the future

The top 10 environmental achievements of Kazakhstan in the period 2008–2018 include:[2]

- Commencement of the shift to gas and development of the country's gas infrastructure;
- Stabilization of the populations of many globally-threatened fauna species;
- Intensive afforestation works, in particular those to mitigate the adverse effects of the Aral Sea disaster;
- Implementation of river basin management;
- Conclusion of new transboundary water agreements;
- High attention given to radioactive waste;
- Nearly universal access to energy services;
- Decrease in infant and maternal mortality;
- Green economy made a policy priority;
- Institutional framework set up for implementation and monitoring of the Sustainable Development Goals.

The top 10 environmental priorities for the forthcoming 5–10 years include:[3]

- Ensure independence and strengthen inspections in the environmental area;

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[2] No ranking applies.
[3] No ranking applies.

- Raise the effectiveness of environmental permitting and reform the environmental payments system to stimulate behavioural changes;
- Raise emission limit standards for large combustion plants and ensure their modernization;
- Support the growth of renewable energy and implement energy efficiency measures;
- Significantly extend the protected area network;
- Improve water use efficiency in agriculture;
- Expand water supply and sanitation with stronger efforts in rural areas;
- Develop modern waste disposal sites and introduce sound chemicals management;
- Address the growing burden of non-communicable diseases;
- Ensure effective public participation in decision-making on the environment.

Introduction

I.1 Geography and climate

Kazakhstan is a landlocked country in Central Asia. It is bordered by the Russian Federation to the north (border length, 6,846 km), the People's Republic of China to the east (1,533 km), Kyrgyzstan (1,051 km), Uzbekistan (2,203 km) and Turkmenistan (379 km) to the south.

With a land area of 2,724,902 km^2, it is the ninth largest country in the world and the largest of the Central Asian countries. The territory of the country extends 3,000 km west to east and 1,700 km north to south.

The topography of the country has extreme variations. The lowest elevation is in the south-west, where the Karagiye Depression lies 132 m below sea level. High mountain ranges fringe the country's eastern and south-eastern borders. The highest point, Khan Tengri (6,995 m), is situated in the Tian Shan Mountains in the extreme south-east. The Altai Mountains, along the country's eastern border, also have high mountain peaks.

The terrain of the country consists mostly of deserts, steppes and hilly upland areas. Deserts and semi-deserts (such as stone, salt and sand wastelands) cover more than two thirds of Kazakhstan's surface area. The largest deserts are the sandy, barren Kyzylkum and the clay-crusted Betpak-Dala, both located in the southern part of the country.

The climate is continental, with hot, dry summers and cold, relatively dry winters. Temperatures vary tremendously by region, with the most dramatic differences between the deserts and the mountains. The southern regions have milder winters and hotter summers. The strong, cold winds from the north make winters in the steppes especially harsh. Depending on the region, the average daily temperature in January ranges from -19°C to -4°C and in July from 19°C to 26°C. Extreme summer temperatures can reach 45°C and extreme winter temperatures can fall to -45°C.

Annual precipitation levels are generally low, less than 100 mm in the deserts and between 250 mm and 350 mm in the steppes. Summer thunderstorms often produce flash floods in the steppes. During winter, most of the country is covered in snow. In the mountains, where the mountain peaks are perpetually snow covered, precipitation averages 1,500 mm per year.

I.2 Population

Between 2007 and 2018, Kazakhstan's population increased by a very high 17.92 per cent and the country's total population grew from 15.40 million at the beginning of 2007 to 18.16 million at the beginning of 2018. However, with the average population density of 6.66 inhabitants/km^2, Kazakhstan is still a very sparsely populated country. Most of the population lives in either the north-east or south-east, while the central and western oblasts are sparsely populated.

The capital of Kazakhstan is a fast-growing city. It had a population of 574,448 at the beginning of 2007, but at the beginning of 2018, its population had grown to 1,030,577, an increase of almost 80 per cent. The former capital, Almaty, with a population of 1,801,993 at the beginning of 2018, remains an important scientific, cultural and financial centre. Other major cities include Karaganda (population 501,419 at the beginning of 2018), situated in the middle of the Karaganda coal basin, an industrial centre focused on coal mining and the production of coal-mining machinery, and Shymkent (population 952,170 at the beginning of 2018), a centre for heavy industry, including chemical manufacturing and the smelting of lead and zinc.

Not only has the population of Kazakhstan increased quickly but the life expectancy of the population has risen very rapidly too. Between 2008 and 2016, female life expectancy at birth increased by 4.0 years while male life expectancy increased by 7.3 years (table I.1).

From 2007 to 2016, the total average life expectancy at birth rose 6.1 years while the birth rate increased by 8.32 per cent. The country's total fertility rate has been on the rise since 2008 and the latest available figure (2016) was 2.77 – well above the population replacement figure of 2.1. The high infant mortality rate, which in 2007 was 14.47 per 1,000, dropped to 8.59 per 1,000 in 2016 – a very impressive 41.04 per cent decrease in eight years.

I.3 Economic development

The economic progress of Kazakhstan has been rapid. The period between 2000 and 2006, especially, was an era of rapid economic development and in 2006 Kazakhstan moved from the lower-middle-income to the upper-middle-income country group. Annual gross domestic product (GDP) growth fluctuated between

9.3 and 13.5 per cent while the average rate of inflation (as measured by the Consumer Price Index, CPI) stayed below 10.8 per cent – a great improvement compared with the pre-2000s period. The rapid growth of the agricultural and industrial sectors, together with foreign investments into the oil sector, triggered a strong and sustained expansion of GDP.

The global financial crisis of 2008 had a sharp but brief effect on Kazakhstan's economy. The long period of steady GDP growth ended when growth dropped from 8.9 per cent in 2007 to 1.2 per cent in 2009 (table I.2). CPI inflation jumped to 17.0 per cent in 2008. However, the economic shock was short-lived and, in 2009 and 2010, GDP was already growing by 7.3 and 7.4 per cent, respectively. GDP growth remained good until 2013. In 2014, GDP growth started to decline, dropping to 1.2 per cent in 2015 and then to 1.1 per cent in 2016. Major contributors to GDP are services (57.4 per cent) and industry (26.8 per cent) (figure I.1).

Because about 60 per cent of the country's export income is related to oil, its economy is very dependent on world oil prices. This dependency on oil became clear when the worldwide crude oil surplus started to have an effect on oil markets in 2014–2015. The oversupply of crude oil had multiple causes, which included the increase of shale oil production in the United States of America and Canada, geopolitical aspirations and goals among oil-producing nations, falling demand for oil due to the deceleration of the Chinese economy, and environmental concerns diverting energy consumption away from fossil fuels – none of which Kazakhstan could have had any influence on.

The changes in world oil prices were dramatic and quite unexpected. The world oil price, which was above US$125 per barrel in 2012, remained above US$100 until September 2014, but had fallen below US$30 by January 2016 – a decrease of 70 per cent in 15 months. Such a steep and sudden decline in hydrocarbon prices revealed Kazakhstan's dependency on commodity export revenues and how vulnerable its economy was to such a sudden shock.

Demand from the country's two main trading partners, the People's Republic of China and the Russian Federation, to which 27 per cent of the country's exports went in 2015, and the global price of and demand for oil, remain the key external factors that impact upon Kazakhstan's economy. The economy's vulnerability to external shocks remains a major source of risk to medium-term growth and poverty reduction.

Up to 2005, Kazakhstan's debt to GDP ratio was diminishing, reaching 8.9 per cent of GDP in 2005. Since then, however, it has been on a generally upward trend, reaching 21.5 per cent of GDP in 2016.

Kazakhstan has attracted a lot of foreign direct investment (FDI), most of it going to its oil and gas industries. It has been so successful that, between 2007 and 2016, over 71.0 per cent of all FDI in the countries of Central Asia went to Kazakhstan.

The national currency, the tenge, depreciated slowly against the US dollar from 2007 to 2014, but since then the slide has been relatively rapid.

I.4 Social issues

Kazakhstan has made noteworthy progress in the fight against poverty. In less than 10 years, the proportion of the Kazakh population living with an income level below the national poverty line diminished from 12.7 per cent in 2007 to 2.6 per cent in 2017. Similarly, the poverty gap, a measure of the resources required to eradicate poverty, diminished from 2.40 in 2007 to 0.40 in 2017 and the acuteness of poverty declined from 0.80 in 2007 to 0.10 in 2017.

Rapid economic growth had already reduced the unemployment figures before 2007. Since then, good rates of development continued but, due to their different calculation methodologies, the national and ECE statistics are quite different. According to the Ministry of Labour and Social Protection of Population, unemployment diminished from 0.7 per cent in 2007 to 0.3 per cent in 2013 and then increased to 0.8 per cent in 2017. The ECE figure was much higher: 7.3 per cent in 2007, diminishing after that to 5.0 per cent in 2014 and staying at that level until 2016.

According to the 2016 UNDP Human Development Report, Kazakhstan belongs to the group of Medium Human Development countries and has the highest Human Development Index (HDI) ranking of the Central Asian countries. The country's HDI rose from 0.747 in 2005 to 0.794 in 2015, placing Kazakhstan 56th of the 188 countries reviewed.

Table I.1: Demography and health indices, 2007–2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Population (million)	15.40	15.60	16.00	16.20	16.40	16.70	16.90	17.20	17.40	17.70	17.90
Birth rate (per 1,000)	20.79	22.75	22.14	22.53	22.51	22.70	22.73	23.10	22.71	22.52	..
Total fertility rate	2.47	2.68	2.55	2.59	2.59	2.62	2.64	2.73	2.74	2.77	..
Life expectancy at birth (years, total)	66.34	67.11	68.39	68.45	68.69	69.52	70.62	71.44	71.97	72.41	..
Life expectancy at birth (years, male)	60.70	61.91	63.55	63.55	63.85	64.74	65.91	66.90	67.49	67.99	..
Life expectancy at birth (years, female)	72.58	72.43	73.25	73.41	73.57	74.29	75.23	75.82	76.26	76.61	..
Percentage of population (0–14 years)	24.00	24.00	24.10	24.20	24.50	24.90	25.50	26.00	26.60	27.10	27.70
Percentage of population (65+ years)	7.80	7.70	7.10	6.80	6.60	6.60	6.60	6.70	6.80	7.00	7.20
Mortality rate (per 1,000)	10.22	9.74	8.88	8.95	8.72	8.54	8.00	7.65	7.46	7.37	..
Infant mortality rate (per 1,000)	14.57	20.76	18.30	16.59	14.91	13.56	11.39	9.83	9.41	8.59	..

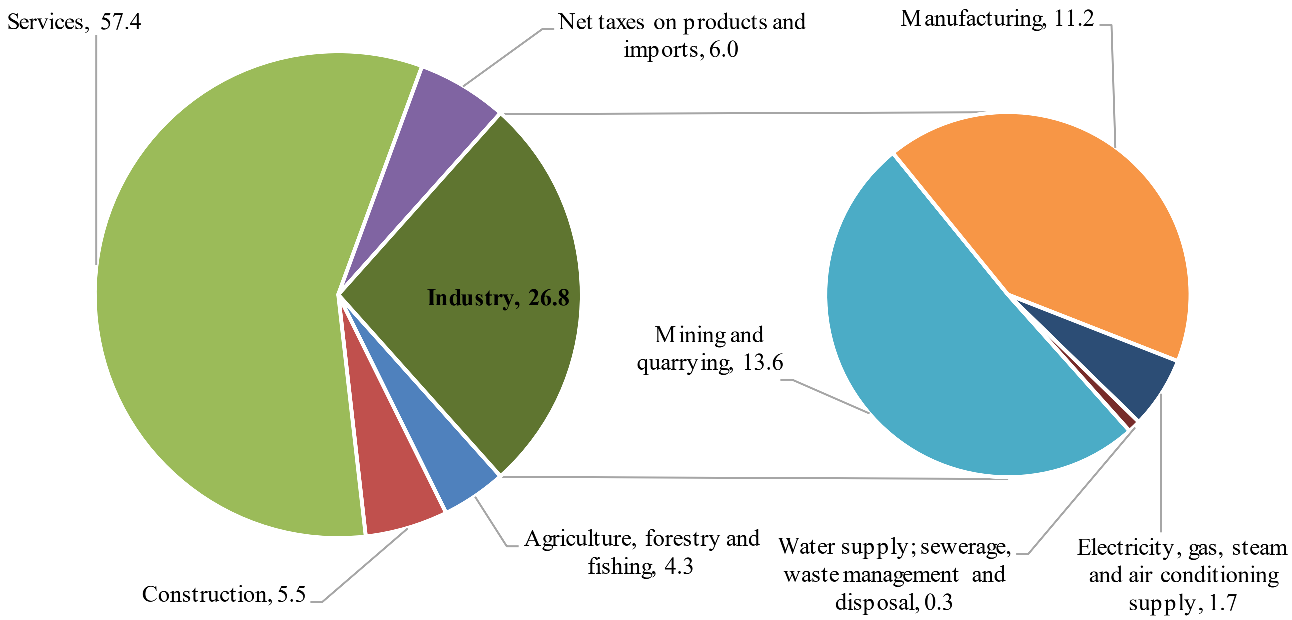
Source: World Bank Databank and ECE statistical database. Accessed January 2018.

Table I.2: Selected economic indicators, 2007–2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
GDP (% change over previous year)	8.9	3.3	1.2	7.3	7.4	4.8	6.0	4.2	1.2	1.1	4.1
GDP in current prices (US$ billion)	104.9	133.4	115.3	148.1	192.6	208.0	236.6	221.4	184.4	137.3	162.9
GDP in current prices (billion tenge)	12 849.8	16 052.9	17 007.6	21 815.5	28 243.1	31 015.2	35 999.0	39 675.8	40 884.1	46 971.2	53 101.3
GDP per capita (US$ per capita)	6 771.6	8 513.5	7 165.1	9 071.0	11 634.5	12 387.4	13 890.8	12 806.7	10 509.9	7 714.8	5 030.3
GDP per capita (US$ per capita PPP)	17 793.1	18 513.9	18 387.2	19 690.4	21 277.7	22 392.2	23 773.8	24 845.5	25 096.7	25 331.3	..
CPI (% change over the preceding year, annual average)	10.8	17.0	7.3	7.1	8.3	5.1	5.8	6.7	6.6	14.6	7.4
PPI (% change over the preceding year, annual average)	12.4	36.8	- 22.0	25.2	27.2	3.5	- 0.3	9.5	- 20.5	16.8	15.3
Registered unemployment (Percentage of labour force, end of period) national data	0.7	0.6	0.6	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.8
Registered unemployment (Percentage of labour force, end of period) ECE data	7.3	6.6	6.6	5.8	5.4	5.3	5.2	5.0	5.0	5.0	..
Current account balance (US$ billion)	- 8.4	6.3	- 4.1	1.4	10.2	1.1	1.3	6.1	- 5.1	- 8.9	..
Current account balance (as percentage of GDP)	- 8.0	4.7	- 3.6	0.9	5.3	0.5	0.5	2.8	- 2.8	- 6.5	..
Net FDI inflows (US$ billion)	- 8.0	- 13.1	- 10.1	- 3.7	- 8.6	- 11.9	- 8.0	- 4.6	- 2.9	- 13.5	..
Net FDI flows (as percentage of GDP)	- 7.7	- 9.8	- 8.7	- 2.5	- 4.5	- 5.7	- 3.4	- 2.1	- 1.5	- 9.8	..
Cumulative FDI (US$ billion)	105.0	91.9	81.8	78.1	69.5	57.7	49.6	45.0	42.2	28.7	..
Foreign exchange reserves (US$ billion)	17.6	19.8	23.1	28.2	29.3	28.3	24.7	29.2	27.9	29.5	..
Gross external debt (US$ billion)	74.0	96.9	107.9	112.9	118.2	125.3	136.9	150.0	157.6	153.4	163.7
Exports of goods and services (US$ billion)	47.8	71.2	43.2	60.3	84.3	86.4	84.7	79.5	46.0	36.7	43.1
Imports of goods and services (US$ billion)	32.8	37.9	28.4	31.1	36.9	46.4	48.8	41.3	30.6	25.4	26.4
Net exports of goods and services (US$ billion)	15.0	33.3	14.8	29.1	47.4	40.1	35.9	38.2	15.4	11.4	..
Ratio of gross debt to exports (%)	155.0	136.1	249.9	187.3	140.2	145.0	161.7	188.8	342.9	417.5	..
Ratio of gross debt to GDP (%)	16.8	14.9	20.0	19.1	15.2	13.6	10.4	13.2	15.1	21.5	..
Exchange rates: annual averages (tenge/US$)	122.6	120.3	147.5	147.4	146.6	149.1	152.1	179.2	221.7	342.2	..

Sources: ECE Statistical database; Committee on Statistics.

Figure I.1: GDP breakdown, 2017, per cent



Source: Committee on Statistics, 2018.

Gender

Kazakhstan acceded to the Convention on the Elimination of All Forms of Discrimination against Women in 1998 and ratified the Optional Protocol of the Convention in 2001. Kazakhstan has regularly submitted periodic reports under the Convention. The fifth report was prepared in 2018 (2018 Resolution of the Government No. 89).

In 2005, Kazakhstan approved the Gender Equality Strategy for the period 2006–2016 (2005 Decree of the President No. 1677), covering several spheres and sets of indicators. In 2009, the parliament enacted the Law of State Guarantees of Equal Rights and Equal Opportunities for Men and Women and the Law on Prevention of Domestic Violence. In 2016, the Concept of Family and Gender Policy for the period until 2030 (2016 Decree of the President No. 384) replaced the 2005 Gender Equality Strategy.

There is no gender imbalance in the total net enrolment ratios of boys and girls in the primary and secondary levels of education. At the tertiary level, female enrolment is higher than male.

After the 2016 elections, 29 of the 107 members of the lower house of Kazakhstan's parliament were women. The share of female representatives is 27.1 per cent – which is very close to the 30 per cent gender equality threshold that is considered to be the level of representation that can lead to real change in policy agendas. The 2017 upper house elections, however, did not produce a similar outcome regarding gender equality. Only 10.6 per cent of representatives, or 5 of the 47 representatives, are women.

In the regional parliaments, the share of women delegates is 18.8 per cent on average, but in certain regions it exceeds the 30 per cent threshold. At the highest level of government, the number of women is still insignificant. In 2018, only one of the country's 16 ministries was led by a female minister.

Kazakhstan has done well in international gender equality comparisons, ranking in the top one third of countries. In the UNDP Gender Inequality Index (2016), Kazakhstan, with a score of 0.202, ranked 42nd of the 188 countries compared in 2015. The World Economic Forum's Gender Gap Report gave Kazakhstan a score of 0.713, ranking it 52nd of 147 countries in 2017. In both comparisons, Kazakhstan was far ahead of the other Central Asian countries.

I.5 Institutions

Kazakhstan is a unitary state with a presidential system of government.

The President appoints and dismisses the Government. The President also initiates constitutional amendments, dissolves the parliament, calls referenda, is Commander in Chief of the armed forces and appoints administrative heads of the oblasts and cities.

In addition, the President may veto legislation that has been passed by the parliament.

The executive power is exercised by the Government. The Prime Minister chairs the Cabinet of Ministers and serves as Kazakhstan's head of government. There are three deputy prime ministers and 16 ministers in the Cabinet.

Kazakhstan has a bicameral parliament composed of the Majilis (the lower house) and the Senate (the upper house). Single-mandate districts popularly elect 105 seats in the Majilis.

The Senate has 47 members. Two senators are selected by each of the elected assemblies (maslikhats) of Kazakhstan's 17 principal administrative divisions (14 oblasts plus three cities (the capital, Almaty and Shymkent)). The President appoints the remaining 13 senators. Both the Majilis deputies and the members of the Government have the right of legislative initiative, though the Government has proposed most of the legislation considered by the parliament.

The judicial system comprises the 65-member Supreme Court, which is a cassation court, and local courts. Local courts include the courts of first instance (rayon and similar courts) and courts of appeal (oblast and similar courts). In addition, special courts may be established (military, financial, economic, administrative, for minors, etc.).

The court of the Astana International Finance Centre has a special status and does not belong to the judicial system of Kazakhstan.

The Constitutional Council determines the constitutionality of laws adopted by the legislature, rules on challenges to elections and referenda and interprets the constitution. The President appoints three of its members, including the chair.

Before June 2018, Kazakhstan was divided into 14 oblasts and two cities of republican significance (Almaty and Astana). In June 2018, Shymkent was given the status of city of republican significance and it was administratively separated from South Kazakhstan Oblast. South Kazakhstan Oblast was renamed Turkistan Oblast and its administrative centre was moved to Turkistan (annex VI, map 1).

The oblasts are divided into 177 rayons (districts), 87 towns, 30 villages and 6,569 auls (small villages). Each oblast, rayon and settlement has its own elective assembly, charged with drawing up a budget and supervising local taxation. Cities also have local assemblies; if large enough, cities are divided into rayons, each with its own assembly. These assemblies are elected for five-year terms.

The oblast and rayon assemblies do not choose the local executives. Each oblast is headed by an akim, appointed by the President, while the municipal akims are appointed by oblast akims. The akim appoints the members of his or her staff. The President has the power to annul the decisions of akims.

PART I: ENVIRONMENTAL GOVERNANCE AND FINANCING

Chapter 1

LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

1.1 Legal framework and its implementation

Environmental legislation

Environmental Code

Environmental legislation in Kazakhstan is codified in the 2007 Environmental Code. This is the only example of an accomplished codification of environmental legislation in the post-Soviet geopolitical area, although many more countries in the region attempted to codify their environmental legislation in the past 20 years. Despite the criticism about a significant number of amendments having been introduced into the Environmental Code (62 times in the period 2007–2017), this codification attempt has been rather successful, making environmental legislation easier to use and understand by public authorities, businesses and the public. Codes in Kazakhstan have a higher legal value than laws, which brings an undisputable value to this codification effort.

The Environmental Code has been modified a number of times, usually as part of the "package laws" introducing amendments to various legal acts at the same time. In 2011, the Law on Amendments to Legislation related to Environmental Issues introduced amendments to eight legal acts and added two new chapters to the Environmental Code on the regulation and assessment of greenhouse gas (GHG) emissions and capture. The amendments also referred to waste management and environmental audit.

In 2015, the Law on Amendments to Legislation related to Industrial and Innovation Policy introduced amendments to 11 legal acts, including the Environmental Code to which a chapter on extended producer responsibility was added. In early April 2016, the Law on Amendments to Legislation related to Environmental Issues introduced changes related to public participation in environmental decision-making. The amendments also recognized the right of public associations to file lawsuits on environmental issues in the public interest. In addition, they introduced the provisions on the annual preparation and publication of the national state of the environment report (SoER) and on the state pollution release and transfer register (SPRTR). In late April 2016, the Law on Amendments to Legislation related to Green Economy introduced changes to 11 codes and laws, including amendments to the Environmental Code related to waste management.

As of 2018, a new Environmental Code is under development. Main reform directions include: introduction of environmental standards and economic mechanisms of environmental regulation; revision of the environmental impact assessment (EIA) procedure; introduction of strategic environmental assessment (SEA); improved regulation of the polluter pays principle; operationalization of integrated permitting; and strengthening the state environmental control procedure.

Permitting

Since 2012, applications for all permits, including environment-related ones, are made through the e-government portal (http://elicense.kz/).

Key environment-related permits are the permit for emissions into the environment (covering air emissions, wastewater discharges, waste disposal and sulphur disposal) and the integrated environmental permit. The 2007 Environmental Code regulates both permits. Facilities that receive permits for emissions into the environment are divided into four categories (I–IV), with most hazardous facilities belonging to category I. Since 2008, major trends for the legislation with regard to the permit for emissions into the environment have been the reduction of the processing period for submitted application materials, reduction of the number of documents submitted for obtaining permits and increase in the duration of permits. A permit for emissions into the environment includes total volumes of air emissions, wastewater discharges, waste disposal and sulphur disposal, without a breakdown by substances. The breakdown by substances is available in the draft emission limit values (ELVs) prepared as part of the procedure to obtain the permit.

An integrated environmental permit can be issued instead of a permit for emissions into the environment upon condition that the applicant company gradually introduces best available techniques (BAT) to reduce emissions and increase resource efficiency. An integrated permit is an option, not a mandatory requirement. The Rules for the issuance of integrated environmental permits and the list of types of industrial facilities for which it is possible to obtain comprehensive environmental permits instead of permits for emissions into the environment were approved (2015 Order of the Minister of Energy No. 37), as well as the List of best available techniques (BAT) (2014 Order of the Minister of Energy No. 155).

Although the concept of an integrated environmental permit was introduced in 2007, as of early 2018, no integrated permit had ever been issued. No company had ever asked for such a permit: apparently, the business-as-usual scenario to apply for and renew a permit for emissions into the environment is easier for companies. They do not see any reason to apply for an integrated permit. Another issue is the lack of knowledge on BAT. Kazakhstan has only four industry-specific technical regulations defining emissions into the environment. No methodological guidance is available on how companies could introduce BAT. In 2016, amendments were introduced to the Environmental Code by the 2016 Law on Amendments to Legislation related to Ecology and Subsoil Use Issues. Among other things, these amendments enable companies to use the technologies included in the European Union (EU) Best Available Techniques Reference Documents (BREFs) when applying for integrated permits in Kazakhstan. This measure should make BAT more accessible.

On the basis of issued permits, each oblast assembles the total aggregate limits for emissions into the air, wastewater discharges and industrial waste disposal for a given year. The amounts per oblast are then consolidated into the total limit values for Kazakhstan. Against these limit values, Kazakhstan assesses its work on combating environmental pollution. However, these limit values reflect total amounts for all air pollutants or total amounts for all wastewater discharges without a breakdown by substances, so they are not effective in assessing the level of pollution prevention efforts.

Environmental assessment

The 2007 Environmental Code is the key act regulating EIA and the state ecological expertise (SEE) (chapter 2). Since 2008, there has been a reduction of the processing period for SEE as part of the general trend to ease the authorization procedures. The requirements on public hearings on EIA have been regulated in more detail. Major criticism refers to the complex non-departmental expertise and, more exactly, to the lack of clarity between the non-departmental expertise and SEE. Although the Environmental Code provides for public ecological expertise, as of early 2018, only two such attempts had been made. Public ecological expertise is not integrated into the decision-making system.

Environmental insurance

Environmental insurance is regulated by 2005 Law on Mandatory Environmental Insurance. Such insurance is mandatory for legal entities and individuals who undertake environmentally hazardous activities listed in the 2015 Order of the Minister of Energy No. 27. In practice, businesses comply with the obligation to purchase environmental insurance but do not ask for insurance benefits in cases when insurance events occur.

Air protection

Air protection requirements are integrated into the 2007 Environmental Code. The most relevant development is the 2016 amendments to the Code related to integrated permitting based on BAT. Technical requirements for air emissions from thermal power plants (TPPs) exist (2007 Resolution of the Government No. 1232). Air pollution reduction techniques are included in the list of BAT for major economic sectors (2014 Order of the Minister of Energy No. 155). Methodological guidance documents to calculate the air-polluting emissions from gas transportation and storage, oil processing, TPPs, boiler houses, cement plants, landfills and other facilities (2014 Order of the Minister of Environment and Water Resources No. 221-Ө) are available.

Climate change

In 2011, amendments to the Environmental Code introduced the system of quotas for GHG emissions allocated to operators of facilities whose emissions exceed 20,000 tons of CO_2-eq./year. These quotas are allocated based on a national allocation plan. The amendments also introduced the emissions trading system (ETS). In addition, the amendments introduced the State Cadastre of GHG Emissions and Capture, the State Register of Carbon Units and the procedures for verification and validation of GHG emissions inventories submitted by operators.

The operation of the quotas system was paused in 2016 and restarted in 2018 based on the national allocation plan for the period 2018–2020 (2017 Resolution of the Government No. 873). The total amount to be allocated was calculated to allow for a 5 per cent reduction of CO_2 emissions compared with the 1990 level. Before 2016, allocation of quotas was based on an historical method (historical emissions) only. Now operators can choose between the historical method and the method of application of GHG-specific emission factors (SEF). About two thirds of operators opted for SEF as it allows them to request additional quota in the case of increased production. The main issue with the system is that it functions as a direct limitation of emissions rather than an economic mechanism.

In 2011, the responsibility for GHG emissions above limits and for submission of unreliable data to the GHG inventory was included in the Code on Misdemeanours. However, the fines for excessive emissions were never applied, as it is easy for an operator to purchase additional quota from another operator.

Currently, the Environmental Code regulates GHG emissions but not adaptation to climate change. It is envisaged that the new Environmental Code, currently under development, would address the terminology, principles, competences and monitoring issues related to adaptation.

There is no carbon tax in Kazakhstan.

Land degradation

The 2017 Law on Pastures is a novelty for Kazakhstan. Previously, the 2003 Land Code regulated pasture management in less detail. Use of pastures is free (only the land tax is paid). At the level of rayons (districts), local executive authorities develop and local representative authorities approve pasture management plans. The participation of pasture users is an important aspect of developing such plans. Pasture management plans for the period 2018–2019 are already adopted in almost all rayons. Pasture infrastructure development and restoration are in the competency of oblast-level authorities. Stockwater development for pastures is a key measure to improve the use of remote pastures.

The 2017 Methodology for activities to counter the degradation and desertification of pastures (2017 Order of the Acting Minister of Agriculture No. 185) defines the indicators for degradation of pastureland and includes the lists of activities for restoration of degraded pastures and for prevention of degradation and desertification.

In 2015, a new version of ecological criteria for assessment of lands (2015 Order of the Minister of Energy No. 188) was approved in place of the 2007 version. These criteria determine through quantitative indicators how to define erosion, agro-degradation and salinization of lands and how to define the degree of degradation of soil and land. The rules on the maximum pressures on pastures (area of pastureland per animal) are defined for various types of pastures, depending on the natural zone (2015 Order of the Minister of Agriculture No. 3-3/332).

Restoration of lands damaged by industry, mining or transport operations is regulated by the 2003 Land Code. The 2015 Instruction on development of projects to rehabilitate damaged lands (2015 Order of the Minister of National Economy No. 346) replaced the 2009 version.

Nature protection and forests

Nature protection is primarily regulated by the 2004 Law on Protection, Reproduction and Use of Fauna, 2006 Law on Specially Protected Natural Areas and 2003 Forest Code. New rules on hunting and fishing were adopted in 2015 (2015 Orders of the Acting Minister of Agriculture No. 18-03/157 and No. 18-04/148, respectively). There is no law on flora; the 2002 Law on Plant Protection and the Forest Code have flora-related provisions. The Committee on Forestry and Fauna recently initiated the development of a law on flora.

In 2012, amendments were introduced in a number of legal acts related to forestry, fauna and protected areas. In particular, the amendments prohibited the placement of sawmills in protected zones of state nature reserves. In 2014, amendments to the 2004 Law on Protection, Reproduction and Use of Fauna transferred some competences on fishery and fauna to local executive authorities.

In 2012, Kazakhstan introduced a year-round ban on commercial fishing of sturgeon species, except for reproduction and scientific purposes. The moratorium on commercial fishing of sturgeons in the Caspian Sea was dictated by the decrease in the populations of sturgeon species. Due to the biological characteristics of the fish, the moratorium should last at least 15–20 years to restore populations of sturgeon species. Since sturgeon species are found in the entire water area of the Caspian Sea shared by five riparian countries, the moratorium was introduced by all Caspian riparian countries. Currently, the moratorium tool is envisaged by the five-party Agreement on the Conservation of the Caspian Sea Water Biological Resources signed in 2014 and in force since 2016.

In 2016, Kazakhstan introduced a ban on spring hunting (from 16 February to 14 June) and a daily limit for a hunter equal to five units per game species (whether bird or animal) (2016 Order of the Chair of the Committee on Forestry and Fauna No. 265). The measures were introduced due to the increase of illegal hunting (from 636 cases of violation in 2015 to 758 cases in 2016) and the reduction of bird populations.

In 2017, amendments related to flora and fauna were introduced in a number of legal acts. The 2004 Law on the Regulation of Trading Activities was amended to prohibit the sale of saksaul timber products and the sale of prohibited fishing equipment. The sale of monofilament fishing nets was banned (due to the cheap price of such nets, fishermen used to forget them, leaving them in the water). The 2017 amendments also regulate the catching of sturgeon species in order to counter illegal sale of sturgeons. In 2017, the notion of biosphere reserves was introduced in the 2006 Law on Specially Protected Natural Areas. In addition, the requirement was added to this Law of the establishment of advisory coordination councils under the protected area institutions. As of early 2018, the process to establish such councils is ongoing; they are expected to become a mechanism to address the various interests and, in particular, to address the growing pressures from the tourism sector on protected areas.

The 2017 amendments to the Forest Code enable the transfer of lands of other categories to the forest fund. This should allow enriching the forest fund with forested areas, which are not part of it.

Further challenges for nature protection legislation include the current provision of the 2003 Land Code that exceptionally allows the transfer of protected area land to “reserve land” in three cases: state boundary protection; construction of water infrastructure of strategic importance; and tourism. There are strong appeals to exclude tourism from the list of exceptions in order to allow for preservation of valuable natural areas.

Genetically modified organisms (GMOs)

GMOs are regulated by the 2007 Environmental Code, 2009 Code on Public Health and the Public Health System, 2007 Law on the Safety of Food Products, 2010 Law on Protection of Consumer Rights and several acts of subsidiary legislation. The production of GMOs is an environmentally hazardous activity (2015 Order of the Minister of Energy No. 27). The import, export, supply, sale, packaging, storage and transportation of GMOs are regulated by the Eurasian Economic Union (EEU) documents, technical regulation on requirements for the safety of food products derived from genetically modified (transgenic) plants and animals (2010 Resolution of the Government No. 969) and the Rules for the turnover of genetically modified objects (2008 Resolution of the Government No. 630).

The following norms related to GMOs are in place: a ban on selling and sowing genetically modified (GM) seeds; a ban on selling GM products in educational institutions, including kindergartens; mandatory labelling about GMO content in food products; requirements for SEE and sanitary-epidemiological expertise in the case of creation and production of GMOs; mandatory environmental insurance of GMO production; and mandatory registration of GMOs.

The challenges with implementation of legislation include insufficient state control over GMO content in imported food products. The system to inform consumers is also weak: producers of food products do not follow the requirements on GMO labelling. Since 2016, Kazakhstan began to apply the Codex Alimentarius standards to identification of GMOs in food products.

Waste

The key act on waste management is the 2007 Environmental Code. Since 2008, several waste-management-related amendments were introduced. In 2011, the obligation of all enterprises with category I and II facilities and all waste management enterprises (sanitary landfills) to develop a waste management programme was introduced. Such a programme is part of the application package for permits for emissions into the environment. Also in 2011, the environmental requirements for storage of waste containing POPs were included in the Code.

In 2015, the Law on Amendments to Legislation related to Industrial and Innovation Policy introduced a chapter on extended producer/importer responsibility into the Environmental Code. The extended producer responsibility for motor vehicles and their parts (tyres, oil, batteries) was introduced in 2016. In 2017, it was introduced for electrical equipment and, also since 2017, extended producer/importer responsibility applies to plastic, paper, glass and metal packaging. The relevant subsidiary legislation includes the list of goods subject to extended producer responsibility (2016 Order of the Minister of Energy No. 555) and the Rules for the implementation of extended producer (importer’s) responsibility (2016 Resolution of the Government No. 28). A Working Group to Improve the Legislative Framework on Extended Producer Responsibility was created in 2016 and is still active. Major criticism of the system refers to insufficient transparency and the existence of only one extended producer responsibility operator appointed by the Government. The Ministry of Energy, however, considers this one operator as an opportunity to “test” the system before the appointment of several operators.

In 2016, amendments were introduced to the Environmental Code to extend the types of waste prohibited from burial at landfills. On 31 December 2018, the landfills must stop accepting plastic and polyethylene, paper and cardboard, and glass. On 31 December 2020, they must stop accepting construction waste and food waste. As of early 2018, it appears that the entry into force of the ban on construction waste and food waste will be postponed.

In 2016, the Law on Amendments to Legislation related to Green Economy introduced a new requirement into the Environmental Code that all vehicles transporting municipal solid waste have GPS. This requirement enters into force in 2019. It should prevent the emergence of dumpsites and help control the volumes of waste. The same Law also allowed industrial enterprises to store generated waste for up to six months without paying for emissions to the environment.

Other developments include the adoption of Rules for management of abandoned hazardous waste (2015 Order of the Minister of Energy No. 229) and Rules for collection, storage and disposal of radioactive waste and spent nuclear fuel (2016 Order of the Minister of Energy No. 39).

In addition, the 2015 Business Code provides for investment preferences for implementation of investment projects for activities included in the list of priority activities (2016 Resolution of the Government No. 13). This list includes collection of hazardous waste, treatment and disposal of non-hazardous waste, and disposal of sorted materials except for treatment of ferrous and non-ferrous scrap.

In order to promote public–private partnerships (PPPs) in this area, model tender documentation of a PPP on environmental protection was developed for such facilities as incineration plants with landfills (2017 Order of the Minister of National Economy No. 127, annex 11).

Water

The 2003 Water Code has been amended a number of times. In 2014, the Law on Amendments to Legislation related to Civil Protection introduced amendments related to the safety of hydrotechnical installations into the Water Code. This was a response to a series of accidents at hydrotechnical installations.

Through these amendments, the Committee on Water Resources under the Ministry of Agriculture was assigned new responsibilities, e.g. to develop regulatory acts on dam safety and to review and register/reject the declaration of safety of a dam. The Committee also maintains a list of registered dam safety declarations. The Committee passed most of its dam safety responsibilities to the basin inspections, which are facing considerable difficulties in dealing with these issues due to a lack of expertise and limited numbers of staff. The actual assessment of the safety of hydrotechnical installations is outsourced to the private sector. As of early 2018, only four companies are licensed; this is very few, taking into account the number of hydrotechnical installations in the country. A draft law on hydrotechnical facilities was prepared; however, it seems that no separate law will be adopted but dam safety will be introduced into the Water Code. Several subsidiary legislative acts on dam safety were approved in 2015, including the Rules for ensuring the safety of water management systems and infrastructure (2015 Order of the Minister of Agriculture No. 19-4/286).

In 2015, the Law on Amendments to Legislation related to Water Supply and Sanitation, Credits and Subsidies in Housing and Communal Services included amendments to the Water Code related to water metering (mandatory in-house water metering for multi-apartment buildings) and introduced mandatory water recycling in industry.

An important amendment was introduced into the 2003 Land Code by the 2016 Law on Amendments to Legislation related to Green Economy. It prohibits allocating land plots within 500 m of a water body if the water protection zones and strips and the regime of their economic use are not yet defined. This measure aims to prevent chaotic construction activities at riverbanks.

Environmental offences and crimes

The 2014 Criminal Code, which replaced the 1997 Criminal Code, added two new environmental crimes: unauthorized use of subsoil resources and breach of the rules for protection of fish resources. Other changes to the articles on environmental crimes in the 2014 Code refer to the amounts of fines and duration of criminal sentences.

In 2015, two new articles were added to the 2014 Code on Misdemeanours, which replaced the 2001 Code on Misdemeanours. These articles refer to violation of requirements on extended producer/importer responsibility. In late 2017, several articles of the Code on Misdemeanours with regard to subsoil use, water resources, and forest and fauna protection were amended. Summary analysis of court records prepared for Almaty Oblast showed that most of the environment-related court cases in 2016 referred to illegal purchase/sale/import of wild animal and plant species (62 cases), followed by breach of fishing rules (48 cases), breach of hunting rules (23 cases) and illegal construction in water protection zones and strips (17); no other environment-related articles of the Code on Misdemeanours were applied in that year.

Environment-related provisions in sectoral legislation

Transport

In 2007, the requirements on emissions of polluting substances from motor vehicles were defined in the technical regulation that included the schedule of moving towards cleaner ecological classes of vehicles and fuels (2007 Resolution of the Government No. 1372, no longer valid). Kazakhstan moved to new ecological standard Euro-5 for most categories of motor vehicles in 2016 and for the few remaining ones in 2018. The Euro-5 standard is now valid for new vehicles produced in Kazakhstan or imported. There has been a lot of debate on whether this environmentally friendly measure in fact aims to restrict the import of new cars in the same price range as locally produced ones but produced abroad. The measure has also been criticized for having appeared "ahead of time" since high-quality fuel is not yet produced in Kazakhstan, therefore pushing vehicle owners to damage their cars by filling them with Euro-2 fuel or to use more expensive Euro-4 and Euro-5 fuels imported from abroad. The measure was also criticized for its lack of actual environmental effect as it does not apply to second-hand cars, including imported ones.

Periodic technical inspections of vehicles are regulated by the technical regulation of 2014 (2014 Order of the Acting Minister of Investments and Development No. 197) and the Rules for organization of mandatory technical inspections of 2015 (2015 Order of the Acting Minister of Investments and Development No. 329). Decreasing the adverse environmental impacts from transport vehicles is among the objectives of mandatory technical inspections.

In 2016, as part of its efforts to apply extended producer/importer responsibility, Kazakhstan introduced the "utilization fee" to be paid before the first registration of a car in Kazakhstan. The base fee is 50 monthly calculation indexes (MCI) [4] and multiplying factors are applied depending on the volume of the engine. Also in 2016, Kazakhstan introduced a charge for first-time registration of a car in the country; the charge rates are differentiated by the age of the vehicle.

Energy efficiency requirements are defined for various types of transport (road, air, railway, inland water, sea and urban electric) (2015 Order of the Minister of Investments and Development No. 389). Moreover, in 2017, the Road Committee of the Ministry for Investments and Development approved the recommendations to define the green principles for sustainable road and transport infrastructure (R RK 218-137-2017). They set the criteria and a scoring system for assessing the environmental friendliness of transport facilities, roads, service stations and motorway hotels and assigning a score (green, silver, gold or platinum) to such facilities.

In 2013, a new version of the rules for navigation during the spawning period and in water bodies where fishing is prohibited (2013 Order of the Minister of Environmental Protection No. 313-Ө) replaced the 2010 version. These rules prohibit bottom dredging during the spawning period. In addition, motor boats are prohibited to use engines in marked spawning areas and waterbirds' nesting places.

Energy

The 2012 Law on Energy Saving and Energy Efficiency Improvement includes the requirements on energy audits, preparation of energy saving action plans and introduction of mandatory energy efficiency assessment for new buildings and in the case of expansion of existing buildings. It regulates the activities of energy service companies (ESCOs). The Law used to require large energy consumers to introduce energy management standard ISO 50001; however, this requirement was removed in 2015. Extensive subsidiary legislation was adopted, e.g. on energy efficiency requirements for equipment, on energy efficiency labelling of buildings, on energy efficiency of construction materials and on the energy efficiency map (2015 Orders of the Minister of Investments and Development No. 407, No. 1106, No. 401, No. 1139, respectively). The energy efficiency map (in fact, a list of projects) was prepared (http://kazee.kz/karta-energoeffektivnosti/).

The 2009 Law on Support for the Use of Renewable Energy Sources intends to create the mechanism to support renewable energy source (RES) investments. Subsidiary legislation was adopted on feed-in tariffs and rules for the centralized purchase and sale of

[4] A calculation unit set for the purposes of defining fees, fines, etc., the monetary value of which is regularly revised.

electricity produced from RES. There is a guarantee for the purchase of renewable energy at a fixed tariff for 15 years. In accordance with 2016 amendments, fixed tariffs are subject to annual correlation to inflation. In 2018, an auction scheme for large-scale renewable energy power projects was introduced.

The 2009 Law has been subject to much criticism that in fact it includes more barriers than support. For example, RES producers are obliged to provide one month in advance information on the forecast volume of energy to be delivered to the network. The new auction system also faces criticism. Through the auctions, projects to construct new RES installations will be selected and auction prices for energy produced by RES will be defined. However, it is not clear what will happen to those investors who want to invest in RES but were not selected through the auction.

The 2010 Law on State Regulation of Production and Turnover of Biofuel aims to promote biofuel and provides for governmental support for research on biofuel markets. This provision is criticized as being insufficient in terms of support measures. In accordance with the Law, the Government sets the limits for the annual production of biofuel: for example, in 2011, 2,870 million litres; in 2017, 3,034 million litres; in 2018, 3,009 million litres (2016 Order of the Acting Minister of Agriculture No. 4-6/701). This system is blamed for not allowing the expansion of biofuel production. Food security is invoked as a reason for limitations, although the Law includes a safeguard clause that quotas for food raw material to be used for biofuel production can be established when food security in the country is under threat.

Housing

The 2012 Law on Energy Saving and Energy Efficiency Improvement aims to ensure the energy efficiency of buildings. It introduced the notion of thermal modernization of buildings and the system of energy efficiency classification of buildings. For the first time, the Law introduced the requirement that consumers pay for heat according to differentiated tariffs depending on the availability of heat energy measuring devices. The Law requires that the design of multi-apartment buildings provides for the use of energy-efficient materials, installation of in-house heat and water metering devices, in-apartment electrical energy, water, gas metering devices, heating system controllers, and automated heat consumption control systems. For existing housing stock, the Law provides for support to the owners of residential buildings and apartments with the payment of measures aimed at energy saving and improvement of energy efficiency.

New construction standards, such as SN RK 2.04-04-2011 "Thermal protection of buildings", establish the energy-efficiency requirements regarding the design of new buildings. Technical regulations on the safety of construction materials and constructed facilities include the requirements on efficiency of energy and heat (2010 Resolution of the Government No. 1202).

Industry and mining

The 2014 Law on Civil Protection replaced six laws, including the 2002 Law on Industrial Safety of Hazardous Industrial Facilities. The 2014 Law maintains the requirement of the previous legislation on the mandatory declaration of industrial safety to be developed for all hazardous industrial facilities. The novelty is that the list of registered declarations is available on the website of the Committee on Industrial Development and Safety. In addition, there is a list of substances and thresholds to define hazardous industrial facilities (2014 Resolution of the Government No. 864). The rules on industrial safety are in place for numerous industries, e.g. for hazardous facilities in the metallurgic industry, chemical industry, oil and gas industry, for coal mines and for major pipelines (2014 Orders of the Minister for Investments and Development No. 346, No. 345, No. 355, No. 351 and No. 354, respectively).

The 2017 Code on Subsoil and Subsoil Use replaced the 2010 Law on Subsoil and Subsoil Use. The codification covers solid mineral deposits, uranium mining and hydrocarbon extraction. The Code significantly simplifies the administrative procedures to increase the attractiveness of the sector for investors. There is a new system of contracts for subsoil use – they will be based on a sample subsoil use contract and, if complying with the sample contract, the use will not require economic, geological, legal or environmental expertise. The Code does not include the environmental requirements as such; rather, it makes references to the requirements of the legislation on environmental protection. The Code includes a different system for guarantees of post-mining rehabilitation: the amount of the deposit to be paid by subsoil users as a guarantee of rehabilitation (previously, as little as 1 per cent of the costs for exploration and exploitation) now has to be defined by the institute that drafts project documentation. The Code does not address the issue of abandoned oil wells, which is an important issue in Kazakhstan.

In parallel with the adoption of the Code, the 2007 Environmental Code was amended to state that mandatory SEE is not required for those draft documents on subsoil use that according to the Code on Subsoil and Subsoil Use have been consulted by the authorized body on environmental protection. New requirements were added to the Environmental Code with regard to (i) the use of groundwater and (ii) subsoil use in the territories of state preservation zones.

Agriculture

The major novelty in the agricultural sector has been the adoption of the 2015 Law on Organic Production. The Law stimulated high interest in organic production but the system of certification is not yet in place. As of early 2018, three national standards have been developed but still need to be adopted (on the procedure for certification of organic products, on requirements of organic products and on graphic design of the national conformity mark). Next steps are to establish certification bodies and to develop support schemes for organic producers. The Rules for production and sale of organic products (2016 Order of the Minister of Agriculture No. 230), among other matters, define the transition periods for various types of products: for sown areas, not less than one year preceding the sowing; for meat products and milk products, six months; for fish, two months; for poultry, six weeks.

The Rules for subsidies to partially compensate for investment expenditures by agro-industrial operators (2017 Order of the Minister of Agriculture No. 48) provide for subsidies to farmers who invest in equipment, transport and infrastructure. They do not include any environment-related criteria for allocation of subsidies. The only environment-related provision is that drip irrigation is included in the list of eligible investment projects. Subsidies can also be received for agricultural production in greenhouses (2015 Order of the Acting Minister of Agriculture No. 4-3/177).

The 2015 Rules for rational use of agricultural lands (2015 Order of the Acting Minister of National Economy No. 268) define key principles for rational use of such lands, except pastures. Key instruments to ensure rational use are the crop rotations plan that is developed by the farmer and shared with local executive authorities and the passport for every agricultural plot, which includes information about humus content and the state of the plot as regards land reclamation.

Several technical regulations were approved: on fertilizers (2010 Resolution of the Government No. 491), pesticides (2008 Resolution of the Government No. 515) and food products from GMOs (2010 Resolution of the Government No. 969).

Tourism

The 2001 Law on Tourism Activities names ecological tourism as one of the types of tourism. It states the obligation of a tourist to take care of the environment and the duty of a tourism operator to inform tourists in writing about safety aspects of the upcoming trip, including the state of the environment. Some subsidiary legislation exists on ecotourism, e.g. Rules to create passes for regulated ecological tourism in specially allocated parts of state nature conservation areas (2010 Order of Acting Minister of Agriculture No. 559). However, the subsidiary legislation on tourism accommodation facilities (Rules on classification of overnight stay facilities for tourists (2008 Order of the Minister of Tourism and Sport No. 01-08/200)) and tourism services (standards ST-RK 2848-2016 and ST-RK 2849-2016) does not include specific environmental requirements.

Other relevant acts

In 2011, amendments to the 2007 Law on Public Procurement (no longer valid) introduced the existence of a certified environmental management system among the criteria for choosing a vendor. The 2015 Law on Public Procurement, replacing the 2007 Law, also included that criterion. The amendments made to the 2015 Law by the 2016 Law on Amendments to Legislation related to Green Economy allocate priority to the goods produced from recyclable material recovered from waste. This provision, however, is not yet reflected in the Rules for conducting public procurement (2015 Order of the Minister of Finance No. 648) and does not work yet.

The legislation on inspections has seen many changes, driven by the overall trend to decrease pressure on business and make the business environment more attractive. The 2011 Law on State Control and Surveillance (no longer valid) introduced common principles for various inspections and risk-assessment-based planning of inspections. In 2012, the Law was amended to introduce the ban on planned inspections for small business entities during the three years from their registration date (at that time, small business entities made up 98 per cent of all business entities in the country). The 2015 Business Code regulates the establishment of businesses, business associations, business participation in law-making, public–private partnerships, corporate social responsibility, competition, permitting, insurance and inspections. It is the key law regulating all inspection procedures, including environmental inspections. The Business Code does not mention the public environmental control provided for in the 2007 Environmental Code. Public environmental control does not work in practice as no mechanism is specified in the legislation.

Following the adoption of the Business Code, new subsidiary legislation approved the risk assessment criteria and checklists for inspections on environmental protection (2015 Joint Order of the Minister of Energy No. 721 and Acting Minister of National Economy No. 835), fauna (2015 Joint Order of the Minister of Agriculture No. 18-04/1126 and the Minister of National Economy No. 808), water resources and dam safety (2015 Joint Order of the Minister of Agriculture No. 19-2/1131 and the Minister of National Economy No. 809) and sanitary and epidemiological well-being (2017 Joint Order of the Minister of Health No. 463 and Minister of National Economy No. 285).

In 2016, the Supreme Court adopted a resolution on application of environmental legislation in the courts (2016 Resolution of the Supreme Court No. 8), which clarifies, among other things, the standing of NGOs in environmental cases and limitations on access to environmental information.

Legal monitoring and regulatory impact assessment

Kazakhstan has a well-developed system of regular legal monitoring, aimed to ensure identification of outdated or contradictory norms (2016 Resolution of the Government No. 486). Every governmental body has an annual plan detailing the legal acts subject to such monitoring. In addition, in 2014, Kazakhstan introduced the elements of the regulatory impact assessment (RIA) system, although its RIA system is rather centralized, with the Ministry of National Economy playing the leading role.

1.2 Policy framework

Development planning system

Kazakhstan has a well-developed system of state planning laid down by the 2009 Decree of the President No. 827. The system includes three levels:

- First-level documents define the long-term vision of the country's development. These include the Strategy "Kazakhstan-2050", the Forecast Scheme of Territorial Development and the Strategy of National Security;
- Second-level documents define the development strategy for an area/sector. These include the Forecast of socioeconomic development (for five years) and state and governmental programmes (for up to five years);
- Third-level documents include details to achieve the vision of the first- and second-level documents. They include strategic plans of ministries (developed every three years for a five-year period), programmes for development of a territory (for five years) and strategies for development of national holdings and companies.

The annual President's message can trigger the development and revision of state planning documents. A separate type of planning documents are "concepts" and "doctrines" – these are developed upon request of the President (2010 Resolution of the Government No. 305).

Clear rules are in place for development of all strategic documents. There are official lists of state programmes and governmental programmes, and no programme can be developed and approved if it is not in these lists.

All ministries have departments of strategic planning and analysis in charge of the process of monitoring implementation. Clear rules exist for indicator-based monitoring and review of implementation of strategic planning documents, as well as for annual publication of implementation reports on the websites of governmental authorities (2010 Decree of the President No. 931; 2016 Order of the Minister of National Economy No. 58). These rules are strictly complied with, although locating implementation reports on the websites of governmental authorities is not always an easy task. The drawback of the indicator-based system is that the choice of indicators largely determines the prioritization of certain measures and allocation of funding over other measures that are not accompanied by indicators. The robust system of semi-annual/annual reporting contributes to good knowledge of strategic documents on the ground, e.g. the 2013 Concept on Transition to Green Economy is well known in sectoral ministries and at all levels of government.

Strategic documents on sustainable development and green economy

In 2011, the 2006 Concept of Transition of the Republic of Kazakhstan to Sustainable Development for the period 2007–2024 and the 2003 Concept of Ecological Security of the Republic of Kazakhstan for the period 2004–2015 were invalidated (2011 Decree of the President No. 47).

2012 Strategy "Kazakhstan-2050"

The 2012 Strategy "Kazakhstan-2050" (delivered in the Message of the President, 14 December 2012) replaced the 1997 Strategy "Kazakhstan-2030" (delivered in the 1997 President's message) as the key development vision of the country. Environmental protection was not among the seven long-term priorities of "Kazakhstan-2030", although it was mentioned as part of the long-term priority 4, "Health, education and wellbeing".

"Kazakhstan-2050" defines comprehensive economic pragmatism as the essence of the new economic policy, whereby all economic and managerial decisions are to be guided by economic efficiency and long-term interests. Comprehensive economic pragmatism also presumes the creation of a favourable investment climate to boost economic capacity. "Kazakhstan-2050" establishes the target for Kazakhstan to become one of the 30 most developed countries by 2050. It also includes the task to make Kazakhstan a global player in environmentally clean agricultural production.

Green economy and environmental protection are not mentioned among seven priority directions of "Kazakhstan-2050". The only environmental issues referred to in the document are water resources and RES. The Strategy includes the targets to raise the share of alternative and renewable energy sources in total energy consumption to 50 per cent by 2050, and to solve the problems with water supply to the population by 2020 and with irrigation water by 2040.

2015 Plan of the Nation "100 concrete steps"

The 2015 Plan of the Nation "100 concrete steps" does not include any measures on environmental protection or green economy but provides for a number of measures that had an impact on environmental regulation (e.g. development of the 2015 Law on Access to Information, amendments to the Land Code to place agricultural lands on the market, etc.)

2010 Strategic Plan for Development until 2020

The 2010 Strategic Plan for Development until 2020 (2010 Decree of the President No. 922, no longer valid) included a number of targets on green economy and environmental protection (introduced in November 2013), which were further included in the strategic plans of respective ministries, state programmes and programmes of development of territories (local level).

The implementation report published by the Ministry of National Economy in 2017 indicates that most targets were achieved in 2016. The target on RES (to raise the share of alternative energy sources in total energy consumption to at least 3 per cent by 2020) is indicated as "at risk of failure", since it reached 0.98 per cent (or 0.928 billion kWh) in 2016. The target for the share of gas-fuelled power stations in total energy production (20 per cent in 2020) was achieved ahead of time (21 per cent in 2016). The target to cover 100 per cent of the urban population with centralized sanitation by 2020 was on track in 2016 with 84 per cent of the urban population covered. The target to increase coverage of the rural population by centralized sanitation by 20 per cent by 2020 was also on track, with 11.2 per cent covered in 2016. The implementation report recognizes that the deadlines for some targets (e.g. for transfer to cleaner fuels) are to be postponed.

2018 Strategic Plan for Development until 2025

The 2018 Strategic Plan for Development until 2025 (2018 Decree of the President No. 636) replaced the 2010 Strategic Plan. Green economy and environmental protection are one of its seven policies. The following tasks are included: achievement of the commitments under the Paris Agreement; defining the sources of financing, consideration of green finance and investments; promotion of investments in green technologies; decarbonization of the economy; increased efficiency in use and protection of water resources; development of RES and improvement of conventional energy sources; conservation of biodiversity; development of low-waste economy; and waste management.

Only two indicators of the Strategic Plan (energy intensity of GDP and share of RES) refer to green economy and environmental protection. The rest of the areas are not covered by indicators, which may have an impact on the level of commitment and resources.

2013 Concept on Transition to Green Economy

Kazakhstan adopted a policy framework on green economy: the Concept on Transition to Green Economy (2013 Decree of the President No. 577) and Action Plan for the period 2013–2020 (2013 Resolution of the Government No. 750). The Concept explains the notions of green economy and how they apply to Kazakhstan and makes linkages to other strategic documents. Its additional value is that, in the absence of other strategic documents on environmental protection, this Concept has become de facto the only strategic document for the environmental sector.

Priority tasks of the Concept are to:

- Increase the efficiency of the use of resources (water, land, biological, etc.) and their management;
- Modernize the existing infrastructure and build a new one;
- Raise the well-being of the population and quality of environment through cost-effective ways of decreasing pressures on the environment;
- Increase national security, including water security.

The Concept repeats some relevant indicators from previous strategic documents and adds several new ones, e.g. on waste (to increase population coverage by waste collection services to 100 per cent in 2030; to increase recycling to 40 per cent in 2030 and 50 per cent in 2050).

The Action Plan included 119 measures originally and 141 altogether to be implemented in transport, energy, agriculture, forestry, tourism and other areas. The Action Plan has been modified four times: new measures were added and non-implemented measures were removed. Most measures are not infrastructural but, rather, refer to development of analyses and suggestions on particular green economy initiatives (e.g. to develop a plan of long-term phased implementation of measures to decrease emissions from TPPs).

There is no dedicated governmental funding for implementation of the Concept and its Action Plan. In fact, the Action Plan includes a column "Funding required, million tenge" but for the vast majority of measures it indicates that no funding is required.

Both the Concept and its Action Plan are well known in sectoral ministries as implementation reporting takes place annually. In 2017, a multi-year National Implementation Report was prepared to assess the overall results of implementation in the period 2013–2016.

The Concept and its Action Plan has undoubtedly triggered many actions, both on the policy level and on the ground, to move towards cleaner fuels, develop cycling, increase the quality of public transport, introduce dust-collecting systems in TPPs, etc. The successes also include the adoption in 2016 of the Law on Amendments to Legislation related to Green Economy (often referred to as the "Law on Green Economy" which in fact was a package of amendments to various legislative acts related to green economy issues) and the establishment of the Council on Transition to Green Economy in 2014.

The criticism aimed at the Concept and its Action Plan refers to their significant attention to energy and transport issues and lack of attention to environmental regulation, biodiversity, ecosystems and forests (very few measures on biological resources were deleted from the Plan in 2015), as well as lack of attention to investments, green technologies, green public procurement, reduction of subsidies with adverse environmental impact in energy and agriculture, environmental goods and services, and valuation of ecosystem services.

In 2018, the renewal of the Concept is taking place, primarily to take into account the recent international commitments of Kazakhstan under the Paris Agreement, 2030 Agenda for Sustainable Development and the OECD Declaration on Green Growth.

<u>Other policy frameworks on green economy</u>

In 2011 Kazakhstan developed the Green Bridge Partnership Programme (GBPP) to provide leadership for green economic growth in Central Asia and the wider region through promoting international cooperation and the facilitation of technology transfer, knowledge exchange and financial support. As of early 2018, 16 countries had joined the GBPP Charter. An action plan (roadmap) was adopted to facilitate the promotion of the GBPP as well as attract green technologies and facilitate green technology transfer through Kazakhstan's enterprises (No. 17-62/5336//3100-3 (2014)). Future initiatives under the GBPP include the establishment of an international centre for the development of green technologies and investment projects.

In 2015, the OECD and the Government of Kazakhstan signed a Memorandum of Understanding (MoU) on a two-year Country Programme to support a set of reforms of Kazakhstan's policies and institutions, including on green economy. In 2016, Kazakhstan adhered to the OECD's 2009 Declaration on Green Growth.

Strategic documents on the environment

In the first decade of the century, Kazakhstan had a number of strategies and programmes on environmental protection, e.g. 2003 Concept of Ecological Security, 1999 National Strategy and Action Plan on Conservation and Sustainable Development of Biodiversity, 2000 Concept of

Development and Management of Specially Protected Natural Areas until 2030, 2002 Programme "Drinking Water" for the period 2002–2010, 2004 Programme "Environmental Protection in the Republic of Kazakhstan for 2005–2007", 2005 Programme to Combat Desertification for 2005–2015, 2004 Programme "Forests of Kazakhstan" for the period 2004–2006, 2005 Programme "Zhasyl Yel" [forests and tree planting] for the period 2005–2007, 2007 Programme "Zhasyl Yel" for the period 2008–2010 and 2005 Programme for Conservation and Restoration of Rare and Endangered Species of Ungulates and Saigas for the period 2005–2007.

The 2010 Sectoral Programme "Zhasyl Damu" [Green Development] for the period 2010–2014 (2010 Resolution of the Government No. 924, invalidated in 2014), accompanied by an action plan, was the last comprehensive strategic document on the environment. It covered green economy (mostly energy efficiency and resource efficiency), air and water quality, waste management, climate change mitigation, biodiversity, protected areas, forestry, rehabilitation of polluted areas, environmental monitoring, environmental education, and research and development.

Since 2010, there was a trend of reducing the number of strategic documents by integrating their issues into larger documents. Planning in the environmental area has clearly suffered from this trend. The 2003 Concept of Ecological Security, invalidated in 2011, was never replaced by a document that would include the long-term vision for the environmental area in its entirety. Strategic documents on specific environmental issues have expired and were not replaced by new ones. There is currently no state programme and no governmental programme that would address environmental issues and allocate funding for them.

Environment-related issues are addressed in the strategic plans of the Ministries of Energy and Agriculture; however, these documents do not provide a long-term vision and cannot play the role of the overarching document on environment. The choice of indicators in these documents is far from ambitious. The currently valid Strategic Plan of the Ministry of Energy for the period 2017–2021 (2017 Order of the Minister of Energy No. 490), under Strategic Direction 3.1, includes target indicators with regard to the total volume of emissions into the air and discharges into water bodies. However, the target values are set with a "reserve" to ensure that the targets are met. For example, the total actual emissions into the air were 4.4 million tons in 2015 and 4.5 million tons in 2016. But the target set for 2017 by the Strategic Plan of the Ministry of Energy was 4.9 million tons. In early 2018, the Ministry reported to have successfully met the 2017 target with the actual volume of air emissions of 4.25 million tons.

Water

The "Ak Bulak" Programme for the period 2011–2020 (2011 Resolution of the Government No. 570) aimed to increase water supply coverage. Its measures included increased participation of the private sector in water management, increased water metering, and research of additional groundwater resources. The Programme was invalidated in 2014 and measures on water supply were integrated into the 2014 Programme for Development of the Regions until 2020 (2014 Resolution of the Government No. 728).

One of the five objectives of the Programme for Development of the Regions is effective and rational provision of drinking water and sanitation to the population. The Programme (revised version of 2016) aims to increase centralized water supply coverage from 80 per cent in urban areas and 51.5 per cent in rural areas in 2015 to 97 per cent and 62 per cent, respectively, in 2019. For centralized sanitation coverage, 82 per cent of the population in urban areas and 11 per cent in rural areas were covered in 2015, and the targets for 2019 are 97 per cent and 13 per cent, respectively. The implementation report for 2016 indicates the achievement by the end of 2016 of centralized water supply coverage of 88 per cent in urban areas and 52.3 per cent in rural areas and centralized sanitation coverage of 84 per cent in urban areas and 11.2 per cent in rural areas.

The 2014 State Programme for Management of Water Resources (2014 Decree of the President No. 786) aimed to ensure the availability of water for the population, the environment and economic sectors, increase the efficiency of water use and ensure the conservation of water ecosystems. The Programme was accompanied by an Action Plan for the period 2014–2020 (2014 Resolution of the Government No. 457) which provided for detailed allocation of financial resources. The implementation reports for 2014–2015 show that the effectiveness of achieving the planned indicators suffered from insufficient allocation of funding (35.3 per cent of the planned amount). Nevertheless, 60.4 per cent of planned activities were implemented. The Programme and its Action Plan were invalidated in 2017. Many of its measures and indicators were included in the 2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021.

Other planning documents in the water sector include the 2016 General Scheme of Integrated Use and

Protection of Water Resources developed in 2012 (2016 Resolution of the Government No. 200) and the basin-specific schemes of integrated use and protection of water resources. These documents include detailed description of available surface and groundwater resources and identify their current uses and prospects for future use. They serve as a basis for defining the limits on water use.

Waste

The 2014 Programme for Modernization of the Solid Waste Management System for the period 2014–2050 (2014 Resolution of the Government No. 634) aimed to rehabilitate the existing and construct new sanitary landfills, systematically introduce waste separation at source, improve the management of hazardous waste and increase recycling capacities. The Programme was invalidated in 2016. Its indicators were integrated into the Strategic Plan of the Ministry of Energy and the programmes of development of territories (local level). At national level, the 2013 Concept on Transition to Green Economy remains the only document with waste-related targets.

Sectoral development with a possible impact on the environment

Infrastructure development

The post-crisis new economic policy “Nurly Zhol” (economic stimulus) (introduced in the 2014 President’s message) and the State Programme of Infrastructure Development “Nurly Zhol” for the period 2015–2019 (2015 Decree of the President No. 1030) represent a major infrastructure development initiative. The policy and the State Programme cover many areas (transport, industrial and tourism infrastructure, energy infrastructure, housing and utilities, education infrastructure, etc.). On a strategic level, “Nurly Zhol” has been brought into synergy with the Belt and Road Initiative of the People’s Republic of China to maximize the economic effect (box 1.1).

Transport

Key environment-related issues in the transport sector include the aged vehicle fleet (61.01 per cent of registered passenger cars were over 10 years old at the beginning of 2018); low quality of domestically produced fuel; limited, though increasing, use of gas (compressed natural gas); lack of appealing, widely available and high-quality public transport services; and lack of infrastructure for cycling and walking.

Building modern transport infrastructure and integrating it into the international transport system are among the key objectives of the State Programme of Infrastructure Development “Nurly Zhol” for the period 2015–2019. Its transport-related provisions do not include environmental measures, but measures such as the introduction of intelligent transport systems or modernization of deteriorated transport infrastructure are expected to have an environmental effect.

Box 1.1: Cooperation with the Belt and Road Initiative

In August 2016, Kazakhstan and the People’s Republic of China signed the Plan of Cooperation on the Synergies between the New Economic Policy "Nurly Zhol" and the Belt and Road Initiative (2016 Resolution of the Government No. 518). The Plan, intended for a five-year period, identifies priority areas for cooperation:

- Transport infrastructure (promote the creation of transport corridors "China–Kazakhstan–West Asia", "China–Kazakhstan–Russian Federation–Western Europe" and "China–Kazakhstan–South Caucasus/Turkey–Europe" and improve transport infrastructure (roads, logistics terminals, airports, railways));
- Trade (stimulate trade in electrical equipment, electronic and information goods, photovoltaic products, national brand products, non-ferrous metals, oil and oil products and natural gas and develop coordinated policies on certification);
- Processing industry (develop cooperation in Kazakhstan’s special economic zones and in a number of industries, including biotechnologies and new sources of energy);
- Other (a number of areas, including municipal infrastructure, water supply and tourism).

The document does not include other provisions on environmental impacts of the planned measures but mentions the commitment of two countries to implement the agreements previously reached by the Joint Kazakhstan–China Commission on Environmental Protection (included in 2017 in the Kazakhstan–China Committee on Cooperation).

The Programme "National Export Strategy" (2017 Resolution of the Government No. 511) identifies six areas in which Kazakhstan has key export opportunities. The first area is transport. The Programme recognizes that an increase in the export of transport services will take place due to the transit potential of Kazakhstan’s part of the Belt and Road Initiative and points to the need to enhance the capacities of transport and logistics infrastructure. No provisions on environmental impact are included in the National Export Strategy.

Stronger impetus and guidelines for greening the transport sector are provided by the Action Plan of the Concept on Transition to Green Economy for the period 2013–2020. The implementation reports from many oblasts and Almaty City provide evidence of numerous measures implemented to improve the quality of public transport services, develop cycling-friendly infrastructure, move towards ecologically cleaner fuels and introduce electric cars (box 1.2).

In April 2017, the Vice-Minister of Investments and Development approved the Roadmap for Development of Electric Cars Production and Creation of the Necessary Infrastructure. The roadmap has three focus areas: local production (local raw materials and labour), development of infrastructure (charging stations) and raising awareness to stimulate the purchase of electric cars. This roadmap has already facilitated the creation of charging stations in the capital and in Almaty City. Local production of electric cars is to start in 2018.

Box 1.2: Implementation of the Concept on Transition to Green Economy in the transport sector in Almaty

Measures to green the transport sector in Almaty City include:

- Renewal of public transport vehicles (850 units or 55 per cent of vehicles renewed);
- Increase in the number of buses working on natural gas (from 600 to 737 units);
- Purchase of diesel-fueled buses of Euro-5 standard (185 units purchased);
- 400 taxis transferred to compressed natural gas and provided to private operators;
- 33 municipal vehicles work on compressed natural gas;
- Increase in the number of fuel stations providing gas fuel (70 of a total of 230 stations have gas filling equipment; of a total of 55,000 registered motor vehicles, 8,932 use mixed fuel and 1,531 use gas fuel);
- Purchase of 30 charging stations for electric cars (as of early 2018, 12 are installed) and identification of places to install other charging stations;
- 13 environmental posts function at the entrances to the city to control the toxicity and opacity of exhaust fumes from motor vehicles;
- Access restrictions for personal vehicles introduced in some streets;
- Cycling lanes reached 68 km.

Source: Almaty City Division of Natural Resources and Nature Use, 2018.

Photo 1: Bike rental station in Almaty

Energy

High energy intensity is among the key characteristics of the sector. Policy documents on energy saving and energy efficiency include the 2011 Integrated Plan on Energy Efficiency for the period 2012–2015 (2011 Resolution of the Government No. 1404) and the 2013 Programme "Energy Saving-2020" (2013 Resolution of the Government No. 904, invalidated in 2016). The outcomes of the Integrated Plan included the adoption of the 2012 Law on Energy Saving and Energy Efficiency Improvement and the development of more than 20 acts of subsidiary legislation. The Integrated Plan was "cascaded" into 16 oblast/city plans on energy saving.

The objectives of the Programme "Energy Saving-2020" included raising the energy efficiency of industry; decreasing losses in energy and heat networks; awareness-raising on energy saving among the population; and development of mechanisms to stimulate energy efficiency. The targets of the Programme were an annual decrease of 10 per cent in the energy intensity of GDP during the period 2013–2015 and a decrease in the energy intensity of GDP by 40 per cent in 2020 from the 2008 level. By 2017, the energy intensity of Kazakhstan's GDP, expressed in toe per US$1,000 in 2000 prices, had decreased by 18.18 per cent from the 2008 level (figure 10.1).

In 2016, the share of RES reached 0.98 per cent of total energy consumption. The 2013 Action Plan for Development of Alternative and Renewable Energy Sources for the period 2013–2020 (2013 Resolution of the Government No. 43, invalidated in 2017) included the lists and plans for location of wind, solar and hydro power stations to be constructed.

Kazakhstan has adopted targets on RES. By 2020, the electric power produced by RES should reach 3 per cent of total production (2016 Order of the Minister of Energy No. 478). The total capacity of RES facilities in 2020 should reach 1,700 MW, to come from wind plants (933 MW), solar plants with photovoltaic solar energy converters (467 MW), hydro energy (290 MW) and biogas plants (10 MW). The long-term target of the Strategy "Kazakhstan-2050" is to raise the share of alternative and renewable energy sources in total energy consumption to 50 per cent by 2050.

The 2014 Concept for Development of the Fuel and Energy Sector until 2030 (2014 Resolution of the Government No. 724) covers coal, oil, gas and nuclear energy, as well as power and heat supply. It states the strategic priorities of the sector: energy security, development of the resource base and improvement of the environmental situation. Key objectives of the sector until 2030 include: modernization of existing and construction of new energy generation capacities; development of internal markets and competition; modernization of industry and transport; introduction of modern technologies to increase energy efficiency and decrease adverse environmental impact; and development of technology and infrastructure for alternative energy sources, including nuclear. Targets include decreasing the energy intensity of GDP by 25 per cent in 2020 from the 2008 level.

The Concept also envisaged the modernization of the Atyrau and Shymkent oil refineries and Pavlodar petrochemical plant to enable them to produce fuels of ecological classes K4 and K5 (corresponding to Euro-4 and Euro-5 standards). Kazakhstan was granted exceptional delayed application of the technical regulations of the Customs Union ("On the requirements for automobile and aviation gasoline, diesel and marine fuels, fuel for jet engines and oil") until 1 January 2018. For a long time, K4 and K5 fuels were imported from abroad as they were in demand among owners of new cars (about one third of the vehicle fleet is 0–10 years old). Modernization of three oil refineries was completed by the end of 2018.

The 2014 Concept for Development of the Gas Sector until 2030 (2014 Resolution of the Government No. 1275) provides the vision and measures to increase the use of gas by development of gas transportation infrastructure and gasification of the regions, as well as stimulating the use of gas in transport. Currently, it is envisaged to merge this Concept with the Concept for Development of the Fuel and Energy Sector until 2030 in one revised Concept for Development of the Fuel and Energy Sector.

The 2014 Plan of Priority Actions on Construction of Nuclear Power Stations approved by Order of the Prime Minister provides for the development of feasibility studies for two nuclear power plants.

Housing

There are high levels of provision of housing to the population in Kazakhstan (on average, 21.6 m^2 per person in 2017, with 24.1 m^2 in urban areas and 18.2 m^2 in rural areas). However, housing infrastructure is not sufficiently developed, especially in rural areas. In 2017, water supply was available in 96 per cent of rural housing stock. However, only 37 per cent of rural housing stock had sanitation, 7 per cent had a bath or shower, 3 per cent had central heating, 2 per cent had a centralized hot water supply and 1 per cent had electric floor heating.

The 2010 Programme of Modernization of the Housing and Utilities Sector until 2020 (2010 Resolution of the Government No. 1146, invalidated in 2011) was the only strategic document that included a section with assessment of its environmental impact. The Programme was abolished five months after adoption.

The Programme "Accessible Housing 2020" (2012 Resolution of the Government No. 821, invalidated in 2014) aimed to attract private investment to construction of housing stock and promote public–private partnerships. The Programme focused on development of a construction industry that introduces new technologies and uses construction materials that meet energy efficiency and environmental soundness requirements.

The Programme for Development of Monotowns for the period 2012–2020 (2012 Resolution of the Government No. 683, invalidated in 2014) included some measures on housing maintenance and modernization and development of water, energy and heat supply in monotowns (towns where the entire population works in one or few industrial enterprises).

In 2014, the Programme "Accessible Housing 2020" and the Programme for Development of Monotowns for the period 2012–2020 were integrated into the 2014 Programme for Development of the Regions until 2020 (2014 Resolution of the Government No. 728). Modernization of municipal infrastructure, housing and utilities is one of four objectives of this Programme. The Programme is implemented through budget investment projects. The cumulative environmental effect of the project (reduction of air emissions and wastewater discharges, increased recycling rate and introduction of energy-saving technologies) is among four criteria for allocation of funding. By the end of 2016, implementation of the Programme had allowed an increase in the share of modernized/constructed heat, power and gas supply networks to 2.1 per cent of the total length of such networks.

The 2015 State Programme of Infrastructure Development "Nurly Zhol" for the period 2015–2019 has a section on modernization of infrastructure in the housing and utilities sector and municipal heat, water and sanitation networks. It used to have a housing construction component but this was removed at the end of 2016 and the new Programme of Housing Construction "Nurly Zher" (2016 Resolution of the Government No. 922) was adopted. The objectives include raising the accessibility of mortgage funding, the promotion of construction by the private sector and the promotion of rental housing for vulnerable groups in the population. The Programme does not mention resource efficiency and environmental standards in housing.

The 2013 Concept on Reform of the Regulatory Framework for the Construction Sector (2013 Resolution of the Government No. 1509) provides for the vision to revise the rules and regulations in the sector. It explicitly states that building rules should include minimum requirements for protection of human health and safety and the environment.

Industry

The 2011 Programme "Productivity 2020" (2011 Resolution of the Government No. 254, invalidated in 2016), aimed at modernization (technical refurbishment) of current production processes and increasing the competitiveness of enterprises in priority economic sectors. The Programme mentioned energy efficiency and green technologies as one of many aspects of increasing the efficiency of production processes. The Programme provided for compensating enterprises for expenditures on modernization of technological processes. No information on the environmental effects of this programme is available.

Among other things, the State Programme of Industrial and Innovative Development for the period 2015–2019 (2014 Decree of the President No. 874) underscores the global trend of increasing the environmental requirements for the metallurgic industry. This is not reflected in the Action Plan and indicators of the Programme, however.

The development of industrial infrastructure – namely, special economic zones – is reflected in the State Programme of Infrastructure Development "Nurly Zhol" for the period 2015–2019. No specific environment-related provisions are included in this, however.

The 2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021 has a target to increase water recycling and recirculation in industry: water recycling from 0.69 km^3 in 2015 to 0.77 km^3 in 2021; recirculation from 7.3 km^3 in 2015 to 7.62 km^3 in 2021.

Agriculture

The 2010 Programme on Development of the Agro-industrial Complex for the period 2010–2014 (2010 Resolution of the Government No. 1052) was replaced in 2013 by the Programme on Development of the Agro-industrial Complex "Agribusiness-2020" (2013

Resolution of the Government No. 151). The Programme aimed at the financial revival of agro-industrial enterprises and increased effectiveness of regulation. In 2016, the revised version of the Programme was issued as “Agribusiness-2017”. “Agribusiness-2017” included the objective to establish conditions for production and marketing of organic products, namely, to establish the legal framework, introduce the system of control at all stages of production of organic products and develop inspection and certification procedures and mechanisms for support of producers. In 2017, the Programme was invalidated.

The 2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021 (2017 Decree of the President No. 420) recognizes the challenges for development of organic production, such as the lack of a certification system in the country, lack of laboratories, low awareness of agricultural producers and the population of the advantages of organic production and insufficient reuse of waste in agriculture. The State Programme envisages developing the requirements and harmonizing the rules for production and certification of organic products with international requirements. It is also planned to introduce statistical reporting on production, sales, export and import of organic products and to organize awareness campaigns. In addition, the Programme includes measures on water use by agriculture. The target is to decrease water use for every 1 ha of irrigated land by 20 per cent to the level of 2015 (i.e. from 9,180 m^3 in 2015 to 7,348 m^3 in 2021).

Forestry

In early 2017, the state forest fund occupied 29.4 million ha or 10.8 per cent of the country’s territory. The areas covered by forests were only 12,706 thousand ha, or 43.2 per cent of the state forest fund. The forest cover of the country is 4.7 per cent. The private forest fund is 695 ha and does not include areas covered by forests.

There is no programme on forestry, reforestation and afforestation. These activities are performed according to the Strategic Plan of the Ministry of Agriculture; however, the lack of a long-term vision and adequate funding is clearly felt.

Tourism

The objectives of the State Programme of Infrastructure Development “Nurly Zhol” for the period 2015–2019 include the development of tourism infrastructure. Its Action Plan includes 13 activities, such as construction of sewerage systems and roads to selected tourism destinations.

The 2017 Concept of Development of the Tourism Sector until 2023 (2017 Resolution of the Government No. 406) identifies six touristic clusters (destinations) to be supported. Each cluster includes a number of key sightseeing places. Many of these places are protected areas. The Concept provides that: general plans of the specially protected natural areas are to be reviewed by the governmental body responsible for tourism; procedures for allocation of land plots to long-term and short-term use in state national nature parks will be simplified; and ecotourism passes will be equipped to allow access by persons with limited mobility. The Concept also describes measures to develop various types of tourism, including agrotourism and hunting and fishing tourism.

Health

In the early 2000s, Kazakhstan had a National Action Plan on Environmental Health (2000 Resolution of the Government No. 878). No similar plan was developed subsequently.

The 2010 State Programme for Development of the Public Health System “Salamatty Kazakhstan” for the period 2011–2015 (2010 Decree of the President No. 1113) had very important outcomes, e.g. a decline in maternal mortality by 1.9 times (from 22.7 per 100,000 births in 2010 to 11.7 per 100,000 births in 2014), a decline in infant mortality by 1.7 times (from 16.58 per 1,000 live births in 2010 to 9.72 per 1,000 live births in 2014) and a decline in morbidity from tuberculosis by 30.3 per cent (from 95.3 per 100,000 population in 2010 to 66.4 per 100,000 population in 2014). It did not have a focus on environmental health, though some activities were relevant to environmental health (e.g. promotion of healthy lifestyle, strengthening road safety and food safety).

The 2016 State Programme for Development of the Public Health System “Densaulyk” for the period 2016–2019 (2016 Resolution of the Government No. 176) aims to further improve the public health system, strengthen prevention of diseases and increase the efficiency of management and financing. Among other measures, improvement of the public health system is to be achieved through introduction of standards on resource and energy efficiency and the environmental friendliness of health institutions. The Programme provides that the health system should play a role in increasing the awareness and involvement of the population in action to reduce the adverse impact of environmental factors. It also envisages the development of a risk map of environmental pressures on human health.

Information technologies

The 2013 State Programme “Informational Kazakhstan-2020” (2013 Decree of the President No. 464, invalidated in 2018) covered the use of information and communications technologies (ICT) to control emissions and energy efficiency and the use of ICT-based systems for environmental monitoring. It pointed out the need to develop a unified state information system of environmental and natural resources monitoring. Targets of the State Programme included a gradual increase in the coverage of the national territory by the unified state information system of environmental and natural resources monitoring and an increase in the share of category I industrial enterprises with installed automated self-monitoring that transmit data online.

Another state programme, “Digital Kazakhstan” (2017 Resolution of the Government No. 827), adopted in 2017, envisages support to building the unified state information system of environmental and natural resources monitoring. Activities to be introduced, including automatic monitoring of fisheries, biodiversity, specifically protected natural areas, water resources and water infrastructure, are also envisaged in the State Programme.

Other programmes

The 2017 Programme to Attract Investments “National Investment Strategy” (2017 Resolution of the Government No. 498) does not include specific measures to promote/attract green investment.

The 2015 Unified Programme for Support and Development of Business “Roadmap for Business 2020” (2015 Resolution of the Government No. 168) aims to promote entrepreneurship and business in rural areas, small towns and monotowns by increasing access to finance. Its objectives include, among others, support to business projects in energy and resource efficiency (energy audits, certification, introduction of energy management systems and introduction of RES). Information on projects that received subsidies, guarantees and microcredits through the Programme is available but is not disaggregated by substantive area.

Strategic documents at subnational level

Since 2013, the authorities at subnational level can no longer develop and adopt environmental protection programmes, programmes on protection of forests and use of forests and afforestation, and programmes for the protection, reproduction and use of fauna. The key document at local level is the programme of development of a territory (oblast, city, town, etc.). Such a programme must integrate all relevant aspects, including environmental ones. For example, the Programme of Development “Almaty-2020” includes the sections “Good roads and transport”, “Clean environment” and “Reliable housing and utilities infrastructure”, which reflect tasks and measures to improve the environmental situation through raising energy efficiency, greening the transport system, increasing green areas and improving solid waste management and recycling. Programmes of development are accompanied by action plans. Annual reports are prepared and publicly available. Texts of the programmes of development and action plans are regularly revised based on the emerging tasks and outcomes of reporting.

As implementation of waste management policy has been transferred, in 2014, to subnational level and the republican budget generally does not allocate funding for waste management to local budgets, waste management is addressed in the programmes for development. In addition, local authorities develop roadmaps at oblast level (which may include activities for specific rayons). Such roadmaps provide for activities to increase the population coverage of waste collection services, to introduce waste separation at source and recycling. For example, in Northern Kazakhstan Oblast, two documents on waste management are in place: 2015 Programme for Modernization of the Solid Waste Management System of the Northern Kazakhstan Oblast for the period 2015–2030 and the 2016 Northern Kazakhstan Oblast Roadmap to Implement Separate Collection, Sorting and Disposal of Solid Municipal Waste and Cooperation of Local Executive Authorities with Specialized Waste Management Operators until 2020. Local executive authorities report twice a year to the Ministry of Energy on implementation of the roadmaps.

Another policy document at subnational level is an integrated plan on energy saving and energy efficiency, adopted for several years. In 2017, 12 oblasts and Almaty City had such valid plans (approved in 2014, 2015 or 2016) and two oblasts and the capital had developed such plans. In 2017, the Ministry for Investments and Development published a ranking based on assessment of efforts by the oblasts to implement energy efficiency policies.

Other relevant policy documents include plans for management and use of pastures approved at a lower (rayon) level.

Strategic environmental assessment

While Kazakhstan has a well-developed strategic planning system, SEA (the procedure of assessment of the environmental impacts of future strategic documents) is not part of it. Sectoral strategic documents almost never include an analysis of their environmental impact.

During the period 2015–2018, the Joint EU/UNDP/ECE project "Supporting Kazakhstan's Transition to a Green Economy Model", among other activities, has assisted Kazakhstan to introduce SEA. The legislative analysis commissioned by the project in 2017 concludes that Kazakhstan's legislation includes few elements similar to the SEA elements:

- The legislation requires mandatory EIA for some documents of the state planning system (e.g. some types of urban construction planning);
- EIA used to exist for development of state, sectoral and regional programmes for economic sectors (Rules approved by the Order of the Minister of Environmental Protection dated 9 June 2003 No. 129-p) but the relevant rules were abolished in 2010;
- There is a procedure of consent to be given by the governmental body in charge of environmental protection to the drafts of plans and programmes for development and strategic plans developed by local executive authorities at oblast level and in the cities of republican significance and the capital; this procedure involves the review of the environmental section of those draft documents (Order of the Minister of Environmental Protection dated 27 March 2012 No. 78-p);
- Some state plans and programmes (general plans of development of towns and territories, forestry projects in the state forest fund) are currently subject to SEE but not EIA.

These and several other requirements resemble some elements but do not cover the scope and procedural steps of the SEA mechanism as envisaged by the 2003 Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (Protocol on SEA), or Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment, or the 2006 OECD DAC Guidance on Applying Strategic Environmental Assessment.

As SEA is a new concept for Kazakhstan, in 2017–2018, the project assisted Kazakhstan to conduct, on a pilot basis, an SEA of the Concept for Development of the Fuel and Energy Sector until 2030, which was under revision.

The key challenge for introducing SEA into the country's strategic planning system is the lack of understanding of what the instrument actually is. SEA is often misinterpreted as being not in line with the overall trend of decreasing environmental regulation. As Kazakhstan's EIA/SEE system is rather different from the EIA system of many other countries, there are also concerns that the SEA tool may be "adapted" in Kazakhstan and may divert from the SEA instrument as envisaged by the Protocol on SEA and practised in EU Member States and many OECD Member countries. Another challenge is the lack of a national environmental authority independent from sectoral ministries that would be in charge of conducting an unbiased review of SEA documentation. Relevant issues also include staff constraints and the need for training on SEA issues.

An important aspect for the introduction of the SEA tool is to build a coherent SEA and EIA framework that excludes, as much as possible, duplication in collection of data and information as part of these procedures.

1.3 Sustainable Development Goals

Millennium Development Goals

Kazakhstan prepared reports on implementation of the Millennium Development Goals (MDGs) in 2002, 2005, 2007 and 2010. The report of 2007 included an MDG+ agenda with additional goals adapted for Kazakhstan (e.g. to halve poverty among the rural population and to achieve universal secondary education). No final MDG implementation report was prepared.

Institutional set-up for coordination of Sustainable Development Goals implementation and monitoring

In 2017, Mainstreaming Acceleration and Policy Support (MAPS) under the leadership of the UNDP Seoul Policy Centre prepared a MAPS report with the purpose to identify issues and milestones to assist the Government in formulating its roadmap to implement the Sustainable Development Goals. The report called for a whole-of-government approach for the realization of the Sustainable Development Goals and provided recommendations on adapting Sustainable Development Goals to national and local circumstances, including by setting achievable yet ambitious national targets for the Sustainable Development Goals and by localizing the Sustainable Development Goals further through contextualizing them to conditions in different oblasts and rayons.

In August 2018 the Government developed the following institutional structure for coordination of Sustainable Development Goals implementation and monitoring:

- Coordination Council chaired by the Deputy Prime Minister as a high-level body in charge of overall guidance, with meetings twice a year;
- Five intergovernmental working groups (Peace; People; Planet; Prosperity; Partnership), meeting on a quarterly basis and responsible for discussion and development of recommendations to achieve the relevant Sustainable Development Goals in Kazakhstan;
- Ministry of National Economy as a body in charge of overall coordination of Sustainable Development Goals implementation;
- Committee on Statistics as a body responsible for monitoring of Sustainable Development Goals in coordination with intergovernmental working groups;
- JSC Economic Research Institute as a working body/secretariat, responsible for organizational support to the meetings of the Coordination Council and intergovernmental working groups and preparation of reports on Sustainable Development Goals implementation.

The intergovernmental Working Group "Planet" headed by the Minister of Energy was established and had its first meeting in October 2018. This Working Group is responsible for the issues of rational use of terrestrial and water ecosystems and climate change under five Sustainable Development Goals, 46 targets and 56 indicators:

- Goal 6. Ensure availability and sustainable management of water and sanitation for all, 8 targets, 11 indicators;
- Goal 12. Ensure sustainable consumption and production patterns, 11 targets, 13 indicators;
- Goal 13. Take urgent action to combat climate change and its impacts, 5 targets, 8 indicators;
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development, 10 targets, 10 indicators;
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss, 12 targets, 14 indicators.

Sustainable Development Goals in the national policy framework

In 2017, the Rapid Integrated Assessment exercise reviewed 18 medium- and long-term state and regional strategic documents to match them against Sustainable Development Goals targets and 126 selected indicators. The findings showed that there was a fair amount of common coverage between the national and sectoral plans and Sustainable Development Goals targets (61 per cent). Nevertheless, there are important gaps in alignment with some goals, including the environmental sustainability goals. The report mentions the low level of coverage of Goals 12 (sustainable consumption and production), 13 (climate change), 14 (marine resources) and 15 (lands).

As of March 2018, Sustainable Development Goals are mentioned in two policy documents: the 2018 Strategic Plan for Development of the Republic of Kazakhstan until 2025 (2018 Decree of the President No. 636) and the 2017 Main Directions of the State Policy of the Republic of Kazakhstan on Official Development Aid for the period 2017–2020 (2017 Decree of the President No. 415). No systematic effort has yet been applied to explicitly integrate Sustainable Development Goalsinto sectoral programmes and plans.

Indicators

The Committee on Statistics under the Ministry of National Economy implemented a gap analysis to determine the availability of data for Sustainable Development Goals indicators. In addition, in cooperation with ECE and the Food and Agriculture Organization of the United Nations (FAO), it organized several thematic workshops on environmental and agricultural statistics. An Interagency Working Group to develop the system of Sustainable Development Goals monitoring was established with the participation of governmental authorities, the private sector, state-owned enterprises, NGOs, agencies of the United Nations system and development banks.

In December 2018, the Committee on Statistics presented a draft indicator framework for Sustainable Development Goals monitoring, consisting of 257 indicators, to the Coordination Council on Sustainable Development Goals. It was tasked to finalize and consult upon the final set of indicators until the end January 2019. The first report on Sustainable Development Goals statistics was prepared in the framework of the Government of Kazakhstan/World Bank Joint Economic Research Program (JERP) in June 2018. It includes data since 2010 on 125 available indicators (of 257 in total).

In late 2018, the Committee on Statistics launched a section for Sustainable Development Goals reporting on its website under the title "Monitoring of the Sustainable Development Goals until 2030".

Major challenges identified by the Committee on Statistics include: the need for disaggregation of data; the lack of methodology for some Tier III indicators; the needs for training of governmental officials on and outside the Committee; the need to strengthen coordination and cooperation with other governmental bodies that will act as data providers.

Awareness and ownership

As of mid-2018, the Sustainable Development Goals are poorly known among governmental officials of central government authorities and at subnational level. Most officials have heard about the Sustainable Development Goals at the level of the goals but do not know specific targets that are relevant to their work. Implementation of Sustainable Development Goals takes place as part of regular activities of the ministries and other governmental institutions. However, no effort was applied to explicitly integrate Sustainable Development Goals into national strategic documents and to explain the relevance of the global goals for Kazakhstan.

1.4 Institutional framework for the environment and green economy

Since 2008, the institutional framework for environmental protection, at that time centred around the then Ministry of Environmental Protection, experienced several reorganizations. In May 2012, territorial bodies of the Ministry were reorganized, namely, six departments of ecology under the Ministry's Committee of Environmental Regulation and Control were split into 16 departments of ecology (2012 Resolution of the Government No. 656). In October 2013, the Ministry of Environmental Protection was transformed into the Ministry of Environment and Water Resources (2013 Decree of the President No. 677). This involved: (a) the transfer of competences on water supply from the Ministry of Agriculture, and (b) the transfer of competences on groundwater use from the then Ministry of Industry and New Technologies.

A major restructuring of the institutional framework for environmental protection took place in August 2014 as part of a larger reform of governmental institutions (2014 Decree of the President No. 875) when the Ministry of Environment and Water Resources was abolished. The functions of the dismantled Ministry with regard to development and implementation of policy on natural resources, waste management, development of RES and control of implementation of the green economy policy were vested with the Ministry of Energy. The functions of the former Ministry of Environment and Water Resources with regard to development and implementation of policy on fisheries, water management, forests and fauna passed to the Ministry of Agriculture.

Since August 2014, the Ministry of Energy is a designated governmental authority on environmental protection. Many other governmental institutions have various competences related to the environment and green economy.

No governmental body is responsible for flora. The Committee on Forestry and Fauna under the Ministry of Agriculture is in charge of flora only in forests and protected areas.

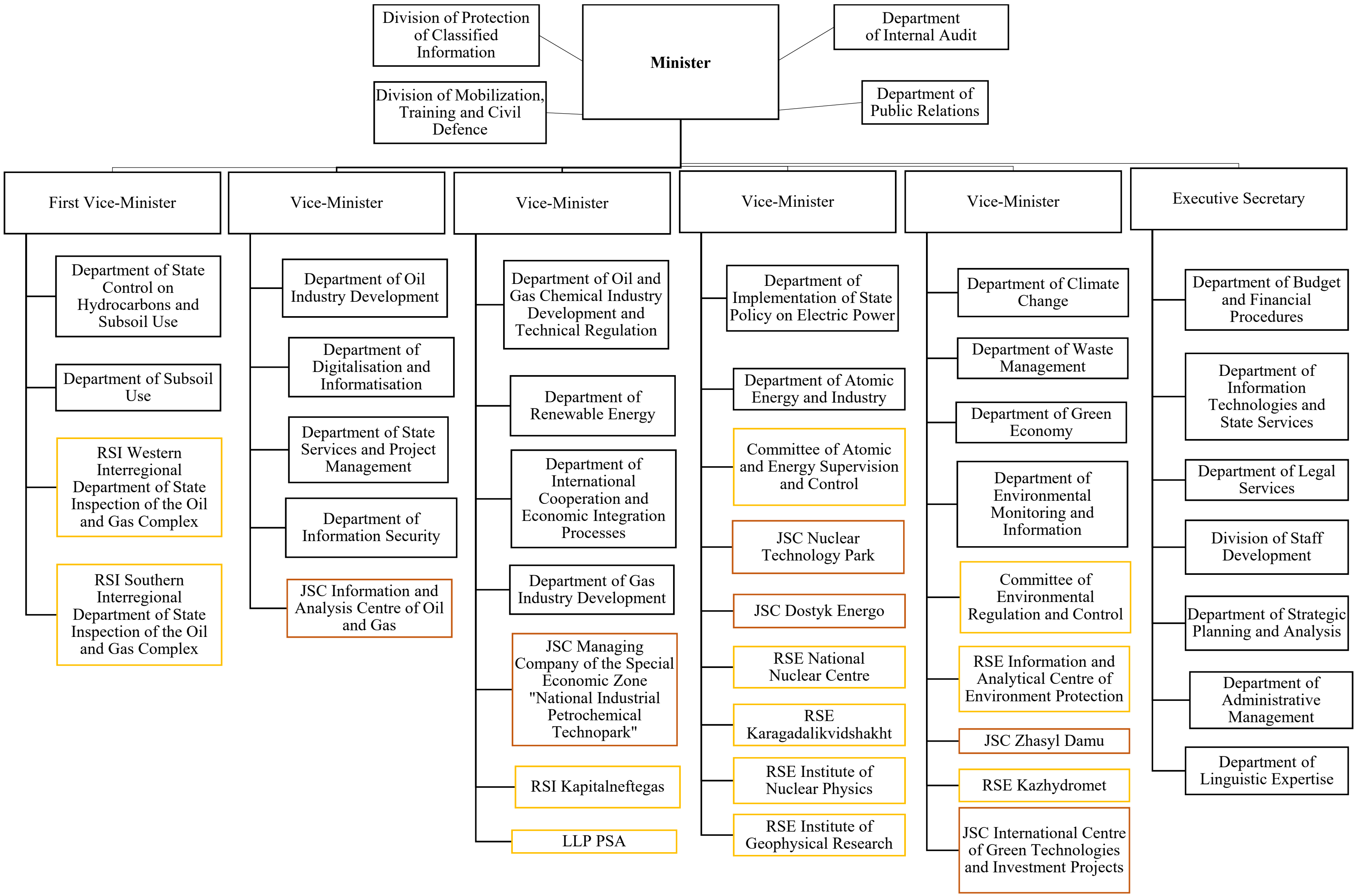
Ministry of Energy

The Ministry of Energy is in charge of the development and implementation of state policy on the oil and gas industry, products and transportation; gas, power and heat supply; the coal industry; the nuclear industry; environmental protection; the use, protection, control and surveillance over the use of natural resources; solid waste management; development of RES; and control over the green economy policy implementation. The Ministry also has some responsibilities with regard to protection of the climate and ozone layer, GHG emissions inventory and abandoned hazardous waste (2014 Resolution of the Government No. 994).

Although the Ministry of Energy is a designated governmental authority on environmental protection, only five departments deal with environmental issues (figure 1.1).

The number of staff in these departments has remained constant in the period 2015–2018: 11 staff in the Department of Environmental Monitoring and Information, 13 in the Department of Waste Management, 8 in the Department of Climate Change, 10 in the Department of RES, and 10 (2015–2016) or 9 (2017–2018) in the Department of Green Economy. The departments in charge of energy issues are relatively better staffed (e.g. 24 staff in the Department of Subsoil Use, 21 in the Department of Oil Industry Development and 19 in the Department of Atomic Energy and Industry).

Figure 1.1: Organizational chart of the Ministry of Energy



Source: Ministry of Energy, 2018.
Note: JSC = Joint Stock Company; LLP = Limited Liability Partnership; RSE = Republican State Enterprise; RSI = Republican State Institution.

Four of the five departments that deal with environmental issues are subordinated to one Vice-Minister who leads the environmental portfolio of the Ministry. The Department on RES is not subordinated to the Vice-Minister who leads the environmental portfolio, but to the Vice-Minister in charge of the oil and gas industry.

Overall, the scope of issues covered by these five departments is limited, to ensure comprehensive development of environmental policy and the fulfilment by the Ministry of the role of the designated governmental authority on environmental protection.

Committee of Environmental Regulation and Control

The Committee of Environmental Regulation and Control is an agency subordinated to the Ministry. The Chairperson of the Committee is appointed by the Minister. The budget of the Committee is part of the Ministry’s budget, although the Committee has its own Department of Budget and Finance.

The functions of the Committee of Environmental Regulation and Control (Regulation approved by the 2014 Order of the Minister of Energy No. 62) include:

- Environmental permitting (namely, the issuance of permits for emissions for category I installations, integrated environmental permits and permits for the use of ozone-depleting substances (ODS));
- Organization of state ecological expertise for category I installations;
- Issuance of requests for mandatory environmental audit;
- Licensing of environmental activities such as development of emission/discharge limit values for category I installations and environmental audit;
- State control over compliance with environmental legislation, that is, environmental inspections.

The Committee’s central office has seven departments (Department of Metrological and Analytical Control; Department of State Ecological Control; Legal Support Department; Department of Budget and Finance; Department of Licensing and Permitting; Department of State Ecological Expertise; Department of Administration and Human Resources). As of 2018, the Committee has 16 territorial bodies (14 in oblasts and one each in Almaty City and the capital) called “departments of ecology”. Overall, the Committee has experienced a decrease in staff. The number of staff of the central apparatus of the Committee declined from 60 in 2015 to 54 in 2018. The staff of its territorial bodies declined from 485 in 2015 to 466 in 2018. Some decline in staff took place when the e-government system was introduced. Some departments of ecology have to attract additional staff on a temporary basis: for example, in the Department of Ecology of Karaganda Oblast, 39 staff (of whom 27 are inspectors) are civil servants and 19 staff work on a contractual basis. The central apparatus of the Committee experienced a high turnover of staff in the period 2014–2018.

The departments of ecology of the Committee of Environmental Regulation and Control, although functioning at local level, are subordinated only to the Committee, meaning that there is no parallel subordination to local executive authorities. The departments of ecology register the hazardous waste passports, issue permits for emissions for category I installations (this competency is shared with the central office of the Committee), issue the conclusions of SEE for category I installations and conduct inspections. Inspectors from the central office of the Committee can join any inspection done by any department of ecology.

Compliance promotion is not formally listed as a function of the Committee. Active compliance promotion activities by the Committee and its departments of ecology are at the inception stage. Examples of such activities include awareness-raising campaigns (articles in newspapers, interviews on TV) and meetings with business associations to explain changes in the legislation and discuss problematic compliance issues.

Overall, the subordination of the key regulatory and enforcement authority in the environmental area to the Ministry in charge of a key polluting sector is an issue of great concern. The freedom of the Committee’s staff to decline to issue/renew a permit or impose strict sanctions on polluters in the event of non-compliance is limited by the concerns of keeping a job.

RSE Information and Analytical Centre of Environment Protection

The RSE Information and Analytical Centre of Environment Protection (IACEP) under the Ministry of Energy, which employs 48 staff in 2018, provides information and analytical support to the Ministry for planning and implementation of environmental protection activities and citizens’ right to a healthy environment.

IACEP maintains the State Environmental Information Fund, implements the state service “provision of environmental information”, supports the information system of natural resources cadastres and maintains the State Cadastre of Waste from Production and Consumption. Upon request of the Ministry, the IACEP leads the process of preparation of the annual SoER. It runs the SPRTR and an environmental legislation database, “EcoInfoPravo”. It works on environmental awareness of the population and organizes training on environmental issues for staff of the Ministry’s subordinated organizations, territorial bodies of the Committee of Environmental Regulation and Control, local executive authorities and other stakeholders.

RSE Kazhydromet

RSE Kazhydromet is responsible for weather, hydrological, agrometeorological and environmental (air, surface water, soil) monitoring and issuing emergency warnings on disasters. It employs 3,443 staff across Kazakhstan.

JSC Zhasyl Damu

In 2012, the former Kazakh Scientific and Research Institute of Ecology and Climate was reorganized into JSC Zhasyl Damu (2012 Resolution of the Government No. 978). JSC Zhasyl Damu manages abandoned hazardous waste, which was transferred to the national property by a court. It also provides technical and advisory support to the Ministry of Energy on implementation of climate change commitments (two departments function in this respect: one is responsible for national ETS regulation and the other for the GHG emissions inventory and the register of carbon units). Of all subordinated organizations of the Ministry, JSC Zhasyl Damu is the only one to have experienced a significant decline in staff numbers in recent years: from 106 in the period 2014–2016 to 70 in 2017–2018.

Ministry of Agriculture

Significant competences on the environment are vested with several committees under the Ministry of Agriculture (figure 1.2).

Committee on Water Resources

During the review period, the Committee on Water Resources was brought for a short time (from February 2013 to September 2014) under the auspices of the then Ministry of Environment and Water Resources. During the rest of the review period, it has been under the Ministry of Agriculture. While the total number of staff positions (186) stayed the same in the period 2014–2018, there has been a reduction in the actual numbers of staff (from 176, of whom 136 were in the basin inspections, in 2014, to 169, of whom 131 are in the basin inspections, in March 2018).

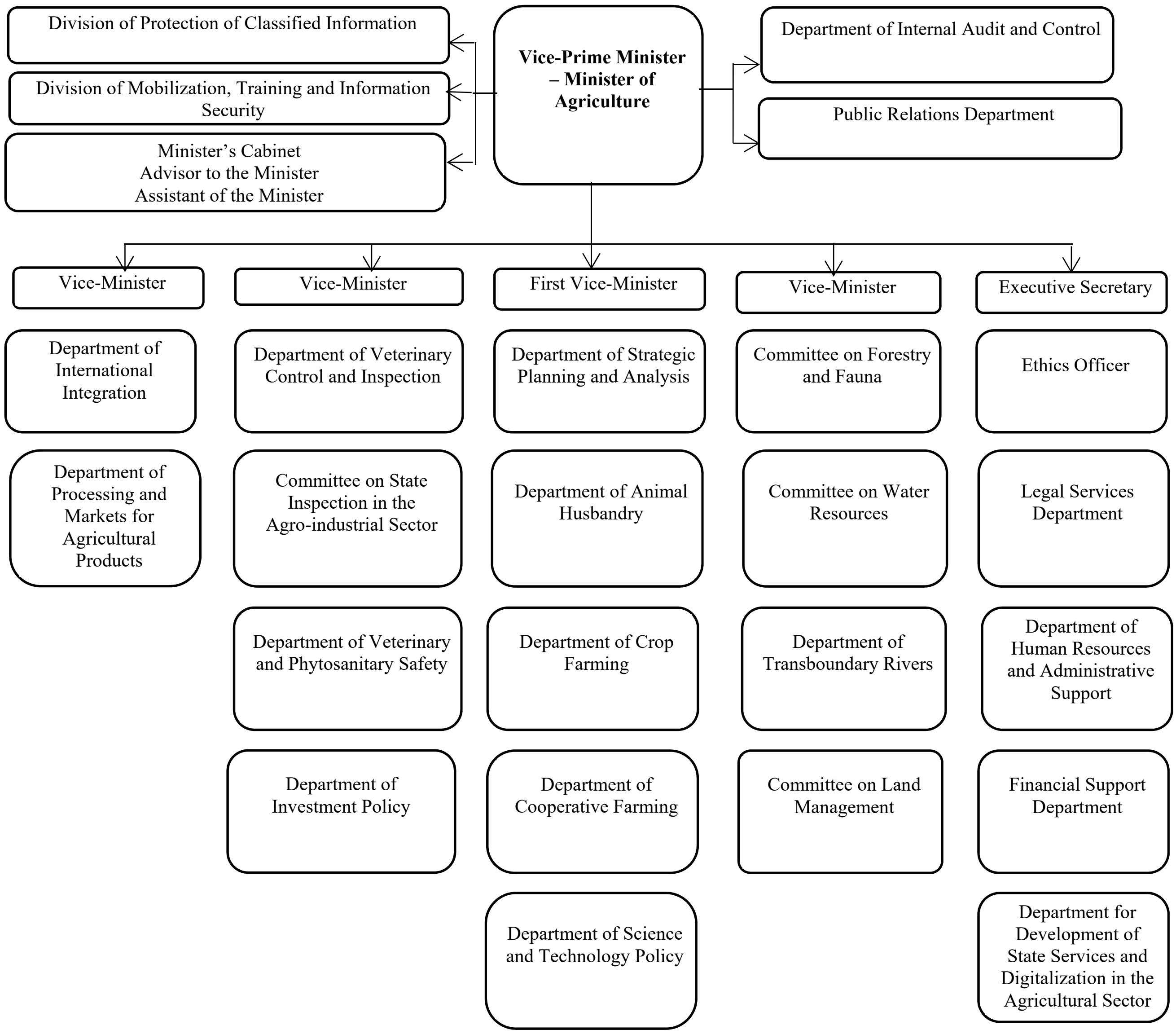
The Committee’s functions include coordination of the implementation of state policy on water management, and regulation and control in the area of water management (2016 Order of the Minister of Agriculture No. 475). With agriculture being among key water uses, there remains an inherent conflict of interest since the Committee on Water Resources does not have an equally distant relationship with all water users.

Subordinated organizations of the Committee include, among others, RSE Kazvodhoz. Kazvodhoz was created in 2011 by merging more than 20 vodhozes (state water management enterprises) and enterprises in charge of hydrotechnical installations. Kazvodhoz is responsible for use and maintenance of hydrotechnical infrastructure (about 78 large facilities) and canals for irrigation water. Kazvodhoz is also in charge of use and maintenance of more than 30 large water supply pipelines to the point where they reach human settlements (in human settlements, water supply is the competence of municipal enterprises and local authorities).

Eight basin inspections on the use and protection of water resources are the territorial bodies of the Committee. Basin inspections cover hydrographic basins, which extend over the territories of several oblasts. Basin inspections are in charge of integrated water resources management, state control over the use and protection of water resources, and coordination of water uses in a basin through implementation of basin agreements and providing support to the activities of basin councils.

Basin inspections issue three types of permits for special water use: for water abstraction and/or use from surface water bodies; for discharge of industrial, household, drainage and other wastewater; and for use of groundwater resources. They also give their consent to the construction and other works at water bodies and in water protection zones and strips. In 2014, basin inspections were entrusted with a new area of work – to conduct inspections to ensure the safety of hydrotechnical facilities. A major issue is the lack of relevant expertise in basin inspections to accomplish this task.

Figure 1.2: Organizational chart of the Ministry of Agriculture



Source: Ministry of Agriculture, 2018.

Basin inspections provide substantive support to the annual meetings of consultative bodies – the basin councils. Previously, there have been financial problems in organizing regular meetings of basin councils. In the last three years, the republican budget provided support to finance the organization of annual meetings of all basin councils. However, most councils still lack financial resources for implementation of concrete activities beyond regular meetings.

Basin inspections are clearly understaffed. As of March 2018, 131 staff altogether in eight inspections covered close to 3,080 primary and more than 40,000 secondary water users. For example, the Nura-Sarysu Basin Inspection, with 14 staff (as of March 2018), of whom only four are inspectors, has to cover the territory of the Nura drainage basin (58,100 km^2), the Sarysu drainage basin (81,600 km^2) and Tengiz and Karasor lakes.

Department of Transboundary Rivers

The Department of Transboundary Rivers is not part of the Committee on Water Resources but a separate structure within the Ministry. As seven of the eight major drainage basins in Kazakhstan are transboundary, the Department is in charge of Kazakhstan's bilateral water cooperation with Kyrgyzstan, the People's Republic of China and the Russian Federation, as well as multilateral cooperation, including in the framework of the International Fund for saving the Aral Sea (IFAS) and its Interstate Commission for Water Coordination (ICWC).

Committee on Forestry and Fauna

In 2014, following the 2014 Decree of the President No. 875, the Committee on Forestry and Hunting and the Committee on Fisheries of the then Ministry of Environment and Water Resources were merged into the Committee on Forestry and Fauna of the Ministry of Agriculture (2014 Resolution of the Government No. 1002). The same transformation happened to the territorial bodies of the two committees.

The Committee on Forestry and Fauna (2016 Order of the Minister of Agriculture No. 408) has strategic, regulatory, implementation and control functions in forestry, fauna and specially protected natural areas. It is also responsible for fisheries though this is not reflected in the title of the Committee. In the area of forestry, the functions of the Committee include reforestation and afforestation, state control over protection of forests from fires and pests, state control over felling and approval of annual felling volumes on the territory of the state forest fund. With regard to protected areas, the Committee manages protected areas that are assigned to it, implements state control over enforcement of protected area regimes and issues permits for some activities in protected areas. In the area of fauna, the Committee issues permits for the use of fauna and CITES permits and controls the implementation of rules on hunting and fishing. As of early 2018, there are 52 staff in the central apparatus of the Committee, of whom 11 work on forests and specially protected natural areas, eight on fauna and hunting, eight on fish protection and regulation of fishing, and five on fish reproduction and aquaculture; the rest are managerial and administrative staff.

The Committee has 14 territorial bodies, called oblast territorial inspections of forestry and fauna. These territorial bodies are subordinated only to the Committee (meaning there is no double subordination to local executive authorities). Staff and equipment are the main concern: for example, in the Karaganda Oblast Territorial Inspection of Forestry and Fauna, 41 staff (of whom 37 are inspectors) are responsible for 42 million ha. Oblast territorial inspections of forestry and fauna also issue permits for regulation of the numbers of certain fauna populations.

Subordinated organizations of the Committee include state-level protected areas, state forestry enterprises (leskhozes), state fishery farms, and the Kazakh State Forestry Research Institute "Kazgyproleskhoz". Leskhozes in Kazakhstan deal mostly with the protection of forests rather than forest harvesting, due to the limited forest availability and the availability of other fuels. Therefore, the conflict of interests common in many other states when a governmental body in charge of forestry does both forest harvesting and forest protection is not present in Kazakhstan.

In 2018, the number of staff in the Committee on Forestry and Fauna (central apparatus and territorial inspections) was 689.

Committee on Land Management

Prior to February 2013, the body in charge of land management existed as the Agency of Land Management. In February 2013, it became the Committee on Land Management under the then Ministry of Regional Development. In 2014, the Committee was brought under the Ministry of National Economy, and since 2016, it is under the Ministry of Agriculture. Among other functions, the Committee is in charge of ensuring the rational and effective management of land resources. It also does state control with regard to land issues.

Ministry of National Economy

The Ministry of National Economy is responsible for, among other matters, national strategic planning, tax, budget, investment and trade policies and regional development policies. It has a leading role in coordinating the implementation and monitoring of the 2030 Agenda for Sustainable Development.

The Committee on Regulation of Natural Monopolies, Protection of Competition and Consumer Rights under the Ministry deals with these three areas. The regulation and control over electric power producers and suppliers is outside the scope of activities of this Committee.

In 2014, the previously separate governmental body the Agency of Statistics was transformed into the Committee on Statistics under the Ministry of National Economy. Among other responsibilities, the Committee publishes statistical books on environmental protection and provides data on 36 environmental indicators annually.

Ministry for Investments and Development

The Ministry for Investments and Development was created in 2014 (2014 Decree of the President No. 875) by bringing together the competences of the former Ministry of Industry and New Technologies (except those on power supply and nuclear energy), the competences of the former Ministry of Transport and Communications, the competences on industrial safety of the former Ministry of Emergencies and the competences of several other bodies. It is responsible for many areas where integration of environmental requirements is crucial.

The Committee on Geology and Subsoil Use under the Ministry has regulatory, control and implementation functions in the areas of geological research, rational use of subsoil and state regulation of subsoil use.

The Committee on Transport under the Ministry has regulatory, control and implementation functions for all types of transport except aviation and pipelines. The Committee on Transport is not in charge of fuel for vehicles, this issue being the competence of the Ministry of Energy. A separate Civil Aviation Committee under the same Ministry deals with air transport.

The Committee on Industrial Development and Safety under the Ministry has regulatory, control and implementation functions in the areas of metallurgy, mechanical engineering, chemical, pharmaceutical and light industries, timber processing and production of construction materials. It is also responsible for energy saving, energy efficiency and industrial safety.

The Committee on Construction, Housing and Utilities under the Ministry has regulatory, control and implementation functions in urban planning, construction, housing, utilities and municipal waste management (except solid municipal waste). It has regulatory functions in the areas of water supply and sanitation and heat supply (except combined heat and power (CHP) plants and boiler houses that are part of a central heating system) inside human settlements.

Among other functions, the Committee of Technical Regulation and Metrology under the Ministry maintains the Unified State Fund of Regulatory Technical Documents (https://www.egfntd.kz), organizes the development of standards harmonized with technical regulations, develops and approves rules for labelling of products, and develops rules for selection of accreditation bodies and organizes tenders to select accreditation bodies

Ministry of Health

The Ministry of Health is responsible for the policy on public health. Its relevant competences include sanitary-epidemiological surveillance, sanitary-epidemiological expertise, promotion of a healthy lifestyle and healthy diet, response of the public health system in the event of disasters and civil emergencies, and regulation of medical waste management.

In 2014, the system of sanitary and epidemiological control was weakened by the transfer of the sanitary and epidemiological control (performed by the Committee for the Protection of Public Health of the Ministry of Health) to the Committee on Protection of Consumer Rights under the Ministry of National Economy. In early 2017, the Committee for the Protection of Public Health was brought back into the Ministry of Health (2017 Resolution of the Government No. 71).

Ministry of Education and Science

The Ministry of Education and Science is in charge of governmental policy on education, science and children's rights. It is responsible for development of state education standards and approval of standard (model) education curricular and plans for all levels of education. The Ministry is not specifically entrusted to promote environmental education or education for sustainable development (regulation approved by 2013 Resolution of the Government No. 236).

In 2012 the Technology Commercialization Centre (2012 Resolution of the Government No. 989) was created as a subordinated organization of the Ministry of Education and Science following the 2008 Loan Agreement with the International Bank for Reconstruction and Development to improve the country's science and technology system.

Ministry of Interior

The Ministry of Interior has a nature protection police. Its functions include identification and prevention of environmental offences and crimes, preliminary investigation of environmental crimes and preparation of administrative environmental cases. For example, when the Committee of Environmental Regulation and Control discovers a case of significant pollution, it passes the materials to the nature protection police to identify the persons responsible. The nature protection police also does awareness-raising among the population about environmental legislation and responsibility for violations.

Prosecutor's Office

The Committee on Legal Statistics and Special Accounting at the General Prosecutor's Office checks the legality of inspections, namely, the observance of requirements of the 2015 Business Code for initiation of an inspection.

The Nature Protection Prosecutor's Office is one of several specialized prosecutor's offices. It checks the legality of activities of governmental authorities in the area of environmental protection. It can intervene to check the legality of actions only upon request of the President or the General Prosecutor.

Subnational authorities

As of early 2018, the administrative and territorial structure of Kazakhstan included 14 oblasts, Astana City and Almaty City; in June 2018 the status of the city of republican significance was also assigned to Shimkent. These are further divided into rayons (177), towns (87) and localities (30 villages and 6,569 auls (small villages)).

Oblasts, cities of republican significance and the capital

Local representative authorities (maslikhats) at the level of oblasts, cities of republican significance and the capital usually have thematic parliamentary commissions in charge of environmental issues (e.g. the Commission on Industry, Small and Medium Sized Business, Agricultural Issues and Ecology in the Karaganda Oblast Parliament).

In their respective territories, the local representative authorities at oblast level and in the cities of republican significance and the capital:

- Approve waste management programmes;
- Approve programmes for development (e.g. Programme for Development of Karaganda Oblast for 2017–2020);
- Approve target indicators of the state of the environment;
- Approve projects for reduction of GHG emissions and carbon capture;
- Adopt rules of general water use (based on the model rules);
- Define the rates for water charges for surface water sources;
- Approve the expenditures for the creation and functioning of local specially protected natural areas;
- Define the rates for charges for the use of local specially protected natural areas;
- Define the rates for charges for forest use in the state forest fund.

In 2013, the local representative authorities at oblast level and in the cities of republican significance and the capital lost the powers to approve environmental protection programmes and expenditures for environmental protection, programmes on protection of forests and use of forests and afforestation, and programmes for protection, reproduction and use of fauna.

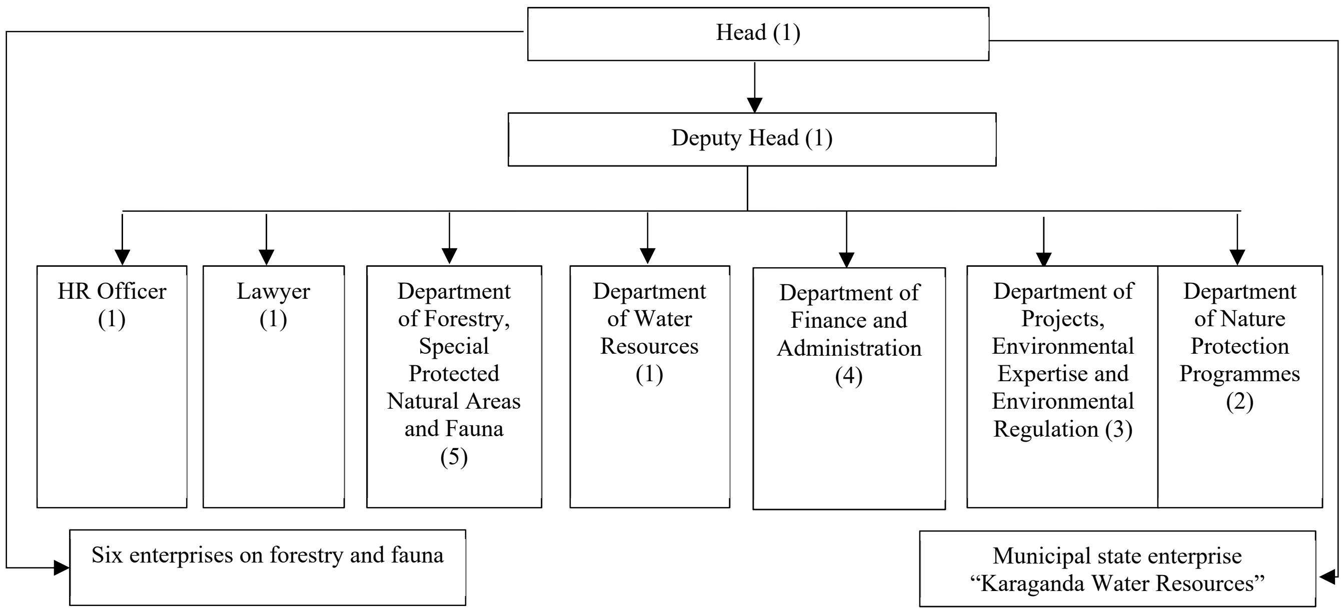
The local representative authorities can request information and reports from local executive authorities or enterprises and in this way can draw attention to specific environmental problems in their territory.

The local executive authorities at oblast level and in the cities of republican significance and the capital (called oblast akimats) have specific divisions in charge of environmental issues. Such divisions are called oblast divisions of natural resources and nature use. Figure 1.3 shows a typical organization of such an institution. Some other divisions of oblast akimats can also have competences relevant for environmental protection, e.g. the divisions of control over land use or the divisions of public health.

Local executive authorities at oblast level and in the cities of republican significance and the capital organize the implementation of the state policy on environmental protection in their respective territories. Among other functions, they are mandated to:

- Develop target indicators of the state of the environment;
- Organize the SEE for installations of categories II, III and IV;
- Organize public hearings as part of the SEE;
- Issue permits for emissions for installations of categories II, III and IV and decide on the ELVs in such permits;
- Organize the development and implementation of waste management programmes;
- Allocate land plots for construction of waste disposal sites;
- Develop the projects for reduction of GHG emissions and carbon capture;
- Manage the water infrastructure that is in municipal property;
- Define the water protection zones, strips and sanitary protection zones for drinking water sources upon consultation with basin inspections and bodies of sanitary-epidemiological control;
- Decide on creation and expansion of specially protected natural areas of local importance upon approval of the central body in charge of protected areas;
- Develop and approve the management plans for specially protected natural areas assigned to them;
- Decide on the allocation of hunting grounds and fishery water bodies;
- Issue permits for use of fauna, except for rare and threatened species;

Figure 1.3: Organizational chart of the State Institution "Division of Natural Resources and Nature Use of Karaganda Oblast"



Source: Division of Natural Resources and Nature Use of Karaganda Oblast, 2018.
Note: Staff numbers are indicated in parenthesis.

- Organize fire protection measures and measures to counter pests and diseases in the state forest fund;
- Inform the population about the state of the environment and water bodies.

In 2013, as a result of the amendments to the Law on Support for the Use of Renewable Energy Sources, the local executive authorities lost the power to develop and implement local programmes for the development and use of RES.

As payments for emissions are not earmarked for environmental protection, the oblast divisions of natural resources and nature use often have limited budgets for environmental protection measures. For example, in 2016–2017, the budget for environmental protection measures in Karaganda Oblast was only 9–10 per cent of the amounts received as payments for emissions from enterprises of that oblast.

In addition to budgetary constraints, oblast divisions of natural resources and nature use face difficulties in implementing some of their functions, due to a lack of guidance. For example, they do not have methodological guidance in order to develop projects for the reduction of GHG emissions and carbon capture, and some are delayed in developing the target indicators of the state of the environment for their respective territories.

Rayon and town level

In 2011, the local authorities of rayons, towns of oblast importance, towns of republican importance and the capital city were entrusted with wider responsibilities in the field of municipal waste management. Local executive authorities develop the tariffs for collection, removal, recycling and disposal of municipal solid waste and also the rules for management of abandoned waste recognized as municipal property by decision of the court. These rules are then approved by local representative authorities.

Vertical coordination

At oblast level and in the cities of republican significance and the capital, both local executive authorities and the territorial bodies of central government authorities have opportunities to provide comments and suggestions in the process of developing or amending the national-level legal and policy documents related to environmental issues. They receive drafts for comments and their representatives are included in the working groups in charge of developing new legal or policy documents. The system of legal monitoring also serves to ensure the bottom-up flow of information and suggestions on the legislative changes required. However, there is often an issue in the lack of feedback about how comments provided at subnational level are taken into account by central government authorities.

Horizontal coordination

National level

Kazakhstan used to have a Council on Sustainable Development, created in 2004 (2004 Resolution of the Government No. 345, invalidated in 2014). This body was abolished in 2014 as part of a larger reform meant to decrease the number of interministerial councils and commissions (2014 Resolution of the Government No. 970). Overall, after 2014, it became more difficult to establish interministerial councils to address the issues belonging to the competence of several ministries.

As of early 2018, the only active interministerial platform for horizontal coordination where issues of environmental protection and green economy can be discussed is the Council on Transition to Green Economy under the President. This Council was created in 2014 as an advisory and consultative body aimed at monitoring and reviewing the implementation of the Concept on Transition to Green Economy (2014 Decree of the President No. 823). The tasks of this body include identification of barriers for implementation of the Concept, development of proposals to ensure full implementation of measures and elaboration of proposals to improve coordination between the authorities at various levels in greening the economy.

The Council on Transition to Green Economy is chaired by the Prime Minister. Its composition includes the Deputy Prime Minister, nine ministers, heads of several international organizations, business associations and NGOs. The Ministry of Energy serves as a working body of the Council. The Council has eight working groups (chapter 3). In the period 2014–2017, the Council had seven meetings. Most meetings were devoted to various thematic issues of implementation of the Action Plan of the Concept on Transition to Green Economy. In addition, the Council became the platform to discuss the country's climate change commitments.

In late 2015, an Interagency Council on Water Resources Management was created as an advisory and consultative body under the Government (2015 Order of the Prime Minister No. 141-p). The task of the Council is to develop recommendations on the national priorities for water management policy and identify the national priorities for water supply in river basins and by sectors. The Council also has a clear environmental mandate – to define the environmental protection standards. The Council is headed by the First Deputy Prime Minister. Its composition includes eight deputy ministers and the Chair of the Committee on Water Resources of the Ministry of Agriculture, as well as the heads of the basin councils and a representative of the National Chamber of Entrepreneurs “Atameken”. The working body of the Council is the Ministry of Agriculture. The Council was supposed to meet twice a year; however, as of March 2018, only one meeting had taken place.

The Coordination Council on Implementation of Framework Partnership Agreements between the Government of Kazakhstan and International Financial Organizations (2014 Resolution of the Government No. 632), chaired by the Prime Minister, includes ministers and representatives of key international financial institutions. It meets regularly to approve projects to be funded by the National Fund for Implementation of Projects on Sustainable Development and Growth and implemented jointly with the international financial institutions. This Council has several working groups, including one on sustainable environmental development, green economy and energy efficiency.

Some interministerial councils and commissions incorporate other stakeholders (NGOs, business, academia) along with governmental officials; however, the membership of those stakeholders is usually less numerous than that of governmental officials. The involvement of stakeholders is channelled through a slightly different mechanism – public councils created in accordance with the 2015 Law on Public Councils. Public councils are considered to be the key instrument for consultations with stakeholders.

The current stand of Kazakhstan vis-à-vis target 17.14 of the 2030 Agenda for Sustainable Development is described in box 1.3.

Subnational level

There are currently no sustainable development councils created at oblast, rayon, town or a lower level. The current formal mechanisms for horizontal coordination at subnational level are the ad hoc working groups established to tackle a cross-cutting issue (e.g. air pollution or forest fires). Such working groups usually bring together relevant actors from both local representative and executive authorities and territorial bodies of central government authorities.

Box 1.3: Target 17.14 of the 2030 Agenda for Sustainable Development

Goal 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development
Target 17.14: Enhance policy coherence for sustainable development

This target covers one of the systemic issues for the achievement of the Sustainable Development Goals. It addresses how the country works across policy sectors and coordinates the sectors to achieve joint objectives of sustainable development. It also addresses the extent to which policies in various sectors are coherent and aligned with sustainable development.

There is a high degree of coherence among policy documents in Kazakhstan. Policy documents are consistent in terms of goals, targets and objectives set and measures envisaged for their implementation. However, the absence of SEA is a gap in ensuring the stronger and coherent integration of environmental and green economy aspects into sectoral policies.

The global indicator for target 17.14 refers to existence in the countries of mechanisms to enhance policy coherence for sustainable development. Kazakhstan has some mechanisms for horizontal coordination on sustainable development issues at the national level, though the interministerial councils created to address the issues of a crosscutting and intersectoral nature are not many. The Council on Sustainable Development was abolished in 2014. The Interagency Council on Water Resources Management under the Government created in 2015 has so far met only once. The Council on Transition to Green Economy chaired by the country's Prime Minister is the only active platform to discuss the issues of green economy and environmental protection. Some horizontal coordination takes place in the framework of interministerial working groups created for drafting policy or legal documents, public councils created as advisory bodies to various governmental authorities and steering committees for international projects. However, there is room for improvement to ensure the regularity of meetings of existing bodies and to increase the involvement of other stakeholders along with governmental bodies, organizations and institutions. In addition, the scope of such bodies currently does not include all aspects of the 2030 Agenda for Sustainable Development.

There are examples of formal cooperation agreements concluded between different authorities at local level: for instance, in Karaganda Oblast in 2018, the Department of Ecology (territorial body of the Committee of Environmental Regulation and Control) and the Oblast Division of Natural Resources and Regulation of Nature Use (local executive authority) signed a memorandum to work together towards a decrease in allowed volumes of air emissions for category I facilities. They have also agreed on an action plan for 2018 to decrease the allowed volume of emissions for installations of categories II, III and IV.

Another example is the joint action plans regularly developed by local divisions of the nature protection police under the Ministry of Interior and the departments of ecology (territorial bodies of the Committee of Environmental Regulation and Control).

No mechanism of joint inspections is provided for in the legislation. However, when a major pollution accident or other serious violation is discovered, the various control authorities (inspectors from the department of ecology; territorial inspection of forestry and fauna; inspectors of specially protected natural areas; inspectors from the basin inspection) inform each other, as relevant, and each sends their inspection teams.

Furthermore, the nature protection prosecutor's offices at local level are quite powerful in pushing the various authorities at local level to work together. For example, the Nature Protection Prosecutor's Office of Karaganda Oblast, with only three staff, issues annually about 50 acts of prescription to terminate a violation of the rule of law. The governmental authorities who are addressees of these acts (e.g. local executive authorities, departments of ecology or basin inspections) always react to correct the violations.

Training and advanced training

According to the 2015 Law on Public Service, each civil servant has to undertake advanced training at least once every three years. Advanced training on general (non-environmental) issues is delivered by the Academy of Public Administration under the President. Since 2016, the Institute of Supplementary Education of Civil Servants under the Academy offers a seminar on "Green Economy" (4 days, 24 hours). Another relevant seminar offered is on public–private partnerships.

The IACEP, under the Ministry of Energy, regularly organizes three-day training seminars specifically on the issue of environmental protection. The plan for 2018 includes 26 training seminars to be organized across the country. Seven thematic programmes were developed to cover in detail the requirements of the

Environmental Code, environmental regulation and SEE, state environmental control, GHG inventory, waste management, environmental safety of the oil and gas industry and environmental standard-setting. The training seminars of the IACEP are attended mostly by enterprises, departments of ecology of the Committee of Environmental Regulation and Control and local executive authorities. The cost of participation for staff of an enterprise is 140,000 tenge, for a private individual, 100,000 tenge, and for a governmental official, less than 50,000 tenge. Teachers from higher educational institutions, staff of NGOs and Aarhus Centres are trained at no charge. Training sessions were attended by 334 persons in 2013, 264 in 2014, 178 in 2015, 368 in 2016 and 330 in 2017. The Centre organizes surveys to collect feedback from attendees with an aim to improve the quality and relevance of training offered. Except for a single case when the Ministry of Defence requested the IACEP to organize a training seminar for its staff in 2014, staff of other sectoral ministries do not attend training seminars organized by the Centre.

1.5 Assessment, conclusions and recommendations

Assessment

The major institutional restructuring of 2014, when the Ministry of Environment and Water Resources was abolished and the Ministry of Energy was designated as the governmental authority on environmental protection, with many other competences related to the environment allocated to the Ministry of Agriculture and some other governmental institutions, has had an impact on the development and implementation of environmental policy in the country.

The designation of a sectoral ministry as the governmental authority on environmental protection is not a rare case. It can work as a satisfactory arrangement, provided the Government strongly prioritizes environmental protection, ensures a relatively independent development of environmental policy and regulation and has a strong and independent environmental compliance and enforcement system (e.g. as part of an independent inspectorate that brings together all inspection authorities, including the environmental inspection, and is not subordinated to any ministry).

In the case of Kazakhstan, the clear policy priority outlined by the 2012 Strategy “Kazakhstan-2050” is comprehensive economic pragmatism, whereby all economic and managerial decisions are to be guided by economic efficiency and long-term interests. The scope of issues covered by the five environment-related departments in the Ministry of Energy is quite limited, in terms of ensuring the comprehensive and systematic development of environmental policy and the fulfilment by the Ministry of the role of the governmental authority on environmental protection. The subordination of the key regulatory and enforcement authority in the environmental area (i.e. the Committee of Environmental Regulation and Control) to the ministry responsible for one of the key polluting sectors limits the independence of environmental regulation and enforcement.

In the period 2000–2010, Kazakhstan had a number of strategies and programmes on environmental protection. Since 2010, there was a trend of reducing the number of strategic documents by integrating their issues into larger documents. Planning in the environmental area has clearly suffered. The 2003 Concept of Ecological Security was never replaced by a document that would include the long-term vision for the environmental area in its entirety. Strategic documents on specific environmental issues have expired and have not been replaced by new ones.

The integration of environmental requirements into sectoral policy documents has started but is still insufficient. SEA – a key tool for integration of environmental considerations into sectoral policies – is not available. Actual implementation of environmental measures in economic sectors has been largely driven by the 2013 Concept on Transition to Green Economy and its Action Plan, rather than by sectoral policy documents. In the areas less pronounced in the Concept on Transition to Green Economy and its Action Plan (e.g. forestry, mining and tourism), the integration of environmental requirements is rather weak.

The 2013 Concept on Transition to Green Economy and its Action Plan have prompted important environmental actions in economic sectors and on the ground. In the absence of other strategic documents on environmental protection, the Concept on Transition to Green Economy has become a “rescue boat” for the environmental sector. However, the Concept does not cover many environmental issues (e.g. environmental regulation, biodiversity, ecosystems, forests). It was not meant to and cannot replace a framework policy document on environmental protection. Furthermore, no separate governmental funding is allocated for implementation of the Concept and its Action Plan.

Environmental legislation has seen many important developments, such as the introduction of extended producer/importer responsibility, improvement of access to information and public participation procedures and measures to strengthen nature protection. Nevertheless, some advanced concepts of environmental legislation (e.g. integrated permitting, environmental audit or environmental insurance) introduced a decade ago, do not yet work properly in Kazakhstan.

Conclusions and recommendations

Institutional framework

The abolishment of a separate ministry responsible for the environment, the designation of the Ministry of Energy as an authorized governmental authority on environmental protection and the allocation of many environment-related responsibilities to the Ministry of Agriculture and some other governmental authorities, resulting from the institutional restructuring of 2014, has impacted on the efforts to develop and improve environmental policy and legislation and ensure their effective implementation and enforcement. Environmental issues have not been on top of the agenda of these sectoral ministries, especially in the context of the overall trend to reduce regulation, attract investment and ease conditions for business development and to limit the number of governmental institutions.

Recommendation 1.1:
The Government should consider restoring a separate ministry or governmental body with the same status and competences as a ministry that is part of the Cabinet of Ministers, which would be responsible for policy development, regulatory, control (enforcement) and implementation functions in the areas of environmental protection and the use of natural resources.

Strategic planning in the environmental area

Some environment-related issues are addressed in the state programmes and governmental programmes devoted to sectoral and infrastructure development and in the strategic plans of the ministries of energy and agriculture. However, there is no state programme and no governmental programme that would provide a long-term vision on environmental issues and allocate funding for implementation of measures. The lack of a long-term vision is felt in particular with regard to biodiversity, protected areas, forests, air protection, climate change and waste management. The 2013 Concept on Transition to Green Economy has fostered important changes but covers a limited number of environmental issues.

Recommendation 1.2:
The Government should revise the 2013 Concept on Transition to Green Economy to consolidate all relevant environmental and climate change issues into one policy document.

Sustainable Development Goals

In 2018 Kazakhstan intensified efforts on coordinating the implementation and monitoring of the 2030 Agenda for Sustainable Development. In August–October 2018 an institutional framework for Sustainable Development Goals implementation and monitoring was formed. This framework is to be led by the Coordination Council on Sustainable Development Goals, headed by the Deputy Prime Minister and supported by five intergovernmental working groups and a working body/secretariat. Overall coordination of Sustainable Development Goals implementation is vested with the Ministry of National Economy. The Ministry of Energy is leading one of the intergovernmental working groups.

While there is a fair amount of common coverage between the national and sectoral plans and the Sustainable Development Goals targets, no systematic effort has yet been applied to explicitly integrate Sustainable Development Goals into sectoral programmes and plans. Under the leadership of the Committee on Statistics under the Ministry of National Economy, a draft national Sustainable Development Goals indicator framework has been prepared. A section on Sustainable Development Goals reporting became operational on the Committee's website. However, the Sustainable Development Goals are poorly known among governmental officials of central government authorities and at subnational level.

Recommendation 1.3:
The Government should:

(a) Ensure regular and transparent activities throughout the entire institutional framework for Sustainable Development Goals implementation and monitoring;
(b) Raise awareness on the Sustainable Development Goals and their relevance for Kazakhstan among governmental officials and the public;
(c) Explain the synergies between the existing national targets and the Sustainable Development Goals and proceed with setting up additional national targets based on the Sustainable Development Goals in those areas where such targets are not defined;

(d) *Ensure that the Sustainable Development Goals are explicitly integrated into all future strategic planning documents;*
(e) *Ensure that the existing strategic documents are revised to mainstream Sustainable Development Goals;*
(f) *Ensure the regular preparation of reports on Sustainable Development Goals implementation.*

Strategic environmental assessment

Kazakhstan has a well-developed system of strategic planning. However, a weak point of the planning system, especially from the environmental perspective, is the non-application of the SEA tool for evaluation of environmental impacts of future sectoral policies. The lack of SEA prevents systematic, coherent and comprehensive integration of environmental measures and requirements into sectoral policies. Key challenges for the introduction of SEA include poor understanding of the instrument and lack of training and expertise. As Kazakhstan's EIA/SEE system is rather different from that in many other countries, there are also concerns that the SEA tool may be "adapted" in Kazakhstan and may divert from the SEA instrument as envisaged by the Protocol on SEA and practised in EU Member States and many OECD Member countries. In turn, introduction of the SEA tool could help Kazakhstan to enhance policy coherence for sustainable development in line with target 17.14 of the 2030 Agenda for Sustainable Development.

Recommendation 1.4:
The Government should:

(a) *Introduce a fully fledged Strategic Environmental Assessment (SEA) system into its legislation in line with the Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context;*
(b) *Provide capacity-building on SEA among governmental authorities and other stakeholders;*
(c) *Accede to the Protocol on Strategic Environmental Assessment;*
(d) *Define an environmental assessment framework in which SEAs can be the reference for the development of Environmental Impact Assessments (EIAs) for single interventions on the territory, thus avoiding duplications in data collection, analysis, evaluation and monitoring.*

Training and advanced training

The advanced training of civil servants on general (non-environmental) issues is delivered by the Academy of Public Administration under the President. Recently, the Institute of Supplementary Education of Civil Servants under the Academy started to offer a seminar on "Green Economy" as part of advanced training programmes.

There is a good system of training and advanced training on environmental issues under the auspices of the RSE Information and Analytical Centre of Environment Protection under the Ministry of Energy. Its training seminars are attended by enterprises, departments of ecology of the Committee of Environmental Regulation and Control and local executive authorities. The Centre also trains, for free, teachers from higher education institutions and staff of NGOs. However, except for a single case, employees of other sectoral ministries and their subordinated organizations do not receive training in the Centre.

Recommendation 1.5:
The Government should extend the schemes of training and advanced training on environmental issues to civil servants in sectoral ministries and their subordinated organizations, using the platforms of the Academy of Public Administration under the President and the Republican State Enterprise "Information and Analytical Centre of Environment Protection" under the Ministry of Energy.

Chapter 2

REGULATORY AND COMPLIANCE ASSURANCE MECHANISMS

2.1 Permitting and licensing

Since 2008, Kazakhstan has endeavoured to improve the rules for obtaining all types of permits and licences, including environment-related ones, in order to make the process simpler and more transparent. Permits are now granted following a request submitted through the "e-licence" portal (although, in some cases, a scanned application must also be submitted in paper format at the front office of the local authority).

The environmental permitting system in Kazakhstan is in limbo. It ceased to be a system based on single-medium permits in 2002, but it has not yet become a system based on integrated permitting. The permitting system is almost multimedia, but it addresses emission sources separately and does not take into consideration the cross-media impacts of pollution. Furthermore, best available techniques (BAT) are not yet embedded in the permitting process.

Environmental permits

Four categories of facilities are subject to permitting, with category I facilities representing the greatest impacts on the environment. The categorization of facilities is linked to the sanitary classification of industrial facilities (table 2.1). Activities outside the sanitary classification of industrial facilities are considered, by default, to be undertaken in category IV facilities.

Two types of environmental permits are envisaged: permits for emissions into the environment and integrated environmental permits.

<u>Permit for emissions into the environment</u>

Permits for emissions into the environment specify limits with regards to: i) air emissions; ii) wastewater discharges; iii) waste disposal; and iv) disposal of sulphur produced during oil extraction. CO_2 emissions, water use, noise and radiation are not covered by the permit for emissions into the environment. Permits for emissions into the environment indicate aggregate amounts of air emissions and wastewater discharges without a breakdown by pollutant. Breakdown by pollutant is not part of a permit and can only be found in the draft ELVs that are prepared as part of the EIA/SEE process.

Pollution charges are applied when an enterprise does not exceed the volumes of emissions established in its permit. If an enterprise exceeds the limits established in the permit, it is subject to fines, which means that the revenue-raising principle continues to apply even though the due payments are much higher.

Table 2.1: Categories of environmental impact

Facility category	Category of environmental impact	Hygienic and sanitary classes
I	> 1 000 tons of air emissions per year (> 50 tons for oil and gas industry) > 2 000 tons of wastewater discharge per year > 10 000 tons of industrial waste generated in a year	Class I of sanitary impact, sanitary zone from 1 000 m and more Class II of sanitary impact, sanitary zone from 500 m to 1 000 m
II		Class III of sanitary impact, sanitary zone from 300 m to 500 m
III		Class IV of sanitary impact, sanitary zone from 100 m to 3 000 m
IV		Class V of sanitary impact, sanitary zone from 0 m to 100 m

The validity of the permit for emissions to the environment was extended to up to 10 years for categories I, II and III facilities. For category IV facilities the permits are not time bound. For all facilities, permits need to be reapplied for if the enterprise changes technology. A simplified procedure for category IV facilities was anticipated in the 2007 Environmental Code and put into practice in 2012. Since 2013, a waste management programme is required as one of the documents to be included in the application for a permit.

Permits for emissions into the environment are granted by different authorities at three decision-making levels: the Committee of Environmental Regulation and Control under the Ministry of Energy, its territorial subdivisions (called departments of ecology of the Committee of Environmental Regulation and Control), and local executive authorities. For category I facilities with a sanitary zone of more than 1,000 m, permits for emissions into the environment are granted by the Committee's central apparatus. For the remaining category I facilities, the permits are issued by the departments of ecology. For categories II, III and IV facilities, the permits are granted by local executive authorities.

All authorities involved in the permitting system have access to the information hosted in the "e-government" back office portal. Moreover, quarterly reports on issued permits are provided to the State Revenue Committee (as foreseen in the Tax Code) and to other supervisory bodies upon request.

In 2017, 2,975 permits for emissions into the environment were issued for Category I facilities in the entire country (table 2.2). The annual number of permits for emissions into the environment issued for Categories II, III and IV facilities nationwide averaged 13,790 in the period 2013–2017. In North Kazakhstan Oblast alone, the number of permits for emissions into the environment issued for Categories II, III and IV facilities by the Oblast Division of Natural Resources and Nature Use stayed well above 1,000 in the period 2012–2017 (table 2.3). The number of permits issued each year is very high, which raises concerns about the viability of the work carried out by the environmental authorities and local executive authorities, with the current allocation of resources available to them, going beyond a purely administrative evaluation.

The breach of permit requirements is considered an environmental offence. Permits can be withdrawn by decision of the court.

Permits for emissions into the environment may include different regimes for a facility's operation, depending on the meteorological situation. However, in practice, enterprises rarely switch the regime when there are unfavourable meteorological conditions.

Integrated environmental permit

The 2007 Environmental Code introduced the notion of integrated environmental permitting, based on BAT, similar to EU Directive 2008/1/EC concerning integrated pollution prevention and control (the IPPC Directive). Industrial facilities can apply for integrated environmental permits instead of obtaining permits for emissions to the environment when they plan to introduce BAT to decrease their emissions and other environmental impacts.

In 2008, the Government approved a list of types of industrial facilities that can apply for an integrated environmental permit, together with the rules for issuing such permits (2008 Government Resolution No. 95, no longer valid). The list is similar to that of Annex I of the IPPC Directive. The list and the rules were revised in 2015 (2015 Order of the Minister of Energy No. 37). When applying for an integrated environmental permit, the proponent must provide information on the volume of emissions before and after the introduction of BAT, the values for energy consumption and resource use before and after the introduction of BAT, and a plan for transition to BAT with detailed information on the technology planned for implementation, terms of implementation and estimated budget.

The introduction of integrated environmental permits raises a sensitive issue, which has so far not been addressed: the insufficient compatibility of the model associated with integrated environmental permits with the current ELVs establishment process. The procedure for obtaining an integrated environmental permit assumes that ELVs should be established based on BAT and may be difficult to reconcile with the current setting of emission limits.

Table 2.2: Permits for emissions into the environment, 2011–2017, number

	2011	2012	2013	2014	2015	2016	2017
Category I facilities	1 367	1 435	1 429	2 677	2 403	2 675	2 975
Categories II, III, IV facilities	..	..	13 668	11 948	13 699	13 849	15 785

Source: SoER for 2011–2014; SoER for 2017.

Table 2.3: Permits for emissions into the environment for Categories II, III and IV facilities issued in North Kazakhstan Oblast, 2009–2018, number

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 (Jan.-Oct.)
Issued permits	605	409	769	1 149	1 780	1 042	1 183	1 179	1 662	679

Source: North Kazakhstan Oblast Division of Natural Resources and Nature Use, http://dpr.sko.gov.kz/page/read/Otdel_ekolog_regulirovaniya.html?lang=ru.

In any case, as of December 2018, no integrated environmental permits had been issued in Kazakhstan. Since industrial facilities eligible to obtain an integrated permit can choose between obtaining a conventional permit for emissions into the environment and obtaining an integrated environmental permit, no applications for integrated permits were ever received. The industrial enterprises are familiar with the traditional system of issuing permits for emissions into the environment, which has significant differences from the integrated permitting based on BAT. Industrial enterprises do not appear to be aware of the positive potential arising from the use of integrated permits and the use of BAT.

Although it is clear that the success of integrated environmental permits depends on the existence of widespread knowledge about BAT and their effective use, documents that have been prepared about BAT by competent authorities in Kazakhstan are too general. The approved list of BAT (2014 Order of the Minister of Energy No. 155) is composed of three horizontal (wastewater treatment; tailings; waste reuse) and six sectoral (CHP production; extraction of oil at sea and on the mainland; processing and storage of oil, oil products and hydrocarbon gases; iron and steel industry; non-ferrous metallurgy; chemical industry) lists of BAT. The lists include both technical and technological solutions and are very much focused on pollution control technologies, many of which are at the end of the production cycle. The detailed descriptions of technologies are not part of these lists. In 2016, the Environmental Code was amended to allow companies to use the technologies included in the EU BREFs when applying for integrated permits in Kazakhstan. This measure is expected to make BAT more accessible.

The move towards an integrated environmental permitting system and, within this, a shift to BAT, is still perceived as a risk by economic actors in Kazakhstan. Governmental authorities do not carry out awareness-raising campaigns on the benefits of the integrated environmental permit system and BAT, and do not create adequate incentives to stimulate economic actors to shift to BAT.

Permits for special water use

There are three types of permits for special water use: for water abstraction and/or use from surface water bodies; for discharge of industrial, household, drainage and other wastewater; and for use of groundwater resources. These permits are issued by the basin inspections of the Committee on Water Resources under the Ministry of Agriculture. For permits for abstraction of groundwater in the amount of 50–2,000 m^3 a day, an agreement of subsoil authorities is needed. In the period 2008–2017, the Nura-Sarysu Basin Inspection (covering 461 primary water users in 2017) issued, on average, 103.5 permits per year (2008, 45; 2009, 108; 2010, 79; 2011, 96; 2012, 181; 2013, 98; 2014, 94; 2015, 136; 2016, 122; 2017, 76).

Permits for use of fauna

Permits for use of fauna are issued by local executive authorities, except for permits for scientific-research fishing in fishery water bodies located in the territories of two or more oblasts. In the latter case, permits are issued by the Committee on Forestry and Fauna.

Hunting is permitted only on defined hunting lands and exclusively for species falling under the category of game species. The territorial offices of the Committee on Forestry and Fauna are responsible for determining the limits on seizing wild animals in the areas assigned for hunting. The limits on seizing for each species are established by the Committee at the national level and distributed to the different oblasts.

CITES permits

CITES permits are issued by the Committee on Forestry and Fauna of the Ministry of Agriculture. Kazakhstan is mainly an important source country for wildlife in trade. Between 2008 and 2017, 6,015 permits were issued for the export of live species. In terms of legal exports, live birds and sturgeon caviar occupy the top two places.

Ozone-depleting substances

Import and export of ODS and ODS-containing equipment are subject to licensing. In 2016, four licences were issued for the import of 61 tons of ODS.

Use of ODS and repair of ODS-containing equipment requires a permit. Such permits are issued by the Committee of Environmental Regulation and Control of the Ministry of Energy.

Licences

Environmental project design, development of ELVs for category I facilities and environmental audit for category I facilities are licensed activities. Such licences are issued by the Committee of Environmental Regulation and Control of the Ministry of Energy.

2.2 State ecological expertise and environmental impact assessment

Domestic context

Scope

SEE and EIA are two complementary instruments, closely interlinked, which are used by public authorities to assess, prevent or minimize potential adverse impact on the environment and on public health deriving from economic activities. Furthermore, there is a clear link between EIA, SEE and the permitting procedures. EIA and SEE precede the permitting procedure. Only after the presentation of the EIA and its approval, following the SEE, by the competent authorities can the developer start the permitting procedures.

The existing SEE and EIA legal framework is first and foremost defined on the basis of the Environmental Code (chapters 6 and 7) and the 2011 Law on Architectural, Urban Planning and Construction Activities. The following regulations complement this framework: 2007 Instruction on EIA (2007 Order of the Minister of Environmental Protection No. 204-p); 2015 Rules for the implementation of the SEE (2015 Order of the Minister of Energy No. 100); and Rules on access to environmental information related to EIA (2007 Order of the Minister of Environmental Protection No. 238-p).

EIA is compulsory for all types of economic and other activities that may have a direct or indirect impact on the environment and public health. SEE has a wider scope. The list of activities subject to SEE is exhaustive and includes:

- Pre-project and project documentation of the planned activities that have an impact on the environment;
- Draft ELVs;
- Draft legal instruments, technical regulations and methodologies, implementation of which may have negative environmental impacts;
- Documentation about goods placed under the customs procedure for destruction;
- Draft scientific and feasibility studies on the creation and expansion of specially protected natural areas, degazetting of state nature conservation areas and state preserved zones and the reduction of their territory;
- Biological justification of harvesting and use of flora and fauna;
- Draft urban development and spatial plans;
- Documentation to justify the determination of zones of ecological disaster or environmental emergency;
- Proposed projects of economic activities that may affect the environment of neighbouring states, or implementation of which requires the use of natural bodies shared with other states.

The scope of application of SEE and EIA is made more concrete through two lists of activities: the list for the SEE and the list of the EIA Instruction. The SEE list is based on the sanitary classification of the industrial facilities and sizes of its sanitary protection zones. Although it presents the same nomenclature of categories used to group activities according to the level of risk, the EIA list does not derive entirely from the first one, which creates some mismatch between the two and may generate confusion among operators. There is also a third list of economic activities that are subject to public hearings (2016 Order of the Acting Minister of Energy No. 240).

EIA is developed by or under the responsibility of the proponent in the pre-design phase of the project. EIA of category I economic activities is a licensed activity.

SEE for category II, III and IV projects falls under the responsibility of local executive authorities. For category I facilities, the central apparatus of the Committee of Environmental Regulation and Control conducts SEE for the most dangerous facilities (i.e. those having a sanitary protection zone of 500–1,000 m), while its territorial subdivisions are responsible for the other facilities classified as category I.

Through SEE, and in particular on the basis of EIA, the environmental authorities assess whether the project complies with the environmental requirements of the national legislation. SEE focuses on an environmental conformity check of the proposed activity. In this regard, it does not fulfil its full potential, which would be to support the developer in identifying the best ways of avoiding or minimizing negative environmental effects. The positive conclusion of the SEE contains findings on the admissibility of the reviewed subject. In the event of a negative conclusion by the SEE, the developer is obliged to either further refine the project and/or documents submitted in accordance with the SEE conclusions and resubmit them again, or withdraw the project.

SEE is conducted for multiple economic activities. Upstream (but running in parallel) to the SEE, a project for an economic activity is subject to complex non-departmental expertise, through the mobilization of appropriate multidisciplinary knowledge for this assessment. There are therefore two conclusions issued by public authorities: the complex non-departmental expertise conclusion and the SEE conclusion. The weak point is the unclear relationship between the complex non-departmental expertise and SEE.

Stages

To reach the finish line, a project proponent must go through a multi-step course: developing pre-EIA conducted on the basis of the initial documents and the feasibility study of the proposed activity; ensuring public participation (public hearings if the project is a category I activity; public opinion surveys in the case of category II, III and IV activities); reviewing the project and developing EIA documentation; submitting pre-EIA and EIA documentation for review by the SEE; and issuance of the SEE conclusions by the competent authorities.

Since 2008, some changes have occurred, driven by the purpose of simplifying permit procedures and reducing the burden on economic operators. EIA procedure no longer foresees its final stage – the post-project analysis. Probably more penalizing than the elimination of the last phase was that the original EIA shortcomings were not remedied in the meantime, e.g. since 2007. Annex 2 of the EIA Instruction lists the activities that should be considered for screening purposes whenever there are changes to or expansion of a project. Therefore, screening is not envisaged for any other activities than those listed in Annex 2. Annex 2 establishes that screening is implemented on the basis of thresholds. However, these thresholds have not yet been defined. According to the Committee of Environmental Regulation and Control, screening is implemented through a case-by-case examination. The Committee did not confirm whether these case-by-case screening processes lead to a statement whereby the authorized environmental body confirms whether EIA is required for a specific project. A clarification of the screening process would determine that better decisions are made on the need for EIA and increase the transparency of EIA, and would also be beneficial for developers.

Scoping was never part of the EIA framework in Kazakhstan. Therefore, all matters related to the project must be investigated as part of the EIA. Although it represents an additional workload for the public authorities, the common practice in other countries is that developers can request a scoping opinion from the authorized environmental body.

Nevertheless, there have been positive developments since 2008. In 2014, an electronic “e-licence” system was introduced, through which the public service of issuing SEE conclusions is provided. Documents may be submitted for review electronically or in hard copy to the department of ecology. An SEE conclusion (positive or negative) is uploaded to the “e-licence” system, and automatically sent to the proponent. The introduction of the single-window system was an important measure in increasing the overall efficiency of the triangular decision-making process composed of EIA, SEE and permit issuance.

In 2017, 15,400 SEE conclusions were issued (table 2.4). Of these, 66 per cent were issued by local executive authorities and 34 per cent by the Committee of Environmental Regulation and Control and its territorial bodies. These figures are a good indicator of the extent of the task with which public authorities are confronted and allow anticipation of difficulties in the paradigm shift in relation to the conduct of SEE: placing it at a level above that of conformity checking.

Table 2.4: SEE conclusions, 2011–2017, number

	2011	2012	2013	2014	2015	2016	2017
Category I facilities	1 367	1 435	1 429	2 677	2 403	2 675	2 975
Categories II, III, IV facilities	..	..	13 668	11 948	13 699	13 849	15 785

Source: SoER for 2011–2014; SoER for 2017.

Taking into account the number of SEEs undertaken by the public authorities, including for complex projects, it is worth mentioning that the legislation foresees the possibility of involving external experts, which could contribute to strengthening the quality of the SEE. However, it does not provide for the mechanism to pay for the services of external experts.

The Committee of Environmental Regulation and Control estimates that, each year, around 60 per cent of the submitted EIA reports are rejected. Accurate data on the rejections categorized by type of rejection are not available. The poor quality of the prepared project documentation is identified as the main reason for project rejection. Strengthening the community of EIA practitioners would contribute to increasing the quality of EIA and, therefore, the environmental quality of projects. This requires a huge effort in capacity-building for the public authorities, NGOs, academia and consultants and that guidance documents providing practical help to those involved in the stages of the EIA process (including examples of good practice) are developed and made available.

Public participation

Public participation in EIA can take two distinct forms: public hearings and, since 2017, public opinion surveys. The 2007 Rules for holding public hearings (2007 Order of the Minister of Environmental Protection No. 135-p as amended in 2017) establish the requirements for both forms, while the 2016 List of the types of proposed activities which are subject to public hearings (2016 Order of the Acting Minister of Energy No. 240) specifies the scope of the public hearings.

According to the legislation of Kazakhstan, the proponent has the main responsibility for organizing public consultations, thus making it the main actor in ensuring transparency in the EIA process. The local executive bodies also have some responsibilities, such as agreeing with the proponent on the time and location of public hearings, dissemination of an information plan, preparing the list of members of the public concerned and ensuring that environmental information on the project is made available to the public.

Formal opportunities for public participation in EIA in Kazakhstan are foreseen in the legislation and they occur at the pre-EIA and EIA stages. The principle of public participation holds, however, that those who are affected by a decision have a right to be involved in the decision-making process. In this regard, some inadequacies persist:

- There is no methodology to determine the composition of the list of members of the public concerned;
- The results of public participation are included in the EIA documentation but it is not assumed that the results of public consultation are taken into account in the decision-making process. The SEE conclusions should address how these results were considered in reaching a decision on the application for development, but in practice they do not.

The Compliance Committee of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) received three communications by representatives of the public that address the deficiencies referred to and some others gaps (communications ACCC/C/2004/2 submitted in 2004, ACCC/C/2011/59 submitted in 2011 and ACCC/C/2013/88 submitted in 2013). The Meeting of Parties to the Aarhus Convention has issued five decisions in this regard, in 2005, 2008, 2011, 2014 and 2017, stating that Kazakhstan is in non-compliance with the Convention. Decision VI/8g issued in 2017 recalls the recommendations not yet addressed by Kazakhstan, including:

- Respecting the mandatory content of the public notice or the requirement to ensure that the public authority competent for the decision-making on the activity gives members of the public concerned access to all information relevant to the decision-making;
- Removing the stipulation that comments from the public must be “reasonable”;
- Taking the necessary measures to ensure that the relevant public authorities inform the public promptly of the decisions taken and how the text of the decisions can be accessed, and maintaining publicly accessible lists or registers of the decisions taken.

EIA documentation does not contain a non-technical summary. Without a non-technical summary, public participation is hampered, given that the local population will have difficulty understanding what is at stake, what the project’s characteristics are and what its potential impacts are. Transparency is not just about establishing public consultation mechanisms but, above all, it implies the creation of enabling conditions for consultation to take place.

Public ecological expertise

Public ecological expertise can be initiated by individuals or NGOs whose interests may be affected by the proposed project. The Environmental Code includes detailed requirements with regard to public ecological expertise which aim to ensure the quality of assessment done in the framework of such expertise.

However, the instrument of public ecological expertise is not used in practice. The main reason is that the public ecological expertise is poorly integrated into the decision-making process on proposed projects. The Environmental Code envisages that the conclusions of the public ecological expertise should be merely "considered" during the SEE process. It also provides that the conclusions of the public ecological expertise "may be taken into account" in decision-making by local executive authorities, financial institutions and proponents of the project. These provisions make the efforts to conduct public ecological expertise of little value. Another constraint is the costs of conducting the public ecological expertise, which have to be borne entirely by the initiating person or NGO and are considered by the NGOs to be rather high.

Transboundary context

Kazakhstan has been a party to the 1991 Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) since 2001, but has not accepted its two amendments. The Points of Contact regarding Notification are the Ministry of Energy and the RSE Information and Analytical Centre of Environment Protection (IACEP), a subordinated organization under the Ministry of Energy. The Focal Points for Administrative Matters are the IACEP and the Ecological Expertise Division of the Committee of Environmental Regulation and Control. The country has complied with its reporting obligations under the Convention.

Kazakhstan does not have specific legal provisions for the implementation of the Espoo Convention. According to the Environmental Code, the conduct of a transboundary EIA is governed by international treaties ratified by Kazakhstan, that is, the Convention is directly applicable and considered to be self-executing. However, the Convention does not provide detailed procedures for its application, which should be provided for by its parties. In Kazakhstan they are not.

Kazakhstan has no experience in the transboundary procedure of EIA as a party of origin. As an affected party, Kazakhstan was only involved in one project – the Andash gold and copper mining facility – where the party of origin was Kyrgyzstan, in 2006–2007.

Ongoing legislative review

In 2018, a review of legislative aspects of EIA in Kazakhstan in relation to the implementation of the provisions of the Espoo Convention was developed within the framework of the Joint EU/UNDP/ECE project "Supporting Kazakhstan's Transition to a Green Economy Model". The preliminary results point to a set of inconsistencies between Kazakhstan's national legislation and the obligations arising from the Espoo and Aarhus Conventions:

- Delegation of the responsibility for conducting the EIA from the public authorities to the developer (initiator) of the proposed activity (Article 6, paragraphs 2, 6, 9 and 10 of the Aarhus Convention refer explicitly to public authorities);
- Application of the sanitary classification of the industrial facilities to the determination of the objects of the SEE, which is incompatible with Annex I of the Aarhus Convention and Appendix I of the Espoo Convention, serving as the basis on which the types of the proposed activity that are the subject of the EIA and of the transboundary EIA are defined;
- Absence of a legally established procedure for the implementation of screening as defined by the requirements of Article 6, paragraph 1(b) of the Aarhus Convention and Article 3, paragraph 5 of the Espoo Convention and intended for the determination of additional types of activity that can have a significant impact on the environment;
- Absence of a legally established procedure for the transboundary EIA as required by Article 2, paragraph 6 and Article 3, paragraph 5 of the Espoo Convention;
- Absence of clearly defined provisions with regard to the identification of the public concerned as required by Article 6, paragraph 5 of the Aarhus Convention;
- Absence of regulation for due account to be taken of the outcomes of public participation in decision-making and the indication of reasons and considerations on which the decision is based as required by Article 6, paragraph 9 of the Aarhus Convention and by Article 6, paragraphs 1 and 2 of the Espoo Convention;
- Absence of the post-project analysis stage envisaged by Article 7 of the Espoo Convention.

Work is being developed, however, with the strong involvement of the country, to improve institutional and legislative frameworks on EIA within the general framework of the ongoing green economy reforms and, in particular, within the EU-funded project "Supporting Kazakhstan's Transition to a Green Economy Model".

2.3 Environmental standards

Ambient quality standards

Kazakhstan continues to use the sanitary and hygienic norms expressed as maximum allowable concentrations (MACs) of hazardous substances in different environmental media (air, water and soil) inherited from the Soviet period. Those standards expressed in terms of MACs were set based on the concept of "zero risk" for people and the environment in the worst possible circumstances (e.g. under the worst weather conditions). In OECD Member countries, environmental quality standards (concentration of pollutants in air, water and soil) are targets, not mandatory maximum permissible standards. In Kazakhstan, the MACs are established for a very high number of parameters, but effective monitoring capacity, in both public authorities and industry, falls well short of the ambition that the MAC lists presuppose.

Ambient quality standards are considered to be binding limits for all the users of a given environmental medium. Therefore, individual limits for emissions to the air, discharges to water and waste disposal arise from direct application of MACs.

MACs of polluting substances in the air are established for 683 pollutants (2015 SanPiN No. 168).

Water standards are established for drinking water and for water bodies used for domestic needs, water bodies used for fishery and for seawater. MACs are approved for more than 1,300 substances with regard to chemical substances in water bodies used for domestic-potable and recreation needs (2015 Order of the Minister of National Economy No. 209), for 912 substances in respect to hazardous substances for fishery ponds and more than 1,400 substances for drinking water.

MACs of hazardous substances, micro-organisms and other biological substances in the soil have been set for 321 substances (2004 Joint Order of the Ministry of Health No. 99 and the Minister of Environmental Protection No. 21-p).

Emission standards

MACs are translated into enterprise-specific emission and effluent limit values. ELVs are to be calculated at the pre-design stage, during preparation of the feasibility study and technical report, and they are a mandatory step towards being granted an environmental permit. ELVs are defined exactly as they appear in the technically specific emission standards or are estimated by means of calculation and (or) instrumental methods, based on the objectives of achieving environmental quality standards at the border of the sanitary protection zone and in nearby residential areas.

In 2012, the methodology for determining emission standards by means of calculation was approved (2012 Order of the Minister of Environmental Protection No. 110-p). Complementarily, in 2014, several methodologies for calculating the emissions from enterprises in various industries into the air were approved (2014 Order of the Minister of Environment and Water Resources No. 221-Ө). The latter document provided a set of methodologies covering a significant number of activities: gas transportation and storage facilities; oil refining and petrochemical enterprises; TPPs and boiler houses; technological equipment of machine-building enterprises; working with plastic materials; cement production enterprises; category IV facilities; unorganized sources; disposal of ash and slag waste for boilers of various capacities burning solid fuels; solid domestic waste landfills; ambient air from emissions of enterprises; and certain technological processes in metallurgy.

The List of pollutants and types of waste for which emission standards are established (2015 Order of the Minister of Energy No. 26) and Hygiene standards for atmospheric air in urban and rural settlements (2015 Order of the Minister of National Economy No. 168) bear witness to Kazakhstan's efforts to improve, densify and regulate in more detail the establishment of ELVs and to reduce the number of pollutants for which ELVs have to be defined.

However, the results of the process will never be very different if the underlying concept of the process – the establishment of ELVs exclusively anchored in MACs – is not revised. ELVs are not benchmarked on sector-specific BAT, but, rather, on health and sanitary standards. ELVs are determined based on the level of historical pollution and background concentrations, and not on the basis of those limit values that could be achieved when applying BAT.

Product standards

Since 2008, 32 technical regulations have been developed, including on drinking water safety (2008 Government Resolution No. 456), safety of pesticides (2008 Government Resolution No. 515), safety of fertilizers (2010 Government Resolution No. 491), safety of food products derived from genetically modified (transgenic) plants and animals (2010 Government Resolution No. 969), and product labelling (2016 Government Resolution No. 724). The safety of toys is regulated in accordance with the 2007 Law on the Safety of Toys and the 2011 EEU Technical Regulation No. 798.

2.4 Compliance assurance mechanisms

Self-monitoring and reporting by regulated entities

As of early 2018, there were 2,398 category I enterprises (table 2.5).

Table 2.5: Category I enterprises, 2018, number

Oblasts and cities	Category I enterprises
Aktobe Oblast	181
Almaty Oblast	244
Atyrau Oblast	51
East Kazakhstan Oblast	134
Zhambyl Oblast	270
Karaganda Oblast	177
Kostanay Oblast	188
Kyzylorda Oblast	93
Mangystau Oblast	84
North Kazakhstan Oblast	115
Pavlodar Oblast	102
South Kazakhstan Oblast	435
West Kazakhstan Oblast	61
Astana City	51
Almaty City	212
Total	**2 398**

Source: State Registry of Nature Users, http://ecogosfond.kz/gosudarstvennyj-fond-jekologicheskoj-informacii/vidy-jekologicheskoj-informacii/, accessed March 2018.

Self-monitoring and reporting requirements are established in the Environmental Code. The requirements of self-monitoring reports and timelines for their submission are clearly specified (2013 Order of the Minister of Environmental Protection No. 16-O).

Enterprises of categories I–III submit their self-monitoring reports (paper copies) to the departments of ecology under the Committee of Environmental Regulation and Control every three months. In 2016, 291 fines were imposed for failure to submit self-monitoring reports. The self-monitoring environmental reports are used by public authorities mainly as background information for conducting inspections. Quality assurance and quality control of the self-monitoring are, however, not always guaranteed.

Results of self-monitoring are also communicated in the form of regular statistical reports. Companies have to submit to the Committee on Statistics three standardized statistical reports on air, water and toxic waste. Reporting of water use, as well as of toxic waste generation and disposal, is done annually. The air report is submitted twice a year.

It might be worth analysing the set of reports that companies have to submit to public authorities and make an effort to streamline them with a view to reducing the administrative burden of reporting.

Environmental audit

Environmental audit is regulated by the Environmental Code. No subsidiary legislation exists. An enterprise can be requested to do a mandatory audit in the event of its reorganization, bankruptcy or a significant damage to the environment discovered by an inspection. Environmental audit can also be undertaken voluntarily and, in such a case, its outcomes are confidential. There are no data on how many voluntary audits take place. Data on mandatory audit vary between different sources but none of them suggests more than 100 audits were undertaken in 2017 across the entire country. This is clearly not enough for Kazakhstan when compared with the number of identified violations of environmental legislation (3,498 in 2017) and shows that the instrument does not function properly.

Licences to undertake an environmental audit are issued by the Committee of Environmental Regulation and Control under the Ministry of Energy. Both legal entities and individuals can be licensed. Licences are of unlimited duration. The Committee receives mandatory environmental audit reports but it rarely comments on the reports received. According to the Code, environmental auditors (both legal entities and individual entrepreneurs) shall be part of a chamber of environmental auditors. Several such chambers exist.

The major issue with improperly functioning environmental audit is that it does not serve its purpose – to prevent environmental violations and damage. There are no incentives for an enterprise to undertake a voluntary audit. A mandatory environmental audit takes place when the prescription to remediate the violation is already in place and the damage has already occurred. In addition, the audit does not motivate the enterprise to implement environmental protection measures, as there is no formal system to check whether an enterprise implemented measures prescribed by the audit. Furthermore, the audit is not formally linked to planning environmental protection measures.

There are no provisions in the legislation on the impartiality, conflict of interest and responsibility of environmental auditors. Reportedly, there are cases of the same people having developed draft ELVs for an enterprise and then undertaken an audit for that enterprise. Several years ago, there was a draft law to transfer the functions of the Committee of Environmental Regulation and Control on licensing and attestation of auditors to the chamber(s) of environmental auditors. The draft failed, as there seemed to be a lack of trust towards the auditors. In addition, it was not clear whether one or several chambers should be entrusted with such a role and how to prevent abuses.

The 2014 Code on Misdemeanours includes an article about breach of the legislation on environmental audit. This article was never applied.

Inspections

Procedures

The 2015 Business Code establishes the procedural requirements applicable to all types of inspections and to the measures taken by inspectors in cases of non-compliance revealed during the inspection. Inspections are divided into the following three types: inspections conducted with special procedures on the basis of risk assessment; random inspections; and unscheduled inspections (in response to a complaint).

Small enterprises and microenterprises are exempted from the first two types of inspection in the first three years after registration. The frequency of inspections for high-risk facilities is determined by criteria for assessing the degree of risk but cannot be higher than annually.

All inspections are to be announced in advance. Some exceptions exist that allow the conducting of unannounced inspections (in the cases of an outbreak of infectious disease or production of falsified pesticides or drugs), but these are not applicable on environment-related matters.

In terms of scope, inspections can be comprehensive or thematic.

A mandatory departmental report and an inspection statement is prepared after every inspection.

Random inspections are conducted on the basis of a list drawn up for each half-year and are posted on the official website of the respective ministry. The lists are coordinated between the ministries and their territorial subdivisions and finally approved by the Prosecutor General.

Environmental inspections

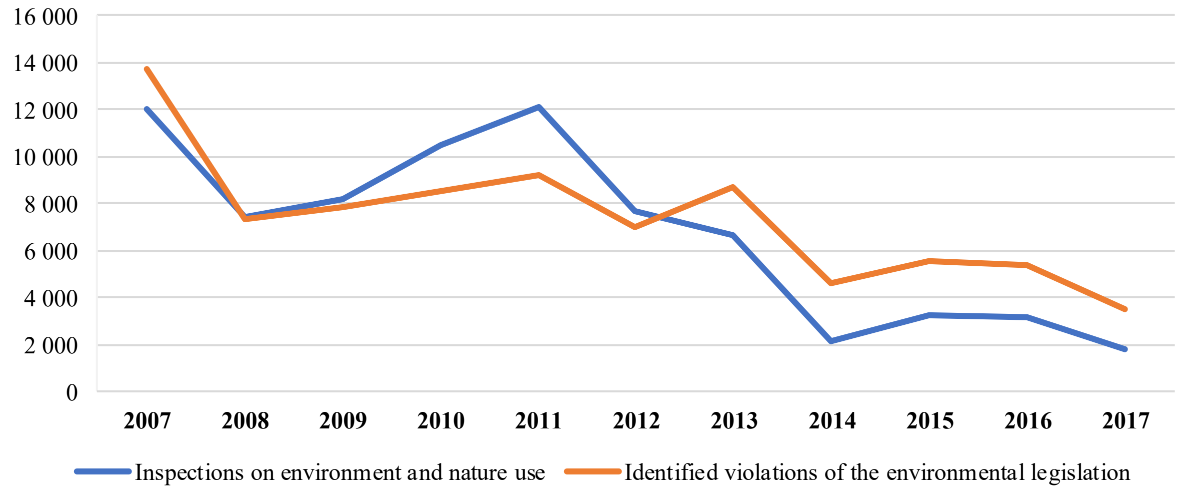
Environmental inspections are conducted by inspectors of the Committee of Environmental Regulation and Control. They are done by inspectors from the Committee's territorial bodies – departments of ecology – but inspectors from the central apparatus of the Committee can join any inspection organized by any department of ecology. The number of inspectors mobilized for an inspection range from one to four. The workload per inspector was beyond the normative standards until 2012–2013 but reduced thereafter due to a decline in the number of inspections.

Random inspections are planned based on a risk assessment methodology (2015 Joint Order of the Minister of Energy No. 721 and Acting Minister of National Economy No. 835). The methodology details the criteria for assessing the degree of risk and establishes a checklist for inspections on environmental protection and reproduction and use of natural resources. The criteria used for assessing the degree of risk include objective criteria (degree of risk in a particular area of activity and not directly dependent on the particular inspected entity) and subjective criteria (results of the activity of the particular inspected entity). In preparing the list (or plan) of random inspections, the results (score) of evaluation of subjective criteria of the inspected entities and the workload of inspectors are taken into account. Inspectors of the departments of ecology report no difficulties in applying the criteria for assessing the degree of risk.

The number of inspections was reduced significantly from 2012, supporting the overall trend of reducing the pressure on businesses and improving the planning of inspections on the basis of risk assessment. Apparently, there is a correlation between the reduction in the number of inspections and the decline in the number of revealed environmental violations (figure 2.1). This apparent correlation should be thoroughly assessed because, if confirmed, it means that the number of violations has not diminished and that the reduction in the number of revealed violations identified is solely due to the decline in the number of inspections.

At the heart of non-compliance with environmental legislation are the following factors: late securing of permits by nature users; exceedance of the pollutant thresholds; unauthorized use of natural resources; and lack of environmentally friendly technologies and equipment.

Figure 2.1: Environmental inspections, 2007–2017, number



Source: Ministry of Energy, 2018.

Water-related inspections

Inspections on water issues and, since recently, dam safety, are undertaken by inspectors from the eight basin inspections under the Committee on Water Resources of the Ministry of Agriculture.

Water users are divided into primary users (those who abstract water from water bodies) and secondary users (those who receive water based on contracts from primary users). There are 626 large primary water users (water users who take more than 5,000 m^3/day or operate reservoirs with a volume of more than 10 million m^3) and 2,332 smaller primary water users (water users who take less than 5,000 m^3/day or operate reservoirs with a volume of less than 10 million m^3). As of early 2018, there are 74 inspectors who do water inspections and have to cover 3,080 primary water users.

Since 2010, the frequency of water inspections has been determined by the significance of the consequences and the degree of risk, in a two-stage approach: first, all primary water users are divided into three groups, depending on the strategic importance of the facilities and the volumes of water abstraction; and secondly, in accordance with the “earned” points (score). Group I includes the most sensitive facilities, those classified by the 2017 Government Resolution No. 933 as facilities of special strategic importance. Group I includes 57 reservoirs, 29 hydro complexes and dams, and water intake facilities and pumping stations that provide water to 36 cities and towns. Group II has the large primary water users who take more than 5,000 m^3/day or operate reservoirs with a volume of more than 10 million m^3. Group II includes 626 primary water users. Group III covers the small primary water users. The criteria and checklist for determining the risk are in place and used to prepare the lists of facilities for random inspections (2015 Joint Order of the Minister of Agriculture No. 19-2/1131 and the Minister of National Economy No. 809).

A closer look at data on the number of inspections and violations in the water sector by river basins reveals the same pattern of significant reduction in the number of inspections after 2013 (table 2.6), as for environmental inspections (figure 2.1). The most common violations of the water-related legislation include exceedance of ELVs (541 cases in 2016), violation of state ownership of water (171 cases), violation of rules for primary accounting of water and use of water (159 cases) and distortion of data and reporting on water (74 cases).

Forestry, fauna and fishery inspections

Inspections related to forestry, fauna and fisheries are conducted by inspectors of the Committee on Forestry and Fauna of the Ministry of Agriculture, in particular of its 14 territorial bodies called oblast territorial inspections of forestry and fauna.

Inspectors in oblast territorial inspections of forestry and fauna have to be “universal”, that is, they have to combine knowledge of forestry, fauna, fisheries, and protected areas laws and regulations. Although individual specially protected natural areas have their own inspectors, the inspectors from oblast territorial inspections of forestry and fauna have the right to conduct inspections in protected areas and check the work of protected areas inspectors. Inspectors from oblast territorial inspections of forestry and fauna check the implementation of measures on afforestation and reforestation and preparedness for fires. They also verify compliance with the rules and permit conditions during sanitary and clear-cut felling (in Kazakhstan, clear-cut felling is prohibited only in coniferous forest). Inspectors can carry firearms. The risk assessment criteria and the checklist for fauna inspections are in place (2015 Joint Order of the Minister of Agriculture No. 18-04/1126 and the Minister of National Economy No. 808).

In addition to inspections of business entities (352 inspections related to fauna in 2016, table 2.7), the inspectors of oblast territorial inspections of forestry and fauna also do patrol checks, often together with the police, to identify violations of hunting, forestry and fishing legislation. In 2016, 9,191 patrol checks were conducted by the oblast territorial inspections of forestry and fauna. The data on patrol checks related to fisheries is found in table 2.8.

Protected areas inspections

Three types of protected areas (state nature conservation areas, state national nature parks and state nature reserves) have their own inspectors. In 2016, protected area inspectors conducted 6,242 patrol checks, having identified 1,011 violations. Control in protected areas can also be conducted by the inspectors of the oblast territorial inspections of forestry and fauna.

Sanitary-epidemiological inspections

The Committee for the Protection of Public Health of the Ministry of Health, through its territorial departments, is responsible for sanitary-epidemiological inspections. Sanitary-epidemiological inspections have an important environmental dimension: the inspectors check the state of the water supply networks, the quality of the environment in public places, including schools and hospitals, safety and environmental conditions at workplaces, the safety of toys, etc. The regulated community for sanitary-epidemiological inspectors (114,669 entities in 2017) is much larger than for environmental inspectors of the Committee of Environmental Regulation and Control.

Table 2.6: Water-related inspections, 2013–2017, number

											Communicated cases									
	Inspections					Identified violations					Prosecutor Office					Courts				
	2013	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
Aral-Syrdarya	95	34	29	69	13	108	58	40	84	16	3	1	3	0	0	16	15	2	3	0
Balkhash-Alakol	296	68	95	128	101	318	100	131	174	147	2	1	9	1	12	86	45	14	20	21
Irtysh	76	26	29	38	21	46	20	33	28	11	0	0	2	1	0	11	4	8	9	6
Ishim	123	39	54	31	9	58	18	30	20	4	0	0	0	0	0	34	10	5	2	0
Nura-Sarysu	109	40	22	28	14	53	19	17	23	13	4	2	0	0	0	3	4	6	0	0
Tobol-Torgai	79	12	29	40	16	29	6	25	155	20	5	0	0	0	0	6	2	3	3	3
Ural-Caspian	140	39	22	20	5	140	47	18	26	18	0	0	0	0	0	21	10	0	3	1
Shu-Talas	58	13	14	31	33	32	17	26	31	32	0	0	0	0	0	2	4	0	0	0
Total	**976**	**271**	**294**	**385**	**212**	**784**	**285**	**320**	**541**	**261**	**14**	**4**	**14**	**2**	**12**	**179**	**94**	**38**	**40**	**31**

Source: Committee on Water Resources, 2018.

Table 2.7: Inspections of business entities related to protection, reproduction and use of fauna, 2016, number

	2016
Inspections, of which:	352
Random	233
Unscheduled	116
Identified violations	226

Source: SoER for 2016.

Table 2.8: Patrol checks on fish protection by the oblast territorial inspections of forestry and fauna, 2010–2016, number

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Patrol checks	9 467	10 886	9 554	8 211	8 926	7 435	..
Identified violations	9 949	9 547	8 094	7 639	7 302	5 413	5 947

Source: SoER for 2015; SoER for 2016.

Altogether, the Committee for the Protection of Public Health through its territorial departments organized 59,159 inspections conducted with special procedures in 2017.

Joint inspections

Joint inspections between different government agencies are conducted rarely. It is more common to have several teams of inspectors (environmental inspectors, water inspectors, fishery inspectors) visiting the same installation in the event of an emergency (e.g. a spill or a massive fish kill) but conducting their inspections separately.

Status of inspector

In Kazakhstan, inspectors are not covered by a particular career and do not receive any special compensation, unlike in some other countries where inspectors are accorded a special status in view of their increased functional duties and the requirement to ensure high standards of impartiality.

Non-compliance response

Between 2008 and 2017, 67,525 violations of environmental legislation were revealed. Measures against environmental violations fall under civil, administrative and criminal law.

Administrative liability

Administrative liability is regulated by the 2014 Code on Misdemeanours. Monetary penalties (fines) continue to be the main administrative liability instrument in the environmental field. The number of installation shutdowns or permit revocations is very low, according to the Committee of Environmental Regulation and Control.

Administrative liability covers individuals (physical persons), with an important differentiation between regular citizens and “officials” (managers of legal entities or individuals with decision-making power), individual entrepreneurs and legal entities (juridical persons), and is particularly onerous for large enterprises (fines for large enterprises are in most cases double those foreseen for small or medium-sized businesses).

Administrative fines can be imposed by environmental enforcement authorities or by a court. Warnings and fines are the only sanctions used by government agencies. Suspending an activity, even in the presence of significant damage to the environment, is not within the powers of government agencies, but only of the courts. In the period 2012–2017, courts supported, on average, 83.7 per cent of requests for suspension of activity submitted as a result of environmental inspections. Repeated offences, as well as those contested by the offender, can only be enforced judicially. The prosecutor’s office can initiate administrative actions and may order the imposition of a sanction or initiate an administrative enforcement case and refer it to the competent authority for an appropriate decision.

Fines in Kazakhstan are expressed in conventional units whose monetary value is regularly revised (a monthly calculation index (MCI) equalled 2,405 tenge as of 1 January 2018). Environmental violations entail penalties in the amount of from 5 to 1,000 MCIs, depending on the type of violation and the nature of the offender. Where there is a limited number of violations, the penalty can go up to the amount of the monetary value of the damage caused to the environment.

Given that some discretion is exercized in the actual definition of the fine – since the Code on Misdemeanours provides for minimum and maximum limits – it would be helpful if criteria were set to guide the competent authorities to decide on the actual amount of the fine. But they are not.

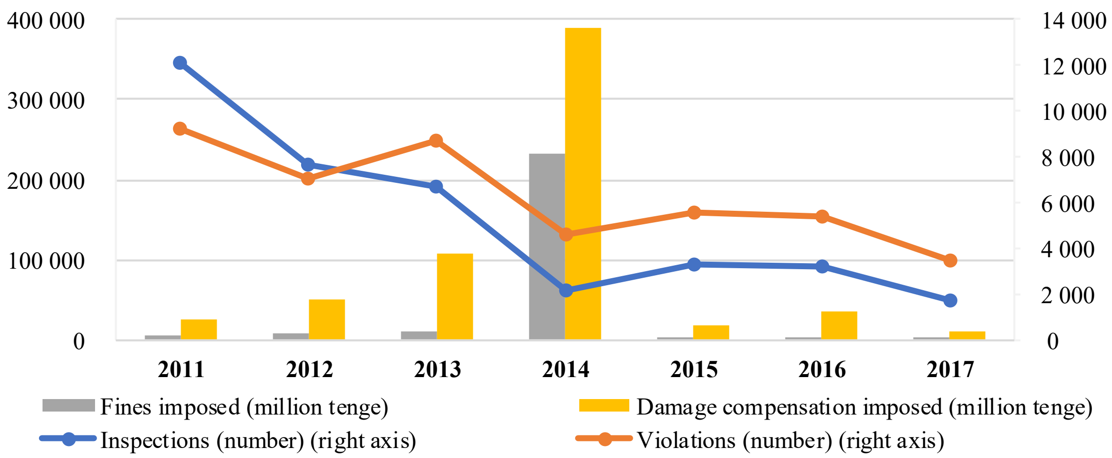
The significant change in the number of inspections since 2014 has led to a pronounced decline in the number of revealed violations (figure 2.1, table 2.9 and figure 2.2). However, this has resulted in rather minor declines in the amounts of imposed fines and damage compensation claims in the period 2015–2017, compared with the period 2011–2013 (table 2.9 and figure 2.2), with the notable increase in the amounts of imposed fines and damage compensation claims in 2014 connected to one single case of violation (chapter 3). The fact that the decline in the amounts of imposed fines and damage compensation claims is insignificant compared with the scale of decline in the number of inspections can partly be explained by the better targeting of inspections on the basis of the risk approach. The data for Karaganda Oblast (table 2.10 and figure 2.3) available for a larger time series show the overall decline in the number of inspections and revealed violations between 2008 and 2017 and no declining trend in the amounts of fines and damage compensation claims. There is also no declining trend observed in the amount of fines for nationwide data on water-related violations in the period 2013–2017, despite the pronounced decline in the number of inspections and identified violations (table 2.11 and figure 2.4).

Table 2.9: Indicators of environmental inspection activities, 2011–2017

	2011	2012	2013	2014	2015	2016	2017
Inspections (number)	12 084	7 639	6 680	2 135	3 274	3 177	1 753
Violations (number)	9 194	7 028	8 665	4 627	5 531	5 363	3 498
Fines imposed (number)	8 468	7 364	9 054	4 262	3 718	5 127	2 977
Fines imposed (million tenge)	6 389	9 146	10 556	232 604	4 019	1 965	1 582
Fines collected (million tenge)	2 218	10 384	6 091	17 128	4 086	1 776	1 663
Damage compensation claims imposed (number)	1 722	1 828	2 357	1 357	1 564	1 589	994
Damage compensation imposed (million tenge)	25 773	51 674	109 009	390 698	18 190	35 369	11 033
Damage compensation collected (million tenge)	16 149	37 453	39 006	30 431	13 270	8 429	30 407
Suspension of activity requests (number)	..	226	656	689	183	194	142
of which: approved by the court	..	173	576	590	146	179	114

Source: SoER for 2011–2014, SoER for 2016, Report for 2017 on implementation of the Strategic Plan of the Ministry of Energy for the period 2017–2021, 2018.
Note: Fines collected and damage compensation collected also include amounts from previous years.

Figure 2.2: Fines and damage compensation for environmental violations, 2011–2017



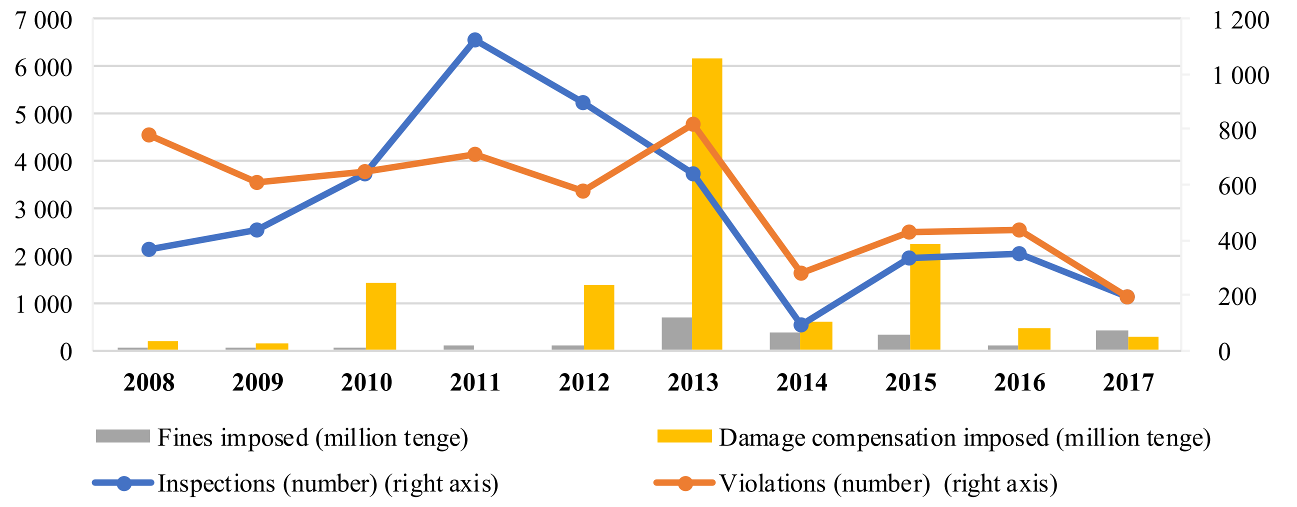
Source: SoER for 2011–2014, SoER for 2016, Report for 2017 on implementation of the Strategic Plan of the Ministry of Energy for the period 2017–2021, 2018.

Table 2.10: Fines and damage compensation for environmental violations in Karaganda Oblast, 2008–2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Inspections (number)	368	432	640	1 126	895	638	91	332	351	190
Violations (number)	776	604	643	713	579	817	283	425	436	194
Fines imposed (number)	606	568	705	795	624	788	323	369	367	187
Fines imposed (million tenge)	19.24	37.56	48.15	110.93	86.56	711.46	391.41	315.56	103.99	439.52
Fines collected (million tenge)	18.01	34.64	37.98	86.27	82.99	702.28	48.18	438.49	92.74	187.23
Damage compensation claims (number)	98	80	104	159	140	163	63	73	91	91
Damage compensation imposed (million tenge)	172.30	167.42	1 404.56	..	1 359.61	6 170.43	606.05	2 258.00	475.60	270.45
Damage compensation collected (million tenge)	71.24	91.15	1.80	211.00	977.93	171.83	288.47	719.31	1 978.83	247.56
Suspension of activity requests (number)	..	..	25	28	24	20	8	7	7	18
of which: approved by the court	..	..	20	24	24	16	8	4	4	10

Source: Annual reports of the Nura-Sarysu Department of Ecology and Karaganda Oblast Department of Ecology, 2008–2017.
Note: Fines collected and damage compensation claims collected also include amounts from previous years. In 2012, the Nura-Sarysu Department of Ecology of the Committee of Environmental Regulation and Control of the Ministry of Environmental Protection was renamed the Karaganda Oblast Department of Ecology of the Committee of Environmental Regulation and Control of the Ministry of Environmental Protection (2012 Government Resolution No. 656). Data for 2008–2011 refer to the Nura-Sarysu Department of Ecology. Data for 2012–2017 refer to Karaganda Oblast Department of Ecology.

Figure 2.3: Fines and damage compensation for environmental violations in Karaganda Oblast, 2008–2017



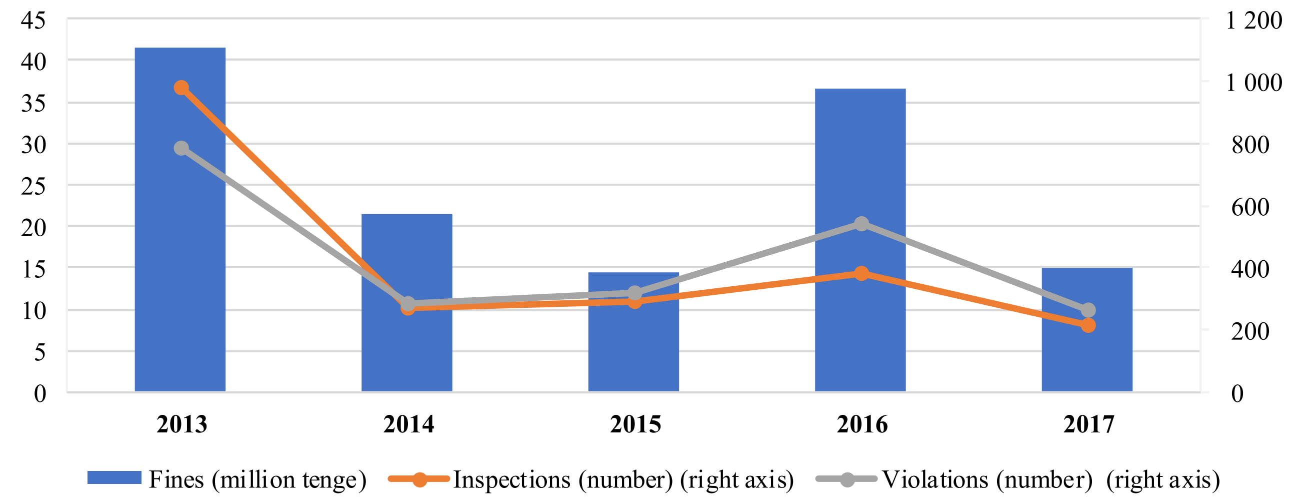
Source: Annual reports of the Nura-Sarysu Department of Ecology and Karaganda Oblast Department of Ecology, 2008–2017.

Table 2.11: Fines for water-related violations collected by the basin inspections, 2013–2017, million tenge

	2013	2014	2015	2016	2017
Aral-Syrdarya	3.27	3.16	0.71	6.11	1.76
Balkhash-Alakol	15.02	5.73	3.73	9.44	6.15
Irtysh	0.72	0.67	2.50	1.25	0.61
Ishim	6.25	2.11	1.85	2.27	0.51
Nura-Sarysu	2.98	2.56	0.79	2.85	0.91
Tobol-Torgai	1.44	0.36	0.76	9.73	0.96
Ural-Caspian	11.62	6.64	3.73	2.66	1.73
Shu-Talas	0.12	0.19	0.44	2.27	2.31
Total	**41.42**	**21.42**	**14.51**	**36.57**	**14.94**

Source: Committee on Water Resources, 2018.

Figure 2.4: Fines for water-related violations, 2013–2017



Source: Committee on Water Resources, 2018.

Criminal enforcement

Criminal enforcement is carried out exclusively through court proceedings. Criminal cases can be initiated either by environmental inspectors or other enforcement agencies or by the prosecutor's office.

The 2014 Criminal Code stipulates 20 types of environmental criminal offences. According to the Code, the following sanctions can be used against such crimes: fines; withdrawal of the right to hold a certain position or carry out a certain activity; correctional works; restriction of personal freedom; arrest; and imprisonment. Environmental crimes can lead to very heavy sentences but in fact they do not. A punishment with imprisonment can be as severe as eight or even 15 years in the case of the crime of ecocide, though the latter article has never been applied

Only a residual part of environmental violations becomes subject to criminal proceedings. Nevertheless, a general trend of an increase in the total number of criminal cases submitted to the courts – by 175 per cent in the period 2013–2017 – is observed (table 2.12). The most frequently committed environmental crimes are, by far, illegal use of rare and endangered species, poaching, illegal logging and illegal fishing (table 2.12).

2.5 Environmental liability, insurance and compensation

The Environmental Code includes the notion of environmental liability and environmental damage. The regime inscribed in the Environmental Code does not focus on remediation of the ecological damage, where the polluter has to repair the harm to environmental assets per se. Likewise, the practical implementation of chapter 46 of the Environmental Code, which is devoted to Liability for Environmental Offences and Settlement of Ecological Disputes, transforms the concept of environmental liability into a revenue-raising mechanism.

Table 2.12: Environmental criminal cases, 2013–2017, number

	2013		**2014**		**2015**		**2016**		**2017**	
Article of Criminal Code	Cases received	Cases completed	Cases received	Cases completed	Cases received	Cases completed	Cases received	Cases completed	Cases received	Cases completed
Art. 325 - Violation of environmental requirements when handling environmentally hazardous chemical or biological substances (Art. 278 in 1997 Code)			3	3	1	1	3	1	0	2
Art. 327 - Violation of veterinary rules or rules established for the control of plant diseases and pests (Art. 280 in 1997 Code)					0	0	1	1	3	3
Art. 330 - Pollution of the marine environment (Art. 283 in 1997 Code)					1	1				
Art. 333 - Violation of rules on the protection and use of mineral resources (Art. 286 in 1997 Code)	1	1								
Art. 334 - Unauthorized use of mineral resources					2	2	3	3		
Art. 335 - Illegal extraction of fish resources, other aquatic animals or plants (Art 287 in 1997 Code)	63	54	59	63	52	56	32	32	46	43
Art. 337 - Illegal hunting (Art. 288 in 1997 Code)	40	50	34	29	67	68	44	48	57	54
Art. 339 - Illegal use of rare and endangered species, as well as prohibited species of plants or animals, their parts or derivatives (Art. 290 in 1997 Code)	97	97	218	214	201	199	165	171	178	175
Art. 340 - Illegal logging, destruction or damage to trees and shrubs (Art. 291 in 1997 Code)	11	10	5	8	514	509	415	419	298	298
Art. 341 - Destruction of or damage to forests (Art. 292 in 1997 Code)									1	
Total	**212**	**212**	**319**	**317**	**838**	**836**	**663**	**675**	**583**	**575**

Source: Supreme Court, 2018.
Note: A new Criminal Code was adopted in 2014 to replace the 1997 Criminal Code. The statistics for 2015 are partially based on the 2014 Code and partially on the 1997 Code.

The established methodology to carry out inspections operationalizes the damage-compensation-driven approach foreseen in the Environmental Code. It clarifies that the damage compensation is to be applied in cases of damage caused to the environment, the health of citizens, property, physical and legal persons and to the state, due to destruction and damage to natural resources, illegal and irrational use of natural resources, unauthorized emissions and emissions above limits.

The economic assessment of the damage from air and water pollution, damage to land resources beyond established standards and illegal use of subsoil, as well as damage from distribution of industrial waste, including radioactive waste, exceeding established norms is determined by direct or indirect methods according to the Rules on economic assessment of damage caused by environmental pollution (2007 Government Resolution No. 535).

Although the methodology foresees that officials of the authorized body in the field of environmental protection first assess the possibility of carrying out restoration activities after damage and that the polluter is made responsible for the implementation of the remediation measures, practice shows that, in general, a level of compensation for the damage is estimated and charged to the polluter.

The current regulatory framework neither encourages nor facilitates the application of an environmental liability regime.

The use of compensation can contribute to environmental damage prevention, unless it is considered as a cost by the operator. The use of compensation, however, does not ensure the remediation of environmental damage, not even if the compensation provided to the state would be channelled exclusively to remediating the damage, which is not the case in Kazakhstan.

The introduction of a system of mandatory financial security in Kazakhstan started with the 2005 Law on Mandatory Environmental Insurance. Entities carrying out environmentally hazardous economic and other activity are required to have environmental insurance. The Law foresees that the list of environmentally hazardous types of economic and other activity is to be determined by the Government. According to the information collected, a specific list for the purpose of environmental insurance was not approved. Operators of category I activities are considered the ones who fall within the scope of the mandatory environmental insurance.

In practice, businesses comply with the obligation to purchase environmental insurance but do not ask for insurance benefits when insurance events occur. According to EnergyProm, environmental insurance business is the most profitable of all mandatory insurance types in Kazakhstan: in 2017, environmental insurance benefit payments were 0.04 per cent of total benefit payments for mandatory insurance, and insurance premiums exceeded benefit payments by 106 times.

There are insufficient data to draw reliable conclusions on the effectiveness of the mandatory environmental insurance in terms of the actual remediation of environmental damage.

2.6 Voluntary compliance promotion instruments

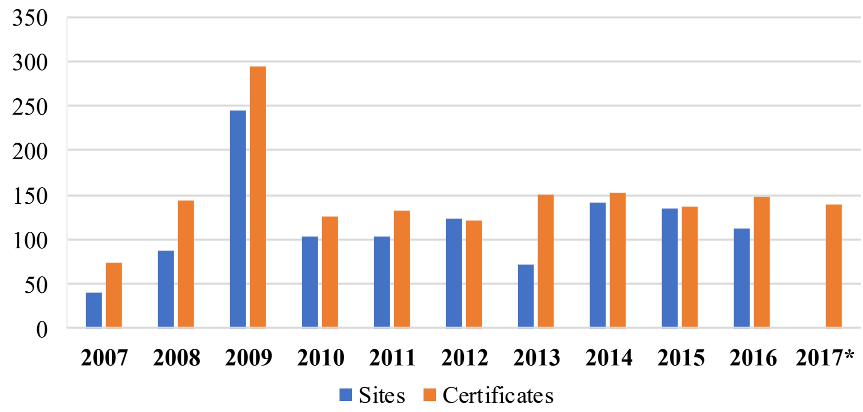
Environmental management systems

Environmental compliance promotion activities do not have wide expression in Kazakhstan.

The national standard ST RK ISO 14001-2006 “Environmental Management Systems. Requirements and user guidelines” was introduced in 2006 and issued in a revised version, ST RK ISO 14001-2016, in 2016 to take into account the new version of the international standard ISO 14001:2015. Since August 2017, certification is done only in accordance with ST RK ISO 14001-2016.

However, the environmental management systems are not widely used, although their use is higher in sectors that are more exposed to international markets. Figure 2.5 indicates no significant increase in the number of ISO 14001 certificates in Kazakhstan. In 2009, the number of certified enterprises reached its highest peak, 294. Since then, the numbers of valid certificates have varied between 122 and 152, evidencing a failure to expand the use of environmental management systems. In 2017, a total of 140 certificates were valid in Kazakhstan (of which 72 corresponded to ISO 14001:2004 and 68 to ISO 14001:2015), which is an extremely small number given the size of the regulated community in Kazakhstan.

Figure 2.5: ISO 14 001 industrial sites and certificates, 2007–2017, number



Source: ISO 14001 Surveys for 2016 and 2017.
Note: * No data are available on the number of sites.

Incentives for the use of ISO 14001 are practically unavailable. The reduction of pollution charges for companies certified under ISO was abolished in 2012. ISO 14001 certification is not seen as a factor in increasing the competitiveness of an enterprise. Private companies that provide consultancy to enterprises to comply with international standards, namely, in the environmental field, are only starting to emerge.

The Eco-Management and Audit Scheme (EMAS), through its global mechanism, is available worldwide to help reduce the environmental impact of (industrial) operations. However, there are no enterprises applying EMAS in Kazakhstan.

Eco-labelling

Eco-labelling in Kazakhstan is developing slowly. The Standardization Technical Committee "Environmentally friendly products" was established in 2006 by the Committee for Standardization, Metrology and Certification of the Ministry of Industry and Trade with the primary goal of developing state standards in the environmental area. The International Academy of Ecology, a Kazakhstan non-profit organization, became a member of the Global Ecolabelling Network in 2016, and has since been issuing eco-labels. Another system of environmental labelling – ECOTANBA – was created by the NGO ECO Standard in 2015. There are no eco-labelling schemes officially adopted by the Government.

Corporate social responsibility

Kazakhstan does not have a comprehensive policy to promote corporate social responsibility (CSR). Following a call from the President for a CSR agenda to be put in place, numerous initiatives were developed and several ministries did work on the CSR field. However, the work undertaken was fragmented and it seems that no ministry considers itself as having the primary responsibility for developing the policy.

A legal definition of CSR was first included in the 2006 Law on Private Entrepreneurship (no longer valid). The 2015 Business Code mentions that the Government promotes the introduction of CSR by business entities.

In 2008, the first National Forum on Corporate Social Responsibility was held to foster dialogue between business and the Government on CSR. The President launched the Paryz award at the Forum to recognize leading enterprises in the field and to provide incentives for integrating CSR into decision-making processes.

Several initiatives of a non-governmental nature promote CSR:

- The CSR Programme at the Eurasia Foundation of Central Asia (EFCA) aims to provide a platform for dialogue among all key stakeholders and to develop a unified CSR approach in Kazakhstan. The website on CSR in Kazakhstan was launched by EFCA, in partnership with Chevron and GSM Kazakhstan/Kcell. The CSR Club of Kazakhstan, also created by EFCA in 2011, aims to disseminate best practices and standards that promote sustainable development and the CSR business handbook.
- The American Chamber of Commerce Working Group on CSR and the Centre for Corporate Governance and Business Ethics division within the Association of Financiers of Kazakhstan have supported dissemination of CSR best practices.

- Kazakhstan's Business Council for Sustainable Development, a coalition of 20 industrial enterprises and consulting companies, has also endeavoured to promote CSR in Kazakhstan and provides annual reports on developments.

Some companies have adhered to the practice of CSR by allocating part of their funds to social projects. However, these funds are being managed by regional authorities (akimats) as part of budgets for regional development, without being earmarked to specific projects. Thus, the principles underlying CSR are lost halfway through execution: it is not ensured that the project supported by the company's financing is directly related to the risks that the company represents for the community, and the participation of the community in the choice and implementation of the project is not assured.

2.7 Legal, policy and institutional framework

Legal framework

The 2007 Environmental Code continues to play a key role in the legal basis for environmental regulation and compliance assurance. Since 2008, Kazakhstan made significant progress in establishing a more comprehensive basis of secondary legislation to facilitate implementation of primary acts.

Subsidiary legislation has been adopted or revised with regard to permitting (in particular, integrated permits), SEE/EIA (with a focus on public participation procedures) and inspection (with the adoption of the subsidiary legislation to enable risk-based planning of inspections). The gaps include the absence of subsidiary legislation on environmental audit, no legal frameworks to provide incentives for the introduction of environmental management systems, the lack of subsidiary legislation to stimulate restoration of environmental damage instead of damage payments and the absence of subsidiary legislation on eco-labelling.

The important changes in the overall legal framework in Kazakhstan, which also affected the environmental area, have been driven by the overall strategy to reduce the pressure on businesses, in particular through easing the permitting procedures and decreasing the inspection burden for economic entities.

Policy framework

There are no specific policy documents, strategies and related action plans on compliance assurance on environmental matters. Strategic goals for compliance assurance have not been established. The system focuses on counting activities (fines, revealed violations) rather than obtaining compliance results. The inspectors' work is still evaluated based on the fines and damage compensation claims imposed, rather than effectiveness of preventive and compliance promotion activities. With some exceptions, compliance promotion and dialogue with the industry is not part of inspectors' work.

Institutional framework

Regulation and control in the field of environmental protection is ensured by a two-level approach – the national and territorial levels. The main actors of environmental compliance assurance are:

- The Committee of Environmental Regulation and Control of the Ministry of Energy and its territorial bodies (16 departments of ecology);
- The Committee on Water Resources of the Ministry of Agriculture and its eight basin inspections;
- The Committee on Forestry and Fauna of the Ministry of Agriculture and its territorial bodies (16 territorial inspections of forestry and fauna);
- Local executive authorities at oblast level and in the cities of republican significance and the capital, through their departments of natural resources and regulation of nature use.

Local executive authorities have important regulatory functions. They issue permits for emissions to the environment for category II, III and IV facilities. They are also in charge of SEE for category II, III and IV facilities and for drafts of legal and regulatory acts developed by local authorities.

The eight basin inspections under the Committee on Water Resources of the Ministry on Agriculture carry out their activities in the territory of two or more oblasts. The exercise of control and regulation has to be carried out in a very vast territory, and the insufficiency of resources is a critical issue.

The Committee on Industrial Development and Safety under the Ministry for Investments and Development, the Committee for Nuclear and Energy Supervision and Control under the Ministry of Energy and the Committee for the Protection of Public Health under the Ministry of Health are also relevant players in the environmental compliance assurance institutional framework, due to their responsibilities with regard to chemical products and industrial safety in enterprises dealing with hazardous substances, nuclear materials and radioactive waste, and sanitary and epidemiological welfare of the population, respectively.

Photo 2: Tamgaly Tas

In a context in which the environmental domains are under the tutelage of different ministries, and given the effects that changes in the state of many of those often cause in others, it should be noted that there is no institution with responsibilities for operational coordination or articulation of the work developed by different entities with competencies in the different environmental domains, nor procedures in force or practices that discipline the articulation and exchange of information between them. The exchange of information among the different entities is carried out essentially on an occasional or informal basis.

At the top of this broad pyramid of environmental enforcement is the General Prosecutor's Office, which has an oversight function over competent enforcement agencies and is supported at subnational level by environmental (nature protection) prosecutors whose key task is the supervision of executive authorities.

A particular aspect of the current institutional framework regarding environmental regulation and enforcement deserves special mention: the coexistence, under the same political tutelage, of regulatory and regulated entities. This is the case of the Ministry of Energy (with its subordinate Committee of Environmental Regulation and Control) and of the Ministry of Agriculture (with its subordinate Committee on Water Resources). These Ministries therefore each have conflicting and competing functions and goals. No clear public benefit in combining these functions can be identified and, although risks of conflict can be managed, it is likely that the trade-offs that will necessarily have to happen will not lead to environmental enforcement and compliance gains.

Information and transparency

Data and information about the performance of the environmental regulatory and compliance assurance system are publicly available but they are scattered throughout various sources and not presented in a form that would allow for assessment and identification of trends.

Territorial bodies of central public authorities disclose the data on issued permits, EIA/SEE, inspections and non-compliance measures at their own discretion, with varying frequency and in various formats. Some information is available only upon request, e.g. annual reports on activities of departments of ecology of the Committee of Environmental Regulation and Control can be requested from the IACEP.

The national public authorities (Committee of Environmental Regulation and Control, Committee on Forestry and Fauna, Committee on Water Resources) do not regularly publish such information in a uniform way although it can be retrieved from various sources (e.g. reports of respective ministers or the annual reports on implementation of strategic plans of the ministries).

The SoER reports often present the data on regulatory and compliance assurance activities for a given year only, in a slightly different format from the previous year, and mostly in a text format.

In other words, the public is flooded with information about millions of tenge imposed as fines but only a very determined person would be able to gather and analyse such information to see how effective the system is.

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis targets 12.1 and 12.6 of the 2030 Agenda for Sustainable Development is described in box 2.1.

Box 2.1: Targets 12.1 and 12.6 of the 2030 Agenda for Sustainable Development

Goal 12: Ensure sustainable consumption and production patterns
Target 12.1: Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries
Target 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

The promotion of sustainable consumption and production patterns (SCP) is one of the principles underlying the 2013 Concept on Transition to Green Economy. The main priorities of the Action Plan of the Concept include: increasing resource efficiency; modernizing the existing and new infrastructure; improving the well-being of the population; and improving national security, including water security.

Although Kazakhstan did not designate a national focal point for the 10-year framework of programmes (10YFP) on SCP or establish national priorities to shift towards SCP patterns in the areas covered by the 10YFP (consumer information; sustainable lifestyles and education; sustainable public procurement; sustainable buildings and construction; sustainable tourism, including ecotourism; and sustainable food systems), the country has developed work in this field.

In 2015, the First Central Asian Sub-Regional Meeting of the 10YFP was held in Kazakhstan. In March 2018, Kazakhstan organized the first National Roundtable on SCP with the following overall objectives: taking stock of progress and challenges for the country to shift to SCP patterns, enhancing cooperation among key institutional actors and stakeholders on national implementation, promoting interministerial dialogue and considering national engagement in the implementation of some of the 10YFP programmes. The event was organized by the Ministry of Energy and the United Nations Environment Programme (UNEP), serving as the 10YFP Secretariat.

Encouraging companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle is not done on a consistent basis, and neither are there public incentives to foster such behaviours. Several companies have developed CSR and sustainability strategies and provide regular reports on the efforts undertaken. Karachaganak Petroleum, Tengizshevroil and Shymkentcement are following such practice. There is no database where reports are made accessible and there is no mechanism available to let people know which companies produce reports or how many reports have been produced. In these circumstances, not only is it impossible to account for indicator 12.6.1, but neither is benchmarking and the dissemination of good practices encouraged.

2.8 Assessment, conclusions and recommendations

Assessment

Kazakhstan's commitment to shift to a green economy requires stronger efforts in the field of environmental regulation and compliance assurance mechanisms, because it cannot happen only by decree and neither will it happen if the private sector is not fully engaged in it. In recent years, contradictory steps have been taken. The simplification agenda, which is absolutely critical to ensure conditions more conducive to economic growth, has come up against environmental protection goals. Significant reduction in the number of inspections without additional countervailing measures is a good example of this.

The apparent correlation between the reduction in the number of inspections and the number of environmental violations raises concerns about the true extent of the occurrence of environmental non-compliance in Kazakhstan. While the aim of reducing the administrative and bureaucratic burden on business is very commendable, it is important that this is not achieved at the expense of potentially silencing environmental violations that would have direct environmental consequences.

Since 2008, significant improvements have been introduced into the permitting system. The creation of the electronic "e-licence" system deserves to be highlighted as a very positive step. On the other hand, persistent challenges to restructuring the permitting system, the best example being the absence of issued integrated environmental permits, constitute a clear weakness that is not conducive to better environmental performance on the part of the operators.

Kazakhstan has shown ambition to shift to a green economy, which is inseparable from a move to a new technological level with higher environmental protection standards for all its economic actors, whether public or private. Compliance with environmental legislation requirements by itself does not ensure the transition to a green economy. It has to be supplemented by a wide use of BAT and not only technologies at the end of the production cycle.

The country has not yet freed itself from concepts and practices that are very heavy administratively, inefficient and perverse, such as the application of pollution charges. This paradigm (pollute as long as you pay) remains unchanged and is also a constraint for adopting a system based on BAT.

Efforts to clarify the primary legislation through regulations, methodologies and instructions are unequivocal, but shortcomings persist in critical areas, such as the consistency between the national legislation on environmental assessment and public participation and the obligations arising from the Espoo and Aarhus Conventions, as well as in the secondary legislation with regard to environmental liability.

Conclusions and recommendations

Permitting

Integrated environmental permitting is not yet a reality in Kazakhstan. Success depends on a significant change in how ELVs are established and requires adherence and commitment to them by companies. Companies do not fully understand how to follow the BAT path. Supporting documents on BAT cannot be, as they are currently, general and not providing practical guidance. The close link between permits issuance and the pollution charges is not considered. A company makes rational decisions; if the cost associated with an upgrade of technology for reducing pollution is higher than the pollution charge it has to pay, the choice will fall on paying the pollution charge. Positive incentives for companies to adopt environmental behaviours are not in place.

Recommendation 2.1:
The Government should:

(a) Adopt an incremental plan for the implementation of integrated environmental permits, starting with a pilot project covering a limited number of companies in a given sector and expanding to all category I facilities by 2022 (at which time, category I companies would have to be subject to an integrated permit);
(b) Raise awareness of the benefits of integrated environmental permitting and implement capacity-building activities for industrial operators to prepare them to undertake the necessary changes to apply for an integrated permit;
(c) Ensure training of staff of the Committee of Environmental Regulation and Control of the Ministry of Energy to undertake control over enterprises with integrated environmental permits;
(d) Develop new documents on best available techniques (BAT) and extend the scope and detail of the existing documents on BAT, enabling their effective use by the regulated community, and encourage the use of appropriate EU BAT Reference Documents (BREFs);
(e) Balance the application of pollution charges with positive incentives to ensure that companies are incentivized to invest in processes that reduce the level of pollution.

See Recommendation 3.1.

Environmental impact assessment

Kazakhstan has no specific legal provisions for the conduct of transboundary EIA and the implementation of the Espoo Convention. There are also inconsistencies between Kazakhstan's national legislation and the obligations arising from the Espoo and Aarhus Conventions, namely, on the delegation of the responsibility for conducting the EIA procedure from the public authorities to the developer (initiator) of the proposed activity, the application of the sanitary classification of industrial facilities on the determination of the objects of SEE, the absence of a legally established procedure for the implementation of screening, the absence of clearly defined provisions to identify the public concerned, the absence of regulation for due account to be taken of the outcomes of public participation in decision-making and the absence of the post-project analysis stage. Another weak point of the SEE/EIA system in Kazakhstan is the unclear relationship between the complex non-departmental expertise and SEE. The tool of public ecological expertise is practically not applied in Kazakhstan, since the public ecological expertise is poorly integrated into the decision-making process on proposed projects.

Recommendation 2.2:
The Ministry of Energy should:

(a) *Amend EIA legislation to overcome inconsistencies with the obligations arising from the Espoo and Aarhus Conventions;*
(b) *Detail the transboundary aspects of EIA in the legislation;*
(c) *Ensure that large construction projects, including residential ones, fully fall within the SEE;*
(d) *Integrate the public ecological expertise into the decision-making system.*

Self-monitoring

Facilities of categories I–III are obliged to self-monitor their emissions. Quality assurance and quality control of the self-monitoring, however, are not yet always guaranteed. The 2003 Reference Document on the general principles of Monitoring of the EU (updated and renamed Reference Document for Monitoring of Emissions to Air and Water 2017) provides detailed information on monitoring principles such as preparation, planning and execution of measurements, quality assurance, monitoring methods, analysis, references and standards.[5] Some relevant guidance can still be taken from the 2007 OECD Technical Guide on Environmental Self-Monitoring in countries of Eastern Europe, Caucasus and Central Asia and the 2007 ECE Guidelines for strengthening environmental monitoring and reporting by enterprises in Eastern Europe, Caucasus and Central Asia.

Recommendation 2.3:
The Ministry of Energy should:

(a) *Develop a guideline document (rules, instructions or requirements) for the planning, preparation, execution and reporting on self-monitoring by industrial facilities, taking into account the existing international practice;*
(b) *Increase the capacity of relevant committees to control and supervise self-monitoring reports of industrial facilities.*

Inspections

There are no specific policy documents on compliance assurance on environmental matters. Strategic goals for compliance assurance have not been established. The system focuses on counting activities (fines, revealed violations) rather than obtaining compliance results. Compliance promotion activities and dialogue with industry are at the very early stage of inception.

Reducing the number of environmental inspections has reduced the administrative burden for businesses. This is the unquestionable effect of the reduction. But the effects will not naturally be limited to easing the environment for the operation of business. Kazakhstan still faces many environmental problems. Inspections are a primary pillar of the enforcement system. The violations have probably continued but some have become invisible in the eyes of environmental authorities. While the planning of inspections on the basis of a risk assessment approach allows better targeting of inspections, the absence of the very possibility of unannounced inspections influences the behaviour of companies and decreases the likelihood of discovering violations.

Data and information about the performance of the environmental regulatory and compliance assurance system are publicly available but they are scattered throughout various sources and not presented in a form that would allow for assessment and identification of trends.

Recommendation 2.4:
The Government should:

(a) *Establish strategic goals and priorities in terms of environmental compliance and enforcement;*
(b) *Thoroughly assess the positive and negative effects deriving from the reduction of inspections;*
(c) *Balance the reduction in the number of inspections through the establishment of unannounced inspections;*

[5] Available from http://eippcb.jrc.ec.europa.eu/reference/.

(d) *Improve the disclosure of data about the performance of the environmental regulatory and compliance assurance system.*

Environmental liability

The primary purpose of an environmental liability regime is that of natural reconstitution, to the point as if nothing had been changed, and where this is not possible, the value of the pecuniary compensation should be directed towards complementary or compensatory remedial measures. In Kazakhstan, in most cases, environmental damage is not remedied, despite the polluter being identified and paying for the damage done.

Recommendation 2.5:
The Ministry of Energy should develop and adopt a guideline document (rules, instructions or requirements) on environmental liability, establishing procedures on environmental remediation and determining that the non-remediation option, if chosen, should always be well founded and approved by environmental authorities.

Environmental management systems

Voluntary approaches, such as environmental management systems, complement regulatory and incentive-based mechanisms, providing a good platform for encouraging better production or consumption practices. However, the expression of these voluntary approaches in the country is very limited. As practically no incentives for the use of ISO 14001 are available, companies do not see direct benefits in implementing environmental management systems. The number of valid ISO 14001 certificates is extremely low (140 in 2017), given the size of the regulated community in Kazakhstan. There are no enterprises applying EMAS in Kazakhstan.

Recommendation 2.6:
The Ministry of Energy should:

(a) *Introduce incentives for companies certified under ISO 14001 or Eco-Management and Audit Scheme (EMAS) standard;*
(b) *Put in place an awareness-raising and communications campaign on the benefits available to companies that implement environmental management systems;*
(c) *Create a publicly available database to disseminate information on the companies that implement environmental management systems.*

Corporate social responsibility

Although the concept of sustainable development and corporate social responsibility has undoubtedly gained prominence in Kazakhstan in the last 10 years, implementation is still lagging behind. Current efforts by the public authorities are fragmented and not sufficient, if Kazakhstan wishes to have the business community more profoundly engaged in adopting behaviours that lead to sustainable development and support the attainment of the Sustainable Development Goals.

Recommendation 2.7:
The Government should promote corporate social responsibility and establish clear and quantifiable targets in relevant policy documents.

Sustainable consumption and production patterns

Kazakhstan has shown close attention to SCP but its commitment has not been continuous or consistent. In Kazakhstan, SCP policies are seen as fundamental elements of a green economy. At the level of the Government, there is awareness of the relevance of SCP and a commitment to improving the country's performance in this area. There are significant weaknesses, however, with regard to SCP: existing public and private initiatives are not consistently documented; there is no clear institutional framework for governance of SCP; there is no consistent assessment of existing gaps in national efforts towards implementation, where support by the 10YFP could be very beneficial.

The country is not actively engaged in the work of the 10YFP and does not have a national SCP action plan/programme. At the policy level, some improvements could be considered, such as introduction of green procurement and developing a publicly accessible database where sustainability reports (indicator 12.6.1: Number of companies publishing sustainability reports) could be displayed. These efforts would bring Kazakhstan closer to achieving Sustainable Development Goal 12 (Ensure sustainable consumption and production patterns).

Recommendation 2.8:
The Government should:

(a) *Mandate the Committee of Environmental Regulation and Control to actively participate in the work of the 10-year framework of programmes (10YFP) on sustainable consumption and production patterns (SCP);*

(b) *Develop and implement a national SCP action plan and establish a strong governance framework for SCP.*

Environmental insurance

There are insufficient data to draw reliable conclusions on the effectiveness of the mandatory environmental insurance in terms of the actual remediation of environmental damage. Businesses comply with the obligation to purchase environmental insurance but do not ask for insurance benefits when insurance events occur. In 2017, environmental insurance benefit payments were 0.04 per cent of total benefit payments for mandatory insurance, and insurance premiums exceeded benefit payments by 106 times.

Recommendation 2.9:
The Government should assess the system of mandatory environmental insurance, addressing current figures that show that insurance premiums greatly exceed benefit payments.

Chapter 3

GREEN ECONOMY AND TRADE

3.1 Greening the tax and tariff system

Pollution charges

The 2007 Environmental Code states that emissions payments are among the key mechanisms for economic regulation of protection of the environment and the use of natural resources. The Code provides that emissions payments shall be established and levied in the procedure provided by the 2017 Code on taxes and other mandatory payments to the budget (Tax Code). Emissions below authorized emissions limit values (ELVs) have been subject to pollution taxes while emissions of pollutants above ELVs have been subject to two distinct types of payments: i) administrative penalties; and ii) monetary payment for environmental damages. The ELVs are set in the permits, which are issued by environmental authorities at either national or regional level depending on the size of the operation. The largest ("significant") polluters are still subject to a command-and-control approach, which penalizes non-compliance with a predetermined emissions limit set in an environmental permit.

The tax payments for authorized emissions are based on each enterprise's ELVs. The Tax Code specifies the tax rates per kilogram, per ton or per GigaBecquerel. Pollution tax rates are set as coefficients multiplied by the monthly calculation index (MCI). For example, the rate per ton of sulphur oxides emitted is 10 times the MCI. The MCI is established by the Government on an annual basis to take into account inflation and other factors and is then used to determine taxes, as well as penalties and certain other payments.

Pollution tax rates for emissions within the ELVs set in the permit are determined in a two-stage process. The Tax Code fixes the minimum or base tax rates, which apply for each of the 16 regional entities (oblasts, cities of republican significance and the capital). Each oblast may then set a higher tax rate provided that such a rate does not exceed twice the base rate, except for gas flaring by the oil and gas industry, which may be subject to locally imposed tax rates 20 times the base rate. Most oblasts impose the highest possible rate of tax in each case.

For above-ELV emissions, the locally applicable rates used to be multiplied by a factor of 10 but this multiplier factor was removed in 2017. However, some base rates of taxes, for example for flaring by the oil and gas industry, are still subject to multipliers. The local representative authorities can increase the base rates by up to two times, except for flaring. Decreasing coefficients can be applied in the case of utilities.

Administrative penalties are imposed by authorities when the levels of emissions or discharges exceed the ELVs set in project documents and environmental permits. They can also be applied for the absence of an environmental permit. The 2014 Code on Misdemeanours establishes that the penalty for emissions above the established ELVs are based on MCIs and the largest businesses can be fined up to 200 times the MCIs.

The ELVs in the permitting process are based on the level of historic pollution and background concentrations rather than emission limits that an industry could achieve when applying best available techniques (BAT). The approved BAT documents in place today in Kazakhstan provide specific technical emission limits and reference methodologies for only three industrial processes that should be the basis for approved ELVs in permits. This is insufficient compared with a variety of processes used by industrial facilities. Also, the BAT documents do not clearly specify emission standards for all basic pollutants. Among the recommended technological solutions in the documents, the "end of pipe" technologies prevail.

The Environmental Code also introduced integrated permitting on a pilot basis, following benchmarks established by EU Directive 2010/75/EU on industrial emissions (the IPPC Directive). However, as of early 2018, no applications had been submitted for an integrated permit.

While the combined amount of revenue to the oblasts and state budget from all payments imposed has been substantial, the system has for long been considered discretionary, complex and administratively onerous. The setting of pollution charges was often guided by the desire to generate sufficient revenues for the support of oblast or local budgets, and not necessarily to address environmental problems. The tax payments for authorized emissions are based on each enterprise's ELVs. This leaves room for discretion in setting the ELVs and is not in line with standard environmental tax principles, which require a charge per unit of emissions unless there is clear evidence of threshold effects. The calculation of penalties for emissions above the established ELVs for large businesses is also subject to interpretation. The authorities interpret this to mean that the penalty should be calculated not only by multiplying the rate by 10, but also by then multiplying the product by the amount of the relevant emissions, i.e. the same way that the tenfold tax is calculated (tax rate multiplied by 10 times the amount of excess emissions). The language of the provision in the Code on Misdemeanours on administrative penalties does not clearly stipulate that the rate should also be multiplied by the amount of the relevant emissions, i.e. that the penalty is effectively equal to the tax amount for the excess emissions.

The system involves discrimination against specific industrial operators (e.g. locally owned versus international, the latter of which are particularly targeted by enforcement authorities) and sets rates for taxes and fines, which are not uniform for all industry sectors. The rates applicable to taxes are not always realistic and consistent with international practice, as they allow punishment for emissions associated with industrial practices using BAT. In addition, penalties function de facto as a form of taxation. Enforcement is not always transparent and even handed. Insufficient regulatory guidance is provided on how to assess the extent of the damage, needs and costs of remediation, and how to select clean-up measures.

In addition to taxes and administrative penalties, emissions of pollutants above the permitted ELVs are subject to monetary damage payments via a judicial system. The Environmental Code defines the economic value of environmental damage as the cost of environmental remediation that can be assessed directly or indirectly. The direct method is used to assess the damage. It aims to determine the expenditure (in market prices) necessary to restore natural resources and living organisms through "most effective engineering, management and technological measures" in accordance with a time-specific project. The Environmental Code gives "priority" for the remediation to be undertaken by the party responsible for the damage. It also provides for the engagement of independent experts to assess the damages, whose fee must be paid by the responsible party.

However, unlike the practice in OECD Member countries, the environmental authorities mostly use the indirect method, which is easier to apply, usually results in much higher damage payments and does not lead to remediation of the actual damage caused to the environment. As in many other countries of Eastern Europe and Central Asia, the indirect method determines the value of the "pollution damage" as a function of the current pollution tax rates and determines the "pollution damage" from each pollutant using a mathematical formula and then combines the resulting assessments of damage caused by each pollutant. The indirect method of calculating monetary damages relies on a pre-established formula and hence does not require measurements (or proof) of actual damage to the environment in determining the amount of compensation that must be paid. Both the direct and indirect methods, as stipulated, contradict legal principles applied in many OECD Member countries because environmental liability for "damages" arises upon the exceeding of a predetermined limit stipulated in the permit. In OECD Member countries, the permit plays no role in damage assessment; liability for damages arises only upon a claimant bringing physical evidence of actual harm. The assessment of environmental damages in OECD Member countries is primarily based on resource equivalency analysis to estimate the needs and costs of restoring affected resources or environmental services. The remediation scope may be mandated by law or left to the discretion of the competent authority, which determines specific measures using criteria such as technical feasibility, effectiveness and efficiency.

Kazakhstan still follows fault-based concepts for damages that tie liability to exceeding a predetermined limit in an emissions permit. Such practice has generally been abandoned in OECD Member countries that instead adopted the strict liability/polluter-pays model based on evidence of actual harm to the environment. By contrast, environmental liability for pollution in Kazakhstan applies only if the emission limits set in the permit have been breached (the fault standard), even in the absence of proof of environmental damage. Environmental liability in Kazakhstan remains focused on calculating and collecting monetary compensation for the state (essentially serving as a revenue-raising penalty) rather than on preventing and correcting the damage. There is very little regulatory guidance on how to assess the extent of the damage, needs and costs of remediation, and how to select clean-up measures.

Revenues are collected at the oblast level and allocated to the oblast and state budgets. The proceeds of the emissions taxes and administrative payments and penalties, except from the oil and gas sectors, are allocated to the oblasts where the facilities are located, for their general expenses. Revenues from damage compensation payments, except for the oil and gas sector, are allocated to the state budget. The taxes and other payments from the oil and gas sector are allocated to the National Fund, a sovereign wealth fund that manages oil revenue.[6]

The system generates an important revenue stream. One estimation shows that the payments in the mining and metallurgical sectors in 2016 amounted to 67 billion tenge (€163 million), with 86 per cent of that amount coming from the payments for emissions within the established limits. Most of the revenues are collected in four oblasts (Karaganda, Aktobe, Atyrau and Pavlodar). However, the largest environmental payments are generated through the lawsuits that are brought by the environmental authorities against the major oil and gas projects and concern the gas flaring claims. In one of the biggest legal disputes, the multinational consortium North Caspian Operating Company, which developed the Kashagan oil field in the Caspian Sea, was threatened with having to pay 152 billion tenge (US$845 million, using the prevailing exchange rate) in 2014 in taxes, fines and damages for alleged damage to the environment from flaring residual sour gas during start-up operations. In 2016, Karachaganak Petroleum Operating Company, which operates one of the largest fields in the world (the Karachaganak field located in West Kazakhstan Oblast), was ordered to pay a fine of 526 million tenge (over US$1.5 million) for releasing pollutants into the atmosphere. In 2011, fines equal to US$11.5 million were imposed on the Tengiz oil field operator for gas flaring.

Environmental taxes and penalties collected at the local level are generally not effectively used for improving environmental conditions and promoting a green economy. According to information provided by the Government, only about 30 per cent of revenues from environmental charges are spent on environmental protection measures (33 per cent in 2016). This relatively low proportion would not have been questioned if environmental problems had been in check, but evidence shows that environmental payments are used as a form of subsidy to address other problems, economic or social, and no adequate resources are allocated to address pollution or reduce its impacts on human health or ecosystems.

To address the challenges, in early 2018, the Ministry of Energy initiated the process of revising the Environmental Code to better align the environmental regulations and environmental payments system with the polluter pays principle. The process of reforming the Environmental Code includes reform of environmental taxes and non-compliance payments, environmental quality standards, impact assessment and permitting procedures, the state environmental controls and monitoring, and incentives to introduce green technologies. The reform provides an opportunity to restore credibility in the regulatory system and align the laws governing environmental taxes, fines and damages to the environmental policy objectives and the international commitments of Kazakhstan.

Vehicle-related taxes and excise duties

Kazakhstan has made significant reform of the excise taxes on gasoline and diesel use. Since 2017, the excise tax rate on sales by producers of gasoline during summer (June–October) has more than doubled (from 4,500 tenge to 10,500 tenge) and the rate on diesel fuel increased by 17 times (from 540 tenge to 9,300 tenge) (table 3.1). A similar increase was applied to retail sales by producers and to imports. While these increases are commendable, there is still a large gap between the rates in Kazakhstan and those commonly used in OECD Member countries. For example, even for the highest rates under the current legislation (e.g. 10,500 tenge per ton) the tax equals somewhat less than US$0.25 (€0.20) per litre. This still leaves a large gap relative to Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity, which sets a minimum excise tax rate of €0.36 (US$0.44) per litre for unleaded gasoline for use in motor vehicles.

However, the vehicle taxation still does not take environment impacts fully into account. According to the Tax Code, the rates of vehicle taxes are differentiated based on engine volume (cm^3). For instance, the tax rate for a vehicle with an engine size between 3,000 cm^3 and 4,000 cm^3 is 15 times higher than that for a vehicle with an engine size of less than 1,100 cm^3, while for a car with an engine size over 4,000 cm^3 the rate is 117 times higher. From an environmental point of view, this can theoretically incentivize the purchase of smaller cars that, everything being equal, are less environmentally harmful. However, this goes contrary to the practice in a number of OECD Member countries that have a long history of using one-time or recurrent vehicle taxes on the basis of CO_2 emissions or fuel efficiency to drive the demand for fuel-efficient and cleaner cars.

[6] The Kazakhstan National Fund is a sovereign wealth fund created as a stabilization fund against fluctuations in oil, gas and metal prices. It is managed by the National Bank of Kazakhstan. According to the National Bank of Kazakhstan, the total market value of the Kazakhstan National Fund's portfolio amounted to US$61.8 billion at the end of 2017.

Table 3.1: Excise tax rates on gasoline and diesel fuels, 2015, 2017, tenge per ton

	From 1 January 2015 (2015 Resolution of the Government No. 133)		From 1 April 2017 (2017 Resolution of the Government No. 144)*	
	Gasoline **	Diesel fuel	Gasoline **	Diesel fuel
Wholesale sales of gasoline and diesel fuel by producers (period from June to October)	4 500	540	10 500	9 300
Wholesale sales of gasoline and diesel fuel by producers (period from November to May)	4 500	540	10 500	540
Wholesale sales of gasoline and diesel fuel by individuals and legal entities	0	0	0	0
Retail sales by producers of gasoline and diesel fuel (period from June to October)	5 000	600	11 000	9 360
Retail sales by producers of gasoline and diesel fuel (period from November to May)	5 000	600	11 000	600
Retail sales by individuals and legal entities of gasoline and diesel fuel	500	60	500	60
Imports	4 500	540	4 500	540

Source: 2015 Resolution of the Government No. 133, 2017; Resolution of the Government No. 144.
Note: * 2017 Resolution of the Government No. 144 is no longer valid. Excise tax rates are provided in the 2018 Resolution of the Government No. 173, but rates are the same as in the 2017 Resolution of the Government No. 144.
** Except for aviation.

Fees for use of mineral resources

Taxation of the extraction of mineral resources has been an important part of the tax system in Kazakhstan. The system was significantly redesigned in 2009 as part of the revisions of the Tax Code to stimulate the diversification of the economy away from natural resource extraction. To achieve this, the 2008 Tax Code attempted to shift the tax burden to subsoil users by raising taxes on the sector, while significantly reducing the statutory corporate tax rate and simplifying the tax system outside subsoil production. At the same time, the Code eliminated subsoil contract stability provisions from many subsoil use contracts.[7]

The 2017 Tax Code specifies several special taxes that apply to mining companies in addition to general taxes (corporate income tax, VAT, excise and customs duty, payroll tax, tax on transport, environmental pollution fees). All licensed activities that extract mineral resources in Kazakhstan are subject to mineral extraction tax, excess profit tax, rent tax on exports, and bonuses payable upon the signing of licence agreements and upon confirmation of commercial discoveries. Starting from 1 January 2019, the bonus for commercial discovery will be fully abolished.

A mineral extraction tax is payable on the value of the mineral resources produced (minus normative losses) and is payable on a quarterly basis. The value of the mineral resources for the purposes of mineral extraction tax is generally determined using the average exchange price of extracted minerals at the London Metal Exchange or the London Precious Metal Exchange as quoted by specified publications.[8] There are fixed approved percentage rates of mineral extraction tax that range from zero to 18.5 per cent depending on the type of minerals. For example, the rate for copper is 5.7 per cent; gold silver, platinum and palladium, 5 per cent; iron ore, 2.8 per cent; and uranium, 18.5 per cent. The mineral extraction tax replaced the royalty that applied to subsoil users under the previous Tax Code.

Excess profits tax is payable annually in relation to the portion of net income under the relevant subsoil use contract, which exceeds 25 per cent of specified deductions (which are primarily deductions for corporate income tax purposes). The tax rates range according to a sliding scale from zero to 60 per cent of the net income of a subsoil user under each specific subsoil contract, in excess of 25 per cent of tax deductions. In the context of oil and gas, the tax base is determined as the value of the exported crude oil and

[7] The 2008 Tax Code abolished the stability of the tax regime for subsoil use contracts other than production sharing agreements (PSAs) signed with the Government prior to 1 January 2009 and that passed the obligatory tax inspection, and contracts signed by the President. All other subsoil users, including those with contracts concluded before 2009, are subject to taxation in accordance with the tax law that is in effect at the time when a particular tax liability arises.

[8] If there is no official exchange price for a mineral, it will be determined as the actual average sales price.

gas condensate based on the same tax valuation. The tax rate ranges from 7 per cent to 32 per cent and is applied once the world price for crude oil and gas condensate exceeds US$40 per barrel.

The exploration or mining licences issued by the Ministry for Investments and Development and the Ministry of Energy were replaced by a subsoil use contract. The contracts are, with certain exceptions, granted following competitive tenders, pursuant to negotiations with the tender winners. Unlike in many countries, subsoil-related laws in Kazakhstan envisage that mineral deposits to be put out to tender be determined by the Government. Accordingly, a potential investor cannot choose a particular deposit to be explored since tenders are announced with respect to deposits from the list approved by the Government.

Despite the reform of the rights and taxation, Kazakhstan policies continue to provide strong incentives for the development of the fossil fuel and mining sectors. This includes deductions of exploration costs from taxable incomes. The 2017 Code on Subsoil and Subsoil Use primarily aims to promote exploration, increase the fossil fuel and mineral resource base and create new projects and employment in the mining sector. This development is aligned with the Government's view that these fossil fuel and mineral extraction sectors are the base industry to achieve the GDP growth targets set under the 2018 Strategic Plan for Development until 2025. Nevertheless, such strong incentives for the fossil fuel and mining sectors may contradict the country's aspiration towards diversification of the economy and its "green" transition, as highlighted in the 2013 Concept on Transition to Green Economy, and keep the energy and GHG intensity of the economy high in the long run.

Market-based instruments

Emissions trading system

Kazakhstan has been one of the pioneering countries to set and trade quotas for GHG emissions. The 2011 amendments to the Environmental Code created a framework for a GHG emissions trading system (KazETS). Under the system, emissions from the highest-emitting sectors and activities were capped, and tradeable emissions allowances (quotas) were allocated to individual enterprises. This market-based mechanism provided for any excessive amount of GHG emissions to be offset (or compensated for) with the relevant amount of quota units (either saved because of implementation of special GHG emissions reduction measures or created by implementation of projects for absorption of GHGs) that can be purchased at the commodity exchange.[9] The quotas are allocated in the National Allocation Plan (NAP) approved by the Government and recorded in the quota certificates issued by the Kazakhstan competent authority.[10] Nearly half of GHG emissions are covered by KazETS, which includes emissions by companies in the oil and gas, power, mining and chemicals sectors, which emit more than 20,000 tons of CO_2 per year. Previously, KazETS also formally covered GHG emissions from the agricultural and transport sectors, although in practice these sectors did not receive allocations. These sectors were excluded from the scope of the system in April 2016.

KazETS has evolved over time (table 3.2). For the first and second NAPs, the allowances were set at the emissions level in the baseline year (2010) based on the historical data – the so-called "grandfathering" method. The third NAP allowed entities to choose either the grandfathering or benchmarking method, which usually better rewards emitters with greater efficiency and early actions. The Ministry of Energy plans to use only the benchmarking method for a NAP after 2020, through adopting a new list of benchmarks that will be closer to European benchmarks.

The 2017 Resolution of the Government No. 370 on approval of the rules for the allocation of greenhouse gas emissions quotas and the formation of reserves of the established quantity and the amount of quotas of the National Greenhouse Gas Emission Allocation Plan defines two methods of allocation and provides how the obligations to reduce emissions for each year should be determined. Units received through implementation of measures to reduce GHG emissions are not limited in time. The mechanism of additional quota allocation is also regulated (2016 Order of the Minister of Energy No. 292).

[9] The 2011 amendments to the Environmental Code contained a principle that only GHG emissions reductions *not* due to a reduction in production can be sold on the market. In practice, procedures to ensure or verify the origins of such reductions were not clear. This principle was removed in 2016 as part of a package of amendments to the Environmental Code.

[10] Kazakhstan aims periodically to determine the number of "carbon units" based on the number of units allocated under international treaties, the number of units absorbed by Kazakhstan facilities or the number of units acquired in the international market. The Kyoto Protocol and the Environmental Code define this aggregate amount as the Established Quantity. Under Kazakhstan legislation, the Established Quantity is divided between the Established Quantity Reserve and the NAP for GHG emissions.

Table 3.2: Kazakhstan emissions trading system: Key milestones

	Milestone
2013	Launch of KazETS, one-year pilot phase and implementation of the first NAP on GHG emissions for 2013
2014	Implementation of the second NAP on GHG emissions for the period 2014–2015
2015	Development of the third NAP on GHG emissions
2016	Suspension of KazETS until 1 January 2018 due to technical deficiencies in the modalities in the legal documents related to KazETS
2017	Adoption of the new NAP for the period 2018–2020
2018	Relaunch of KazETS (trading of quotas is planned to start in 2019)

Even though the auctioning of emissions quotas is considered to fully comply with the polluter pays principle and generally does not distort price signals for tradable quotas, Kazakhstan has not yet introduced it due to its lack of capacity to develop the necessary procedures, modalities and benchmarking methodologies. The experience of OECD Member countries shows that a failure to move towards auctioning, or at least to allocation less tied to historic emissions, usually weakens the environmental effectiveness of the system.

KazETS was an important instrument in fulfilling international commitments to reduce the country's GHG emissions. However, there were a number of elements in the legislation on KazETS that did not function correctly. As a result, the system was suspended until January 2018 and the intervening period was used to improve the system's provisions, including the method of allocation of quotas, the creation and distribution of quotas from a reserve, certain definitions and oversight of the carbon trading platform. The system was re-established in January 2018, but it is too early to say whether the new system is improved. One important consideration in the new phase of KazETS is to allow any KazETS revenues (e.g. from penalties or future auctioning) in the future to be reinvested in further GHG mitigation instead of being absorbed into the state budget, as is currently the case.

Auctioning to promote renewable energy

Policies to promote renewable energy were recently reinforced. In January 2018, Kazakhstan switched from a feed-in tariff scheme to an auctioning system, which is expected to provide incentives for cost reductions and greater transparency through competitive bidding. Under the feed-in tariff scheme, the fixed tariffs to be paid by the Financial Settlement Centre of Renewable Energy LLP, the off-taker of electricity, were set in the local currency (i.e. Kazakhstan tenge) without any adjustment mechanism provided by the legislation for the fluctuations in exchange rates. This led to a high level of uncertainty for the investors and lenders, given the recurrent practice of devaluation of the Kazakhstan tenge, while capital costs are mainly denominated in foreign currencies.

In 2018, the Ministry of Energy launched the first auctions to select renewable energy projects. The auctions took place in two sessions (in spring and fall) in electronic format. The Government placed on international auction a total capacity of 1 GW, including solar power stations with a capacity of 290 MW, wind power stations of 620 MW, hydroelectric power stations of 75 MW and bioenergy installations of 15 MW. The total volume of proposals from participants exceeded the demand by 3.5 times. Of the 620 MW wind power stations put up for auction, 500 MW were selected; of the 290 MW solar stations put up for auction, 270 MW were selected; of the 75 MW hydroelectric power stations put up for auction, 82 MW were selected; and one 5 MW project was selected for biogas, to be implemented in Karaganda Oblast. In total, 113 companies from nine countries participated in the auctions. Approval was given to 36 projects from 30 companies in six countries to build RES facilities with a total capacity of 858 MW. Auction prices have declined by weighted average for wind power stations and hydropower plants by 12 per cent and for solar power stations by 35 per cent. For individual projects, there was a reduction in tariffs for wind power stations and hydroelectric power plants by 23 per cent and for solar power stations by 48 per cent. These projects will be implemented in the period 2021–2023.

At the same time, Kazakhstan also reinforces its efforts to expand the introduction of renewable energy by other means. For example, several agreements were concluded with the international financial institutions on the allocation of funds for the development of renewable energy sources. This includes an agreement with the European Bank for Reconstruction and Development (EBRD) to allocate €200 million and attract another €480 million investment in renewable energy projects, and agreements with the Green Climate Fund, which approved funding in the amount of US$110 million for the implementation of renewable energy projects. These projects include the development of solar, wind, small hydropower and biogas energy, as well as the modernization and reinforcement of electricity grids in order to integrate renewable energy into the unified energy system. This is part of the country's strategy to increase the share of alternative and renewable energy sources in its power mix to 30 per cent by 2030. In 2017, Kazakhstan saw the commissioning of five renewable energy plants.

3.2 Greening the subsidies system

Kazakhstan subsidizes the use and production of fossil fuels, such as coal, gas and oil, as well as electricity, which are consumed directly by end users or as inputs to electricity generation, of which 89 per cent is generated by fossil-fuel-powered TPPs in 2017. The subsidies, which are estimated by the International Energy Agency (IEA) using the price-gap approach, reached US$4.4 billion in 2016 (figure 3.1). This level of subsidies placed Kazakhstan among the 15 countries with the highest subsidies in the world but number one in subsidizing coal.[11] The subsidies reached this level after a period of steady decline between 2012 and 2015, from US$4.1 billion in 2012 to US$2.2 billion in 2015. However, this decline in value may have reflected lower international energy prices of subsidized fuels since mid-2014, as the gap between international benchmark and end-user prices is closed by lower international prices of energy. The largest share of energy subsidies (36 per cent) was allocated to coal, followed by electricity (31 per cent) and oil (27 per cent). Overall, according to the IEA, fossil fuels are subsidized by an average of 31.9 per cent, meaning consumers pay 68.1 per cent of the total cost.

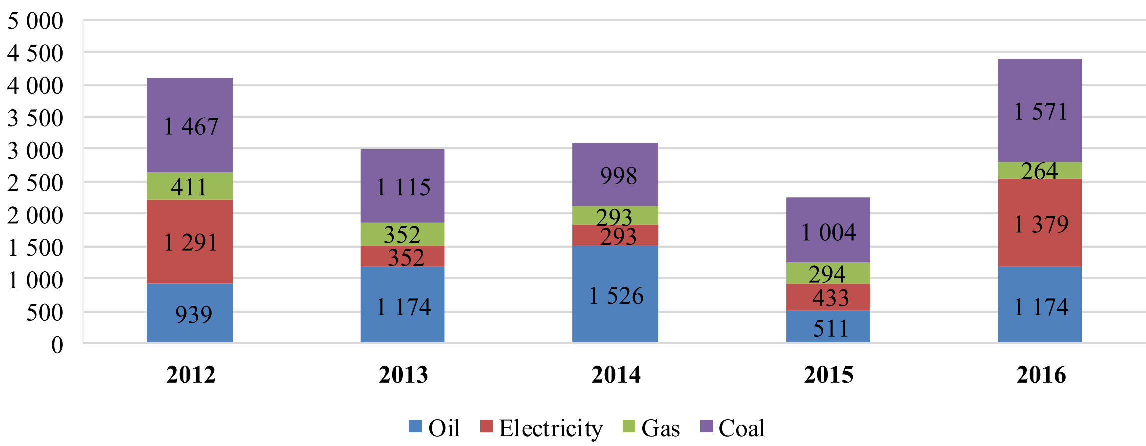
Most types of support schemes used in OECD Member countries are present in Kazakhstan, and consumer subsidies predominate in quantitative terms. Direct grants to producers are not significant but, because of missing data, it was not possible to estimate whether other forms of producer subsidies are provided. This is due to a lack of information, particularly on tax expenditure, and also to the low transparency about the support provided to energy producers by the National Fund.

Nevertheless, Kazakhstan undertook some reform of subsidies. For consumers, most of the direct support for electricity and heat consumers was eliminated, while the Government still provides indirect support by maintaining electricity and heat tariffs at rates that are lower than the real cost of supplying services. Price caps on diesel fuel remain to keep it affordable for farmers. For producers, subsidies include investment support for the extraction of oil and gas, direct transfers from the JSC Sovereign Wealth Fund Samruk Kazyna to the state-owned gas and oil producing company KazMunaiGas, and potential tax concessions to fossil fuel and energy producers. There is still ambiguity in information about who benefits from public support and how much revenue is foregone by the State because of various tax concessions. The country would benefit from further rationalization of the subsidy scheme with a clear and credible timetable for the implementation of reforms to enable energy producers, distributors and households to adjust, for example, by investing in energy efficiency measures.

Sustainable Development Goals and targets relevant to this section

The current stand of Kazakhstan vis-à-vis target 12.c is described in box 3.1.

Figure 3.1: Fossil fuel subsidies, 2012–2016, US$ million in 2016 prices



Source: World Energy Outlook 2017 and World Energy Outlook 2015, International Energy Agency.

[11] The IEA uses the price-gap approach to estimate fossil fuel subsidies by comparing average end-user prices paid by consumers with reference prices that correspond to the full cost of supply.

Box 3.1: Target 12.c of the 2030 Agenda for Sustainable Development

Goal 12: Ensure sustainable consumption and production patterns
Target 12.c: Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

Target 12.c calls for rationalization of fossil-fuel subsidies. In Kazakhstan, elimination of fossil fuel subsidies would provide the Government with more flexibility to redirect financial resources to promote renewable energy and clean transport infrastructure, for example, as well as other types of activities to fulfil pressing needs for socio-economic human development (e.g. inequality and poverty elimination, as set out in Sustainable Development Goal 1).

With regard to indicator 12.c.1 (Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels), analyses by the IEA show that the volume of subsidies for fossil fuels (consumed directly by end users or as inputs to electricity generation) as a share of GDP in 2014 was 2.5 per cent, which increased to 3.3 per cent in 2016, although a decline in GDP at least partly contributes to the increase in the share of GDP.

Although direct subsidies for end consumers were largely eliminated, the Government should further rationalize (indirect) energy subsidies to incentivize businesses to invest in resource-efficient and clean technologies.

Subsidy schemes for green projects

Currently, some subsidy schemes for green projects exist but they are not substantial; however, efforts are being made to enhance the support. For example, the Ministry of Energy provides subsidies for off-grid renewable energy projects. Imported equipment for renewable energy is exempted from customs duties, according to the 2009 Law on Support for the Use of Renewable Energy Sources.

Another area of support is energy efficiency. The Ministry for Investments and Development and JSC Damu Entrepreneurship Development Fund (Damu Fund) launched support to businesses working in renewable energy and the energy-saving field with a much broader goal of fostering the nation's transition to a green economy. As a result, 15 cities, including Kostanay, Shymkent and Taraz, will install energy-saving technologies by 2020 to reduce carbon intensity and enhance infrastructure energy efficiency. The project's overall cost is estimated at US$6 billion, which will be supported through subsidies from a mechanism like that used by the Damu Fund. The project envisages the commercial loans taken out for the implementation of the projects involving low-carbon technologies to have 10 per cent of the loan's bank rate covered by the State to improve the project's financial indicators and shorten the payback period.

3.3 Greening trade

Environmental standards and competitiveness

According to OECD trade facilitation indicators, Kazakhstan's performance is below the averages of Europe (non-OECD) and Central Asia and upper-middle-income countries for information availability, appeal procedures, simplification and harmonization of documents, automation, streamlining of procedures and internal border agency co-operation. Anecdotal evidence indicates that this underperformance is compounded for new environmental goods and services (e.g. new energy equipment was blocked at customs when it should have been displayed during Expo 2017). Also, electric transport and car parts, and electric cars, are not exempted from customs duties. To date in Kazakhstan, the amount of customs duties on electric buses is equal to the cost of customs duties on diesel buses.

There is no empirical evidence on a correlation between the level of stringency or enforcement of environmental standards in Kazakhstan and changes in inflows or outflows of investment in polluting businesses. Nonetheless, the Code on Subsoil and Subsoil Use was designed to promote exploration and increase the fossil fuel and mineral resource base and develop more new projects. This can create a risk that attraction of foreign direct investment (FDI) in extraction and use of fossil fuels may lead to a greater level of CO_2 from combustion and other types of fugitive gases from the production processes of coal, gas and oil, and increase negative impacts on the environment if the environmental regulations referred to in the Code on Subsoil and Subsoil Use and specified in the Environmental Code are not properly enforced.

Kazakhstan has been a member of the Eurasian Economic Union (EEU) since its creation in 2011. In general, subsidies for exported goods and services could cause compensatory measures among the EEU ember States. However, the Treaty on the EEU allows its member States to apply restrictions in mutual trade (provided that such measures are not a means of unjustifiable discrimination or a disguised restriction on trade) in the case that it is required for environmental protection. Subsidies on oil and petroleum products to support adaptation of existing production capacities to the new requirements for environmental protection imposed by the legislation or regulations and associated additional financial burden for economic entities shall not be regarded as grounds for any compensatory measures (Article 84).

Trade-related measures for "environmental goods"

The EEU has not taken specific commitments towards an agreement on environmental goods and services per se. Nevertheless, the Energy Department of the Eurasian Economic Commission (the executive body of the EEU) has been discussing the harmonization of legislation and the introduction of energy-efficient technologies, especially in energy infrastructure. Further, several of these 23 commitments shall be applicable for environmental goods and services, for example, in the areas of elimination of industrial subsidies or quantitative restrictions on imports or technical barriers to trade (product standards and certification).

Sustainable Development Goals and targets relevant to this section

The current stand of Kazakhstan vis-à-vis target 17.10 is described in box 3.2.

Eco-labelling

The Environmental Code provides that "manufacturers can label their products with a sign of ecologically clean production on a voluntary basis after conformity assessment". Procedures for conformity assessment of products with environmental standards and requirements are regulated by the 2004 Law on Technical Regulation.

17 PARTNERSHIPS FOR THE GOALS

Box 3.2: Target 17.10 of the 2030 Agenda for Sustainable Development

Goal 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development
Target 17.10: Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda

Kazakhstan concluded its accession to the WTO in 2015. Most of the neighbours and important trade partners of Kazakhstan are WTO members: Kyrgyzstan, the People's Republic of China, Ukraine, the Russian Federation and Tajikistan, while Uzbekistan has also resumed its talks to enter the Organization. In accordance with its WTO commitments, Kazakhstan would gradually lower 3,512 import tariff rates to an average of 6.1 per cent by 2020.

To promote the trade of environmental goods and services (e.g. air pollution control, natural resource protection), Kazakhstan should:

(a) Support the inclusion of specific environmental provisions in all regional trade agreements, in the context of WTO accession, and, together with the competent bodies of the Eurasian Economic Union;
(b) Develop ambitious and consistent environmental standards, including voluntary ones, to change behaviours (of companies);
(c) Promote trade in environmental goods and services in all regional trade agreements.

For example, as described by the 2013 OECD Environmental Performance Review of Mexico, Mexico unilaterally put a zero tariff on imported anti-pollution equipment that is not competitive with locally manufactured equipment.

Despite these provisions, there are no eco-labelling schemes officially adopted by the Government. The main reason is the lack of an officially recognized accreditation system that could identify required standards, evaluation requirements, accredited laboratories and control over the quality of conformity assessment and decision-making. There are products with “eco-labels” on the market but they are not officially recognized as such and are used by the producers as a competitiveness factor to attract customers’ attention.

With the 2015 Law on Organic Production, some progress has been made on creating a regular framework for certification of organic products, but the necessary standards to regulate certification of such products have not yet been adopted (chapter 12).

Environmental management certification programmes

Strategic development documents such as the 2012 Strategy “Kazakhstan-2050” (which replaced the 1997 Strategy “Kazakhstan-2030”) called for the implementation of international standards ISO 14000 and eco-labelling of products as new approaches to solving the problems of environmental protection. The Environmental Code states that the introduction of international environmental quality standards is voluntary.

Despite the strategic and legal provisions, the number of ISO 14001 certificates obtained by enterprises in Kazakhstan increased very slowly, from 126 in 2010 to 140 in 2017 (figure 2.5). The number of ISO 14001 certificates remains very low compared with countries such as Lithuania (779 in 2017), Slovakia (1,485) and Romania (5,555). The number of ISO 14001 certificates is also low compared with the number of ISO 9001 (general quality management) certified companies in Kazakhstan (666 in 2010, 533 in 2016 and 375 in 2017).

Companies in Kazakhstan do not regard the holding of an ISO 14001 certificate as a competitive factor. A 2016 study even argues that there are also cases of large energy companies that were among the first to implement ISO 14001 being often accused of having environmentally unfriendly operations.[12]

As of April 2018, there is no forest certification scheme in place in Kazakhstan.

Mechanisms aimed at motivating technological improvements and supporting innovation

Kazakhstan’s endowment of natural resources, including proven crude oil reserves of over 4.85 billion tons (table 10.3), natural gas (4.01 trillion m^3) and large supplies of minerals and metals such as uranium, copper and zinc, render the diversification away from heavy reliance on their export challenging. Exports of non-resource goods and services lost ground during the last commodity price boom. The oil and gas sector generates around 30 per cent of GDP, almost one third of budget revenues and close to two thirds of exports. Exports are highly concentrated, with the five top exports (all of them from extractive industries) commanding 70 per cent of total exports. The extractive sectors also command the majority of FDI flows (over 50 per cent over the period 2010–2014 down from 70–80 per cent before 2008). Kazakhstan is almost exclusively internationally competitive in products based on natural resources. At the same time, in the years since independence, the technological complexity of exports has declined. This decline may be due to the loss of the planned economy of the Soviet Union and, with it, high-tech manufacturing such as the military and aerospace sector, as well as the increased importance of manufacturing powerhouses such as the People’s Republic of China.

Overall, as demonstrated by the *OECD Reviews of Innovation Policy: Kazakhstan 2017*, since the 2000s, Kazakhstan has launched major legal reforms, strategies and programmes aimed at boosting science and technology outputs, attracting foreign investors in the non-extractive sectors and upgrading skills, including more value added.

However, the level of overall governmental funding of research and development (R&D) activities remains low. R&D intensity (the ratio of gross expenditure on R&D to GDP) has fallen from a peak of 0.28 per cent in 2005 to 0.15 per cent in 2010 and 0.14 per cent in 2016. It is well below the target set in various governmental strategies and programmes (2 per cent). Nevertheless, there is some encouraging development, with privately funded R&D accounting for more than 50 per cent of expenditure, although the number of firms with ecological innovation fell by 7.7 per cent in 2016.

This overall underinvestment is even more acute to advancing environmental goods, services and

[12] Yerzhan S. Zhambaev et al., “Current problems of improving the environmental certification and output compliance verification in the context of environmental management in Kazakhstan”, *International Journal of Environmental and Science Education*, vol. 11, No. 15 (2016), pp. 8006-8016.

technologies. At present, there is no evidence of a significant and sustained mechanism for specific R&D for environmentally friendly technologies. The JSC Science Fund has provided support for about 12 research projects on various technologies aimed at improving environmental quality but did not provide information on the value of these projects (box 3.3).

In 2017, Kazakhstan organized Expo 2017 on “Future Energy” to open up new channels for technology cooperation and transfers for access to affordable, reliable, sustainable and modern energy for all. The Ministry of Energy selected 105 foreign and 28 national technologies, which were demonstrated in the national pavilions. Close to three quarters were in the areas of electrical power, energy saving, renewable energies and ecology (waste management, water treatment and air quality). Furthermore, more than 100 meetings and negotiations took place with representatives of the participant countries, resulting in nine memoranda of cooperation signed by the Ministry of Education and Science and 20 bilateral memoranda of cooperation signed by Kazakh universities.

Intellectual property rights and environmental technologies

According to the National Institute of Intellectual Property under the Ministry of Justice, about 2,750 patents (or 7.6 per cent of the total number of patents) are related to environmental or clean energy technologies (as of March 2018).

Examination of applications for invention patents can be accelerated on certain conditions (1999 Patent Law). This accelerated patent application system can be applied to energy efficiency, renewable energy and other types of technologies for environmental protection, such as water, air quality and oil spill remediation.

The Ministry of Justice and the National Institute of Intellectual Property also work on harmonization between domestic and EEU legal frameworks. At present, there is no empirical evidence of mutual recognition of a patent filed for environmental/green technologies in a member State of the EEU. However, the Treaty on the EEU specifies general principles on improvement of the mechanisms of commercialization and use of intellectual property, creation of a favourable environment for copyright holders and holders of related rights in the member States and introduction of a registration system for trademarks and service marks.

Responsible business conduct

Responsible business conduct (RBC) is an important part of the investment climate and is increasingly integrated within policies aimed at attracting better quality investment and enhancing sustainable development.[13]

Box 3.3: Research and development projects funded by JSC Science Fund aimed at improving environmental quality until early 2018

- Commercialization of the technology of integrated pulse-beam purification of water for various purposes;
- Creation of a plasma-chemical plant for the production of synthesis gas from agricultural waste;
- Processing of human-made building materials for thermal insulation and multi-purpose sorbents;
- Plantation-based cultivation of rare and endangered species of medicinal plants for the pharmaceutical industry;
- Production of super-quality fruit- and nut-bearing crops using biotechnology methods;
- Commercialization of a block modular heat pump system for the utilization of low-potential waste heat of process water supply systems at industrial enterprises;
- Organization of a commercial and ecological cluster of forestry and timber processing in Northern Kazakhstan;
- Conservation and restoration of the Himalayan snowcock (*Tetraogallus himalayensis*) using modern biotechnological methods;
- Reclamation and development of solonetz soils to establish forest plantations in the protective green belt of the capital;
- Production of green energy (biogas) and eco-friendly products (biofertilizers);
- Processing of oil-contaminated waste using an innovative technology;
- Creation of a complex for increasing the yield of agricultural crops to ensure food security.

Source: JSC Science Fund, 2018.

[13] RBC is a term sometimes used interchangeably with corporate social responsibility (CSR), although RBC is understood to be more comprehensive and integral to core business than what is traditionally considered CSR (mainly philanthropy).

In line with global trends, RBC has also emerged as an important topic in Kazakhstan, which led to the country's adherence in 2017 to the OECD Declaration on International Investment and Multinational Enterprises and, in particular, the establishment of a National Contact Point for the OECD Guidelines for Multinational Enterprises. These two actions provide an opportunity to further promote RBC principles and standards, both within the Government and among the wider public, and to further clarify and set out the Government's expectations on RBC.

The 2015 Business Code, which superseded the 2006 Law on Private Entrepreneurship, includes a legal definition of RBC as "social responsibility of business – voluntary contribution of private business entities in development of social, environmental and other spheres". The Code prioritizes two thematic areas – employment and labour relations, and the environment.

Samruk Kazyna's 2015 Corporate Governance Code, which is applied to all organizations in which the fund owns more than 50 per cent of voting rights, calls for transparency and accountability of internal audit systems, comprehensive and systemic risk management, observance of human rights, prevention of environmental abuse, intolerance of corruption and other integrity-related aspects. It also requires disclosure of these issues in the annual reports of the fund and its subsidiaries. The Code is currently being introduced in Samruk Kazyna affiliated companies.

Since September 2015, the Kazakhstan Stock Exchange participates in the Sustainable Stock Exchanges Initiative and has committed to promoting long-term sustainable investment and improved environmental, social and corporate governance disclosure and performance among its companies.

Due to the importance of the extractives sector, sector-specific initiatives have also been implemented. Kazakhstan participates in the Extractive Industries Transparency Initiative (chapter 11), which aims to promote revenue transparency in the oil and gas industry.

The OECD Guidelines for Multinational Enterprises call on enterprises to take due account of the need to protect the environment, public health and safety, and generally to conduct their activities in a manner contributing to the wider goal of sustainable development. This entails: sound environmental management that aims to control both direct and indirect environmental impacts; establishing and maintaining appropriate environmental management systems; improving environmental performance; being transparent about the environmental impacts and risks, including also reporting and communicating with outside stakeholders; being proactive in avoiding environmental damage; working to improve the level of environmental performance in all parts of their operations, even where this may not be formally required; and training and education of their employees with regard to environmental matters.

Disclosure requirements and rules, including on environmental and climate change matters, are still not strong enough in Kazakhstan. Corporate climate change reporting is relevant for design and implementation of long-term actions aimed at reducing GHG emissions. A majority of G20 countries have some kind of mandatory corporate reporting scheme in place or in preparation that requires disclosure of some climate-change-related information. As new OECD research shows, this information can be used for multiple policy purposes, from informing consumer decisions to assessing performance against policy objectives, investment analysis and risk analysis. Companies themselves also use the information to increase awareness of climate-related risks and opportunities, streamline processes, reduce costs and improve efficiency and mitigation or reversal of negative climate impacts.

3.4 Green markets

Since independence, the extractive sector has been the central pillar of the economy in Kazakhstan. Making the transition to a market economy was initially difficult and was complicated by low commodity prices and the weak Russian economy, to which Kazakhstan was still tied. Rents from the extractive sector helped drive the economic growth between 2000 and 2013, with resource rents constituting 30 per cent of GDP in 2013 and averaging almost 41 per cent of GDP between 2000 and 2013, with a peak of 51.4 per cent in 2005.[14] In 2014, 68.55 per cent of export earnings came from crude oil. If gas and other hydrocarbons are included, that number rises to 76.56

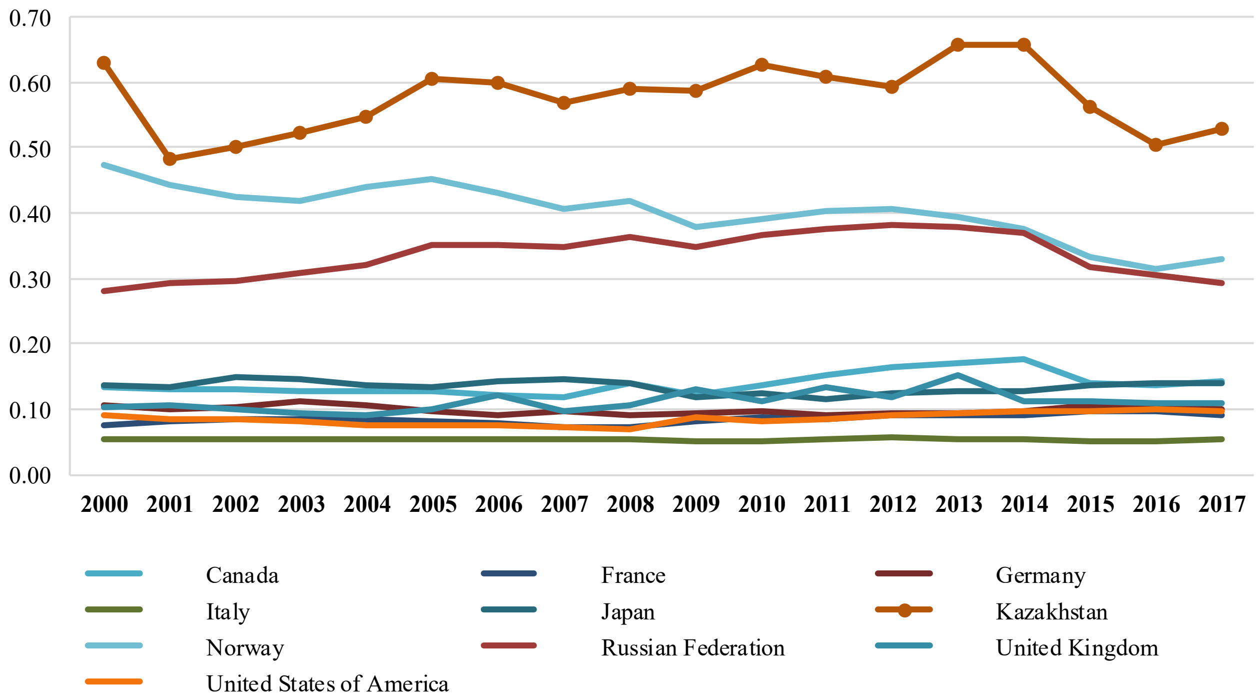
[14] According to the World Bank, of the total natural resource rents, oil rents made up an average of 31.7 per cent of GDP (or 78 per cent of total resource rents) during that period. Mineral rents made up a much smaller portion during that period, with an average of 3.23 per cent of GDP (or 7.94 per cent of total resource rents), with a peak of 5.7 per cent in 2007. These numbers are significant, even compared with other natural-resource-based economies in the area. For example, over the same period (2000–2013), resource rents contributed an average of 28.76 per cent of GDP of the Russian Federation, which declined to 18.2 per cent in 2013.

per cent of export earnings, followed by uranium (2.44 per cent), refined copper (2.19 per cent), ferro-alloys (1.99 per cent) and iron ore and concentrates (1.41 per cent). The only product in the top 10 that is not an extractive commodity is wheat (1.23 per cent). As a result, the economy has become increasingly concentrated on the natural resource sector. The increasing concentration of the economy (visible in metrics such as the Herfindahl-Hirschman Product Concentration Index score, which is a measure of the dispersion of trade value across an exporter's products) is manifested in the high values of the Concentration Index of Kazakhstan, ranging from 0.48 to 0.66 in the period 2000–2017 (figure 3.2).[15]

These developments have not allowed the economy to diversify and mean that the industries with relatively high negative impact on the environment (e.g. extractive sectors) still account for a large share of value added and the majority of exports and foreign investment. Diversifying the economy is a challenge but has become a major policy objective in Kazakhstan.

The Strategy of Industrial-Innovative Development for the period 2003–2015 (2003 Decree of the President No. 1096, invalidated in 2010) was a landmark document in establishing industrial policy in Kazakhstan. The Strategy set out the principal target of fostering sustainable development through the development of non-extractive industries. It also specified export competitiveness as the means of testing success. While the Strategy recognized the role of the extractive sectors in the economy of Kazakhstan, it left the development of those sectors to state intervention through specific sectoral programmes. The Strategy also set out a number of numerical targets: growth in excess of 8 per cent in manufacturing sectors, a trebling of labour productivity and a reduction by half in power intensity, as well as an increase in the share of research and innovation activities to 1.5 per cent of GDP by 2015.

Figure 3.2: Herfindahl-Hirschman Product Concentration Index score of selected countries, 2000–2017



Source: http://unctadstat.unctad.org/EN/, 2018.

[15] A country with a perfectly diversified export portfolio will have an index of zero, whereas a country which exports only one export will have a value of 1.

The 2013 Concept of Innovation Development until 2020 (2013 Decree of the President No. 579) is the basis for the development of industrial policy in Kazakhstan. The Concept sets out a number of principles to support the diversification of the economy: i) balance between industry and cluster priorities and sectoral and general support; ii) the proactive role of the State; iii) continuity and flexibility; iv) commitment to results; v) partnership with business; vi) a larger role for oblasts; and vii) a balanced funding model. However, the Concept does not explicitly refer to the greening of the industrial sector.

While Kazakhstan aims to promote the creation of new sectors with positive impact on the environment (as part of the Concept on Transition to Green Economy), some legacies contradict this intent. For instance, Kazakhstan is still one of the last three countries in the world producing and exporting chrysotile asbestos, which is being replaced in OECD Member countries by substitutes, alternative materials and new technology less damaging to health and the environment. Asbestos production in Kazakhstan fluctuated between 243,400 t and 179,800 t in the period 2008–2017 (table 11.2).

3.5 Green jobs

The Ministry of Labour and Social Protection of Population does not account for green jobs in Kazakhstan using an internationally recognized definition such as that of the International Labour Organization (ILO): jobs at the intersection of employment in production of green products and services, employment in environmental friendly processes and decent jobs.

However, the Kazakhstan Institute for Strategic Studies under the Presidential Administration refers to the definition of a "green job", which involves the reduction of impact on the environment by increasing productivity of resources, recycling and waste management, as well as by preserving or restoring ecosystems and biodiversity.

The 2013 Concept on Transition to Green Economy envisaged that the transformations implemented as part of a green economy would create 500,000–600,000 new jobs by 2030 in the five industrial clusters (green construction (sustainable building), agriculture, the energy sector, waste management and water management). However, no analysis of the number of jobs created in the past period has been carried out, though some positive examples are provided in the 2016 report on implementation of the Concept on Transition to Green Economy in the areas of sustainable water management and sanitation and energy efficiency.

Sustainable Development Goals and targets relevant to this section

The current stand of Kazakhstan vis-à-vis target 8.3 is described in box 3.4.

3.6 Investing in environmental protection and green economy

Implementation costs for the Concept on Transition to Green Economy

The 2013 Concept on Transition to Green Economy estimated that gross investment needs for its implementation between 2014 and 2049 would amount to US$120 billion in 2010 prices. This includes energy supply and demand, water, air pollution, waste management and efficient agriculture practices (table 3.3). This figure is substantial, accounting for 1.8 per cent of GDP in the period from 2020 to 2024, and about 1 per cent of GDP in the entire implementation period. Although the Concept assumed that a majority of the investments would be raised from private investors' funds, it did not specify sources and measures to catalyse such private sector investment.

Among the different sectors and activities included in the Concept on Transition to Green Economy, development of renewable energy and gas infrastructure, energy efficiency in buildings, heat, transport and industry, and better use of water resources account for 87 per cent of the total investment needs (figure 3.3).[16]

While there is no cost estimation done specifically for climate change adaptation in Kazakhstan, the targets on (and costs of) sustainable water use and efficient and productive agriculture included in the Concept on Transition to Green Economy would strongly relate to adaptation.

[16] Various internal and external factors would influence actual costs of decarbonizing the power sector. Such factors include: electricity saving potential achieved by energy efficiency measures; modernization and decommissioning of the existing capacities; evolving costs of conventional and renewable energy generation technologies; the ambition levels of climate change mitigation targets of Kazakhstan; cost of GHG emissions; and availability and price of gas for electricity and heat generation.

8 DECENT WORK AND ECONOMIC GROWTH

Box 3.4: Target 8.3 of the 2030 Agenda for Sustainable Development

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Target 8.3: Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

At several occasions in the past few years, the Ministry of Labour and Social Protection of Population expressed concerns about potential negative consequences of the transition towards a green economy in Kazakhstan, in particular, in industries and communities (e.g. the mining sector and fossil fuel industries). On the other hand, the transition also has a potential to create "green" jobs (e.g. for construction and maintenance of renewable-energy plants) that can stimulate the economy and contribute to the country's long-term economic growth. In Kazakhstan, green jobs are not defined using an internationally recognized definition such as the ILO definition.

The Government should:

(a) Define what green jobs mean in Kazakhstan and identify necessary skill sets for creating green jobs in the country using the ILO definition;
(b) Gradually incorporate aspects on green jobs into technical and vocational education, higher education and workforce training in the light of e.g. the State Programme "Digital Kazakhstan". Examples include occupational standards, educational standards and curricula, and qualifications assessment and certification.

There are already emerging activities that could also accommodate the agenda of green jobs. For instance, while not specifically focusing on green jobs, the Project "2016–2020 Kazakhstan Skills and Jobs Project" launched by the World Bank and the Ministry of Healthcare and Social Development in 2016, could also be one, aiming to improve employment outcomes and skills of those in need of training.

Green public procurement

Reliable procurement systems are a major government activity and are central to public service delivery. They can be harnessed as a policy lever to pursue economic, social and environmental goals while ensuring value for money and efficiency of spending. Many OECD Member countries have used innovative vehicles to achieve economies of scale, restructuring their purchasing functions, consolidating their purchases and adopting information and communications technologies in the procurement process. Moreover, many OECD Member countries use public procurement policies not only to foster value for money but also to pursue other policy objectives. These policy objectives are designed to spur innovation, promote sustainable growth, support the development of SMEs and level the playing field for access to economic opportunities.

The procurement expenditure of the Government is a major source of aggregate demand in Kazakhstan. The procurement expenses of the general Government as a share of GDP reached around 6 per cent in 2010. The procurement expenditure accounted for 43 per cent of total governmental expenses in the same year, which is also relatively high compared with, for instance, the OECD Member countries' average (30.3 per cent in 2015).

The efficiency and transparency of the public procurement system has improved substantially over the past 10 years, in particular through the 2007 Law on Public Procurement and 2015 Law on Public Procurement. One of the major reforms in the public procurement system was the introduction of mandatory e-procurement procedures from 2012, which require that relevant information be published at every stage of procurement. The e-procurement portal uses standard forms of procurement reports, which also ensure that procurement records are not manipulated and are easily accessible. According to the World Bank, this improved transparency and effective spending of public funds led to the saving of over US$1.3 billion in budget spending.

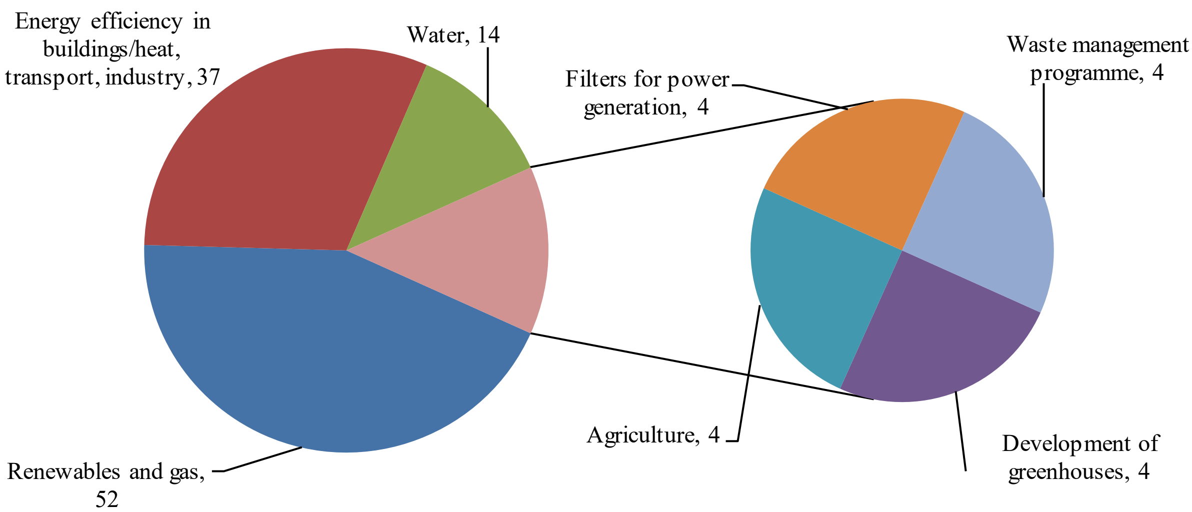
Green public procurement (GPP) can be a major driver for innovation, providing industry with incentives to develop environmentally friendly works, products and services. GPP may also provide financial savings for public authorities, especially if the full life-cycle costs of a contract are considered, not just the purchase price.

Table 3.3: Investment needs for implementation of the 2013 Concept on Transition to Green Economy

	2014-2015	2016-2017	2018-2019	2020-2024	2025-2029	2030-2039	2040-2049
Funding needs as percentage of GDP	0.31	0.44	1.23	1.79	0.77	0.59	0.61
Average annual funding needs for period (US$ billion in 2010 prices)	0.6	1.0	3.1	5.5	3.0	3.0	3.8

Source: 2013 Concept on Transition to Green Economy.

Figure 3.3: Total investment needs for implementation of the Concept on Transition to Green Economy by sector, 2016–2050, US$ billion



Source: 2013 Concept on Transition to Green Economy.

The 2015 Law on Public Procurement requires organizers of public procurement tenders to provide several criteria to determine the supplier. One of the criteria is whether the bidders have put in place certified environmental management systems and/or conform with the standards of environmentally friendly products specified in domestic technical regulations. The Law also mentions principles of purchase of innovative and high-tech goods, works and services, which could be linked with green procurement.

Despite such large expenditure on procurement and the reforms of the procurement system, Kazakhstan does not currently harness the potential of sustainable public procurement to tap into green growth opportunities, which range from natural resource management (renewable and non-renewable, exhaustible and cultivated) to energy, urban and manufacturing systems. Legislative frameworks related to public procurement in Kazakhstan do not have sustainability criteria for goods and services to be procured in particular sectors such as buildings, roads and infrastructure, vehicles, agricultural waste and irrigation systems. There have not been technical specifications or clauses dedicated to environmental or green procurement per se, nor has there been any linkage with the Concept on Transition to Green Economy. Awareness-raising and capacity enhancement is currently not sufficient to operationalize the GPP system in Kazakhstan.

Kazakhstan could use the 2015 Principles of Sustainable Public Procurement developed under the Sustainable Public Procurement Programme of the 10-Year Framework of Programmes (10YFP SPP Programme) and the 2014 OECD Best Practices for Sustainable Procurement to provide useful guidance on integrating environmental considerations into public procurement in a transparent and cost-effective manner. Areas which require intervention include integrating GPP into legal and policy frameworks, making explicit the costs and benefits of GPP, introducing environmental standards in procurement and training professionals on GPP, as well as raising awareness of the rules and procedures and monitoring GPP implementation.

Sustainable Development Goals and targets relevant to this section

The current stand of Kazakhstan vis-à-vis target 12.7 is described in box 3.5.

Box 3.5: Target 12.7 of the 2030 Agenda for Sustainable Development

Goal 12: Ensure sustainable consumption and production patterns
Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities

Promoting public procurement requires strong and enabling policy and legal frameworks. Kazakhstan adopted the Law on Public Procurement in 2007 and later replaced it with a new law on the same subject in 2015, and has remarkably improved the efficiency and transparency in its public procurement system over the past decade. The 2015 Law requires organizers of public procurement tenders to provide several criteria, one of which is whether the bidders have put in place certified environmental management systems and/or conform with the standards of environmentally friendly products.

The Government should further promote green procurement through, for instance:

(a) Establishing procurement regulations that provide a coherent policy framework to promote and allow the inclusion of sustainability issues in public procurement;
(b) Developing and implementing concrete action plans;
(c) Elaborating criteria and technical specifications;
(d) Training procurement staff in green procurement.

Current expenditure and investments for environmental protection

In the statistics system, expenditures for environmental protection mainly consist of (i) current expenditure, and (ii) investment by the public and private sectors (figure 3.4). Current expenditure consists of operational costs for environmental protection, environmental payments, payments for the use of natural resources and compensation for damage, according to the definition by the Committee on Statistics. The amount of current expenditure for environmental protection has increased from 91 billion tenge in 2008 to 175 billion tenge in 2015, but it dropped to 152 billion tenge in 2016. Investment in environmental protection over the period 2012 to 2016 fluctuated markedly, from 75 billion tenge (0.2 per cent of GDP) in 2012 to 103 billion tenge (0.3 per cent) in 2014 and 43.9 billion tenge (0.1 per cent) in 2016. Figure 3.4 shows that current expenditure and investments for environmental protection as a percentage of GDP declined from 1.03 per cent in 2009 to 0.42 per cent in 2016. Figure 3.5 shows that the changes in environmental current expenditure and investments do not reflect the rate of GDP growth.

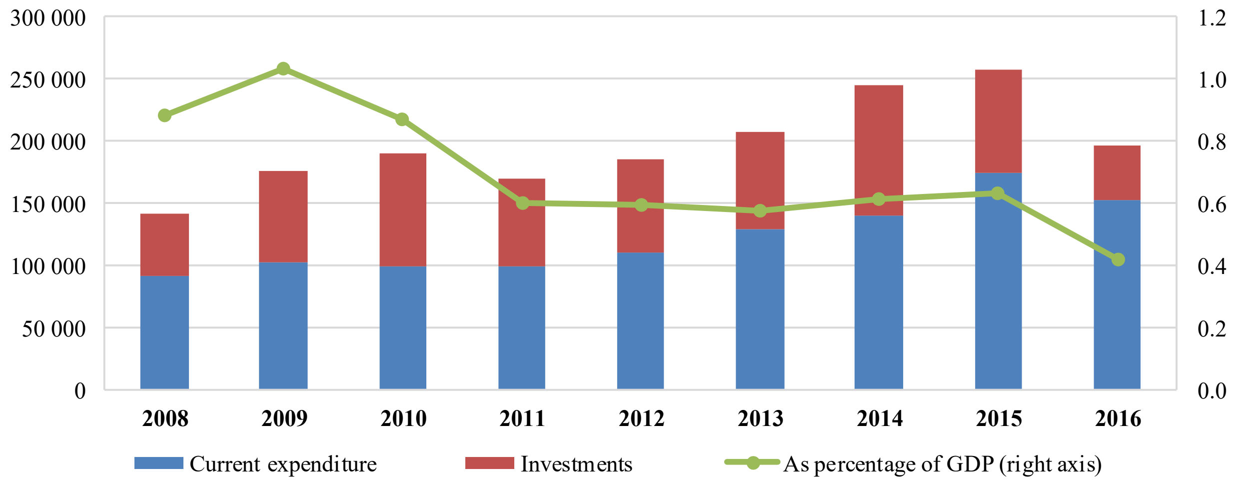
Investments in air pollution abatement have accounted for the largest share of the investments in environmental protection over the past several years (table 3.4) – about 40 per cent of total investment in 2016 and 26 per cent in 2017. The total cost fluctuates by year – 50 billion tenge in 2008 (0.3 per cent of nominal GDP), 90 billion tenge in 2010 (0.3 per cent of nominal GDP), 103 billion tenge in 2014 (0.3 per cent) and 44 billion tenge in 2016 (0.1 per cent).

Expenditure on environmental protection also varies substantially among regions (table 3.5). For instance, Aktobe, Atyrau, Karaganda, Mangistau and Pavlodar Oblasts record relatively high levels of expenditure in environmental protection, especially Atyrau Oblast, which recorded almost three times the current expenditure for environmental protection in 2017 than in 2008. This is partly due to the relatively large size of the economies of these oblasts and their economic structures. In terms of economic structure, Atyrau and Mangistau Oblasts have relatively large shares of the industrial, mining and extractive sectors in their gross regional product (GRP). Karaganda and Pavlodar Oblasts have relatively large shares of the manufacturing and energy sectors in their GRP. Aktobe Oblast has a relatively large share of the mining and energy sectors in its GRP.

Private sector environmental expenditure and investments

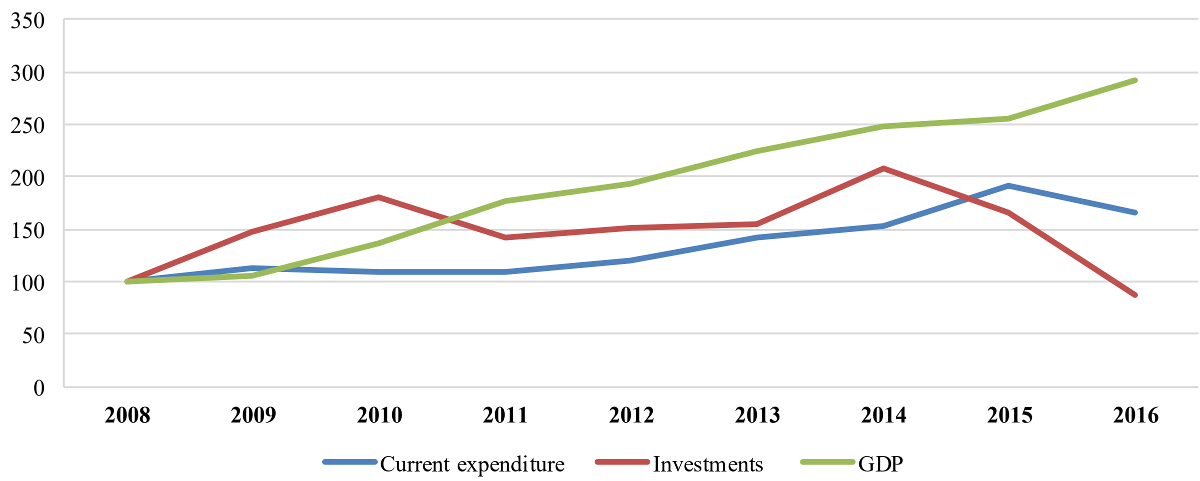
Investment in environmental protection by the industrial sectors (i.e. the energy, manufacturing and mining sectors and water management sector) accounts for 68 per cent of total (public and private) investment in environmental protection in 2017. Of total investments by the industrial sector, mining sector investment accounted for 48 per cent in 2017, followed by the energy sector (36 per cent) and the manufacturing sector (15 per cent) (table 3.6). Investment in environmental protection has also fluctuated over time, having increased from 44 billion tenge in 2008 to 85 billion tenge in 2014 and declined thereafter.

Figure 3.4: Current expenditure and investments for environmental protection, 2008–2016, million tenge



Source: Committee on Statistics, 2017.

Figure 3.5: Changes in current expenditure and investments for environmental protection and nominal GDP compared with the 2008 level, 2008–2016, 2008=100



Source: Calculated on the basis of statistical data of the Committee on Statistics, 2017.

Table 3.4: Investments in environmental protection by domain, 2010–2017, million tenge

	2010	2011	2012	2013	2014	2015	2016	2017
Total	**90 325**	**70 539**	**75 149**	**77 500**	**103 492**	**82 883**	**43 937**	**86 962**
Air pollution	44 289	21 991	28 829	26 815	27 056	24 936	18 128	22 764
Water	13 509	18 478	20 119	18 775	41 812	15 186	10 129	5 966
Waste	13 340	13 464	10 777	8 026	16 941	14 131	8 464	6 210
Soil, and surface water and groundwater	10 780	12 658	7 597	10 612	13 436	10 448	4 278	8 826
Noise	-	1	22	5	126	-	4	-
Biodiversity	169	618	379	135	164	688	461	420
Radiation protection (except for external public safety)	2 985	429	451	197	71	192	90	81
Research and development	1 154	278	454	722	790	333	621	129
Other environmental protection services	4 099	2 622	6 522	12 213	3 096	16 969	1 762	42 568

Source: Committee on Statistics, 2018.

Table 3.5: Current expenditure on environmental protection by region, 2008–2017, million tenge

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total	**91 288**	**102 328**	**99 653**	**99 213**	**109 438**	**129 094**	**140 579**	**174 650**	**152 206**	**175 445**
Akmola	562	2 533	550	255	566	694	604	1 201	2 129	2 049
Aktobe	8 160	9 093	10 075	9 709	12 865	12 063	16 382	18 309	17 711	19 018
Almaty	382	429	1 371	1 152	526	1 623	1 608	2 432	1 793	844
Atyrau	12 748	16 305	23 756	18 777	18 551	32 071	25 159	40 254	26 218	36 828
West Kazakhstan	484	785	552	998	1 553	6 450	4 964	3 794	7 533	10 744
Zhambyl	1 549	701	816	1 880	2 388	1 780	2 182	3 245	3 599	3 424
Karaganda	14 610	12 605	12 848	13 448	15 560	16 798	16 969	23 881	17 040	24 231
Kostanay	7 742	8 495	8 893	13 823	12 263	12 878	16 573	5 171	8 303	6 946
Kyzylorda	2 376	1 722	3 074	2 138	2 222	1 754	2 429	2 905	2 709	2 402
Mangistau	19 448	20 807	13 363	5 209	5 184	6 870	14 651	29 093	18 427	14 266
South Kazakhstan	2 049	2 459	1 619	2 138	3 329	3 860	4 046	4 988	5 462	5 912
Pavlodar	11 255	17 750	12 251	17 152	17 927	15 690	16 266	16 696	19 016	22 983
North Kazakhstan	270	345	397	387	330	570	772	1 865	1 995	2 488
East Kazakhstan	7 445	6 166	7 548	9 285	12 720	11 771	13 317	15 838	15 063	17 783
City of Astana	204	236	267	382	688	1 302	992	1 585	2 425	2 211
City of Almaty	2 005	1 898	2 273	2 479	2 766	2 918	3 664	3 393	2 781	3 315

Source: Committee on Statistics, 2018.

Table 3.6: Investments in environmental protection by type of economic activity of the investor, 2008–2017, million tenge

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total	**43 845**	**71 517**	**79 793**	**55 832**	**67 515**	**66 385**	**84 682**	**62 641**	**31 642**	**58 728**
Electricity, gas, steam supply and air conditioning	28 260	56 477	8 273	8 304	13 419	20 304	13 000	20 130	10 283	21 150
Manufacturing	11 053	10 188	21 589	22 770	17 193	6 742	16 622	16 807	4 907	8 750
Mining	4 533	4 551	49 287	23 953	36 649	38 825	53 294	24 895	15 519	27 920
Water supply, sewerage, control over waste collection and distribution	..	301	644	804	254	514	1 766	810	933	908

Source: Committee on Statistics, 2018.

Sustainable Development Goals and targets relevant to this section

The current stand of Kazakhstan vis-à-vis target 15.a is described in box 3.6.

15 LIFE ON LAND

Box 3.6: Target 15.a of the 2030 Agenda for Sustainable Development

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.a: Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems

According to the Committee on Statistics, total annual public expenditure (current and investment costs) in conservation of biodiversity in Kazakhstan fluctuates substantially, ranging from 467 million tenge to 1.6 billion tenge over the period 2010–2016. Investments of Kazakhstan in conservation of biodiversity have increased from 169 million tenge (US$1.15 million) in 2010 to 461 million tenge (US$2.08 million) in 2016.

Public–private partnerships in support of green economy

The 2015 Law on Public–Private Partnerships (PPPs) does not specifically indicate support measures with the scaling up of projects for green economy through PPPs. Nonetheless, the Law mentions that it is among the main principles of PPPs to increase the level of accessibility and quality of goods and services, taking into account the interests and needs of the population. The 2008 Budget Code also governs prioritization in the state budget allocation, and projects contributing to green economy are among the Government's priorities.

Furthermore, PPP project proposals must contain a chapter on environmental and social impact assessment, which aims to avoid the negative impacts of the projects on the environment and communities. The Public–Private Partnership Development Centre is a public entity established by the decision of the Government to carry out activities to facilitate PPP projects, but very little information is available on green-related activities of the Centre.

Environmental funds and other environment-related funds

There is currently no public fund specifically dedicated to public investment in environmental projects.

Public investments in green economy projects

There are several public financial institutions that have invested in projects designed to contribute to the country's transition to a green economy. Nevertheless, there is no clear definition of "green finance" activities and instruments that are agreed at the national level and can be provided by those public institutions. In addition, those institutions are not required to incorporate climate- or environment-related risks into their corporate governance frameworks.

JSC Baiterek National Management Holding (Baiterek NMH) was established in 2013. The Development Bank of Kazakhstan (DBK), established in 2001 and now owned by JSC Baiterek NMH, has invested in 127 projects between 2001 and 2017 to a total loan amount of 3.47 trillion tenge (US$10.86 billion), some of which are projects for renewable energy development and energy saving. They include the 25 MW Turgusun small-scale HPP (5 billion tenge by DBK), 300 MW Moynak HPP on the Charyn River (38.8 billion tenge by DBK) and a 50 MW wind farm in Kostomar village (30.5 billion tenge by DBK).

JSC Damu Entrepreneurship Development Fund was established in 1997 and is also owned by JSC Baiterek NMH. Damu Fund has been supporting SMEs in Kazakhstan over the past two decades, playing an important part in reducing the overall level of interest rates on loans granted to SMEs. Examples of financial instruments provided by Damu Fund are soft lending through second-tier banks in the framework of targeted programmes for specific oblasts and industries, microcrediting through the microcredit organizations, subsidizing loans to reduce the interest rate burden on loans, and providing a guarantee instrument – providing partial guarantees as collateral for bank loans. Such measures and mechanisms to reduce financial and transaction costs potentially help SMEs access financing for environment-related investment, since the high cost of capital and high collateral requirements often hinder SMEs' access to finance, including for activities contributing to green economy.

Damu Fund and the Ministry for Investments and Development signed an agreement on providing financial support to businesses planning to implement energy saving projects in 2017. The UNDP/GEF project "Sustainable Cities for Low-carbon Development" has agreed to provide a grant of US$3 million. Damu Fund also made an agreement with the European Investment Bank (EIB) in 2016 whereby EIB extended credit lines to Damu Fund under the guarantee of JSC Baiterek NMH; the credit lines are to be available to "green" projects promoting climate change mitigation, rational consumption of energy, an increase in energy efficiency and environmental protection.

JSC Sovereign Wealth Fund Samruk Kazyna has assets of US$64.7 billion (approximately 21.2 trillion tenge) and 327,000 employees. Its mission is to improve the national welfare of the country and to support the modernization of its economy. There are several renewable energy projects funded by the Fund's subsidiaries (e.g. JSC Samruk Energy), although these still represent a small share among the total investment of Samruk Kazyna. These renewable energy projects include 45 MW and 50 MW wind farms near Ereymentau City (total project cost, 43 billion tenge) and a 2 MW solar power plant in Kapshagay City (total project cost, 1.7 billion tenge), which in total account for about 2 per cent of total assets.

Despite having a certain track record, these sovereign funds and DBK do not currently have an explicit mandate to support transition of the Kazakh economy to a green economy. Such a mandate would require certain amendments to the statutory documents of the national funds and banks (e.g. DBK Development Strategy for 2014–2023). In this way, sovereign funds and banks could direct more public finance to "green" projects, especially to energy efficiency and environmental protection activities that need more risk money (e.g. equity investments) and risk reduction instruments (e.g. guarantees). Samruk Kazyna's investment strategy does indicate its role in promoting sustainable development, but it is not clear whether it has a legally binding target for investment in environmental protection and green economy transition, or how the fund allocates its financial resources to such projects.

The Astana International Finance Centre was established in 2015 and became fully operational in 2018. One of the Centre's six mandates is to facilitate green finance by providing the necessary conditions and infrastructure. The Centre and the EBRD worked on a project, The Green Financial System in Kazakhstan, which has focused on green bond [17] market development in the country. As of March 2018, the Centre is at the final stage of adding green bond-related elements to the rulebook of the Astana International Exchange, whereby the rulebook will clarify definitions of green projects that are eligible for, for example, green bonds, listing conditions for issuers and post-issuance reporting.

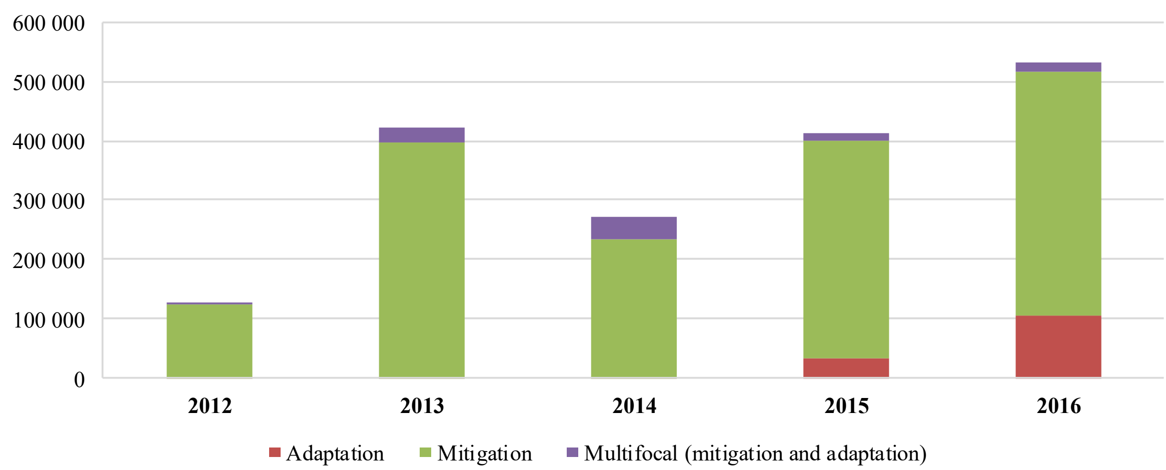
Foreign direct investment

FDI related to environmental protection accounts for 0.2 per cent of total foreign investment flows in 2016, down from a peak of 1 per cent in 2014. This suggests that FDI is largely concentrated on "brown" sectors. For instance, in 2015, geological exploration and prospecting activities accounted for 53 per cent of inward FDI stock (or US$72 billion), followed by mining and quarrying (19 per cent). The manufacturing sector attracts some FDI (10 per cent), a majority of which is directed to the basic and fabricated metal products sector (84 per cent), followed by food products and tobacco (7 per cent) in 2015.

Development assistance

During the period 2012–2016, multilateral and bilateral providers of development finance committed about US$1.76 billion to climate-related projects in Kazakhstan, equivalent to an annual average of US$352.2 million (figure 3.6). Multilateral providers include multilateral development banks and financial institutions as well as international climate funds, while bilateral providers include members of the OECD Development Assistance Committee (DAC).[18] Most of the finance was committed to mitigation projects (87 per cent), while 8 per cent was committed to adaptation and 5 per cent to multifocal projects on mitigation and adaptation. Although these projects are tagged as climate-related development finance, many also target other environmental areas, including biodiversity protection, air pollution abatement, clean mobility, water supply and sanitation, and waste management. It should be noted that the figures are the committed, but not disbursed, amounts.

Figure 3.6: Annual climate-related development finance committed by bilateral and multilateral providers, 2012–2016, US$ thousand



Source: http://www.oecd.org/dac/stats/climate-change.htm

[17] Green bonds are any type of bond instrument where the proceeds will be exclusively applied to financing or refinancing, in part or in full, new and/or existing eligible ("green") projects (International Capital Market Association (2017) Green Bond Principles).
[18] http://www.oecd.org/dac/financing-sustainable-development/development-finance-topics/climate-change.htm

3.7 Legal, policy and institutional framework

Legal framework

The aim of the 2016 Law on Amendments to Legislation related to Green Economy is to support the implementation of the Concept on Transition to Green Economy. Despite its title, the Law was not an overarching attempt to green the economy and did not have major substantive provisions. Rather, it made fragmented improvements to various legal instruments, including the 2007 Environmental Code, on issues pertaining to KazETS, energy efficiency, air pollution, waste, water and protection of habitat, all of which the Concept on Transition to Green Economy highlights as priority sectors and requires the largest amount of finance for.

In his State of the Nation Message of January 2018, the President of Kazakhstan called for "… critical rethinking of the organization of commodity industries and the approaches to the management of natural resources" and he called for an "increase in the requirements for energy efficiency and energy saving of enterprises, as well as the environmental friendliness and efficiency of the energy producers themselves". He stated that "these and other measures will require the updating of legislation, including the Environmental Code". This commitment has now been followed by the comprehensive reform of the Environmental Code launched in March 2018.

Kazakhstan strengthened environmental protection in the energy sector with some new laws and amendments. The fundamental acts included the 2009 Law on Support for the Use of Renewable Energy Sources, 2011 Law on Amendments to Legislation related to Environmental Issues (amendments to the Environmental Code related to the regulation of GHG emissions) and the 2012 Law on Energy Saving and Energy Efficiency Improvement. They all relate closely to the targets to modernize deteriorating infrastructure in the power sector, improve energy efficiency and scale up the share of renewable energy in the country's energy mix, set under the Concept on Transition to Green Economy.

The 2015 Business Code provides a basis for legal, economic and social conditions and guarantees for doing business, as well as for state regulation and support of business activities. The Code also includes a definition of RBC.

Policy framework

There is a history of developing strategic documents for greening the economy in Kazakhstan. The 2010 Sectoral Programme "Zhasyl Damu" (Green Development) for the period 2010–2014 (2010 Resolution of the Government No. 924, invalidated in 2014) was expected to be a catalyst for a green economy, targeting issues such as GHG reduction, protected areas, water quality, air pollution and waste management. The Programme suggested a number of targets and specific measures that offered wide environmental benefits. About 163.5 billion tenge have been earmarked for the Programme implementation. However, the Programme has been criticized at the local level, as well as nationally, for ineffective use of funds and corruption. The lack of compliance with the Programme was particularly significant in Atyrau and Mangistau Oblasts, where most oil and gas exploration and development activities take place. Indeed, poor governance features prominently in explanations of ineffective attempts to implement strategic documents or to promote compliance in the environmental field, as in many others. To address these shortcomings, Kazakhstan took steps to reinforce its commitments towards a more sustainable model of development. These steps were outlined in two key strategic documents: the 2012 Strategy "Kazakhstan-2050" and the 2013 Concept on Transition to Green Economy.

"Kazakhstan-2050" called for widespread economic, social and political reforms to position Kazakhstan among the top 30 global economies by 2050. Among the important indicators of success are: acceleration of economic growth (GDP and per capita income); diversification of the economic structure, production and exports; increase in life expectancy; bolstering of educational parameters; and adoption of an environmentally friendly and sustainable model of economic growth.

The Concept on Transition to Green Economy outlined the path to ensure long-term growth based on climate-friendly technologies, energy efficiency measures and the restoration and sustainable management of natural resources. The Concept also envisaged modernizing deteriorating infrastructure, and set ambitious targets for the power sector, energy efficiency, water and agriculture (box 3.7). The Concept was instrumental in providing a foundation for mainstreaming environmental and "green" considerations into broader policy frameworks in Kazakhstan. Progress was made on several targets. For instance, regarding a target to develop policies to enable further production of renewable energy, changes were made to the Law on Support for the Use of Renewable Energy Sources, with a view to improving the attractiveness of investment in renewable energy through fixed tariffs, a "reserve fund" for renewable energy and a model agreement for grid access. The organization of Expo 2017 was a significant awareness-raising undertaking at both the national and international levels. Several other commitments in the Concept were followed by actions, including the introduction of KazETS to manage GHG emissions and setting up of extended producer/importer responsibility systems for managing selected waste streams. Despite some progress, environmental pollution remains at a high level and the authorities recognize that there is still a lack of incentives for economic actors to reduce environmental pollution.

Recognizing the need for a new policy framework, Kazakhstan adopted the 2018 Strategic Plan for Development until 2025 to achieve a qualitative change in its economic development model. The Plan foresees the implementation of seven reforms with the aim of, for instance, developing human capital, increasing the productivity of existing sectors of the economy, reducing the role of the State in the economy and barriers to doing business, and creating a favourable investment and business climate. The Plan includes a specific section on the "Green Economy and Environmental Protection", with eight ambitious objectives: to meet the goals of the Paris Agreement on Climate Change; to encourage investment in green technologies; to decarbonize the economy; to improve the efficiency of water resources management; to develop renewable energy sources; to develop a circular economy; to develop environmental regulations that can also benefit business competitiveness; and to rationalize energy subsidies.

Following up on these new commitments, the Ministry of Energy has launched a process of updating the Concept on Transition to Green Economy. The revision of the Concept is a step in the right direction. A number of important developments at the global level have placed new challenges on the Kazakh economy, due to important new commitments made by Kazakhstan. The revised Concept can provide a new strategic framework, set new objectives and targets and outline new instruments for their implementation.

Box 3.7: Objectives of the 2013 Concept on Transition to Green Economy

The Concept on Transition to Green Economy was adopted in May 2013 in response to the United Nations Conference on Sustainable Development (Rio+20) the previous year. The Concept is an aspirational, high-level document, prepared in co-operation with various stakeholders.

It recognizes the economic inefficiencies and environmental danger that exist in Kazakhstan, and describes the harmful impact that pollution has upon human health and the environment. The Concept implicitly identifies the nexus between modernized environmental stewardship and economic growth; green growth is synonymous with a more robust economy. The changes envisioned in the Concept involved realignment of economic priorities and mechanisms that not only protect the environment but constitute more viable and effective means for economic development. The Concept sets the goal that transition to a green economy will increase GDP by 3 per cent (compared with the baseline, or the case without the transition) and create more than 500,000 new jobs by 2050.

The Concept focuses on social and regional development and the need for investment. It emphasizes in particular sustainable water use, achieving sustainable and high-performing agriculture, energy saving and energy efficiency improvement, power sector development, better waste management, reducing air pollution and the preservation and efficient management of ecosystems.

The Concept envisions job creation in several industrial clusters: green construction, agriculture, new technologies in the energy sector, waste management and closed-loop materials handling, and public water supply and water management.

The Concept set specific emissions reduction and energy targets, such as:

- Reducing the economy-wide energy intensity of GDP by 50 per cent in 2050 compared with 2013;
- Ensuring that the share of alternative sources in electricity production is at least 50 per cent by 2050;
- Reducing CO_2 emissions per unit of electricity production by 65 per cent by 2050.

Source: OECD, *Multi-dimensional Review of Kazakhstan: Volume 1. Initial Assessment*, OECD Development Pathways (Paris, 2016).

Photo 3: Bayterek

Institutional framework

Ministry of Energy

The Ministry of Energy includes, among others, the Departments of Climate Change, of Waste Management, of Environmental Monitoring and Information and of Green Economy, and the Committee of Environmental Regulation and Control (figure 1.1). The Department of Green Economy coordinates the design and implementation of the Concept on Transition to Green Economy by collecting and processing proposals, changes and additions to the Concept from all stakeholders, such as civil society, governmental bodies and international organizations. It acts as the Secretariat of the Council on Transition to Green Economy under the President. It also leads the organization of round tables and expert working groups.

Ministry for Investments and Development

The Committee on Technical Regulation and Metrology of the Ministry for Investments and Development aims to raise the quality and application of standards. Its objectives include increasing the competitiveness of Kazakh enterprises through the greater application of standards. It also works to harmonize Kazakh standards with international standards.

The Committee on Industrial Development and Safety of the Ministry leads the work in the areas of energy saving and improving energy efficiency. It was overseeing implementation of the 2013 Programme "Energy saving-2020" (2013 Resolution of the Government No. 904, invalidated in 2016) and monitored the energy savings and efficiency plans being submitted by more than 1,000 companies.

Ministry of Education and Science

The Ministry of Education and Science is promoting green economic growth through environmental education and R&D efforts (funding, coordinating research in fundamental and applied sciences, developing the research infrastructure and assessing scientific projects).

The JSC Science Fund offers grants and loans to scientists who wish to commercialize the results of their research for a period ranging from three to five years, in several priority areas: renewable energy technologies; nanotechnologies and new materials;

nuclear technologies and biotechnologies; hydrocarbon, mining, smelting and correlated service areas; and information and space technologies (box 3.3). The Fund had funded 50 projects by the end of 2017.

The Ministry and the World Bank launched the Technology Commercialization Project as a pilot project in 2011 to demonstrate improved scientific performance and commercial relevance of the research performed by interdisciplinary teams of scientists, which were selected through a transparent competitive process. The next phase (2014–2020), with a budget of US$110 million, is focused on establishing junior researcher group grants, operating public–private multi-stakeholder consortia, consolidating the technology commercialization cycle, reinforcing coordination of the national innovation system, and setting up a project implementation unit to monitor, evaluate, raise awareness and develop capacity. Water, in particular, purification, is one of the areas of investigation.

Others

The Ministry of National Economy leads the coordination of the implementation of environmental protection in the areas of strategic and regional planning, tax and budgetary policy statistics and functional analysis of public service activities (e.g. level of services).

Since 1 January 2018, the Astana International Financial Centre has been a special jurisdiction based on the principles of English common law, with a preferential tax regime and an independent financial court. To become a platform for investing in ecologically sustainable projects, green funding and lending for the issuing of green bonds, the Centre has established partnerships with stock exchanges, such as the London Stock Exchange, Nasdaq and Shanghai Stock Exchange.

In May 2018, the Government also announced the establishment of the International Centre of Green Technologies and Investment Projects. Activities planned include technological transformation of the energy sector, sustainable urban development, greening businesses, and transfer and adaptation of green technologies and best practices.

Coordination on green economy issues at various levels

For green economy transition in Kazakhstan, the Council on Transition to Green Economy was established under the President (2014 Decree of the President No. 823). The Council is meant to be a consultative and advisory body tasked to monitor and evaluate the implementation of the Concept on Transition to Green Economy. There are eight working groups to implement the Concept and assist the Council:

- Water resources management;
- Development of agriculture;
- Energy saving and energy efficiency;
- Development of the electric power industry, including renewable energy sources;
- Waste management;
- Reducing air pollution;
- Ecosystem management;
- Enlightenment and formation of ecological culture of the population.

According to the OECD Multi-dimensional Review of Kazakhstan, oblasts are underrepresented in the Council, in terms of both numbers and frequency, while they lack the willingness to implement green reform because of fears that the revenues from emissions payments will be decreased or reallocated away from local budgets. While the private sector participates via the National Chamber of Entrepreneurs, there is no evidence that the energy-intensive sectors have taken part frequently, if at all. A recent analysis pointed out that domestic electric power, mining and chemical industries are not allocating their own resources to improving their environmental performance.

There is no evidence of the participation of other ministries, in particular the Ministry for Investments and Development, the Ministry of Labour and Social Protection of Population and the Ministry of Education and Science. The Department of Regional Development of the Ministry of National Economy is not a member of the Council; its membership would support dissemination of the Council's work in the oblasts. Links between the Council and foreign investors are not yet at a level that is seen in other platforms, such as the Foreign Investor Council chaired by the President and the Council to Improve the Investment Climate chaired by the Prime Minister.

Participation in international agreements

In 2016, Kazakhstan adhered to the OECD Declaration on Green Growth and the Declaration on Risk Reduction for Lead, whereby signatory countries declare their efforts to pursue green growth strategies, encourage green investment and sustainable management of natural resources, and pursue domestic policy reform to remove environmentally harmful policies, such as fossil fuel subsidies. The country is keen to participate actively in the OECD Environment Policy Committee and its subsidiary bodies, sharing best practices and using OECD policy advice to strengthen its green growth policies.

3.8 Assessment, conclusions and recommendations

Assessment

It is commendable that the administrative process and the number of pollutants subject to the environmental payment system have been mitigated substantially since 2008. There is still room for improvement in terms of aligning the environmental payment system with the polluter pays principle. It has not been always clear whether environmental taxes and penalties collected at the local level are effectively used for improving environmental conditions and promoting a green economy. The Government shows that, in 2016, only 33 per cent of the revenue from the environmental payments was spent on environmental protection measures. It is encouraging to see the continuous efforts to improve the Environmental Code and the recently launched process to reform the Code with the aim of having it comply better with the polluter pays principle.

Progress has also been made in reducing the environmental pressures from motor vehicle emissions. Excise taxes on petrol and diesel have been increased and differentiated rates for low-sulphur fuels have been applied. Nevertheless, there is still a large gap in fuel taxes compared with EU Directive 2003/96/EC.

In terms of the better consideration of environmental impacts and related need for environmental protection investments, the Concept on Transition to Green Economy enjoys a high level of political support and has been usefully mainstreaming environmental concerns into decision-making processes in the ministries and public financial institutions. This also relates to Sustainable Development Goal 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all). Nevertheless, the scaling up of the mining and fossil fuel sectors is also a national priority. The statistics show that a certain level of investment in environmental protection and green economy has been already implemented, but its share in GDP remains low (around 1 per cent) and has not increased much, which does not indicate that green finance is being given higher priority. This can still be a barrier to pursuing many Sustainable Development Goals and targets, for instance, target 15.a (Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems).

Revenues from pollution charges are not used effectively to finance environmental protection measures, climate change mitigation and adaptation and green economy. This could take the form of direct financing of the Government’s high-priority projects and/or partial recycling of these revenues to polluting enterprises to create incentives for environmental investment.

Conclusions and recommendations

Environmental payments

Despite considerable progress in reducing the administrative burden on the country’s environmental payment system, the fundamental issues remain in terms of the effectiveness of the system, provision of incentives for pollution reduction and compliance with the polluter pays principle. Kazakhstan still follows fault-based concepts for monetary damages that tie liability to exceeding a predetermined limit in an emissions permit. The system involves discrimination against specific industrial operators and sets rates for taxes and fines, which are not uniform for all industry sectors. The rates applicable to taxes are not always realistic and consistent with international practice, as they allow punishment for emissions associated with industrial practices using BAT.

Recommendation 3.1:
The Government should:

(a) Create incentives for companies to invest in pollution reduction and technology modernization, including by introducing changes in the environmental payment system;
(b) Ensure that rates applicable to taxes and fines are realistic, consistent with international practice and do not punish emissions associated with industrial practices using best available techniques (BAT);
(c) Shift from the fault-based concepts for monetary damages to the strict polluter pays model based on evidence of actual harm to the environment;
(d) Set rates for taxes and fines that are uniform for all sectors and set uniform rules for assessing damages.

Green trade and market of environmental goods and services

Neither the development of ambitious environmental standards to change behaviours and export environmental goods and services from Kazakh industries, nor the promotion of mainstreaming environmental considerations into investment attraction, has been prioritized in trade-related policies to date. Trade, investment and innovation policies could be further aligned to provide effective policy support to enhancing trade and scaling up the market for environmental goods and services. Overall government funding of R&D activities remains low, despite its important role in advancing the development of new environmental goods, services and technologies.

Recommendation 3.2:
The Government should:

(a) Accelerate the removal of trade barriers in environmental goods and services, in line with the overall push towards greater connectivity for the country, starting with trade facilitation, beyond border measures and services restrictions;
(b) Better align trade, investment and innovation policies to provide effective policy support to foster green scientific and technological outputs, and motivate privately led technological upgrading based on a well-functioning intellectual property rights system and further foreign investment in emerging low-carbon technologies and projects;
(c) Enhance the role and capacity of existing institutions for research on green economy transition.

Green jobs

No specific legislative and policy frameworks on green jobs are in place in Kazakhstan, while the governmental bodies, including the Ministry of Labour and Social Protection of Population, Ministry of National Economy and Ministry of Energy are well aware of the risk of large-scale job losses and negative impacts on certain communities and industries as a result of the transition to green economy. At the same time, the Concept on Transition to Green Economy foresees that a green economy could create several thousands of new jobs in different sectors as a result of the implementation of envisaged policies. There is no official definition of green jobs in Kazakhstan.

Recommendation 3.3:
The Ministry of Labour and Social Protection of Population and the Ministry of Education and Science should:

(a) Adopt the definition of green jobs aligned with internationally accepted definitions (e.g. that of the International Labour Organization (ILO)) and identify necessary skill sets for creating green jobs in the country;
(b) Gradually incorporate a green component into the definition of occupational standards, curricula and qualification assessment and certification, for technical and vocational education, higher education and workforce training, in the light of new initiatives on skills (e.g. the State Programme "Digital Kazakhstan").

Green finance and investment

The cost of implementation of the Concept on Transition to Green Economy between 2018 and 2050 would amount to US$18.4 billion. The Government, public financial institutions and the private sector have shown increasing interest in investing in actions towards transition to a green economy. Yet policies on environmental protection and climate change, as well as broader enabling environments for investment promotion, are not sufficient to mobilize further finance to achieve the goals under the Concept. Kazakh public financial institutions have invested in green projects, but their share in the total portfolio remains low. Green finance mobilization is not part of the investment criteria of these financial institutions. There are no voluntary targets set for a certain share of their loan portfolios to be allocated to green projects.

Environmental taxes and penalties collected at the local level are not used effectively to improve environmental conditions and promote a green economy. Only about 30 per cent of revenues from environmental charges are spent on environmental protection measures. In fact, environmental payments are used as a form of subsidy for other projects (economic or social) at local level.

KazETS is an important instrument in fulfilling international commitments to reduce the country's GHG emissions. After a period of hiatus, the system was re-established in January 2018. However, KazETS revenues are expected to be absorbed into the state budget. There is no legal mechanism to allow investment of the revenues in further GHG mitigation.

Recommendation 3.4:
The Government should:

(a) Adopt a definition of green finance activities and instruments, and promote the incorporation of climate-related risks into the corporate governance of major state-owned entities;
(b) Add a mention of green finance to the mandates of the public financial institutions so they can more legitimately direct their financial resources and use risk-mitigation instruments to mobilize finance for green projects;
(c) Consider opportunities to increase the effectiveness of the use of collected environmental payments for environmental protection at the local level;
(d) Incentivize businesses to invest in resource-efficient and clean technologies through further rationalizing (indirect) energy subsidies, shifting the focus of the environmental permitting and compliance control requirements from "end-of-pipe" solutions to integrated pollution prevention that is also linked to BAT;
(e) Consider allowing Kazakhstan's Emissions Trading System (KazETS) revenues (e.g. from penalties or auctioning) to be reinvested in further climate change mitigation or adaptation instead of being absorbed into the state budget.

Greening the subsidies system

Kazakhstan subsidizes the use and production of fossil fuels, such as coal, gas and oil, as well as electricity, which are consumed directly by end users or as inputs to electricity generation. Fossil fuel subsidies impose a significant fiscal burden on the state budget and can have adverse distributional impacts. The major directions for reforming energy subsidies in Kazakhstan are to strengthen the transparency and rules for disclosing information for investment programmes financed through the state budget, including through support provided by JSC Samruk Kazyna.

Recommendation 3.5:
The Government should:

(a) Regularly prepare detailed tax expenditure reports that estimate the revenue foregone by the State because of various tax concessions, and make such reports publicly available;
(b) Accelerate tariff reform in the district heating sector, gradually introduce tariffs to cover, first, operation and maintenance and, eventually, investment costs, while providing targeted support for adversely affected poorer households;
(c) Set a clear and credible timetable for the implementation of reforms to enable energy producers, distributors and households to adjust, for example, by investing in energy efficiency measures;
(d) Provide government support, such as subsidies and guarantees, for promoting renewable energy sources (RES) development.

Green public procurement

It is critical for Kazakhstan to enhance the integrity of public procurement to harness the potential of its strategic role in facilitating, among other things, uptake of environmental goods and services. The 2015 Law on Public Procurement requires organizers of public procurement tenders to provide several criteria, one of which is whether the bidders have put in place certified environmental management systems and/or conform with the standards of environmentally friendly products. Nevertheless, political and legal frameworks to support green public procurement are still limited.

Recommendation 3.6:
The Ministry of Finance should:

(a) Consider further elaborating the Law on Public Procurement to establish procurement regulations that provide a coherent policy framework and technical specifications to promote the inclusion of environmental (or, more broadly, sustainability) issues in the public procurement system;
(b) Make a clear link between green public procurement and the Concept on Transition to Green Economy to be updated in 2018, to mainstream sustainable consumption and production into public procurement;
(c) Develop, together with the relevant state bodies, environmental sustainability criteria for goods and services to be procured in sectors such as buildings, roads and infrastructure, vehicles, agricultural waste and irrigation systems;
(d) Implement awareness-raising activities, training and information-sharing regarding green procurement for procurement entities and departments across different public institutions.

Chapter 4

ENVIRONMENTAL MONITORING, INFORMATION, PUBLIC PARTICIPATION AND EDUCATION

4.1 Environmental monitoring

Monitoring networks

Air

Since 2008, the number of automatic air quality monitoring stations operated by Kazhydromet has increased from eight to 90. Regarding the transition to automatic measurements, Kazhydromet also acquired specialized environmental data analysis software supporting air quality monitoring data collection, instrument calibration, data verification and quality control, as well as storage and reporting. Furthermore, since 2012, Kazhydromet has annually expanded the range of measured parameters in ambient air with the help of acquired laboratory equipment and automatic monitoring stations. In the period 2008–2017, the number of measured parameters has increased from 16 in 2008 to 28 in 2015, 33 in 2016, and 35 in 2017, and in 2018 two additional parameters (nickel and mercury) were added to the list of parameters.

The following pollutants were monitored in 2017: ammonia, benzene, suspended substances, suspended PM_{10}, suspended $PM_{2.5}$, sulphur dioxide, nitrogen dioxide, nitric oxide, carbon dioxide, carbon monoxide, cadmium, copper, methane, arsenic inorganic compounds, non-methane hydrocarbons, hydrocarbons, sum of hydrocarbons, soluble sulphates, sulphuric acid, hydrogen sulphide, lead, ozone, hydrogen fluoride, formaldehyde, phenol, chlorine, chrome, hydrogen chloride, beryllium, zinc, benz(a)pyrene, manganese, cobalt, petrol and ethylbenzene. Heavy metals were monitored in the cities of Almaty, Balkhash, Shymkent, Taraz and Ust-Kamenogorsk.

In 2017, Kazhydromet assessed the level of air pollution in 49 localities. The assessment was based on analysis and processing of air samples collected using 35 parameters at 146 monitoring stations (annex VI, map 2), including:

- 56 manual stations in the following localities:
  - Aktau, Kokshetau, Kyzylorda, Taldykorgan, Ekibastuz, Special Economic Zone Seaport-Aktau, Glubokoe (1 manual station each);
  - Atyrau, Zhezkazgan, Kostanay, Ridder, Pavlodar, Petropavlovsk, Semey (2 manual stations each);
  - Aktobe, Balkhash, Temirtau (3 manual stations each);
  - Astana, Karaganda, Taraz, Shymkent (4 manual stations each);
  - Almaty, Ust-Kamenogorsk (5 manual stations each);
- 90 automatic stations in the following localities:
  - Sarybulak, Kokshetau, Stepnogorsk, Taldykorgan, Kulsary, Ridder, Glubokoe, Zyryanovsk, Taraz, Zhanatas, Karatau, Shu, Kordai, Aksai, Berezovka, Yannvartsevo, Balkhash, Zhezkazgan, Temirtau, Saran, Karabalik, Akai, Toretam, Beineu, Aksu, Kentau, Turkestan (one automatic station each);
  - Ust-Kamenogorsk, Semey, Kostanay, Jitikara, Arkalyk, Lysakovsk, Rudnyi, Kyzylorda, Aktau, Zhanaozen, Ekibastuz, Petropavlovsk, Shymkent (2 automatic stations each);
  - Astana, Borovoe, Aktobe, Atyrau, Uralsk, Karaganda (3 automatic stations each);
  - Shchuchinsk-Borovoe, Pavlodar (4 automatic stations each);
  - Almaty (11 automatic stations).

The assessment of the ambient air pollution is conducted in accordance with Guidance 52.04.667-2005, "Documents on the state of ambient air pollution in cities for informing government agencies and general public".

The degree of ambient air pollution is assessed by comparing impurity concentration with the maximum allowable concentration (MAC). Three air quality indexes are used to assess the level of air pollution for a one-month period:

- Standard index (SI): the largest single concentration of any pollutant measured in the city, divided by the MAC;

- Highest frequency (HF): percentage exceeding the MAC: the highest frequency exceeding the MAC by any air pollutant in the city;
- Air Pollution Index (API5): an indicator of ambient air pollution. It is calculated using average values of concentrations of five substances with the highest MAC values divided by the MAC and compared with the harmful concentration levels of SO_2.

The degree of ambient air pollution is characterized by four standard gradations of the SI, HF and API5 indicators (table 6.2).

In 2017, 113 locations in two major cities and 12 oblasts were monitored using 14 mobile laboratories, compared with 82 locations in 2016 and 27 in 2008.

Also, while in 2008 there was no regular monitoring of air quality in the Aral Sea region, Kazhydromet's Kyzylorda Branch currently monitors air quality at five points in Kyzylorda City (Southern Industrial Area, Northern Industrial Area, Market of Sybaga, Residential Area Akmechet, Central Square) and at seven points in Kyzylorda Oblast (Zhanakorgan, Shieli, Syrdarya, Zhalagash, Karmakshy, Kasaly, Aral), measuring a total of four air quality parameters (suspended substances, sulphur dioxide, carbon monoxide, nitrogen dioxide).

Apart from Kazhydromet, air monitoring is done by the sanitary and epidemiological service (chapter 13). In 2017, the sanitary and epidemiological service was examining air samples in 74 cities and towns. In 2017, the laboratories of the oblast branches of the National Centre for Expertise under the Committee for the Protection of Public Health analysed air samples using 36 parameters.

Surface water

In 2008, there were 256 hydrological stations in the Kazhydromet network. As of April 2018, there are 310 hydrological stations, including 264 on rivers, 36 on lakes and reservoirs, and 10 at sea. Key monitored parameters include:

- On rivers: water level and temperature, and flow;
- On lakes and seas: water level and temperature.

Standard observation periods are at 8 a.m. and 8 p.m., local time, daily. Primary data collection and processing is undertaken by Kazhydromet branches, and final data processing and management of the "Surface Waters" section of the State Water Cadastre is undertaken by the Department of Hydrology of Kazhydromet. Monitoring data are collected for official use only.

In 2017, surface water quality was monitored using hydrochemical indicators at 404 gauging stations, distributed across 133 water bodies: 86 rivers, 14 reservoirs, 28 lakes, four canals and the Caspian Sea. By contrast, in 2008, data were collected from 192 gauging stations located on 81 water bodies, and without data from the Caspian Sea.

Surface water sampling and analysis is carried out daily, every 10 days and monthly with the following parameters being monitored: visual observations, temperature, hydrogen index, suspended substances, colour, transparency, odour, biological oxygen demand (BOD5), chemical oxygen demand (COD), dissolved oxygen, percentage of oxygen saturation, CO_2, chlorides, sulphates, hydrocarbonates, calcium ions, magnesium ions, hardness, sum of sodium and potassium, amount of ions, ammonium saline, nitrogen, nitrate nitrogen, sum of nitrogen, phosphates, volatile phenols, oil products, anionic surfactants, hydrogen sulfide, fluorides and heavy metals (Fe, Si, Al, Mn, P, Mo, As, Ni, Pb, Cu, Cd, Zn, Hg, Be, Cr, Cr(VI), Co).

In addition, in 2017, surface water was also monitored for pesticides (alpha-HCH, gamma-HCH, 4.4-DDE, 4.4-DDT) in nine water bodies in the territory of North Kazakhstan, East Kazakhstan, South Kazakhstan, Almaty, and Zhambyl Oblasts. Also, while there was no regular monitoring of surface water quality in the Aral Sea region in 2008, Kazhydromet's Kyzylorda Branch currently undertakes monitoring at six gauges on the Syrdarya River and one gauge on the Aral Sea. In addition to monitoring the quality of drinking water from the Syrdarya River, it also monitors local and district water supply sources in the territory of the City of Kyzylorda and Kyzylorda Oblast.

The main water quality criteria for hydrochemical indicators are the MAC values of pollutants for fishery water bodies. The level of surface water pollution is estimated by the value of the comprehensive water pollution index, which is used to compare and identify the dynamics of changes in water quality (chapter 7).

The current network provides data on more than 60 parameters.

Kazhydromet also monitors the quality of surface waters on transboundary rivers with China, Kyrgyzstan, the Russian Federation and Uzbekistan, in 31 transboundary rivers. Surface water quality in transboundary rivers is monitored at 35 hydrochemical gauges. Following the recommendations of the

Caspian Environmental Monitoring Programme of the parties to the Tehran Convention, in 2018, Kazhydromet included an additional sampling point in Kara-Bogaz-Gol bay.

Water quality monitoring data are processed monthly and published in monthly, quarterly and annual informational bulletins, which are available in the Kazakh and Russian languages on the website of Kazhydromet. Monitoring results are also used to inform the following annual publications:

- "Annual data on the regime and resources of surface waters of the land" (contains hydrological data on the regime of water bodies for eight main water basins);
- "Materials of observation of evaporation from surface waters".

Once every 10 years, Kazhydromet publishes the report "Long-term data on the regime and resources of surface waters of the land" for eight main water basins, which contains generalized hydrological data on the regime of water bodies over a longer observation period.

Groundwater

Groundwater monitoring is carried out by the Committee on Geology and Subsoil Use of the Ministry for Investments and Development. Systematic monitoring of groundwater level, temperature and quality is carried out in all administrative oblasts, in a total of 4,345 wells located at 363 monitoring posts (annex VI, map 3). Groundwater monitoring is carried out in accordance with approved work plans. Depending on groundwater depth, monitoring samples are collected three to five times per month.

All monitoring information is to be provided to the National Databank on Mineral Resources (currently under development).

In 2017, the results of groundwater monitoring studies carried out in the period 2014–2016 were published in 12 reports on the state and balance of groundwater in the Akmola, Aktobe, Almaty, Atyrau, East-Kazakhstan, Kostanay, Kyzylorda, Mangistau, Pavlodar, South-Kazakhstan and Zhambyl Oblasts and the Semipalatinsk area.

Photo 4.1: Kazhydromet station on the Merke River

In order to study the technogenic contamination of groundwater, the following five polygons have been regularly monitored:

- Ileksky (hexavalent chromium);
- Koshkaratinsky (strontium, molybdenum and selenium);
- Mirgalimsay-Turkestan (polymetals);
- Rudnensko-Kostanay (nickel, iron and fluorine);
- Semipalatinsk (radionuclides).

For many years, research has been carried out to study hydrogeodynamic earthquake precursors in seismic regions of south-east Kazakhstan at nine stations (Saryzhas, Boguty, Turgen, Kazachka, Medeo, Kaskelen, Kopa, Akkol and Lugovaya). The results of seismic monitoring are provided daily to the Interagency Commission for Earthquake Forecasting for the compilation of a weekly short-term and medium-term forecast of strong earthquakes.

Hazardous geological processes related to groundwater, such as landslides, gullying, river bank failures, etc. are also being monitored regularly. The data bank of the "Groundwater" subsystem (State Water Cadastre) is functioning and regularly updated within the National Databank on Mineral Resources (currently under development).

Annually, groundwater monitoring data are provided to stakeholders in central and local government bodies.

Drinking water quality

The sanitary and epidemiological service of the Ministry of Health performs radiological, bacteriological and extended chemical analyses of groundwater used for drinking water.

Drinking water samples are collected at water treatment facilities but there is no regular collection of drinking water samples to determine water quality in households or at the water supply network.

Sampling of drinking water is done during inspections. Therefore, the frequency of sampling depends on the allowed periodicity of inspections conducted with special procedures and unscheduled inspections, which is regulated by the 2015 Business Code (chapter 2).

In 2016, 34,556 samples of tap water were tested using microbiological parameters, and 30,534 samples tested using sanitary-chemical indicators. Water quality testing was also carried out at decentralized water supply sources (bores, wells, springs), where 2,036 samples were tested using sanitary-chemical indicators and 2,057 samples tested using microbiological indicators.

Atmospheric precipitation and snow cover

Monitoring of the state of atmospheric precipitation and snow cover in Kazakhstan focuses on the chemical composition of atmospheric precipitation, which serves as an indicator of atmospheric pollution, as well as on monitoring the content of pollutants in the snow cover to assess regional atmospheric pollution in the winter period and identify the distribution of pollutants from urban areas and industrial sites. Observation works are carried out in accordance with World Meteorological Organization (WMO) programmes.

Kazhydromet monitors the chemical composition of atmospheric precipitation daily at 46 meteorological stations and monitors the content of pollutants in snow cover at 39 meteorological stations once a year during the maximum accumulation of moisture reserves in the snow. Atmospheric precipitation and snow cover samples are analysed in laboratories in the capital and in Almaty City and observed for: acidity; specific electrical conductivity; anions – sulphates, chlorides, nitrates, hydrogen carbonates; cations – ammonium, sodium, potassium, calcium, magnesium; and microelements – lead, copper, cadmium, arsenic.

MACs of harmful substances for water bodies used for drinking and recreational purposes are used to assess the state of snow cover pollution because MAC values are not existent for snow cover.

With regard to atmospheric precipitation, concentrations of all identified pollutants, with the exception of cadmium, did not exceed the MAC in 2017. The following averages prevailed in atmospheric precipitation in Kazakhstan: hydrocarbonates 33.7 per cent, sulphates 23.2 per cent, chlorides 12.2 per cent, calcium ions 9.5 per cent, sodium ions 8.4 per cent and potassium ions 5.0 per cent. Acidity of atmospheric precipitation samples in Kazakhstan is mainly characterized as strongly acidic, weakly acidic, neutral and mildly alkaline medium.

As for snow cover, in 2017, concentrations of all identified pollutants, except for cadmium and lead, were within the norm. Throughout the whole territory of Kazakhstan, the following prevail in snow cover: hydrocarbonates 29.5 per cent, sulphates 21.1 per cent, chlorides 11.7 per cent, calcium ions 9.1 per cent, sodium ions 6.2 per cent and magnesium ions 5.1 per cent. Acidity of snow cover samples are mainly characterized as weakly acidic, neutral and mildly alkaline medium.

Atmospheric precipitation and snow cover monitoring data are published in monthly, quarterly and annual informational bulletins, which are available in the Kazakh and Russian languages on the Kazhydromet website.

Soil and land

Soil pollution has been regularly monitored by Kazhydromet since 2010 (in 48 locations at that time) in industrial areas of the country, primarily in terms of heavy metals, using eight indicators. In 2017, observations on the state of soil pollution were carried out in 65 localities (annex VI, map 4). Soil samples are collected at five spots in each locality in spring and autumn (usually April and October) and sent to Kazhydromet laboratories in the capital and in Almaty, Atyrau and Aktau, where chemical analysis of soil samples usually takes place.

Selection of sampling locations is related to the coverage of a settlement, considering the congestion of highways, industrial facilities, and schools and recreational areas. Samples were also collected at five oilfields in Atyrau Oblast (Dossor, Kosshagyl, Makat, Zaburunye and Zhanabai) and four oilfields in Mangistau Oblast (Arman, Dunga, Karazhanbas and Zhetibai) to analyse the content of oil products, nickel, copper, cadmium, lead, zinc, manganese and chromium 6. Samples of bed sediments from Lakes Alakol and Balkhash are also regularly collected.

The main quality criteria are the MAC values of pollutant substances in soil. Excess of MAC for cadmium, lead, copper, zinc and chromium in cities has been identified at the boundaries of the sanitary protection zones of large industrial enterprises and in areas of main highways. In 2017, the highest exceeding level (61.8 MAC of copper) was recorded near Balkhash mining and metallurgical factory.

Land monitoring activities are carried out by the RSE "Scientific and Production Centre for Land Cadastre".

The Rules for land monitoring and use of land monitoring data, along with the methodological approach to land monitoring (through mapping, exploration and surveys) are defined (2014 Order of the Minister of National Economy No. 159). Monitoring activities are carried out taking into account land planning and different categories of land use.

The territorial-zonal monitoring network includes stationary and semi-stationary posts. Stationary monitoring posts (sites, fields and landfills) are set up for systematic collection of data on the state of lands. Semi-stationary monitoring posts (temporary platforms, mobile posts) are set up depending on the specific work conditions and objectives. Monitoring is conducted periodically every three, five, 10 or more years. Land monitoring data are collected using both remote sensing (satellite imagery and aerial photography) and observations at the territorial-zonal network posts. Other sources include land inventories, land cadastral documentation and stock data (maps, cartograms, charts, tabular and other information formats).

Land monitoring data that do not contain classified state secrets and other restrictions are publicly available and are provided to interested individuals and legal entities upon request and on a paid basis. Data provided to state bodies are free of charge.

Noise and vibration

There is no regular noise and vibration monitoring; neither are noise maps currently available.

Measurements of noise and vibration are carried out at facilities that use processes, equipment, technology or other sources that might have an impact on human health. Public health authorities control the levels of noise and vibration at industrial enterprises, food industries, municipal facilities, residential areas and kindergartens (chapter 13).

Noise and vibration levels are measured at the Baikonur Cosmodrome during the launch of space vehicles, along standard flight routes (take-off and landing) of aircraft, and at main oil facilities, gas pipelines, compressors and pumping stations, overhead power lines, sewage treatment facilities, railways, overground parts of metro networks, motorways, carparks, garages and car-washing facilities.

Measurement services are provided to private sector companies upon request and on a paid basis, and to citizens at no cost.

Radioactivity

Measurements of the gamma background (exposure dose rate) in Kazakhstan are conducted daily at 86 meteorological stations in 14 oblasts, as well as at 23 automatic monitoring stations for ambient air pollution. Kazhydromet monitors radioactive contamination of the atmosphere through daily measurements of gamma radiation exposure at 85 meteorological stations (an increase from 78 stations in 2008), including 23 automatic stations, in 44 settlements (annex VI, map 5). Calculation of aggregate beta activity is carried out at 43 weather stations (an increase from 40 stations in 2008).

Radiation samples are sent to Almaty Kazhydromet laboratory, which also measures density of beta radiation based on precipitation, which then provides Kazhydromet Office in the capital with laboratory results, which are subsequently published in informational bulletins. Kazhydromet also closely works with the Research Institute of Nuclear Physics, which provides expertise on radiation monitoring.

In 2017, radioactive contamination of the atmospheric surface layer was monitored in 14 oblasts at 43 meteorological stations by sampling air with horizontal valves. A five-day sampling was carried out at all stations.

Also, while in 2008 there was no regular monitoring of radiation in the Aral Sea region, as of early 2018, Kazhydromet's Kyzylorda Branch monitors radiation background at Kyzylorda City and background gamma radiation at Kyzylorda Oblast.

In addition, radiation monitoring of environmental media and objects (food products, drinking and technical water, air, precipitation, soil, construction materials, fertilizers, flora, etc.) is done by the public health authorities. It covers major pressures from ionizing radiation on human health (chapter 13).

Biodiversity

The Committee on Forestry and Fauna of the Ministry of Agriculture is responsible for monitoring specially protected natural areas, mountain ecosystems and desertification, wildlife and flora. Due to the lack of a biodiversity monitoring system and inventory, data are provided to the Committee upon request and on an ad hoc basis, rather than systematically. An integrated biodiversity monitoring system is not established. Data obtained from field research is scattered among different institutions, and some are not available in digital form. The capacity of protected areas for carrying out biodiversity monitoring is often impaired by the lack of funding for modern equipment and professional training. As of 2018, only a few state-funded species-monitoring programmes are continuing, targeted at populations of key rare and threatened species (chapter 9).

Forests

Forest monitoring activities are carried out by the RSE "Kazakh Forest Inventory Enterprise", which reports to the Committee on Forestry and Fauna of the Ministry of Agriculture.

State forestry agencies, local executive authorities, private landowners, state forest management organizations – all have to regularly submit their respective documentation in electronic and paper format.

The scope of monitoring data gathered is more related to forest health status and reproduction potential than rare and threatened species of flora and fauna. Also, the geographical range of monitoring activities conducted by forestry authorities is limited to the land area of the state forest fund, accounting for only 10.8 per cent of the country's territory, and partially overlapping with the protected area network (chapter 9).

Analytical laboratories

There are 21 analytical laboratories being operated by Kazhydromet, spanning all oblasts of Kazakhstan. Their capacities have expanded substantially since 2008, particularly with regard to air quality monitoring. They are adequately equipped to carry out hydrochemical and hydrobiological analysis of more than 70 types of pollutants. The network of laboratories operated by Kazhydromet provides services to the Ministry of Energy upon official request. The laboratories also provide services to private sector companies on a contractual basis. The National Accreditation Centre of the Committee of Technical Regulation and Metrology of the Ministry for Investments and Development is the official body that provides accreditation to Kazhydromet laboratories.

Territorial departments of the Committee of Environmental Regulation and Control under the Ministry of Energy also have their own laboratories.

Laboratory activities concerning public health are undertaken by the National Centre for Expertise under the Committee for the Protection of Public Health and its branches in the oblasts (16), cities (25) and rayons (183).

4.2 Availability of information on the environment and sustainable development

Data reporting by enterprises

Private individuals and legal entities engaged in natural resource management activities are obliged to carry out self-monitoring activities. Such activities are conducted in accordance with their environmental monitoring programmes. These programmes establish a mandatory list of parameters to be monitored, criteria for determining duration and frequency of monitoring, as well as instrumental or calculation methods used. Self-monitoring reports are submitted by category I–III enterprises on a quarterly basis to the territorial bodies of the Committee of Environmental Regulation and Control (chapter 2).

Statistical data

The system of environmental statistics is decentralized. State statistics on environmental protection are assembled by the Committee on Statistics from statistical monitoring and administrative data collected at oblast level. The Committee on Statistics collects and analyses statistical data on air emissions, water supply and sanitation, and on collection, removal, sorting, disposal and depositing of municipal waste. It also uses data from administrative sources on natural resources (land, forestry, game husbandry and fisheries).

Environmental statistics are produced in accordance with the following international standards:

- United Nations Framework for the Development of Environment Statistics (FDES);
- ECE Guidelines for the Application of Environmental Indicators;
- OECD green growth indicators;
- System of Environmental-Economic Accounting (SEEA).

The Committee on Statistics carries out the following annual surveys on environmental statistics:

- Survey on air protection (about 40,000 enterprises);
- Survey on collection and removal of municipal waste (about 600 enterprises);
- Survey on environmental protection expenditures (about 21,000 enterprises);
- Survey on sorting, recycling and depositing of waste (about 240 enterprises);
- Survey on water supply system, sewerage and separate networks (about 850 enterprises).

It also relies on administrative data sources for the following environmental statistics:

- Ministry of Agriculture (pesticide consumption, water abstraction, protected areas, forest fires, land resources, forest and other wooded land, trends in number and distribution of selected species, area of hunting grounds);
- Ministry of Energy (GHG emissions, industrial waste, climate change indicators, air temperature, precipitation, wind speed, solar radiation, air quality in cities, renewable freshwater resources, quality of freshwater and coastal waters);
- Ministry of Health (state of health of the population, water security and drinking water quality);
- Ministry of Internal Affairs (main emergencies of a natural and technological nature);
- Ministry for Investments and Development (nitrates in groundwater, groundwater reserves).

National statistical monitoring forms 2-TP-Air (Report on the protection of ambient air), 4-OS (Report on environmental protection expenditures), 1-Waste (Report on the collection and removal of municipal waste) and 2-Waste (Report on sorting, recycling and depositing of waste) are used for provision of environmental statistics (2017 Order of the Chairperson of the Committee on Statistics No. 173).

Statistical form 2-TP-Air is submitted annually to the territorial statistical body by legal entities that have stationary sources of air pollution. It reflects information on emissions of 115 specific pollutants and GHGs from stationary sources of air pollution. Statistical form 4-OS is designed to record annual environmental charges for the use of natural resources and payments aimed at protecting the environment, broken down by types of nature protection activities. The entity responsible for keeping records of these environmental charges and payments is the Ministry of National Economy.

The 2014 Order of the Chairperson of the Committee on Statistics No. 94 approved statistical monitoring form 2-TP-Water management (Report on the collection, use and discharge of water). The state body responsible for the generation of water management data is the Committee on Water Resources of the Ministry of Agriculture. The form is submitted annually by water users using water for agricultural, production, domestic and hydropower purposes. It contains information on the concentrations of 56 pollutants in wastewater (in mg/litre).

Implementation of SEEA and production of OECD green growth indicators

Implementation of SEEA in Kazakhstan is driven by the implementation of the 2013 Concept of Transition to Green Economy for the period 2013–2020, which requires the regular production of OECD green growth indicators. As another driver, a new “Environmental Accounts” section has been added to the National Accounts System Development Plan until 2020, including SEEA accounts as a priority.

The Committee on Statistics produces environmental-economic accounts based on environmental statistics and administrative sources data (Ministry of Agriculture, Ministry of Energy, Ministry of Finance, Ministry for Investments and Development). Pilot calculations (based on available data) have been compiled by the Committee on Statistics covering the following SEEA accounts:

- Physical flow account for energy for 2014, 2015 and 2016;
- Air emission account for air pollutants for 2014, 2015 and 2016;
- Solid waste account for 2016;
- Environmental protection expenditure account for 2015 and 2016;
- Environmental tax account for 2013, 2014, 2015 and 2016;
- Asset account for mineral and energy resources (for 19 main mineral and energy resources) for 2014, 2015 and 2016.

Following the identification of data gaps during the compilation of these pilot accounts, the Committee on Statistics is currently working with stakeholders involved in the production of environmental statistics to address these gaps. As part of ongoing technical cooperation between the Committee on Statistics and the OECD, a first technical workshop took place in December 2018, with the aim of assessing the level of compliance of these pilot accounts with the SEEA methodology, and the degree of readiness of the pilot accounts for official publication by the Committee on Statistics.

The production of green growth indicators is carried out in accordance with paragraphs 6 and 7 of the Action Plan for the implementation of the Concept of Transition to Green Economy, in accordance with the OECD green growth indicators. Altogether, 38 of the 54 green growth indicators promoted by the OECD are produced. The Committee on Statistics provides information on green growth indicators produced in Kazakhstan on its website (http://stat.gov.kz/faces/wcnav_externalId/Ind_Green_Economy?_adf.ctrl-state=1b7u069c8j_47&_afrLoop=128904002862053 7#%40%3F_afrLoop%3D1289040028620537%26_adf.ctrl-state%3Dk5t9gne47)

Production of thematic bulletins and yearbooks on environmental statistics

The Committee on Statistics produces annually four environmental statistics bulletins, on air emissions, on water and wastewater, on municipal waste, and on environmental protection expenditures, and also makes available the respective datasets for downloading from its website. It also regularly produces a yearbook of environmental statistics under the title "Environmental protection and sustainable development of Kazakhstan".

Databases

State Environmental Information Fund

As part of the implementation of the Aarhus Convention, in 2009, the State Environmental Information Fund (SEIF)[19] was set up under the responsibility of the RSE Information and Analytical Centre of Environment Protection (IACEP) under the Ministry of Energy.

SEIF is an environmental information management system. It is maintained by the IACEP to foster access to official environmental information. Activities under the SEIF include the collection, storage, processing, analysis, provision and dissemination of environmental information.

The SEIF database currently contains more than 20,000 records related to environmental information. It contains environmental information registers with data recorded and systematized by various areas: research, environmental monitoring reports, control activities and inspections, etc. It contains records from natural resource cadastres (Forest Cadastre, Cadastre of Specially Protected Natural Areas, Wildlife Cadastre), records related to waste and ozone-depleting substances, the state pollutant release and transfer register (PRTR), the state of the environment report and other data and information.

Since July 2014, environmental information from the SEIF database is available upon request and provided free to individuals and legal entities, as a public service. Since then, more than 1 000 requests for information have been addressed, providing more than 1,000 units of environmental information to members of the public.

[19] www.ecogosfond.kz and http://iacoos.gov.kz/en/state-fund-of-environmental-information

State cadastre of natural resources

In accordance with the 2000 Resolution of the Government No. 1449, the IACEP has developed a new GIS-based platform for bringing together the information from all state cadastres of natural resources (SCNR).[20] Its information is publicly available online.

The SCNR is an automated system for collecting, systematizing, storing, processing and displaying spatial data on the state of the natural resources of Kazakhstan, as well as for analysis of this data. The system is currently being piloted before operationalization. It incorporates the following cadastres:

- Forest Cadastre: metainformation required for forest management and evaluation of economic activities related to forestry, including the legal status of forest resources, as well as quantitative and qualitative information on the state of forest resources;
- Cadastre of Specially Protected Natural Areas: metainformation on the state of specially protected natural areas;
- Wildlife Cadastre: metainformation on wild animals, game species, commercial ichthyofauna and other aquatic species, animals and invertebrates.

The SCNR's cadastral objects have a description and list of properties, and a link to a specific geographic location on a map. Data for these cadastres are supplied by the Committee on Forestry and Fauna of the Ministry of Agriculture. The periodicity of data entry is once per year. The SCNR database contains information about 672 objects of fauna, 152 objects of woodland, 3,229 objects of fisheries and 37 objects of specially protected natural areas.

The SCNR would be included in the structure of the future Unified State System for Environmental and Natural Resources Monitoring (USSENRM).

State Cadastre on Waste

The Ministry of Energy, in cooperation with the IACEP, has also developed the State Cadastre on Waste (chapter 8). Access to the cadastre web-based platform[21] is password restricted (since it mostly aims at supporting inter-agency exchange of information on waste data). The portal includes waste inventory reports, passports of hazardous waste and cadastre files for waste management sites. Nonetheless, significant gaps related to waste data collection persist, since most municipal and industrial waste data available is estimated rather than the result of monitoring activities like weighing.

State pollutant release and transfer register

Kazakhstan is a party to the ECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) which requires establishing PRTRs. However, it is not a party to the 2003 Protocol on Pollutant Release and Transfer Registers (PRTR Protocol) that clarifies this obligation in greater details. Despite this, important steps have been taken by Kazakhstan over the past years with regard to developing the State Pollutant Release and Transfer Register (SPRTR). The SPRTR is a publicly available database on the state of emissions and environmental pollution. It is maintained by the IACEP of the Ministry of Energy and is part of the SEIF.

In 2016, the amendments to the 2007 Environmental Code introduced an article on the SPRTR, and Rules for the maintenance of the SPRTR were approved (2016 Order of the Acting Minister of Energy No. 241). Annual submission of SPRTR reports is mandatory for enterprises with category I installations. The following information is to be reported:

- General information about the natural resource user;
- An electronic version of the issued environmental permit;
- Information on the volume of actual emissions of pollutants into the atmospheric air;
- Information on the volume of actual discharges of pollutants into water bodies;
- Information on the amounts of waste generated at the production site;
- Information on the disposal of sulphur generated at the production site;
- An electronic version of the self-monitoring programme and the environmental monitoring report;
- An environmental management plan and a report on the implementation of this plan;
- Results of state environmental control activities (inspections);
- Information on mandatory environmental emission charges paid, including charges for exceeding established emission limits.

[20] https://ecokadastr.kz/

[21] oos.energo.gov.kz

Submission of data to SPRTR started on a voluntary basis in 2013. This helped to raise awareness about the SPRTR. In 2017, 778 of more than 2,000 enterprises with category I facilities submitted their reports for 2016.[22]

There are a number of opportunities for improvement of the SPRTR. The submission of data to the SPRTR is currently done by e-mail, i.e. not online, and is not linked with other relevant databases. The potential of a PRTR system as a single window access point for industry and for governmental authorities to fulfill different national and international reporting obligations and to use the outcomes of the reporting in an integrated way for different purposes, is not fully used.

Furthermore, the quality of reports submitted to the SPRTR is variable: there are reports that do not include all required information. Not all enterprises use the mandatory form for submitting the information on actual emissions. Reports are posted by the IACEP on the SPRTR web page[23]. The reports are displayed mostly as scanned photocopies. In other words, the system is a collection of documents and does not allow searching by industrial enterprise, sector, locality or substance. Another issue is that there are facilities of other than category I which would fall under the PRTR Protocol, so amendments to the legislation are needed to make it fully correspond to the Protocol. In addition, the current legislation does not provide for any sanction for non-submission of information.

A new project being implemented by the IACEP assists companies in submitting online reports to the SPRTR. This project aims to improve access to and the accuracy of environmental data on POPs and other priority chemicals and to increase awareness and public participation on environmental issues through the introduction of a fully operational national online PRTR. This project was started in 2013 and involved a pilot testing phase that ran between 2014 and 2016, focusing on the development and testing of an online geo-referenced platform capturing PRTR information. Once finalized, the system would also be the main vehicle for giving public access to PRTR information. At the end of the project phase currently being implemented with the support of UNITAR, and with support from OSCE, the IACEP would submit to the Ministry of Energy draft amendments to the Environmental Code as related to online submission of SPRTR information, and the finalized software of the online SPRTR platform.

National Databank on Mineral Resources

The 2017 Code on Subsoil and Subsoil Use establishes rules for the development of a central information bank on subsoil and subsoil use. Under the responsibility of the Committee on Geology and Subsoil Use of the Ministry for Investments and Development, this information system and database are supposed to enable the storage and provision of access to information on subsoil and subsoil use and the automation of geological information and support coordination of information flows. This information system and database are currently under development under the scope of the State Programme "Digital Kazakhstan" (2017 Resolution of the Government No. 827).

Unified State System for Environmental and Natural Resources Monitoring

There is not yet a fully functional shared system of environmental data and information among relevant ministries, agencies and institutes in Kazakhstan, but steps are under way for the development of a Unified State System for Environmental and Natural Resources Monitoring (USSENRM) according to the provisions of the Environmental Code.

The concept of the System consists of a multi-purpose information system with the aim of improving coordination of environmental monitoring and data collection activities carried out by different government agencies, to provide timely and reliable state-of-the-environment information to decision-makers and the public. Once implemented, the System is expected to support the collection of reliable and comparable information on the state of the environment, facilitate assessment and forecasting exercises on the state of the environment and inform analyses of the effectiveness of environmental protection measures.

While the rules for establishing the USSENRM were approved in 2001 and several steps have been taken since towards its development (e.g. establishment of inter-agency working groups, specification of the information to be exchanged through the System, and development of the IT architecture of the software system that will support it), the System has not yet been established due to insufficient funding. The Ministry of Energy is exploring the possibility of implementation of the System in 2020–2021 as a component of a project under the wider scope of the State Programme "Digital Kazakhstan".

[22] The number of category I facilities in early 2018 is 2,398.

[23] prtr.ecogosfond.kz

Environmental indicators

The methodology for the production of environmental indicators (2015 Order of the Acting Chairperson of the Committee on Statistics No. 223) defines the main aspects of structuring and the methods of nationwide assembling of data on the main state-of-the-environment and pollution indicators. This methodology was developed using the recommendations of ECE's 2007 "Environmental Indicators and Indicators-based Assessment Reports: Eastern Europe, Caucasus and Central Asia".

The Committee on Statistics has been working with ECE on the production of environmental indicators since 2009. Together with countries from South-Eastern and Eastern Europe, the Caucasus and Central Asia brought together under the auspices of the ECE Joint Task Force on Environmental Indicators, Kazakhstan has agreed to produce and share a set of 42 environmental indicators (for which a description, methodology and production template have been developed) and their underpinning datasets to enhance comparability of environmental statistics among countries in the region in support of reporting and assessments and of the establishment of a Shared Environmental Information System (SEIS).

The environmental indicators being produced by Kazakhstan are published on the website of the Committee on Statistics in English, Kazakh and Russian. The website has a section[24] specifically dedicated to the set of ECE indicators, where 36 of the list of 42 ECE environmental indicators are classified under nine environmental and sectoral clusters:

- Air pollution and ozone depletion (all three indicators of the ECE set);
- Climate change (all three indicators of the ECE set);
- Water resources (10 of 16 indicators of the ECE set);
- Biodiversity (all four indicators of the ECE set);
- Land and soil (both indicators of the ECE set);
- Agriculture (both indicators of the ECE set);
- Energy (all four indicators of the ECE set);
- Transport (all four indicators of the ECE set);
- Waste (all four indicators of the ECE set).

Datasets for all 36 indicators are made available for downloading directly from the website. For 20 of these 36 indicators, the Committee on Statistics also publishes metadata information, such as a brief description and explanation of the indicator, methodology used and units and a chart visualization of the available time series. Because of insufficient human resources, no metadata are currently being published for the remaining 16 indicators: indicators 4 (air temperature), 5 (atmospheric precipitation), 11 (freshwater use and recycling), 12 (drinking water quality), 16 (polluted wastewater), 18 (forests and other wooded land), 20 (trends in the number and distribution of selected species), 21 (land uptake), 22 (area affected by soil erosion), 24 (pesticide consumption), 30 (freight transport demand), 31 (composition of road motor vehicle fleet by fuel type), 32 (age of road motor vehicle fleet), 34 (management of hazardous waste), 35 (waste reuse and recycling) and 36 (final waste disposal).

In addition, challenges remain regarding collection of reliable data for the regular production of biodiversity and waste indicators.

The Committee on Statistics also produces another set of environmental or environment-related indicators and publishes these on the "Taldau" information-analytical system and data dissemination portal, available in Kazakh and Russian.[25] "Taldau" was developed with the aim of making available relevant statistical information and indicators to state bodies, enterprises and the broader public through a user-friendly interactive portal.

Environmental statistics and water and wastewater statistics are accessible and available for downloading from the "industrial production and environment statistics" section of the "Taldau" data portal, allowing users to visualize data in charts and graphs, maps and tables. The portal also includes tools and functionalities for searching items by keywords, downloading selected data or analysis results in accessible data formats (e.g. Excel, pdf), and statistical analysis of data, such as comparison of data by regions and classifications, and construction of a dynamic series and correlation analysis.

Environmental statistics and water and wastewater statistics made publicly available through the "Taldau" portal are disaggregated by oblast and rayon, but not by sector.

Indicators and information for the Sustainable Development Goals

The Committee on Statistics is responsible for Sustainable Development Goals monitoring and has established an Inter-Agency Working Group on Sustainable Development Goals Statistics. This working group works on a regular basis through

[24] http://stat.gov.kz/faces/homePage/ecolog

[25] https://taldau.stat.gov.kz

consultations, workshops, seminars and training courses. Technical meetings of this group are held annually (the first in September 2017 and the second in September 2018) with the involvement of all United Nations agencies under an inter-agency process led by the United Nations Population Fund (UNFPA). This second technical meeting discussed the draft indicator framework for monitoring the Sustainable Development Goals and the envisaged preparation of the first voluntary national review in 2019.

In December 2018, the Committee on Statistics presented a draft indicator framework for monitoring the Sustainable Development Goals (consisting of 257 indicators) to the Coordination Council on the Sustainable Development Goals. It was tasked to finalize and consult upon the final set of indicators until the end of January 2019.

The first report on Sustainable Development Goals statistics was prepared in the framework of the Government of Kazakhstan/World Bank Joint Economic Research Program (JERP) in June 2018. It includes data since 2010 on 125 available indicators (of 257 in total).

In late 2018, the Committee on Statistics launched a section called “Monitoring of Sustainable Development Goals until 2030” on its website. The section includes information on 125 indicators.

On the environmental dimension of the country’s new Sustainable Development Goals indicator framework, a workshop on the SEIS and environmental statistics for the Sustainable Development Goals, organized by UNEP and ECE Statistical Division in April 2017, contributed to development of the list of indicators and an initial gap analysis feeding into the national Sustainable Development Goals indicator framework for Kazakhstan.

Application of Shared Environmental Information System principles

Kazakhstan implements the main SEIS principles of open access to environmental data,[26] producing and sharing online a set of ECE environmental indicators associated with the implementation of an SEIS. A total of 36 of the 42 ECE environmental indicators contributing to the establishment of an SEIS in the Pan-European region are regularly calculated in Kazakhstan and published as per criteria for SEIS implementation agreed under the scope of the ECE Joint Task Force for Environmental Statistics and Indicators.

In most cases, environmental data flows produced in Kazakhstan are regularly disseminated, made available and accessible online for users, and generally used for multiple purposes (including production of national indicators, reporting obligations, state of the environment reporting) in accordance with SEIS principles.

However, opportunities remain for further improving the application of SEIS principles of open access to environmental data, including with regard to:

- Provision of public access to the SEIF database (in terms of direct online access to data rather than metadata only);
- Finalization and full operationalization of the SCNR and online SPRTR;
- Effective implementation of the USSENRM (initiated in 2001 but still not implemented).

Also, regarding the production and online sharing of environmental indicators from the ECE set, which are associated with the implementation of an SEIS, Kazakhstan is yet to produce and share online the full set of 42 ECE environmental indicators, and to publish relevant metadata information for 16 of the 36 ECE environmental indicators it already produces and shares online. This is due to insufficient human resources.

Environmental reporting, publication of environmental data, indicator-based assessment reports

National Report on the State of the Environment and Use of Natural Resources

Kazakhstan produces an annual national SoER, known as the National Report on the State of the Environment and Use of Natural Resources.

The Report is compiled to inform the public of the actual environmental situation in the territory of Kazakhstan and the measures taken to improve the situation. The Report is published in the national language (Kazakh) and in Russian. The reports for 2013–2014, 2015 and 2016 are posted on the website of the Ministry of Energy and at the Unified Environmental Internet Resource.[27]

[26] SEIS principles of open access to data: data are managed as close as possible to source, and data are collected once and shared for many purposes.

[27] http://ecogosfond.kz/ltty-bajandama/

The Report is indicator based in that it uses all 36 ECE environmental indicators produced and published by the Committee on Statistics.

For the purposes of broader communication and awareness-raising, the Ministry of Energy, together with Zoï Environment Network and with the support of UNEP, produced an interactive version of the 2016 SoER[28] based on the official text version of the 2016 SoER. To facilitate understanding of the text, the interactive report visualizes it using the Driver-Pressure-State-Impact-Response approach. The interactive version of the 2016 SoER is available in the Russian and Kazakh languages.

Information bulletins on the state of the environment

Since 2008, Kazhydromet has twice redesigned its website.[29] It now features monthly, quarterly, semi-annual and annual information bulletins on the state of the environment, comprising the following information presented by oblast and city:

- General assessment of air pollution levels in the cities;
- Information on cases of high and extremely high air pollution;
- Quality of surface waters;
- Information on cases of high pollution of surface waters;
- Ground-level radiation;
- Ground-level fallout density.

Additional information bulletins on the state of the environment are published by Kazhydromet on a quarterly, semi-annual and annual basis on:

- State of the Environment of the Special Economic Zone “Morport Aktau”;
- State of the Environment in the Kazakh Sector of the Caspian Sea;
- State of the Environment in the Nura River Basin;
- State of the Environment and Public Health in the Aral Sea Region;
- State of the Environment in the Shchuchinsk-Borovoe Resort Area.

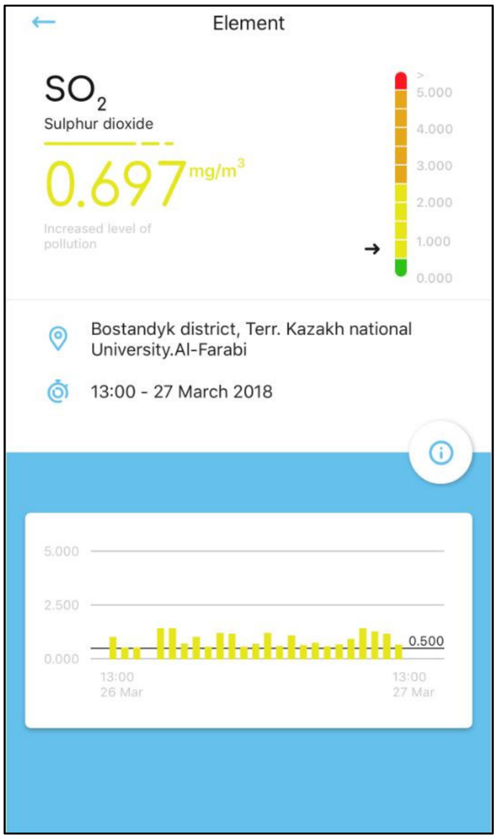
Kazhydromet also publishes an information bulletin on the state of the environment in the Balkash-Alakol lake system basin, on the second and third quarter, as well as every six months. Finally, an information bulletin on transboundary movement of toxicological components in environmental objects is published by Kazhydromet twice a year.

These information bulletins are publicly available on the website of Kazhydromet and are intended to inform the state bodies and the public about the state of the environment in the territory of Kazakhstan.

Publication of air quality data in real time

Kazhydromet has developed an app on urban air quality (AirKz) to make official real-time data on air quality available to the public. AirKz was launched 1 January 2018, allowing users to monitor the quality of atmospheric air throughout Kazakhstan. As of late 2018, AirKz provides information based on data collected in 46 settlements and at 84 automatic and 56 manual air quality monitoring stations.

Photo 4.2: AirKz App



Available in English, Kazakh and Russian, AirKz allows users to manually select desired stations or, according to geolocation data, the app will automatically determine the nearest station. Depending on the selected station, the app displays the concentrations of the main air pollutants, notably nitrogen dioxide (NO_2), nitric oxide or nitrogen monoxide (NO), PM_{10}, $PM_{2.5}$, dust, SO_2, H_2S, and CO. For each parameter, users can view the concentration level in mg/m^3 and in relation to the MAC on a colour scale. In addition to displaying monitoring data, AirKz

[28] http://newecodoklad.ecogosfond.kz/

[29] kazhydromet.kz

includes a description of each pollutant and its effects on human health. However, it does not provide users with recommendations on what to do in the case of specific air pollution levels, nor does it include health risk maps or other health-related information.

Awareness-raising campaigns promoting the use of the AirKz app have been carried out. For example, in Pavlodar, the municipality linked the app to outdoor billboards to raise awareness on air quality issues and further promote the use of the app.

Also, in the capital, the Smart Astana app is being developed by the local executive authorities and it is expected to integrate AirKz as well.

Two other initiatives provide air quality information to the public in Kazakhstan. However, data used by these initiatives are based on non-official sources. The AlmatyUrbanAir app [30] uses non-official data collected at a single local licensed stationary monitoring post, and the Airkaz.org website publishes non-official near-real-time data on $PM_{2.5}$ particles collected by a network of non-licensed low-cost sensors installed in households in Almaty (18 sensors), Karaganda (3) and the capital (5). $PM_{2.5}$ measurements presented on the website AirKaz.org are generally higher than official $PM_{2.5}$ data published by Kazhydromet. Kazhydromet made a comparative analysis of $PM_{2.5}$ data gathered by non-licensed low-cost sensors and the official governmental monitoring data. The analysis showed the compatibility of results for 20-minute time intervals and the compatibility of results for mean daily values.

4.3 Access to environmental information

Scope of environmental information

The definition of environmental information included in the 2007 Environmental Code is generally in line with the provisions of the Aarhus Convention, to which the country has been a party since 2000. In 2016, through amendments to the 2007 Environmental Code, the scope of environmental information was expanded by including an additional eight clusters of information sources and data in the SEIF.

Active access

The public has access to environmental information through the website of the Ministry of Energy (energo.gov.kz) but, primarily, through a number of affiliated websites, such as on the Unified Environmental Internet Resource (ecogosfond.kz), state cadastres of natural resources (https://ecokadastr.kz) and the SPRTR (prtr.ecogosfond.kz), all maintained by the IACEP under the Ministry of Energy (http://iacoos.gov.kz). The Ministry's website does not contain explicit visual reference to its mandate on "environmental protection"; it only refers to "green economy".

Information on water resources, biodiversity, forests and protected areas on the website of the Ministry of Agriculture is poor and outdated.

A large volume of environmental information is available on the website of Kazhydromet (https://kazhydromet.kz). Information collected by Kazhydromet is openly accessible to the public, except data from automatic air quality monitoring stations, although that too can be made available upon request. In 2018, Kazhydromet launched an application for smartphones called "AirKz".

The websites of local governmental authorities contain little environmental information, especially that concerned with analytics and statistical data.

Environmental information that is made available online must be in the Kazakh and Russian languages, according to the 2015 Law on Access to Information. However, the information is not consistently available in the two languages.

A network of 14 Aarhus Centres functions in the country. The original purpose of the Aarhus Centres was to support participatory decision-making, facilitate access to environmental information and raise awareness of environmental and health risks. That purpose has diminished somewhat in recent years. The change is mostly due to changes in the budget allocation to support the operation of the Centres. The Centres are trying to keep afloat financially by diversifying their activities and engaging in fundraising.

The availability of information on chemical safety, the monitoring of pesticides and storage facilities on governmental websites is poor and the information provided there is outdated.

Several media platforms have been developed in the country. An online eco-magazine, "ЛИВЕНЬ. Living Asia" (http://livingasia.online) is produced by Eco-Forum-Kazakhstan and the Public Foundation "Socio-ecological Fund". Other media engaged in promoting environmental issues include the magazine "Ecology and Industry of Kazakhstan", the newspaper "Green

[30] http://almatyurbanair.kz/?l=en

Salvation" and the website of the NGO Arnika (ecocitizens.kz).

At the local level, a good example of public awareness-raising on environmental issues is set by North Kazakhstan Oblast. A number of radio and TV programmes support raising environmental awareness, such as "Туған Жер" and "Rodnoy kray" on North Kazakhstan Oblast channel "Qyzyljar". The weekly programme "Rescue Service 112" informs the population about local environmental issues that can affect people's lives. The newscast "ESIL-ақparat" of the Municipal Television and Radio Channel periodically broadcasts stories about the use of natural resources and environmental protection and the problems of environmental pollution.

Passive access

Good progress has been made in putting in place legislative provisions and establishing the procedures for handling requests from the public for environmental information. The various deadlines established by the legal framework for responding to enquiries and requests for environmental information seem to be reasonable. At the same time, the quality of the information provided remains a challenge.

Environmental enquiries

General environmental enquiries coming from the public are responded to within 15 calendar days from the day of receipt by the Ministry of Energy, unless additional activities (e.g. field missions, collection of information from other entities) are needed to provide a response, in which case the deadline is extended to 30 calendar days. Where there is a need for further research or investigation, another extension of 30 calendar days could be approved, bringing the total to 60 calendar days.

In special cases where the enquiry requires a long-term investigation (like the black snow case in Temirtau in early 2018, box 5.1), additional time is allocated by the Minister.

Environmental enquiries pertaining to the competence of another authority are transmitted to that authority within three working days (two if from mass media) and the enquirer is informed of this action within the same period.

Other deadlines are established for responding to environmental enquiries from lawyers (10 working days) and mass media (seven working days).

Requests for environmental information

Responses to requests are provided in 15 calendar days from the receipt date. In the case of a refusal to provide information, the requester is provided with a response within five working days from the day of registration of the request. In cases where more time is needed to obtain information from other sources, the deadline may be extended only once, with a maximum of 15 additional days, of which the requester is informed within three working days. The same applies if the requested information is already available online; the requester is informed within three working days and is given the exact location where the information is accessible.

The Ministry of Energy redirects requests that are not under its competence to the relevant competent authority within three working days of the date of receiving the request and, within the same period, the requester is informed of this action.

Responses are provided by default in written form or in electronic format unless another format is specified in the request.

Complaints

Complaints concerning state environmental services are addressed within five working days. Complaints to challenge the action or inaction of governmental officials regarding the provision of environmental information are addressed by a higher authority within 30 working days.

Information refusals

An enquiry or request is refused if the essence of the issue is not stated or is not in line with the 2015 Law on Access to Information, or concerns information with restricted access (designated "for official use"). Grounds for refusal also include an ongoing process following an inspection and an ongoing process of decision-making involving one or several governmental authorities. A response justifying the refusal is then sent within five working days.

The correspondence between the Ministry of Energy and the enquirer is discontinued where a second follow-up environmental enquiry does not contain new facts and arguments and the response already provided contains complete materials on the issue raised. The enquirer is then informed within three working days. Any further enquiries on the same matter are left without any action being taken. The correspondence may be resumed only in the case of provision of new facts and arguments.

Processing procedure

The Ministry of Energy registers oral, written and video enquiries, requests and complaints at the registration desk located in the Ministry's Chancery. This procedure is part of the e-governance system. The Minister or the Vice-Minister in charge of the environment signs off the enquiries and requests to relevant departments and entities to be addressed.

The 231 Population Service Centres across the country provide facilities (terminals) and explain to the public how enquiries and requests, including for environmental information, can be made through the e-governance system. Video cabins are installed where persons with disabilities or the elderly can record their enquiry in a video address. Enquiries related to energy and the environment are then received by the Ministry of Energy.

The Ministry of Energy received 816 enquires (of which 192 related to the environment) in 2016 and 941 (of which 117 related to the environment) in 2017. Most environmental enquiries came from Almaty City and the capital.

Charges

The provision of environmental information is free of charge. Costs related to printing and making copies of the requested information must be covered by the requester. The costs for printing and photocopying are determined by the Government.

The Ministry of Energy provides environmental information free. Since July 2014, environmental information is provided free from the SEIF for individuals and legal entities as a public service.

Kazhydromet provides environmental information free, except data from automatic air quality monitoring stations, for which there is a charge. The cost for 2017 air quality data in Almaty City was 569,408 tenge (more than US$1,700), which is more than 3.5 times the average monthly salary in 2017.

Challenges for passive access

According to NGOs, challenges around the provision of requested environmental information remain, such as the lack of complete and comprehensive information and deviation in the response from the issues raised in a request.

Some NGOs have documented cases when the environmental information was incomplete, not correct or refused without a reason, such as by the Ministry of Culture and Sport (http://esgrs.org/?p=16122, 2017, case No.1), the Committee on Forestry and Fauna of the Ministry of Agriculture (2017, case No. 6), the Department of Public Health (Almaty) of the Committee on Public Health of the Ministry of Health (2017, case No. 9), the Almaty Akimat (2017, case No. 2), the Division of Natural Resources and Nature Use, Almaty (2017, cases No. 3, 4, 7, 10) and the Division of Land Use and Protection Control, Almaty (2017, No. 8).

NGOs point out that governmental authorities commonly create obstacles for requests for information on: sanitary protection zones of hazardous facilities; sanitary and epidemiological results or conclusions for hazardous facilities; EIA; misuse of land plots, including on the territory of national parks; boundaries of land plots, including the boundaries of national parks and protected World Heritage sites; project documentation for a planned economic activity; and cartographic materials containing environmental information. Project information during the process of public consultation is difficult to obtain at the oblast level and in rural areas, as such information is often incomplete or not provided in time.

Overall, the main concerns regarding access to environmental information are the quality and efficiency of provision of such information across the Government and at all governmental levels in the country and the limited involvement of other governmental institutions (beyond the Ministry of Energy) in implementing the Aarhus Convention.

4.4 Public participation in decision-making on environmental matters

NGOs

The number of active environmental NGOs is around 180–200. In 2018, 179 environmental NGOs registered in the electronic database of active NGOs set up by the Ministry of Religious and Civil Society Affairs submitted their annual reports.

According to a review of environmental NGOs in Kazakhstan commissioned in 2017 by the Regional Environmental Centre for Central Asia (CAREC), the work of environmental NGOs has declined in recent years. The main challenges they face are the lack of funding to support their activities and lack of timely information to engage NGOs in environmental activities. Often, such information is circulated only to the Aarhus Centres. Frequently, environmental NGOs engage in other social activities for which they manage to raise funds. The review notes the increasing development of partnerships with business sector entities that sponsor NGOs activities.

Engaging NGOs through state social procurement, grants and awards

A mechanism that enables the outsourcing of activities through partnerships between governmental institutions and NGOs, including environmental ones, in the form of state social procurement, was established in 2005. Additionally, since 2015, the work of NGOs is being supported financially by the Government through grants and awards.

State social procurement increased nearly fivefold in the period 2012–2018, to 19.3 billion tenge in 2018. In 2018, 2,066 projects were planned for implementation. There is, however, a decrease in state social procurement for environmental projects in both the number of projects and their share of social procurement overall, i.e. from 50 projects in 2013 to 30 in 2016 and from 3 per cent of all projects in 2015 to 1.6 per cent in 2016. The Ministry of Energy did not receive any allocation of state social procurement funds for 2018 and, in 2017, it had one of the smallest allocations (9.3 million tenge) among ministries. The majority of state social procurement funds is allocated to local executive authorities (e.g. in 2018, ministries received a total of 543.5 million tenge for 40 projects and akimats received 18.7 billion tenge for 2,026 projects).

About 10 million tenge was allocated for grants for environmental protection in 2017, out of a total of 588 million tenge allocated for grants to NGOs. Grant financing has trebled, compared with 2016. Another 53 per cent increase is foreseen in 2018 with a total of 900 million tenge allocated for grants.

In addition, environmental protection is one of the themes for state awards. In 2017, 68 million tenge was distributed as state awards and, of these, environmental protection received 4.5 million tenge.

Public councils

Public councils were introduced in 2015 to serve as the mechanism for broad public participation in decision-making at all levels of the Government and to enhance state accountability to the public, including on environmental matters. As at November 2017, 229 public councils existed, including 16 at the national level and 16 at the oblast level.

Members of the public are selected on a competitive basis to the public councils and their commissions. The term of a public council is three years. Public councils are engaged in public control. Public control actions consist of four main activities: public monitoring; public hearings; public expertise; and public meetings on reports about governmental institutions' activities aimed at protecting public interests. Members of public councils receive no remuneration. Meetings of public councils are open to the public.

Public Council on Fuel and Energy Complex and Environment

The Ministry of Energy established the Public Council on Fuel and Energy Complex and Environment in February 2016. In 2018, the Council comprised 29 members, including 20 members from public and legal entities, associations and funds and academia, and one citizen. Eight members are from organizations active on the environment, green economy, sustainable consumption and production, climate change and environmental audit.

Five thematic commissions are established. The Commission on Environment consists of 14 members, including three officials from the Ministry and 11 representatives of the public. Representatives of NGOs active in the environmental area also participate in the work of other commissions (e.g. Commission on Nuclear Energy and Commission on Budget, Strategic and Regulatory Framework).

Information about the work and relevant documents of the commissions are posted on the website of the Ministry. Annual workplans and activity reports of the Council are also posted on the website. Every year, the Minister presents a report on activities of the Ministry and the Chair of the Public Council presents a report on activities of the Council.

Other public councils

Other ministries, including those dealing with environmental issues, have also established public councils in 2016–2017. For instance, the Ministry of Agriculture established the Public Council on the Development of the Agro-industrial Complex. Limited information about the activities of this council is available online.

Overall assessment

Public councils represent the regularized frameworks for public participation that are obviously convenient for governmental authorities. Public councils face criticism, however, as they encompass a limited number of NGOs (in addition to governmental representatives and business associations, box 4.1).

Moreover, the scope of activities of the public councils under the Ministry of Energy or the Ministry of Agriculture includes the entire spectrum of activities covered by the relevant ministry, therefore reducing the representation of environmental interests and making them less heard.

Public participation in decision-making on specific activities (projects)

Public participation in decision-making on specific activities (projects) takes place through the EIA mechanism. Public participation in EIA can take two forms: public hearings and, since 2017, public opinion surveys (chapter 2).

Overall, the representatives of NGOs are of the opinion that, while the procedures for organizing public hearings are established, their full and efficient implementation is yet to be achieved. Compliance with legal provisions on organizing and conducting public hearings is not controlled by the governmental authorities. The SEE conclusions are supposed to document how the results of public participation were considered in reaching a decision on the proposed development project, but in practice they do not.

The practical application of legal provisions to ensure effective public participation in decision-making remains a challenge. The "Findings and recommendations with regard to communication ACCC/C/2013/88 concerning compliance by Kazakhstan", adopted by the Compliance Committee under the Aarhus Convention in 2017 in connection with the case on decision-making with regard to the construction of a ski resort in the Kok Zhailau area of the Ile-Alatau National Park, describe the main obstacles to effective public participation. The 2017 Decision VI/8g by the Meeting of the Parties to the Aarhus Convention includes recommendations to ensure compliance with the provisions of the Convention (chapter 2).

The lack of adequate procedures for enabling effective public participation in decision-making on water resources, in particular in rural areas, has been specifically highlighted.

The language barrier, in particular in rural areas, is a bottleneck for active participation by the public. The majority of the Kazakhstan population lives in rural areas but does not get access to project-related information in the Kazakh language.

Although the 2007 Environmental Code provides for the mechanism of public ecological expertise, as of early 2018, only two such attempts had been made. Public ecological expertise is not integrated into the decision-making on projects (chapters 1, 2).

Strategic planning and legislation

Draft laws and regulations, before being sent for approval by other state bodies, are required to be made available for public discussion on the web portal http://legalacts.egov.kz. Draft laws and regulations are posted for public comments within 15 calendar days. The process of monitoring how comments from the public are taken into account is not clear.

Box 4.1: Assessment of public councils' effectiveness as mechanisms for public participation

The study on the public councils carried out by the Kazakhstan Institute for Strategic Studies under the President shows the main trends since the establishment of public councils in 2016–2017 and suggests measures to address the following bottlenecks:

- The representation of the public in the public councils is unbalanced: the representation of young people is limited and older people are overrepresented. Only 25 per cent of members are women. The State is overrepresented and the public is underrepresented.
- The dominant function of the public councils at national level was found to be public expertise, with other functions exercised to a limited extent.
- Public participation by sending requests through local level public councils is rather low. The trends regarding the functioning of the local-level public councils are somewhat similar to those at the national level. In 2016–2017, public expertise was the most frequently exercised form of public control at the local level, whereas public monitoring was the least performed of the functions.
- The availability of websites and email addresses of public councils remains low. Few local public councils have an email address. Materials in the Kazakh and Russian languages are not streamlined (different materials are in one language only). Few public councils use social networks.
- The common portal for the public councils (kazkenes.kz), created by the Ministry of Religious and Civil Affairs to develop capacity of public councils and to raise awareness about their activities, is not used.
- Public opinion on the public councils, which is mainly expressed through mass media, is predominantly negative and sceptical. Public councils are perceived as a tool for filtering environmental activists. In contrast, their members perceive public councils positively.
- Most of the public councils lack a staff unit to maintain records and lack financial support to organize activities.

Public councils are entitled to organize public hearings on draft laws, regulations and other legal acts. The public and relevant stakeholders are to be informed and provided with relevant documentation of such hearings not later than 10 days before the day of the hearing.

Public councils can also carry out public expertise of draft decisions made by governmental bodies. Such expertise is carried out by an expert commission set up upon the decision of a public council. The outcomes of such public expertise are not binding.

The Ministry of Energy consults on drafts of legal and policy documents with other relevant ministries and stakeholders. The drafts are also consulted on with legal entities (22 entities as at March 2018), including a few active in the areas of nature use, environmental audit, waste management, water use, environmental professionals and an association of environmental organizations. Environmental NGOs are not actively consulted. Often, only the Aarhus Centres are included in the distribution list.

GMO-related decision-making

Although the production of GMOs is recognized by the legislation as an environmentally hazardous activity and therefore should be subject to SEE (2015 Order of the Minister of Energy No. 27), in fact, GMO production is not included in the list of activities requiring an EIA, nor is it included in the activities subject to SEE. Thus, there are no mechanisms for public participation in GMO-related decision-making.

The public is not consulted on results of the sanitary-epidemiological expertise on GMO-related issues.

Persecution of environmental activists

There are cases of persecution of environmental activists. The publication "Dangerous work", produced by Crude Accountability and ECO-Forum of NGOs in Kazakhstan in 2017, describes a few cases of criminal punishment of environmental activists who were prosecuted for initiating public protests against changes in the land legislation. It also describes several measures introduced by the Government in 2015–2016 to toughen control over NGO activities and funding sources through increased reporting requirements.

NGO representatives report that while, formally, individuals have the right to participate in meetings, rallies, pickets, marches and demonstrations in the field of environmental protection, in practice, the public expression of protest is propagated by the state authorities and the media as a reprehensible and extremist form of exercising rights. Measures such as dismissal from work, public intimidation, blackmail and persecution of activists themselves and their relatives and friends are used. Some representatives of environmental NGOs who lead environmental litigation in courts indicate that their clients have been persecuted for environmental activities. Some representatives of NGOs, in particular those active at the local level, indicate that there is fear of disseminating environmental information.

4.5 Access to justice

Cases related to environmental protection and access to justice are considered in accordance with the general procedure provided by the 2015 Civil Procedure Code, the 2014 Criminal Procedure Code and the 2014 Code on Misdemeanours. There are no specific procedures for environmental cases.

Separate courts specializing in environmental cases do not exist.

Courts do not have environmental experts.

Judges specializing in environmental cases are very few.

To ensure a harmonized approach by the courts when considering environmental civil cases, the Supreme Court developed detailed norms for the application of environmental legislation (2016 Resolution of the Supreme Court No. 8). To develop the capacity of courts in environmental cases, the Academy of Justice under the Supreme Court organizes training and conferences on the application of environmental legislation in courts.

A court case, including on environmental matters, lasts not more than two months, on average. The duration of the trial in the court of first instance must not exceed one month and, on appeal, two months. However, the judicial practice of some environmental NGOs shows that, taking into account the consideration of the case in the court of first instance, the appellation instance, the cassation instance and the execution of judicial acts, a case can last several years.

Any litigation with the participation of a lawyer is expensive and not affordable for most people, since hiring a lawyer costs about US$800–US$900 per month. In practice, legal aid for members of the public and NGOs to bring environmental cases is provided only by the specialized public organizations.

Environmental NGOs identify the following main impediments to access to justice on environmental matters:

- Lack of a fair trial, especially for cases concerning state institutions or large private companies;
- Lack of uniform application of laws by judges when considering cases brought by the public;
- Poor enforcement of the 2016 Resolution No. 8, which exempts NGOs from payment of state duty (in some cases, courts ask NGOs to pay the state duty);
- Lack of impartial consideration of cases by judges when examining cases about action or inaction by state bodies;
- Long-term non-enforcement of legal acts;
- Lack of an independent judiciary.

There is no independent institution such as an environmental ombudsperson's office or an environmental commissioner, to which members of the public and NGOs could address their complaints related to environmental matters instead of going to court.

4.6 Environmental education and education for sustainable development

The need to integrate environmental and sustainable development issues into education was already recognized in 2002, when the Minister of Education and Science and the Minister of Environmental Protection jointly adopted the Concept of Ecological Education (2002 Order of the Ministry of Education and Science No. 697 and the Ministry of Environmental Protection No. 229-p). However, there is no indication that the Concept has ever been implemented. No concrete implementation plan was developed by the two ministries and no inter-ministerial institutional mechanism was put in place.

Preschool education

The preschool education programme is guided by the state compulsory standard of preschool education and training, updated in 2016. Efforts are now concentrated on putting the updated standard into practice, learning from initial experience and adjusting it as necessary.

The educational area Cognition aims at developing cognitive skills in children, enabling them to understand a holistic picture of the world and use information to find solutions for vital problems. It includes activities with natural and waste materials; enhancing knowledge about objects and phenomena of an animate and inanimate nature; building knowledge about seasonal phenomena; fostering respect for the animal world; and expanding knowledge about plants. Activities under the other four educational areas—Health, Communications, Creativity and Social life—have also integrated principles of sustainable development.

Secondary education system

Environmental issues are considered mainly within the framework of the natural-biological sciences cycle through integrating environmental concerns into the content of individual subjects.

For all levels of the secondary education system, the curriculum has been updated in recent years and includes, to some extent, the issues of education for sustainable development (ESD). The updated curriculum is being introduced gradually; some grades have already transitioned to updated curricula, while others are expected to do so in 2018–2019 or 2019–2020.

<u>Primary education</u>

Primary education consists of four grades (1–4) and includes 6- (or 7-) year-olds to 9- (or 10-) year-olds. Nearly 100 per cent (99.13 per cent) of 7- to 10-year-old children are enrolled in primary education.

The updated primary school education curriculum is guided by the 2015 state compulsory standard for primary education. It includes two themes related to environmental protection and sustainable development: the Natural History theme and subject; and the Man and Society theme with two subjects – Knowledge of the World and Self-knowledge. The number of hours devoted to these themes in the updated curriculum is higher (two hours per week) than it used to be (one hour per week).

<u>Lower secondary education</u>

The lower secondary education programme comprises five grades (5–9) and includes 10- (or 11-) year-olds to 14- (or 15-) year-olds.

For the 5th and 6th graders, environmental and sustainable development education takes place mainly during the Natural Science subject. The Natural Science subject serves as an integrated course for the further study of Biology, Geography, Physics and Chemistry.

Photo 4.3: School Gymnasium No. 58 in the capital

Children learn to have a positive attitude towards the environment and the conservation of environmental balance. The learning process involves the use of interactive teaching methods based on direct involvement of pupils in the discussion, presenting their own points of view and arguments and taking the initiative to make a constructive decision.

In addition to compulsory subjects, students can take elective courses, engage in extracurricular activities and participate in scientific projects, including on issues related to sustainable development and the environment.

Environment, as a separate subject, is taught mainly as part of elective courses. This approach is implemented most effectively in lyceums and other specialized schools with in-depth study of natural science subjects, where special courses of an applied nature and training internships can be organized.

<u>Upper secondary education</u>

The upper secondary education programme comprises two grades (10–11) and includes 15- to 16-year-olds and 16- to 17-year-olds.

Environmental protection and sustainable development topics are integrated across the mandatory subjects and mostly in the subjects of Self-knowledge, Fundamentals of Economics and Business, Kazakhstan in the Modern World and Initial Military and Technological Training. Under the subject Self-knowledge, students are educated to understand their role and involvement in the life of the country, city, village, school and family, and ways of interaction between humans and nature based on universal human values.

Students who study advanced levels of natural and mathematical sciences learn about global and regional environmental problems and principles for the protection of natural resources, consequences of anthropogenic impact on the environment, and the state of the environment in the world and in Kazakhstan.

Those who study advanced levels of social and humanitarian sciences learn about environmental protection and issues related to sustainable development.

Currently, similarly to children in grades 6–9, those in grades 10 and 11 study environment-related issues mainly during Biology, Chemistry and Geography. For instance, within Biology, 11th graders in the advanced natural science-mathematical orientation programme have 20 hours of studying "Inter-relations between the organism and environment. Basics of environmental studies (ecology)". Those in the advanced social-humanitarian direction have 11 hours on the same theme.

Extracurricular activities

Environmental education (EE) is done in the framework of teaching and educational work, amounting to 1–3 hours per year in each class and constituting 30 hours during the 10 years overall of secondary education.

Children learn about the environment and sustainable development by engaging in extracurricular activities, such as participating in Environmental Study Circles and Tourist and Local Lore Study Circles in the framework of the general secondary education schools. In 2017, there were 2,557 Environmental Study Circles attended by 52,115 schoolchildren and 2,050 Tourist and Local Lore Study Circles attended by 40,735 schoolchildren. Compared with 2016, the number of children involved in these two extracurricular activities increased by 13 per cent.

Vocational training

Vocational training is provided in specialized schools, colleges and tertiary colleges for those who completed lower secondary and/or upper secondary education.

Standard education programmes and plans for the two environment-related specializations (Environment and Nature Protection and Environment and Rational Use of Natural Resources) have been developed with the involvement of employers and international experts.

The standard education plans of all specialities contain a mandatory subject, Environment and Sustainable Development. In 2013, two topics were integrated into the subject: "Economic aspects of sustainable development. Green economy and sustainable development. Water resources management" and "Eco-energetics. Strategy of global energy-environmental sustainable development in the 21st century. Renewable energy sources".

Photo 4.4: Award-winning drawing by Egor Kulchev, in the drawing competition "Children Should Have Decent Life in a Healthy Environment", 2018

Post-secondary education

The content of education programmes includes the study of vocational training programmes integrated into modules and of additional modules or subjects of bachelor's education programmes. Colleges, tertiary colleges and specialized schools (culture and arts) provide post-secondary educational programmes. Graduates receive the qualification of applied bachelor (junior engineer).

To a certain degree, general education subjects taught in colleges correspond to grade 11 of upper education, which integrates issues of environmental protection and sustainable development. However, it is not clear if and to what extent ESD and/or EE is integrated into the specialized education of post-secondary institutions, in particular in preparing future teachers and educators.

Higher education

Forty-one higher education institutions, including 15 private institutions, are preparing environment (ecology)-related specialists. There is a system of state orders (grants), whereby a certain number of places are reserved in higher education institutions for the preparation of certain specialities, including environment-related ones. In principle, this system is supposed to ensure a match between specialists graduating from the system and the needs of the economy. However, higher education and, in particular, the environment-related specialities, is facing the challenge of continuously matching the specialities and the number of graduates to the demand from the labour market, which can be unstable and rapidly changing. Furthermore, the challenge is to ensure the availability of competent specialities that would support the transition of the country to green economy.

Environment and Sustainable Development, along with eight other subjects, is part of the elective component of the educational programme. Its inclusion in the education programme depends on the specialization of the higher education institution. Prior to the 2017–2018 school year, the subject was part of the mandatory subjects. It was moved to the elective component because of the transition to a 12-year secondary education system. It is planned that under the new system, in the 12th grade students will study environment and sustainable development (a change that is yet to be implemented).

The L.N. Gumilyov Eurasian National University, located in the capital, has a Faculty of Natural Sciences. The Faculty management is actively promoting diversification of environmental specialities. The new classifier of specialities includes a specialist in eco-audit and an eco-lawyer. Additional specialities promoted for inclusion are environmental health and environmental management.

Training of teachers

In the Abai Kazakh National Pedagogical University located in Almaty, the Institute of Natural Sciences and Geography prepares teachers with bachelor's, master's and PhD degrees within six specialized departments. The Department of Geography and Ecology of Kazakhstan prepares geography teachers and ecologists with a scientific orientation. The bachelor's degree includes specializations in Ecology, Economic and Social Geography (ecology, tourism and basics of economics) and Physical Geography. The Department includes study subjects such as Environment and Sustainable Development, Geo-ecology, Bio-ecology, Human Ecology, Environmental Study, Industrial Ecology and Applied Ecology. The subject of Environment and Sustainable Development is mandatory for all pedagogical and scientific specializations. The Department's scientific work includes research on the fundamentals of developing the national environmental (ecological) primers (abecedary), on solving conceptual issues of the country's innovative development using its ecology and geography, on cleaning the environment of oil pollution by using bio products (e.g. in Aktobe Oblast) and developing effective models of sustainable development of mono-cities (e.g. Tekeli and Zhezkazgan).

Advanced training courses to enhance the skills of teachers of preschool, secondary, additional or supplementary and specialized education are being revised during 2018.

Scientific research

Scientific research on environmental issues is carried out based on financing provided through state grants and targeted programmes. Overall governmental funding of research and development (R&D) activities remains low (chapter 3 and box 11.2).

Scientific research on EE and ESD is done by the Nazarbayev Intellectual Schools (NIS) and by pedagogical universities, such as the Abai Kazakh National Pedagogical University.

Informal and non-formal education

In 2018, there were 1,287 organizations engaged in additional education, including 53 environment-related organizations.

Online environmental-biological magazines for children (“EcoWeek” and “Temirkazyk”) are issued six times per year in the Kazakh and Russian languages with the mission to promote the development of children’s and young people’s scientific, technical, environmental and biological technical creativity. The Ministry of Education and Science’s National Educational and Methodological Centre for Non-formal Education produces and hosts the magazines.

Selected examples of additional education activities include:

- In 2015, the National Educational and Health Centre “Baldauren” organized a Forum of Young Environmentalists, “Save the Green Planet”; in 2016, a Forum of Scientific Projects, “Focus on Eco-World”; in 2017, an Environmental and biological expedition, “EXPO-2017: country of spirituality”; and in 2018, a Children’s environmental forum of young researchers, “Birthplace, fatherland, global citizen”;
- Online environmental contests are organized by the National Educational and Methodological Centre for Non-formal Education through its web portal (www.ziyatker.org), with a view to raising the young generation’s awareness about current environmental concerns and to promote sustainable use of natural resources;
- An essay contest among graduates of schools and colleges on “My contribution to EXPO-2017: Ways to green the economy of Kazakhstan through my future profession” was organized in April 2015 with the participation of children from 76 settlements;
- The water expedition, “Urals” – a tourist-environmental expedition that grew into an environmental movement of youth from West Kazakhstan – is especially popular among schoolchildren. The expedition programme includes: an environment and local lore trip dedicated to “Small rivers of the Urals”; the actions “Clean village”, “Green sail of the Urals” and “Plant your tree, tourist!”; competitions in birding; and an environmental expedition, “West Kazakhstan’s nature monuments”.

4.7 Legal, policy and institutional framework

Environmental monitoring and information

<u>Legal framework</u>

The 2007 Environmental Code provides the legal basis for monitoring the environment and natural resources. The Code addresses the establishment of the USSENRM, which has not yet been implemented. The 2016 Law on Amendments to Legislation related to Environmental Issues introduced the SPRTR to the Environmental Code.

The 2012 Joint Order of the Committee on Statistics No. 202 and the Ministry of Environmental Protection No. 252-P on information interaction provides the legal framework for regular sharing of environmental data between the two agencies.

The 2003 Water Code contains the rules for maintaining state records of water and their use, the state water cadastre and state monitoring of water bodies. These rules detail the procedure for managing the water cadastre as well as for surface water monitoring, and assign Kazhydromet as responsible for the collection, processing and analysis of hydrological monitoring data on surface waters.

Groundwater monitoring is implemented in accordance with the Rules for the implementation of state monitoring of subsoil (2015 Order of the Minister for Investments and Development No. 398) and Instructions on the organization and maintenance of routine observations of the level, pressure, flow rate, temperature and chemical composition of groundwater in the system of the state monitoring of groundwater (2004 Order of the Chairperson of the Committee on Geology and Subsoil Use No. 144-b).

According to the 2009 Code on Public Health and the Public Health System, noise and vibration monitoring fall under the scope of public health protection. The 2015 Orders of the Minister of National Economy on the approval of hygiene norms for physical factors affecting human beings (No. 169) and on sanitary and epidemiological requirements for the establishment of the sanitary protection zone of production facilities (No. 237) provide the legal basis for noise and vibration monitoring. These norms and requirements regulate noise levels in residential areas and workplaces, and clearly define and classify hazardous categories of facilities which might have an adverse impact on the environment and human health, including impacts due to noise and vibrations (in addition to other environmental impacts).

Statistical forms on forestry are approved by the 2015 Order of the Acting Chairperson of the Committee on Statistics No. 231.

The Rules for the Preparation of the National Report on the State of the Environment and Use of Natural Resources (2016 Resolution of the Government No. 673) and Rules for provision of information by central government authorities and local executive authorities for the purposes of the preparation of the National Report (2017 Resolution of the Government No. 13) regulate the production of the annual SoER. All 36 ECE indicators are integrated into these Rules. According to the Rules, data and information in the National Report should be based on official materials submitted by governmental authorities.

Policy framework

Kazhydromet conducts environmental monitoring in the framework of budget programme 039 “Development of hydro-meteorological and ecological monitoring”, subprogramme 100 “Monitoring of the state of the environment”. Environmental monitoring activities in the Aral Sea are carried out in accordance with the work programme “State of Environment and Public Health Monitoring in the Aral Sea Region”, which covers atmospheric air, drinking water and radiation monitoring.

The annual work plan of the department of production of environmental statistics of the Committee on Statistics establishes the framework for the production of environmental statistics in Kazakhstan.

Institutional framework

Kazhydromet is a subordinated organization of the Ministry of Energy. Kazhydromet operates a network of monitoring stations and analytical laboratories, conducts the state environmental monitoring and develops methodological guidance for the network.

Kazhydromet’s Department for Environmental Monitoring coordinates environmental monitoring activities and is responsible for air quality monitoring, monitoring of the state of atmospheric precipitation and snow cover, radiation monitoring, soil monitoring, surface water quality monitoring, and monitoring of pollution in transboundary rivers.

Kazhydromet’s Kyzylorda Branch carries out environmental monitoring activities in the Aral Sea. Kazhydromet also carries out environmental monitoring activities in the Caspian Sea under the scope of the Caspian Sea Environmental Monitoring Programme of the parties to the Tehran Convention.

The Ministry of Energy is responsible for monitoring environmental emergencies and environmental disaster areas. It also organizes activities related to the monitoring of emissions of GHGs and consumption of ozone-depleting substances. JSC Zhasyl Damu is responsible for inventories of emissions of GHGs and ozone-depleting substances, and reports its monitoring results to the Ministry of Energy.

The RSE Information and Analytical Centre of Environment Protection (IACEP) is responsible for gathering environmental information and making it available to the public. It is a subordinated organization of the Ministry of Energy.

Other relevant ministries that provide information on natural resources and the environment, or relevant to the environment, include the Ministry of Agriculture, Ministry of Health, Ministry for Investments and Development and Ministry of National Economy.

The RSE “Scientific and Production Centre for Land Cadastre” carries out land monitoring in the framework of the State Land Cadastre. It reports to the Ministry of Agriculture.

Under the Ministry of Agriculture, the Committee on Water Resources carries out monitoring of water bodies and their use; the Committee on Forestry and Fauna carries out the monitoring in specially protected natural areas, monitoring of mountain ecosystems and desertification, and monitoring of fauna and flora. The RSE “Kazakh Forest Inventory Enterprise” carries out forest monitoring and reports to the Committee on Forestry and Fauna.

The Committee on Geology and Subsoil Use of the Ministry for Investments and Development carries out monitoring of subsoil resources (including groundwater monitoring).

The Ministry of Health, through its Committee for the Protection of Public Health, carries out sanitary and epidemiological monitoring, as well as noise and vibration monitoring.

The Ministry of Energy organizes environmental monitoring of military test ranges and of space industry activities.

Access to information, public participation and access to justice

Legal and policy framework

The 2015 Law on Access to Information regulates the provision to the public of information, including environmental information.

The 2007 Environmental Code was amended in 2015 to require that state bodies and officials provide open access to environmental information, including at the request of individuals and legal entities. Access to information was further expanded in 2016 by amending the Code to increase the transparency of environmental financing through online provision of information related to budget revenues from payment for environmental emissions and from recovery from damage caused to the environment and fines for violation of environmental legislation. Budget expenditures for environmental protection measures are also to be provided on open access.

The 2007 Law on Procedure of Consideration of Requests of Individuals and Legal Entities, the Law on Access to Information and the Environmental Code regulate enquiries and requests for environmental information from the public.

The 2015 Law on Public Councils regulates the establishment of public councils and their work. The Law lacks provisions on the procedure for financing the activities of public councils.

The 2014 Criminal Procedure Code, the 2015 Civil Procedure Code, the 2014 Code on Misdemeanours and the 1997 Law on Advocacy provide the framework for legal aid for members of the public and NGOs in relation to their exercising their rights in the courts in environmental criminal and civil cases, and cases of administrative offences.

The 2015 Rules for the transfer of information to official information of limited distribution and working with it (2015 Government Resolution No. 1196) regulate the official information with restricted access.

The 2016 Resolution on some issues of application by the courts of the environmental legislation of the Republic of Kazakhstan in civil cases No. 8 adopted by the Supreme Court aims to ensure the uniform application by courts of the environmental legislation in civil matters.

No specific policy document exists in the area of access to information and public participation in environmental matters.

The current stand of Kazakhstan vis-à-vis target 16.10 of the 2030 Agenda for Sustainable Development is described in box 4.2.

Institutional framework

The Ministry of Energy and its subordinated institutions (in particular, Kazhydromet, the IACEP) and the Ministry of Agriculture, are key institutions in ensuring access to environmental information. The Ministry of Energy outsources to the IACEP services related to developing, managing and disseminating environmental information, including developing and maintaining the SEIF and SPRTR. The Ministry of Energy is also the lead institution mandated to enable and ensure effective public participation in decision-making on environmental matters. The Department of Strategic Planning of the Ministry of Energy is in charge of consulting on drafts of legal and policy documents with other relevant ministries and stakeholders.

The Ministry of Religious and Public Affairs is responsible for policies and activities with regard to civil society, including environmental NGOs. It supports the organization of a Civic Forum every two years.

The Ministry of Justice should be the main institution enabling effective access to justice on environmental matters. In practice, the Supreme Court is taking the lead on this matter. The Academy of Justice under the Supreme Court, jointly with the training centres of the Supreme Court and oblasts and other courts, the OSCE Programme Office in Astana and the Aarhus Centres at local level, organizes interactive training sessions, workshops, round tables and conferences on the application of environmental legislation in courts. Particular attention is given to the study of the provisions of the Aarhus Convention. Monthly round tables are organized by the Academy with the participation of judges, NGOs, the Ministry of Energy and the Ministry of Justice. About four workshops for judges are held annually at the national and oblast levels. Every six months the judges meet by video conference to discuss issues, including those related to environmental cases.

The General Prosecutor's Office monitors compliance with the legal requirements on passive access to information. Its Committee on Legal Statistics and Special Records maintains statistical reports on the activities of the courts, including information on crimes and administrative offences relating to environmental protection.

An advisory Commission on Access to Information was established in 2015. In 2016, the Commission was abolished and another Commission on Access to Information was established. In 2018, the composition and oversight of the Commission was revised. It includes 24 members, including ministers, vice-ministers, parliamentarians, department directors and other governmental officials, together with 10 representatives of civil society. The role of the Commission is to consider and protect the public interest in accessing information. It is not clear whether the Commission is operational and what role it plays in overseeing compliance in providing environmental information to the public.

At the local level, local executive (akimats) and representative (maslikhats) authorities are required to ensure access to environmental information. No assessment is available on whether such access is ensured in practice.

Public councils are established as advisory and consultative bodies to governmental authorities. National-level public councils are established under the ministries and other central executive authorities that are not part of the Government and authorities subordinated to the President. Local-level public councils are hosted by akimats and maslikhats. Functions of the public councils include representation of the public in decision-making processes, development of cooperation between the public authorities and civil society and the exercise of public control. The public councils do not yet effectively fulfil their public control function.

No environmental ombudsperson exists in Kazakhstan. There has been an ombudsperson for human rights in Kazakhstan since 2002 but the office has a limited role in protection of citizens' environmental rights. In 2017, only one of a total of 1,474 complaints received by the ombudsperson for human rights referred to the right to a healthy environment (in 2016, none of the 1,785 complaints did so). In 2015, the Special rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes recommended that the office of the ombudsperson for human rights in Kazakhstan should increase its activities to address human rights issues related to hazardous substances and wastes.

The Aarhus Centres have been established throughout the country with a view to promoting the three pillars of the Aarhus Convention. Their activity is declining due to the lack of funding.

One of the most active NGOs in the area of access to justice on environmental matters is the Ecological Society "Green Salvation" based in Almaty. It is engaged in about 10 environmental legal cases and provides about 200 legal consultations annually.

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

Box 4.2: Target 16.10 of the 2030 Agenda for Sustainable Development

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Target 16.10: Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

The establishment of the enabling framework for the implementation of Goal 16 in the environmental area is yet to be completed. Goal 16 is well supported by the current legislative framework. Its enforcement and practical implementation on environmental matters, with the active involvement of the public, remains a challenge to be addressed.

Target 16.10, measured by indicator 16.10.2 (Number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information), among other measures, is implemented through the 2015 Law on Access to Information. The Law covers environmental information and stipulates that such information should not be restricted. The Ministry of Energy is the state institution in charge of enabling access to environmental information. The adequate implementation of the Law in practice remains challenging, in particular with regard to restricted information.

The other aspect of this target refers to persecution of journalists, the media and activists. While no data exist in Kazakhstan on the global indicator 16.10.1 (Number of verified cases of killing, kidnapping, enforced disappearance, arbitrary detention and torture of journalists, associated media personnel, trade unionists and human rights advocates in the previous 12 months), cases of persecution of activists for their environmental activities do exist. Such cases are evidence that this matter requires urgent attention.

Environmental education and education for sustainable development

Legal and policy framework

The 2007 Law on Education regulates the education system.

The Strategic Plan of the Ministry of Education and Science for 2017–2021 (2016 Order of the Minister of Education and Science No. 729) sets out activities to implement the state education and science policy ensuring the development of the national intellectual potential with a view to joining the 30 most developed countries. The Plan's vision is to develop a system of education to function as a main driver of the development of the national economy and integrating the international educational dimension. The Strategic Plan includes activities for the promotion, integration and capacity development of the updated content of the education programme.

There is no policy document on ESD. The 2002 Concept of Ecological Education (2002 Order of the Ministry of Education and Science No. 697 and the Ministry of Environmental Protection No. 229-p) has never been supported by an action plan with concrete implementation activities.

The current stand of Kazakhstan vis-à-vis targets 4.7 and 12.8 of the 2030 Agenda for Sustainable Development is described in box 4.3.

Institutional framework

The Ministry of Education and Science is the main institution in charge of education. However, ESD is not explicitly mentioned in its mandate or in its strategic documents. There is no employee assigned to deal with ESD or EE. The Ministry of Education and Science cooperates with the Ministry of Energy in the development of materials to integrate green economy principles into the education system, including by organizing environment days, "green" classes and project-based activities under the theme "Green means thrifty". The Information and Analytical Centre established in 2011 at the Ministry of Education and Science is a subordinated agency of the Ministry that provides data and analytics on educational practices in the country.

The Nazarbayev Intellectual Schools developed and tested the updated content of the education programme. NIS is also developing scientific and practical films for children's development with a focus on greening the country's economy.

The National Academy of Education serves as a scientific-pedagogical and methodological support for the development of the national education system, considering the best domestic and international practices. The Academy is involved in the implementation of the updated curriculum. The Academy, in cooperation with the Ministry of Education and Science, is preparing and issuing annually the Instructive and Methodological Letter containing objectives and targets for each subject for the study year.

Each oblast and major city has a department of education in charge of schools and other educational institutions.

The Independent Agency for Ensuring Quality Education is a non-governmental institution to improve the quality of education and competitiveness of Kazakhstani educational institutions at the national and international levels. The Agency develops and promotes systems and processes to ensure quality education in line with European and international standards.

CAREC is actively promoting ESD, including organizing conferences, capacity-development workshops and training for governmental officials and representatives of NGOs, the private sector and academia.

4.8 Participation in international agreements and processes

Environmental monitoring and information

Kazakhstan participates in the work of the CIS Statistical Committee and the CIS Interstate Council for Hydrometeorology, and in the corresponding exchange of data and information, including on environmental statistics, notably on water, emission of air pollutants and investments in environmental protection, and on specially protected areas. For regular information exchange, forecasting and monitoring of natural disasters, Kazhydromet exchanges operational and forecast information with neighbouring countries.

Box 4.3: Targets 4.7 and 12.8 of the 2030 Agenda for Sustainable Development

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Target 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development

Goal 12: Ensure sustainable consumption and production patterns
Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

Targets 4.7 and 12.8 are measured by similar global indicators (4.7.1 and 12.8.1), assessing the extent to which (i) global citizenship education and (ii) ESD, including gender equality, human rights and climate change education, are mainstreamed at all levels in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment.

The Information and Analytical Centre of the Ministry of Education and Science proposes four alternative internal indicators to be introduced, namely, proportion of: higher education students involved in socially useful activities; young people participating in voluntary activities; children who transitioned to the updated curriculum based on the NIS experience; and teachers who undertook training to enhance their professional skills on the updated curriculum. Administrative data, data in the information system NEBD (an automated collection of statistics of preschool, primary, secondary education and vocational training institutions) and data in the Unified System for Higher-education Management (ЕСУВО) will serve as information sources.

In 2017, the Information and Analytical Centre of the Ministry of Education and Science prepared an analytical report for developing proposals for implementing Goal 4 and its targets through programmes and an action plan of the Ministry of Education and Science. Reference is not made to the ECE Strategy for ESD and activities under its framework. According to the Information and Analytical Centre, Kazakhstan is at various stages of implementation of seven strategies to achieve target 4.7 that are included in the "SDG-4 Education 2030 Framework for Action" prepared under the auspices of UNESCO.

Developing policies and programmes to promote ESD and global citizenship education (GCED) and bringing them into the mainstream of formal, non-formal and informal education through system-wide interventions, teacher training, curricular reform and pedagogical support is at level 3 of implementation, i.e. these two issues are somewhat integrated in various national education strategies and programmes.

Two other strategies, providing learners of both sexes and of all ages with opportunities to acquire, throughout life, the knowledge, skills, values and attitudes that are needed to build peaceful, healthy and sustainable societies, are being implemented (level 4).

Two strategies are at the expert discussion level (level 2) – developing and disseminating good practices on ESD and GCED within and between countries to better implement education programmes and enhancing international cooperation and understanding, and promoting participatory programmes for learners and educators related to ESD and GCED to engage in their communities and society.

Two strategies – supporting the development of systems for ESD and GCED to assess cognitive, socio-emotional and behavioural learning outcomes, to ensure ESD and GCED at all levels and in all forms of education – are at level 1, i.e. do not yet have a normative framework for their implementation.

Formally, the Ministry of Education and Science is not in charge of target 12.8. Given that the two targets (4.7 and 12.8) and their indicators are rather similar, it would be effective to assign the Ministry of Education and Science the lead role in implementing target 12.8 in close cooperation with the Ministry of Energy, Ministry of Economy and other relevant ministries and stakeholders.

Overall, with the implementation of the updated curriculum, Kazakhstan is on a good track to achieve targets 4.7 and 12.8, concerning integrating ESD into (a) national education policies and (b) curricula at the preschool, primary and secondary levels of education. Work remains to be done regarding integrating it into (c) teacher education and (d) student assessment, as well as enhancing its integration into vocational training and higher education. Integrating ESD into in-service training of teachers at all levels is also required. However, the lack of adequate resources is an impediment for the achievement of progress in this area. Kazakhstan should support the implementation of ESD with adequate human and financial resources.

Photo 4.5: Award-winning drawing by Kirill Maksimov, in the drawing competition "Children Should Have Decent Life in a Healthy Environment", 2018

Kazakhstan is a member of the Eurasian Economic Union (EEU). Although environmental cooperation and the exchange of environmental information are not among the EEU's priorities, the country participates in sectoral and statistical cooperation within its framework and in the relevant exchange of information, some of which is of environmental importance. Similarly, Kazakhstan participates in the cooperation and exchange of statistical and sectoral information within the framework of the Economic Cooperation Organization (ECO) bringing together the countries of Central Asia and the Middle East.

The Ministry of Energy and the Committee on Statistics participate in the work of the ECE Working Group on Environment Monitoring and Assessment and the ECE Joint Task Force on Environmental Statistics and Indicators. Through the Committee on Statistics, Kazakhstan has a leading role in the ECE Joint Task Force, being its chair for several years in a row.

The Committee on Statistics also collaborates regularly with OECD processes related to the implementation of the System of Environmental-Economic Accounting (SEEA) and the production of green growth indicators.

Access to information, public participation and access to justice

Kazakhstan has been a party to the Aarhus Convention since 2000. The country is not participating in the 2005 Almaty Amendment on GMOs to the Aarhus Convention and the Protocol on PRTR. The country actively participates in activities under the Aarhus Convention and submits the national implementation reports regularly. Kazakhstan also cooperated with the Compliance Committee of the Aarhus Convention in a constructive manner.

The Ministry of Energy, through the IACEP, cooperates with OSCE on matters related to the implementation of the Aarhus Convention, such as establishing Aarhus Centres, amending the legislation and conducting capacity-building activities.

Kazakhstan cooperates with the OECD on assessing the country's administration system, including on open government and on public administration reform.

Environmental education and education for sustainable development

Kazakhstan submitted the first national implementation report for the 2005 ECE Strategy for ESD in 2007 and the second in 2010. The country did not submit a third national implementation report in 2015. Neither did it submit its report, due in October 2018, in the framework of the fourth cycle of the mandatory national implementation reporting (2017–2019).

Up until the major institutional restructuring of 2014, the Ministry of Environment and Water Resources and the Ministry of Education and Science had the status of national implementing authorities for the ECE Strategy for ESD and, by default, for ESD. It is not clear whether the ESD mandate has been transmitted to the Ministry of Energy and who exactly in the Ministry of Energy is in charge of this issue. In recent years, Kazakhstan has curtailed its participation in activities under the ECE Strategy for ESD.

Kazakhstan is engaged in the activities to implement Goal 4 of the 2030 Agenda for Sustainable Development under the leadership of UNESCO and cooperates actively with the UNESCO Asia and Pacific Regional Bureau of Education based in Bangkok.

4.9 Assessment, conclusions and recommendations

Assessment

Environmental monitoring and information

The environmental monitoring network run by Kazhydromet covers core environmental themes, and good progress in the development and expansion of the monitoring infrastructure has been made since 2008. In particular, the air quality and surface water quality monitoring networks have been significantly expanded in terms of number of monitoring stations and parameters being monitored. In addition, both air and surface water quality monitoring activities are systematically adapted to/revised in line with high pollution episodes, through supplementary monitoring campaigns. Current plans include provisions for further expanding the number of air quality monitoring stations as well as hydrological stations. However, biodiversity and forest monitoring activities led by the Committee on Forestry and Fauna of the Ministry of Agriculture and its monitoring capacities are currently insufficient.

While, in 2008, only very limited environmental monitoring data and information were published on the website of Kazhydromet (and only on environmental monitoring in the Kazakh part of the Caspian Sea), it is now publishing online all its environmental monitoring information bulletins. In addition, the AirKz app for mobile phones and tablets provides users with official real-time data on air quality, along with basic information on parameters monitored and air pollution effects on human health. Overall, there has been a substantial increase in the online provision of public access to environmental monitoring data and information collected by Kazhydromet.

Some progress has been made in terms of development of databases and environmental information management systems. At the same time, the establishment a Unified State System for Environmental and Natural Resources Monitoring is still work in progress, in spite of some developments such as the State Cadastre on Waste and the efforts towards online management and sharing of PRTR information. Nonetheless, full development and establishment of a Unified State System for Environmental and Natural Resources Monitoring is still pending due to the lack of financial resources.

The annual national SoER is a very detailed and dense report of approximately 500 pages with few data visualizations, which limits its outreach to the public. To address this limitation, in April 2018, the IACEP finalized an online interactive version of the 2016 edition of the SoER.

Kazakhstan has a solid system for the production of environmental statistics and indicators and, in general, promotes the SEIS principles of open access to data and use of data for multiple reporting purposes. However, opportunities remain for further improving application of the SEIS principles of open access to environmental data.

Access to information, public participation and access to justice

Since 2008, Kazakhstan has improved access to environmental information by amending its legislation and starting to put it into practice. The main implementation challenge is to set up effective user-friendly mechanisms that will meet the public's actual needs and facilitate access to environmental information. There is much room for improvement with regard to dissemination of environmental information via the Internet and other electronic tools. The main problem is the quality and efficiency of providing environmental information upon request across the Government (beyond the Ministry of Energy and its subordinated institutions) and at all levels of government in the country.

The country is progressing with ensuring effective public participation on environmental matters. The introduction of advisory public councils in 2015 is an important achievement. However, the effectiveness of this instrument in terms of ensuring adequate representation of public interests is not sufficient. Public councils are sometimes viewed as a silver bullet that can be used as a replacement for the entire spectrum of instruments for public participation. Other challenges include enabling effective public participation in decision-making on projects and providing opportunities for public participation in GMO-related decision-making, in particular on the deliberate release into the environment and the placing on the market of GMOs.

Access to justice on environmental matters is prominently promoted by the Supreme Court but still has to be advanced further to cover the entire judicial system in the country.

Environmental education and education for sustainable development

EE is integrated well into preschool and overall secondary education. Recent updates of the education curricula, which now include ESD issues to some extent, are a good foundation for further work to enhance the integration of sustainable development issues into educational system at all levels.

With the implementation of the updated curriculum, Kazakhstan is on a good track to achieve by 2030 targets 4.7 and 12.8 of the 2030 Agenda for Sustainable Development concerning integrating ESD into (a) national education policies and (b) curricula at the preschool, primary and secondary levels of education. Work remains to be done regarding integrating it into (c) teacher education and (d) student assessment. Integration of ESD into vocational training and higher education, as well as into in-service training of teachers, is still insufficient.

There is no specific strategy on ESD or an implementation plan, and neither is there an inter-ministerial institutional mechanism, to support the coherent, effective and continuous implementation of ESD. No adequate human and financial resources are allocated in the country to support the implementation of ESD.

Conclusion and recommendations

Air and surface water monitoring

While the air quality monitoring network has been significantly expanded in terms of number of monitoring stations and parameters being monitored, there are still opportunities for improving the network, particularly regarding the density of automatic air quality monitoring stations in large urban areas and industrial areas. Similarly, the surface water monitoring network run by Kazhydromet could be made more effective through increasing the number of portable laboratories.

Recommendation 4.1:
The Ministry of Energy should continue developing and expanding the state environmental monitoring network run by Kazhydromet, particularly with regard to further increasing the density of automatic air quality monitoring stations in large urban areas and industrial areas, and the number of mobile laboratories for monitoring surface water quality.

Information on air quality

The new AirKz app developed by Kazhydromet provides users with basic information on both the parameters monitored and air pollution effects on human health. However, it does not provide users with recommendations on what to do in the case of specific air pollution levels, nor does it include health risk maps or other related information, since these are the responsibility of the Ministry of Health. In addition, non-official measurements conducted both through informal sensor networks and by local executive authorities have been challenging the effectiveness of official air quality monitoring results in alerting the population to high air pollution levels.

Recommendation 4.2:
The Ministry of Energy and the Ministry of Health should:

(a) Engage relevant local executive authorities and civil society initiatives towards improving the effectiveness of air quality information in alerting the population to episodes of high air pollution levels, complementing this, if necessary, with additional measurements and relevant citizen science initiatives (promoting public engagement and adherence to monitoring standards at the same time);
(b) Strengthen efforts and initiatives on the use of air quality information to raise public awareness on urban air pollution, including through additional campaigns, sharing of

online air quality information through billboards and providing support to the further development of the AirKz app initiative to provide users with information and recommendations on what to do in the case of specific air pollution levels.

Improved availability of information

The Unified State System for Environmental and Natural Resources Monitoring in Kazakhstan, as per provisions of the 2007 Environmental Code, is not established. The SEIS principles of open access to environmental data are fully not applied, in particular, with regard to the provision of public access to the SEIF database (in terms of direct online access to data rather than metadata only), and with regard to the finalization and full operationalization of the SCNR and online SPRTR. These will be instrumental in improving the effectiveness of relevant agencies in the timely sharing of actionable environmental information, while at the same time promoting public access to environmental information. Also, opportunities remain for increasing public outreach of the findings of the annual SoER.

Recommendation 4.3:
The Government should:

(a) *Accelerate the development of the Unified State System for Environmental and Natural Resources Monitoring;*
(b) *Further develop and improve the content and online access to the database of the State Environmental Information Fund, natural resource cadastres, State Cadastre on Waste and State Pollutant Release and Transfer Register (SPRTR), to bring them together into the Unified State System and make the information available to the public;*
(c) *Enhance public outreach of the annual national state of the environment report in both the Kazakh and Russian languages through the use of interactive tools for enhanced data visualization supported by online portals.*

State Pollutant Release and Transfer Register

The SPRTR established by Kazakhstan provides a solid basis and a sizable opportunity for the country to use the good examples of PRTRs developed by other countries, including OECD Member countries, in order to improve its use of the PRTR instrument. It is important to ensure that the SPRTR embraces recent technological developments and plays an effective role as a single window access point for industry and for authorities to fulfil various national reporting obligations and the reporting obligations of Kazakhstan under MEAs and the Sustainable Development Goals, therefore reducing the overall reporting burden for the authorities and enterprises. It is also important to ensure that the SPRTR enables using the outcomes of the reporting in an integrated way for different purposes. Since the PRTR systems very much depend on technological developments, it is crucial to ensure that new projects and activities regarding the SPRTR in Kazakhstan take into account the recent technological developments, foresee possible future software/technical updates and are sustainable over a long period of time.

A well-functioning SPRTR and accession of Kazakhstan to the Protocol on PRTRs would give a clear signal to large polluting industries to be transparent about their emissions and would guarantee public access to the data on emissions. Furthermore, growing public awareness can generate preparedness by the industry to install adequate air pollution reduction equipment based on BAT and to look for cleaner technological processes. Enhancement of the existing SPRTR would also be in line with the OECD’s 2018 Recommendation of the Council on Establishing and Implementing Pollutant Release and Transfer Registers (PRTRs) (OECD/LEGAL/0440).

Recommendation 4.4:
The Government should:

(a) *Accede to the Protocol on Pollutant Release and Transfer Registers under the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters;*
(b) *Provide sufficient human and financial resources to continue developing and maintaining the State Pollutant Release and Transfer Register (SPRTR), in particular to enable the introduction of online reporting, integration with other relevant databases and improvement of data dissemination through the online portal;*
(c) *Encourage learning from international experience and good practices on establishing Pollutant Release and Transfer Registers (PRTRs) through expert assistance and participation in capacity-building activities under the Protocol on PRTRs;*
(d) *Improve the SPRTR to become a single-window access point for industry and for governmental authorities to fulfil different national and international reporting obligations and to use the outcomes of the*

reporting in an integrated way for different purposes;

(e) Raise enterprises' awareness of reporting obligations and capacity to report.

Environmental indicators

While 36 of the full list of 42 ECE environmental indicators are regularly calculated in Kazakhstan and made publicly available online by the Committee on Statistics, with metadata information for 20 indicators, there is a need to strengthen human and financial resources in order to produce and share online the full set of 42 ECE environmental indicators along with the complete metadata information (brief description and explanation of the indicator, information on methodology used and units, brief interpretation of data flows and trends, etc.). Also, the set of OECD green growth indicators and full implementation of SEEA accounts are not completed due to limited human resources for the production of environmental statistics and environmental-economic accounting.

Recommendation 4.5:
The Government should provide sufficient human and financial resources in order for the Committee on Statistics to produce and share online the full set of 42 ECE environmental indicators along with the complete metadata information, and to complete and publish the full set of OECD green growth indicators, as well as fully implement the System of Environmental-Economic Accounting (SEEA) accounts.

Production of waste indicators

Challenges remain regarding the collection of reliable data for the regular production of waste indicators and capacities for the production of waste statistics at national and oblast levels, which are insufficient.

Recommendation 4.6:
The Committee on Statistics of the Ministry of National Economy, in cooperation with other ministries and agencies, should address existing gaps in waste data collection and production of reliable and actionable/useful waste indicators and build capacities for the production of waste statistics at the national and oblast levels.

Access to information

The availability of environmental information on the websites of the main governmental authorities mandated to work in the environmental area – the Ministry of Energy and the Ministry of Agriculture – is poor. Provision of environmental information through the Internet is done by the IACEP under the Ministry of Energy by means of several dedicated websites. Although such practice is not a shortcoming in itself (since environmental information is actually made available by the IACEP), poor visibility of environmental information and lack of opportunities for the public to access it on the websites of the Ministry of Energy and Ministry of Agriculture signal the inadequate level of attention given to environmental issues by these ministries. The websites of local governmental authorities contain little environmental information, and the poor quality of the information provided remains another challenge to be addressed.

The Ministry of Energy provides environmental information free. Since 2014, environmental information is provided from the SEIF as a free public service. However, as evidenced by the example of Kazhydromet, charges for supplying environmental information outside the free public service of provision of environmental information may be quite high.

Key challenges with regard to provision of environmental information upon request include the provision of incomplete and incomprehensive information and deviation in the response from the issues raised in a request. NGOs have documented cases in which the environmental information was incomplete, not correct or refused without a reason. Adequate implementation of the 2015 Law on Access to Information is crucial for Kazakhstan to progress towards the achievement of target 16.10 of the 2030 Agenda for Sustainable Development in relation to environmental information.

The network of 14 Aarhus Centres established in the country to promote all three pillars of the Aarhus Convention, which played an important role in facilitating access to environmental information, experiences serious difficulties in continuing to function, due to changes in the budget allocation to support the Centres' operation.

Recommendation 4.7:
The Government should ensure that:

(a) The provision of environmental information on the websites of central and local environmental authorities is enhanced by being timely, regular and easy to access, and in forms and formats that meet the needs of different users with appropriate multi-query search and geographical reference functions;

(b) Charges for supplying environmental information outside the free public service of

provision of environmental information, if applicable, do not exceed a reasonable amount and do not constitute a barrier to access to environmental information;

(c) *The possible grounds for refusal of a request for environmental information are interpreted in a restrictive way, taking into account the public interest served by the disclosure and the aims and the objectives of the Aarhus Convention;*

(d) *There is regular training for public officials responsible for various aspects of access to environmental information, including decision-making on disclosure of environmental information.*

Public participation

Persecution of activists for their environmental activities does occur in Kazakhstan, hampering the activities of environmental NGOs and activists. Prevention of such cases requires urgent attention by Kazakhstan as a party to the Aarhus Convention and to achieve progress with target 16.10 of the 2030 Agenda for Sustainable Development.

Public participation procedures function, but their full and efficient implementation is yet to be achieved. Compliance with legal provisions on organizing and conducting public hearings is not controlled by the governmental authorities. Public participation in law-making and policymaking takes place but the process of monitoring how comments from the public are taken into account is not clear. The 2017 Decision VI/8g by the Meeting of the Parties to the Aarhus Convention includes recommendations to the country to ensure compliance with the Convention.

Public councils represent the regularized frameworks for public participation that are convenient for governmental authorities. However, they face criticism in terms of their representativeness and efficiency of their work, especially with regard to exercising the public control function. The scope of activities of the public councils under the Ministry of Energy or the Ministry of Agriculture includes the entire spectrum of activities covered by the relevant ministry, therefore reducing the representation of environmental interests and making them less heard.

Recommendation 4.8:
The Government should:

(a) *Take urgent measures to build the capacities of public authorities to prevent persecution of environmental activists for exercising their rights and ensure safe reporting and independent and impartial investigation of such cases;*

(b) *Ensure translation of the Maastricht Recommendations on Promoting Effective Public Participation in Decision-making in Environmental Matters into the Kazakh language and its distribution to public authorities at the national and local levels and to relevant stakeholders;*

(c) *Ensure the organization of training on public participation procedures based on the Maastricht Recommendations for different target groups (public authorities, developers, etc.);*

(d) *Implement Decision VI/8g on compliance by Kazakhstan with its obligations under the Aarhus Convention;*

(e) *Improve the effectiveness of public councils, especially those with a mandate to consider environmental issues.*

See Recommendation 2.2.

Amendment on GMOs

Kazakhstan is not a party to the 2005 Almaty Amendment on GMOs to the Aarhus Convention. Participation in the Amendment is a way to ensure opportunities for the public to participate in decision-making on the deliberate release of GMOs into the environment and their placement on the market, thereby widening the application of the Convention's public participation pillar and increasing the quality of decision-making on GMOs.

Recommendation 4.9:
The Government should ratify the Almaty Amendment on genetically modified organisms to the Aarhus Convention and take the legislative, institutional and technical measures to implement its provisions.

Access to justice

The Academy of Justice under the Supreme Court organizes training and conferences on the application of environmental legislation in courts. Despite progress achieved, there are still very few judges specializing in environmental cases. Courts do not have environmental experts.

Costs of litigation on environmental issues with the participation of a lawyer are not affordable for most people. In practice, legal aid for members of the public and NGOs to bring environmental cases to courts is provided only by the specialized public organizations.

Recommendation 4.10:
The Ministry of Justice should:

(a) In cooperation with the Supreme Court and the Ministry of Energy, enhance training and development of the expertise and capacity of judges, lawyers and other legal personnel on environmental matters;
(b) Strengthen judicial specialization in environmental law and the capacities of courts in using independent environmental expertise;
(c) Take measures to improve access for members of the public to legal aid in environmental matters.

Institutional framework for ESD

ESD is not explicitly mentioned in the mandate of the Ministry of Education and Science, which is responsible for the overall education system and policies. It is not clear whether the responsibilities for ESD and the mandate to participate in the activities in the framework of the ECE Strategy for ESD passed to the Ministry of Energy from the former Ministry of Environment Protection and Water Resources in 2014. In recent years, Kazakhstan has not been active in the activities under the ECE Strategy for ESD.

Kazakhstan does not have a strategy or an action plan for implementing ESD at all levels of education and across governmental institutions. The country does not have an ESD coordination mechanism. The lack of adequate human and financial resources for the implementation of ESD is clearly felt. These institutional drawbacks impede progress in achieving targets 4.7 and 12.8 of the 2030 Agenda for Sustainable Development.

Recommendation 4.11:
The Government should:

(a) Assign a clear mandate to the Ministry of Education and Science to implement education for sustainable development (ESD) in close cooperation with the Ministry of Energy and other stakeholders;
(b) Ensure that ESD is integrated into the relevant strategic documents and allocate adequate financial resources for the development and promotion of ESD;
(c) Establish a multi-stakeholder coordination mechanism for ESD;
(d) Ensure the active participation of the country in ECE regional activities on ESD.

Upper secondary education, vocational training and higher education

The subject Environment and Sustainable Development used to be mandatory in the first year of higher education. It was discontinued on the assumption that it will be introduced in the 12th grade of upper secondary education, which is planned in the future but not yet implemented. It is now part of the elective subjects.

The biggest challenge in general for higher education and, in particular, for the environment-related specialities is to continuously match the specialities and the number of graduates to the demand from the labour market. Another challenge is to ensure the availability of competent specialities that would support the transition of the country to green economy.

Recommendation 4.12:
The Ministry of Education and Science should:

(a) Make the subject Environment and Sustainable Development mandatory in upper secondary education, vocational training and higher education;
(b) In cooperation with the Ministry of Labour and Social Protection of Population and the Ministry of Economy and in consultation with higher education institutions, continuously identify the needs of the labour market and adapt and diversify environmental specializations accordingly.

Teacher training

Following the introduction of updated curricula for several levels of education, which include issues of sustainable development to some extent, teachers, school managers and educators are trained on the updated curriculum. However, dedicated training on ESD is not effectively put into practice. Insufficient integration of ESD into teacher education is among the weak links for the achievement by Kazakhstan of targets 4.7 and 12.8 of the 2030 Agenda for Sustainable Development.

Recommendation 4.13:
The Ministry of Education and Science should include dedicated training on ESD in the training of teachers on the updated curricula.

Chapter 5

CLIMATE CHANGE

5.1 Current and foreseeable environmental and economic impacts from climate change

Environmental impacts from climate change

Weather

Kazakhstan has a continental climate with hot summers, hard winters (strong blizzards and high winds) and limited precipitation. Due to its vast territory and diverse geography, weather patterns are different throughout the country. The northern steppe has long and cold winters, with strong winds, while the desert and semi-arid central and western regions (about 45 per cent of total land area) have long, hot summers, cold winters and high aridity.

January is the coldest month, with temperatures moving from an average of -20°C in the north to -5°C in the extreme south. July is the warmest month, ranging from an average 18°C in the north to 29°C in the south.

Historical climate trends observed between 1941 and 2015 provide a framework for consideration of current and future climate conditions in Kazakhstan. The annual air temperature in Kazakhstan increased by an average 0.28°C every 10 years during this period:

- The highest temperature rise occurs in spring and autumn, by +0.30°C every 10 years, while in winter the value is +0.28°C every 10 years;
- The lowest temperature rise takes place in summer, by + 0.19°C every 10 years.

According to the 2017 USAID fact sheet "Climate Risk Profile, Kazakhstan", more "hot days" (daily maximum exceeds 35°C), that is, 1–3 days in the south and western regions each decade in the period 1941–2011, have also been observed.

Seven of the 10 warmest years in the period 1941–2015 were registered at the beginning of the twenty-first century: the absolute maximum temperature was observed in 2013 when the anomaly was +1.94°C, exceeding the 1983 record of Kazakhstan in the history of instrumental observations. 2012 was one of the hottest years during the same period.

While all the oblasts of Kazakhstan registered significant positive anomalies in the average annual temperature in the last 30-year period, the average annual amount of precipitation did not significantly change in the period from 1940 to 2015, according to the report of the UNDP/GEF project "Development of Kazakhstan's National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) and Biennial Report".

According to the 2017 USAID fact sheet, precipitation patterns differ according to the country's morphologies: the north and central steppe and desert regions have an average annual rainfall of 100–300 mm, while the southern foothills and the mountains in the south and south-east register high precipitation levels (500–1,600 mm). Trends in precipitation are also differentiated due to the vast territory of Kazakhstan.

According to the 2016 study on weather elements of Kazakhstan in the context of global climate change, most significant increases are expected in the period December–March, while precipitation will decrease in the period July–September. In the future, increased intensity of rainfall, storm severity and extreme events (heat waves, droughts, floods, landslides, mudflows), are also expected, along with a reduction in the mass of glaciers (potential loss of half of the total current volume of the Tien Shan glaciers).

Glaciers in Kazakhstan are rapidly shrinking, with an observed loss of 14–30 per cent since 1950 in the Tien Shan glaciers.

Map 6 (annex VI) highlights different impacts due to the changing climate throughout Kazakhstan, from increased stress on water resources, extreme weather events in agricultural areas, flooding and sea-level fluctuations to reduction of ice cover and severe droughts.

Extreme weather events

Climate projections to 2050 show an increase in the number and intensity of weather events, with the capacity to cause emergencies and natural disasters.

As reported in the 2016 UNDP/GEF project, extreme hydrometeorological events in Kazakhstan "have become more frequent in recent years and began to cause enormous damage to the economy and population of the country". During the cold season, they consist of heavy snowfalls and blizzards, storm and even hurricane-force winds, intense, prolonged frosts, ice/frost phenomena, late spring frosts, strong fog, ice slicks and other events. In the warm period of the year, heavy showers, accompanied by thunderstorms, hail, squally wind and intense dust storms may occur. Several observed weather-related events include periods with abnormally high and low air temperatures, poor conditions for road traffic, ice on roads, air pollution and the spreading of pests and diseases.

Forest fires and severe droughts are also frequent, with the latter leading to a sharp decline in crop yields.

According to the 2016 UNDP/GEF project, eastern and south-eastern mountain territories of Kazakhstan are prone to natural disasters such as landslides, mudslides, avalanches, floods, hurricane-force winds, hail, rainfall, frosts and droughts.

Flooding is particularly intense when intense rain is associated with snowmelt, as has happened in recent years, mainly in the central and south-eastern regions of Kazakhstan. For example, as reported by FloodList, in 2015, huge floods affected Akmola, East Kazakhstan, Karaganda and Pavlodar Oblasts, with around 15,000 people evacuated; in 2017, more than 7,000 people were evacuated in Akmola, Aktobe, East Kazakhstan, Karaganda, Kostanay, North Kazakhstan and Zhambyl Oblasts; in March 2018, hundreds of people were evacuated in Ust-Kamenogorsk, in Ayagoz, Glubokoe, Kurshim and Ulan rayons.

In March 2013, several rayons of Akmola, Kostanay and North Kazakhstan Oblasts were exposed to hurricane-force winds with a speed of 35 m/s, causing 197 cars to be pulled out and 576 people evacuated from the snowdrift.

Almaty Oblast has the highest frequency of extreme weather events (heavy rain, wind, snow and blizzard), with almost every second case of heavy rain, heavy snow and strong wind in Kazakhstan occurring on its territory.

Mountain and lowland river flooding and mudslides are other extreme weather events with significant impact on human health: flooding represents 70 per cent of the total number of extreme weather events in Kazakhstan, while mudslides represent 10 per cent, according to the 2016 UNDP/GEF project.

According to the Committee on Emergency Situations, the number of hydrometeorological emergencies increased from 39 in 2012 to 74 in 2017 (table 5.1). A progressive increase in the number of extreme weather events in Kazakhstan is expected until the end of the century, according to the RCP (Representative Concentration Pathway) 4.5 scenario.

Table 5.1: Emergencies, 2012–2017

	2012	2013	2014	2015	2016	2017
Emergencies (number)	20 066	16 541	17 779	17 678	16 823	17 723
of which:						
Human-made disasters	..	14 193	14 990	15 013	14 762	15 259
Natural disasters	..	2 348	2 789	2 665	2 061	2 464
of which:						
Hydrometeorological emergencies	39	36	43	75	77	74
Total aggrieved (persons)	4 918	4 262	4 251	4 105	3 691	3 774
of which:						
In human-made disasters	..	2 015	1 805	1 776	1 921	1 921
In natural disasters	..	2 247	2 446	2 329	1 770	1 853
of which:						
In hydrometeorological emergencies	20	12	19	8	8	35
Total casualties (persons)	1 585	1 333	1 202	1 237	1 196	1 094
of which:						
In human-made disasters	..	888	708	684	728	654
In natural disasters	..	445	494	553	468	440
of which:						
In hydrometeorological emergencies	15	3	9	0	1	11

Source: Committee on Emergency Situations, 2018.

Photo 5: A sandstorm is not a reason to miss school, Aral Sea Region

Water resources

Freshwater deficit and adverse changes in the flows of major rivers due to climate change are increasingly important issues in Kazakhstan. Economic development and population growth will increase the demand for water, and the country will have to cope with the expected reduction in water availability.

According to the 2014 summary of the report "Strengthening Cooperation in Adaptation to Climate Change in Transboundary Basins of the Shu and Talas Rivers (Kazakhstan and Kyrgyzstan)", serious impacts of climate change will occur in some river basins: namely, increased aridity and reduced availability of water resources. Domestic water resources, mainly surface water, are also susceptible to impacts of warming and drying. The report shows that the Shu and Talas Rivers faced important changes in different seasons, with a decline in traditional maximum precipitation in spring and autumn accompanied by an increase, though insignificant, in rainfall in winter and summer.

Major water basins will be more and more affected by warming and droughts, especially the Lake Balkhash basin, one of the largest and most densely populated areas of Kazakhstan.

In the medium term (until 2050), according to the study on forecast water resources until 2050 developed for the 2017 Seventh National Communication to the UNFCCC, temperatures are expected to change in the areas of river basins. Projections from 2025 to 2050 show a possible increase of +2.5°C, compared with the historical trend, in the basins of the Moiyldy, Nura, Oba, Sarysu, Tobol, Yelek and Yessil Rivers, and between +0.43°C and +1.35°C on the Irtysh River.

Summer river flow in Kazakhstan relies on glacial melt, especially in the south. The glacial melt will, in the short- to mid-term, affect river flows and increase flood risk.

Simulated values of flow for different periods in the future and changes in relation to the longstanding norm of flow, elaborated for the Seventh National Communication and taking into account the RCP 4.5 scenario, foresee that the water resources in the mountain basins of Kazakhstan might increase on average from 1.94 per cent to 12.54 per cent by 2050 in the basins of the Arys, Assa, Ile, Ertis, Keles, Kuragaty, Oba, Sharyn and Ulba Rivers, depending on glaciers melting. In the low lands of the rivers of western, northern and central Kazakhstan, the water flow will instead decrease from 3.7 per cent to 15 per cent compared with the norm of flow in the past, because of the increase in the average annual air temperature, and might decrease by 9.2–23.7 per cent by the end of the century.

The increase in extreme weather events connected to heavy precipitation is also expected to have a side effect on water quality due to increased risks of penetration of industrial, agricultural and mining pollutants into water bodies.

By 2050, the glaciers loss would be such that the flow of mountain rivers would diminish, putting irrigation of land under severe threat and consequently affecting food security. The glacier retreat in northern Tien Shan is related to increased air temperatures, with a prolonged ablation period due to the rise of the temperatures in late autumn.

Land and soil

The territory is for more than 90 per cent flat land, with high mountains in the south-east and eastern part of the country. A significant part of the country is occupied by arid natural zones (deserts, semi-deserts, dry steppe) and humid steppe and forest-steppe can be found only in the northern region.

According to the UNDP project "Community-based Adaptation: Kazakhstan", nearly 75 per cent of the territory is subject to high-risk ecological destabilization. According to the 2013 Concept of Transition to Green Economy, desertification is of severe concern and may affect up to almost 70 per cent of the land area, contributing to low yields. Temperature rise affects mainly the desert and semi-desert regions of Kazakhstan.

Erosion processes are particularly intense in the deserts of Kyzylkum, Muyunkum, Big and Maly Barsuky, and Saryshikotrau, in the desert, semi-desert and steppe zones, and on light mechanical composition and carbonate soils.

Wind erosion in the arid zones of Kazakhstan, especially the degraded rangelands, indents the soil's superficial layer and contributes to its desertification, turning large areas into deflated soil, whose plough layer, otherwise rich in organic matter, has a lower content of humus and a decreased absorbency capacity.

The main areas of agricultural lands subject to wind erosion are in the oblasts of Almaty (about 5 million ha), Atyrau and South Kazakhstan (3.1 million ha), Kyzylorda (2.8 million ha) and Aktobe and Zhambyl (more than 2 million ha). The largest proportion of eroded agricultural lands (more than 30 per cent of their total area) spans Almaty, Atyrau and South Kazakhstan Oblasts (annex VI, map 7).

A decrease in vegetation and accelerated soil erosion are a consequence of climate change in drylands, with frequent occurrence of dust storms. In areas such as the Aral Sea Basin, invasive species have replaced the native, more salt-sensitive plants, due to soil salinization.

Another impact of climate change in Kazakhstan is the damage caused by the increasing locust ranges: Moroccan locusts, once confined to lowlands and foothills in southern Kazakhstan, moved further north and higher in the mountains, and Italian locusts are gradually expanding their habitat further north as temperatures rise. Climate change has led to the migratory locust raising young twice a year instead of once, causing enormous damage to the territory.

Climate change would exacerbate soil conditions in the scenarios for 2050 and beyond, requiring Kazakhstan to implement appropriate strategies to preserve and improve soil quality and combat desertification.

Forest

Forests are concentrated in the mountains in the east and south-east of Kazakhstan and in the humid plain in the north of Kazakhstan. From 2008 to 2017, the forest fund increased from 27.8 million ha to 29.4 million ha (from 10.2 per cent to 10.8 per cent of the country's territory). In 2016, the actual forest cover accounts for only 4.7 per cent of the territory.

In mountain regions, forests can play a significant role in prevention of the increased risks of erosion and landslides due to climate change, also acting as shelterbelts and windbreak protection for agricultural land from desertification and land degradation.

Climate change has an impact on forest cover in Kazakhstan because temperature and humidity changes are affecting pine, fir, larch and cedar forests, causing changes in species composition, with an increase in deciduous trees and shrubs. Junipers, which usually grow in the northern border of the forested areas, are more capable of reacting to changing climatic conditions.

According to a 2017 study on wild apple growth and climate change in south-east Kazakhstan,[31] climate

[31] I. P. Panyushkina et al., "Wild apple growth and climate change in Southeast Kazakhstan", *Forests,* vol. 8 (2017), p. 406.

change affects the radial growth of wild apple trees, which grow in forests in the Trans-Ili Alatau and Jungar Alatau ranges of the Tian Shan Mountains in south-east Kazakhstan.

Higher temperatures and lower soil moisture due to climate change also have a link to forest fires and shifts in ecological zonation. According to the 2017 GHG Inventory, between 700 ha and 182,500 ha annually were burnt by fires in the period 1990–2015 (figure 5.1).

Biodiversity

Climate change has impacts on biodiversity in Kazakhstan on multiple levels. Drier climate conditions are affecting plant cover density and threaten the country's wetlands. Forest and steppe fires are expected to increase in frequency and importance, risking further land degradation and consequent loss of biodiversity, according to the 2017 USAID fact sheet. These changes have consequences for livelihoods, with land degradation affecting water and pasture availability.

According to a study of water-related problems in Central Asia,[32] dryland degradation decreases the number of wildlife species. Particularly sensitive areas hosting ecosystems vulnerable to climate change are the Irtysh River, the delta of the Syrdarya River, with lake and marsh systems in its lower reaches, and the delta of the Ili River with Lake Balkhash, where changed climatic conditions with warmer summers and cold winters also affect fauna.

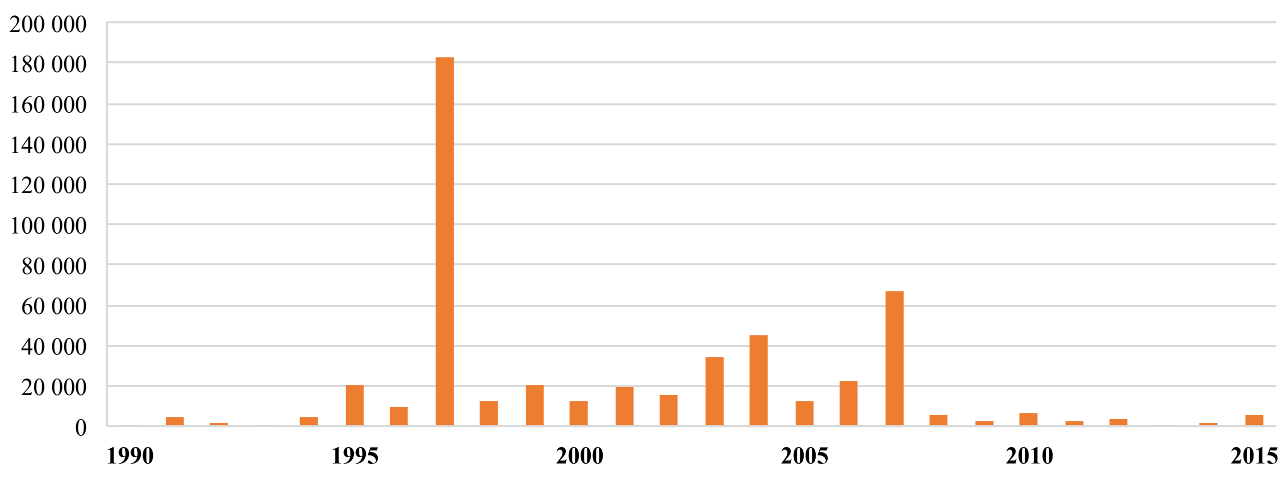
Human health

Climate change represents a threat to human health in Kazakhstan. A change in temperature and humidity may alter the transmission of infectious diseases, increase mortality and morbidity from extreme weather events and reduce availability of clean water. In 2009, Kazakhstan faced an outbreak of Crimean-Congo haemorrhagic fever, a disease that is highly climate sensitive (chapter 13).

Reduced availability of water, due to climate change, also adversely affects food security and nutrition. The average temperature increases in the warm season, especially relating to poor air quality in urban areas, may affect depth and frequency of breathing, the speed of blood circulation, the supply of oxygen to cells and tissues of the body, carbohydrates, salt, lipid-water exchanges and muscle tone. The upsurge of several extreme weather events, in both the cold and warm seasons, may cause human casualties.

Climate change may also have an impact on human health in Kazakhstan by affecting indoor air quality, mainly through the lack of ventilation due to the sealing of the windows, and it may also introduce new issues related to changes in outdoor conditions, for instance when existing buildings' structures are no longer able to act as a barrier against changing external temperatures. In addition, climate change may exacerbate the impacts on human health caused by existing environmental problems, as happened due to the changes in the prevailing direction of the winds in Temirtau, Karaganda Oblast (box 5.1).

Figure 5.1: Surface area affected by fire, 1990–2015, ha



Source: GHG Inventory, 2017.

[32] I. V. Severskiy, "Water-related problems of Central Asia: some results of the (GIWA) International Water Assessment Program". *Ambio*, vol. 33, No. 1/2 (2004), pp. 52-62.

Box 5.1: Changes in prevailing direction of the winds exacerbate air pollution in Temirtau

Production of iron and steel is concentrated at the Temirtau Electrometallurgical Plant in Karaganda Oblast, where there is also a cement production facility. Climate change is perceived as an urgent issue to be addressed in Temirtau, where many industrial facilities are concentrated and emit air pollutants.

Recently, the prevailing direction of the winds in the Temirtau area changed, causing the air pollution to remain in the atmosphere within the industrial area and adjacent human settlements, rather than being pushed away in the steppe by the winds as had happened for decades previously. This caused "black snow" to fall in Temirtau in January 2018.

This raised concerns among the inhabitants, who already live in one of the worst air quality locations in Kazakhstan (figure 6.1). Local executive authorities are consequently considering what steps to undertake, among which is strengthening the current weather forecasting network and the elaboration of a new strategic plan to address air pollution. An additional issue of concern is that, whereas Kazhydromet's local branch issues warnings about upcoming unfavourable meteorological conditions, enterprises in Temirtau do not follow these warnings by taking such measures as temporary suspension of activity or reduced operation. Changing the operating regime in the event of unfavourable meteorological conditions is prescribed in the permits of the enterprises but is not applied in practice.

At present, decision-making support tools such as the multicriteria analysis used in the SEA process are not used by local executive authorities to evaluate different aspects (environmental, social and economic issues/targets) and come up with better informed decisions about the sound and sustainable future of the area.

Economic impacts from climate change

Energy

The energy sector would be affected by the change of weather conditions and the rise of extreme weather events related to climate change. The country's power supply and energy infrastructure is vulnerable to the effects of extreme weather. These pressures on the sector are an additional stress factor to the existing low efficiency transmission and distribution networks, as well as to the generally old facilities.

Electricity transmission is affected by pressure on power lines from ice and wind (wires and bearing supports). Electrical power systems and power lines are exposed to flooding, changed temperatures, thunderstorms and wind, including squall. In 2015, for instance, floods and mudflows in Almaty caused serious damage to power lines.

Air temperature and wind speed also have significant effects on the operation of combined heat and power (CHP) plants and on generation of thermal energy.

The efficiency and potential of the hydropower sector is also undermined by the decreasing glacial contributions to river volume, increased reservoir drying and reduced river flows.

Climate stress on water resources may exacerbate the existing pressures on the hydropower sector due to potentially increased withdrawals by neighbouring countries from transboundary rivers, such as the Irtysh, Ili and Syrdarya Rivers, with consequent economic impacts.

Industry

Most of the industrial facilities have outdated production technologies, and their energy intensity is high. Water availability for some industrial sites could be a problem in the short and medium term.

Climate change increases the risk of higher accident rates at industrial and infrastructure facilities, especially in the water supply and wastewater industries and those using water from surface sources for equipment cooling and other processing needs.

The mining sector is particularly vulnerable to climate change. Available mining deposits worldwide are increasingly deeper and declining, requiring higher quantities of water to operate and producing more significant amounts of mine waste. The current climatic situation in Kazakhstan, with a projection of future water shortage, will increase the sector's vulnerability to climate change.

Agriculture

Agriculture in Kazakhstan is particularly vulnerable to climate change in many interconnected aspects – not only environmental (agricultural techniques and the extension of some crops have an impact on biodiversity, water patterns and soil erosion) but also social and economic.

Kazakhstan is currently the world's ninth largest producer and seventh largest exporter of wheat. According to the UNDP/USAID project "Improving Climate Resilience of Kazakhstan Wheat and Central Asian Food security", higher temperatures due to climate change and inaccurate weather forecasting in the coming years might lead to 50–70 per cent crop losses in the Central Asia region.

According to the United States Department of Agriculture 2016 Commodity Intelligence Report, crop yields in Kazakhstan are affected by the observed rise of severe drought events: unfavourable harvest weather or droughts during the growing season usually cause 1–3 per cent, but sometimes up to 8 per cent, of land sown in wheat to remain unharvested.

Dry and hot weather during the growing season causes soil drought, as happened in 2014 and 2015. Consequently, extremely low yields were recorded in Aktobe, Karaganda, Kostanay, Pavlodar and West Kazakhstan Oblasts.

Climate change in natural areas, the dry and arid steppes of Kazakhstan, in recent years led to a proliferation of dangerous locust pests, that cause significant damage to agriculture each year in the southern part of Kazakhstan. According to the 2015 study on a preventive approach of phytosanitary control of locust pests in Kazakhstan and adjacent areas,[33] zones of mass reproduction of the Moroccan locust are now located in areas of South Kazakhstan Oblast.

Sharp and sudden weather changes, such as sequences of heavy rain, strong wind, dust storms and intense heat, cause significant loss of cattle, as happened in May 2015 in Aktobe, Akmola and Kostanay Oblasts, where enormous numbers of saiga antelopes (more than 150,000 of a total population of 280,000–300,000) died from hemorrhagic septicemia caused by the *Pasteurella multocida* type B bacterium. According to the 2018 study on saiga mass mortality events,[34] the bacterium was already present in healthy antelopes: abnormally high relative humidity and temperatures "activated" and transformed it into a deadly disease.

Forestry

Forests provide ecosystem services for environmental protection, soil and water protection, particularly in the watershed areas of the Syrdarya River, which flows into the Aral Sea, but also for climate-regulating functions and as a source of raw wood, food and medicinal products.

Consequently, threats posed to forests by climate change in Kazakhstan, including the increased risk of forest fires, may have adverse impacts on the economy.

Transport

The transport sector is affected by climate change, especially regarding the resilience of infrastructure to such change. The intensification of extreme weather events causes an increase in the number of days on which traffic circulation is interrupted on Kazakhstan's road networks.

As reported in the 2016 UNDP/GEF project, events such as abundant snowfall often lead to difficulties in the movement of transport and people. In January 2013, for example, huge snowdrifts formed after a cold front with a heavy snowfall, snowstorm and frost in the northern, central and eastern regions of Kazakhstan, causing many highways to remain closed to circulation, with some occupied vehicles captured in snowdrifts. In Urdzhar rayon in East Kazakhstan Oblast, 65 people were rescued on the road. Due to bad weather, highways in East Kazakhstan and Karaganda Oblasts were closed. In Pavlodar Oblast, six cars were pulled from snowdrifts and 11 people were rescued.

In summer, mudslides can cause the blockage of road networks, as happened in July 2013 in the depression in front of a bridge on a highway in the middle zone of Ile-Alatau foothills.

Tourism

According to the United Nations World Tourism Organization, tourism and travel in Kazakhstan account for only 1.6 per cent of the GDP and 1.7 per cent of employment. The current impacts of climate change on tourism are considered limited.

Healthcare systems

Climate change would affect the population's health in Kazakhstan, with an increase of diseases related to the change in temperature. The healthcare system would encounter changes in healthcare needs, and would have to face emergencies due to extreme weather events or the spread of pests and diseases as a consequence of climate change.

[33] V. K. Azhbenov et al., "Preventive approach of phytosanitary control of locust pests in Kazakhstan and adjacent areas", International Conference of Agricultural, Ecological and Medical Sciences (AEMS-2015), Penang (Malaysia), 2015.

[34] R. Kock et al., "Saigas on the brink: multidisciplinary analysis of the factors influencing mass mortality events", *Science Advances*, vol. 4, No. 1 (17 Jan. 2018).

Costs of inaction

To date, Kazakhstan has not estimated the economic costs of climate change impacts on the agricultural, energy, forestry, health, transport and water sectors.

According to data elaborated by UNDP,[35] Kazakhstan has a high value of natural resource depletion, consuming resources faster than they can be naturally replenished. A monetary expression of energy, mineral and forest depletion expressed as a percentage of gross national income, the natural resource depletion score for Kazakhstan is higher than for other countries: 13.7 in 2014, compared with 9 for Uzbekistan, 6.1 for Kyrgyzstan and 1.1 for Tajikistan among Central Asian countries, and with values ranging from 0 for France and Germany to 0.1 for Italy and Ireland and 0.3 for Hungary, among European countries. This means that, if no actions are taken to invert the trend, the costs to be borne to face climate change impacts could be high for the country.

5.2 GHG emissions from economic sectors

In 2015, total GHG emissions amounted to 314,914.43 Gg of CO_2-eq., including land use, land use change and forestry (LULUCF) (table 5.2). In 2015, the energy sector was responsible for 78.39 per cent of GHG emissions with LULUCF, while agriculture, industrial processes and product use (IPPU), LULUCF and waste accounted for 9.13 per cent, 6.09 per cent, 4.44 per cent and 1.94 per cent, respectively. GHG emissions in Kazakhstan in 2015 including LULUCF were below the level of 1990 by 15.3 per cent, and excluding LULUCF by 22.7 per cent.

The country's CO_2 emissions halved between 1990 and 1999 but then were increasing up until 2014. In 1990, emissions were 371,831 Gg of CO_2-eq. and the latest available CO_2-eq. annual emission (2015) was 314,914 Gg. Since this represents a 15.3 per cent decrease on the base year level, Kazakhstan had already reached its targeted 15 per cent emissions reduction in 2015, 15 years earlier than planned (figure 5.2). During the same period, Kazakhstan's annual GDP, as measured in tenge, grew 854-fold; however, if calculated in 2010 US dollars, GDP only doubled in the period from 1990 to 2016. GDP measured in national currency was increasing constantly over the period, but GDP measured in US dollars decreased due to the tenge exchange rate devaluation against the US dollar in 2013 (figure 5.3).

The decoupling of CO_2 emissions from economic development can best be seen in figure 5.4. The CO_2 emissions per capita increased in the period 2001–2006, but since 2006, CO_2 emissions per capita have levelled out and stabilized. CO_2 emissions per US$1,000 of GDP produced have been decreasing in the period 2003–2015 and have almost halved, decreasing from 1.34 tons in 2000 to 0.73 tons in 2015. GHG emissions in tons of CO_2-eq. per capita increased from 12.98 t in 2000 to 17.15 t in 2015, with a peak of 18.92 t in 2014 (figure 5.4).

Energy

In 2015, the energy sector was responsible for 78.39 per cent of GHG emissions. The production and consumption of energy resources is mainly due to the burning of solid fuels, in particular, coal. According to the 2017 GHG Inventory, fuel combustion activities account for 211,311.15 Kt of CO_2.

Industry

In 2015, industrial processes and product use (IPPU) is responsible for 6.09 per cent of GHG emissions. The iron and steel manufacturing industries are the major contributors to GHG emissions (with high emissions from coal-alimented blast furnaces), followed by non-ferrous metals manufacturing (table 11.4). Due to several factors, including high energy inefficiencies, the industrial sector consumes the highest amount (49.8 per cent) of final energy consumption in Kazakhstan (table 10.13).

Agriculture

In 2015, agriculture's contribution to GHG emissions amounts, on average, to 9.13 per cent of the total emissions, mainly through methane (enteric fermentation) and nitrogen oxide (from agricultural land) emissions. GHG emissions from agriculture decreased from 42,249 Gg of CO_2-eq. in 1990 to 28,752 Gg of CO_2-eq. in 2015 (table 5.2). CH_4 emissions decreased by 34.92 per cent, from 1,115,300 t in 1990 to 725,870 t in 2015 and N_2O emissions decreased by 26.2 per cent, from 48,210 t in 1990 to 35,590 t in 2015 (figure 5.5).

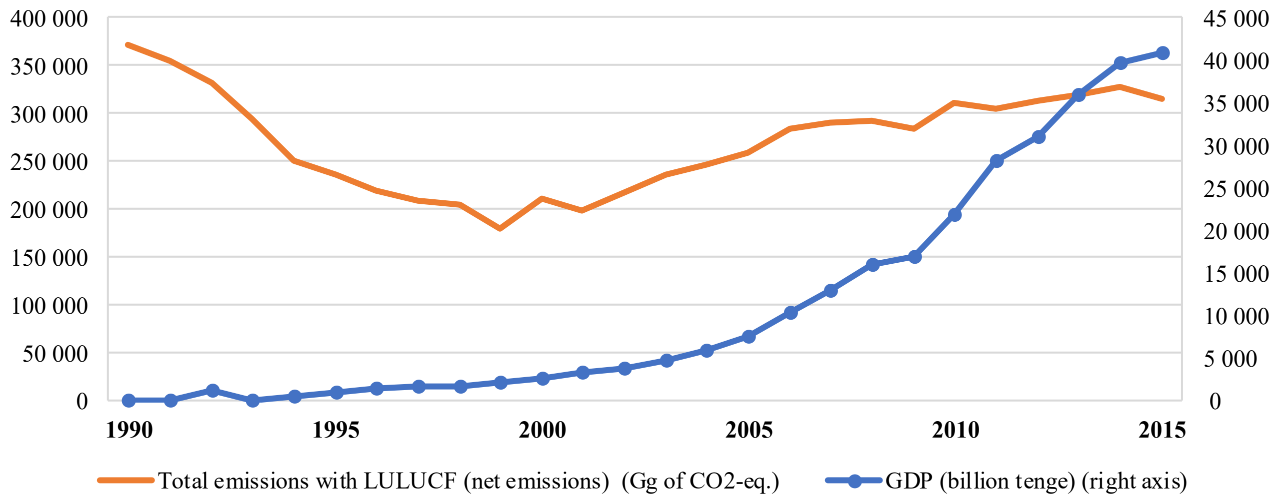
[35] http://hdr.undp.org/

Table 5.2: GHG emissions, 1990–2015, Gg of CO_2-eq.

	Energy activities	IPPU	Agriculture	LULUCF	Waste				Total emissions	
					MSW landfilling	Wastewater	Healthcare waste	Total	with LULUCF	without LULUCF
1990	318 195.02	23 885.04	42 249.08	-17 273.21	2 265.21	2 510.09	0.00	4 775.28	371 831.25	389 104.47
1991	300 299.82	22 548.28	41 135.86	-13 732.32	2 377.62	2 452.07	0.00	4 829.70	355 081.34	368 813.66
1992	275 111.44	19 767.95	42 052.82	-9 795.97	2 489.60	2 173.20	0.00	4 662.80	331 799.03	341 595.00
1993	242 410.94	14 718.05	39 869.65	-7 504.06	2 596.52	1 924.56	0.00	4 521.07	294 015.65	301 519.71
1994	206 839.48	9 658.86	32 410.43	-2 516.46	2 683.20	1 793.77	0.00	4 599.74	250 869.27	253 385.73
1995	190 464.06	10 403.75	28 432.39	2 574.30	2 752.01	1 738.76	0.00	4 490.76	236 365.25	233 790.95
1996	175 710.77	8 998.94	23 476.36	5 931.78	2 812.14	1 694.28	0.00	4 506.42	218 624.27	212 692.49
1997	162 285.94	11 126.27	20 772.53	9 988.14	2 866.26	1 691.62	0.00	4 557.88	208 730.75	198 742.62
1998	157 853.82	9 843.19	20 338.99	12 882.08	2 902.85	1 593.37	0.00	4 496.22	205 414.30	192 532.22
1999	126 584.92	12 118.79	22 017.40	15 052.39	2 937.66	1 560.05	0.00	4 497.71	180 271.21	165 218.82
2000	152 332.76	13 305.46	23 005.29	17 094.15	2 975.17	1 543.76	0.00	4 593.92	210 331.57	193 237.43
2001	140 698.15	13 486.50	24 294.77	16 040.18	3 017.03	1 555.28	0.00	4 572.31	199 091.91	183 051.73
2002	159 491.52	13 979.72	23 769.94	14 736.75	3 064.27	1 516.88	0.00	4 581.16	216 559.09	201 822.34
2003	178 454.16	14 889.00	24 515.49	14 043.93	3 116.88	1 519.24	0.00	4 636.12	236 538.70	222 494.76
2004	186 775.49	15 539.58	25 145.20	13 798.45	3 175.67	1 566.26	0.00	4 741.92	246 000.64	232 202.19
2005	200 005.97	14 698.04	25 660.05	13 606.98	3 241.49	1 541.28	0.00	4 782.76	258 753.80	245 146.82
2006	223 766.67	15 293.41	26 318.47	12 399.53	3 313.52	1 678.71	0.00	4 992.24	282 770.32	270 370.79
2007	229 809.49	17 557.77	26 797.79	11 118.81	3 393.92	1 782.00	0.57	5 176.49	290 460.35	279 341.54
2008	233 408.90	16 373.82	26 745.72	9 640.18	3 450.75	1 736.48	0.84	5 188.07	291 356.69	281 716.51
2009	228 816.66	16 333.41	26 999.30	5 937.54	3 521.85	1 785.29	7.52	5 314.66	283 401.83	277 464.29
2010	257 527.46	19 072.43	26 786.70	2 599.92	3 599.77	1 847.65	8.07	5 455.48	311 442.00	308 842.07
2011	247 991.17	19 740.37	26 220.88	4 121.11	3 682.27	1 922.60	4.95	5 609.81	303 683.33	299 562.22
2012	257 136.57	18 806.54	26 139.52	5 916.81	3 755.40	1 939.54	4.37	5 699.29	313 698.73	307 781.92
2013	261 269.79	18 461.93	26 791.12	7 351.11	3 830.29	1 981.04	3.44	5 814.76	319 688.70	312 337.59
2014	264 317.47	18 974.04	27 794.39	10 649.05	3 905.96	2 069.99	7.08	5 983.01	327 717.96	317 068.91
2015	246 874.79	19 177.99	28 752.57	13 993.93	3 996.12	2 111.57	7.47	6 115.15	314 914.43	300 920.50

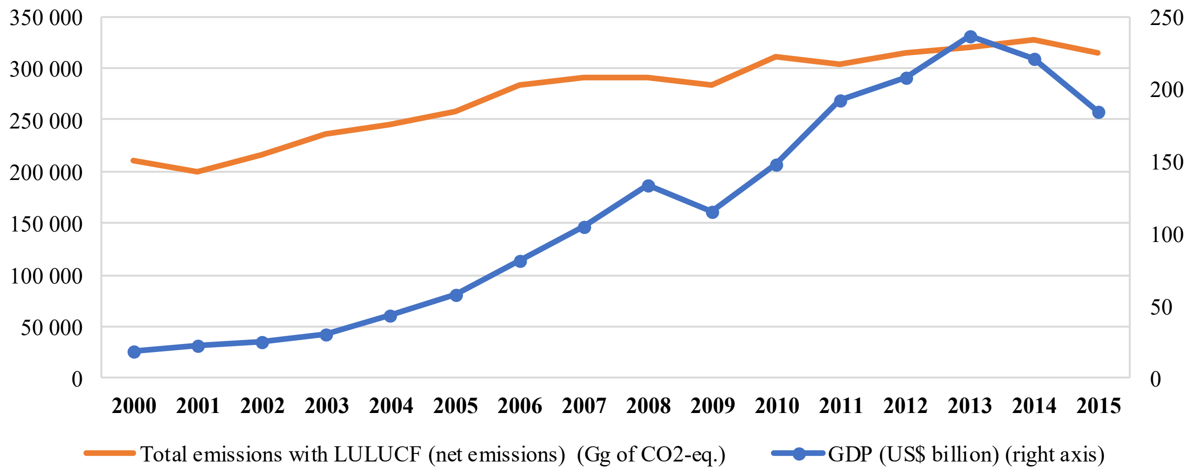
Source: GHG Inventory, 2017.

Figure 5.2: Trends of GDP in tenge and GHG emissions, 1990–2015



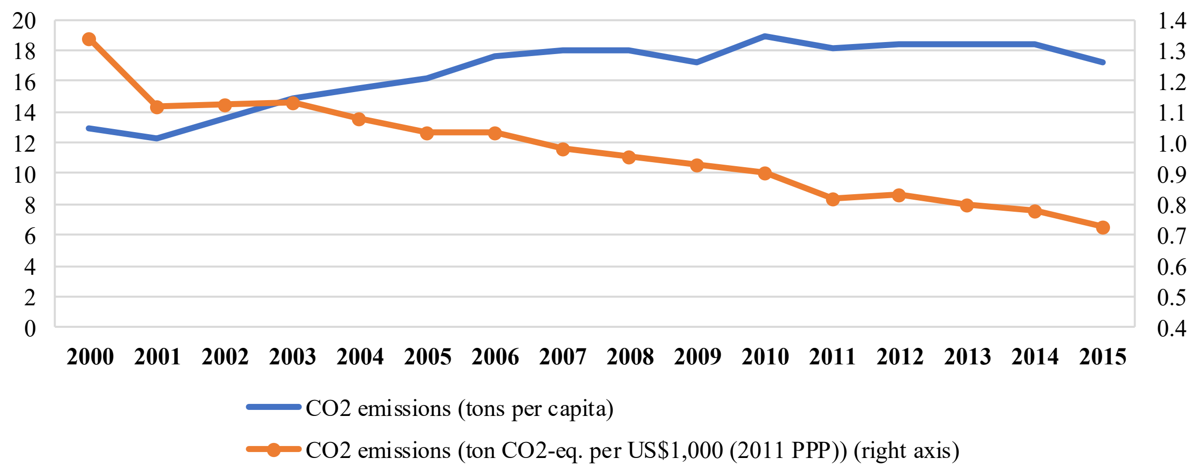
Source: Committee on Statistics, 2018.

Figure 5.3: GHG emissions towards GDP in US$ billion, 2000–2015



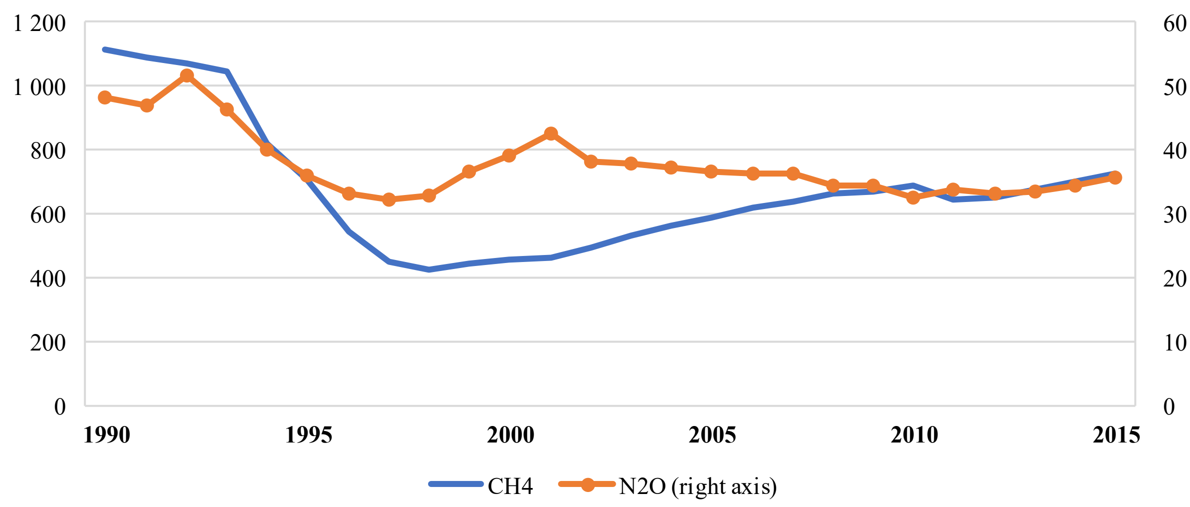
Source: Committee on Statistics, 2018.

Figure 5.4: GHG emissions per capita and per US$1,000 (2011 PPP), 2000–2015



Source: Committee on Statistics, 2018.

Figure 5.5: CH_4 and N_2O emissions from agriculture, 1990–2015, 1,000 t



Source: 2017 GHG Inventory.

Land use, land use change and forestry (LULUCF)

The forest land is a GHG sink, with an annual GHG removal of about 8–10 million tons in CO_2-eq. In 2015, the CO_2 removals amounted to 11,092.54 Gg CO_2-eq. from the forest lands, 28,763.84 Gg CO_2-eq. from pastures and 1,767.88 Gg CO_2-eq. from perennials plantations. Emissions from arable lands amounted 55,618.20 Gg CO_2-eq.. LULUCF emissions have increased by 181.1 per cent in the period 1990–2015, from -17,273.21 Gg CO_2-eq. to 13,993.93 Gg CO_2-eq.

Transport

The main contributor to GHG emissions in the transport sector in Kazakhstan is road transport (automobiles and freight). In 2015, CO_2 emissions from road transport (18.134.69 Gg) amounted to 82.5 per cent of total emissions from the transport sector (table 5.3). The GHG emissions reduction potential of the transport sector is limited by the high demand for transportation services. However, most road vehicles in Kazakhstan are older than 10 years, and, to date, the issue has not been adequately addressed at the national level.

Municipal solid waste and wastewater

GHG emissions from MSW and wastewater management increased from 4,775,300 t of CO_2-eq. in 1990 to 6,115,160 t of CO_2-eq. in 2015. Emissions are due to landfilling, wastewater discharge and treatment, and incineration of healthcare waste. Emissions from incineration of healthcare waste have increased as a consequence of the introduction of stricter regulations on hazardous healthcare waste management and prevention of its disposal to landfill, reaching 7,470 t of CO_2-eq. in 2015.

Housing sector

In 2017, the urban population accounts for 53.2 per cent of the total population, with an estimated 0.94 per cent annual increase in the urbanization rate in the period 2015–2020. Urban areas have an increased incidence of GHG emissions, and, at the same time, good potential for improved energy efficiency.

The total housing stock is 343.4 million m^2, with 63 per cent located in urban areas and 37 per cent in rural areas. Between 2013 and 2016, housing stock increased by 7 million m^2 in urban areas and 0.3 million m^2 in rural areas.

Households throughout the country mainly rely on energy produced from coal, which consequently contributes to the increase in air pollution and health issues, especially in urban areas. GHG emissions in the residential sector grew by 8.22 per cent from 1990 to 2015. However, in the period 2008–2015, emissions grew by 244 per cent, due to the consistent development of the housing sector. In the period 2013–2015, the housing stock increases resulted in an increase of GHG emissions by 2.7 times or by 11.65 million tons of CO_2-eq. (table 5.4).

Table 5.3: Transport GHG emissions, 1990, 2000, 2008–2015, Gg CO_2

	1990	2000	2008	2009	2010	2011	2012	2013	2014	2015
Aviation	442.95	41.15	658.63	884.05	877.79	765.89	715.34	860.46	542.06	541.80
Road transport	14 628.58	6 208.38	16 516.74	16 706.36	16 994.86	17 452.84	21 805.17	18 780.97	16 137.14	18 134.69
Off-road transport	151.19	56.52	141.05	140.28	143.63	142.29	175.96	151.18	144.77	131.59
Railway transport	4 756.61	713.99	1 006.42	1 066.59	1 246.32	1 419.82	1 196.77	1 627.99	1 686.81	1 981.77
Maritime transport	208.38	0.20	869.10	32.79	56.15	87.05	80.86	39.20	96.15	289.51
Pipeline transportation	440.90	2 076.87	3 577.55	2 867.00	1 850.83	1 793.95	1 481.91	940.26	930.40	908.83
Total CO_2 emissions	**20 628.61**	**9 097.11**	**22 769.49**	**21 697.08**	**21 169.57**	**21 661.84**	**25 456.02**	**22 400.05**	**18 804.79**	**21 988.19**
Total emissions of CO_2-eq.	**21 055.54**	**9 253.40**	**23 154.64**	**22 098.95**	**21 570.41**	**22 071.13**	**25 967.37**	**22 838.56**	**19 211.13**	**22 416.81**

Source: GHG Inventory, 2017.

Table 5.4: GHG emissions from households, 1990, 2000, 2006–2015, million tons of CO_2-eq.

1990	2000	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
16.963	4.165	7.780	5.520	7.500	6.878	7.862	10.822	8.517	6.710	17.400	18.358

Source: GHG Inventory, 2017.

5.3 Legal, policy and institutional framework

Legal framework

As of April 2018, Kazakhstan does not have any legislation that would directly address climate change at the national and local level. No carbon tax exists in Kazakhstan.

Environmental Code

The 2007 Environmental Code was amended in 2011 by adding two new chapters on the regulation and assessment of GHG emissions and capture, with further amendments to these chapters in 2014 and 2016. The Code introduces the system of emission allowances and sets the legal basis for a national allocation plan and an emissions trading system. The Code describes the system of recording GHG emissions and absorptions, consisting of: i) the National Inventory System of GHG emissions and absorptions, ii) the national cadastre of emissions and absorption sources of GHGs, and iii) the state register of carbon units. The Code prohibits operators in the oil and gas, energy, chemicals, mining, metallurgical, agricultural and transport sectors, whose GHG emissions exceed the equivalent of 20,000 tons of CO_2/y, to operate without receiving a GHG emissions allowance.

Land Code

The 2003 Land Code regulates the rational use of land, and duties and rights of land users. However, it does not include specific considerations about mitigation of and adaptation measures for climate change, which would address holistically land degradation, soil erosion, habitat fragmentation and ecosystems stressors.

Law on Civil Protection

The 2014 Law on Civil Protection repealed several previous legislative acts: on natural and human-made disasters, on fire safety, on emergency rescue services and lifeguards status, on civil defence, on national materials reserves, and on industrial safety of hazardous production facilities. The Law does not specifically mention climate change, but it addresses emergencies resulting from hazardous natural phenomena (geophysical, geological, meteorological, agrometeorological and hydrogeological hazards) mainly related to climate change, such as natural fires, epidemics, and damage to agricultural plants and forests by diseases and pests.

Energy sector legislation

The 2009 Law on Support for the Use of Renewable Energy Sources aims to contribute to the achievement of GHG emissions reductions targets as it regulates support for the use of RES. The Law introduced the framework for the system of feed-in tariffs for supply of electrical energy produced by RES (table 10.14). In 2017–2018, the feed-in tariff system was replaced by an auction system (chapter 3).

The 2012 Law on Energy Saving and Energy Efficiency Improvement establishes the framework for energy efficiency activities, identifying implementing entities and general requirements for energy efficiency investment and audits. The Law introduced requirements for implementing energy saving policies and increasing energy efficiency by state bodies and state organizations, for ensuring compliance with energy efficiency requirements for new and existing buildings, and for the mandatory use of metering devices for cold and hot water, electricity and heat consumption in designed and newly built residential dwellings. It also foreees a special regulatory regime for entities that consume energy above certain levels and the mandatory labelling of electrical-energy-consuming devices (chapter 10).

The 2015 Energy Efficiency Requirements for Construction Materials, Products and Structures (2015 Order of the Minister for Investments and Development No. 401) concern requirements to be applied to construction materials, products and engineering structures, such as window constructions, balcony doors and lamps, thermal insulating materials and products. The 2015 Rules for the determination and revision of energy efficiency classes for buildings, structures and premises (2015 Order of the Minister for Investments and Development No. 399) determine energy efficiency classes based on a set of indicators. Energy efficiency classes from A (the best performing) to E (the worst performing) are set for new buildings and the refurbishment of existing buildings. An energy class is awarded as a result of an energy audit. There are no data showing the numbers of buildings falling within these classes.

The current regulatory framework does not foresee the compulsory use of a share of renewable energy for new construction and the mandatory refurbishment of existing buildings to increase their energy efficiency.

Policy framework

Kazakhstan does not have a specific policy document on climate change, which would address both mitigation and adaptation. Also, the country does not have a separate national adaptation plan. In 2010, a draft national concept on adaptation to climate change was prepared by the Government with the support of UNDP, but it was not formally adopted. As of 2018, a project proposal has been submitted with the support of UNDP to the Green Climate Fund to support the drafting of a national adaptation plan.

Climate change issues are not fully integrated into relevant policies and plans and concrete actions are not foreseen to achieve the ambitious targets related to climate change.

As of mid-2018, Kazakhstan does not apply the SEA instrument to ensure the integration of environmental and climate change aspects into sectoral policies and plans at various levels (chapter 1). This is clearly a missed opportunity. According to the 2010 OECD Guide on SEA and Adaptation to Climate Change, a well-performed SEA can fulfil several functions in relation to climate change adaptation, including that of an independent analysis of the likely performance of existing or new plans and programmes (a form of climate proofing). In addition, it can serve as an integrated planning and assessment process designed to both generate and test the response of options of plans, programmes and policies to different climate scenarios that are actively explored as part of the SEA.

Kazakhstan does not have a disaster risk reduction strategy in line with the Sendai Framework.

<u>Concept on Transition to Green Economy</u>

The 2013 Concept on Transition to Green Economy sets ambitious targets for alternative (including nuclear) energy share: 30 per cent in 2030 and 50 per cent in 2050, maintaining the same amount of coal production. These targets do not find an application in the current situation: in 2017, wind and solar sources together generated only 0.43 per cent of electricity, whereas HPPs were responsible for 10.90 per cent of nationally generated power (table 10.9). Nuclear power has not yet been developed in Kazakhstan.

The Concept focuses on five key areas related to climate change, and the corresponding investments are to be raised from private investors. The areas are:

- Green power sector: shift of electricity generation from a coal-based to a gas-based system, combined with a significant increase in the share of alternative energy sources;
- Energy efficiency in manufacturing: additional investments in energy-saving technologies in key manufacturing sectors, such as metals, chemicals, minerals, food, paper and pulp, construction and machinery;
- Energy efficiency in transport: additional investments in energy-saving transportation technologies;
- Energy efficiency in heat supply: additional investments in efficiency of heat plants, loss reduction in district heating networks and energy saving in buildings;
- Sustainable agriculture: investments in water efficiency and land productivity.

The implementation of the Concept requires drastic modernization of key infrastructure and production technologies based on energy-efficient technologies, but, to date, not all its objectives have been successfully translated into concrete actions.

In 2018, the Concept is undergoing a revision. The revised Concept is expected to include a specific mitigation chapter, directly connected to the low carbon strategy.

Concept for Development of the Fuel and Energy Sector until 2030

The Concept for Development of the Fuel and Energy Sector until 2030 (2014 Resolution of the Government No. 724) foresees the development of the oil and gas, coal, nuclear and electric power industries, that will have direct and indirect implications on emissions reduction. It promotes the use of BAT for fuel and energy production, the increase of the share of renewable and alternative energy sources and energy efficiency. The modernization of the economic sectors is also expected to reduce GHG emissions.

Like the Concept on Transition to Green Economy, the Concept for Development of the Fuel and Energy Sector until 2030 has the target of 30 per cent reduction of energy intensity of GDP by 2030 compared with the 2008 level. Energy intensity of GDP decreased by 18.18 per cent, from 1.87 toe per US$1,000 in 2000 prices in 2008 to 1.53 toe per US$1,000 in 2000 prices in 2017.

Strategy “Kazakhstan-2050”

The 2012 Strategy “Kazakhstan-2050” is structured around the formula: “Economy first, then politics”, and does not contain any specific reference to climate change. The Strategy aims to make Kazakhstan one of the top 30 most developed countries in the world by 2050. It acknowledges water shortages as a future challenge to agriculture and advocates for increased use of water-saving technologies. It also sets the target to achieve a 50 per cent share of alternative and renewable energy sources by 2050.

Strategic Plan for Development until 2025

The 2018 Strategic Plan for Development until 2025 reconfirms Kazakhstan’s nationally determined contribution (NDC) commitment to achieve a 15 per cent reduction of GHG emissions by 2030 and calls for revision of the 2013 Concept on Transition to Green Economy to enable such a reduction.

Plan of the Nation “100 concrete steps”

The 2015 Plan of the Nation “100 concrete steps” does not mention climate change among the steps. However, Step No. 52 is dedicated to electricity tariffs to cover operating costs of energy production and Step No. 59 is about attracting international investments in energy saving.

Strategic Plan of the Ministry of Energy for the period 2017–2021

The Strategic Plan foresees the future construction of nuclear power plants, new generating facilities (e.g. Balkhash CHP plant), the rehabilitation of existing power plants (e.g. a third generating unit at Ekibastuz GRES power plant-2) and the modernization of the national electricity grid.

The “Improving the quality of the environment” pillar of the Plan addresses emissions reductions through improved state environmental control and regulation. The Plan refers specifically to NDC commitments, which should be met through the implementation of:

- Regulation of GHG emissions and removals through a market mechanism, i.e. the emissions trading system (ETS);
- Increasing the share of RES in the country’s energy balance;
- Modernization of TPPs and boiler houses;
- Implementation of energy efficiency and energy saving projects.

State Programme of Industrial-Innovative Development for the period 2015–2019

The State Programme of Industrial-Innovative Development for the period 2015–2019 (2014 Decree of the President No. 874) does not specifically address climate change but its implementation would reduce GHG emissions. It aims at 15 per cent reduction of the energy intensity of manufacturing industry. It also aims to develop the petrochemical industry.

State Programme of Infrastructure Development “Nurly Zhol” for the period 2015–2019

The Programme foresees the development of the transport infrastructure, its integration into the international transport system, and the upgrading (reconstruction and construction) of the housing and utilities infrastructure as well as heat supply and water and sanitation systems. Its implementation would have an impact on GHG emissions. There are no specific measures specifically addressing climate change.

National Allocation Plans

In 2011, the National Allocation Plan envisaged the free allocation of quotas among 178 large operators in the sectors of subsoil use, metallurgy, chemicals industry, agriculture and transport, emitting carbon dioxide above 20,000 tons of CO_2-eq./y. It also established emissions trading among operators by their participation in auctions held by the trade exchange at least once a year. The operation of the quota system was paused in 2016 and restarted in 2018 based on the National Allocation Plan for the period 2018–2020. The amount to be allocated was calculated to allow for a 5 per cent reduction of CO_2 emissions compared with the 1990 level. Since 2018, operators can choose between the historical method and the method of application of GHG-specific emission factors.

Policy documents in the agricultural sector

The Strategic Plan of the Ministry of Agriculture for 2017–2021 identifies a range of measures, which include some measures addressing climate change adaptation, but concrete actions and targets are not clearly indicated.

The 2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021 addresses water scarcity from a perspective of climate change. Measures include providing subsidies for drip irrigation (up to 30 per cent of all the costs borne by the farmer (2017 Order of the Minister of Agriculture No. 48)). As of 2017, water-saving technologies are used at 13–15 per cent of the irrigated area. Sprinkling technology is the most popular, being used on around 100,000 ha, and drip irrigation is used on about 80,000 ha. A number of projects support the implementation of the drip irrigation technique and other measures to adapt to climate change in the agricultural sector (box 5.2).

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis targets 1.5, 11.b, 13.1, 13.2 and 13.3 of the 2030 Agenda for Sustainable Development is described in box 5.3.

Institutional framework

Ministry of Energy

The Ministry of Energy is responsible for climate-change-related policy in the country and climate negotiations at the international level.

Box 5.2: Support for adaptation to climate change in the agricultural sector

The UNDP programme “Community-based Adaptation: Kazakhstan” works with communities to integrate climate change concerns into sustainable rangeland and agricultural management practices. It also works with local water managers to integrate climate change concerns into irrigation regimes for climate-resilient and sustainable agriculture.

The programme’s overall portfolio includes 10 projects, including the 2009–2011 UNDP/GEF project “Adaptation of Farmers’ Agricultural Practices in Response to Intensified Climate Aridity in Akmola Oblast”. This project deserves a particular mention, because it was developed within a steppe region, in which harsh climatic conditions increased soil erosion and land degradation, damaging the local economy and reducing production and incomes. The project piloted a new system of agriculture based on the combination of the summer grain crops and winter wheat production, resistant to droughts. The project was developed on selected plots, where local farmers applied drip irrigation with the result of doubling the yield and halving the water consumption. The winter crop cultivation technology was also implemented, leading to an increase of 15 per cent in crop production. A local NGO, the Akbota Public Foundation, raised awareness among the local farmers on the impacts of climate change and the available adaptation measures. This project efficiently combined concrete adaptation measures with local communities’ engagement and awareness-raising on climate change.

Source: http://adaptation-undp.org/projects/spa-community-based-adaptation-kazakhstan

Box 5.3: Targets 1.5, 11.b, 13.1, 13.2 and 13.3 of the 2030 Agenda for Sustainable Development

Goal 1. End poverty in all its forms everywhere
Target 1.5: By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
Target 11.b: By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to

climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels

Goal 13. Take urgent action to combat climate change and its impacts
Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Kazakhstan has no national policy document on adaptation to climate change. Local actions are randomly implemented through international cooperation/funding. Municipal social housing, in accordance with the 1997 Law on Housing Relations provides homes for citizens in need of housing who belong to the vulnerable categories, among which are persons who have lost their homes because of environmental disasters, or natural or human-caused emergencies.

Partial data on indicator 1.5.1/13.1.1 (Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population) are available: in 2017, the total number of aggrieved persons because of natural disasters (including casualties) was 3,774, compared with 4,262 in 2013. The total number of casualties attributed to natural disasters in 2017 was 440, compared with 445 in 2013.

Kazakhstan has no data available on indicator 1.5.2 (Direct economic loss attributed to disasters in relation to global gross domestic product (GDP)). However, the Global Sustainable Development Goals Indicators Database[36] indicates that, in 2017, Kazakhstan suffered US$12.34 million worth of direct economic loss attributed to disasters (or 0.00009 per cent relative to GDP).

Regarding indicator 1.5.3/11.b.1/13.1.2 (Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030), Kazakhstan has no national disaster risk reduction strategy in line with the Sendai Framework for Disaster Risk Reduction, although some initiatives are carried out through UNDP and UNICEF projects aimed at strengthening Kazakhstan's capacity in risk assessment and reduction of natural disasters.

Concerning indicator 1.5.4/11.b.2/13.1.3 (Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies), no local executive authorities have adopted and implemented local disaster risk reduction strategies in Kazakhstan, which is also due to the lack of a national disaster risk reduction strategy. Cities in Kazakhstan are not required to adopt and implement disaster risk management (target 11.b).

To allow for progress with targets 1.5, 11.b and 13.1, Kazakhstan should:

(a) Develop and adopt a disaster risk reduction strategy;
(b) Build capacity in disaster risk reduction at the national, regional and local levels;
(c) Encourage awareness-raising activities among public officers and citizens;
(d) Encourage local governments to develop and implement local disaster risk reduction strategies.

Target 13.2: Integrate climate change measures into national policies, strategies and planning

In Kazakhstan, climate change is not fully mainstreamed across sectoral policies. Climate change is often perceived as a separate topic that has to be dealt with by the national authority responsible for climate change issues (i.e. the Ministry of Energy) alone. To enable progress with Goal 13, Kazakhstan should ensure that climate change concerns are integrated into national policies, strategies and plans, which would increase its ability to adapt to the adverse impacts of climate change, foster climate resilience and lower GHG emissions.

Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

Kazakhstan has started to incorporate climate-change-related education in the school curricula, but the full scope of the topics covered by global indicator 13.3.1 (Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula) is not yet covered. NGOs and international projects play an active role in raising awareness and advancing education on climate change.

The Department of Climate Change consists of two sections: one on low-carbon development and one on adaptation and climate risks. Its main functions are: i) developing and implementing a uniform state policy on climate change; ii) arranging the elaboration of climate and ozone layer protection programmes; iii) coordinating the implementation of the provisions of the UNFCCC and other international treaties and protocols related to climate change and the ozone layer; and iv) state regulation of emissions and absorption of GHGs and ozone-depleting substances (ODS).

Kazhydromet, subordinated to the Ministry of Energy, provides an assessment (territorial and for economic sectors) of climatic conditions and vulnerabilities to

[36] https://unstats.un.org/sdgs/indicators/database/?area=KAZ

extreme hydrometeorological events. Its climatology division is responsible for:

- Managing the database on climate change;
- Recording, studying and ensuring the implementation of the recommendations of the World Meteorological Organization with a view to meeting international obligations on climatology issues;
- Processing meteorological information;
- Providing meteorological and climatic information for public authorities and economic sectors.

JSC Zhasyl Damu manages the system of regulation and GHGs emissions trading, including the registry and cadastre.

Ministry for Investments and Development

The Ministry for Investments and Development is responsible, inter alia, for innovation development in industry, and for energy saving and energy efficiency issues.

Ministry of Agriculture

The relevant competences of the Ministry of Agriculture include mitigation and adaptation measures in the agricultural sector.

The Committee on Forestry and Fauna is responsible for managing 20 per cent of the forested area, mainly the forests within the protected areas.

The Committee on Water Resources is responsible for water management issues, including adaptation of water resources and hydrotechnical infrastructure to climate change.

Coordination

Interministerial coordination on sustainable development in Kazakhstan is ensured through the Council on Transition to Green Economy headed by the Prime Minister. During its regular sessions, participants discuss conceptual approaches to the improvement of environmental conditions, including climate-change aspects.

Apart from the Ministry of Energy, public authorities do not have specific departments or sections dedicated to climate change – a topic that is generally perceived to be "external", compared with the various institutions' main missions.

Local representative authorities at oblast level and in the cities of republican significance and the capital approve programmes for development of their territories. They are also mandated to develop projects for the reduction of GHG emissions and carbon capture.

Regulatory, economic and information measures

Land use planning

Currently, the system of land classification is articulated in seven categories. Land use structure changed significantly in the period 1991–2000 due to implementation of land reforms, but, since 2000, the fluctuations within the categories have not been significant. No significant change was observed in the period 2012–2017 (figure 5.6). However, compared with internationally recognized classification, the current system of land classification does not support understanding and analysis of natural phenomena such as climate change, provide a means to assess carbon stock accountability or help monitor agricultural development, disaster management, land planning and biodiversity conservation.

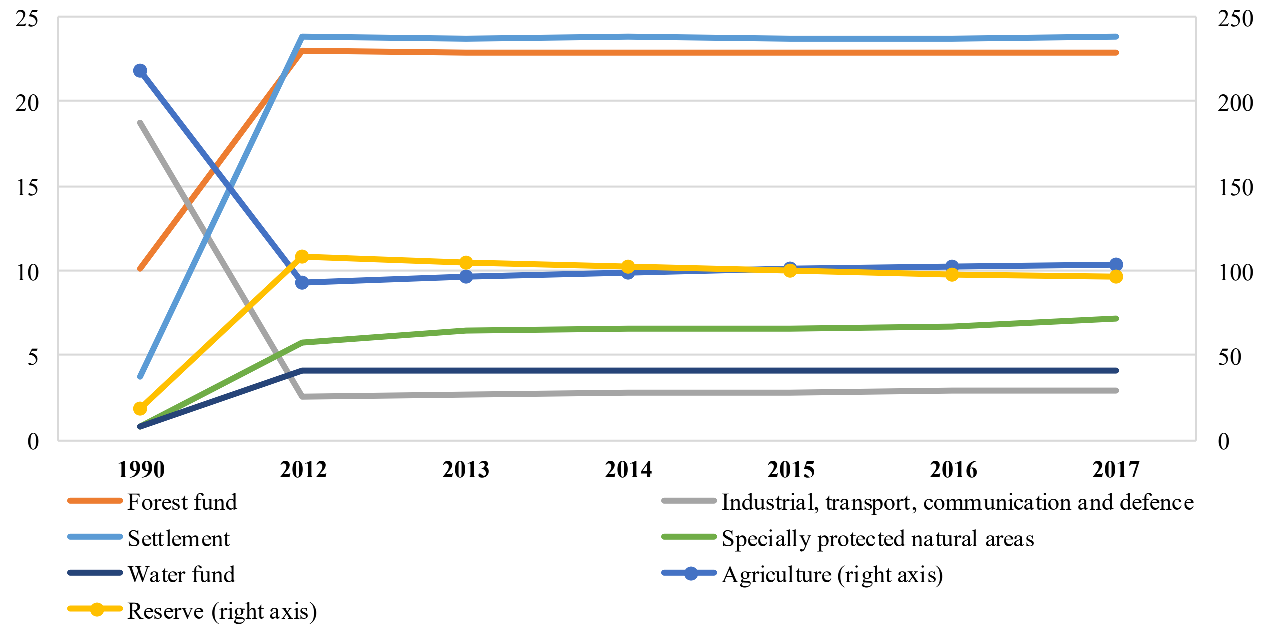
Land use planning is an important instrument in addressing climate change impacts. However, land management in Kazakhstan does not yet foresee a national geoportal, as is implemented in some OECD Member countries based on, for example, the INSPIRE (Infrastructure for Spatial Information in Europe) geoportals, [37] according to Directive 2007/2/EC and its Implementing Rules on interoperability of spatial data sets and services. Coupling GIS and remote sensing would allow better management and oversight of various components responding to such phenomena as floods and forest fires.

National emissions trading system

Kazakhstan did not participate in the first commitment period of the Kyoto Protocol (2008–2012), thus avoiding the introduction of relevant regulations and mechanisms that were perceived to be unnecessary barriers to economic growth in that historical moment.

[37] France: https://www.geoportail.gouv.fr/;
Germany: http://www.geoportal.de;
Italy: http://www.pcn.minambiente.it .

Figure 5.6: Land use categories, 1990, 2012–2017, million ha



Source: SoER for 2016; Environmental protection and sustainable development of Kazakhstan 2013–2017, Statistical book.

In 2011, the country adopted, and developed until 2017, a system of measurement, reporting and verification of emissions and emissions reductions, for the subsequent transition to a GHG emissions trading system. Although pilot reporting from enterprises began in 2011, full reporting entered into force only in 2013 because of the late establishment of the GHG Verifiers Forum in 2012. The GHG Verifiers Forum is in charge of exchanging key updates between the Kazakhstan Emissions Trading System (KazETS) management and the accredited professionals who verify emissions performance under the trading programme.

During the first phase (2013–2015), the verification was underestimated. Currently, the accreditation of verifiers is carried out according to ISO 14065, but there is still a need for technical assistance for the accreditation centre (training and compliance with ISO standards).

KazETS was launched in 2013 to regulate domestic CO_2 emissions and to drive the development of low-carbon technologies. It involved the 178 companies responsible for 55 per cent of the emissions at that time. It issued 158.1 million tons of CO_2 quotas. During the second phase (2014–2015), allowances were calculated by averaged data on emissions for 2011–2012 for each plant.

In 2016, KazETS was suspended until January 2018, in order to elaborate a better framework for the allocation plan – but, in practice, in order to avoid additional burdens on business development. This period of suspension allowed *de facto* the avoidance of stricter regulations on CO_2 emissions for the sectors covered by KazETS. During this period, improvements in the monitoring, reporting and verification system were introduced, such as the reduction of documentation flow and the implementation of electronic reporting. The National Accreditation Centre under the Ministry for Investments and Development was appointed as the accreditation body for validation/verification and accreditation of verifiers in accordance with ISO standards.

An online platform for monitoring, reporting and verifying emission sources and GHG emissions was launched in February 2018. The platform enables major emitters to transmit and record data on GHG emissions, as well as to trade online. As of April 2018, KazETS covers all major companies in the energy, oil and gas sectors and the mining, metallurgical, chemicals and processing industries.

The 2018 National Allocation Plan sets an emission cap for 129 companies for the period 2018–2020. It foresees emissions reductions of 5 per cent from the 1990 level in the regulated sectors (225 installations whose average annual emissions exceed 20,000 tons of CO_2-eq. are covered).

The 2017 GHG Inventory for the period 1990–2015 did not record obligations (AAUs[38]). No registry of carbon units linked to the International Transactions Log to meet compliance standards under the UNFCCC exists in Kazakhstan.

Following the resumption of KazETS in 2018, installations were asked to decide between two different methods of emissions allocations:

- The specific emission factor (SEF) or benchmarking method calculates the assigned allowance considering the average value of the product produced in the 2013–2015 period, multiplied for the relevant value in the approved list of benchmarks (for oil and gas the multiplier is 0.065). Fifty-two GHG-specific emission factors were established and approved for the energy and industry sectors, including oil and gas;
- The baseline or basic method calculates allowance considering the average value of CO_2 emissions in the 2013–2015 period, multiplied by three (the three years of the National Allocation Plan).

According to an evaluation carried on by JSC Zhasyl Damu, the baseline/basic approach applied to the energy sector issues higher CO_2 emissions allowances than the benchmarking approach.

The adoption of the baseline/basic method for the calculation of allowances is, therefore, less beneficial for the emissions reductions targets in Kazakhstan. For the 2018 National Allocation Plan, 149 facilities opted for the SEF and 76 for the baseline/basic method.

The 2014 Code on Misdemeanours foresees a fine of five monthly calculation indexes for each unit of the quota exceeding the assigned volume of emissions that is not compensated for by allowances from other users of natural resources, and (or) by carbon units received as a result of realization of the projects in accordance with the legislation of Kazakhstan. In 2013, the Government waived all penalties for non-compliance for that year. The current non-compliance penalty is approximately €30/tCO_2.

The full switch to the SEF method, with a progressively more restrictive revision of the specific emission factors, would allow the pursuit of more ambitious emissions reductions objectives, in line with the official commitment of Kazakhstan under the Paris Agreement.

[38] Assigned Amounts Units represent the initial assigned amount of each Annex B party (Arts. 3–7 of the Kyoto Protocol).

Information measures

The 2016 amendments to the 2007 Environmental Code regarding environmental information update legislation about the provision of ecological information, including the information on climate change.

The national state of the environment reports provide information on climate change issues.

Expo 2017 in Kazakhstan was the occasion of an information campaign on energy efficiency issues and on climate change. Visits to the Arnasay eco-village were organized for Expo 2017 participants.

Since 2010, Kazhydromet has been issuing an annual bulletin on climate. The bulletin describes the climatic conditions for the year, including assessment of the surface air temperature and precipitation. It also provides information on trends in the mean values since the fourth decade of the twentieth century.

There are a number of NGO initiatives related to climate change education. For example, since 2000, the public association EcoObraz, located in Karaganda, implements the International School Project on the Application of Resources and Energy, which is aimed at schoolchildren, schoolteachers and kindergarten teachers. The Ecomuseum in Karaganda showcases many environmental issues, including some impacts of climate change. The museum communicates these issues in an unconventional and engaging way.

Participation in international agreements and processes

United Nations Framework Convention on Climate Change

Kazakhstan ratified the UNFCCC in 1995, the Kyoto Protocol in 2009 and the Paris Agreement in 2016. The country is considered an Annex I Party for the purposes of the Protocol but remains a Non-Annex I Party for the purposes of the Convention. As a Non-Annex I Party to the UNFCCC, Kazakhstan is obliged to submit its national communications every four years and to submit its biennial update reports on GHG emissions every two years.

The First National Communication was submitted in 1998, the Second in 2009 and the Third to Sixth

National Communications in 2013, with the support of UNDP and GEF. The latter synchronizes the dates of the communications with other countries included in Annex I and compiled the Third, Fourth, Fifth and Sixth National Communications.

The Second Biennial Report and the intended nationally determined contribution (INDC) for the Paris Conference were submitted in 2015. In late 2017, Kazakhstan submitted its Seventh National Communication and Third Biennial Report to the UNFCCC.

Kazakhstan is considered a least developed country (LDC) for the purposes of the Green Climate Fund, and is therefore eligible to receive allocated funds.

European Union-Central Asia (EU-CA) Water and Environment Cooperation Platform

The Water and Environment Cooperation Platform (WECOOP), established in 2009, is based on the EU Strategy for Central Asia agreed with the Central Asian countries. Kazakhstan takes part in the EU-CA Working Group on Environment and Climate Change, chaired by Italy. Activities carried out in 2018 are focused on facilitating access to international funds for climate-change-related projects in Central Asian countries.

5.4 Mitigation and adaptation

Mitigation scenarios

As stated in its 2015 INDC, Kazakhstan intends to achieve an unconditional target of a 15 per cent reduction in GHG emissions and a conditional target of a 25 per cent reduction in GHG emissions, by 2030, compared with the 1990 level. The 1990 emissions of CO_2-eq. were 371,831 Gg; the latest available annual CO_2-eq. emissions (for 2015) were 314,914 Gg, which was 15.3 per cent below the base year level. Therefore, Kazakhstan actually reached its emissions reduction target of 15 per cent 15 years earlier than planned. Nonetheless, keeping the emissions at this level until 2030 is a challenge for the country.

According to the 2018 study on long-term climate change mitigation in Kazakhstan in a Post-Paris Agreement context,[39] a 25 per cent GHG emissions reduction pathway is highly ambitious and requires an almost full phase-out of coal consumption in power generation by 2050, with even further additional actions required to promote RES.

Kazakhstan's annual GDP calculated in 2010 US dollars doubled from 1990 to 2016. Total CO_2 emissions have been stabilized and have stayed almost at the 2006 level since that year, while the CO_2 emissions per US$1,000 of GDP produced have been decreasing since 2000. The decoupling of CO_2 emissions from economic activity has clearly taken place in Kazakhstan (figure 5.4). The amount of CO_2 emissions per US$1,000 has almost halved, decreasing from 1.34 tons in 2000 to 0.73 tons in 2015. However, according to 2016 IEA figures, Kazakhstan's energy intensity is still almost double that of Germany and higher than the world average.

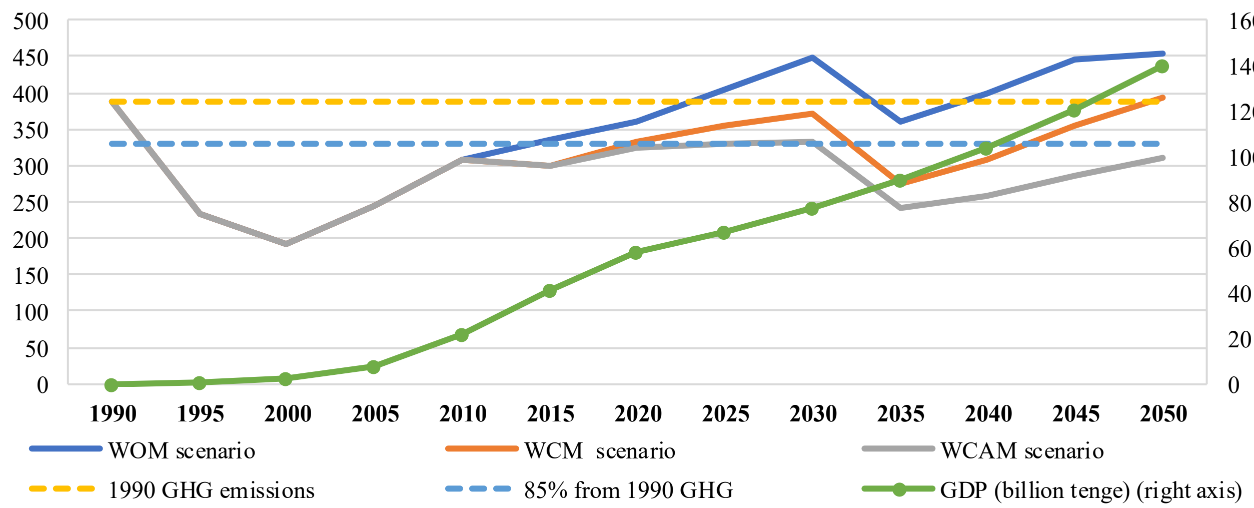
In the Seventh National Communication, three GHG emissions scenarios were developed for the energy sector: without measures (WOM), with current measures (WCM) and with current and additional measures (WCAM). All scenarios assume annual GDP growth at an average rate of 3.5 per cent until 2020 and 3 per cent after 2020 (figure 5.7). The World Bank recommended Kazakhstan consider updating its mitigation scenarios to a more realistic 1 per cent GDP growth.

The WCAM scenario includes possible measures and policies that are directly aimed at reducing GHG emissions, such as:

- Capacities to be installed by 2020 according to targets for renewable energy are doubled by 2030;
- One more 1 GW nuclear power plant (NPP) is commissioned by 2030 in addition to the already forecasted 1 GW NPP;
- Efforts are applied to reduce 1 ton of CO_2-eq. at the cost of US$10, US$15 and US$25 in 2020, 2025 and 2030, respectively.

[39] A. Kerimray et al., "Long-term climate change mitigation in Kazakhstan in a post-Paris Agreement context", in *Limiting Global Warming to Well Below 2 °C: Energy System Modelling and Policy Development*, G. Giannakidis, K. Karlsson, M. Labriet and B. Ó Gallachóir (eds.), Lecture Notes in Energy, vol. 64 (Springer, 2018), pp. 297-314.

Figure 5.7: GHG emissions projections



Source: Seventh National Communication to the UNFCCC, 2017.
Note: WOM = scenario with no measures. WCM = scenario with current measures. WCAM = scenario with current and additional measures.

The analysis of Kazakhstan's mid- and long-term emissions is dependent of the main assumptions of the scenarios and how well these assumptions fit the actual development of the parameters. In many ways, the past few years have been very tumultuous, and the long-term estimations might very quickly prove to be inaccurate. The fall in oil prices, from a peak of US$115 per barrel in June 2014 to under US$35 per barrel at the end of February 2016, which slowed down Kazakhstan's economic growth, came as a surprise, as did the devaluation of Kazakhstan currency by 82 per cent in 2015.

Under the WOM scenario, Kazakhstan's economy would grow in real terms by 4.3 times before 2050, which would correspond to about 3.8 per cent average annual real GDP growth. All GHG reduction scenarios would lead to a slight fall in GDP growth compared with the baseline WOM scenario. However, GDP growth under the different scenarios would be almost the same up to 2040, after which the growth paths would start to separate. The range of GDP loss with different emissions reduction scenarios would be between 3.5 per cent and 9 per cent.

The strictest emissions reduction scenario, WCAM, would keep the GHG emissions levels 15 per cent below 1990 levels. This outcome would be achieved by the economy growing more than fourfold (4.09 times) between 2011 and 2050.

The Partnership for Market Readiness (PMR) project of the World Bank highlighted that Kazakhstan has significant mitigation potential at "relatively low cost", due to substantial inefficiencies in the energy system that could be addressed and upgraded. However, all simulated scenarios would cause structural changes to the country's economy. The mining sector will lose its importance while transport and services will have a much greater share of the country's gross value added.

The different scenarios elaborated under the PMR project show that relying on current KazETS sectors only to pursue decarbonization objectives would be, on the one hand, too burdensome for the KazETS sectors, and, on the other hand, would not exploit the full mitigation potential expressed by non-KazETS sectors (transport, urban areas, housing, waste management, commercial). The PMR project demonstrates how the inclusion of non-KazETS in the decarbonization strategies of Kazakhstan would avoid high economic costs.

The PMR project suggests that the introduction of a CO_2 tax for the commercial (trade and other services) and housing sectors would have a "positive impact on the GDP in the medium term and would cost less than 2 per cent of GDP by 2050". The project concludes that a combination of KazETS with measures in non-KazETS sectors and the introduction of a CO_2 tax would be the best solution to reach INDC targets.

New technologies are the way to achieve higher mitigation levels from non-ETS sectors. Measures could include incentives for fuel-efficient vehicles, motor fuel taxes, and improvements in energy efficiency of street lighting and boiler houses. Renewable energy systems such as geothermal heat pumps should be progressively introduced for heat supply and air conditioning.

Resources

According to OECD data for the period 2012–2015, Kazakhstan raised US$1.76 million for climate-related development projects (of which about 87 per cent were for mitigation, 7.9 per cent for adaptation and the remainder for projects on both adaptation and mitigation) (figure 3.6).

Mitigation and adaptation efforts by sector

Energy

Since 1991, Kazakhstan has invested in thermoelectric power infrastructure as a means of meeting increased demand and promoting energy security. At the same time, little has been done to upgrade the existing energy infrastructure.

The energy sector has great potential for reducing GHG emissions through increasing its efficiency, primarily by progressively switching from dependency on fossil fuels to a reasonable mix of RES, cleaner coal and gas.

Kazakhstan is working to expand the use of RES. The target for renewable energy development is to increase the share of RES in total electricity production by 2020 to 3 per cent (1,700 MW), which would include wind power (933 MW), solar (467 MW), hydro (290 MW) and biogas (10 MW) (2016 Order of the Minister of Energy No. 478).

Kazakhstan has introduced energy audits among measures for mitigation and adaptation in the energy sector (chapter 10).

Three main oil refineries underwent a modernization programme that should lead to a reduction in GHG emissions (chapter 10).

Kazakhstan also aims to increase the share of gas consumption. Implementation of the General Scheme of Gasification for the period 2015–2030 (2014 Resolution of the Government No. 1171) will result in a reduction in GHG emissions. The gas infrastructure is expanding as part of the Government's plan to increase the energy security and environmental friendliness of the economy (chapter 10).

Industry

Currently, no adaptation strategy for the whole industrial sector is developed. Mitigation aspects for this sector are mainly addressed through KazETS for major emitters.

Initiatives applied to the industrial sector include KazETS, obligatory energy audits and promotion of green technologies (e.g. through Expo 2017). Additional planned measures include the optimization of the technological process in ammonia and in calcium carbide production, installation of technology for CO_2 capture and storage in the production of clinker and lime (with a capture efficiency of 80 per cent) and modernization and optimization of iron and steel production to meet European standards.

Water availability for some industrial sites is an important aspect from the perspective of adaptation of the industrial sector to climate change. So far, the industrial sector has faced little modernization with technologies which are less energy intensive and less water demanding.

Agriculture

One of the major concerns for agriculture in Kazakhstan is related to water availability: 90 per cent of irrigated land in the south of Kazakhstan benefits from water coming from glaciers in neighbouring countries.

From the perspective of future water scarcity, on the one hand, Kazakhstan actively cooperates with neighbouring countries to ensure that the same levels of water are made available, and on the other, it tries to reduce water consumption in agriculture by promoting more efficient irrigation networks (with a target to reduce losses from 40 per cent to 20 per cent by 2030) and by the use of water-efficient technologies such as drip irrigation systems.

To reduce emissions from agriculture, Kazakhstan is trying to reduce the energy intensity of agriculture by undertaking such measures as transition to drip irrigation, protection from land degradation (prevention of the reduction of humus in soils) and improvement of irrigation and drainage systems.

Forests

The Ministry of Agriculture allocated around 140 million tenge under the 2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021 to finance forest regeneration, forest planting and the transformation of non-forested lands into forest cover.

However, land use and forest cover are controlled without the use of GIS and satellite observations. The Ministry of Agriculture is expecting to develop a specific geoportal for land management, to be implemented as part of the State Programme "Digital

Kazakhstan" by 2021. Protection of existing forest areas and their extension to increase their contribution to overall emissions reduction would benefit from the implementation of a geoportal (e.g. the European INSPIRE standard) and cartographic activities, with integration of satellite and aerial data (e.g. Cover/Use, Land Motion, DTM/DSM aerial LiDAR, snow melt prediction, etc.). These tools would also help in controlling forest fires and logging.

Transport

In a scenario with no measures (WOM scenario), the projections of emissions from transport could rise to 45,500 t of CO_2-eq. (an increase of 103.15 per cent) by 2030, while in a scenario with current and additional measures (WCAM), they could rise to 38,600 t of CO_2-eq. (an increase of 72.32 per cent) by 2030, from 22,400 t of CO2-eq. in 2015 (table 5.5).

The transport sector could only make a contribution to the achievement of INDC targets if there were a consistent ban on old, highly polluting engines, since the primary sources of emissions from transport are automobiles and trucks. However, the Committee on Transport of the Ministry for Investments and Development does not foresee, for the near future, any specific transport policy that considers climate change, since climate change is still perceived to be a separate competence of another ministry.

There is a great deal of room for integrating climate change concerns into plans and regulations in the transport sector. For instance, there is a lack of strict environmental standards for the existing fleet of extremely polluting vehicles and the statistics on circulating vehicles are not updated on a regular basis. The Energy Efficiency Requirements for Transport (2015 Order of the Minister for Investments and Development No. 389) determine the regulatory standards for the energy efficiency of railway, road, maritime, inland waterway, air and urban electric transport; however, the requirements apply only to transport imported and produced since April 2015.

Kazakhstan does not thoroughly promote energy efficiency in public transport, for example, by modernizing public transport fleets.

Urban areas and housing

The urban population in Kazakhstan is growing continuously, and new residential areas are being built, especially around the major cities such as Almaty and the capital.

New buildings may face structural and environmental challenges if their design does not anticipate future climatic conditions. Currently, there is a lack of pre-feasibility studies using satellite remote-sensing campaigns in high risk areas (those prone to flooding, landslides, subsidence, etc.) to reduce the impact of climate change on new developments.

Table 5.5: Scenarios for GHG emissions from transport, 1,000 t CO_2-eq.

	Actual		WOM			WCM			WCAM		
	2011	2015	2020	2025	2030	2020	2025	2030	2020	2025	2030
Aviation	0.8	0.5	2.1	2.5	3.2	2.1	2.5	3.2	2.1	2.5	3.2
Road transport	17.8	18.5	26.4	33.1	38.7	24.4	28.6	32.4	24.4	28.6	31.8
Railway transport	1.4	2	1.1	1.3	1.6	1.1	1.3	1.6	1.1	1.3	1.6
Navigation	0.1	0.3	0	0	0	0	0	0	0	0	0
Other transport	2	1.1	1.6	1.8	2	1.7	1.8	2	1.7	1.8	2
Total	**22.1**	**22.4**	**31.2**	**38.7**	**45.5**	**29.2**	**34.1**	**39.1**	**29.2**	**34.1**	**38.6**

Source: Seventh National Communication to the UNFCCC, 2017.
Note: WOM = scenario with no measures. WCM = scenario with current measures. WCAM = scenario with current and additional measures.

In 2013, the city of Taraz, in Zhambyl Oblast, signed the Covenant of Mayors for Climate and Energy, which is an EU initiative addressed to local governments committed to implementing EU climate and energy objectives (signatory cities pledge actions to support implementation of the 40 per cent GHG reduction target by 2030 and the adoption of a joint approach to tackling mitigation and adaptation to climate change). In 2014, Taraz submitted its Sustainable Energy and Climate Action Plan with commitments to 2020. Data issued from the Baseline Emission Inventory of Taraz show that more than half of the city's emissions come from the residential sector, followed by the transport sector. There is no information about implementation of the Action Plan and its integration with the local statutory planning. Eight other cities (Aksu, Astana, Karaganda, Lisakovsk, Petropavlovsk, Satpaev, Temirtau and Zhezkasgan) signed the Covenant of Mayors in 2013–2014 but have not yet submitted their respective action plans.

Health

A review conducted by WHO in 2009 under the project "Protecting Health from Climate Change in Kazakhstan" identified adaptation measures in the health sector with regard to climate change:

- Enforcement of the control and treatment of infectious and cardiovascular diseases;
- Improvement of the sanitary and hygiene culture of the population, with a particular focus on water intake facilities, water collectors, distribution and prompt disinfection;
- Support for the establishment of early warning mechanisms;
- Provision of guidance and support of pilot tests for adaptation of housing and public structures to extreme conditions;
- Emergency management and disaster response.

These measures are still largely relevant as of 2018.

5.5 Assessment, conclusions and recommendations

Assessment

Kazakhstan ratified the Kyoto Protocol in 2009 and the Paris Agreement in 2016. CO_2 emissions per US$1,000 of GDP have almost halved, decreasing from 1.34 tons in 2000 to 0.73 tons in 2015. In 2015, GHG emissions including LULUCF were 15.3 per cent below the level of 1990.

In 2013–2014, Kazakhstan introduced an emissions trading system, KazETS, which regulated domestic CO_2 emissions and drove the development of low-carbon technologies. However, in 2016, KazETS was suspended until January 2018. The interruption of KazETS was not beneficial in terms of stimulating large emitters to undertake consistent emissions reductions. However, during this period of hiatus, improvements in the monitoring, reporting and verification system were introduced. Since February 2018, an online platform has enabled major emitters to transmit and record data on GHG emissions and to trade online. As of April 2018, KazETS covers all major companies in the energy, oil and gas sectors, and the mining, metallurgical, chemicals and processing industries, but does not include other sectors contributing to GHG emissions, such as urban areas, housing and waste management.

Kazakhstan has ambitious targets that might be competing with each other: to be one of the top 30 most developed countries in world by 2050 and the unconditional target of a 15 per cent reduction in GHG emissions by the end of 2030, in comparison with 1990. Kazakhstan has high potential to decrease its footprint as a global GHG emitter. The energy sector is the major CO_2 emitter, accounting for the lion's share of GHG emissions (82.4 per cent, on average, for the period 1990–2015). A shift from coal and oil to gas and RES would decrease GHG emissions and, at the same, decrease the pollution caused by the processing of oil and coal.

Kazakhstan does not have legislation to specifically address climate change, nor a specific policy document on this issue. While climate change is of a cross-sectoral nature, it is still perceived to be a separate topic that must be managed by a specific authority designated as being in charge of climate change issues. This is echoed in the lack of integration of climate change concerns into various policy documents and the limited coordination on climate change issues. The lack of an SEA procedure is also an impediment to tackling climate change issues at the national level.

Conclusions and recommendations

Policy framework for climate change

Kazakhstan does not have a policy document that would address climate change concerns (adaptation and mitigation). Furthermore, the country does not have a separate national adaptation plan. Due to the lack of a national climate change policy, these concerns are not reflected at the oblast level. Climate change aspects are not yet thoroughly integrated into sectoral policies. In general, there is a common understanding among different institutions of the "existence" of climate change. However, climate change is still perceived as a stand-alone topic, and its cross-cutting relevance among different sectors, such as energy, industry, agriculture, transport and urban planning, is not yet thoroughly acknowledged.

Recommendation 5.1:
The Government should:

(a) *Develop and adopt a national adaptation plan;*
(b) *Ensure that climate change concerns are prominently integrated into sectoral policies, plans and programmes, in particular in the housing, transport, agricultural, urban planning, health, energy and industrial sectors, including the mining sector;*
(c) *Encourage oblasts and cities to integrate climate change into their programmes for development;*
(d) *Promote the elaboration and implementation of local adaptation plans.*

Disaster risk reduction

Kazakhstan lacks a disaster risk reduction strategy in line with the Sendai Framework. Taking into account the recurrence of extreme weather events in Kazakhstan and the current and future climate conditions, a disaster risk reduction strategy, and mainstreaming of disaster risk reduction from the national to the local level, would support Kazakhstan in the implementation of targets 1.5, 11.b and 13.1 of the 2030 Agenda for Sustainable Development.

Recommendation 5.2:
The Government should:

(a) *Develop and adopt a national disaster risk reduction strategy in line with the Sendai Framework;*
(b) *Promote the elaboration and implementation of local disaster risk assessment plans.*

Strategic environmental assessment

In many economic sectors in Kazakhstan, there is a general lack of a more strategic vision that would address environmental, social and other impacts from different sources, as well as climate change impacts and the resulting need for mitigation and adaptation for the sector.

As of mid-2018, SEA is not applied in Kazakhstan. However, according to the 2010 OECD Guide on SEA and Adaptation to Climate Change, a well-performed SEA can fulfil numerous functions in relation to climate change adaptation. Multi-criteria analysis tools used in SEA allow the setting up of concrete and rational frameworks for development in any sector and support the linking of concrete actions and indicators to the different targets. SEA can be very useful in mainstreaming climate change across different sectoral policies and institutional levels in Kazakhstan.

A legal framework for SEA according to the standards of the ECE Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context, with climate change considerations integrated into it, would also facilitate support for funding applications to international donors and financial institutions.

Recommendation 5.3:
The Government should:

(a) *Introduce strategic environmental assessment (SEA) as a support tool to develop sound and coordinated sustainability policies that integrate climate change;*
(b) *Ensure that climate change considerations (mitigation and adaptation, linked to disaster risk reduction) are an explicit part of SEA;*
(c) *Ensure the application of SEA to policy documents in the housing, transport, agriculture, land use, urban development, energy and industrial sectors, including the mining sector and other sectors, at the national and oblast levels.*

See Recommendation 1.4.

Cities and climate change

Taraz City in Zhambyl Oblast joined the Covenant of Mayors in 2013 and developed its Sustainable Energy and Climate Action Plan. Little information is available about implementation of this plan. Eight other Kazakh cities signed the Covenant in 2013–2014 but have not submitted their respective action plans.

Recommendation 5.4:
The Government should promote among the cities of Kazakhstan:

(a) *The signing and implementation of the Covenant of Mayors;*
(b) *The development and implementation of Sustainable Energy and Climate Action Plans.*

Mitigation efforts

The unconditional target in Kazakhstan's INDC to reach a reduction of 15 per cent of GHG emissions by 2030 compared with 1990 is ambitious. Its achievement would make a strong contribution to global progress with Sustainable Development Goal 13 (Take urgent action to combat climate change and its impacts). However, the mitigation scenarios developed for Kazakhstan show that only with current and additional measures would Kazakhstan be able to achieve the unconditional target. The World Bank advises Kazakhstan to update the mitigation scenarios with more realistic GDP projection growth of 1 per cent and to develop tailored and realistic policies and plans. This also involves the contribution to GHG emissions reduction from non-KazETS sectors (transport, urban areas, housing, waste management, commercial), which is currently not sufficiently addressed.

The current regulatory framework does not foresee the compulsory use of a share of renewable energy for new construction and the mandatory refurbishment of existing buildings to increase energy efficiency.

Recommendation 5.5:
The Government should:

(a) *Update mitigation scenarios to 1 per cent GDP growth;*
(b) *Strengthen KazETS by abandoning the baseline/basic method for allocations;*
(c) *Address emissions from non-KazETS sectors with comprehensive plans, concrete actions and indicators to monitor progress in emissions reductions;*
(d) *Introduce carbon taxation for sectors such as housing and commercial, to incentivize the switch to more sustainable technologies, taking into account the needs of poor and vulnerable groups;*
(e) *Revise the regulations to increase energy efficiency and use of renewable energy sources for new and existing buildings, in line with international near-zero-energy building standards;*
(f) *Incentivize the penetration of renewable energies, such as photovoltaics, geothermic heat pumps and biogas, in housing, street lighting, public utilities, etc., as a partial alternative to the use of coal.*

Land cover classification

The current system of land classification does not allow for understanding and analysis of natural phenomena such as climate change.

Recommendation 5.6:
The Government should adopt international standards for land cover classification, such as the CORINE standards.

Use of satellite and GIS technologies

No national cartographic geoportal has been developed in Kazakhstan, based on both GIS and remote-sensing technologies such as the INSPIRE geoportals, according to Directive 2007/2/EC and its Implementing Rules on interoperability of spatial data sets and services. GIS application and satellite observations and data on the environment and disasters allows for better management and control of land use, forest cover, agriculture and climate-change-related issues.

Recommendation 5.7:
The Government should:

(a) *As part of the State Programme "Digital Kazakhstan", set up a geoportal for spatial information that integrates satellite and aerial data, including relevant information on climate-change-related issues, using modern technologies, and make it publicly accessible;*
(b) *Ensure, in cooperation with relevant stakeholders, that protocols are established for data flow, including workflow definitions (precisely defining who reports what, when and to whom) and protocols on higher levels of information subsystems to avoid segregation of the whole system.*

PART II: MEDIA AND POLLUTION MANAGEMENT

Chapter 6

AIR PROTECTION

6.1 Urban and rural air quality

Reporting on air quality

Kazakhstan has defined air quality standards as MACs. These MAC values are set for 684 pollutants. The values are set for short term maxima (the concentrations of 20-minute samples are compared with these values) and for daily means. Every pollutant has a defined hazard class (from 1 to 4, with class 1 the most hazardous) (table 6.1).

To assess the air pollution in a certain area or city, Kazakhstan uses different indexes that are related to the MAC values. The standard index (SI) is defined as the highest once measured concentration of a pollutant divided by its (short term) MAC value. The highest frequency (HF) index is the most repeated exceedance in percentage terms of the MAC value of a pollutant. The most important is the Air Pollution Index, commonly abbreviated as API_5. To calculate the API_5, the average daily mean concentrations of the five most important pollutants – the five substances with the highest MAC values considering their risk class – are divided by their daily mean MAC values and benchmarked by a factor related to the MAC value of SO_2. The substances can be different in different locations. API is calculated using the formula: $API_5 = \Sigma\ (X_i\ /MAC_i)^{C_i}$ in which X_i is the average concentration of the pollutant i, MAC_i the average daily MAC value of the pollutant and C_i the exponent, that depends on the class of dangerous substance compared with sulphur dioxide. The indices are presented on an annual basis.

The final level of air pollution in a city or region is characterized by four classes that are established by the three indexes: Low, Increased, High and Very High (table 6.2).

When a contradiction between the indexes occurs, the API_5 value leads for assessment of the air pollution in a city. Cities in Kazakhstan are ranked annually according to their indexes. Figure 6.1 shows air pollution indexes for selected cities in 2017. For some cities with high air pollution (e.g. Ust-Kamenogorsk and Petropavlovsk), not all indexes are reported in 2017.

In the HF (most repeated exceedance in per cent) index, Almaty had the highest score in 2017 (37). The standard index (SI) gives highest values for Karaganda (16) and Ust-Kamenogorsk (62) in 2017. The API_5 in 2017 gives the highest values for Shymkent (10), Ust-Kamenogorsk (9), Temirtau (8), Karaganda (8), Karatau (8), Zhezkazgan (8) and Glubokoe (8). Table 6.3 shows estimates of the level of ambient air pollution for 2017 in accordance with the three indexes.

Table 6.1: Maximum allowable concentrations of selected ambient air pollutants, µg/m³

	Short term maximum	Daily mean	Hazard Class
Nitrogen dioxide	200	40	2
Sulphur dioxide	500	50	3
TSP	500	150	3
$PM_{2.5}$	160	35	..
PM_{10}	300	60	..
Carbon monoxide	5 000	3 000	4
Lead	1	0	1
Benzene	300	100	2
Ammonia	200	40	4
Phenol	10	3	2
Hydrocarbons	1 000	..	3
Formaldehyde	50	10	2
Ozone	160	30	1
Cadmium	..	0.3	1

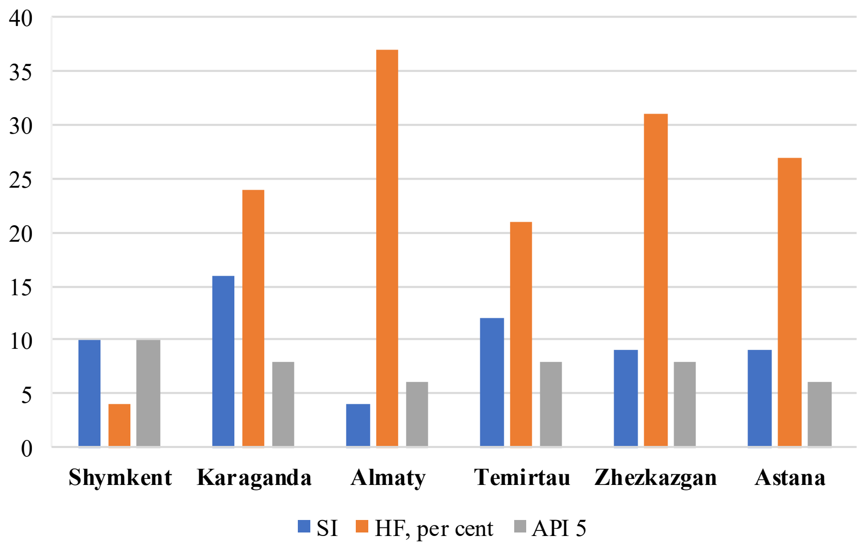
Source: Hygiene standards for atmospheric air in urban and rural settlements (2015 Order of the Minister of National Economy No. 168); Informational Bulletin on the condition of the Environment in the Republic of Kazakhstan for 2017.

Table 6.2: Estimation of the air pollution levels by different indexes

Class	Air Pollution	Indexes air pollution	Yearly estimation
I	Low	SI	0-1
		HF, per cent	0
		API	0-4
II	Increased	SI	2 to 4
		HF, per cent	1 to 19
		API	5 to 6
III	High	SI	5 to 10
		HF, per cent	20-49
		API	7 to 13
IV	Very High	SI	> 10
		HF, per cent	≥ 50
		API	≥ 14

Source: Informational Bulletin of the Condition of the Environment in the Republic of Kazakhstan for 2017.

Figure 6.1: Air pollution indexes for selected cities, 2017



Source: Informational Bulletin of the Condition of the Environment in the Republic of Kazakhstan for 2017.

Table 6.3: Estimates of ambient air pollution, 2017

Level of pollution	Location
High level	Zhezkazgan, Karatau, Karaganda, Shymkent, Temirtau, Ust-Kamenogorsk and Glubokoe
Increased level	Astana, Almaty, Aktobe, Zhanatas, Semey, Ridder, Taraz, Aktau, Balkhash and Chu
Low level	Stepnogorsk, Aksay, Arkalyk, Jitikara, Zyryanovsk, Kentau, Lisakovsk, Rudnyi, Saran, Kostanay, Turkestan, Uralsk, Kokshetau, Aksu, Kyzylorda, Pavlodar, Zhanaozen, Kulsary, Ekibastuz, Taldykorgan, Berezovka, Beyneu, Akay, Sarybulak, Atyrau, Petropavlovsk, Toretam, Yanvartsevo, Karabalyk, Kordai, Borovoye resort and Shchuchinsk-Borovoe resort area

Source: Informational Bulletin of the Condition of the Environment in the Republic of Kazakhstan for 2017.

For a realistic evaluation of the air quality in the country, the use of indexes is not practicable because much information about short-term and annual concentrations and exceeding of air quality standards is hidden behind these data. The indexes can be used to rank cities and regions but for a modern air quality information system component- and site-specific concentrations must be available to establish necessary emission reduction measures. As none of the indexes relates directly to the MAC values or to other international standards for the air pollutant concentrations (such as WHO or EU standards), the environmental and health risks cannot be established as direct consequences of the local concentrations of specific pollutants during different periods, which is, in most cases, the standard approach in international practice. However, 2010 data indicate triple exceedances of MAC for total suspended particles (TSP) and NO_2, but as average values for cities. Their number with exceedances of those MACs is also given – 17 and 21 cities, respectively, of 35 monitored.

As the MACs were established before 1990, the list of parameters has not been revised or harmonized with international standards. While the system mandates very low ambient concentrations of pollutants, there is a mismatch between the scope of regulation and government monitoring. As the system is ambitious, but not fully effective, there is now widespread recognition of the need to reform the MACs system in Kazakhstan.

The assessment of air quality by directly comparing measured monthly or annual means of concentration levels with, for example, EU standards gives a more understandable picture of the situation with respect to the levels of air pollution in Kazakhstan (box 6.1).

Impact of air pollution on human health

In the urban and industrialized areas of Kazakhstan, exposure to air pollution has serious health consequences. In 2013, the World Bank estimated the annual number of premature deaths due to air pollution in Kazakhstan to be 2,800 (caused by particulate matter in ambient air and household air pollution) and the annual health costs to be US$1.3 billion.[40] Almaty City, Pavlodar, Ust-Kamenogorsk, Temirtau and Shymkent are the cities bearing the highest costs for human health.

According to the 2013 study "Human health cost of air pollution in Kazakhstan", [41] air pollution in Kazakhstan constitutes a significant contribution to the environmental burden of diseases. It concludes that the impact of air pollution on premature mortality in Kazakhstan is highest in Almaty City. This can be explained by the fact that Almaty has a relatively high $PM_{2,5}$ concentration. The high concentration of $PM_{2.5}$, estimated from TSP measurements by Kazhydromet, is mainly attributed to the traffic emissions and the domestic use of coal with a high ash content in Kazakhstan.

Box 6.1: Measured concentrations of air pollutants in selected cities, 2010–2012

Air quality measurement results (measured concentrations of air pollutants in the period 2010–2012) show that, in a number of stations in Almaty City, the annual mean and monthly mean values for PM_{10} and NO_2 are exceeding EU standards by (in some cases) a factor of 2–3. The busy traffic in the city, in combination with the low quality of fuel and the specific terrain in which the city is situated (which often causes thermal inversions in which the polluted air cannot rise and dilute), lead to these high air pollution levels. Measured PM_{10} levels vary from 40–100 µg/m^3 and NO_2 levels from 60–150 µg/m^3

The EU air quality standards are 40 µg/m^3 for PM_{10} and NO_2 (annual average). Kazakhstan uses MAC values (60 µg/m^3 for PM_{10} and 40 µg/m^3 for NO_2 (24-hour averages), and 300 µg/m^3 for PM_{10} and 200 µg/m^3 for NO_2 (maximum values).

In Temirtau, where high emissions from the steel industry occur, the estimated PM_{10} concentration level (derived from the measured TSP concentration), is around 80 µg/m^3 (annual mean), which is twice as high as the EU limit value for PM_{10}. High emissions of polycyclic aromatic hydrocarbons, phenols and trace elements (heavy metals) also occur. Mercury in the surrounding soils caused by former industrial processes can be emitted into the air by remobilization of dust into the air.

Ust-Kamenogorsk is a major mining and metallurgical centre. Due to the heavy industry, the mean monthly and annual concentration levels of PM_{10}, SO_2 and NO_2 are 3–5 times higher than the EU standards and pose a threat to public health.

In Ridder, also a major mining centre where important nonferrous metal processing occurs, the monthly and annual mean concentrations of SO_2 and NO_2 are 4 and 2 times higher than the EU standards, respectively.

Source: World Bank, *Towards Cleaner Industry and Improved Air Quality Monitoring in Kazakhstan*, 2013.

[40] World Bank, *Towards Cleaner Industry and Improved Air Quality Monitoring in Kazakhstan* (2013).

[41] Kenessariyev, U. and others, "Human health cost of air pollution in Kazakhstan", *Journal of Environmental Protection*, vol. 4 (2013), pp. 869-876.

According to the 2015 study "Influence of ecologic factors on respiratory diseases in urban residents of Kazakhstan", [42] medical examinations of the population around industrial complexes in Temirtau, Ust-Kamenogorsk, Aktau and Ekibastuz show the increase of diseases of circulatory, respiratory and digestive systems.

According to the 2017 study "Environmental problems and policies in Kazakhstan: Air pollution, waste and water",[43] in Temirtau, medical examination has shown delayed physical development of children.

Impact of air pollution on livestock and biodiversity

Although the concentrations of air polluting substances are highest in industrial and populated areas where no large concentrations of cattle are present, worse air quality in rural areas contributes to the problems of desertification and erosion, especially in areas where water shortage and overgrazing are already a problem. Heavy air pollution – for example, caused by mining – can contribute to land and water resource degradation that also leads to biodiversity loss. Dust and air pollution (by ammonia, methane, endotoxins) inside animal buildings, caused by indoor breeding, has, in many cases, more effect on animals than does outdoor pollution. No studies about the relationship between air pollution and the impact on livestock and biodiversity have been conducted in Kazakhstan.

6.2 Trends in air emission levels

Since 2001, Kazakhstan has been a party to the Convention on Long-Range Transboundary Air Pollution (CLRTAP). It has, however, not ratified any of the Protocols to the Convention. Notwithstanding, Kazakhstan has reported an Informative Inventory Report and submitted emissions data to the Centre on Emission Inventories and Projections (CEIP) in 2017.

The CEIP collects data on emissions and projections of acidifying air pollutants, heavy metals, particulate matter and photochemical oxidants from parties to the CLRTAP. Submitted inventories are reviewed by nominated experts. In 2017, the CLRTAP inventories of Kazakhstan were reviewed (coordinated by CEIP). The Expert Review Team found the inventory submitted by Kazakhstan to be partly in line with the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2016 and the ECE Reporting Guidelines and has identified the need for further improvements in the transparency, completeness, consistency and accuracy of the inventory. The submitted data have been corrected in May 2018 (table 6.4).

Every year, the Ministry of Energy publishes the comprehensive National Report on the Environmental Situation and the Use of Natural Resources in Kazakhstan, which is in fact an SoER. In this report, the annual emissions of stationary sources of a great number of components are given. Table 6.5 shows the emission trends for some of these components.

Stationary sources' emission trends as reported by the Ministry of Energy show some fluctuations for acidifying agent (SO_2, NO_2) but no clear increasing or downward trends. NMVOC emissions doubled in the period 2011–2016, while the hydrocarbon emissions data reduced by more than 50 per cent. The emissions data that are submitted to the EMEP for mobile sources (as part of table 6.4) are only 20 per cent of the total NMVOC emissions. The remaining emissions of NMVOC in table 6.4 are twice as high as the emissions in table 6.5 because of the relatively high contribution from the agricultural sector that is not included in the National Report. Emissions of total suspended particles (TSP) from stationary sources have been declining since 2011, while PM_{10} and $PM_{2.5}$ emissions from all sources are stable according to the submission to EMEP in table 6.4.

For the SO_2 and NO_2 emissions, there are differences between the submitted data to EMEP and the data in the National Report. Stationary source emissions of NO_2 are two times higher in the submission to EMEP than in the National Report.

Table 6.6 shows the distribution of air emissions per sector in 2016 for SO_2, NO_x, NMVOC and CO, based on the submission by Kazakhstan of emissions data to the EMEP (corrected May 2018).

[42] Ibrayeva L. K. and others, "Influence of ecologic factors on respiratory diseases in urban residents of Kazakhstan", *Meditsina truda i promyshlennaia ekologiia*, vol. 3 (2015), pp. 29-33.

[43] Nugumanova L. and others, "Environmental problems and policies in Kazakhstan: air pollution, waste and water", Working Papers 366 (Leibniz-Institut für Ost- und Südosteuropaforschung (Institute for East and Southeast European Studies) (2017). Available from https://www.dokumente.ios-regensburg.de/publikationen/wp/wp_366.pdf.

Table 6.4: Emission trends, 1990, 2000, 2005, 2010–2016, Gg

	1990	2000	2005	2010	2011	2012	2013	2014	2015	2016
SO_2	1 046	409	540	597	738	650	627	646	594	638
NO_2	869	366	526	643	648	727	738	737	773	797
NH_3	341	150	195	257	207	211	213	222	229	238
NMVOC	380	170	204	277	259	290	280	312	300	299
CO	1 573	625	718	1 252	1 097	1 361	1 196	1 520	1 355	1 327
$PM_{2.5}$	15	7	9	11	11	12	11	10	12	11
PM_{10}	80	35	42	48	48	48	48	48	49	50

Source: EMEP CEIP, submission by Kazakhstan, 14 February 2018, corrected 18 May 2018.

Table 6.5: Emission trends for stationary sources, 2011–2016, Gg

	2011	2012	2013	204	2015	2016
SO_2	774	770	729	729	711	767
NO_2	445	446	458	479	451	473
NH_3	2	2	2	2	2	2
NMVOC	53	58	92	114	105	100
C_xH_y	138	171	96	62	66	63
TSP	631	594	551	494	466	461

Source: SoER for 2017.

Table 6.6: Emissions per sector, 2016, Gg

	SO_2	NO_2	NMVOC	CO
Power plants	332	285	5	22
Industry	164	250	9	84
Transport	8	134	53	476
Residential	42	25	24	240
Agriculture	2	61	111	35
Others	90	14	97	470
Total	**638**	**797**	**299**	**1 327**

Source: EMEP CEIP, submission by Kazakhstan, 14 February 2018, corrected 18 May 2018.

Ammonia

NH_3 emissions have increased slightly from 2011 and are mainly from manure management in the agricultural sector (table 6.4). Industrial emissions and emissions from other sectors (wastewater treatment) are relatively low and hardly contribute to total NH_3 emissions. Figure 6.2 shows the breakdown of ammonia emissions.

Heavy metals

Heavy metals are emitted in the iron and steel industry, the metallurgical industry and the mining industry, and from coal-fired power plants, galvanizing enterprises and other industries. Table 6.7 shows emissions of five heavy metals from stationary sources as presented in the National Report on the Environmental Situation and the Use of Natural Resources.

The trend in emissions is strongly downward for As, stable for Cd and Hg and fluctuating for other metals. The heavy metals emissions data submitted to EMEP differ considerably from the emissions data in the National Report. The EMEP data include all sources while the National Report includes only stationary sources. For Cd and Hg, the EMEP submission is five times higher than the emissions in the National Report, but for Pb the EMEP submission is 10 times lower and for Cu and As two to three times lower, which does not seem logical.

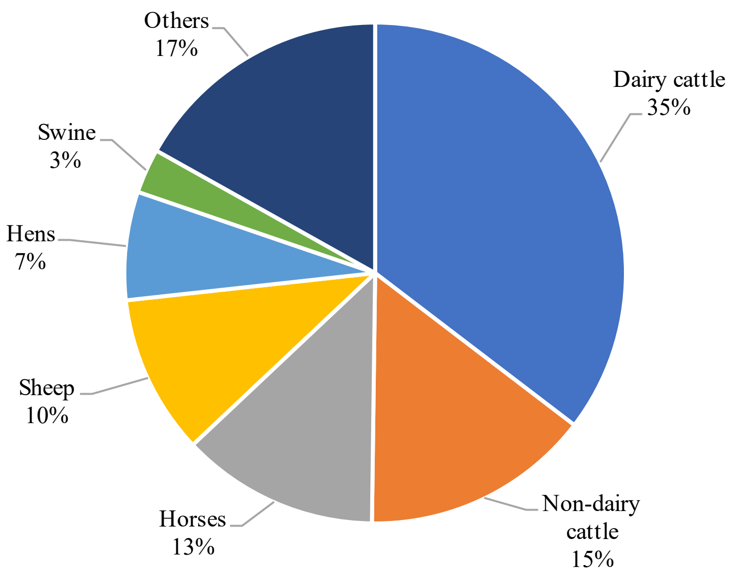
Persistent organic pollutants

The most important emission sources of unintentionally emitted persistent organic pollutants (POPs) to air in Kazakhstan are heat and power generation, ferrous and non-ferrous metal production, metallurgical processes, the chemical, petrochemical, pulp and paper and cement industries, and uncontrolled (waste) incineration (PCDD/Fs and PAH). POPs are not produced in Kazakhstan. There are, however, stockpiles with obsolete pesticides.

Emissions data of some POPs are shown in the country-specific report for Kazakhstan by the Meteorological Synthesizing Centre East (MSC-E) (Moscow) (table 6.8).

According to the country-specific reports of MSC-E for Kazakhstan, emissions of PCDD/Fs and B(a)P did not change significantly in the last five years. B(a)P emissions were around 15,000 kg/y before 2002. PCB emissions are reducing steadily, while HCB emissions fluctuated and increased after a reduction from an emission of 1 kg/year in 2010. HCB was used as a fungicide in the past and can also be emitted as a by-product in industrial processes or from agricultural activities.

Figure 6.2: Ammonia emissions, 2015



Source: Centre on Emission Inventories and Projections (2017), National sector emissions: main pollutants, particulate matter, heavy metals and persistent organic pollutants, Kazakhstan, 2015.

Table 6.7: Selected heavy metals emissions from stationary sources, 2011–2016, Mg

	2011	2012	2013	2014	2015	2016
Pb	645	542	572	699	636	225
Cu	310	249	166	163	255	218
As	161	103	122	88	41	13
Cd	..	1.2	1.3	1.2	1.2	1.3
Hg	0.3	0.2	0.2	0.2	0.2	0.2

Source: National Report on the Environmental Situation and the Use of Natural Resources, 2017.

Table 6.8: POPs with significant air emissions, 2011–2015

	2011	2012	2013	2014	2015
PCDD/Fs (g TEQ)	241	230	220	223	288
B(a)P/PAH (kg)	6 600	6 700	6 800	6 900	7 000
HCB (kg)	0.59	0.53	0.42	0.85	0.91
PCB-153 (kg)	20.90	19.30	17.60	15.90	14.20

Source: www.msceast.org/index.php/kazakhstan

Greenhouse gas emissions

Greenhouse gas (GHG) emissions in Kazakhstan in 2015 are 22.7 per cent lower than in 1990 (table 5.2). Since 1995, the land use, land-use change and forestry (LULUCF) sector data changed from absorption (sink) to emission. The energy sector is by far the largest source of CO_2 emissions: GHG emissions from the transport sector and industrial combustion installations are included in this sector.

Ozone-depleting substances

ODS, such as HCFCs, are not produced in Kazakhstan. In 2005, zero consumption of CFCs was reached. The consumption and emissions of methylbromide have been reduced from 2010 by more than 90 per cent compared with 2008. The consumption of HCFCs has also been reduced considerably in the last few years (table 6.9), with the exception of 2013.

Kazakhstan is delayed in meeting its compliance obligations under the Montreal Protocol but has submitted a plan of action to ensure the goal of achieving zero ODP tonnes of HCFCs by 2020.

6.3 Performance and gaps in air monitoring networks

The air monitoring network is mainly situated in the big cities and industrial centres in the country. As of April 2018, there are 146 stationary monitoring stations in 49 human settlements; 56 are manually operated and 90 are automatic. Almaty and Ust-Kamenogorsk have most manual stations (each city has five). Almaty has the highest number of automatic stations (11). Other populated and/or industrial areas have many fewer automatic stations (in the heavily industrialized city of Temirtau there is only one, along with three manual stations).

An additional 14 mobile stations are operated in the country.

There are different measurement programmes for air quality, varying from 2–4 measurements a day to continuous measurement. In total, at different places 35 different substances are measured, including $PM_{2.5}$, PM_{10}, NO/NO_2, SO_2, SO_3, C_xH_y, O_3, CO, CO_2, NH_3, benzene, benz-A-pyrene, phenol, formaldehyde, Cd, Pb, Zn, Cr, As and Be. All key pollutants that are discussed in the 2016 OECD report on air pollution indicators [44] are measured in Kazakhstan. Other important aspects for air monitoring, such as geographic coverage of monitoring stations and public availability of air quality data, are mentioned in this report. The geographic coverage of air monitoring stations in Kazakhstan has been improved in the last five years. With regard to public availability of data, Kazhydromet publishes reports on air quality data on a monthly, quarterly and annual basis at http://kazhydromet.kz.

In the last five years, the number of monitoring stations has almost doubled, from 78 in 2012 to 146 in 2017, and a number of high priority pollutants like $PM_{2.5}$, PM_{10}, O_3 and benz-A-pyrene mentioned in the 2016 OECD report are now measured. This also brings Kazakhstan much closer to the EU criteria and EU Guidance for the siting and minimum number of monitoring stations as stated in the 2008 EU Air Quality Directive (Directive 2008/50/EC on ambient air quality and cleaner air for Europe). The number of monitoring stations, however, is not yet sufficient. In the heavily industrialized area of Temirtau city, the number of automatic monitoring stations is still low and not sufficient.

Due to the rapid growth in the number of stations and measurements of many additional air polluting substances, it is a challenge to get sufficient skilled and trained personnel to guarantee solid quality control and quality assurance procedures for adequate monitoring, in compliance with international standards, such as organized reference methods, on-the-spot calibrations, equivalence tests and data validation. In the absence of solid quality assurance and quality control procedures, and given the current air quality standards, representative and reliable air quality data do not support decision-making and guide the reduction of emissions.

Table 6.9: HCFC consumption, 2008–2017, ODP t

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total	62.80	63.00	110.00	90.75	21.36	83.32	24.80	12.11	4.96	6.82

Source: http://ozone.unep.org/en/data-reporting/data-centre, accessed December 2018.

[44] Turner, J., “Air pollution exposure indicators: review of ground-level monitoring data availability and proposed calculation method”, OECD Green Growth Papers No. 2016/01 (Paris, OECD Publishing, 2016). Available from http://dx.doi.org/10.1787/5jlsqs98gss7-en.

6.4 Pressures on air quality

Agriculture

Agricultural lands occupy 32 per cent of the total area of Kazakhstan and 86 per cent of these are pastures. The agricultural sector is the largest source of emissions of NH_3 (accounting for 99 per cent), while industry only emits 1 per cent.

Animal husbandry is the main contributor to agricultural ammonia emissions, while the use of mineral fertilizers has declined strongly in comparison with 1990. The emission of ammonia is calculated by applying emission factors considering the different methods of breeding and manure storage, treatment and application. Ammonia emissions are increasing slightly since 2011 (table 6.4) but are still much lower than in 1990, when there was an important emissions contribution from industry and synthetic urea-based fertilizers. Another cause of this lower level of emissions is the severe livestock reduction in the period 1990–1997, whereas the numbers of livestock have been increasing again slightly since 1998. Good practice to control ammonia emissions is not yet widely applied in Kazakhstan, as the largest proportion of the emissions comes from pastures, where the majority of livestock spends most of the year. Dairy cattle live on pasture land for more than half of the year and goats and sheep two thirds of the year, and horses may even live there all year round, while measures to reduce emissions (based on BAT) are mainly operated in livestock housing and directed towards storage and emissions from slurry.

GHG emissions from the agricultural sector are 9.13 per cent of the total emissions of GHGs in the country in 2015. They decreased by 31.95 per cent, from 42,249 Gg CO_2 equivalent in 1990 to 28,753 Gg CO_2 equivalent in 2015 (table 5.2). Methane and nitrous oxide are the main components of the GHG emissions in the sector. Enteric fermentation represented, on average, 45.86 per cent of GHG emissions from agriculture in the period 2008–2016 (figure 12.6). Since 1998, GHG emissions from the agricultural sector have been increasing slightly.

Energy sector

Electrical power generation and heat generation

In 2016, 40 per cent of the emissions of SO_2 and 60 per cent of the emissions of NO_x from stationary sources in the country were caused by the electrical power plants. As much of the coal that is combusted in these power plants is of low quality, with a high ash content (45 per cent), the emissions of particulates are high as the standards for dust emission are much less stringent (by a factor 10 at least), than in most of the OECD Member countries that apply EU standards or comparable emission standards (Canada, Japan, Norway, Turkey, the United States). Reduction of the high emissions of SO_2, NO_x and particulates from power plants can be achieved by a change of fuel from coal to natural gas, in combination with combustion improvement and selective catalytic reduction to remove NO_x, or by installing adequate desulphurization and dedusting equipment.

The Government has developed a list of power plants proposed for modernization or reconstruction (e.g. change of fuel from coal to gas) and for the construction of new state-of-the art facilities, which should have BAT and ELVs as established in the EU BREF for Large Combustion Plants. As an example, the CHP plant-2 in Almaty (6 units, 510 MW_e) is expected to be transferred from coal to gas fired in 2020.

Coal, oil and gas

Coal is the most important fuel in the economy of Kazakhstan (55 per cent of the primary energy consumption in the country). Natural and associated gases account for 22 per cent, oil products for 19 per cent and hydropower for 4 per cent. Electricity and heat generation for power plants (70 per cent) and industry and households (30 per cent) are the main consumers. The demand for coal for electricity and heat generation in Kazakhstan is expected to grow in the next decade and, if no additional measures are taken, the emission of sulphur and nitrogen oxides, fine particles and GHGs into the atmosphere will increase.

At present, emission limit standards for large combustion plants in Kazakhstan are far less stringent than in the EU (table 6.10). Existing emission limit standards in Kazakhstan are different for existing plants and new plants. They are quite relaxed for existing plants not undergoing any modernization, more stringent for existing plants that undergo modernization and most stringent for new plants. Nevertheless, the most stringent standards (i.e. for new plants) in Kazakhstan are in times less stringent than the corresponding EU standards. Another related issue is that under EU Directive 2010/75/EU, any new application for a permit is conditional upon the compliance with the Directive's ELVs, while in Kazakhstan existing plants continue to apply for and receive new permits with the lowest emission limit standards.

Table 6.10: Air emission standards for large combustion plants in Kazakhstan and the EU, mg/m^3

Pollutant	Power plant	Power (MW)	Kazakhstan Emission limit standards (mg/m^3)			EU Emission limit values (mg/m^3)		
			Solid fuel	Liquid fuel	Gaseous fuel	Solid fuel	Liquid fuel	Gaseous fuel
PM	Existing plant after modernization	0–299	670–870			20		5
		300–1 179	100–400			10		
		≥ 1 180	400–600					
	Existing plant before modernization	0–299	700–900			20		
		300–1 179	600–1 200			10		
		≥ 1 180	1 200–1 600					
	New plant	0–299	150–500			20		
		300–1 179	100–200			10		
		≥ 1 180	100–200					
SO_2	Existing plant after modernization	0–100	2 000–3 400			400	350	35
		100–299				200		
		≥ 300	2 000–3 000			150		
	Existing plant before modernization	0–100	2 000–3 400			400	350	
		100–299				200		
		≥ 300				150		
	New plant	0 < 100	1 200–1 400			400	350	
		100–200				200		
		200–249	1 800–2 000					
		250–299	700					
		≥ 300	780			150		
NOx	Existing plant after modernization	0–100	500–700	290	255	300		100
		100–299				200		
		≥ 300	570–800	350	290	150		
	Existing plant before modernization	0–100	600–850	400	350	300		
		100–299				200		
		≥ 300	600–1 050	500	400	150		
	New plant	0–100	320–640	250	125	300		
		100–299				200		
		≥ 300	300–550	250	125	150		

Source: 2010 Government Resolution No. 747; EU Directive 2010/75.
Note: The EU Directive does not differentiate between existing and new plants. Numbers for EU are indicated as valid for all plants in the EU that apply for permits starting from 2013.

Kazakhstan has proven, large onshore oil, associated petroleum gas and natural gas reserves in the west of the country. It exports 85 per cent of the extracted oil via ships and pipelines, mostly to the People's Republic of China, the Russian Federation and Turkey (via Azerbaijan and Georgia). There are three oil refineries in the country (Pavlodar, Atyrau and Shymkent), the first served by a pipeline from Western Siberia and the other two mainly handling domestic oil. Kazakhstan exports natural gas via pipelines from the western part of the country to the People's Republic of China and the Russian Federation. The lack of proper infrastructure for gas still resulted in the need for gas imports to meet domestic demand, but, in 2015, new links to existing pipelines have replaced imported gas with domestic gas in the south of Kazakhstan. In the north of the country and the capital, natural gas is imported by road from the Russian Federation.

The three main refineries in Kazakhstan were upgraded in the period 2014–2018, allowing Kazakhstan to become temporarily self-sufficient in fuel. The upgrading, whereby desulphurization facilities have been installed, should result in both an improvement in the quality of the produced fuels to Euro 4 and 5 standards and a reduction in the facilities' atmospheric air pollution by reduction of SO_2, NO_x, VOC, H_2S and PM emissions. Higher quality of the fuel used (less sulphur) is very important for the air quality in the cities with abundant vehicular traffic.

Photo 6: Smog in Almaty

Heat generation

More than 35 per cent of the heat output of power plants in Kazakhstan is delivered by CHP plants and is used for heat supply to large industrial enterprises and nearby populated areas for district heating. The existing CHP plants in Kazakhstan are generally more than 35 years old and need to be upgraded or replaced. District heating is widespread in urban areas in Kazakhstan but not in rural areas.

Transport

The transport sector in Kazakhstan causes 2 per cent of the SO_2 emissions, almost 40 per cent of the CO emissions, 17 per cent of the NO_x emissions, 20 per cent of the NMVOC emissions and an estimated 35 per cent of the emissions of particulate matter ($PM_{2.5}$). Ecological class K2 (comparable with Euro-2, 500 mg/kg sulphur for diesel and gasoline) has been in force since 2009. Ecological class K3 (Euro-3, 350 mg/kg for diesel and 150 mg/kg for gasoline) has been in force since 2011.

According to the Ministry of Energy and Kazhydromet, Karaganda, Almaty and the capital are the cities in which motor vehicles are the most important factors in air pollution.

Since 1 January 2018, gasoline and diesel fuel entering the retail market in Kazakhstan must comply with the ecological classes K4 and K5 (comparable with Euro-4 and -5), which should mean a threefold decrease (for K4) and a 15-fold decrease (for K5) in the sulphur content of gasoline (from 150 mg/kg to 50 mg/kg and 10 mg/kg) and a sevenfold decrease (for K4) to a 35-fold decrease (for K5) for diesel fuel (from 350 mg/kg to 50 mg/kg and 10 mg/kg). The K4 and K5 ecological classes apply to both gasoline and diesel.

The upgrading processes of the three domestic refineries should make it possible to fulfil the sulphur requirements and reduce SO_2 emissions from the transport sector by a factor of 10–20, and to reduce fuel imports from the Russian Federation.

Because of the growing fleet of automobiles and the age of most transport vehicles in Kazakhstan, additional measures are required to ensure that emissions of NO_x and $PM_{2.5}$ in 2020 are also decreasing, to achieve an improvement in urban air quality, especially during winter. Policy measures that promote the greening of transport through incentives for cleaner fuels such as CNG/LPG, the use of hybrid or electric cars and promotion of clean urban public transport are lacking. In 2017, the OECD [45], in

[45] OECD, *Promoting Clean Urban Public Transportation and Green Investment in Kazakhstan,* Green Finance and Investment (Paris, 2017).

cooperation with the Ministry of Energy, published a comprehensive study that describes opportunities to reduce air pollution and GHG emissions from the public transport sector.

Since 2018, Kazakhstan prohibits the import of cars that are below Euro-4 emission standards. To prevent emissions from road transport, vehicles older than five years and engine volumes that exceed 3 litres may not be imported.

As 70 per cent of the private car fleet is 10 years old or older, most cars in Kazakhstan will not correspond to Euro-4. And 50 per cent of the vehicles are probably even below Euro-3 standards. There is a mandatory technical inspection requirement for cars but, since June 2015, it applies only when a car reaches seven years of age. Different requirements exist for commercial carriers and taxis: cars up to three years old are inspected once during these three years, cars three to seven years old are inspected every two years and cars more than seven years old are inspected annually. Compliance validation of engine exhaust gas emissions to MACs for CO and hydrocarbons is included in the inspection.

Urban areas with heavy smog and air pollution, like Almaty, do not apply alternating driving days for cars with even- and odd-numbered licence plates and do not prohibit old cars in the city centre. Such measures as allowing free public transportation during peak pollution periods have not been considered.

Housing

Kazakhstan is one of the coldest countries in the world, with abundant energy resources and relatively low energy prices. In 2015, 46 per cent of the population was living in rural areas, where only 4 per cent of households are connected to district heating and 24 per cent to network gas. In urban areas, 75 per cent of households are connected to district heating and 61 per cent to network gas.

Besides the industrial and car emissions, during the (long) heating season, emissions from private households have a considerable impact on the air pollution levels in the cities. Coal is used for space heating – up to 30 per cent in cities, but especially in rural areas, where it accounts for more than 70 per cent – which causes unfiltered emission of SO_2, dust and PAHs from sources located in low positions, thus having a large adverse influence on the ambient air quality.

Residential coal consumption per capita in Kazakhstan is one of the highest in the world (IEA, 2015).

According to the 2017 study "Household Energy Consumption and Energy Poverty in Kazakhstan",[46] almost 20 per cent of the CO emissions in the country comes from residential sources (households) and the use of coal causes casualties by CO poisoning every year. The use of other solid fuels than coal like firewood is also wide spread in less prosperous areas where illegal logging of wood and waste burning is present.

More access to central heating installations or network natural gas would improve the air quality in urban and especially in rural areas. As most of the energy prices in Kazakhstan are subsidized, the growing availability of natural gas systems would lead to (subsidized) natural gas prices lower than coal prices as an incentive for citizens to transfer to natural gas. Another instrument for emission reduction of housing is to enhance the efficiency of space heating which at this moment is low in Kazakhstan in comparison with other countries. According to the 2012 OECD publication "Promoting energy efficiency in the residential sector in Kazakhstan", the average heat consumption per m^2 in apartment buildings in Kazakhstan is three times as high as in Sweden.

Improvement of energy efficiency in the residential sector would have a strong influence on air quality. At the moment, there are not enough investments in maintenance and renovation of central- and district heating systems, and modernization of installations to better energy efficiency standards for household devices and reconstruction and isolation of buildings and private houses.

6.5 Legal, policy and institutional framework

Legal framework

Regarding air quality assessment and management, there is no specific national air quality legal framework in Kazakhstan.

The 2007 Environmental Code provides the basic legal framework for environmental protection and climate change control. The Code should be followed by executing acts and decisions, including on air

[46] Kerimray, A. and others, "Household energy consumption and energy poverty in Kazakhstan" (International Association for Energy Economics, 2017). Available from https://www.iaee.org/en/publications/newsletterdl.aspx*?id =382*&usg=AOvVaw0TrJaI1LHmZXUBebUAMx7D.

protection, but there are practically none on air protection. The legislation provides no incentives for clean production and installation of air pollution prevention technologies. The system of environmental fines for violating the standards is not effective. Uncontrolled burning of waste is prohibited but still remains a common practice, especially in rural areas.

In 2016, amendments were introduced to the Environmental Code by the 2016 Law on Amendments to Legislation related to Ecology and Subsoil Use Issues. Among other matters, these amendments enable companies to use the technologies included in the EU BREFs when applying for integrated permits in Kazakhstan. In addition, the amendments state that the ELVs for point sources of pollution are to be either calculated in order to comply with the MAC values or defined in accordance with technical standards for specific industries (such technical standards are set in the 2007 Government Resolution No. 1232).

The 2014 Order of the Minister of Energy No. 155 on the scope of recommended BAT for combustion of fuels and control of emissions contains air pollution reduction techniques that are state of the art and, when applied, are on BAT level. The 2015 Order of the Minister of Energy on the rules concerning integrated permitting No. 37 identifies industrial facilities that can apply (but are not required to apply) for an integrated permit.

Relevant laws for emission reduction of GHGs are the 2009 Law on Support for the Use of Renewable Energy Sources and the 2012 Law on Energy Saving and Energy Efficiency Improvement.

Policy framework

Kazakhstan has no national policy on air protection, nor has it specific air quality programmes. The general policy directions of air quality assessment and air quality management may be identified from other policy documents.

<u>Concept on Transition to Green Economy</u>

The 2013 Concept on Transition to Green Economy describes pressures on air quality and the plans and actions for improvement. The Concept mentions five actions for the industrial sector and three actions for the transport sector. For the energy sector, energy scenarios with the development of renewable sources are defined for the coming years up to 2050. Two scenarios, Basic and Green, are described, in which the share of renewables amounts to 20 per cent and 50 per cent in 2050, respectively. The Concept also promotes air protection management based on air quality standards aligned to the values of EU Directive 2008/50/EC on ambient air quality and cleaner air for Europe and ELVs for emissions from the energy sector identical with those of the revised Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol) of the CLRTAP. For emissions from the transport sector, emission standards in accordance with Euro 4 and beyond are proposed, as well as an annual control of emissions from motor vehicles and an audit of the full vehicle fleet by 2020.

<u>Strategic Plan of the Ministry of Energy for the period 2017–2021</u>

The Strategic Plan of the Ministry of Energy for the period 2017–2021, in strategic direction No. 3, describes intentions to improve the quality of the environment by developing a regulatory framework and decreasing emissions by transition to a low carbon and green economy. The number of air pollution monitoring stations is expected to rise to 250. To reduce emissions of GHG, enhancement of energy efficiency, modernizing of powerplants and emissions trading are envisaged.

<u>National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants</u>

In 2009, Kazakhstan submitted its National Implementation Plan (NIP) to the Stockholm Convention, in which unintentional POPs (uPOPs) and the new POPs were not yet considered. Although POPs are not produced in Kazakhstan, obsolete and unusable pesticides in agriculture and equipment containing POPs in industry, energy and transport remain an issue to be resolved. Another problem is the release of dioxins and furans into the atmosphere, caused by (unintentional) emissions from industry or uncontrolled combustion processes. The 2009 NIP was based on inventories that have been executed in the first decade of this century and covers storage of obsolete pesticides, PCB-containing equipment, emissions of dioxins and furans and POP-polluted territory.

The updated NIP with new POPs, covering the period 2015–2028, was adopted in 2014 (2014 Order of the Minister of Energy No. 228) and submitted to the Convention Secretariat in 2015. It includes regulatory measures on reduction or elimination of releases and an Action Plan on pesticide wastes containing POPs. Another Action Plan regards the safe management, storage and destruction of equipment and waste containing PCBs. An Action Plan on measures to reduce releases from unintentional production of dioxins and furans has also been established. This 2014 NIP was revised again in 2017 with support of the four-year UNDP/GEF project "NIP Update, Integration of POPs into National Planning and Promoting Sound Healthcare Waste Management in Kazakhstan". The revision incorporates uPOPs into the NIP.

Kazakhstan does not yet take sufficient measures for identification and monitoring of POPs in the environment and products (chapter 13). It is not clear whether POP emissions are systematically monitored during self-monitoring by enterprises. According to the NIP for the period 2017–2028 (2017 Order of the Minister of Energy No. 312), national priorities are:

- A detailed inventory of POPs, including new POPs listed in the Stockholm Convention;
- Development of a POP monitoring system;
- Creation of a unified system of POP control;
- Development of legislation on the issue of chemical safety and creation of mechanisms for its implementation;
- Increasing human capacity in the field of POPs.

Programme on the phase-out of hydrofluorocarbons

Kazakhstan is a non-Article 5 party to the Kigali amendment to the Montreal Protocol for the phase-out of HFCs. The stages of HFC reduction for Kazakhstan compared with the baseline production and consumption (2011–2013) are 5 per cent in 2020, 35 per cent in 2025, 70 per cent in 2029, 80 per cent in 2034 and 85 per cent in 2036 and beyond.

Other

Other relevant policy acts include the 2013 Action Plan for Development of Alternative and Renewable Energy Sources for the period 2013–2020 (2013 Resolution of the Government No. 43, invalidated in 2017) and the 2014 Concept for Development of the Fuel and Energy Sector until 2030 (2014 Resolution of the Government No. 724) (chapter 10).

Policy documents on spatial planning do not sufficiently address environmental considerations. In particular, urban spatial planning does not adequately take into account the characteristics of the sites to develop, with an aim to avoid adverse effects such as street canyons determined by the buildings' height.

Sustainable Development Goals and targets relevant to this chapter

The current position of Kazakhstan in relation to targets 3.9 and 11.6 of the 2030 Agenda for Sustainable Development is described in box 6.2.

3 GOOD HEALTH AND WELL-BEING

Box 6.2: Targets 3.9 and 11.6 of the 2030 Agenda for Sustainable Development

11 SUSTAINABLE CITIES AND COMMUNITIES

Goal 3: Ensure healthy lives and promote well-being for all at all ages
Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

Long-term effects of air pollution on morbidity (asthma, bronchitis) have been investigated in relative few studies (in the EU and United States) and the results of health impact assessments of air pollution are not easy to transfer to other countries, as climatic factors, smoking habits and other social factors also play a role. Concentration response information for morbidity effects of air pollution are also known for China from United States–Chinese research (PM_{10}, SO_2, NO_2 and asthma, cardiovascular conditions related to hospital admissions, respiratory symptoms and hypertension).

In Kazakhstan, in 2016, the annual mortality rate attributed to respiratory diseases is estimated at 102.1 cases per 100,000 population (table 13.3). Air pollution by particulate matter (PM) is the most important factor, but other components (NO_2, SO_2, PAH, O_3) also contribute.

Exposure of the population to high levels of air pollution leads to the additional burden of diseases and increased economic costs. According to the 2013 World Bank assessment, PM pollution causes approximately 2,800 premature deaths in Kazakhstan and costs the economy more than US$1.3 billion annually in terms of increased healthcare costs. According to the Concept on Transition to Green Economy, air pollution results in up to 6,000 premature deaths per year. The 2013 study "Human Health Cost of Air Pollution in Kazakhstan" concluded that mean estimates of mortality risk attributable to air pollution are about 16,000 cases per year and with a 95 per cent confidence index of the risk not exceeding 25,500. Zones of extreme and very high risk of respiratory disorders from the effects of dust fractions in ambient air are reported for seven cities.

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

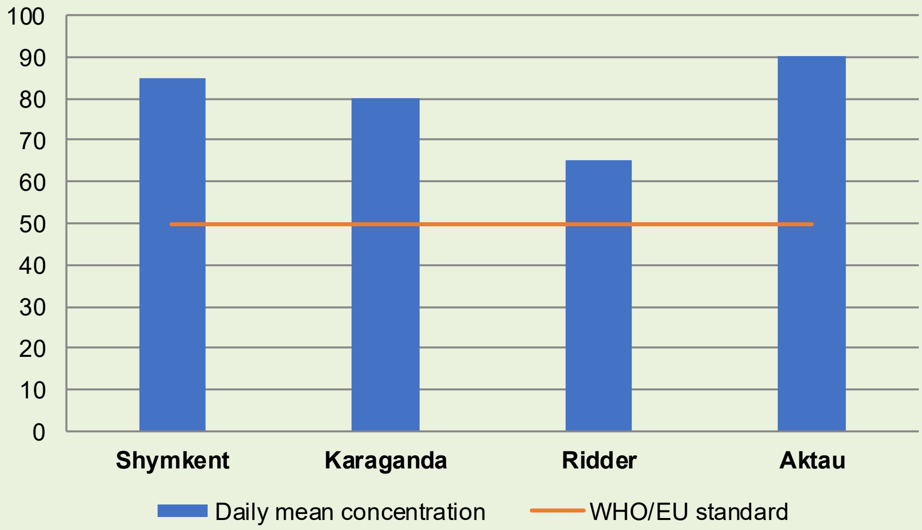
The WHO Air Quality Guideline for the annual mean concentration of PM_{10} is exceeded in many cities in Kazakhstan, as are the EU Air Quality Standards also.

The daily mean concentration of PM_{10} in many cities in Kazakhstan in 2017 is higher than the EU and WHO standards (EU: exceeding the standard 35 days per year is allowed; WHO: exceeding the standard three days per year is allowed) (figure 6.3). The daily mean concentration of $PM_{2.5}$ in many cities in Kazakhstan in 2017 is higher than the WHO standard (in Karaganda, even four times higher) (figure 6.4).

To reduce the mortality and morbidity rates from stroke, heart disease, lung cancer and chronic and acute respiratory diseases like asthma, very substantial measures to reduce air emissions from industry, traffic, households and services must be taken.

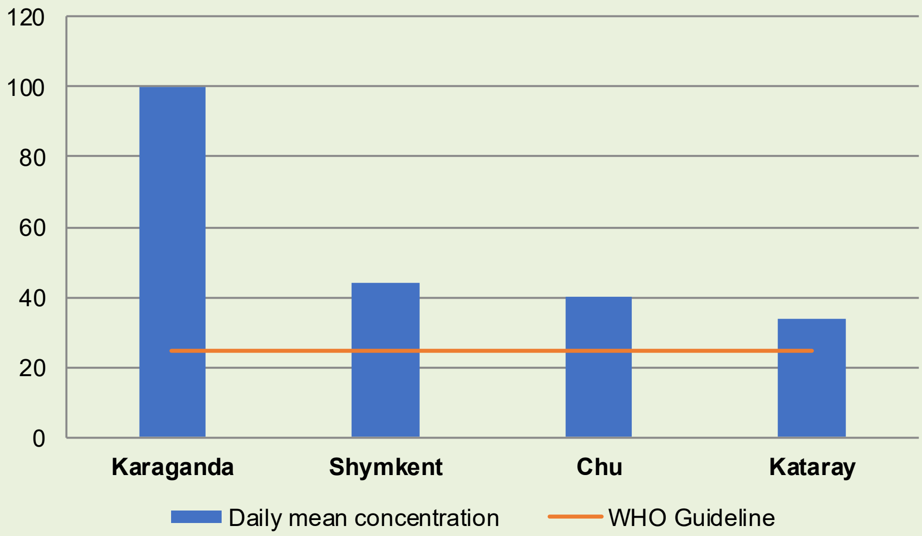
Kazakhstan takes some measures, e.g. it defined the scope of recommended BAT for combustion of fuel and control of emissions (2014 Order of the Minister of Energy No. 155), however implementation is an issue. BATs are not applied in Kazakhstan. Kazakhstan should promote the application of BAT and develop emission reduction plans for air polluting industrial sectors.

Figure 6.3: Daily mean concentration of PM_{10} in selected cities, 2017, µg/m^3



Source: Informational bulletin on the condition of the environment in the Republic of Kazakhstan (2017)
Note: Daily mean values: WHO Air Quality Guideline: 50 µg/m^3; EU Air Quality Standard: 50 µg/m^3.

Figure 6.4: Daily mean concentration of $PM_{2.5}$ in selected stations, 2017, µg/m^3



Source: Informational Bulletin on the condition of the environment, 2017.
Note: WHO Air Quality Guideline: 25 µg/m^3 (daily mean value). No daily EU Air Quality Standard for $PM_{2.5}$.

Institutional framework

In 2014, the Ministry of Environment and Water Resources was abolished and most of its tasks regarding environmental protection were transferred to the Ministry of Energy. Since this reorganization, the Committee of Environmental Regulation and Control, the RSE Informational and Analytical Centre of Environmental Protection and the RSE Kazhydromet, all subordinate to the Ministry of Energy, are the most important organizations acting on air protection.

The Committee of Environmental Regulation and Control is responsible for environmental permitting procedures and enforcement. Decisions on permits are taken based on the conclusions of the SEE. Air pollution experts of the SEE are involved in the procedures. Territorial bodies of the Committee perform state control (inspection) on environmental regulations and the issuing of permits in the oblasts (chapter 2).

The RSE Informational and Analytical Centre of Environmental Protection gathers and processes information from state monitoring of the environment (including emissions to air), publishes the National Report on the Environmental Situation and the Use of Natural Resources (with air emissions data) and is responsible for maintaining the SPRTR, which includes information on air emissions.

RSE Kazhydromet, the national hydrometeorological service, is responsible for environmental monitoring. Kazhydromet monitors air quality alongside the monitoring of radiation, the quality of surface water and the usual meteorological data, and publishes information on air quality.

Other ministries that are important stakeholders in air pollution issues are the Ministry of Health (its sanitary and epidemiological authorities also control air emissions and indoor air quality) and the Ministry for Investments and Development (Committee on Transport) with regard to transport emissions.

The local executive authorities (akimats) can also improve the air quality in their territory by taking measures in the field of spatial planning, such as promoting clean public transport, construction and use of a cycle network, stimulation of cycling by shared bicycle initiatives, improved inspection of cars, and stimulation of the use of electric cars and charging facilities. In 2016, the Almaty City Akimat approved a comprehensive action plan to improve air quality in the city. It consists of 51 measures and is part of the Almaty 2020 Development Programme. The greening of transport, gasification to reduce private emissions (from housing), reduction of air pollution by stationary sources (beginning with power plants) and the building of 30 charging stations for electrical cars are part of the Plan (box 1.2).

The Regional Environmental Center for Central Asia (CAREC) is very active in programmes on climate change and air pollution. In 2013, CAREC and UNEP published the report “Vehicle emissions, fuel quality standards and fuel economy policies in Kazakhstan”.

Regulatory, economic and information measures

<u>Permits</u>

The 2007 Environmental Code introduced integrated environmental permitting similar to EU Directive 2010/75/EU on industrial emissions (the IPPC Directive). Industrial facilities that have a large environmental impact were listed in the 2008 Government Resolution No. 95 (no longer valid; now replaced with 2015 Order of the Minister of Energy No. 37). The list is similar to the Annex I list of the Directive. These industrial facilities are entitled to receive an integrated environmental permit based on BAT with the appropriate ELVs; however, as of May 2018, no applications for such a permit had ever been submitted. This is mainly due to the complexity of the process and the lack of relevant knowledge among those in industry. Industrial facilities still apply for and receive conventional permits for emissions into the environment. The conditions for such permits are derived from MAC values, classes of environmental exposure and sanitary exposure and sanitary zones.

The permit conditions are generally not stringent in comparison with EU emission standards based on BAT. As an example, the permitted emissions from a large iron and steel plant in Temirtau are currently higher than for comparable plants in Europe by a factor of 5 (for NO_x) to 10 (for SO_2 and PM). To achieve acceptable air quality in adjacent populated areas that meets international air quality standards, the appropriate dedusting, desulphurization and denitrification measures must be executed. In part of the aforementioned plant, the oxy steel plant, these measures such as secondary dedusting have already been carried out, while in the agglomeration unit (sinter plant) they were under development.

All stationary sources of air pollution must apply for a permit, even those with very low emissions and hardly any environmental impact. There is no use of general binding rules for these installations (i.e. ELVs that are generally applicable, legally obligatory and not necessarily taken up in permits) that would enhance efficiency and save time for the competent authority (Committee of Environmental Regulation and Control), allowing it to focus on the important installations.

Vehicle inspections

All vehicles that are registered in Kazakhstan must undergo regular (legal) obligatory technical inspection, which also includes compliance validation of engine exhaust gas emissions of CO and hydrocarbons. Inspections are carried out by private parties accredited by the Transport Committee of the Ministry for Investments and Development. The inspection centres have stationary and mobile inspection lines. For non-commercial (private) vehicles, obligatory inspection is mandatory only after the vehicle reaches seven years of age. For commercial vehicles, the obligatory inspection is undertaken annually for vehicles older than seven years, every two years for vehicle between three and seven years old and once in three years for vehicles less than three years old. Besides regular inspections, unscheduled examinations of vehicle exhaust gas emissions are undertaken on the roads by nature protection prosecutor office representatives and traffic police officers.

Charges and fines

Companies pay charges for emissions of a large number of air pollutants. For emissions in excess of permitted amounts, fines are due. Fines can be very high; for example, in 2018 in Temirtau, an iron and steel plant was fined US$4 million for failing general environmental protection standards and causing "black snow". Neither payments for emissions nor fines are earmarked for environmental protection measures.

Information

The Committee on Statistics publishes environmental indicators, including on air.

The Ministry of Energy, through the Informational and Analytical Centre of Environmental Protection, publishes the National Report on the Environmental Situation and the Use of Natural Resources annually. Informational bulletins on the condition of the environment (air pollution and radioactivity) are published annually by Kazhydromet. Kazhydromet also publishes monthly bulletins about indexes of measured air pollution. If individual measurements exceed MAC values more than 10 times, the competent authorities (Committee of Environmental Regulation and Control and the Department of Environmental Monitoring and Information) are informed.

Kazhydromet does not provide direct online public information on measured concentrations of air pollutants. However, in January 2018, Kazhydromet launched a smartphone app called "AirKz". It provides citizens, for free, the air quality data from automatic air quality monitoring stations.

Since 2016, the mobile app AUA (Almaty Urban Air) has reported air quality data in Almaty by measuring $PM_{2.5}$ by one unit installed at the Kazakh National Medical University. Users can follow the recommendations on the app (not to go outside for sporting and other outdoor activities on days with high concentrations). The project was undertaken by the Common Sense Civic Foundation.

Another private initiative started in 2016 in Almaty involves a number of relatively simple dust measuring instruments with which a network of measuring points has been installed, measuring $PM_{2.5}$. The site Airkaz.org shows the results online (15-minute and 24-hour means). In addition to Almaty, there are measuring points in Karaganda and in the capital.

Since 2016, there is a database of the largest polluters in Kazakhstan that is compiled by NGOs (ecocitizens.kz). Data on individual companies include GHG emissions, and emissions of mutagenic and carcinogenic substances.

6.6 Participation in air-related international agreements and processes

United Nations Framework Convention on Climate Change and Kyoto Protocol

Implementation of the UNFCCC (chapter 5) and the Paris Agreement go hand in hand with improving air quality. Important measures to reduce GHG emissions are transfer from coal to gas as fuel in power plants, reduction of the energy intensity in the (growing) manufacturing industry and increasing the share of RES.

However, with the currently implemented policies, Kazakhstan's INDC unconditional target of 15 per cent reduction in GHG emissions by the end of 2030 in comparison with 1990 would not be reached.

Kazakhstan did not ratify the Doha Amendment to the Kyoto Protocol (2012). The Doha Amendment established the 2008–2010 emission levels as the limit for GHG emissions in the period 2013–2020 in

Kazakhstan, which was not acceptable to the State. The ratification of this amendment would have led to a Kyoto pathway of (almost 15 per cent) lower GHG emissions annually.

Convention for the Protection of the Ozone Layer and Montreal Protocol

Kazakhstan is party to the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer. It acceded to the Montreal Protocol and all amendments and is classified as a party not operating under paragraph 1 of Article 5 of the Protocol.

For the purposes of the Kigali Amendment to the Montreal Protocol, the non-Article 5 parties of are divided into two groups. Belarus, Kazakhstan, the Russian Federation, Tajikistan and Uzbekistan form the second group. For this group, the baseline HFC consumption is calculated as the average in the period 2011–2013 plus 25 per cent of HCFC baseline production/consumption. For this group, the reduction targets for HFC production and consumption from the baseline HFC consumption are 5 per cent in 2020, 35 per cent in 2025, 70 per cent in 2029, 80 per cent in 2034 and 85 per cent in 2036.

HCFC consumption is slightly above the required level in Kazakhstan (4.96 actual vs. 4 demanded ODP tons in 2016, down from 83 ODP tons in 2013) and Kazakhstan is not yet in full compliance with its obligations. For 2020, the target is set at zero emission of HCFCs, save for critical uses.

Convention on Persistent Organic Pollutants

In 2007, Kazakhstan ratified the Stockholm Convention. Since 2009, Kazakhstan has the NIP. The current NIP is valid for the period 2017–2028 and also includes uPOPs. Challenges are the identification of stakeholders and inventories of new POPs and the implementation of reduction measures and an Action Plan for remediation of the territories that are contaminated with POPs.

Convention on Long-Range Transboundary Air Pollution

Kazakhstan has been party to the CLRTAP since 2001 but has not acceded to any of its protocols.

Although Kazakhstan has not yet acceded to the EMEP Protocol, it did report emissions data to the EMEP CEIP in 2016, 2017 and 2018, as it had in previous years. In October 2017, a stage 3 review report for Kazakhstan was undertaken by an EMEP Review Team (ERT). The ERT found Kazakhstan's inventory to be partly in line with the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2016 and the ECE Reporting Guidelines. Transport emissions are reported based on fuel sold. The ERT has identified the need for further improvements in the transparency, completeness, consistency and accuracy of the inventory. It did not identify possible technical corrections. Technical support from EMEP for good emission inventory practice is very important to achieving a qualitatively sufficient air pollution inventory.

Three amended protocols to the Convention are considered very important to the overall aim of the Convention: the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol), the Protocol on Heavy Metals and the Protocol on Persistent Organic Pollutants.

The amended Gothenburg Protocol has introduced flexibility measures to facilitate the accession of new parties. The Protocol provides ELVs for stationary and mobile sources in the annexes and requires implementation of BAT (for NH_3 – control measures in the agricultural sector). Kazakhstan is currently not in line with the ELVs in the annexes to the Protocol. As a preparatory step to acceding to the Gothenburg Protocol, Kazakhstan would have to gradually introduce ELVs based on BAT to be able to meet the requirements under the Protocol.

The focus of the amended Protocol on Heavy Metals is the limitation of the emissions of lead, cadmium and mercury compared with a base year (1990 or alternative). By reducing the PM emissions, combined with improved recycling of metal containing dust, most heavy metal emissions would be reduced too.

The introduction in Kazakhstan of BAT for heavy metals emissions reduction according to the Guidance Document on BAT established under the CLRTAP by the Task Force on Techno-Economical Issues, together with a qualitatively good emissions inventory, should make it possible for Kazakhstan to accede to the Protocol on Heavy Metals in the near future.

The amended Protocol on POPs under the CLRTAP focuses on 23 substances (pesticides, industrial chemicals and by-products/contaminants). The objective of the Protocol is to eliminate emissions, discharges and losses of POPs into the environment. Prohibition or restriction of production and use, elimination of stocks and prevention of by-products are the appropriate measures. Extension of the existing POPs inventory in Kazakhstan according to the EMEP

Guidelines, followed by application of control techniques from the Guidance Document on BAT, is necessary before the accession by Kazakhstan to the amended Protocol on POPs.

6.7 Assessment, conclusions and recommendations

Assessment

Extensive mining, oil exploration and industrial activities, the economic growth in the last decade and the rapid growth of traffic in the cities require an urgent approach for serious management of air pollution and other environmental problems.

Industrial air emissions, combined with the air-polluting emissions by the growing number of vehicles and emissions from domestic heating with firewood and other solid fuels, create severe air pollution in industrial and urban areas, which causes serious nuisance and health problems. During episodes of less favourable meteorological conditions, very high concentration levels of substances such as SO_2, NO_x and PM are reached in urban areas such as Almaty, Karaganda, Shymkent, Temirtau and Ust-Kamenogorsk. Advanced abatement techniques are not installed in industrial facilities and sufficient measures to reduce traffic emissions, such as cleaner fuels, have not yet been taken to achieve better and healthy air quality. These measures to reduce air pollution would allow Kazakhstan to reach targets 3.9 and 11.6 of the 2030 Agenda for Sustainable Development.

State-of-the-art technical measures to prevent air emissions from industry, such as those described in EU BREFs, are not currently prescribed in environmental permits and the integrated permitting system that is based on BAT does not work.

Conclusions and recommendations

Air quality standards

Kazakhstan uses MAC levels of pollutants as the measuring unit for air quality. Air quality standards are based on short-term maximum and daily mean values, but to evaluate the state of air pollution, specific indexes are used that relate indirectly to the MAC values. Indexes can be used as indicative instruments and for comparison of cities but, in practice, the use of indexes is not a method to get a clear picture of real air quality in order to evaluate human health risks, as can be achieved by applying standards from international practice in terms of concentrations.

Recommendation 6.1:
The Government should take measures to transfer the current air quality assessment to air quality standards based on pollutant concentrations according to internationally accepted practices.

Policies

Kazakhstan does not have a specific national air quality policy and legislation. Some policy directions for air quality are derived from other strategic documents, such as the 2013 Concept on Transition to Green Economy. In most European countries, local authorities in localities with high levels of air pollution are obliged to develop and adopt policy documents to plan for the reduction of air pollution. No such requirement exists in Kazakhstan.

Recommendation 6.2:
The Government should:

(a) Strengthen the national legislation to specifically address air protection, including through incentives for clean production and installation of air pollution prevention technologies;
(b) Support oblast and other local authorities to analyse industrial emissions and urban developments (traffic, heating) and propose measures for reduction of air pollution as part of their air quality plans and programmes;
(c) Support oblasts and other local authorities to draw up air quality plans and programmes to reduce and prevent the exceeding of air quality standards.

Emissions from transport

The quality of vehicle fuels in Kazakhstan has long been low, and they had relatively high sulphur content. Many vehicles can barely comply with Euro-2 standards. The introduction of fuels of higher quality (Euro-2, -3 and -4 standards) was delayed. The three oil refineries in Kazakhstan have recently been updgraded to produce fuel that can meet Euro-4 and Euro-5 standards.

Recommendation 6.3:
The Government should:

(a) Take all possible measures to improve access for car and truck drivers to fuels of higher quality and to stimulate car owners in the transfer from liquid fuels of low quality to natural gas, petroleum gases or electric propulsion;

(b) *Introduce economic incentives to facilitate the renewal of the car fleet.*

Municipal transport systems

Improvement of fuel quality alone is not enough for some cities that experience heavy smog from traffic. Additional measures, including in the sphere of spatial planning, are equally important.

Recommendation 6.4:
The Government should encourage cities and towns polluted by traffic, such as Almaty, to:

(a) *Ensure the deployment of intelligent transportation systems;*
(b) *Ensure that effective and reliable public transport systems are working;*
(c) *Promote active (non-motorized) mobility in cities, taking into account the possible co-benefits of such a transformation;*
(d) *Enforce environmental considerations in urban spatial planning in order to proactively consider the characteristics of the sites to develop, such as prevailing winds, morphology, etc. and the possible effects of the localization of future built-up volumes, to maximize the exploitation of natural light and avoid drawbacks such as street canyons determined by the buildings' height;*
(e) *Apply temporary measures to quickly decrease air pollution in peak-pollution periods, such as alternating driving days for cars with even- and odd-numbered licence plates, allowing at the same time free public transportation for those limited periods, and restrict the circulation of old and polluting cars in the city centre.*

Convention on Long-Range Transboundary Air Pollution

Since 2001, Kazakhstan has been party to the Convention on Long-Range Transboundary Air Pollution. It did not become a party to important protocols under the Convention, such as the amended Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, amended Protocol on Heavy Metals and amended Protocol on Persistent Organic Pollutants.

Kazakhstan started submitting emissions inventories to the EMEP CEIP. The accession to the EMEP Protocol would provide a good basis for quick accession to the other key Protocols of the Convention. This would also give further access to the expert network under the Convention, which can help in providing guidance on ELVs based on BAT.

The Convention is increasingly focusing on providing expertise and guidance to the Eastern European, Caucasus and Central Asian countries to help them ratify and implement the key protocols and reduce air pollution.

Recommendation 6.5:
The Government should accede to the EMEP Protocol under the Convention on Long-Range Transboundary Air Pollution as soon as possible, and initiate a stepwise process to accede to the three amended protocols to the Convention: the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, the Protocol on Heavy Metals and the Protocol on Persistent Organic Pollutants.

Emissions from the residential sector

Domestic heating is a big source of air pollution in cities in winter time. The lack of insulation of buildings leads to low energy-efficiency performance. The energy efficiency of houses in countries such as Germany and France is twice as high as in Kazakhstan. Since 2011–2012, legal provisions for energy efficiency improvement in housing have been established in Kazakhstan. The use of firewood, coal and other heat sources in individual stoves and furnaces located in a low position, and the use of fuel with a high sulphur content in district heating systems, contribute a lot to bad air quality and lead to the exceeding of (EU) air quality standards (dust, SO_2) and high air pollution index values in winter time

Recommendation 6.6:
The Government should:

(a) *Stimulate implementation of measures for energy efficiency in residential and commercial buildings, e.g. by enhancing the attractiveness of energy efficiency measures by guaranteeing a reasonable payback period of costs and setting conditions for better maintenance of heating systems;*
(b) *Promote the use of low carbon technologies (heat pumps, renewables, and also considering geothermal heat pumps) and cleaner fuels such as natural gas instead of liquid and solid fuels for individual households and apartment buildings;*
(c) *Promote the use of individual heat-use monitoring devices (thermostats) in apartment buildings;*
(d) *Take measures to modernize the heating systems.*

Emission standards for the heat- and power industry

Emission standards for the heat- and power industry are defined in the 2010 Government Resolution No. 747. These emission standards are considerably less stringent than emission limit values used in the EU (and also those under the annexes of the amended Protocol to Abate Acidification, Eutrophication and Ground-level Ozone used by several countries of Eastern Europe, Caucasus and Central Asia), as they are not based on existing and (in the EU countries) generally applied BAT for emission reduction in large combustion plants. Furthermore, Kazakhstan practises a differentiated approach to emission standards whereby the existing plants enjoy more relaxed standards than new ones – a practice that does not encourage modernization.

Recommendation 6.7:

The Government should revise the legislation on emission standards for large combustion plants, in particular by:

(a) As a first step, basing these standards on the best available techniques (BAT) that are defined in the annexes of the amended Protocol to Abate Acidification, Eutrophication and Ground-level Ozone under the Convention on Long-Range Transboundary Air Pollution;

(b) As a second step, adapting the emission limit values for large combustion plants that are defined in the most recent (EU) BREF for Large Combustion Plants (2017);

(c) Addressing the issue of the different approaches to emission standards for new (more stringent standards) and existing (more relaxed standards) combustion plants, to make their modernization more attractive versus business as usual.

Chapter 7

WATER MANAGEMENT

7.1 Water resources

Kazakhstan is characterized by natural irregularity in the distribution of water resources by region. The eastern region has 34.5 per cent of all water resources, the south-eastern region 24.1 per cent, the southern region 21.2 per cent, the western region 13.4 per cent, the northern region 4.2 per cent and the central region 2.6 per cent.

The total average annual flow of rivers and temporary watercourses constitutes 100.58 km^3, of which 55.94 km^3 (55.6 per cent) are formed on the territory of Kazakhstan, while the remaining 44.64 km^3 (44.4 per cent) are formed outside its borders, including the largest rivers, such as the Irtysh, Syrdarya and Ili, which originate or flow through the territory of other countries.

In 2016, the total reserves of fresh water were estimated at 524 km^3, of which glaciers accounted for 80 km^3, lakes 190 km^3, rivers 101 km^3 and groundwater reserves 58 km^3. The average level of water supply is 20,000 m^3 per km^2 of the country's territory. The situation with water availability in Kazakhstan varies significantly by region. It should be noted that the volume of renewable fresh water in Kazakhstan has increased significantly over the past five years, from 92.7 billion m^3 in 2012 to 139.0 billion m^3 in 2017 (table 7.1).

Surface water

In Kazakhstan, there are currently about 39,000 rivers and temporary watercourses, more than 7,000 of which are more than 10 km in length. Many rivers of Kazakhstan belong to the internal drainage basins of the Caspian Sea and Aral Sea, Lake Balkhash, Lake Alakol and Lake Tengiz. The exception is the Irtysh River, which belongs to the Arctic Ocean Basin. The Caspian Sea, Lake Balkhash, Lake Zaysan, the Alakol Lake system and the Irtysh River are designated water bodies of special national importance.

There are more than 48,000 lakes, with a total water surface area of 4,500 km^2 and with a volume of about 190 km^3. Most of the lakes are located in the forest-steppe zone and northern part of the steppe zone.

There are eight water basins on the territory of Kazakhstan (annex VI, map 8), the four largest of which together constitute more than 90 per cent of water resources and more than 70 per cent of available resources of fresh water.[47] Table 7.2 depicts water resources of the eight basins in 2015, broken down by source.

Table 7.1: Renewable freshwater resources, 2008–2017, billion m^3

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Precipitation	694.98	880.30	877.58	874.85	705.88	940.26	746.62	907.39	1 081.79	784.77
Actual evapotranspiration	644.68	822.10	800.38	817.55	656.68	865.26	683.12	839.69	990.09	704.87
Internal flow	50.30	58.20	77.20	57.30	49.20	75.00	63.50	67.70	91.70	79.90
Inflow of surface water and groundwater from neighbouring countries	39.40	41.80	66.40	44.50	43.50	46.10	46.30	39.70	54.40	59.10
Renewable freshwater resources	89.70	100.00	143.60	101.80	92.70	121.10	109.80	107.40	146.10	139.00

Source: Committee on Statistics, 2018.

[47] Analysis of all water basins is largely based on the EU, UNDP and ECE joint project "Supporting Kazakhstan's Transition to a Green Economy Model" (materialy issledovanyy seminara-treninga "Povysheniye effektivnosti upravlenya rechnymi basseynami" = documentation for the training course "Increased efficiency of river basin management") (2017).

Table 7.2: Water resources by basin, 2015, km^3

Basin	Local water resources	Transboundary water resources	Groundwater	Other sources	Total
Aral-Syrdarya	3.4	14.6	0.2	3.2	**21.4**
Balkhash-Alakol	15.4	12.2	0.4	0.4	**28.4**
Irtysh	25.9	7.8	0.2	0.0	**33.9**
Ishim	2.5	0.1	0.1	0.0	**2.7**
Ural-Caspian	4.1	7.1	0.2	0.3	**11.7**
Nura-Sarysu	1.4		0.1		**1.5**
Tobol-Torgai	1.6	0.3	0.0	0.0	**1.9**
Shu-Talas	1.6	2.6	0.1	0.0	**4.3**
Total	**55.9**	**44.7**	**1.3**	**3.9**	**105.8**

Source: State Programme on Development of the Agro-industrial Complex for the period 2017–2021.

Aral-Syrdarya Water Basin

The basin covers an area of about 345,000 km^2 and stretches over two oblasts – South Kazakhstan and Kyzylorda. The main waterway of the basin is the lower course of the Syrdarya River, the regime of which is regulated by the Shardara Reservoir and many smaller hydrotechnical developments. The Koksaray counter-regulator has been built for flood prevention. The length of the river within the country, from the Shardara Reservoir to the Aral Sea, is 1,627 km, 346 km of which are in South Kazakhstan Oblast and 1,281 km in Kyzylorda Oblast. The largest tributaries of the Syrdarya River in Kazakhstan are the Keles, Arys, Badam, Boroldai and Bugun Rivers, as well as small rivers that flow from the southwestern slopes of the Karatau Range.

Balkhash-Alakol Water Basin

The main waterway of the basin is the Ili River, the regime of which is regulated by the Kapchagay Reservoir. The territory of the basin is divided into two natural areas – the Lake Balkhash Basin and the Lake Alakol Basin. The Ili River Basin constitutes about 70 per cent of the water catchment area and 80 per cent of the total surface flow of Lake Balkhash. According to the Committee on Water Resources (CWR), in an average water year, the total flow of surface waters into Lake Balkhash and Lake Alakol constitutes 27.76 km^3, including 11.5 km^3 coming from China. About 86 per cent of the flow of surface waters is formed in Lake Balkhash Basin, and 17.7 km^3/year belongs to the Ili River. In low water years, which occur, on average, every 20 years, the total flow of surface waters of the Balkhash-Alakol Basin is reduced to 17.8 km^3/year, while the total flow of the Ili River Basin is reduced to 12.3 km^3/year.

Irtysh (Yertys) Water Basin

The transboundary Irtysh River, which is a water body of special national importance, occupies the central place in the hydrographic network of East Kazakhstan and Pavlodar Oblasts. The Irtysh River enters Kazakhstan as a navigable river with an average annual flow of about 9.5 km^3/s. The river flow is regulated by the cascade of reservoirs: Buchtarma Reservoir (the design capacity of which is 49.6 km^3), Oskemen Reservoir (0.66 km^3) and Shulbinsk Reservoir (2.39 km^3). In the Irtysh Water Basin there are 13 rivers that are more than 200 km in length, while the remaining 775 are classified as small rivers. Their overall length is 17,700 km.

Ishim (Yesil) Water Basin

The basin of the Ishim River in Kazakhstan occupies an area of 245,000 km^2. The major proportion of the water supply is concentrated in lakes (55 per cent) and river flow (34 per cent), with water storage reservoirs accounting for 7 per cent. The main waterway is the Ishim River, whose regime is regulated by four water storage reservoirs: Ishim, Astana, Petropavl and Sergeyevka. The water regime is characterized by a pronounced spring flood and a prolonged drought flow. One of the features of the Ishim Water Basin rivers is a pronounced irregularity of flow that diverges not only between seasons but also between years. The runoff of the Ishim River is used for water supply in the capital, Petropavlovsk City, rural settlements of the Akmola and North Kazakhstan Oblasts, regular irrigation of lands and inundative irrigation and other areas.

Nura-Sarysu Water Basin

The main volume of annual flow (up to 90 per cent and above) occurs in a short period of spring flooding. In the summer-autumn-winter low water season, the water discharges of rivers are significantly reduced and, on most rivers, there is no flow during this period. There are about 2,000 lakes and more than 400 artificial watercourses on the basin territory. The main rivers of the basin are the Nura and Sarysu. The regime of basin rivers is regulated by four reservoirs: Samarkand Reservoir, Sherubaynurinsk Reservoir, Kara-Kenguir Reservoir and Fedorovsky Reservoir. The Nura River originates in the Kiziltas Mountains at an altitude of 1,100–1,250 m above sea level and flows into the endorheic Lake Tengiz. The natural water flow of the Nura River in the upper part of the basin to Samarkand Reservoir constitutes 420 million m^3. The main source of river recharge is snow reserves. Groundwater constitutes 25 per cent, while the remaining water resources include surface sources: lakes 20 per cent, reservoirs 4 per cent and river courses 33 per cent. The Sarysu River falls into Lake Telekol in Kyzylorda Oblast. The total water catchment area of the Sarysu River constitutes 8,166 km^2. The main tributaries are the Karakengir and Kensaz Rivers.

Tobol-Torgai Water Basin

The main rivers of the basin are the Tobol, Torgay and Irgiz. The regime of basin rivers is mainly regulated by the Upper Tobol Reservoir and Karatamarsky Reservoir. This is the basin with the poorest water resources. The surface flow of basin rivers is formed during the melting of the snow cover and is subject to significant variations, with alternating periods of high water and low water years. The duration of the high-water periods ranges from eight to 10 years, while the low water periods range from six to 20 years. In high water years, the river flow exceeds the average long-term values by 3–5 times, and in low water years, it decreases to 0.6–0.15 from the average long-term values. Within the basin there are more than 5,000 lakes, 80 per cent of which have a surface area of less than 1 km^2. Most lakes dry up in summer. There are four large lakes: Lake Kushmurun, Lake Sari Kopa, Lake Aksuat and Lake Sarimoin.

Ural (Zhaiyk)-Caspian Water Basin

The main waterways of the basin are the Ural (Zhaiyk), Emba, Sagiz and Wil Rivers. The long-term water resources of the basin constitute 16.0 km^3, of which 10.5 km^3 derive from the Russian Federation. Almost half of the surface flow belongs to the Kigach River, which is the delta arm of the Volga River and is located in Kazakhstan only at its mouth. The average annual flow of the Kigach River on the border with the Russian Federation is 8.25 km^3.

The Ural-Caspian Water Basin covers in Kazakhstan an area of 415,000 km^2 and includes the catchment area of the Ural River (236,000 km^2), the Volga-Ural interfluve (107,000 km^2) and the Ural-Emba interfluve (72,000 km^2). The water fund is 28.0 km^3, including the Ural River Basin (11.4 km^3), the Volga Basin (13.4 km^3) and the basins of the Uil, Sagyz and Emba Rivers (1.5 km^3). The rivers contribute 97 per cent, whereas groundwaters contribute 3 per cent.

Shu-Talas Water Basin

The basin includes the Shu, Talas and Asa Rivers with a total area of 64,300 km² (including part of the territory of Kyrgyzstan). The main part of the basin territory (73 per cent) is located in the desert and semi-desert regions, while the Tien Shan Mountains occupy 14 per cent of the basin's territory. In the basin there are also 204 small rivers (in the Shu Water Basin there are 140 rivers, in the Talas Water Basin there are 20 rivers and in the Asa Water Basin there are 64 rivers), as well as 35 lakes and three large reservoirs. The flow of the Shu, Talas and Asa Rivers is fully regulated. There are two reservoirs in Kyrgyzstan's part of the basin: the Kirov Reservoir with the design capacity of 0.55 km^3 on the Talas River and the Orto-Tokoy Reservoir with the design capacity of 0.42 km^3 on the Shu River. The basin reservoirs are mainly aimed at irrigation.

Groundwater

As of 1 January 2017, on the territory of Kazakhstan, 3,273 deposits (4,054 sites) are registered, with approved operational reserves in the amount of 42.966 million m^3/day, including 15.655 million m^3/day for drinking water supply (DWS), 2.216 million m^3/day for industrial and technical purpose (ITP), 18.887 million m^3/day for irrigation, 1.177 million m^3/day for DWS and ITP, 4.305 million m^3/day for DWS and irrigation, 0.725 million m^3/day for integrated use (DWS, ITP, irrigation). However, the hydrogeological peculiarities of the country have caused irregularity in the territorial distribution of groundwater resources for DWS, which affects the water supply of certain regions: about 50 per cent of resources are concentrated in the south, 30 per cent in the central, northern and eastern regions, and less than 20 per cent in the west.

In general, Almaty (16.894 million m^3/day), East Kazakhstan (6.679 million m^3/day), Zhambyl (4.668 million m^3/day), Pavlodar (3.887 million m^3/day) and Karaganda (3.003 million m^3/day) Oblasts have the largest resources of groundwater suitable for drinking and technical purposes. Extremely limited resources of such groundwater are available in the North Kazakhstan (0.192 million m^3/day), Atyrau (0.255 million m^3/day), West Kazakhstan (0.331 million m^3/day), Mangistau (0.355 million m^3/day) and Akmola (0.437 million m^3/day) Oblasts.

7.2 Water quality

Quality of surface waters

The main criteria for water quality assessment according to hydrochemical indicators in Kazakhstan are the values of maximum allowable concentrations (MACs) of pollutants for fishery waters. The level of surface water pollution was estimated by the size of the Complex Water Pollution Index (CWPI), which is used to compare and detect the dynamics of water quality change. According to the CWPI, there are four classes of water quality, from I (clean according to the norms, CWPI $\leq$ 1.0) to IV (extremely high level of pollution, CWPI $\geq$ 10). In 2017, of all surface water bodies monitored, extremely high levels of water pollution were observed in the Kylshakty River, Shagalaly River and Lake Maybalyk (table 7.3)

Table 7.3: Water quality in surface water bodies in accordance with the CWPI, 2017

	River	Lake	Reservoir	Other
Clean according to the norms	Ural/Zhaiyk (Atyrau Oblast), Sharonova, Kigash, Katta-Bugun		Markakol	Caspian Sea
Moderate level of pollution	Kara Yertis, Irtysh (Yertys), Buktyrma, Oba, Yemely (East Kazakhstan Oblast), Ayagoz, Usolka, Yemba, Ural/Zhaiyk (West Kazakhstan Oblast), Shagan, Derkoly, Yelek (West Kazakhstan Oblast), Shyngyrlau, Saryozen, Karaozen, Aktasty, Oiyil, Ulken Kobda, Kara Kobda, Togyzak, Uy, Zhelkuar, Yesily, Akbulak, Nura, Bettybulak, Kokpekty, Ile, Tekes, Bayankol, Shilik, Sharyn, Kaskelen, Karkara, Yesik, Turgeny, Talgar, Temirlik, Lepsy, Tentek, Zhamanty, Ygrayty, Kishi Almaty, Yesentay, Ulken Almaty, Aksu (Almaty Oblast), Karatal, Katynsu, Urzhar, Yeginsu, Talas, Assa, Berikkara, Shu, Aksu (Zhambyl Oblast), Toktash, Sarykau, Syrdarya, Badam, Arys, Bogen	Dzhasybay, Sabyndykoly, Shalkar (West Kazakhstan Oblast), Shalkar (Aktobe Oblast), Sultankeldy, Kopa, Zerendy, Bilikoly, Burabay, Sulukoly, Katarkoly, Tekekoly, Sholak, Yesey, Kokay, Ulken Almaty, Sasykkoly	Buktyrma, Usti-Kamenogorskoe, Amankelydy, Zhogargy Tobyl, Sergeevskoe, Vyacheslavskoe, Kengir, Kapshagay, Kurty, Bartogay, Tasotkely, Samarkan, Shardara	Koshimskiy, Nura-Yesily, Yertis-Karaganda, sewerage canal (Karaganda Oblast), Aral Sea
High level of pollution	Breksa, Tihaya, Ulybi, Glubochanka, Krasnoyarka, Yelek (Aktobe Oblast), Kargaly, Kosestek, Ory, Yrgyz, Temir, Tobol, Ayet, Obagan, Sarybulak, Zhaybay, Kara Kengir, Sokyr, Sherubaynura, Korgas, Emely (Almaty Oblast), Karabalta, Keles	Ulken Shabakty, Shchuchye, Kishi Shabakty, Karasu, Lebyazhye, Balkhash, Alakol, Zhalanashkol	Karatomar	
Extremely high level of pollution	Kylshakty, Chagalaly	Maybalyk		

Source: Information Bulletin on Environmental Protection for 2017.

Photo 7.1: Talgar, Almaty Oblast

Pollution of water bodies by heavy metals, biogenic and organic substances affects water bodies in the Aktobe, East Kazakhstan, Karaganda and Zhambyl Oblasts. In particular, pollution of water resources by manganese, nickel and iron is noted in the basin of the Tobol River, and by copper and fluorides in the mountain rivers of the Ili River basin, and high mineralization occurs in the Balkhash-Alakol systems of lakes and the lakes of the Shchuchinsk-Borovoe resort area. The main sources of surface water pollution in the Balkhash-Alakol, Irtysh and Tobol-Torgai Water Basins are branches of heavy industry (metal ore mining and steel production, as well as oil processing), while agriculture is the main source of pollution in the rest of the river basins. In Lake Maybalyk (salinity >1,000 mg/g), which is on the list of waters with an "extremely high level of pollution", an excess of MAC on chlorides, sulphates, calcium and magnesium is observed.

There are high values of BOD_5 in some water bodies. The oxygen regime of all monitored water bodies is normal, except Lake Lebyazhye (lack of oxygen).

Quality of groundwater

Industrial enterprises, solid and liquid waste storage facilities, tailing storage areas of industrial and agricultural facilities, oilfields and refineries are the largest sources of groundwater pollution in Kazakhstan.

The largest contaminated areas and territories are in the Almaty, East Kazakhstan and Karaganda Oblasts. These areas are characterized by high water salinity, hardness of water and concentrations of sulphates and chlorides exceeding MACs. Human-generated groundwater pollution is observed in the western and northwest regions of Kazakhstan, that is, in the oil-extracting and mining regions, where iron, manganese and hexavalent chromium pollution of water is observed.

Individual water supply sources in rural areas (rural wells) are often contaminated and unsuitable for domestic use. Due to the excessive use of agricultural fertilizers, high levels of nitrates are observed in such waters, despite strict rules that require the organization of sanitary protection zones around the water intakes. In general, according to available data, bacteriological water pollution in wells in the rural areas occurs in 40 per cent of cases, as does chemical pollution in 16 per cent.

Quality of drinking water

The Sanitary and epidemiological requirements for water sources, water intake points for household and drinking purposes, domestic and drinking water supply and places of cultural and domestic water use and safety of water bodies (2015 Order of the Minister of National Economy No. 209) is the main standard for drinking water quality. In general, this document meets EU and WHO standards; however, some levels of maximum values in international standards, e.g. for turbidity, are stricter. As for water sampling, it is usually limited to water treatment facilities. There is no systematic and regular sampling of water at the end-user points in the water supply network.

For centralized water supply systems, the proportion of samples with exceeded chemical contamination has decreased from 2.3 per cent in 2009 to 1.5 per cent in 2013 and has since increased to as much as 3.5 per cent in 2016 and 3.4 per cent in 2017 (table 13.5). The same trend is observed in the proportion of samples with exceeded microbiological contamination in centralized systems: 1.9 per cent in 2009, 1.2 per cent in 2013 and 2.4 per cent in 2017. For decentralized water supply sources, the proportion of samples with exceeded chemical contamination has generally been increasing (5.6 per cent in 2009 and 9.4 per cent in 2017), whereas the proportion of samples with exceeded microbiological contamination remained between 2.9 per cent and 4.9 per cent in the period 2009–2017 (table 13.5).

Quality of sea water

In 2016 and 2017, the water quality of Kazakhstan's part of the Caspian Sea was classified under the CWPI as "clean according to the norms".

7.3 Performance and gaps in water monitoring networks

The system for monitoring of water resources of Kazakhstan includes a number of actors:

- The Committee on Water Resources under the Ministry of Agriculture conducts state monitoring of water bodies and generates statistical data on the abstraction, use and discharge of water;
- Kazhydromet under the Ministry of Energy conducts monitoring of atmospheric precipitation and snow cover, hydrological monitoring, surface water quality monitoring and sea water quality monitoring;
- The Committee on Geology and Subsoil Use of the Ministry for Investments and Development conducts monitoring of the groundwater level, temperature and quality (annex VI, map 3);
- The Committee for the Protection of Public Health of the Ministry of Health conducts monitoring of drinking water quality;
- Departments of ecology (territorial bodies of the Committee of Environmental Regulation and Control) conduct monitoring of wastewater discharges.

According to Kazhydromet, the monitoring of surface water quality by hydrochemical indicators was carried out in 2017 at 404 gauging stations distributed across 86 rivers, 14 reservoirs, 28 lakes, 4 canals and the Caspian Sea. The number of water bodies in Kazakhstan subject to the monitoring of surface water quality increased from 88 to 133 for the period 2011–2017, while the number of gauging stations increased from 215 to 404. More than 60 parameters are monitored (chapter 4).

The primary collection and processing of data is carried out by the branches of Kazhydromet, whereas the final processing of data and the conduct of the state water cadastre ("Surface water" section) is carried out by Kazhydromet's Department of Hydrology. Processed hydrological data are transferred to the Committee on Water Resources on an annual basis. Monitoring data are published monthly in the environmental status bulletin on the Kazhydromet website.

The Department of Hydrological Forecasting of Kazhydromet is engaged in an operational evaluation of the actual state of water bodies and the hydrological forecast of expected volumes during spring floods and during the growing season, as well as the issuing of warnings of natural hydrological phenomena in water bodies in the country.

Kazhydromet carries out the ecological monitoring of seawater quality in the Kazakhstan sector of the Caspian Sea. The water quality of the Caspian Sea is observed at 64 stations, of which 34 stations are age stacks, 23 are coastal and seven are located in the oilfields. In the waters of the Northern and Middle Caspian, Kazhydromet takes samples at 46 stations. The seawater quality is determined by 45 indicators.

The existing network of 310 hydrological stations in rivers, lakes and reservoirs is not sufficient for the analysis of water regimes in the watercourses and water bodies of Kazakhstan. According to World Meteorological Organization (WMO) standards, 814 hydrological stations are needed for the territory of

Kazakhstan. The current number of stations is still below the level of the 1980s (506 hydrological stations in 1981). It is planned to establish 67 new hydrological stations, with some of them located where previous ones have been closed.

Furthermore, given the fact that the responsibility for collecting information and its processing is distributed among different institutions, there are certain issues concerning the exchange of data. Basin inspections experience difficulties in accessing information gathered by Kazhydromet, departments of ecology and the Committee on Geology and Subsoil Use. Since a large proportion of information collected by these organizations is inaccessible to basin inspections, basin inspections are poorly equipped for planning and decision-making on improvement of water quality. The unified national system for the monitoring of environmental and natural resources in Kazakhstan does not yet exist (chapter 4).

7.4 Management of water use, developments in infrastructure, pressures on water resources and prevention of pollution

The average annual volume of freshwater abstraction in all branches of the economy of Kazakhstan amounted to 22.13 km^3 in the period 2008–2016, of which 94.86 per cent was by means of surface water (table 7.4). Agricultural production accounts for the most water use – 64.21 per cent of the total volume of water consumption in the country in the period 2008–2016. The abstraction of drinking and technical groundwater in 2016 amounted to 1.078 km^3.

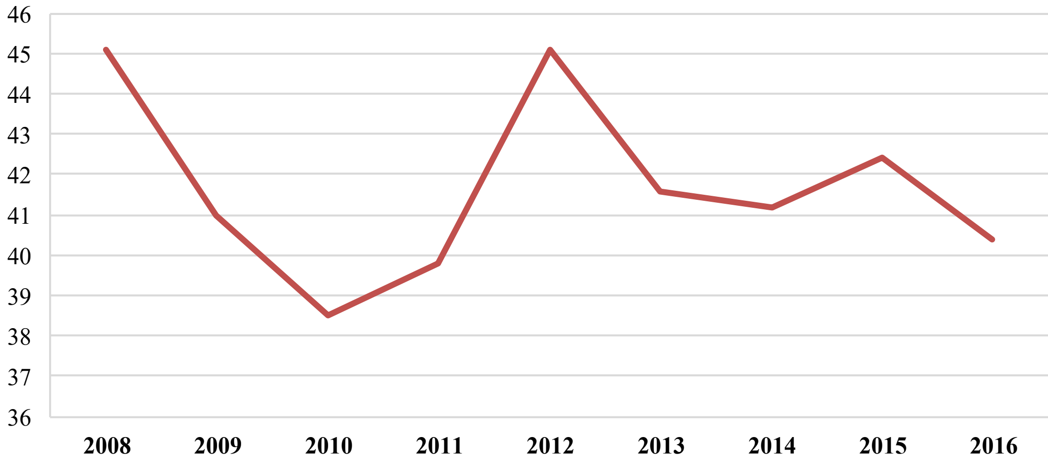
In 2016, the country abstracted fresh water from natural water bodies in the amount of 22.77 km^3 (21.69 km^3 of surface water and 1.08 km^3 of groundwater (table 7.4)) and sea water in the amount of 1.5 km^3. In addition, in the same year, the country received 1.69 km^3 of water from other states (the Russian Federation and Uzbekistan).

Table 7.4: Overall freshwater use, 2008–2016, million m^3

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fresh water abstracted									
Surface water	19 184	20 309	22 626	20 811	20 256	21 455	22 026	20 605	21 693
Groundwater	1 290	1 229	1 186	1 137	1 133	1 075	1 052	1 056	1 078
Total	**20 474**	**21 538**	**23 812**	**21 948**	**21 389**	**22 530**	**23 078**	**21 661**	**22 771**
of which:									
Households	980	940	917	948	884	826	856	840	888
Agriculture, forestry and fishing	12 504	13 647	14 379	13 826	13 688	15 151	14 838	14 701	15 186
of which abstracted for:									
Irrigation	10 255	10 746	10 617	11 237	11 318	11 628	11 676	10 165	11 946
Manufacturing	5 088	4 856	5 398	5 458	5 277	5 502	5 636	5 303	5 412
Electricity industry	798	844	860	859	910	790	788	664	-
Other economic activities	1 104	1 251	2 258	-	630	261	960	153	1 285
Losses of water during transport	2 622	2 507	2 639	3 198	2 932	2 850	2 792	2 490	3 462
Total freshwater use	**17 852**	**19 031**	**21 173**	**18 750**	**18 457**	**19 680**	**20 286**	**19 171**	**19 309**
of which:									
Households	735	742	751	790	724	711	732	730	715
Agriculture, forestry and fishing	10 002	10 932	11 703	9 373	9 141	9 774	12 147	13 582	12 414
of which used for:									
Irrigation	8 163	8 893	9 050	9 066	8 840	9 486	9 485	9 828	9 610
Manufacturing	4 577	4 371	4 853	5 173	5 240	5 477	5 592	5 263	5 230
Electricity industry	735	742	751	745	745	745	745	624	-
Other economic activities	998	1 126	2 032	..	567	261	960	153	2 104
Reused water and recycled water	**8 132**	**7 899**	**8 028**	**7 657**	**8 308**	**8 355**	**8 415**	**8 620**	**8 257**

Source: Committee on Statistics, 2018.
Note: Sea water not included.

Figure 7.1: Reuse and recycling of freshwater, 2008–2016, per cent of total volume of freshwater used



Source: Committee on Statistics, 2017.

Reuse and recycling of water accounted for an average of 8,185 million m^3 in the period 2008–2016, varying between 38.5 per cent and 45.1 per cent of total water use in this period without a particular trend (figure 7.1). The largest volumes of reused and recycled water are in industrial regions of the country, in Pavlodar and Karaganda Oblasts.

Industry

The use of water for industrial needs amounted to 5.230 km^3 or 27.08 per cent of the total water consumption in 2016. At the same time, water abstraction from surface sources by industry amounted to 5.1 km^3. Enterprises in the heat-energy industry, non-ferrous metallurgy and the oil industry together account for the largest share of total water abstraction. In 2015, the volume of reused water in industry was 0.69 km^3 and the volume of recycled water in industry was 7.3 km^3.

Agriculture

Agriculture is by far the biggest user of water resources in Kazakhstan. Total use of water for agricultural purposes in 2016 amounted to 12.4 km^3. Half of the total abstracted (11.9 km^3, 2016) and used (9.6 km^3, 2016) water in the country is used for irrigation (table 12.7). At the same time, over the past years, there has been a trend to increase water abstraction in all branches of agriculture, especially for irrigation: from 10.255 km^3 (2008) to 11.946 km^3 (2016). About 11–15 per cent of the abstracted water is lost during transport, mostly due to the obsolete irrigation infrastructure and methods.

Since 2010, there has been significant growth in the expansion of water-saving technologies – an increase from 2–3 per cent to 13–15 per cent of the irrigated area where some kind of water-saving technology is in use (chapter 12).

Fisheries

The fishery resources of Kazakhstan include a significant area of the Caspian and Aral Seas, Lake Balkhash, the Lake Alakol system, the Bukhtarma, Kapchagay and Shardars Reservoirs and other reservoirs. The total area of these waters, excluding the Caspian Sea, is about 5 million ha. Recently, there has been a trend towards a decrease in freshwater use for fisheries, from 230.1 million m^3 in 2011 to 35.7 million m^3 in 2016.

Infrastructure

<u>Sewerage infrastructure</u>

Kazakhstan is increasingly working on extending its sewerage networks. In 2016, Kazakhstan had 560 wastewater treatment plants (WWTPs) and 317 separate sewerage networks. The street sewerage network covered a distance of 5,600 km. In 2016 alone, 3,827.3 km of water supply networks and 210.3 km of sewerage networks were put into operation. The installed capacity of WWTPs in 2016 amounted to 3,850,200 m^3 per day. The number of sewage pumping stations has increased by 1,283 units in 2016.

The level of coverage of rural settlements by sewerage systems is far behind the level of coverage by water supply. The wear level of sewerage systems in the countryside reaches 70–90 per cent.

Wastewater treatment

There was a very slight decrease in the total volume of wastewater discharged into surface water bodies in the period 2008–2016 (from 6,017 million m^3 in 2010 to 5,205 million m^3 in 2016) (table 7.5). More importantly, there was a decrease in the share of non-treated wastewater discharged (from 4.23 per cent of the total volume of wastewater in 2008 to 1.79 per cent in 2016).

Many operating treatment facilities have already exhausted their performance potential and require repair, while others work in conditions of overload.

There are a number of unsolved issues related to the qualitative characteristics of industrial wastewater, despite the decrease in the total volume of crude wastewater. A significant amount of wastewater from industrial enterprises and also TPPs is discharged directly to municipal WWTPs (up to 24 per cent in some cities) that are not intended for the treatment of industrial wastewater. According to the data from environmental authorities, 50 per cent of wastewater discharged by large industrial enterprises does not meet the requirements, and the concentration of harmful substances in wastewater discharged into water disposal systems of settlements exceeds the MAC levels. Currently, there are no legislative requirements to oblige companies to enter into agreements with water utilities for additional wastewater treatment. There are no local WWTPs in most industrial enterprises, or else pre-treatment is carried out in a manner non-compliant with the regulations. Often, industrial wastewater without preliminary cleaning is discharged directly into rivers. There are also illegal connections by industry to urban sewers.

Storm water

A number of large cities do not have a storm water sewerage system with a complete set of treatment facilities, which results in large amounts of contaminated wastewater entering water bodies. This results in deterioration of the quality of water supplied to consumers. In rural settlements, runoff water systems are also absent, so contaminated water from the territory of settlements is washed away to the nearest water bodies and reservoirs.

Hydrotechnical facilities

There are 1,590 hydrotechnical facilities in total, of which 381 require repair. Of those 381 facilities, 41 are in state ownership, 224 are municipal property, 77 are in private ownership and 28 are classified as abandoned. Regular maintenance and safety of abandoned facilities and those in private ownership has been highly debated in Kazakhstan since 2010.

There are more than 4,000 reservoirs with a total area of 10,000 km^2 in Kazakhstan. According to the CWR, in seven oblasts, another 20 new reservoirs are planned to be built by 2022. They will be able to accumulate almost two billion m^3 of water. The cost is estimated at 57 billion tenge.

Water losses due to infrastructure conditions

Water loss is a serious problem in Kazakhstan, especially in agriculture. Water transportation losses amounted to 3,462 million m^3 (15.2 per cent of total water abstraction) in 2016 (table 7.4). On average, approximately 60 per cent of the total water used by agricultural consumers is lost (about 40 per cent for industry and 50 per cent for utilities systems). Poor state of infrastructure is the main cause of water losses.

In agriculture, the poor (and sometimes critical) condition of the irrigation infrastructure is one of the causes of large water losses. Almost no one is responsible for the "water intake – fields" irrigation infrastructure operation and technical condition. The vast majority of farm canals with title transferred to private owners are abandoned and in fact unusable, because of their wear. This has resulted in low efficiency of distribution lines, large losses of water and a rise in groundwater and the salinity of adjacent lands. In addition, such canals pose a security risk, caused by spring floods and rainfall floods.

Table 7.5: Wastewater treatment, 2008–2016

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total wastewater discharged (million m^3)	5 195.71	5 398.60	6 017.00	5 572.00	5 653.00	6 039.00	6 205.00	5 935.00	5 205.11
Total urban treated wastewater (million m^3)	4 975.71	5 232.60	5 764.00	5 357.00	5 463.00	5 865.00	6 052.00	5 804.00	5 112.00
Non-treated wastewater (million m^3)	220.00	166.00	253.00	215.00	190.00	174.00	153.00	131.00	93.07
Share of non-treated wastewater in total wastewater discharged (%)	4.23	3.07	4.2	3.86	3.36	2.88	2.47	2.25	1.79

Source: Committee on Statistics, 2018.

Photo 7.2: Kapchagay Reservoir

In terms of regional differences, the largest water transportation losses in 2016 were observed in the Kyzylorda (844 million m^3) and Almaty (791 million m^3) Oblasts, where agriculture is developed.

Households

Official statistics on access to water supply and sanitation differ, especially the numbers of people connected to *centralized* water supply and sanitation services. The comparison of such statistics is complicated by the fact that the reports of the Ministry of Health and Ministry for Investments and Development, and the reports on implementation of the Programme for Development of the Regions until 2020, differentiate the data on access by providing a breakdown by urban and rural population but not for the overall population. Conversely, the Committee on Statistics provides data for the overall population but does not differentiate those by urban and rural population (table 7.6). The comparison of data for 2016 and 2017 from these sources is presented in table 7.7.

In 2016, according to the Committee on Statistics, 70.3 per cent of households were connected to water supply and had sustainable access to safe drinking water and 58.2 per cent were connected to sanitation services (table 7.6).

There are a number of problems with water supply, despite some improvements in this field. In particular, operation and maintenance of new water supply facilities after their completion is still a problem. Only rayon-level facilities are provided with material and labour resources. In rural areas, water supply systems are managed and serviced by village akimats, which are not provided with the minimum means necessary for their operation and maintenance or specialist servicing. In other words, investments in modernization and construction of new infrastructure are not supported by professional skills development for water supply company employees.

Table 7.6: Sustainable access to safe drinking water and sanitation services, 2010–2016

	2010	2011	2012	2013	2014	2015	2016
Population	16 321 872	16 557 201	16 792 089	17 035 550	17 288 285	17 542 806	17 794 055
Population with access to sanitation services	8 483 283	10 054 382	10 078 507	104 065 800	10 919 653	10 089 511	10 356 728
Households connected to sanitation system (%)	52.0	60.7	60.0	610.9	63.2	57.5	58.2
Population with sustainable access to safe drinking water	9 469 711	10 871 404	10 957 839	113 821 969	11 877 518	11 891 840	12 506 913
Households connected to water supply system (%)	58.0	65.7	65.3	66.8	68.7	67.8	70.3

Source: Committee on Statistics, 2017.

Table 7.7: Access to centralized water and sanitation systems according to several sources, per cent

	Centralized water supply			Centralized sanitation		
	Total	Urban	Rural	Total	Urban	Rural
Committee on Statistics	70.3	..	..	58.2	..	..
Programme for the Development of the Regions until 2020, implementation report for 2016	..	88.0	52.3	..	84.0	11.2
Ministry of Health*	92.0	98.7	82.7	..	..	..
Ministry for Investments and Development*	..	93.8	57.0	..	88.0	11.5

Source: Committee on Statistics, 2018; Implementation report for 2016 of the Programme for Development of the Regions until 2020, Ministry of National Economy, 2017; Sanitary-epidemiological situation in the Republic of Kazakhstan in 2017, Ministry of Health, 2017; Ministry for Investments and Development, Draft Report of the Ministry, 12 June 2018.
Note: * data for 2017. All other data are for 2016.

Currently, water supply in rural areas is still far worse than in cities (in terms of technical condition and equipment, forms of management, the presence of qualified specialists, etc.), despite the progress made. There are no organized laboratories for regular monitoring of the safety of drinking water, except in large cities. In many settlements, sanitary protection zones around the sources of drinking water supply are not identified and maintained. There are not enough installed disinfection chlorinators and insufficient means of disinfection in rural intake structures and water supply lines. Inadequate use of groundwater potential to provide the population (including rural) with drinking water is another important aspect.

7.5 Impact from and adaptation to climate change

Impact

According to the Seventh National Communication to the UNFCCC, in 2050, based on the RCP 4.5 scenario, water resources in Kazakhstan mountain basins may increase, on average, by 1.94–12.54 per cent in the Keles, Kuragaty, Assa, Ili, Uba, Ulba, Yertis, Arys and Sharyn River Basins. Southern basins, where runoff formation involves glaciers, would mainly contribute to such an increase. In lowland river basins in western, northern and central Kazakhstan, water resources would decrease by 3.7–15 per cent, and, by the end of the century, by 9.2–23.7 per cent against the past runoff norm.

In recent years, there has also been a more than twofold increase in the frequency of floods and mudflows, especially in mountainous areas. About 54 river floods in mountain rivers and 11 mudslides occurred in the period 1967–1990, increasing to 96 and 20 respectively in the period 1991–2015. Rapid warming leads to a rapid melting of the snow cover and glaciers, which leads to the occurrence of an emergency. Even now, due to global climate change, there are abnormal floods in some river basins (e.g. the Ishim River Basin), which may sometimes have negative impacts on human living conditions. Hydrometerological emergencies increased from 39 in 2012 to 74 in 2017 (table 5.1).

According to forecasts, climate change will significantly affect the water resources of Kazakhstan, as a result of which the climate in agricultural regions will become more arid (annex VI, map 6). Some basins in Kazakhstan already experience a significant water shortage, and most of Kazakhstan's irrigated lands are in drought conditions.

Photo 7.3: View from a mud-protection dam on the Talgar River

Adaptation

The Institute of Geography has determined two strategic ways of eliminating the lack of fresh water in Kazakhstan: reducing the load on water resources and increasing the quantity of such resources. The first strategy involves measures to reduce the use of fresh water in industry, agriculture and utilities through the use of more modern technologies. The second strategy involves increasing the water resources available for use by the long-term and seasonal regulation of annual flow, use of fresh groundwater, desalinization of waters and territorial (including transboundary) redistribution of water resources.

The main measures for adaptation to climate change currently undertaken by Kazakhstan include the construction of new reservoirs for seasonal regulation, introduction of drip irrigation systems and conduct of soil conservation measures.

In the period 2010–2014, the ECE-UNDP-OSCE project “Promoting Cooperation to Adapt to Climate Change in the Shu and Talas Transboundary Basin” assisted Kazakhstan and Kyrgyzstan to jointly assess the vulnerability of the basin to climate change. In the period 2015–2018, the GEF project “Enabling Transboundary Cooperation and Integrated Water Resources Management in the Shu and Talas River Basins” expanded the bilateral cooperation to planning specific climate change adaptation activities. The GEF project supported several pilot adaptation measures related to ecosystem restoration and agricultural water-use efficiency.

7.6 River basin management

Kazakhstan has been one of the pioneers in the post-Soviet context in introducing river basin management. By now, basin institutions are well established and have accumulated significant experience.

Basin inspections, subordinated to the Committee on Water Resources, are key institutions in charge of implementing the principle of basin management. The basin councils, which have advisory functions, function to ensure the principles of transparency and involvement of the public in water resources management, use and protection. They consist of water users that promote their interests when discussing water management decisions. Activities and meetings of the basin councils are financially supported by the Government and, for some councils, by international donors. The basin agreements have been concluded and are aimed at coordinating the various water uses and restoration and protection activities. To date, more than 25 basin agreements have been concluded.

The basin-specific schemes of integrated use and protection of water resources (SIUPWRs) serve as the basis of planning at the basin level. They provide information for decision-making on the use, restoration and protection of relevant basins. They also serve as a foundation for decision-making on setting limits on water use. From 2003 to 2009, SIUPWR have been developed and agreed for 12 river basins. Updating of SIUPWRs is envisaged for the period 2017–2021.

The General SIUPWR covering the entire territory of Kazakhstan was developed in 2012 and officially adopted in 2016. This document clarifies the available resources of surface water and groundwater, assesses the level of their use and identifies the water needs of the economic sectors in the future. It facilitates determination of the limits of water use, including in the transboundary river basins.

Despite the significant progress that has been made since the introduction of the basin principle into the Water Code in 2003, the basin authorities still face a range of problems. They mostly concern the low level of material and technical equipment (e.g. lack of portable laboratories for rapid analysis of water quality) and the weak organizational and institutional potential of basin inspections. Insufficient staffing of basin inspections does not allow them to completely fulfil their tasks and functions. The Balkhash-Alakol basin inspection (the catchment area of the basin is 400,000 km^2) has 24 staff. One state inspector must control 14,285 km^2 of the basin, follow the work of 46 primary water users and monitor water use (amounting to 143 million m^3) and sewage disposal (19.4 million m^3). Attracting qualified staff to work in the basin inspections is an issue.

In addition, the basin inspections experience certain problems in accessing information resulting from monitoring. Monitoring of water qualitative characteristics is carried out within each basin by the regional hydrometeorological office of Kazhydromet (which monitors surface water), territorial department of ecology of the Committee of Environmental Regulation and Control (which monitors water quality and discharge of treated and untreated wastewater), territorial department of the Committee for the Protection of Public Health (which monitors water quality for drinking needs) and territorial department of the Committee on Geology and Subsoil Use (which monitors the quality of groundwater). Most information available at these organizations is inaccessible to basin inspections, which makes them less well equipped for the performance of their tasks.

7.7 Legal, policy and institutional framework

Legal framework

Key principles of water legislation include the primary provision of drinking water to the population, fair and equal access to water by the population and the complex and rational use and protection of waters.

The 2003 Water Code is the key legislative act on water issues. Altogether, there are over 300 acts of subsidiary legislation on water issues.

A significant new development in the water legislation is that, since 2012, the authorities have begun to introduce norms, which ensure the safety of hydrotechnical facilities (dams, reservoirs, etc.) into the Code and subsidiary legislation (e.g. 2017 Resolution of the Government No. 933, 2015 Order of the Minister of Agriculture No. 19-4/286).

In 2015, the Law on Amendments to Legislation related to Water Supply and Sanitation, Credits and Subsidies in Housing and Communal Services included amendments to the Water Code related to water metering and introduced mandatory water recycling in industry.

Also, since 2008, two new relevant SanPins have been approved: for water intake facilities and drinking water supply (2015 Order of the Minister of National Economy No. 209) and for sanitary and epidemiological zones of industrial facilities (2015 Order of the Minister of National Economy No. 237).

Policy framework

2014 Programme for Management of Water Resources

One of the main directions of Kazakhstan's transition to "green economy" is the sustainable use of water resources.

The tasks and objectives of the water sector were described in the State Programme for Management of Water Resources (2014 Decree of the President No. 786; no longer valid). The main objective of the Programme was to ensure water safety in Kazakhstan by increasing the efficiency of water management. The tasks of the Programme included:

- Guaranteed supply of water resources to the population, the environment and the economic sectors through the implementation of water conservation measures and increase in the volume of available water resources;
- Increasing the effectiveness of water management;
- Maintaining the integrity of ecological water systems.

The Programme provided measures for reducing the water resources shortage expected by 2020 through modernization and development of infrastructure and effective water use and water resources management, as well as modernization of the water supply and water discharge systems of settlements. The task was also to provide access to the central drinking water supply system: not less than 100 per cent access in cities and not less than 80 per cent in rural settlements by 2020.

2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021

The 2014 State Programme for Management of Water Resources was invalidated in 2017. The 2017 Decree of the President No. 420 approved the State Programme on Development of the Agro-industrial Complex for the period 2017–2021, which included many provisions of the State Programme for Management of Water Resources. However, only three water-related target indicators are included in the 2017 State Programme, which is totally non-comparable to the 14 target indicators of the 2014 State Programme, which covered the entire spectrum of water management and protection.

The water-related targets of the 2017 State Programme are:

- To decrease water use per 1 ha of irrigated land by 20 per cent to the level of 2015 (i.e. from 9,180 m^3 in 2015 to 7,348 m^3 in 2021);
- To increase water reuse in industry from 0.69 km^3 in 2015 to 0.77 km^3 in 2021 and water recycling in industry from 7.3 km^3 in 2015 to 7.62 km^3 in 2021;
- To increase water availability from surface water resources by 1.9 km^3 by 2021 from the level of 2015.

The latter measure is planned to be realized through the construction of 22 new reservoirs in seven oblasts (Almaty, East Kazakhstan, Zhambyl, West Kazakhstan, Kyzylorda, Aktobe and South Kazakhstan). The total cost is estimated at 57.2 billion tenge. As of early 2018, implementation of this measure is at the stage of feasibility studies.

2011 Ak Bulak Programme for the period 2011–2020

The 2011 Ak Bulak Programme, invalidated in 2014, aimed at providing the population with quality drinking water and sanitation services. According to the CWR, the Government has allocated from the state budget and spent funds for reconstruction and construction of group water supply systems in the amount of 49.6 billion tenge for 2011–2014 to implement 64 projects and develop 35 project design documents. As a result of this work, 1,128 km of water supply networks were reconstructed and built and water supply was improved in 178 settlements with a total population of 398,000.

During the period 2012–2014, 557 villages were explored and groundwater reserves of 252,200 m^3/day were approved. In addition, reserves were reapproved for six sites encompassing 1.9 million m^3/day, due to the expiration of their operational periods; 13.6 billion tenge were allocated for these measures.

In the period 2011–2014, 1,312 projects of water supply and water discharge were implemented in the amount of 335.2 billion tenge. As a result, access to the centralized water supply in the cities increased from 82 per cent in 2011 to 86 per cent in 2014 and in rural settlements from 42.5 per cent in 2011 to 50.3 per cent in 2014. Losses on water supply networks decreased from 35 per cent in 2011 to 20.8 per cent in 2014, while the level of effluent treated to the standard of wastewater increased from 64 per cent in 2011 to 76.9 per cent in 2014. In total, more than 15,000 km of water supply and water discharge networks were built and modernized in the period.

2014 Programme for Development of the Regions until 2020

The 2014 Programme for Development of the Regions until 2020 (2014 Resolution of the Government No. 728) aims, among other things, to provide the population with quality drinking water. The Government allocated 181.9 billion tenge from the state budget to the Programme during the period 2015–2017, including 96.8 billion tenge in cities, 61.7 billion tenge in villages and 23.4 billion tenge in group water supply systems. In total, 6,167 km of water supply and water discharge networks were built and reconstructed.

<u>2015 State Programme of Infrastructure Development “Nurly Zhol” for 2015–2019</u>

Among other areas, this Programme has a focus on rural water supply infrastructure. The Government allocated 2.18 billion tenge within the Programme in 2016 and used 1.66 billion tenge (76 per cent).

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis target 3.9 and selected targets under Goal 6 of the 2030 Agenda for Sustainable Development is described in box 7.1.

Box 7.1: Target 3.9 and selected targets under Goal 6 of the 2030 Agenda for Sustainable Development

<u>Goal 3: Ensure healthy lives and promote well-being for all at all ages</u>
<u>Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</u>

Kazakhstan does not measure indicator 3.9.2 (Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)).

The rate of water-borne intestinal infections is not high in Kazakhstan. One outbreak of water-borne acute intestinal infection was registered in each of the years 2010, 2012 and 2013 and one case of viral hepatitis A in 2011. In 2017, drinking water was a source of infection in 1.0 per cent of acute intestinal infection incidents. The causal relationship between the chemical composition of water and the prevalence of urinary system diseases is confirmed in the North Kazakhstan, Pavlodar and South Kazakhstan Oblasts. The notable increase in urolithiasis in Almaty City and the capiatal, along with other causes, can be linked to the high mineralization and rigidity of drinking water (chapter 13).

In the framework of the preparation for accession to the Protocol on Water and Health, 30 target indicators were proposed in Kazakhstan, including those related to decreasing the burden of water-related diseases. The proposed indicators 5–9 are the reduction of the burden of: disease cholera and typhoid fever (5), acute viral hepatitis (6), dysentery (7) and acute intestinal infection (8), and the reduction of the scale of outbreaks and incidents of water-related disease (9).

<u>Goal 6: Ensure availability and sustainable management of water and sanitation for all</u>

Kazakhstan does not currently produce several indicators under Goal 6, including 6.3.1 (Proportion of wastewater safely treated), 6.4.2 (Level of water stress: freshwater withdrawal as a proportion of available freshwater resources), 6.5.1 (Degree of integrated water resources management implementation (0–100)), 6.6.1 (Change in the extent of water-related ecosystems over time) and 6.b.1 (Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management). This is due to the unavailability of approved methodology for these indicators. Nevertheless, these indicators are considered highly important by Kazakhstan.

<u>Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all</u>

Data on access to water supply in Kazakhstan differ among different sources (table 7.7). According to the Committee on Statistics, 70.3 per cent of the total population had access to a centralized water supply in 2016 (table 7.6). Kazakhstan’s target, set by the 2012 Strategy "Kazakhstan-2050", is to ensure water supply to all the population by 2020. The 2014 Programme for Development of the Regions until 2020 sets the targets to increase centralized water supply to 97 per cent of the population in urban areas and 62 per cent of the population in rural areas by 2019. The 2018 Strategic Plan for Development until 2025 envisages increasing access to centralized water supply in urban areas to 100 per cent and in rural areas to 80 per cent by 2025. However, the achievement of these targets may not be feasible with the current level of investments.

<u>Target 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations</u>

According to the Committee on Statistics, 58.2 per cent of the total population had access to a centralized sanitation system in 2016 (table 7.6). The 2014 Programme for Development of the Regions until 2020 sets the targets to increase access to centralized sanitation to 97 per cent of the population in urban areas and 13 per cent in rural areas by 2019. However, the achievement of these targets may not be feasible.

Open defecation is not an issue in Kazakhstan. Where centralized sanitation is not available, pit latrines are used.

No studies are available in Kazakhstan on gender aspects of equitable access to water and sanitation.

Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

With regard to indicator 6.3.1 (Proportion of wastewater safely treated), according to the Committee on Statistics, the share of untreated wastewater decreased from 4.23 per cent in 2008 to 1.79 per cent in 2016 (table 7.5). Nevertheless, untreated wastewater amounted to 93.065 million m^3 in 2016. An additional aspect is that not all WWTPs achieve the required level of treatment. The share of municipal and industrial wastewater treated to the required standard is 55–65 per cent of the total volume of discharged wastewater. Reducing the volume of discharged wastewater and reducing the proportion of untreated wastewater can be used as indicators of reducing environmental pollution.

The 2013 Concept on Transition to Green Economy defines wastewater treatment as a national priority, but to halve the amount of untreated wastewater and substantially increase water recycling is a challenging task for Kazakhstan. Without the allocation of resources from the national budget and a well-designed implementation plan, Kazakhstan will not achieve target 6.3.

Kazakhstan does not currently produce indicator 6.3.2 (Proportion of bodies of water with good ambient water quality). Production of this indicator will be considered by the Committee on Statistics after approval of the methodology at the global level. Currently, the level of surface water pollution is estimated by the use of the CWPI, which is used to compare and detect the dynamics of water quality change. According to the CWPI, there are four classes of water quality, from I (clean according to the norms, CWPI ≤ 1.0) to IV (extremely high level of pollution, CWPI ≥ 10). In 2017, four rivers, one lake and the Caspian Sea were classified as "clean according to the norms". However, the available data do not allow full assessment of progress using the CWPI. Kazakhstan is encouraged to increase collection of data related to ambient water quality.

Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

According to the information provided by Kazakhstan in 2017 as part of the reporting under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes and for global indicator 6.5.2 (Proportion of transboundary basin area with an operational arrangement for water cooperation), for Kazakhstan, the proportion of transboundary basin area with an operational arrangement for water cooperation is 73 per cent. All surface waters shared by Kazakhstan are covered by transboundary water agreements but none of the 15 transboundary aquifers shared by Kazakhstan is covered by an agreement. This demonstrates room for efforts to increase the proportion of transboundary basin area with an operational arrangement for water cooperation on the way to 2030.

Institutional framework

Committee on Water Resources

The functions of the Committee on Water Resources under the Ministry of Agriculture include management, regulation of the use and protection of water resources, including renewable water resources, maintaining the state water cadastre and state accounting of water and its use. The CWR implements its functions directly and through the territorial bodies – basin inspections, which are responsible for water management at the basin level. In addition, RSE “Kazvodhoz” is subordinated to the CWR and responsible for the operation and maintenance of large hydrotechnical infrastructure, canals for irrigation water and large water supply pipelines up to the point that they bring water to human settlements.

The eight basin inspections are in charge of implementing river basin management. Their key functions include:

- Integrated water resources management of the basin (implemented on the basis of a SIUPWR);
- State control over water resources use and protection, and observance by individuals and legal entities of the water legislation;
- Maintenance of state accounting, state water cadastre and state monitoring of water bodies in the respective basin;
- Issuance and suspension of permits for special water use;
- Coordination of plans of local executive authorities in respect of the rational use of water bodies in the respective basin;
- Preparation and implementation of basin agreements;
- Organization of the work of basin councils.

Recently, the basin inspections have been assigned new responsibilities with regard to control and inspection of the safety of hydrotechnical infrastructure. One of the key issues is insufficient staffing of the CWR and its basin inspections (table 7.8) vis-à-vis the tasks entrusted to them, in particular, the implementation of regulation and enforcement in the water sector in line with the principles of integrated water resources management.

Table 7.8: Staff of the Committee on Water Resources and its basin inspections, 2018, number

	Planned	Actual
Committee on Water Resources	40	38
Aral-Syrdarya	19	19
Balkhash-Alakol	25	24
Irtysh	20	16
Ishim	21	18
Nura-Sarysu	15	14
Tobol-Torgai	15	15
Ural-Caspian	18	13
Shu-Talas	13	12
Total	**186**	**169**

Source: Ministry of Agriculture, 2018.

Other institutions

The Committee on Geology and Subsoil Use of the Ministry for Investments and Development is in charge of implementation of state accounting for groundwater, maintenance of the state cadastre concerning the groundwater and monitoring of groundwater quality. Prior to May 2018, it was issuing permits for exploration and abstraction of groundwater from 2,000 m^2/day (this is now the competence of basin inspections).

The Committee on Construction, Housing and Utilities of the Ministry for Investments and Development carries out state regulation in the field of water supply and sewerage within the settlements. It oversees the technical operation of the water supply and sewerage systems of settlements and guides the activities of local executive authorities in the field of water supply and sewerage.

The Committee on Regulation of Natural Monopolies, Protection of Competition and Consumer Rights under the Ministry of National Economy manages the natural monopolies concerning tariff policy and pricing for the water sector and gives its agreement to any water tariff increases requested by water companies.

The Committee for the Protection of Public Health of the Ministry of Health is responsible for the sanitary and epidemiological well-being of the population. It monitors the quality of drinking water (at water intake and water treatment facilities).

The territorial bodies (departments of ecology) of the Committee of Environmental Regulation and Control under the Ministry of Energy perform environmental enforcement (inspections) and monitor the discharge of treated and untreated wastewater.

Kazhydromet under the Ministry of Energy conducts monitoring of surface water quality, sea water quality, snow cover, precipitation and hydrological monitoring. It is responsible for collecting, processing and analysing the monitoring data.

Local executive authorities at oblast level (akimats) manage municipal water facilities, establish water protection zones and protective sanitary zones of sources of drinking water supply, participate in the work of basin councils and basin agreements and develop rates for the use of surface water resources (for approval by Maslikhats).

Division of responsibilities and coordination

Kazakhstan legally implemented separation of the functions of public administration and control in the use and protection of water resources (vested in basin inspections) from the functions of economic use of water resources (vested in Kazvodhoz).

However, implementation of reforms in the water sector is not fully completed. The basin inspections, to which the Water Code transferred the management functions, can be an example. In addition to management and regulatory tasks, one of the main areas of a basin inspection's activity is control and inspection; therefore, it cannot make decisions on many managerial issues independently. As the Government defines directly the legal regime for water bodies of national importance (2004 Government Resolution No. 59), there are potential issues with coordination. Furthermore, the water-related infrastructure (water intake facilities, treatment facilities, wastewater discharge systems, etc.) is under different ministries, and effective coordination of all necessary actions within a basin is often complicated.

In late 2015, the Government created an advisory Interagency Council on Water Resources Management (2015 Order of the Prime Minister No. 141-p), headed by the First Deputy Prime Minister, to strengthen interministerial coordination within the Government. The Council is tasked to give recommendations and proposals to the Government on national policy priorities in the water sector. Its composition includes eight deputy ministers and the Chair of the Committee on Water Resources of the Ministry of Agriculture, as well as the heads of the basin councils and a representative of the National Chamber of Entrepreneurs "Atameken". The working body of the Council is the Ministry of Agriculture. However, as of mid-2018, the Council had met only once (chapter 1).

Basin inspections have no access to information available at other state organizations, and members of the public must solve problems with access to information on water quality and management on their own. There is no organization that would develop and support a complete database on the water sector. As a result, there is a significant lack of information and insufficient awareness by the people who make decisions, as well as among the population.

Transboundary cooperation

The Department of Transboundary Rivers of the Ministry of Agriculture and the CWR (figure 1.2) are responsible for cooperation on transboundary waters. The basin inspections participate in relevant transboundary cooperation activities related to their basins.

Regulatory instruments

Permitting

All water consumers who abstract 50–2,000 m^3 of water per day need a permit for special water use. If the water abstraction does not exceed 50 m^3 per day, water use is considered to be general and does not require a separate permit. However, in this case, the water consumer should notify the relevant local executive body.

The permit for special water use is the main regulatory instrument used to control the use of water resources and protect them from pollution. Basin inspections issue the permits for: i) discharge of industrial, domestic, drainage and other wastewater into the surface water bodies; ii) groundwater abstraction and use; and iii) water abstraction from surface water bodies with the use of technical devices. One should pay for the use of water resources, as well as for the discharge of wastewater. The payment rate for water abstraction depends on the type of water use.

Water protection zones

Allocation of areas along the banks of water bodies is another regulatory measure for protection of water resources from pollution. Certain activities are prohibited in these areas, while other types of activity are to comply with requirements for environmental protection.

Water protection zones are to be established by local authorities. However, there are cases in which such zones are not defined and there is often a failure to comply in practice with the legal requirements within water protection zones.

There are instances of illicit allocation of land for construction within water protection zones, which ultimately leads to water pollution with sewage and household waste from settlements. A frequent form of violation is unauthorized construction of facilities within water protection zones and belts, without the issuance of any permit documents.

Tariffs

Tariffs for the population remain rather low and do not cover service costs, whereas they are much higher for public organizations and commercial enterprises.

Tariffs for cold water in February 2018 increased to 72.3 tenge/m^3. The highest price for cold water is observed in Aktau (234.3 tenge/m^3), Atyrau (113.49 tenge/m^3) and Karaganda (110.26 tenge/m^3). The lowest price is observed in Pavlodar (44.41 tenge/m^3), Zhezkazgan (45.88 tenge/m^3) and the capital (46.21 tenge/m^3). Sewerage services in February 2018 amounted to 47.1 tenge/m^3. The highest price for this service is observed in Karaganda (96.4 tenge/m^3) and the lowest price in Zhezkazgan (17.84 tenge/m^3) and Taraz (18.38 tenge/m^3).

The existing pricing system and approved tariffs, especially in the agricultural sector, do not cover the required operational costs and depreciation charges.

Participation in international agreements

Multilateral agreements

Kazakhstan has been a party to the ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) since 2001. It is not a party to the Convention's Protocol on Water and Health (chapter 13). In the past few years, Kazakhstan has been rather active in the Convention's framework:

- Since 2013, Kazakhstan has hosted the EU Water Initiative National Policy Dialogue on Integrated Water Resources Management. Results include preparation for the country's accession to the Protocol on Water and Health, including through development of targets on water and health, and development of the joint Kazakh-Russian assessment on the Ural River and Kigac tributary of the Volga River;
- Since 2017, Kazakhstan has hosted the International Water Assessment Centre (IWAC), a collaborative centre under the Water Convention. IWAC aims to support the implementation and application of the Water Convention, its Protocol on Water and Health and their respective

programmes of work in and beyond the Central Asian countries;
- In 2018, Kazakhstan hosted the eighth Meeting of the Parties under the Convention.

Kazakhstan participated in the first reporting exercise under the Water Convention in 2017, having submitted its national report on the implementation of the Convention and Sustainable Development Goals indicator 6.5.2.

Kazakhstan is not a party to the 1997 Convention on the Law of Non-navigational Uses of International Watercourses.

Regional agreements

In the review period, Kazakhstan continued to participate in the regional cooperation among Central Asian countries on the Aral Sea and has largely played a stabilizing role in this cooperation. In the period 2009–2012, Kazakhstan was Chair of the International Fund for saving the Aral Sea (IFAS). Under the Chairmanship of Kazakhstan, Central Asian countries extensively discussed opportunities for strengthening the legal and institutional frameworks of IFAS.

Also, Kazakhstan continued to participate in the cooperation under the framework of the Commonwealth of Independent States, where exchange of hydrometeorological information is a significant component.

Bilateral cooperation

In the review period, two new water-related agreements were concluded between the Government of the Russian Federation and the Government of Kazakhstan. The 2010 Agreement on the joint use and protection of transboundary water bodies was largely a comprehensive update of the previous bilateral agreement of 1992. The Kazakhstan–Russian Federation Commission for the shared use and protection of transboundary water bodies continues to function under the new agreement. The cooperation covers transboundary rivers. Formally, the agreement covers transboundary groundwater but in practice there is no cooperation on transboundary aquifers. Another agreement between the Government of the Russian Federation and the Government of Kazakhstan is the 2016 Agreement on ecosystem preservation of the transboundary Ural River Basin. The new agreement established a separate bilateral commission.

There have also been new developments in bilateral cooperation with the People's Republic of China. This cooperation continues to be based on the bilateral 2001 Agreement on cooperation in the use and protection of transboundary rivers. In 2011, a new intergovernmental bilateral agreement was concluded: the Agreement on protection of water quality of transboundary rivers. In the period 2011–2013, Kazakhstan and the People's Republic of China undertook a joint assessment of the flow of transboundary rivers for the preparation of an agreement on water allocation; no such agreement is yet in place. Transboundary groundwaters are not covered by existing bilateral agreements between Kazakhstan and the People's Republic of China.

A specific issue for Kazakhstan in cooperation on transboundary waters is that cooperation on the Irtysh (Yertys) River takes place within the framework of two bilateral agreements (with the People's Republic of China and with the Russian Federation). No trilateral cooperation on the Irtysh (Yertys) River is in place.

Bilateral cooperation with Kyrgyzstan continues on the basis of the 2000 Agreement on the Use of Water Management Facilities of Intergovernmental Status on the Rivers Shu and Talas. In the review period, the Shu and Talas Water Management Commission conducted regular meetings and activities. The Commission has been rather successful in attracting the attention of international organizations and donors to support activities in the basin. In the review period, there were a number of discussions about the need to amend the 2000 Agreement, along with the 2006 Regulation of the Shu and Talas Water Management Commission, mostly to expand the scope of existing cooperation to new facilities and cooperation areas. However, no decision on amendments has been taken, apparently in order not to jeopardize the existing cooperation framework in the current political circumstances.

An important element of cooperation on transboundary waters is the joint monitoring of the quantity and quality of transboundary water resources. Kazhydromet conducts hydrological monitoring on transboundary rivers: hydrological observations take place at 21 stations at the border with the Russian Federation, at five stations at the border with the People's Republic of China, at one station at the border with Uzbekistan and at nine stations at the border with Kyrgyzstan. The countries exchange the hydrological data.

None of the 15 transboundary aquifers shared by Kazakhstan is covered by a transboundary water agreement.

7.8 Assessment, conclusions and recommendations

Assessment

With the natural irregularity in the distribution of water resources across the country and the high dependency on water resources formed outside its borders, Kazakhstan pays significant attention to water management policy. The main directions of such policy are outlined at the top political level and are then cascaded into strategic policy documents and water-related legislation. The policy framework has clear targets in the water sector with regard to increasing water efficiency, water reuse and recycling, increasing the capacity to accumulate water through the construction of new reservoirs, and increasing coverage of the population by water supply and sanitation systems. These national targets make Kazakhstan generally well prepared to achieve Sustainable Development Goal 6, though adequate investment is indispensable for achieving actual progress on the targets. The weak links of the current architecture in the water sector are in the institutional domain. There is insufficient cooperation among various institutions that are in charge of different water infrastructure, as well as inadequate sharing and exchange of information, in particular, information received as a result of monitoring.

Kazakhstan is among the pioneers in the post-Soviet context in actually implementing the basin management approach. During the review period, the basin institutions developed practical experience with implementing integrated water resources management and working across the basin to reconcile the interests of the various stakeholders. Basin councils meet regularly and have become important vehicles in decision-making on the development of their respective basins. However, the Committee on Water Resources and its basin inspections are not adequately staffed vis-à-vis the entire volume of tasks assigned to them.

In the review period, the Government increased attention to the management of hydrotechnical infrastructure. Responsibilities in this area have been better defined and detailed legislation has been adopted. Another development is that Kazakhstan pays stronger attention to the need to adapt to climate change impacts in the water sector. The 2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021 discusses the impacts of climate change for the sector.

In the review period, Kazakhstan has been very active in international cooperation on water issues. It remained a “stability factor” in the regional cooperation among Central Asian countries in the framework of IFAS and started to take an active role in activities under the ECE Water Convention, in particular by hosting the Convention’s International Water Assessment Centre since 2017. Landmark achievements in transboundary water cooperation include the conclusion of two new bilateral agreements with the Russian Federation (2010 and 2016) and a new bilateral agreement on water quality with the People’s Republic of China (2011). Nevertheless, Kazakhstan’s bilateral cooperation on water does not yet cover transboundary groundwater. Another specific issue remains the lack of trilateral basin-wide cooperation on the Irtysh (Yertys) River.

Conclusions and recommendations

Reduction of pollution

Reducing the pollution of drinking water resources is one of the important water management problems. There are a number of unsolved issues related to the qualitative characteristics of industrial wastewater. A significant amount of wastewater from industrial enterprises, including TPPs, comes directly to municipal wastewater treatment facilities that are not intended for the treatment of industrial wastewater. About 50 per cent of wastewater discharged by large industrial enterprises does not meet the requirements. There are no WWTPs in most industrial enterprises, or else pre-treatment is carried out in a non-compliant manner. There are no legislative requirements to oblige companies to enter into agreements with water utilities for additional wastewater treatment. A number of cities do not have a stormwater sewerage system.

Recommendation 7.1:
The Government should:

(a) Ensure compliance with the regulatory requirements for wastewater by industrial enterprises, including thermal power plants, avoiding the discharge of their wastewater into municipal sewerage systems;
(b) Ensure pretreatment of industrial wastewater by enterprises through enhanced compliance monitoring;
(c) Stimulate industrial enterprises to conclude contracts with water utilities for additional wastewater treatment;
(d) Develop a plan/roadmap for expansion of stormwater sewerage networks.

Surface water monitoring

The monitoring of surface water quality is carried out with more than 60 hydrochemical and physico-chemical parameters. Kazhydromet carries out the ecological monitoring of seawater quality in the Kazakhstan sector of the Caspian Sea, where the seawater quality is determined by 45 indicators.

Recommendation 7.2:
The Government should consider expanding the surface water monitoring, including hydrobiological monitoring, based on experience of OECD Member countries.

Water supply and sanitation

One of the priority goals of Kazakhstan is to provide urban and rural settlements with safe drinking water. Access to sanitation is also an important goal, though it features less prominently in the policy documents than does water supply. Currently, water supply in rural areas is still worse than in cities (in terms of technical conditions and equipment, forms of management, the presence of qualified specialists, etc.), despite the progress made. Stronger efforts and investments are of critical importance to enable the achievement by Kazakhstan of its national targets in this area and the relevant commitments under Goal 6 of the 2030 Agenda for Sustainable Development.

Recommendation 7.3:
The Government should continue its work to provide the population with safe drinking water and sanitation services, in particular by:

(a) Paying stronger attention to water supply and sanitation in rural areas;
(b) Increasing investments in and creating favourable conditions for attracting investments in water supply and sanitation.

Basin inspections

Since the inclusion of the basin management principle in the 2003 Water Code, Kazakhstan has significantly progressed in operationalizing river basin management. Basin inspections and basin councils have been established and basin agreements have been concluded. At the same time, insufficient staffing of basin inspections does not allow them to completely fulfil their tasks. They face difficulties in attracting qualified staff. Furthermore, basin inspections have a low level of material and technical equipment and weak organizational and institutional potential. In addition, most information available at other organizations that perform water monitoring is not accessible to basin inspections, which makes them less well equipped for the performance of their tasks.

Recommendation 7.4:
The Government should:

(a) Enhance the number of employees of the basin inspections and ensure regular training of their personnel;
(b) Improve the material and technical equipment of basin inspections (e.g. make available portable laboratories for rapid analysis of water quality);
(c) Ensure dialogue and exchange of information among the authorities responsible for various aspects of water monitoring.

Water losses

Water loss is a serious problem in Kazakhstan, especially in agriculture. On average, approximately 60 per cent of the total water consumed by agricultural consumers is lost. The poor (and sometimes critical) condition of the irrigation infrastructure is one of the causes of large water losses. The vast majority of agricultural canals with title transferred to private owners are abandoned and in fact unusable, because of their wear. This has resulted in low efficiency of distribution lines, large losses of water and a rise in groundwater and the salinity of adjacent lands.

Recommendation 7.5:
The Ministry of Agriculture should:

(a) Conduct an inventory to identify abandoned canals, collectors and drainage systems, dams and reservoirs;
(b) Initiate the transfer of the abandoned infrastructure under the responsibility of state institutions in order to carry out its repair and rehabilitation.

See Recommendation 12.1.

Water protection zones

Water protection zones and belts are to be defined by local executive authorities. They allow the maintenance of water bodies in sanitary, hygienic and ecological conditions and prevention of water pollution. However, the process to define the borders of water protection zones is not completed yet, and there are cases in which the borders are not defined. Also, there is often failure to comply with water protection zone regimes. There are instances of illicit allocation of land for construction within water protection zones.

Recommendation 7.6:
The local executive authorities should:

(a) *Complete the definition of borders for water protection zones and belts for all water bodies;*
(b) *Organize strict control over compliance with the regime of economic activities in these areas;*
(c) *Ensure demolition of illegal buildings in water protection zones and belts.*

Interministerial coordination

The water-related infrastructure (water intake facilities, treatment facilities, wastewater discharge systems, etc.) is under different ministries, and effective coordination of water-related policies and their implementation is often complicated. In late 2015, the Government created an advisory Interagency Council on Water Resources Management (2015 Order of the Prime Minister No. 141-p), headed by the First Deputy Prime Minister. The aim of the Council is to strengthen interministerial coordination within the Government. Such coordination is of the utmost importance to enable the achievement by Kazakhstan of its national water-related targets, as well as Sustainable Development Goal 6. However, as of mid-2018, the Council had met only once.

Recommendation 7.7:
The Ministry of Agriculture should ensure the regular meeting of the Interagency Council on Water Resources Management and that information on its activities is publicly available.

Chapter 8

WASTE AND CHEMICALS MANAGEMENT

8.1 Practices and trends in waste management

Municipal solid waste and similar waste

Annual generation of municipal solid waste (MSW) in Kazakhstan is estimated at 5–6 million t. Data on MSW amounts are calculated from the generation of waste per capita in m^3 per day and estimated density of MSW. This standard generation per capita is defined by each municipality separately and is valid for several years. A study prepared in 2014 by the city of Stepnogorsk compared standards of waste generation in 19 towns in Kazakhstan. This study shows that the values of standard waste generation range from 0.47 to 2.77 m^3/person/year, with the first one being approved in 1991 and the latest in 2013.

The statistical bulletin on collection, transport, recovery and disposal of municipal waste for 2016 includes a new category: companies and individual entrepreneurs who do not collect MSW on a regular basis. Waste generated by this category amounted to 2.6 million t in 2016. This doubles the total amount of MSW in Kazakhstan, resulting in 5.4 million t, and this number is cited as actual MSW generation in Kazakhstan. Similar figures can be found in the report of the Kazakhstan Research Institute of Environment and Climate in 2012, which stated 4.6 million t in 2010 and 5.8 million t in 2011 of MSW collected by regular and other waste services.

Thus, the following data on waste is a characterization of a trend, rather than actual figures on generated waste. Table 8.1 shows data on waste collected from companies providing regular collection services only.

The collected amount of MSW has decreased since 2011, but this was not caused by fewer services being provided; rather, this reflects the actual decrease of MSW generation as it correlates with the development of the real wage index in Kazakhstan (figure 8.1). Thus, the current decrease in MSW generation has a temporary effect and the growth of real income would cause a further increase in the generation of MSW in the future.

Table 8.1: Amount of collected municipal solid waste, 2005–2017, 1,000 t

	Municipal waste	of which: household waste
2005	2 091.9	1 677.8
2006	2 401.2	1 960.0
2007	3 351.8	2 868.1
2008	3 411.9	2 603.5
2009	3 928.3	3 348.2
2010	3 784.7	3 094.9
2011	3 919.0	3 171.7
2012	3 588.3	2 429.9
2013	3 547.7	2 495.5
2014	3 446.3	2 421.0
2015	3 235.5	2 318.0
2016	2 813.6	1 988.5
2017	2 983.9	2 073.4

Source: Committee on Statistics, 2018.

The composition of MSW was analysed in nine cities of Kazakhstan in 2011. Additional studies were made for the capital and for Almaty City by Inglezakis et al.[48] Table 8.2 shows results of these studies. The study by Inglezakis et al. focuses on packaging waste and materials recycling (and thus pays more attention to plastics, paper and metals).

Collection services

The collection of MSW is provided in cities, but rural areas are not fully covered by regular collection services. On average, 70 per cent of the population is covered by regular waste collection services. Regional differences are large, with the range of this coverage from more than 90 per cent in the capital, Almaty City and Atyrau Oblast to less than 50 per cent in Akmola, Kostanay, South Kazakhstan and North Kazakhstan Oblasts. However, considering the additional MSW reported in the statistical bulletin for 2016, these figures on collection coverage may not represent the actual situation in Kazakhstan.

[48] V. J. Inglezakis et al., "Municipal solid waste management in Kazakhstan: Astana and Almaty case studies", *Chemical Engineering Transactions*, vol. 56 (2017), pp. 565-570. Available from https://research.nu.edu.kz/en/publications/municipal-solid-waste-management-in-kazakhstan-astana-and-almaty-

Figure 8.1: Correlation between regularly collected municipal solid waste and index of real wage

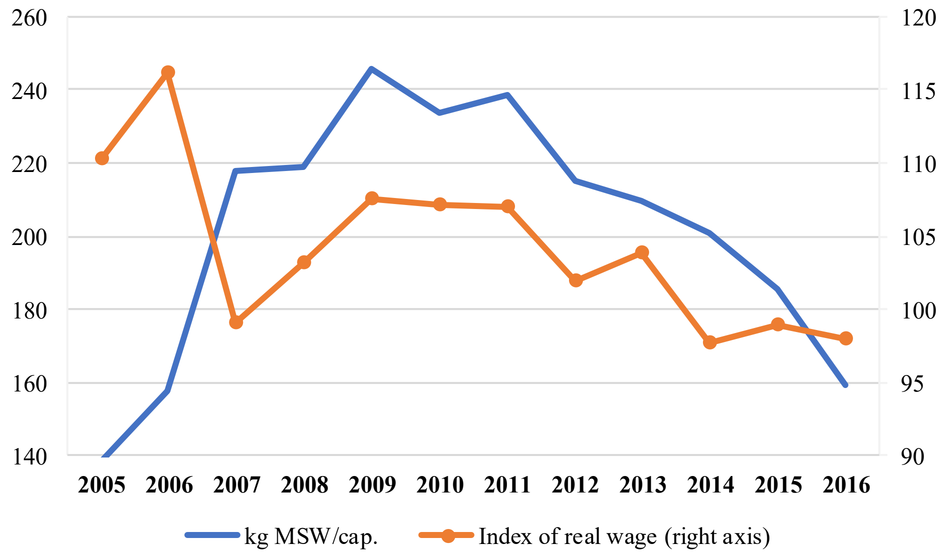


Table 8.2: Composition of municipal solid waste, per cent

	Kazakhstan*	Almaty**	Astana**
Food waste	37.0	28.8	27.6
Paper and cardboard	25.0	22.0	11.2
Plastics	15.0	11.1	15.5
Glass	6.0	6.8	14.9
Textiles	6.0	..	..
Rubber	3.0	..	..
Metals	3.0	3.1	1.0
Wood and garden waste	3.0	5.6	3.4
Ashes	..	..	..
Construction waste	..	..	..
Other	2.0	22.6	26.4
Total	**100.0**	**100.0**	**100.0**

Source: * Data collected in 2011 for nine oblasts as presented in the Programme for Modernization of the Solid Waste Management System for the period 2014–2050 (2014 Government Resolution No. 634; no longer valid). ** Inglezakis et al. (2017).

MSW collection service is provided by municipal and private companies. The share of private companies in the provision of waste collection services is increasing, due to the decentralization and privatization policy of the Government. Private companies collected 90 per cent of MSW in 2016, while their share of MSW collection was 85 per cent in 2013.

Local executive authorities select collection companies through a tender process. The legislation allows a contract duration of up to 10 years, but in practice contracts have shorter time periods, generally between three and five years. In Almaty City, one company has been serving 70 per cent of the city since 2000 (as it repeatedly wins a tender), while the rest of the city is served by 39 small companies.

Separation and sorting

Kazakhstan implements an approach to waste management aimed at increasing the share of recycling. MSW sorting plants were developed in eight regions, including Almaty City and the capital, with an estimated total annual capacity of 1 million t of MSW. This represents about one third of MSW regularly collected. However, available information on recycling and recovery shows that the output of recyclables from these MSW sorting plants is very small. For example, in 2016, only three sorting plants with installed annual capacity of 285,000 t were operational and produced 14,138 t of recycled materials.

Separate collection at source has been implemented in 22 cities, and separation of plastics is also done directly on disposal sites. Including recyclables obtained through buy-out points, scavenging on disposal sites and other unofficial schemes, the level of recycling is estimated to be about 2–3 per cent of collected MSW.

The existing MSW sorting plants are experiencing economic problems, causing disruptions in operation and frequent changes of ownership. The root cause of these problems is that expectations of high profits from waste recycling did not materialize. In addition, the Government was subsidizing the operation of sorting plants, but later, during the crisis, the subsidy was cancelled. Operators of MSW sorting facilities have been forced to increase fees for accepting MSW for sorting, but this has been discouraging collection companies from delivering MSW to sorting plants and they prefer disposal as a cheaper option. As a result, there is even less MSW coming to sorting plants.

The domestic capacities for reprocessing recyclables are scarce, and thus the majority of recyclables is exported to the People's Republic of China and the Russian Federation. This situation makes separation and sorting of waste vulnerable to price fluctuation on the world market of recyclables.

Landfilling

The majority of MSW is disposed of on land. There were nearly 4,000 disposal sites known by 2016, about 600 of which comply with the environmental and hygiene standards of Kazakhstan. Weighing of waste is not done and it is not required by current landfill standards. A typical disposal site in Kazakhstan does not have impermeable layers for protection of groundwater and has no control of leachate, and scavenging for recyclables – mainly for plastic – occurs frequently.

The only site which was developed and is operated according to EU standards is serving the capital. The site was developed in the period 2002–2006, the first cell having designed capacity of 1.8 million t. Due to delays with development of the second cell, additional waste had to be disposed of to the first cell, which contained 3 million t at the time of its completion. The second cell started operation in April 2018.

The existing disposal site Karasay and other smaller sites in Almaty City are receiving approximately 670,000 t of MSW per year and their capacity has already been exceeded. In 2013, the company Tartyp, operator of the Karasay site, introduced the covering of disposed waste by soil. Scavenging for plastics and other recyclables continues on the site.

Almaty City is planning to introduce waste incineration with a capacity of 650,000 t of MSW per year and development of a biogas facility for sludge from wastewater treatment with a capacity of 300,000 t of MSW per year. However, neither financing nor dates for these projects is yet clarified.

Waste generation by sectors of the economy

Data on waste generation by sectors of the economy (table 8.3) are collected and published on an annual basis by the Committee on Statistics. Similar to municipal waste, data on waste from economic activities is not based on weighbridge data, but on calculated amount of waste per unit of production. Depending on the accuracy of per-unit waste generation estimation, the reported data may or may not be close to the real waste generation.

Available data do not allow identification of trends. There is no clear correlation with sectoral GDP, due to the modernization of production processes which leads to better use of raw materials and consequently to a decrease in waste generation. The values are also influenced by improvement of producers' understanding of what is waste and by the focus of governmental authorities on waste management.

Table 8.3: Waste generation by sectors of the economy, 2008–2017, 1,000 t

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Agriculture, forestry and fishery	68.7	70.2	85.7	143.9	1 136.4	1 146.8	1 049.5	1 410.8	1 804.8	2 119.8
Mining and quarrying	368 301.5	151 003.0	166 205.0	275 814.8	283 685.9	298 918.8	268 367.1	185 300.0	88 486.7	79 092.2
Manufacturing	70 814.6	64 399.3	110 028.0	115 000.0	46 000.0	49 402.5	44 918.8	42 929.5	39 160.9	13 320.8
Supply of energy, gas and steam	13 431.9	11 254.5	19 554.5	25 670.0	21 713.0	28 838.8	18 844.3	17 942.8	17 920.0	19 041.0
Construction	22.4	177.3	202.5	165.1	138.8	267.6	247.4	225.6	285.6	105.5
Other economic activities	733.9	650.7	7 041.3	3 874.5	3 278.3	3 645.8	3 988.3	3 756.9	3 733.6	13 195.0
Total	**453 373.1**	**227 555.0**	**303 116.6**	**420 668.3**	**355 952.5**	**382 214.3**	**337 414.8**	**251 565.6**	**151 391.1**	**126 874.3**

Source: Committee on Statistics, 2018.

Manufacturing waste

In 2017, 11.2 per cent of GDP was produced by the manufacturing sector. The sector is represented mainly by metallurgy and machinery, while chemicals, food and light industry have a minor share.

Non-ferrous metallurgy waste dumps occupy an area of about 15,000 ha, of which 8,000 ha are rock waste dumps, the tailings of concentrating mills cover about 6,000 ha and the dumps of metallurgical plants occupy more than 500 ha. The volume of waste generated by the ferrous metallurgy and chemicals industry is of the same order.

Most manufacturing waste is disposed of to dumps, which do not comply with the requirements of safe disposal. This situation allows the spreading of pollution to the surroundings. The worst area is the triangle between the cities of Ust-Kamenogorsk, Ridder and Zyryanovsk. Also, the mechanical engineering, chemicals and oil refining industries in Pavlodar Oblast are a large source of pollution.

Waste from the energy sector

Kazakhstan had 118 electric power stations at the end of 2016. Total installed capacity of these power plants was 22 GW. About 80 per cent of electricity is generated from coal-fired power plants and half of electric energy is generated by six coal-fired power plants. Kazakhstan generates about 19 million t of ash and slag mixtures annually and, to date, more than 300 million t of waste have been accumulated in ash dumps.

Construction and demolition waste

The construction sector produces about 5 per cent of GDP. Construction and demolition works lead to the generation of waste that is mostly inert and has a high potential for recovery or backfilling. Although statistical information on construction and demolition waste is available in Kazakhstan, further details of its management are limited.

Mining and quarrying waste

The mining sector contributes about 15 per cent to GDP (13.6 per cent in 2017). Mining is oriented on coal, copper and chromium. The main coal mining areas include Karaganda, Ekibastuz and Maikuben basins and Kushokinsk, Borly, Shubarkol and Karazhyr deposits. There are more than 30 coal mining companies in Kazakhstan.

The company KAZ Minerals is operating copper mines in Aktogay, Bozshakol and Bozymchak and three underground mines in East Kazakhstan Oblast. This company reported 14.4 million t of waste rock and 40.2 million t of tailings from their activities in 2017.

The National Atomic Company, Kazatomprom, operates 17 uranium mines in the country with annual output of 24,000 t of uranium. Uranium is extracted by in situ leaching. Table 8.4 shows waste originating from uranium mining. Waste from uranium mining and processing is a long-term priority: the Government formulated and implemented the Programme for the conservation of uranium mining enterprises and liquidation of the consequences of the development of uranium deposits for 2001–2010 (2001 Government Resolution No. 1006, invalidated in 2010).

Table 8.4: Amount of radioactive waste

	1 000 t	Curie
High-level waste	0.45	1 900 000
Medium-level waste	6 532.50	13 165 850
Low-level waste	230 663.00	295 050
Total	**237 195.95**	**15 360 900**

Source: Department of Atomic Energy and Industry, Ministry of Energy, 2017.

Under this Programme, 43 mining shafts and 22 ventilation shafts were closed and sealed, and 75 million m^3 of mining waste heaps, 30 million m^3 of mixed waste heaps, 6.5 million m^3 of low-grade ore heaps and about 400 ha of polluted land were rehabilitated by 2007. According to the 2016 national SoER, rehabilitation of uranium mining waste continues. Kazakhstan continues rehabilitation activities in the framework of the EEU’s 2014 Programme for Rehabilitation of Territories of States Affected by Uranium Production.

Crude oilfields are located in Aktobe, Atyrau, Karaganda, Kyzylorda, Mangistau and West Kazakhstan Oblasts. About 70 per cent of hydrocarbon reserves are concentrated in the west of Kazakhstan. The waste originating from current oil extraction activities is well managed, thanks also to the influence of foreign companies in the oil sector, the presence of private companies providing waste management services to oil companies and the importance of the oil sector in the economy of Kazakhstan. Foreign companies with modern waste management solutions often serve as an example for local companies and motivate them to improve their practice.

Agricultural waste

The agricultural sector contributes less than 5 per cent to GDP and shows growth in most parameters. The statistics on waste from the agricultural sector show a much stronger increase – the amount of reported waste from agriculture, forestry and fishery nearly doubled in the period 2012–2016. This indicates that more attention is being given to waste generated in this sector and its management is beginning to improve.

Hazardous waste

The definition of hazardous waste used in Kazakhstan is based on a combination of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and the EU approach. However, the Soviet approach, dividing hazardous waste into three categories based on toxicity, remains valid, since the Kazakh legislation recognizes three groups of hazardous waste: green, amber and red. These three categories were introduced in the EU to define the customs regime for transboundary movement of waste, not for defining the level of hazard, as the system is used in Kazakhstan. However, this approach can be used currently for focusing the national waste management strategy on the most hazardous waste defined in the red list as the top priority. The national SoERs for 2016 and 2017 present the distribution of hazardous waste by categories (table 8.5).

Table 8.5: Amount of hazardous waste, 2016–2017, t

Level of hazard	2016	2017
Green	132 151 053	122 764 052
Amber	19 231 509	4 108 515
Red	8 567	1 709
Radioactive	127 869	162 751
Total	**151 518 998**	**127 037 027**

Source: National reports on the State of the Environment and Use of Natural Resources in Kazakhstan for 2016 and 2017.

Medical waste

The amount of medical waste generated in Kazakhstan is estimated at 78,000 t of hazardous (infectious) waste and 122,000 t of non-hazardous waste (similar to MSW) in 2017. This represents an improvement in information on medical waste, as, in 2011, only 16,000 t of non-hazardous waste and 8,500 t of hazardous waste were reported. Hazardous medical waste must undergo thermal treatment, which resulted in 91 incinerators and more than 1,000 batch-type furnaces being used for burning medical waste in 2011. According to 2017 data, there are installed 158 incineration and sterilization units specialized for medical waste treatment and 69 units accommodated to incinerate medical waste. Although the number of units for treatment of medical waste has increased, it is still not sufficient.

In 2011, the management of medical waste lacked storage and transport safety, which led to the accumulation of medical waste at hospitals, especially in rural regions. In these regions, medical waste was incinerated in heating boilers or burned in barrels or simple furnaces on hospital grounds and residues were disposed of on municipal sites. Since then, the situation has improved and many companies provide collection and disposal services for medical waste and offer waste containers to the medical sector on a commercial basis. Lack of cooled storage facilities and transportation is an issue.

Hospitals are managing medical waste on their own, applying local solutions. A regional approach to medical waste management is not implemented. As a result, the cost of management of medical waste is high, often up to US$2,000 per ton.

Medical waste from individual households is not collected.

Radioactive waste

Kazakhstan has a nuclear industry generating radioactive waste. The main operator, Kazatomprom, is responsible for mining, processing of ore and for the facility JSC Ulba Metallurgical Plant, which produces uranium pellets used as fuel in nuclear reactors. Kazatomprom was also responsible for decommissioning the nuclear reactor BN-350 which was operated in Aktau.

Research activities are concentrated in the National Nuclear Centre at the Institute of Nuclear Physics, which has four reactors in operation and storage facilities for radioactive substances and waste.

The main source of high-level and medium-level radioactive waste is the operation of five nuclear reactors.

The main storage facility for radioactive waste, Baykal-1, is located in Semey (formerly Semipalatinsk). It started receiving spent sealed sources in 1995 and is designed for 50 years of operation. By the end of 2017, more than 40,000 sealed sources with total activity of $3*10^{15}$ Bq were accepted for long-term storage in reinforced concrete vaults.

The decommissioning of BN-350, a sodium-cooled fast reactor located at Aktau Nuclear Power Plant, started in 1999 and ended in 2010. During decommissioning, 3,000 spent fuel assemblies were packed into 60 containers and transported to a temporary storage site developed near Baykal-1. The spent fuel will be stored for 50 years under the supervision of the IAEA. The final decision on the fate of this radioactive waste has not yet been made.

Other users of nuclear sources are medicine, laboratories, industrial enterprises and oil and metal-mining companies. There are about 15,000 radioactive sources in use by these.

Radioactive waste occurs in various forms, from waste ore accumulations, wastewater and spills, tailing ponds, remains after nuclear explosions, spent fuel and other waste from power reactors and research reactors operations and decommissioning to spent sealed sources and radioisotopes.

Persistent organic pollutants waste

The main POP wastes are obsolete pesticides, which accumulated in the past, equipment containing POPs and industrial use of POPs, including production of capacitors.

The first inventory of the amount of obsolete pesticides, conducted in the period 2003–2005, found 1,500 t, of which 10 per cent were characterized as POP-type pesticides, but this inventory covered only 20 per cent of Kazakhstan. Additionally, more than 330,000 pieces of pesticide packaging were identified.

The total amount of waste containing PCBs was estimated to be 250,000 t, including soil polluted by improper dismantling of equipment containing PCBs. There were 114 transformers identified, most of which were found in the JSC ArcelorMittal Temirtau Steel Mill. The inventory identified about 50,000 capacitors, 23,000 of which are still in use; of these, 16,000 are installed in Aksu ferro-alloy plant and about 15,000 are buried in the territory of Semipalatinsk nuclear testing site. Capacitors in use were mainly produced locally, in the Capacitor Plant in Ust-Kamenogorsk, which ceased operation in 1990.

The Chemical Plant located in Pavlodar, which produced cables and footwear from PVC, used about 6 m^3 of PCB oil as a heat exchange medium. It ceased to operate before 1990. Following its closure, about 1–1.5 m^3 of PCBs were stored on the company's territory.

The second inventory was conducted in the period 2010–2015 and found an additional 48 transformers and 1,473 capacitors.

Temporary storage of equipment containing PCBs on the existing premises of private companies (ArcelorMittal Temirtau Steel Mill and Aksu ferro-alloy plant) was modernized. All capacitors from six companies in Almaty, Karaganda, East Kazakhstan and Pavlodar Oblasts were packed and taken to "Promotkhod Kazakhstan" LLP storage in Karaganda in autumn 2014.

As there is no suitable facility for destruction of PCBs in Kazakhstan, more than 230 t of PCB oils and equipment were exported to France. It is estimated that about 220 t of capacitors requiring disposal remain in Kazakhstan.

Specific waste streams

Although documents defining the future development of waste management in Kazakhstan are highlighting separate collection and recycling as the main direction, there is no information available on specific waste streams management.

There is an extensive system of buy-out points where people can bring recyclables such as paper, plastics, metals and batteries. These points are operated by the private sector.

About 80–90 per cent of waste paper was exported to Kyrgyzstan, the Russian Federation and Uzbekistan in 2017. Every month, about 1,500 t of waste paper is transported out of the country, leading to a raw material deficit. Kazakhstan Kazagy JSC, a large waste paper collecting and processing plant, has complained about insufficient supply of waste paper for reprocessing.

An end-of-life vehicle recycling plant was built in Karaganda in 2017, with annual capacity to demolish and recycle the materials from 50,000 end-of-life vehicles. The plant is a complex enterprise: it also includes smelters for metals from disassembled vehicles and a pyrolysis furnace for treating oils. There are 17 centres to which an end-of-life vehicle can be delivered, and these have already accumulated about 30,000 old cars. Owners of end-of-life vehicles are motivated to give their cars over for recycling by receiving 150,000 tenge or a discount certificate for purchase of a new car to the value of 315,000 tenge.

8.2 Transboundary movement of waste

Kazakhstan exports waste for recycling mainly to the People's Republic of China, Kyrgyzstan, the Russian Federation and Uzbekistan. Waste paper, waste plastics, oily waste and ferrous and non-ferrous scrap metals are exported. Hazardous waste is exported according to the rules of the Basel Convention. Table 8.6 provides an overview of transboundary movement of hazardous waste.

Under a project on improved management of POPs, hazardous waste was exported in 2014, when 80 t of PCB oil in 292 drums were transported by air to France, where they were destroyed. This was followed by another export of 152 t of capacitors in June 2015 to the same destination.

8.3 Practices and trends in chemicals management

Production

Chemical industries produce sulphuric acid, chromium compounds and phosphorus. A range of auxiliary chemicals is used in manufacturing: acids, alkalis, solvents and dyes. Agriculture is using pesticides, herbicides and fertilizers.

Sulphuric acid is needed for uranium mining. In 2007, a total of 0.76 million t was produced. Its production increased to 2.25 million t in 2016.

Production of chromium compounds was in the range of 60,000–70,000 t in the period 2007–2016, making Kazakhstan the second biggest producer in the world. Phosphorus production remained on the level of 50,000–55,000 t in this period, while production of nitrogen and phosphorus fertilizers increased from 106,000 t in 2007 to 440,000 t in 2016.

Imports and exports

Exports include products of the oil and gas, mining and ore processing industries. Imports are mainly chemicals needed for mining and ore processing but also chemicals used in agriculture.

The regulation of imports and exports of chemicals has improved since 2006. According to the Ministry for Investments and Development, 6,729 exports, imports and transit permissions were issued in 2016 and 7,037 permissions in 2015. These permissions cover not only chemicals but all production of Kazakhstan, including technologies, works and services that are subject to export control.

Storage, transportation and use

A summary of nationwide information on the storage, transportation and use of chemicals is not available.

Disposal

A specific register on disposed chemicals is not available. However, the amount of hazardous waste in the red and amber groups is a good approximation of the amount of waste chemicals. According to the 2016 data, 20 million t of chemical waste was generated, of which 2.6 million t was recovered as material or energy, 1.5 million t was transferred to other organizations for treatment, recycling or disposal, 0.2 million t was treated to reduce hazardous properties of waste and 0.08 million t was disposed of on disposal sites owned by waste producers.

Emergency preparedness, response and follow-up

Industrial facilities in Kazakhstan are ranked according to risk level. The criteria for placing a facility in the high-risk category are based on technology used and past record of accidents, but the use of chemicals is not included in these criteria. Typically, underground mines, quarries, oil and gas fields, metallurgical and chemical plants, oil refineries, nuclear facilities and main pipelines are qualified as high-risk facilities.

Facilities classified at the high-risk level are regularly inspected by the Committee on Industrial Development and Safety of the Ministry for Investments and Development. There are over 9,000 high-risk facilities registered in Kazakhstan, which represent less than 5 per cent of all industrial facilities.

Table 8.6: Transboundary movement of hazardous waste, 2006–2017, 1,000 t

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Imports	0.0	0.0	..	1.5	9.7	6.2	13.8	0.7	4.6	0.1	12.4	39.1
Exports	68.2	93.6	..	0.3	0.3	0.6	20.5	0.3	0.0	0.0	5.0	2.9

Source: Committee on Statistics and the Ministry of Energy, 2018.

Each facility has an action plan for emergency, covering the impact of, preparedness for and response to natural disasters and technological accidents. Accidents involving chemicals are a subcategory of technological accidents. Large plants have their own emergency departments aimed at responding to emergency situations. On the national level, the Committee for Emergency Situations of the Ministry of Interior has the task to respond to all types of emergency situations, including chemical accidents.

The number of industrial accidents in Kazakhstan decreased by 60 per cent between 2008 and 2016. There were 26 industrial accidents in 2016, of which 14 were in high-risk facilities. Although chemical accidents are not specifically monitored, the overall improvements in operational safety indicate improvements in chemical management.

8.4 Pressures from waste and chemicals

The available information on environmental impact is focusing on pollution from radioactive mining and processing. However, studies are investigating the impact of radioactivity on the population or environment from all sources, not specifically from waste. Assessment of impact on the environment and human health is done in individual cases, but summary information is not available.

Air

Air quality is affected by dust spreading from improperly operated tailing ponds. Similarly, dust is spreading from uncovered ore heaps, transporting heavy metals. Improving management and monitoring of waste disposal activities where mining and ore processing is performed is crucial to improve air quality.

Water

According to Kazhydromet, in 2017, only four rivers, one lake and the Caspian Sea were considered clean, whereas 60 rivers and 18 lakes were assessed as moderately polluted, 23 rivers and eight lakes were assessed as highly polluted and two rivers and one lake were assessed as extremely highly polluted, according to the CWPI (table 7.3). This is an indication that industrial activities, including waste generated by them, have a negative impact on water quality on practically the entire territory of Kazakhstan.

Soil and land

Soil and land pollution by heavy metals is an issue around industrial centres such as Ust-Kamenogorsk, Ridder, Zhezkazgan, Shymkent, Karaganda and Pavlodar. A study prepared by the NGO Arnika (Czech Republic), the Karaganda Regional Ecological Museum and the Centre for Introduction of New Environmentally Sound Technologies (both from Kazakhstan) in 2015 identified high concentrations of copper around Lake Balkhash, lead and arsenic exceeding norms near the slag waste dump in Glubokoye and lead pollution of soils in Temirtau.

The Committee on Statistics reported more than 8 billion t of non-hazardous waste and nearly 2 billion t of hazardous waste accumulated on the territory of Kazakhstan by the end of 2016. Waste from mining activities alone occupies 250,000 ha.

Landscape

Disposal sites and tailing ponds are disturbing elements in the landscape. They are often located near industrial facilities. Due to extensive mining industries, these cover large areas. For example, Lake Koshkar-Ata was turned into a uranium tailing pond and, later, industrial sludge and wastewater were discharged into it. Now the accumulated sludge and waste of various types covers an area of 77 km^2. Although several projects have been implemented to investigate the situation in Koshkar-Ata, to achieve sustainable improvement requires extensive resources.

Biodiversity and ecosystems

Municipal and industrial waste management is a typical local activity (performed on a small territory), which does not have significant impact on biodiversity or ecosystems. Ecosystems and local biodiversity can be affected by the large accumulation of, for example, mining waste, but this is a consequence of mining activities, not of waste itself.

Human health

The total dose of artificial and natural radiation per person in Kazakhstan is, on average, about 4 mSv/year, which is one and a half times higher than the world average. The annual effective dose of the population living near radioactively contaminated territories in North Kazakhstan was investigated in two settlements, where it was 8 mSv/year.

Increased concentrations of pesticides and nitrates in food and pesticides and heavy metals in drinking water may have a negative impact on human health.

Scavenging for recyclables occurs on disposal sites in Kazakhstan. Scavengers are exposed to smoke from burning waste and fumes from decaying waste, and may be injured when picking waste.

There is no information on waste-related health impacts.

Development and well-being of local communities

Due to the past development practice, residential areas were built near industrial facilities. Also, waste from industrial activities was disposed of near the facilities. This situation leads to exposure of the population to emissions from industrial activities, including waste, which continues today.

Sanitary zones around industrial facilities, which were established to protect the population from negative impact, in some cases conflict with existing residential areas and there is no effective mechanism to resolve such situations.

8.5 Legal, policy and institutional framework

Legal framework

Waste management

The 2007 Environmental Code regulates waste management. Provisions of the Code regulating waste management are now largely in line with current trends in international legislative practice. However, the subsidiary legislation, which is used to implement the Environmental Code, is still written in the style of the old Soviet approach to waste management, which uses waste generation norms and definition of hazardous waste by stating exactly which waste streams from which production facilities are hazardous. Modern international practice relies on the weighing of waste and general characterization of hazardous properties.

The import of radioactive waste is forbidden for storage or disposal. The Code also defines requirements for storage and disposal of radioactive waste and sets general requirements for radioactive waste transport, and the requirements for operation of facilities for storage of radioactive waste.

The responsibility for waste is defined as a "waste ownership right". The Code sets rules on how to assign an owner to abandoned waste.

The Code introduces the waste classification system, addresses hazardous properties of waste and divides hazardous waste into three groups: red, amber and green. It is required to characterize hazardous waste from the red and amber groups in a passport of hazardous waste.

Further, the Code defines requirements on hazardous waste management, stressing the importance of proper marking of hazardous waste facilities and containers, and the need for emergency plans in the event of waste-related accidents.

The Code defines requirements on transport of hazardous waste, including appropriate packaging and labelling, documentation on hazardous waste transported, and the responsibility of the carrier of transported hazardous waste.

Transport of hazardous waste is based on the provisions of the Basel Convention and is regulated in more detail by the Rules for import, export and transit of waste (2007 Resolution of the Government No. 594). Imports of hazardous waste for recovery and disposal require permission from the Government. Exports are prohibited to countries that are party to the Basel Convention and have banned imports of hazardous waste. This regime of transboundary movement of waste is quite liberal in Kazakhstan, compared with other countries in the Central Asia region, which often set a strict ban on waste imports.

Record-keeping on waste is defined in the Code. Waste producers and holders are required to keep records on waste produced, transported, treated and disposed of. This information shall be sent to the State Cadastre of Waste from Production and Consumption in the form of annual reports.

The Code introduces environmental requirements for MSW management. The responsibility for organizing the collection, treatment and disposal of MSW is assigned to local executive authorities. Supervision over MSW services is also a local responsibility.

The Code defines requirements on disposal sites and long-term storage sites. These sites are categorized as sites with increased environmental risk. Landfills are divided into three classes: hazardous waste landfill, non-hazardous waste landfill and inert waste landfill. Waste (except inert waste) shall be treated before disposal. Landfills shall have a waste acceptance area and shall ensure monitoring of air pollution, landfill gas, leachate and wastewater. Considering the situation in waste management in Kazakhstan, the provisions on disposal sites and long-term storage sites are not being effectively implemented.

Details on waste management are regulated by the 2015 Order of the Minister of National Economy No. 176 which sets sanitary epidemiological requirements for the collection, use, application, treatment, transportation, storage and disposal of waste from production and consumption.

Classification of waste is established by the 2007 Order of the Minister of Environmental Protection No. 169-p. This Order prescribes how to assign a code to waste. The code reflects:

- Waste name;
- Reasons for classifying the material as waste;
- Physical characteristics of waste;
- Hazardous substances present in waste;
- Hazardous properties present in waste;
- Method of waste management (disposal or recovery code);
- Type of activity from which waste is generated;
- Level of hazard of industrial waste.

Medical waste is regulated by the 2017 Order of the Minister of Health No. 357 on Sanitary-epidemiological requirements for healthcare facilities, which defines rules for the collection, treatment and storage of waste in healthcare facilities.

The 2017 Code on Subsoil and Subsoil Use regulates the management of tailing ponds and requires mining operators, immediately after the termination of mining works, to start remediation and conservation of tailing ponds, based on an approved remediation plan. The operator must make a financial guarantee to ensure financing remediation and conservation of tailing ponds.

Additional details on radioactive waste management are defined in the Sanitary-epidemiological requirements to ensure radiation safety (2015 Order of the Acting Minister of National Economy No. 261).

Rules for handling of POPs and POPs waste are in place (2012 Order of the Minister of Environmental Protection No. 40-p).

Chemicals management

Sound management of chemicals is regulated by the 2007 Law on Safety of Chemical Products, which aims to bring chemicals management into line with recommendations formulated by the Strategic Approach to International Chemicals Management (SAICM). This Law stipulates rules for the registration of producers of chemicals, rules for risk assessment of chemical production, preparation of a declaration on safety of chemical production and labelling of products. Further, safety requirements in production, use, transport, storage and introduction to the market are defined. The Law also introduces requirements on workers' safety during the life cycle of chemical products.

The Law on Safety of Chemical Products is supported by the 2014 Order of the Minister of Investments and Development No. 345, which defines Rules for ensuring industrial safety in hazardous production facilities in the chemicals industry. According to the Strategic Plan of the Ministry for Investments and Development for the period 2017–2021 (2016 Order of the Minister of Investments and Development No. 887), 9,249 companies registered 230,733 hazardous production plants and hazardous technical units.

Policy framework

Concept on Transition to Green Economy

The 2013 Concept on Transition to Green Economy identified the non-existence of an integrated waste management system and a legacy of industrial and radioactive waste as the main problems. The Concept expects that introduction of modern waste management and closed-loop material handling will create 8,000 jobs by 2030. The modernization of waste management to green economy standards is estimated to cost US$4 billion.

The Concept recommends that an inventory and an assessment of options to recycle and dispose of the legacy waste be developed, and for sustainable financing of industrial waste management to be ensured.

The Concept states that improvement in MSW management should be achieved through development of a state programme on MSW recycling and disposal and that existing disposal sites should be replaced by the most up-to-date environmental and sanitary landfills, with use of anaerobic, composting and biogas plants. Also, information on MSW should be improved.

The section on agriculture stresses the need for improved waste management to reduce food loss and proposes to use biodegradable waste as a source of compost and biogas. The energy section calls for the introduction of a fund, to which the developer would assign sufficient money to pay for clean-up costs when a nuclear plant is decommissioned. The development of a uranium waste management strategy is also listed as a priority. These measures await their implementation.

Programme for Modernization of the Solid Waste Management System for the period 2014–2050

The approach to management of municipal waste and national goals were defined in the 2014 Programme for Modernization of the Solid Waste Management System for the period 2014–2050 (Resolution of the Government No. 634). The Programme was developed according to the Action Plan for implementation of the Concept on Transition to Green Economy.

The main goal of the Programme was to upgrade the efficiency, reliability and social acceptability of MSW services, increase recovery of MSW and ensure safe disposal of waste. This Programme had set ambitious goals: 100 per cent coverage of the population by MSW collection, safe disposal of 95 per cent of disposed waste by 2030 and 50 per cent MSW recovery by 2050. The cost of implementation of this Programme was estimated to be 128 billion tenge, of which 884 million tenge should have been financed from the national budget, municipal budgets should have provided 52 billion tenge and the private sector had to contribute 75 billion tenge.

The Programme was invalidated in 2016. Its indicators were integrated into the Strategic Plan of the Ministry of Energy and the development programmes of territories (local level). In the 2017 implementation report, the Ministry indicates the achievement of 30.91 per cent recycling and reuse of industrial waste and 9 per cent recycling and reuse of MSW.

Others

The National Profile on Assessment of National Infrastructure for Management of Chemical Substances was prepared in 2006 and last updated in 2013. The Profile provides an overview of chemicals produced and used in Kazakhstan and their impact on the environment. The Profile highlights priority problems such as the lack of a national waste management strategy, non-rational use of raw materials and energy, lack of legislation and lack of economic instruments encouraging waste reduction.

The draft national plan on reducing the use and collection of mercury was developed within the framework of implementation of the UNDP/GEF project “NIP Update, Integration of POPs into National Planning and Promoting Sound Healthcare Waste Management in Kazakhstan” and is based on results of the preliminary mercury inventory. It aims to implement the principles of the Minamata Convention on Mercury, presents past and current activities in Kazakhstan aimed at the reduction of mercury pollution and describes activities planned for the period 2017–2020. The draft has been handed over to the Ministry of Energy.

Local-level policy documents

At the local level, waste management is addressed in the development programmes of the respective territories. In addition, local authorities develop waste management roadmaps at oblast level (which include activities for specific rayons) (chapter 1).

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis targets 3.9, 11.6, 12.4 and 12.5 of the 2030 Agenda for Sustainable Development is described in box 8.1.

3 GOOD HEALTH AND WELL-BEING
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Box 8.1: Targets 3.9, 11.6, 12.4 and 12.5 of the 2030 Agenda for Sustainable Development

Goal 3: Ensure healthy lives and promote well-being for all at all ages
Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

Pesticides, kerosene, household chemicals and carbon monoxide are common causes of unintentional poisoning. Kazakhstan has established a legal framework regulating imports and use of chemicals.

With regard to indicator 3.9.3 (Mortality rate attributed to unintentional poisoning), the trend in the mortality rate from unintentional poisoning in Kazakhstan has been decreasing since 2001, when it peaked at 48.1 cases per 100,000 population. According to WHO data, the mortality rate from unintentional poisoning in Kazakhstan was 9.3 cases per 100,000 population in 2015, a decrease of 80.6 per cent compared with 2001. It has also decreased in comparison with 2008 data, when Kazakhstan reported 16.8 cases per 100,000 population. Unintentional poisoning occurs much more frequently in the male population (15.3 per 100,000) than the female population (4.2 per 100,000). The global average mortality rate from unintentional poisoning was 1.5 cases per 100,000 population in 2015.

Kazakhstan should continue its efforts on reducing mortality from unintentional poisoning in order to achieve target 3.9.

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

With regard to indicator 11.6.1 (Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities), approximately, half of urban solid waste is regularly collected in Kazakhstan, and the coverage by regular collection is about 70 per cent of the total population. Apart from the capital, no city in Kazakhstan operates a disposal site that complies with modern landfilling standards. Although a regulatory system is in place, it is not sufficiently implemented and enforced.

Kazakhstan should develop a waste collection system based on regional sanitary landfills. Considering the current approach to MSW management, Kazakhstan does not seem to be on track to achieve this target by 2030.

Goal 12: Ensure sustainable consumption and production patterns
Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

Indicator 12.4.1 is the Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement.

Kazakhstan is party to the four of the five main waste and chemical agreements and has adopted the legal framework for implementation of its obligations. However, implementation is not fully communicated to the secretariats of these conventions. The notifications under the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade have not been responded to since 2008 and the reporting to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal has not been updated since 2010. With regard to the Montreal Protocol on Substances that Deplete the Ozone Layer, the consumption of HCFC in Kazakhstan slightly exceeds the required levels.

Kazakhstan is not a party to the Minamata Convention on Mercury. Although the use of mercury is controlled and Kazhydromet is monitoring mercury in rivers, accession to the Minamata Convention by Kazakhstan and its implementation would also support the achievement of target 12.4.

With regard to indicator 12.4.2 (Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment), Kazakhstan does not have reliable data on hazardous waste, because its definition of hazardous waste differs from practice in OECD Member countries. The average annual generation of hazardous waste per capita in OECD Member countries is at the level of 150 kg in the period 2006–2011, while Kazakhstan reports the average annual generation of 18 t per capita in the period 2006–2016.

Based on the current indicator used in Kazakhstan, it is not possible to assess progress towards achieving target 12.4. Kazakhstan should consider improving reporting mechanisms on hazardous waste following international definitions.

Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

Despite attempts to develop a recycling industry in Kazakhstan, recycling rates remain low, especially in the municipal waste sector. The main cause of this is that investments needed to upgrade municipal waste infrastructure are coming from the private and municipal sectors, and at the same time waste fees are kept low. There is also a lack of a market for recyclables. Material recycling of municipal waste in Kazakhstan is estimated to be at 2.6 per cent while OECD Member countries average 34 per cent.

The industrial sector has achieved better results. The recycling rate of hazardous waste in Kazakhstan is about 22 per cent, while EU countries achieve 44 per cent, on average. Recycling of non-hazardous waste in Kazakhstan is estimated to be at 30 per cent, while EU countries achieve 50 per cent, on average.

To achieve target 12.5, Kazakhstan should reconsider its approach to municipal waste management and encourage the industrial sector to strengthen its efforts on industrial waste recycling.

Institutional framework

Ministry of Energy

The Ministry of Energy, through its Department of Waste Management, regulates waste management. The competencies of the Department are mainly related to the preparation of legislation and development of national strategies and policies.

JSC Zhasyl Damu supports the Department of Waste Management. This company implements the legislation on waste management at the national level. This involves transfer of abandoned waste to state ownership by court decision, development of measures and projects for the treatment and disposal of waste and development of modern waste collection and disposal systems. JSC Zhasyl Damu also provides support in fulfilling Kazakhstan's obligations under international conventions related to waste and chemicals (Stockholm Convention, Basel Convention, Rotterdam Convention).

The Committee of Environmental Regulation and Control issues permits for emissions into the environment (chapter 2), which include limits for waste generation. It also inspects waste producers.

Although it is not directly responsible for radioactive waste, the Committee of Atomic and Energy Supervision and Control inspects activities related to the use of radioactive sources, controls the export and import of radioactive materials and keeps a register of ionizing radiation sources and state accounting of radioactive materials.

Other governmental authorities

The Nuclear Technology Safety Centre based at the Institute for Nuclear Physics in Almaty plays an important role in developing and implementing technological processes for decommissioning of nuclear reactors in Kazakhstan and assesses methods proposed for radioactive waste management.

Local authorities

At the municipal level, local executive bodies define the norms of municipal waste generation, define fees for collection, separation, recycling and disposal of municipal waste, and define rules for the management of abandoned waste transferred to municipal responsibility by a court decision. Their responsibilities also include the development of roadmaps on waste management and allocation of land for waste disposal and for development of waste infrastructure. By early 2018, the process of developing roadmaps is almost completed.

Coordination at national, regional and local levels

Oblast authorities have to cooperate with lower-level municipal authorities in defining local municipal waste generation norms. Considering the wide range of these norms, there seems to be little interregional exchange of information.

Most decisions on municipal waste management are made at the local level. Local authorities make their decisions independently but must follow national policies related to waste. They have to report on their decisions to the oblast and central administrations.

Decisions on industrial waste are made centrally by the Committee of Environmental Regulation and Control of the Ministry of Energy. However, cooperation with municipalities in this process to reflect local needs and address environmental impacts is limited.

Regulatory, economic and information measures

Permits

Separate permits for waste management activities were mostly removed in the process of decentralization.

Waste generation is covered by permits for emissions into the environment (chapter 2) which set, among other aspects, the allowed amount of waste generation. The 2007 Environmental Code introduced the notion of integrated environmental permits but no integrated permits were ever issued (chapter 2).

Permits are also required for the establishment and operation of a disposal site, but the majority of these sites do not comply with legal requirements.

The number of companies with a permit to provide regular MSW collection services reached 412 in 2016, of which 361 were private companies and 51 state-owned companies.

The Ministry of Energy issues permits for transboundary movements of hazardous waste and for transport of hazardous waste in the country.

In the case that the owner of waste is not known, the oblast court issues a decision on assigning an owner, typically the owner of the land on which the waste is located, or decides on transfer of the waste to state ownership. By the end of 2016, 12 facilities and areas where hazardous waste was identified were transferred to state ownership by a court decision.

Taxes and fees

Waste producers are required to pay an environmental tax for disposal of waste. Under Kazakhstan's legislation, such a tax is considered as one type of payment for emissions into the environment. This tax is defined as a multiplier of a monthly calculation index (MCI), which is regularly revised (the MCI equalled 2,405 tenge as of 1 January 2018). Multipliers for various types of waste and their recalculation to actual fees are shown in table 8.7.

At the current stage of development of the waste management system in Kazakhstan, the fact that the disposal tax is implemented and used is more important than its financial impact on waste producers. The disposal tax is an incentive to minimize waste disposal and promote recycling, but due to the estimation of waste generation and insufficient control of waste accepted for disposal, a producer may reduce the payment for only a fraction of waste generated by its activities. Nevertheless, an increase in the disposal tax would probably not increase the recycling rate but rather lead to illegal disposal of waste.

Waste fees paid for municipal waste are set by each town individually. Fees are defined for the population living in maintained residential areas (apartment blocks), the population living in non-maintained residential areas (family houses) and legal entities. For example, the monthly waste fee in the capital is 260 tenge per person and in Almaty it is 341 tenge per person. In other cities the monthly waste fee varies between 100 tenge and 400 tenge per person. Waste fees for legal entities are set per cubic meter. These are in the range of 1,000 tenge to 2,300 tenge.

Several disposal sites collect a gate fee. The landfill in the capital collects 1,430 tenge per ton of received waste, of which 183 tenge is used to cover the cost of waste disposal and 1,247 tenge is used for administration costs and loan payment. Almaty disposal site collects 857 tenge per ton, Petropavlovsk site collects 686 tenge per ton and Shymkent site collects 850 tenge per ton, according to data published in 2017. For comparison, the sorting plant in the capital requires 3,130 tenge per ton of delivered waste.

Although no detailed economic analyses of municipal waste management costs are available, the current waste fees seem to be sufficient to cover operating costs of waste collection and disposal. Full operation of existing sorting plans can be ensured only with additional financing. Also, the necessary improvement of disposal sites and development of additional sorting plants will require additional financing and create pressure on user fees.

Waste fees cover mainly operational expenses connected with collection and disposal of waste. The cost of sorting the waste is not fully included, and it was subsidized at the beginning of operation, but these subsidies were cancelled without compensating for them by an increase in waste fees. Also, the current disposal fee is low, as the cost of disposal reflects the low operational standards of disposal sites used.

Table 8.7: Environmental tax for disposal of waste

Waste	Multiplier	tenge/ton	US$/ton
Municipal solid waste	0.19	456.95	1.37
Hazardous waste red group	7.00	16 835.00	50.51
Hazardous waste amber group	4.00	9 620.00	28.86
Hazardous waste green group	1.00	2 405.00	7.22
Non-hazardous waste	0.45	1 082.25	3.25
Mining waste	0.002– 0.019	4.81– 45.70	0.01– 0.14
Slag and sludge from metallurgy	0.02	45.70	0.14
Ash from heating plants	0.33	793.65	2.38
Waste from agriculture	0.00	2.41	0.01
Radioactive waste (GBq)*			
Transurans	0.38	913.90	2.74
Alpha-radioactive	0.19	456.95	1.37
Beta-radioactive	0.02	48.10	0.14
Enclosed sources of radiation	0.19	456.95	1.37

Source: 2017 Tax Code.
Note: * GBq = GigaBecquerel.

Cadastres

The Environmental Code provides for two waste-related cadastres. The State Cadastre of Waste from Production and Consumption is to serve as the main source of information on waste generation, waste facilities and disposal sites. This is a new requirement, which is not fully implemented yet. Less than 10 per cent of legal entities registered in Kazakhstan provided information for the State Cadastre of Waste from Production and Consumption in 2016, the first year of its implementation, and the process of entering the information into the system (serviced by the RSE Information and Analytical Centre of Environment Protection under the Ministry of Energy) took several months.

The State Cadastre of Disposed Dangerous Materials, Radioactive Waste and Wastewater Discharges to Subsoil Resources is supposed to contain qualitative and quantitative information on disposed materials and information on facilities that received these materials. This cadastre is mainly used by the mining sector and was created in the period when Kazakhstan considered imports of hazardous waste for disposal. As this approach is no longer used, the importance of this cadastre declined. Information from this cadastre is not publicly available.

Extended producer responsibility

Kazakhstan started to implement the principle of EPR. A company called "EPR Operator", acting as national operator of the EPR scheme, was established and is responsible for organizing collection of waste falling under the EPR scheme. Any enterprise falling under the EPR scheme shall pay a recycling fee unless it organizes its own collection and recycling scheme or exports its products.

Since January 2016, EPR applies only on vehicles, tyres, accumulators and oils. The recycling fee depends on the type of vehicle and engine capacity. The recycling fee was defined in MCI. The fee ranges from 360,750 tenge for a hybrid car to 2,765,750 tenge for a personal car with a more than 3-litre engine. Recycling fees are also defined for trucks and buses. Since January 2017, EPR has been expanded to packaging and electrical and electronic products.

The initial activities of the EPR Operator were oriented towards establishing a collection system for end-of-life vehicles and incentives for people to deliver them for recycling. Those who delivered their vehicle for recycling received a discount certificate for a new car in the first round of end-of-life vehicles collection, and a cash reward in the second round. During 18 months of collection, 68,881 end-of-life vehicles were delivered for recycling in the Karaganda recycling plant.

In 2017, the EPR scheme was implemented for electronic and electrical equipment and for packaging (paper, cardboard, glass, plastic, iron) with a zero base rate of the recycling fee. In 2017, 56,725 t of packaging waste was collected and recycled. According to concluded contracts, in 2018, the amount of recycled packaging waste is to reach 95,872 t.

As of late 2018, around 150 stations receiving recyclables are established across the country, of which 200 stations were created as part of the EPR scheme. In the capital, a "Clean Taxi" service functions for free collection of old electrical appliances from the population.

The EPR Operator began supporting the introduction of separate collection in the capital in June 2018 by placing the first containers in Yesil District. Since 2018, the local executive authorities of the capital, jointly with the EPR Operator, implement a pilot project on separate collection of MSW and processing and disposal of organic (food) waste. In the framework of the pilot project, it is planned to purchase 1,990 containers for "wet" fraction and 6,276 yellow Eurocontainers with a volume of 1.1 m^3 for "dry" fraction. It is envisaged to purchase 29 motor vehicles for the collection of waste from these containers (25 of which will be produced domestically for "dry" fraction). Separately collected waste will be sent to enterprises for processing into goods, i.e. will not be landfilled. In the event of successful implementation of the pilot project, the experience gained will be disseminated to other regions.

Awareness, education and training for sound management of chemicals and waste

Awareness of sound management of chemicals is supported on several levels. Assistance projects of international donors such as GEF, UNEP and UNDP on POPs management include training and an awareness-raising component. Such a component was also incorporated in the joint project with the then Ministry of Environmental Protection, "Kazakhstan/UNEP/UNDP Partner Initiative for Integration of Sound Chemicals Management (SMC) into Planning and Development Processes" (2012–2013). The UNDP/GEF project "PCB Management Plan for Kazakhstan (2010–2015)" was to demonstrate sound management of PCBs in all phases of their life cycle. Project results included the training of 1,100 people, two national hazardous waste companies and

10 laboratories on PCB management and analysis and stakeholder awareness.

At the governmental level, the Ministry of Energy, the Ministry for Investments and Development and the Ministry of Health are involved in the training of inspectors and other governmental officials in sound management of chemicals and in implementation of national legislation in this area.

Private companies provide training in sound management of chemicals and development of documents required for company compliance with the legislation on chemical safety.

NGOs implement impressive activities on raising awareness in the area of chemical safety.

Awareness-raising in waste management is oriented towards the separate collection of waste and implementation of EPR. Raising the level of information on modern methods of waste management is a regular part of activities of the Ministry of Energy, other state institutions, municipalities and private companies. For example, the Ministry of Energy, Kazakh waste recyclers association KazWaste and UNDP Kazakhstan held a seminar on “Improvement of Waste Management System in Kazakhstan” in Kostanay in 2018. A waste management and recycling forum presenting investment opportunities for the private sector in waste sorting and recycling was organized in cooperation with OSCE in Almaty in January 2018.

Under the UNDP/GEF project “NIP Update, Integration of POPs into National Planning and Promoting Sound Healthcare Waste Management in Kazakhstan”, seminars held in 2014 and 2015 were aimed towards medical waste management and POPs management.

Participation in international agreements and processes

Kazakhstan participates in international conventions targeting waste and chemical management. However, their implementation in the country and fulfilment of reporting obligations to secretariats is below standard.

Kazakhstan ratified the Stockholm Convention in 2007. The country submitted its First National Implementation Plan (NIP) on the Stockholm Convention in 2009. The currently valid NIP covers 2017–2028 (2017 Order of the Minister of Energy No. 312) (chapter 6).

The country acceded to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal in 2003. The National Report on transboundary movement of hazardous waste was last submitted for the year 2010.

Kazakhstan acceded to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade in 2007. According to the Convention information system, since 2008, Kazakhstan did not respond to 31 requests for information on the import of chemicals.

Kazakhstan created a joint contact point for all three of the above conventions at the Ministry of Energy.

Kazakhstan is not a party to the Minamata Convention on Mercury but has started the procedure for joining it. The Mercury Initial Assessment, which would determine the national requirements and needs for participation in the Minamata Convention, was approved for implementation in February 2017. In addition, the inventory of mercury was compiled in 2015–2016.

In 2010, Kazakhstan ratified two conventions regulating management of radioactive waste: the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Kazakhstan submitted the Second National Report on Compliance with Obligations Subsequent upon the Convention on Nuclear Safety in 2016.

Kazakhstan participates in the SAICM process and appointed a national focal point, but the national institutional framework needed for SAICM implementation is not created and a national action plan for its implementation is not developed (chapter 13).

8.6 Assessment, conclusions and recommendations

Assessment

Waste management in Kazakhstan is a complex problem characterized by unbalanced development. Municipal waste management is focused on recycling but neglects modern landfilling. Recycling plants do not achieve expected separation results because the population receives money for bringing recyclables to buy-out points. Industrial waste management is improving under the pressure of modernization of the economy, but waste accumulated in the past is suppressing the achievements of current waste management. The legacy of radioactive waste and hazardous waste is a priority, but this leaves aside the management of non-hazardous waste.

Central governmental authorities define strategies and goals which must be achieved but implementation is fully on the shoulders of municipalities and the private sector, without the support of central authorities. Legislation on waste management follows a modern approach, but daily practice is still based on the old approach defined in Soviet times.

Conclusions and recommendations

Data

The system of estimating waste amounts from per-unit generation (waste generation norm) is not compatible with modern waste management, which is based on real data obtained from the weighing of waste. The system of waste generation norms is deeply incorporated in the waste legislation, but to achieve better functioning of the entire waste management system requires abandoning the estimation/calculation of waste amounts and switching to implementation of weighbridges to obtain real data on waste.

The State Cadastre of Waste from Production and Consumption is intended to be the central information database on waste, but only large waste generators seem to provide their reports on waste. One agency is not able to process and enter waste reports to the register; a more suitable approach could be decentralized data input with the central agency verifying data and preparing summary reports.

The introduction of EPR enables monitoring of specific waste streams (currently end-of-life vehicles and packaging) but this development is not covered by appropriate changes in waste reporting and statistics.

Recommendation 8.1:
The Ministry of Energy should:

(a) Introduce the weighing of waste at all waste treatment and disposal facilities;
(b) Evaluate the effectiveness of the current system of waste data management and implement changes that will ensure that reports from all waste generators are included;
(c) Enforce collection of quantitative statistics on waste streams.

Municipal waste management

The lack of modern disposal capacities is the key problem for modernization of municipal waste management in Kazakhstan. Dumping waste on uncontrolled sites has a negative impact on the environment and presents a risk to the population, but it is also the zero-cost option for collection companies. A cost-based gate fee, eventually supported by a landfill tax, provides the best motivation to prioritize recycling.

Development of modern controlled landfilling is an expensive project and municipalities cannot afford allocation of the investment from their own budget. And without a cost-based gate fee, the private sector would be not interested in investing in landfill development.

Additional guidance for modern controlled landfilling can be drawn from core performance elements for waste management facilities (Annex I to OECD's 2004 Recommendation on the Environmentally Sound Management of Waste). Efforts to improve municipal waste management are crucial for Kazakhstan to achieve progress with reducing the adverse per capita environmental impact of cities (target 11.6 of the 2030 Agenda for Sustainable Development).

Recommendation 8.2:
The Ministry of Energy should:

(a) Reconsider the current waste management policy and initiate development of an action plan aimed at development of controlled landfills;
(b) In cooperation with local executive authorities, analyse the current system of financing of municipal waste management and develop a roadmap to achieve cost-based financing of municipal waste management.

Improved reporting on recyclables

The information on actual amounts of separately collected material in Kazakhstan is limited. The majority of recyclables are managed by the private sector and it is possible that not all recyclables are reported to the national statistics system. Improved knowledge on recyclables will increase understanding of the recycling sector and will allow the proposal and implementation of effective measures aimed towards increasing recycling rates of municipal waste.

Recommendation 8.3:
The Ministry of Energy, in cooperation with local authorities and the Committee on Statistics, should identify and implement measures for improved reporting on recyclables.

Sorting infrastructure

Waste sorting facilities, which were developed in Kazakhstan, are not performing as planned. Waste fees do not provide sufficient funds for their operation. A system to ensure sustainable operation of the sorting infrastructure is not in place; therefore, investments in this infrastructure are close to being pointless.

Recommendation 8.4:
The Ministry of Energy, in cooperation with local authorities and operators of waste sorting plants, should identify the key issues that hinder effective and sustainable operation of waste sorting infrastructure and develop an action plan that will fully utilize existing sorting capacities.

Sound management of chemicals

The last comprehensive information on the situation with chemicals in the country is 10 years old. The National Profile on Assessment of National Infrastructure for Management of Chemical Substances was last updated in 2013. Evaluation of progress achieved is necessary to present achieved results and to introduce corrections as needed.

Recommendation 8.5:
The Government should update the National Profile on Assessment of National Infrastructure for Management of Chemical Substances.

See Recommendation 13.2.

International conventions

The creation of a single contact point for the Basel, Rotterdam and Stockholm Conventions is a good approach to ensure coordinated communication with these Conventions. However, there are deficiencies in providing the required information. The single contact point is not sufficiently staffed and supported to fulfil Kazakhstan's obligations under these Conventions. The country often fails to meet national commitments in transmitting information as required by the chemicals conventions (target 12.4 of the 2030 Agenda for Sustainable Development).

Kazakhstan is not yet a party to the Minamata Convention on Mercury, although preparatory activities are in process.

Recommendation 8.6:
The Ministry of Energy should:

(a) Analyse the operation of the contact point for the three chemicals conventions, and propose and implement changes to enhance capacities with the aim of satisfactorily fulfilling international obligations;
(b) Take steps to ensure accession to the Minamata Convention on Mercury.

Radioactive waste

Radioactive waste is one of the priorities and receives appropriate attention. However, the decision on final disposal of radioactive waste has been postponed and the national operator of the disposal facility has not yet been established.

Recommendation 8.7:
The Government should:

(a) Review the available options for final disposal of radioactive waste and decide about its final disposal;
(b) Create the national operator of the radioactive waste disposal facility.

Medical waste

The management of medical waste is improving, but the regional approach is not yet implemented. Rural medical services, especially, are often not included in medical waste collection and treatment schemes. There is also a lack of cooled storage facilities and transportation. Development and implementation of regional waste management plans for medical waste is a suitable approach for ensuring that all medical waste generated in an area will be safely collected and treated.

Recommendation 8.8:
The Ministry of Health, in cooperation with the Ministry of Energy, should:

(a) Initiate development and ensure implementation of regional waste management plans for medical waste;
(b) Ensure that contracts for collection and treatment of medical waste support the regional approach.

Chapter 9

BIODIVERSITY AND PROTECTED AREAS

9.1 Trends in species and ecosystems

Species diversity

According to the current state of knowledge, the flora of Kazakhstan includes almost 9,000 species (5,754 vascular plants, 485 lichens, more than 2,000 algae, and some 500 bryophyte species). The number of fungi species is estimated at some 5,000. Similarly, the number of fauna species can only be estimated, and varies depending on the source. According to the SoER for 2016, the fauna of Kazakhstan included 835 vertebrate species: 104 fish, 3 *Cyclostomata* species, 12 amphibian, 49 reptile, 489 bird (396 nesting in Kazakhstan) and 178 mammal, while the number of invertebrate species is estimated to be around 100,000 (including more than 50,000 insect species). According to the information provided in 2018 by the Institute of Zoology, the fauna of Kazakhstan consisted of 839 vertebrate species (almost all fully researched) and more than 80,000 invertebrate species (approximately half of which are adequately researched).

This large diversity of flora, fungi and fauna species translates into an extensive pool of plant and animal genetic resources, of high genetic potential and significant economic values. The agricultural biodiversity of Kazakhstan includes not only a large number of crop varieties and local breeds of livestock, but also some 226 flora species that are wild relatives of cultivated plants, and several fauna species that are wild relatives or ancestors of domestic animals. The list of medical plants (completed in 2013) includes 1,525 species. Hence, the preservation and sustainable use of the high biological diversity of flora and fauna, as an important natural resource of Kazakhstan, are essential also from the economic point of view.

Threatened species

The International Union for Conservation of Nature (IUCN)'s global Red List (version 2017–13, last updated on 5 December 2017) contains records on 308 plant and 838 animal species present in Kazakhstan. According to the IUCN data, 16 plant species occurring in Kazakhstan are globally threatened by extinction, including 5 categorized as Critically Endangered (CR), 8 as Endangered (EN) and 3 as Vulnerable (VU). A further 3 plant species occurring in Kazakhstan are categorized as Near Threatened (NT), 23 as Data Deficient (DD) and 266 as Least Concern (LC). As for the fauna, as many as 66 animal species occurring in Kazakhstan are globally threatened by extinction, including 1 species categorized as Extinct in the Wild (EW), 14 as CR, 13 as EN and 39 as VU. A further 38 fauna species are categorized as NT, 51 as DD and 682 as LC.

Not all plant, fish, molluscs and other invertebrate species have so far been assessed for the IUCN Red List. Therefore, the flora, fungi and fauna of Kazakhstan may as well include many more species globally threatened by extinction, which have not yet been assigned relevant Red List categories by the IUCN. Similarly, due to missing or incomplete data from recent field research and inventory works, many other species are temporarily categorized only as DD, despite their confirmed rarity status. The latter case can well be illustrated by the example of the desert dormouse (*Selevinia betpakdalaensis*), named after the Betpak-Dala Desert (located to the west of Lake Balkhash), an endemic rodent species occurring solely in Kazakhstan, in very low numbers, but categorized as DD.

Kazakhstan is a refuge for the largest remaining viable parts of the global population of three globally threatened animal species: critically endangered (CR) saiga antelope (*Saiga tatarica ssp. tatarica*) and sociable lapwing (*Vanellus gregarius*), and endangered (EN) Semirechensk salamander (*Ranodon sibiricus*). Therefore, conservation of these species by Kazakhstan is particularly important. The saiga antelope is listed as a game species in Kazakhstan, but in 2010 the Ministry of Agriculture issued a prohibition on hunting saiga (2010 Order of the Acting Minister of Agriculture No. 704), initially valid until 31 December 2020 and later confirmed by the Government (2012 Government Resolution No. 969) but with the validity period shortened by one year ("until 2020").

Rare and endangered species

In 2006, the Government adopted updated lists of rare and endangered flora and fauna species (2006 Government Resolution No. 1034). Publication of these lists in 2006 allowed for updating the Red Lists, and publication of corresponding Red Books. The

2006 lists of rare and endangered flora and fauna species of Kazakhstan (currently Annexes No. 5 and 6 to 2012 Government Resolution No. 1413) include 387 flora species (370 vascular plants, 1 lichen and 3 moss species), 13 fungi species and 224 fauna species (128 vertebrate species: 18 fish, 3 amphibian, 10 reptile, 57 bird, and 40 mammal species and subspecies; and 96 invertebrate species: 2 annelids, 6 molluscs, 1 crustacean, 2 arachnids and 85 insect species).

Hence, the share of rare and endangered species listed in 2006 by the Government (thus, considered potentially threatened by extinction on a regional scale) in the total number of species naturally occurring in Kazakhstan accounted for some 6.43 per cent of vascular plants and 26.82 per cent of vertebrate animals, and was the highest for mammals (71.91 per cent), followed by amphibians (25 per cent), reptiles (20.41 per cent), fish (16.82 per cent) and birds (11.66 per cent). The conservation status of several species might have changed over the last 12 years. Therefore, the 2006 lists require verification and updating, based on findings of continued regular countrywide field research and inventory work, and scientific assessments using contemporary IUCN methodology and criteria.

Trends in threatened and widespread wild species populations

Recent trends in the size and viability of all threatened species populations cannot properly be assessed, due to the fact that the vast majority of data on these species derives from those protected areas which are regularly patrolled by their permanent field staff (protected area inspectors and rangers), while such areas encompass only 2.58 per cent of the country's territory. Data derived from hunting ground authorities and concessionaires are, for obvious reasons, more focused on the current size of populations of game species than of threatened species. Second, not all hunting grounds conduct wildlife inventories each year (for instance, according to the Committee on Statistics, in 2016, the total area of hunting grounds was 252,646,000 ha, while the census of wild animals has been conducted on only 81,951,000 ha. Furthermore, the quality of data depends on the human and technical capacities of field and research personnel responsible for a particular area, who are often seriously impaired by the lack of adequate monitoring equipment and skills. Last, but not least, the insufficient coordination of biodiversity monitoring activities, paired by the lack of a central database, determine the insufficient availability of data and result in discrepancies between numbers provided in the official statistics and those published in national reports on the implementation of international conventions.

Nevertheless, according to available data, populations of globally threatened key ungulate mammal species free-ranging in Kazakhstan are either stable, or constantly growing in numbers (table 9.1), including the critically endangered (CR) saiga antelope (*Saiga tatarica*) and European mink (*Mustela lutreola*), vulnerable (VU) Bukhara deer (*Cervus elaphus yarkandensis*), goitered gazelle (*Gazella subgutturosa*), Siberian musk deer (*Moschus moschiferus*), snow leopard (*Panthera uncia*) and Menzbier's marmot (*Marmota menzbieri*), as well as the near threatened (NT) Asiatic wild ass (*Equus hemionus*) and five local subspecies of the argali sheep (*Ovis ammon*).

The population of saiga antelope, which dramatically declined in numbers in the 1990s and early 2000s (by 97.8 per cent, from 963,000 individuals in 1995 to only 21,100 in 2003) and was close to extinction, is slowly recovering, despite the recent catastrophic mass die-offs in 2010 (of the Ural population) and 2015 (Betpakdala population), as a result of haemorrhagic septicaemia caused by a specific type of the *Pasteurella multocida* bacterium infection spread during the calving season. But the population of the Himalayan brown bear (*Ursus arctos isabellinus*), formerly categorized as CR (currently all brown bear subspecies are jointly categorized by the IUCN as LC), is constantly decreasing in Kazakhstan (table 9.1). The saiga antelope, Siberian musk deer, Altai weasel (*Mustela altaica*) and common brown bear (*Ursus arctos*) are still listed among game species, while the grey wolf (*Canis lupus*) retains "outlaw" status (allowing for hunting wolves without any limits or permits), despite its regulatory functions in the ecosystem, which are important for the health status of numerous wildlife populations (in particular, of ungulate mammals), and favourable for the natural regeneration of the forest.

One of the reasons for the success in conservation of several key mammal species is that protected rare and endangered animal species are not hunted in Kazakhstan. Simultaneously, applied anti-poaching measures are quite effective. Second, the Committee on Forestry and Fauna of the Ministry of Agriculture implemented several state species conservation programmes and projects, in cooperation with relevant scientific (the Institute of Zoology) and academic institutions subordinate to the Ministry of Education and Science, and national ecological NGOs, in particular, the Association for the Conservation of Biodiversity of Kazakhstan (ACBK), with the support of the international community.

Photo 9.1: Grey wolf

Encouraged by the success in reintroduction of fauna species previously extinct in Kazakhstan (the Asiatic wild ass reintroduced since 1953 and Bukhara deer since 1981), similar state–NGO partnership initiatives are currently aimed at the reintroduction of the Przewalski's horse (*Equus ferus ssp. przewalskii*) into Altyn-Emel and Tarbagatay State National Nature Parks (the latter planned for establishment in 2018) and forming new local populations of the Asiatic wild ass in Altyn Dala State Nature Reserve. There are also plans for the introduction of the endangered (EN) Amur tiger (*Panthera tigris ssp. altaica*) from the Russian Federation to the new protected area to be established in Kazakhstan in the Ili River delta on the southern shore of Lake Balkhash, former habitat of the globally extinct (EX) Caspian tiger (*Panthera tigris virgata*), on the basis of an MoU signed with WWF in September 2017.

According to the Committee on Statistics, populations of several rare and globally threatened bird species occurring in Kazakhstan increased in numbers between 2008 and 2016. The population of the critically endangered (CR) slender-billed curlew (*Numenius tenuirostris*) increased within the above period from 166 to 180 individuals. Populations of the endangered (EN) saker falcon (*Falco cherrug*) increased from 121 to 312 individuals, white-headed duck (*Oxyura leucocephala*) from 404 to 812, steppe eagle (*Aquila nipalensis*) from 2,379 to 2,950 and Egyptian vulture (*Neophron percnopterus*) from 58 to 86 individuals. Within the vulnerable (VU) threat category, the population of the red-breasted goose (*Branta ruficollis*) increased from 135 to 760 individuals, while the population of the lesser white-fronted goose (*Anser erythropus*) declined slightly from 360 to 356 individuals. The most rapid decline has recently been observed in the globally most important Kazakhstan population of the critically endangered (CR) sociable lapwing (*Vanellus gregarius*), from 2,676 individuals in 2006 and 1,360 in 2008 to only 850 in 2016 (which indicates a 68.2 per cent decline within 10 years). Recently published statistical books contain no data on observations of the Siberian crane (*Leucogeranus leucogeranus*) (also categorized CR) migrating across Kazakhstan along the Western/Central Flyway.

Photo 9.2: Sociable lapwing

Endemic species

Some 14 per cent of vascular plants occurring in Kazakhstan, including numerous relict species, are considered endemic (occurring naturally only in this region of Central Asia). The main centres of flora endemism are the mountain regions. As for the fauna, according to the global IUCN Red List (version 2017-3), as many as five mammal species naturally occur solely in Kazakhstan (besides the abovementioned desert dormouse) and are therefore endemic on a global scale. The Caspian Sea is the only habitat of the endemic sea mammal, Caspian seal (*Pusa caspica*), categorized as globally endangered (EN), endemic mollusc *Dreissena caspia ssp. Caspia* categorized as Critically Endangered (CR/Possibly Extinct) and 31 endemic fish species. More wild animal species present in Kazakhstan are considered endemic on a regional scale, including several *Arthropoda* species, as well as numerous fish species of the Balkash and Aral Lakes, and in particular of the Caspian Sea. Not enough data are available to assess recent trends in population size and conservation status of these endemic species.

Widespread species

Due to the size of its vast territory (37.6 per cent of which is categorized as non-used “reserve land” in 2016), its extensive land-use pattern of agricultural land and low density of population in the countryside (approx. 3 persons per km^2 in 2016), Kazakhstan is a refuge for large populations of other, non-threatened wild species of flora, fungi and fauna.

Statistical books on environmental protection and sustainable development in Kazakhstan contain data on game species (grouped under three headings: ungulate, fur animals and fowl) supplemented by data on the number of animals hunted each year. Data for the period 2008–2016 show that the population of many game species increased in numbers over this short period: of the Siberian ibex (*Capra sibirica*) from 10,431 to 13,438 individuals, Eurasian elk (*Alces alces*) from 1,831 to 3,141, red deer (*Cervus elaphus*) from 4,085 to 6,992, Siberian roe deer (*Capreolus pygargus*) from 57,608 to 65,512, wild boar (*Sus scrofa*) from 17,564 to 27,312, short-tailed weasel (*Mustela erminea*) from 13,884 to 26,647, Eurasian beaver (*Castor fiber*) from 2,835 to 4,023 and brown bear (*Ursus arctos*) from 742 to 1,709 individuals. The population of the Turkestan lynx (*Lynx lynx isabellinus*) increased from 275 individuals in 2010 to 690 in 2016. The above numbers prove that, within the reporting period, the Ministry of Agriculture kept the annual hunting quotas at a very reasonable level, allowing not only for the regeneration of wildlife populations, but also for their continuous increase in numbers (even regardless of poaching on several species). The population of the near threatened (NT) Altai weasel (*Mustela altaica*), which was not hunted during this period, increased from 710 individuals in 2010 to as many as 2,571 in 2016.

Table 9.1: Globally threatened mammal species population dynamics, 1990, 1995, 2000, 2005, 2008–2017, number

	IUCN status	1990	1995	2000	2005	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Argali sheep (*Ovis ammon)*	NT	11 800	9 700	8 900	7 800	13 100	13 200	13 246	13 597	13 872	14 525	14 737	15 710	15 979	16 802
Asiatic wild ass (Khulan) (*Equus hemionus)*	NT	400	600	600	1 000	2 086	2 440	1 724	2 441	2 920	3 222	3 420	3 595	3 807	3 984
Bukhara deer (*Cervus elaphus yarkandensis)*	VU (1994)	200	250	280	350	375	400	418	421	451	465	481	503	716	825
Goitered gazelle (*Gazella subgutturosa)*	VU	12 000	10 000	9 700	12 200	16 100	16 100	12 150	12 200	12 397	12 888	12 994	13 197	13 218	13 727
Menzbier's marmot (*Marmota menzbieri)*	VU	dd	dd	dd	dd	13 718	13 701	12 700	13 270	15 924	16 870	17 800	dd	18 330	dd
Siberian musk deer (*Moschus moschiferus)*	VU	dd	dd	dd	dd	dd	372	378	417	421	377	394	453	453	dd
Snow leopard (*Panthera uncia)*	VU	dd	dd	dd	dd	96	101	102	117	119	131	146	120	110	dd
European mink (*Mustela lutreola)*	CR	dd	dd	dd	dd	311	283	290	410	430	440	485	dd	508	dd
Himalayan brown bear (*Ursus arctos isabellinus)*	CR	dd	dd	dd	dd	537	526	548	544	571	403	440	dd	164	dd
Saiga antelope (*Saiga tatarica)*	CR	910 000	963 000	153 500	39 600	61 000	81 000	*85 400	102 000	137 500	187 000	256 700	**295 400	108 300	152 600
of which,															
Betpakdala saiga population						32 300	45 200	53 400	78 000	110 100	155 200	216 000	**242 500	36 200	51 700
Ural saiga population						18 300	26 600	*27 100	17 900	20 900	26 400	39 000	51 700	70 200	98 200
Ustyurt saiga population						10 400	9 200	4 900	6 100	6 500	5 400	1 700	1 270	1 900	2 700

Sources: Committee on Statistics; Convention on the Conservation of Migratory Species of Wild Animals, Saiga MoU Reports (2010 and 2015); SoER (2016); Committee on Forestry and Fauna (2018).
Note: dd = data deficient
* Before the mass die-off (of 11,920 individuals) in the Ural saiga population in May 2010.
** Before the mass die-off in the Betpakdala saiga population in May–June 2015.
IUCN Red List category acronyms: CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened.

Photo 9.3: Saiga

Populations of some other wild animal species declined between 2008 and 2016: of the Tolai hare (*Lepus tolai*) from 889,099 individuals to 700,975, bobak marmot (*Marmota bobak*) from 3,135,027 to only 1,292,744 and grey wolf (*Canis lupus*) from 9,726 to 8,490 individuals, but all these three animals are growing in numbers in recent years, which confirms the viability of their populations.

Beginning from 2014, no data on game fowl species' population numbers are available in the official statistics. Only the number of hunted individuals is provided, which allows neither for assessment of the recent trends in populations of these bird species nor for evaluation of the effect of hunting on these species in recent years.

Alien species

According to the 2014 Fifth National Report on Progress in Implementation of the Convention on Biological Diversity (CBD), alien and invasive species have been present in Kazakhstan since the 1950s, but for several decades were not considered to pose a potential threat to the native flora and fauna species. As a result, as of March 2018, there is no special programme or measures for their control and eradication.

According to the 2012 survey on invasive alien species, as many as 26 fish species, 1 bird, 5 mammal, several invertebrate species (including insects and crustaceans) and a high number of non-native invasive plant species were present in Kazakhstan. Since 2015, the Institute of Botany and Phytointroduction conducts research on invasive alien flora species (initially funded by GEF, later by the State). Some invasive alien species migrated to Kazakhstan from neighbouring countries, while others were introduced incidentally (e.g. in the course of aquaculture production processes, or transported in ship ballast water) or deliberately, by releasing imported non-native game fowl or fur animal species for hunting purposes into the wild. Available sources indicate more alien bird species than were identified in 2012, e.g. the common myna (*Acridotheres tristis*), which is threatening native avifauna species, and the common pheasant (*Phasianus colchicus*). Alien invasive mammal species in Kazakhstan include the migrating Asiatic jackal (*Canis aureus*) and raccoon dog (*Nyctereutes procyonoides*) and the intentionally introduced American mink (*Neovison vison*), which compete with native carnivorous species for native fish, amphibians, small mammals and ground nesting bird species.

The spread of the comb jellyfish (*Mnemiopsis leidyi*) in the Caspian Sea threatens fish and Caspian seal (EN) populations, while the non-native mollusc *Mytilaster lineatus* species competes with the almost extinct endemic mollusc *Dreissena caspia ssp. Caspia* (CR). Available sources also report on the increasing pressure of introduced non-native fish species on the original fauna species composition and ecosystems of Lakes Alakol and Balkhash.

Ecosystems

Kazakhstan has a distinctive latitudinal spatial layout pattern of lowland landscape and vegetation zones (including the forest-steppe, steppe and desert zones), framed by the mountain zone in the South, Southeast and East of the country, and by the Caspian Sea coastal and marine ecosystems in the West. Both the steppe and desert zones include the azonal ecosystems of river valleys, tugay riparian forests, floodplains and meadows, marshes, lakes and coastal aquatic ecosystems, while the mountain zone also includes the specific intermontane hollow-desert ecosystems.

Due to this complicated spatial pattern of intersecting different ecosystem types, and continuous changes of their geographic range (in particular due to the ongoing desertification processes), their clear demarcation by drawing a borderline between similar ecosystems is not possible. This is probably why available sources present various approaches to the biographic zonation of Kazakhstan, and differ in the delimitation of landscape and vegetation zones, their division into subzones, the size of particular zones and subzones, and descriptions of corresponding ecosystem types. A simplified classification of the terrestrial natural ecosystems of Kazakhstan is presented in table 9.2.

Desert and steppe zones prevail, together encompassing 89.82 per cent of the territory of Kazakhstan, which determines the vulnerability of the country to the effects of climatic changes (affecting all ecosystems occurring in Kazakhstan), in particular desertification. All aquatic, coastal and marsh ecosystems experience significant periodic fluctuations in water level and salinity.

Table 9.2: Terrestrial natural ecosystems

Ecosystem	Area (1 000 km^2)	% share in country territory
Forest steppe zone	**34.1**	**1.3**
Southern forest-steppe, moderately warm, with aspen-birch and aspen forests	5.8	0.2
Moderately dry forest-steppe, with scatterred insular aspen-birch vegetation spatial layout pattern	28.3	1.0
Steppe zone	**1 079.0**	**39.7**
Moderately dry motley grass and feather grass steppe	312.4	11.5
Moderately dry and dry fescue-feather grass steppe	553.4	20.4
Deserted wormwood-feather grass steppe (semidesert)	213.2	7.8
Desert zone	**1 362.7**	**50.1**
Northern dry moderately hot grassland steppe desert	398.5	14.7
Central / Northern turan arid hot desert, with saxaul forest	512.3	18.9
Southern turan arid hot desert, with shrubs and saxaul	303.4	11.2
Highland / piedmont arid dry very hot desert	32.1	1.2
Highland / piedmont arid dry very hot psammophyte shrub desert	116.4	4.3
Mountain zone, with coniferous and deciduous forests	**163.3**	**6.0**
Lakes and river valleys	**78.2**	**2.9**

Sources: Bigaliev A. (2003). Problemy okrujaiushchei sredy i sohraneniya biologicheskogo raznoobraziya (Problems of environmental protection and conservation of biological doversity); Prokhikh R., Krylova V. (2013). OOPT Kazakhstana: proshloe, nastoyashchee, budushchee (Specially Protected Natural Areas of Kazakhstan: past, present, future).

Forest ecosystems

Intensive ecosystem restoration and rehabilitation works are implemented in forest ecosystems. All forests in Kazakhstan are perceived as protective forests, providing important ecosystem services (e.g. water retention, soil protection, climate regulation), and almost all forests are state owned: 21.8 per cent (6,427,500 ha) of the forest fund is managed by the Committee on Forestry and Fauna, while 77.4 per cent of the forest fund is under the jurisdiction of oblast akimats. The size of areas where artificial (e.g. planting) reforestation and afforestation works are carried out, and where forest management measures are aimed at enhancing the natural regeneration of tree stands, is constantly increasing, from 13,400 ha (including forest planting on 10,400 ha) in 2004, 25,800 ha (including forest planting on 12,900 ha) in 2008, 35,000 ha (including forest planting on 32,000 ha) in 2016, to 35,900 ha (including 23,500 ha of plantation) in 2017. However, the planned increase of the forest cover to 5 per cent of the country by 2030 requires conducting works on some 80,000 ha per year.

As for 2017, despite large areas being officially classified as forests ("state forest fund" land, which includes pastures and open areas), the share of afforested areas (in particular of closed-canopy forest cover) is very low, compared with other countries. Between January 2008 and January 2017, the total area of the forest fund increased from 27.8 million ha to 29.4 million ha (from 10.2 to 10.8 per cent of the country's territory), the forest cover area from 12.3 million ha to 12.7 million ha, the timber stock from 380.7 million m^3 to 412.3 million m^3. The share of forest cover increased from 4.5 to 4.7 per cent of the country's territory, but decreased slightly from 44.24 to 43.2 per cent of the total forest fund land.

The spatial distribution of forests in uneven – the share of the forest fund and forest cover in the total area of administrative provinces (oblasts) varies. In January 2017, the forest fund share was the highest in three (of five) southernmost oblasts – Zhambyl (15.5 per cent), Southern Kazakhstan (13.9) and Kyzylorda (13.6) – while the lowest share was in Atyrau (0.1) and Aktobe (0.2) oblasts in the western part of the country and Karaganda oblast (0.4) in the central part. As for the size of the forest cover, in 2017, the southernmost and easternmost oblasts were the richest: Kyzylorda (3.0 million ha), Zhambyl (2.2), Eastern Kazakhstan (2.0), Almaty (1.8) and Southern Kazakhstan (1.6 million ha), while the least forest cover was in Atyrau (0.01 million ha), Aktobe (0.05) and Karaganda and Western Kazakhstan oblasts (0.1 million ha each).

The spatial distribution of the main forest types in Kazakhstan is presented in map 9 (annex VI).

Saxaul forests in the desert zone are the predominant forest type, covering 48.9 per cent of forest cover areas, followed by shrub in desert and steppe zones, accounting for 23.2 per cent, coniferous (including mountain forests, and pine tree stands in the steppe and forest-steppe zones) for 13.6 per cent, soft-leaved forests for 12.1 per cent and hard-leaved forests for 0.8 per cent. As of January 2017, the coniferous tree stands accounted for 61.9 per cent (255.23 million m^3) of the total timber stock, with pine tree stands prevalent among them (42.3 per cent, 108.03 million m^3). Soft-leaved tree stands accounted for 33.7 per cent (138.76 million m^3) of the total timber stock, the prevailing share of which were birch tree stands (21.4 per cent, 91.11 million m^3). Saxaul stands, despite the large area covered, account for only 3.4 per cent (15.03 million m^3) of the total timber stock, due to having a very low timber stock per ha compared with the other main forest-forming species. In 2016, the total amount of harvested timber (including sanitary cuts) accounted for only 1.176 million m^3 (0.28 per cent of the total timber stock). In August 2015, the Committee on Forestry and Fauna banned timber harvesting in saxaul forests in order to save the saxaul forests, and since February 2017, no longer allows sanitary cuts in coniferous tree stands.

Under the forest conservation and afforestation project, implemented between 2006 and 2015 by the Committee on Forestry and Fauna with the financial support of the World Bank, 56,000 ha of saxaul forest were planted on the dry South Aral Sea bottom, in order to prevent wind erosion and the resulting increasing salinization of adjacent areas (the result of, e.g. salty dust storms). At present (since 2017), works on the phyto-melioration of the sea bottom are continuing, in cooperation with the Forest Service of the Republic of Korea, with the objective to plant a further 10,000 ha of saxaul forest. There are also plans for the extension of the territory of the Barsakelmes SNCA ("zapovedni") by including part of the Syrdarya River delta.

9.2 Performance of biodiversity monitoring networks and gaps in biodiversity monitoring and research

As of 2018, an integrated biodiversity monitoring system, which could provide comprehensive and regularly updated information on the current state of ecosystems and habitats and trends in populations of species of flora and fauna, is not available in Kazakhstan. State monitoring programmes on rare and threatened plant species, or invasive alien species, are currently absent.

Sources of biodiversity data

Data obtained from field research is scattered among different institutions, and some are not available in digital form. A considerable gap relates to the spatial coverage of currently conducted monitoring activities. The availability of data depends to a large extent on the legal status of the territory concerned, and the legal protective status of the monitoring subject (e.g. species). Most complex biodiversity monitoring is carried out on a regular basis only in protected areas, in particular those of republican significance and legal entity status, which employ research staff and field inspectors (rangers). In recent years, monitoring of selected key fauna species (including saiga antelope and snow leopard) was carried out with the use of modern techniques, including, for example, telemetry, photo-traps and radio tracking collars, as well as aerial wildlife census using aircraft and drones. However, staffed protected areas (including three state regional natural parks, subordinate to oblast akimats) encompass only 2.58 per cent of the country's territory. In addition, not all data regularly collected in protected areas (in particular, the archival records gathered since their establishment) are stored and available in digital format. Furthermore, the capacity of protected areas' administrations to carry out biodiversity monitoring is often impaired by the lack of funding for modern equipment and professional training.

Other important sources of information are the Kazakhstan Research Institute on Forestry LLC and state forestry institutions (subordinate to either the Committee on Forestry and Fauna or oblast akimats), but the scope of monitoring data gathered is more related to a forest's health status and reproduction potential than to rare and threatened species of flora and fauna. Again, the geographical range of monitoring activities conducted by forestry authorities is limited to the "state forest fund" land area, which accounts for only 10.8 per cent of the country's territory, and partially overlaps the protected area network.

Data on vertebrate fauna species are also collected in areas managed by aquaculture (fishery) enterprises, and in hunting grounds. The latter encompasses a considerable part of the territory of Kazakhstan (in 2016, the total area officially classified as hunting grounds accounted for 252,646,000 ha, or 92.7 per cent of the country). But, not all hunting grounds regularly perform wildlife censuses and report their outcomes to the Committee on Forestry and Fauna; for example, in 2016, the census was conducted on only 81,951,000 ha. In addition, the focus of these periodic wildlife inventories is much different than in protected areas, as hunting grounds' concessionaires are much more interested in the current population numbers of game species as potential targets of hunting activities than of the rare and protected animal species. Again, monitoring capacities vary between particular oblasts and hunting grounds (“farms”), depending on the professional qualifications of the hunting ground personnel (which is usually lower than of those employed in protected areas). A recent achievement is that, since 2018, specialists from the Institute of Zoology are obliged to be involved in wildlife censuses carried out on hunting grounds (the same obligation concerning protected areas has been in force since 2017).

Other sources of information on biodiversity

Valuable data resulting from field research and nature inventory works on selected priority species and ecosystems are gathered by a wide range of academic institutions (including the Al-Farabi Kazakh National University, Kazakh National Agrarian University and S. Seifullin Kazakh Agrotechnical University) and scientific research institutes, in particular the Institute of Zoology, the Institute of Botany and Phytointroduction, and the Institute of Geography LLC (the latter formerly part of the Academy of Sciences), most often on a short- and medium-term project basis. Some of these research projects have immense value and still unrealized potential for the improvement and extension of the current state protected area system, e.g. the project on mapping important plant areas (IPAs) identified according to Planta Europa criteria (carried out by the Institute of Botany and Phytointroduction), or landscape zonation and mapping, landscape-ecological assessment, mapping and research on nature conservation and sustainable development issues in the border areas (conducted by the Department of Landscape Study and Problems of Nature Management of the Institute of Geography LLC).

Other valuable sources of information are the outcomes of wildlife monitoring conducted by environmental NGOs (in particular, the ACBK), which partially fill the information gap resulting from, for example, the insufficient monitoring of rare bird species (illustrated by the absence of data on their populations in official statistics).

Threats to the continuity of long-term biodiversity monitoring programmes

A major concern relates to the continuity of biodiversity monitoring, threatened by the recent changes in the state funding rules. In the past, the State used to allocate the annual core budget of research institutes, sufficient for continuing long-term research programmes and undertaking research on new priority research themes. In addition to this, the State used to commission a number of research and monitoring projects, on a strategic programmatic basis. Most recently, the Government changed the rules for financing scientific activities (2017 Government Resolution No. 264), and simultaneously decreased state funding for the annual core budgets of scientific institutions, which immediately resulted in reducing the scope of research. Among other issues, the new rules for financing scientific activities impose the presence of private partner(s) providing co-financing as an advantageous factor for a grant application. Currently, research institutes compete for state grants and submit research project applications, which are evaluated according to the rules of public procurement procedures. As a result, several research programmes and projects have been suspended or abandoned. As of 2018, only a few state-funded species-monitoring programmes are being continued, targeted at populations of key rare and threatened species (e.g. rare ungulates, including the saiga antelope, and sturgeon).

The major reorganization of the central executive institutional structure in 2014, due to which the Ministry of Agriculture was delegated the powers and responsibilities for biodiversity and protected area issues (previously under the competence of the Ministry of Environmental Protection, since liquidated) raised another concern, that the State’s research priorities will gradually shift towards research themes bringing practical outputs and having high potential for immediate commercialization in the agricultural sector. Such an approach could potentially threaten the continuation of long-term research on, for example, rare and threatened wild species of flora and fauna, and the implementation of Article 7 of the CBD requiring the monitoring of the components of biological diversity, with particular attention to those requiring urgent conservation measures.

9.3 Trends in development and management of protected areas

Protected area system

The 2006 Law on Specially Protected Natural Areas defines 10 categories of protected areas and an additional six categories of objects in the state nature conservation fund (which territory can either overlap with the protected area network or constitute separate objects outside the network). The Law divides protected areas into two groups: of republican (national) significance and local (oblast) significance, which has implications for the competences and obligations of authorities at different administrative levels, concerning protected area designation, management and funding.

Categories of protected areas (table 9.3 and map 10 (annex VI)) include: state nature conservation area (zapovednik) (SNCA), state national nature park, state nature reserve, state zoological park, state botanic garden, state dendrological park, state nature monument, state nature sanctuary (zakaznik), state preserved zone and state regional nature park. Protected areas of republican significance include the first nine of the above categories, while protected areas of local significance include only six categories (excluding SNCA, state national nature park, state nature reserve and state preserved zone).

The Law divides protected areas into two groups: those bearing legal entity status (which includes the first six above categories, and state regional nature park) and those not granted such status (three categories: state nature monument, state nature sanctuary, state preserved zone). The legal entity status provides for the establishment of an administration responsible for a particular area and employing personnel, due to which such protected areas can be protected and managed more efficiently than the others, which are managed by the territorially relevant state nature conservation or state forest management institutions. The Law further divides the protected areas with legal entity status into those established as a state nature conservation institution (including state nature conservation area, state national nature park, state nature reserve and state regional nature park) and those that are a state enterprise (state zoological park, state botanic garden and state dendrological park). One of the implications of this division is that all protected areas with institutional status are required to have an outer buffer zone, where human uses and activities that are not compatible with their protective functions can be either limited or prohibited.

The Law provides for the differentiation of the protective regime applied in different functional zones of protected areas, or in objects of the state nature conservation fund: the strict conservation regime (prohibiting all activities that could affect the natural state of natural complexes and objects), customized protective regime (entirely or seasonally prohibiting certain activities, for a certain or indefinite time) and regulated economic activity regime (allowing limited use of natural complexes and objects, as well as traditional economic activities that do not adversely affect natural complexes and objects of the state nature conservation fund).

Categories of objects of the state nature conservation fund include: forest complexes and tree stands of high conservation values, wetland areas of international importance (which, pursuant to Article 75 paragraph 2 of the Law, are included in protected areas), key ornithological areas, unique natural water bodies and objects of high conservation values, subsoil plots (of special ecological, scientific, historical-cultural and recreational values) and unique single flora objects (of special scientific and/or historical-cultural values).

Protected areas

State nature conservation areas

State nature conservation areas (SNCAs, called "zapovedniks", following the former USSR nature conservation terminology), equivalent to the IUCN protected area management category Ia (Strict Nature Reserve), are wilderness areas in which natural conditions and ecological processes are exceptionally well preserved, and where human interference or use is seriously restricted.

The entire SNCA territory has the highest legal protective regime, excluding all activities that could interfere with the main objective of its designation, allowing only research and limited visitation for environmental education purposes. The protective regime of the SNCA outer buffer zone prohibits numerous activities that could influence the SNCA territory (e.g. construction, mining, hunting), but allows, for example, forest management, traditional land use (e.g. livestock grazing), tourism and recreation, fishing, and the conduct of active nature conservation measures (e.g. habitat restoration works).

As for size, only four SNCAs are smaller than 100,000 ha: the smallest, Karatau SNCA, encompasses 34,300 ha (which is still a vast area in European terms), while the largest, Korgalzhyn, extends over 543,171 ha. As of March 2018, Kazakhstan had already designated 10 SNCAs covering a total area of 1,611,419.01 ha (0.59 per cent of the country's territory).

State national nature parks

State national nature parks (SNNPs, IUCN category II) are areas in which natural conditions are relatively well preserved, and which have important natural, scientific, historical, cultural and recreational values. SNNPs are divided into four functional zones: the core zone of the strict conservation regime, zone of ecological stabilization, tourist and recreational use zone, and limited economic use zone. The strict conservation regime of the SNNP core zone allows regulated tourist visitation; the share of this protective zone in the overall SNNP area is prescribed by the Law (10–40 per cent of the total). The zone of ecological stabilization allows the conduct of active nature conservation measures and prohibits economic and recreational activities (except for regulated ecological tourism). The SNNP tourist and recreational use zone allows for regulated, short-term visitation and recreational use (including fishing), while the limited economic use zone allows for the conduct of a wide range of recreational and economic activities, including construction of tourist facilities and accommodation. Hunting is prohibited in all SNNP zones, as well as its outer buffer zone.

As for size, only two SNNPs are smaller than 100,000 ha: the smallest, Bayanaul SNNP, encompasses 68,452.8 ha, while the largest, Zhongar-Alatau SNNP, extends over 356,022 ha. As of March 2018, Kazakhstan had designated 12 SNNPs of a total area of 2,523,869.2 ha (0.92 per cent of the country's territory).

State nature reserves

State nature reserves (SNRs, IUCN category Ib) have two functional zones: the core zone of the strict protective regime, as in state nature conservation areas (prohibiting all economic or recreational activities), while the SNR internal buffer zone regime allows the conduct of active nature conservation measures (including forest management), traditional land uses that enhance the long-term conservation of biodiversity in the core zone, and the overall sustainability of ecosystems in the entire SNR, as well as regulated tourist and recreational activities (including fishing). Activities that could influence the core zone (including construction, timber harvesting) are not allowed in the SNR internal buffer zone, while the protective regime of the outer buffer zone is the same as in the case of SNNPs.

Despite their strict protective regime, all SNRs encompass large areas. The smallest, Akzhajyk SNR, covers 111,500 ha, while Irgiz-Torgay SNR (the largest protected area with legal entity status in Kazakhstan) extends over 1,173,511 ha. In March 2018, the five SNRs covered 2,714,200.8 ha (1 per cent of the country's territory).

State zoological parks, state botanic gardens and state dendrological parks

State zoological parks, state botanic gardens and state dendrological parks are important for the conservation of genetic resources of native rare and threatened flora and fauna species, which can be used for their recovery, rehabilitation and reintroduction into their natural habitats, as well as for scientific research. However, the purpose of their establishment is the ex situ conservation of species, outside their natural ecosystems and habitats. Therefore, the above three categories are not perceived to be protected areas in the common understanding of this term.

In March 2018, Kazakhstan had four zoological parks, five state botanic gardens and one state dendrological park, together encompassing around 900 ha, thus comprising an insignificant share of the country's territory.

State nature monuments

State nature monuments (SNMs, IUCN category III) include single complexes and objects of important scientific, cultural and aesthetic values (according to the Law, values of both natural and artificial origin). Currently, their areas often overlap with territories of protected areas of other categories. When existing SNMs of local significance are incorporated by newly designated or extended protected areas of republican significance, they also gain republican significance status. Initially, the protective regime of SNMs was as strict as that for SNCAs – in 2012, the Government amended the Law in order to allow active nature conservation measures.

As for area, SNMs usually cover less than 10 ha (the two smallest are only 0.5 ha). Only five exceed 100 ha: the largest, located inside Charyn SNNP, covers 5,014 ha. Due to the above, SNMs cannot protect considerable parts of natural ecosystems, or habitats of fauna species. All 26 SNMs present in Kazakhstan in March 2018 together encompass 6,614.1 ha (of which only 403 ha is located outside protected areas of other categories).

State nature sanctuaries

State nature sanctuaries (SNSs, called "zakazniks") are of IUCN category IV (Habitat/Species Management Area). They are further divided by the Law into eight types, depending on the purpose of their designation, including complex, biological (botanic or zoological), palaeontological, hydrological, geomorphologic, geological and mineralogical, soil-protective, and hydrogeological. SNSs are designated for a short term (less than 10 years), a long term (more than 10 years) or an indefinite period, and can incorporate all categories of land without their withdrawal from the landowners and land users. This is why limitations on economic activities are differentiated, and take into account the original purpose of SNS designation; for example, in botanic SNSs, activities such as livestock grazing, haymaking, logging, collecting plants, off-road driving and other activities which could harm vegetation are prohibited. Similarly, hunting is prohibited in zoological SNSs, but regulated hunting is possible in complex SNSs. The protective regime allows touristic, recreational and limited economic uses of the SNS area.

As of 2018, only three types of SNSs are present in Kazakhstan: complex, botanic and zoological (table 9.3). As for size, 34 SNSs are less than 100,000 ha in size: botanic SNSs are the smallest (48–15,000 ha), while the largest is Andasay SNS (zoological, 1 million ha), followed by three complex SNSs: Almatynskyi (542,400 ha), Karoy (509,000 ha) and Pribalkash (503,000 ha). All 50 SNSs present in Kazakhstan in March 2018 together encompassed as much as 6,022,801.67 ha (2.21 per cent of the country's territory).

State preserved zones

State preserved zones (SPZs) are specific protected areas established in terrestrial and/or aquatic ecosystems planned to be designated as SNCAs, SNNPs or SNRs. Similarly to SNSs, SPZs can incorporate all categories of land without their withdrawal from the landowners and land users. SPZ area status prohibits activities that could adversely affect natural landscapes and the viability of ecosystems, or threaten the conservation and reproduction of particularly valuable natural resources. Additionally, parts of an SPZ can be assigned different protective regimes (strict conservation, customized or regulated economic activity regime). As for size, all SPZs extend over large areas: the smallest, Aryss and Karatau SPZ, covers 404,000 ha, while the largest, Southern Kazakhstan SPZ, covers 6,258,000 ha. Due to the above, the five existing SPZs alone together encompass as much as 11,312,420 ha (4.15 per cent of the country's territory).

Protected areas of local significance

State regional nature parks (SRNPs, IUCN category II) are equivalent to SNNPs, but assigned "local significance" status. In March 2018, there were three SRNPs in Kazakhstan (Syrdarya-Turkestan SRNP of 119,978.4 ha in Southern Kazakhstan Oblast, Medeu SRNP of 708.12 ha in Almaty Oblast, and Kyzylsay SRNP of 68,445 ha in Mangistau Oblast), together encompassing a total area of 189,131.52 ha (0.07 per cent of the country's territory).

Information on protected areas of local significance other than these three SRNPs (hence, not assigned legal entity status) is generally absent from official statistics and national reports (regardless of the fact that the remaining five categories, all with names that begin with "state", also belong to the state specially protected area system).

Buffer zones

Pursuant to the Law on Specially Protected Natural Areas, outer protective buffer zones (other than, e.g. inner buffer zones of SNRs or limited economic use zones of SNNPs and SRNPs) are designated around protected areas established as a state nature conservation institution (including SNCAs, SNNPs, SNRs and SRNPs), in order to prevent possible adverse impacts and pressures resulting from human uses and activities that are not compatible with the biodiversity conservation functions.

The size, boundaries, protective regimes and limitations imposed on land use and economic activities performed in the buffer zone shall be determined on the basis of studies, taking into account the natural characteristics of the area, scientific, technical and economic justifications. The Law additionally determines that the width of a buffer zone shall not be less than 2 km. However, this minimum width of the buffer zone is sometimes interpreted as the main instruction for the designation of a buffer zone. An example might be Ile-Alatau SNNP, where the buffer zone was established in 2015 and delimited by marking the external border at a 2 km distance from the park boundary, regardless of such factors as the topography of the area, its landscape features, fauna migration corridors and current land use. Such artificial spatial design of a buffer zone cannot result from any thorough scientific assessment, but, rather, a bureaucratic (and minimalistic) response to biodiversity conservation requirements.

Management

According to the Committee on Forestry and Fauna, since 2007, management plans have been elaborated and in force for all protected areas established as state nature conservation institutions and adopted for the medium term (2008–2012, 2013–2018). In 2018, the Committee and its subordinate institutions commenced work on the preparation of new management plans (2019–2023) for the majority of protected areas, with the involvement and support (on a project basis) of the UNDP, relevant scientific and research institutions, the ACBK and other environmental NGOs. Overall costs of management plan development and implementation are covered by the state budget, unless additionally supported by external sources (e.g. the UNDP). The average cost of elaborating a management plan (including maps) for a protected area is approximately US$5,000.

Photo 9.4: Greater flamingo

Pursuant to the Law on Specially Protected Natural Areas, all protected areas with legal entity status (and of local significance) have their own administration (based in, or in close vicinity to, the area) and personnel (including field rangers). Protected area administrations are subordinate to the Committee on Forestry and Fauna, with the exception of Burabay SNNP, which is managed by the Administration of the President of Kazakhstan (2000 Government Resolution No. 1246). The oblast-level state nature conservation authorities and/or state forest management institutions (subordinate to either the Committee on Forestry and Fauna or the oblast akimats) are responsible for the management of remaining protected areas located within their territorial operational range (in particular for patrolling the area and preventing illegal activities, e.g. poaching).

Protected area personnel are motivated to raise their professional skills and capacities by participating in training organized each year by the Committee in cooperation with scientific and research institutions, as upgrading their skills allows them to reach a higher salary level. Protected area rangers are equipped with vehicles, weapons, communication means, outdoor gear and clothing. Due to the above, the adverse effect of illegal activities (e.g. poaching, unauthorized fishing, illegal logging) carried out inside protected areas with legal entity status, effectively prevented and suppressed by field rangers, is negligible.

However, the technical capacities of protected area staff are often impaired, in particular due to the lack of modern monitoring equipment (used for tracking animals, such as radio tracking collars and photo-traps) and alternative energy sources (e.g. solar energy panels) for field ranger stations and facilities. Furthermore, the basic visitor infrastructure is often insufficient; for instance, in 2018, visitor centres were in operation in only six protected areas in Kazakhstan: in three SNCAs – Aksu-Zhabaglin, Korgalzhyn and Naurzum – and three state national nature parks – Altyn-Emel, Burabay and Ile-Alatau – while some other protected area administrations (e.g. of the Almatynskiy SNCA) try to squeeze nature museums and rooms for environmental education purposes into their offices.

The mechanism allowing for thorough analysis and assessment of the effectiveness of protected area management plan implementation is not yet in place, although the related methodology has recently (in 2017) been elaborated by the UNDP, approved by the Scientific-Technical Council of the Committee on Forestry and Fauna, and is ready for adoption by the

Government. Most probably, the most effective protected areas are those with legal entity status, which have their own administration, operational budget and personnel. As of March 2018, such protected areas accounted for some 28.9 per cent of the total area covered by protected areas. This could imply that the remaining 71.1 per cent of the total area under legal protection in Kazakhstan receives much less effective (if not minimal) protection.

Development of the state network of protected areas

Since 2008, two new SNNPs have been designated: Zhongar-Alatau (2010, 356,022 ha) in Almaty Oblast and Buyratau (2011, 88 968 ha) in Karaganda Oblast; along with two new SNRs: Akzhayk (2009, 111,500 ha) in Atyrau Oblast and Altyn-Dala (2012, 489 766 ha) in Kostanau Oblast; two SNSs: complex SNS Beldeutas in Karaganda Oblast (2009, 44 660 ha) and zoological SNS Southern Altai (2012, 197,176.1 ha) in Eastern Kazakhstan Oblast; and two SRNPs: Syrdarya-Turkestan (2012, 119,978.4 ha) in Southern Kazakhstan Oblast and Kyzylsay (2012, 68,445 ha) in Mangistau Oblast. A new protected area of local significance, Merke SNR (2016, 68,910 ha) was designated by the authorities of Zhambyl Oblast. Moreover, several protected areas have been extended considerably by incorporating new territories; for example, Korgalzhyn SNCA in Akmola Oblast was extended in December 2008 by some 263,400 ha, Altyn-Emel SNNP in Almaty Oblast in 2015 by 146,550 ha and Irgiz-Torgay SNR in Aktobe Oblast in 2016 by as much as 409,962 ha. As a result, between 2008 and 2018, the protected area network increased by some 2,392,741 ha. Only a few protected areas have recently been decreased in size, for example, Ile-Alatau SNNP (by 1,034 ha), Sayram-Ugan SNNP (by 16 ha) and Semey-Ormany SNR (by 804 ha).

Kazakhstan has almost doubled the territory encompassed by the state network of protected areas, which increased from 138,262 km^2 in 1990 to 152,341 km^2 in 2000, 220,840 km^2 in 2008 and no less than 243,750 km^2 in March 2018. Hence, the share of protected areas in the total territory of Kazakhstan increased from 5.07 per cent in 1990, 5.59 per cent in 2000 and 8.1 per cent in 2008 to the current value of at least 8.94 per cent of the country's territory (table 9.3).

However, the 40 protected areas with legal entity status (including 30 large nature conservation areas, nature reserves, national and regional parks, which are most effective in ensuring long-term conservation of larger intact tracts of natural ecosystems, rare habitats and plant communities and threatened flora and fauna species, and are capable of implementing active biodiversity conservation measures) account for a very small share of the country's territory – only 2.58 per cent. Territories covered by these 30 large protected areas together account for only 28.88 per cent of all protected areas in Kazakhstan.

Table 9.3: Protected areas of republican significance and state regional nature parks, 2018

Protected area category	Number	Area (ha)	% share of country's territory
Total	**121**	**24 375 034.63**	**8.94**
Protected areas having legal entity status	**40**	**7 039 409.96**	**2.58**
State nature conservation area	10	1 611 419.01	0.59
State national nature park	12	2 523 869.20	0.92
State regional nature park	3	189 131.52	0.07
State nature reserve	5	2 714 100.80	1.00
State zoological park	4	>100.00	0.00
State botanic garden	5	424	0.00
State dendrological park	1	365.43	0.00
Protected areas without legal entity status	**81**	**17 335 624.67**	**6.36**
State nature monument	26	*403.00 (6 614.10)	0.00
State nature sanctuary	50	6 022 801.67	2.21
including:			
complex	8	2 207 131.33	0.81
botanical	10	48 068.00	0.02
zoological	32	3 767 602.34	1.38
State preserved zone	5	11 312 420.00	4.15

Sources: 2017 Government Resolution No. 593; Committee on Forestry and Fauna of the Ministry of Agriculture (March 2018); ECE secretariat calculations.
Note: * 6,614.1 ha in total, but some state nature monuments are located inside protected areas of other categories.

Protected areas without legal entity status, which account for 71.12 per cent of all protected areas in Kazakhstan (6.36 per cent of the country's territory), receive much less attention and enjoy much less intensive protection. These include 50 SNSs (complex, botanic or zoological zakazniks) of republican significance (many of which extend over huge areas, up to 1 million ha), which together encompass 2.21 per cent of the territory of Kazakhstan (thus, not much less than all protected areas with legal entity status). Furthermore, the above probably relates to protected areas of local significance: state zakazniks and state nature monuments (numbers and total area unknown) designated by oblast authorities. Pursuant to the 2006 Law on Specially Protected Natural Areas, SNSs can be designated for either an indefinite or definite period (e.g. for less than 10 years), which implies that those that had been designated for a definite period can become degazetted upon the expiry of the originally determined period. Such provisional protective status is inappropriate from the point of view of long-term biodiversity conservation requirements, in particular, in the case of complex and botanic zakazniks (and, to a much lesser degree, palaeontological or geological ones).

Gaps in the protected area system in terms of ecosystem coverage and species conservation

According to the 2014 Fifth National Report on progress in implementation of the CBD, at that time, the state system of protected areas ensured neither the conservation of the unique flora and fauna diversity nor the whole set of natural ecosystems of Kazakhstan.

This statement is well justified, for example, by the 8.94 per cent share of the country's territory represented by protected areas (and only 2.58 per cent share represented by the most effective ones, those with legal entity status), meaning that a considerable proportion of natural ecosystems, rare and threatened plant communities and species, wildlife habitats and migration corridors of wide-ranging and globally significant fauna species still remain in the "non-protected" 91.06 per cent of the country (or 97.42 per cent of territory outside the most effective protected areas).

According to the Committee on Forestry and Fauna, the coverage of different natural ecosystems of Kazakhstan by protected areas of all categories is uneven. Moreover, many natural ecosystems are considerably underrepresented in the protected area network (table 9.4). Best protected, relatively, are the natural ecosystems that are not particularly suitable for economic use, for example, central and southern desert ecosystems, 24.03 per cent of which are covered by protected areas (but only 0.69 per cent by areas with legal entity status), and mountain ecosystems (10.09 and 5.49 per cent coverage, respectively). The Committee emphasizes the need to extend the protected area system in order to increase the coverage of natural ecosystems, in particular of mountain, forest, desert and wetland ecosystems. The 2014 National Report emphasized that particular attention should be paid to the western region, including the Ustyurt Plateau and the valley of the Ural River. Furthermore, the coniferous forest complexes and tree stands in the Altai mountain region, riparian tugay forests and floodplain ecosystems, all currently underrepresented in the state protected area system, lack the special attention of the Government. The spatial distribution of protected areas in the natural ecosystems of Kazakhstan is presented in map 10 (annex VI).

Table 9.4: Protected area coverage of main ecosystems, per cent

Zonal ecosystems	Coverage by PAs of all categories	Coverage by PAs with legal entity status
Forests (afforested area)	4.89	1.46
Forest steppe	5.82	2.58
Arid steppe	1.07	1.05
Dry steppe	4.26	3.96
Desert steppe	1.44	1.27
Northern deserts	2.74	1.99
Middle and southern deserts	24.03	0.69
Mountain areas	10.09	5.49
River valleys	2.37	0.00
Lakes	4.32	0.04
Caspian Sea	6.15	0.00

Source: Committee on Forestry and Fauna of the Ministry of Agriculture, 2018.

As for the rare and threatened wild fauna species, available sources emphasize that the protected area network does not sufficiently cover natural habitats, for example of the snow leopard, argali sheep (of four different local subspecies), Asiatic wild ass, goitered gazelle, caracal, Pallas's cat, marbled polecat, European mink, pine marten, muskrat and giant mole rat. Due to the fact that traditional grazing is allowed in a considerable part of the protected area network (e.g. in regulated economic activity regime zones), the pressure on wildlife habitats is considerable and still increasing.

Planned extension of the special protected area system

Previously adopted plans, concepts and programmes proposed the designation of one new SNCA (Caspian), six new SNNPs (Akzhailau, Merke, Shalsu, Tarbagatay, Turkestan and Ulytau), six new SNRs (Aral, Bokeyorda, Ertis River, Ile-Balkash, Tukti and Zhanadarya-Syr), three new SNSs (Kyzylkum, Ulytau-Arganaty and Zhajsan) and one new SPZ (Mangistau).

In 2018, the Government plans to designate the Targabatay SNNP in the Eastern Kazakhstan Oblast and Ile-Balkash SNR in Almaty Oblast. The designation of Ulytau SNNP and Ulytau-Arganaty SNS in Karaganda Oblast is planned for up until 2022.

The further development of the protected area network is envisaged in the Basic Provisions of the General Scheme for Organization of the Territory (2013 Government Resolution No. 1434), providing for the increase of the network to reach 29.1 million ha (10.67 per cent of the country's territory) by 2020, and 41.6 million ha (15.27 per cent) by 2030. According to the 2016 SoER, the state protected area network is planned to reach some 25.6 million ha (9.39 per cent of the country's territory) by 2020. However, these planned developments would still not provide for the achievement of the CBD Aichi Biodiversity Target 11, that, by 2020, at least 17 per cent of terrestrial and inland water areas and 10 per cent of coastal and marine areas shall be included in effectively and equitably managed, ecologically representative and well-connected systems of protected areas.

9.4 Trends in development and management of ecological networks

Ecological network

At the current stage of development of the state protected area network, it can hardly be perceived as forming a coherent ecological network in the globally accepted understanding of this term. The 2006 Law on Specially Protected Natural Areas defines the concept of an ecological network in Kazakhstan, associated with the state protected area system. This legal definition emphasizes the need for spatial interconnectivity between natural complexes (terrestrial and aquatic, including the air space above) linked to protected areas, in order to provide for the stability of natural and cultural landscapes and conservation of biological diversity. According to the Law, the ecological network includes areas of therapeutic and recreational functions, buffer zones of protected areas, ecological corridors, state forest fund land, water protective zones, sections of water bodies and other protected plots of natural objects, including hunting grounds.

The concept of the ecological network has not been further elaborated. However, in 2012, the Government made significant progress by amending the 2006 Law on Specially Protected Natural Areas, adding Article 81 concerning ecological corridors. Moreover, also in 2012, the Government designated the large (489,766 ha) Altyn-Dala SNR in the arid steppes of Central Kazakhstan, which became an important stepping stone for the further development of the ecological network in that part of the country. Similar regional ecological networks are currently being formed in Zaili-Alatau, Zhongar-Alatau and Altai ecoregions. Moreover, crucially important transboundary ecological networks have recently emerged, in cooperation between Kazakhstan and neighbouring countries, in Altai-Sayan and Western Tien Shan mountain ecoregions.

Ecological corridors

The 2006 Law on Specially Protected Natural Areas defines the objectives, legal protective management regime, designation procedure and bodies responsible for the protection and management of ecological corridors linking protected areas. Ecological corridors are designated by the local executive bodies (of the oblasts, cities of republican importance and the capital), on the basis of scientific justifications. The protection and management of ecological corridors is carried out by nature protection institutions (agencies) and organizations specialized in the protection of wildlife. Ecological corridors are established without the withdrawal of land from its owners and users. Areas designated as ecological corridors are subject to the regulated economic activity regime. What is particularly important is that the Law establishes an obligation for the integration of the ecological corridor concept into spatial land use and land management plans for areas including ecological corridors, prepared at republican, interregional and local (urban and town) planning levels, which require the approval of spatial plans by relevant nature conservation authorities as the prerequisite for their adoption.

To date, four ecological corridors have been designated in Kazakhstan: Irgiz-Torgay-Zhylanshyk (2,007,582 ha) established in 2014 in Kostanay Oblast, Beldeutas (9,901 ha) established in 2016 in Karaganda Oblast, Aksu-Zhabagly-Karatau (287,521 ha) established in 2017 in Southern Kazakhstan Oblast and, most recently designated (7 February 2018), the Kapshagai-Balkhash ecological corridor of 973,765 ha, connecting Altyn-Emel SNNP and Pribalkash complex SNS in Almaty Oblast (map 11, annex VI).

Despite the fact that, from the legal point of view, the ecological corridors shall be perceived as protected areas (being subject to the regulated economic activity legal protective regime), they are not accounted for as protected areas. Moreover, the Law does not define their significance level; although designated by oblast authorities, ecological corridors often link protected areas of republican (national) significance. The total area of the first four ecological corridors comprises 3,278,769 ha (which is more than half the total area of all 50 SNSs ("zakazniks") of the same legal protective regime), or as much as 1.2 per cent of the territory of Kazakhstan. Hence, if ecological corridors become officially included in the state network of protected areas, the protected area coverage index would automatically increase, to reach almost 10.15 per cent of the territory of Kazakhstan (even without the area of protected areas of local significance other than SRNPs).

Ramsar network

Initially, in 1976, Kazakhstan had only two areas designated and included in the Ramsar List under the Convention on Wetlands of International Importance especially as Waterfowl Habitat. In 2009, Kazakhstan designated a further six and, in 2012, another two Ramsar sites. As of March 2018, there are 10 areas designated as Wetlands of International Importance, with a total area of 3,281,398 ha (table 9.5).

Pursuant to the 2006 Law on Specially Protected Natural Areas, all aquatic (including marine areas) and wetland sites of international importance enjoy legal protection, and are included in the list of specially protected areas (although this provision has been neglected in official statistics to date) and assigned protective regimes. Furthermore, the majority of these sites are located (fully or partially) inside protected areas of various categories. One of these Ramsar sites (Naurzum Lake System) enjoys an additional international protective status, designated as the "Saryarka – Steppe and Lakes of Northern Kazakhstan" World Heritage site.

Moreover, in order to provide for the enhanced conservation of other wetland areas, in 2013, the Minister of Environmental Protection designated another 44 wetland areas of republican (national) significance, with a total area of 1,773,408 ha (2013 Order No. 273). In 2015, the Minister of Agriculture published the most up-to-date list of all wetlands of either international importance or republican significance (2015 Order No. 18-03/369).

Important Bird Area network

In 2017, the Government supplemented the Law on Specially Protected Natural Areas by adding a new article on the key ornithological areas, with the aim to protect habitats of larger populations of birds, rare and endangered bird species, birds characteristic of certain types of landscape and areas important for nesting and migratory bird species (including waterfowl). These areas are granted the regulated economic activity regime. All key ornithological areas of Kazakhstan are internationally designated as IBAs. As of March 2018, Kazakhstan had 127 IBAs of a total area of 15,414,627 ha.

Table 9.5: Ramsar sites

Site	Designation year	Area (ha)	Coverage by protected areas	Notes
Lakes Kourgaldzhin and Tengiz	1976	353 341	partial	237,100 ha in Korgalzhyn SNCA
Lakes of the Lower Turgay and Irgiz	1976	348 000	full	Irgiz-Turgay SNR
Ural River Delta and adjacent Caspian Sea Coast	2009	111 500	full	North Caspian SPZ
Lake Koibagar-Tyuntyugur System	2009	58 000	no	Protected under 2010 Government Resolution No. 1212 and 2015 Order of the Minister of Agriclture No. 18-03/369. Part of Western/Central Asian Site Network for Protection of Cranes and Other Globally Endangered Wetland Bird Species under CMS.
Kulykol-Taldykol Lake System	2009	8 300	no	Local decree banning hunting in 3 km wide offshore zone
Naurzum Lake System	2009	139 714	full	Naurzum SNCA. "Saryarka – Steppe and Lakes of Northern Kazakhstan" World Heritage site.
Zharsor-Urkash Lake System	2009	41 250	partial	29,344.1 ha in Zharsor-Urkash
Alakol-Sasykkol Lakes System	2009	914 663	partial	Alakol SNCA
Ili River Delta and South Lake Balkash	2012	976 630	full	Balkash SNS, Karroy SNS, Kukan SNS
Lesser Aral Sea and Delta of the Syrdarya River	2012	330 000	no	Includes two Important Bird Areas: Lesser Aral Sea IBA (KZ 043) and Syrdarya Delta Lakes IBA (KZ 044)
Total		**3 281 398**		

Sources: Ramsar Sites Information Service; 2017 Government Resolution No. 593; 2015 Order of the Minister of Agriculture No. 18-03/369; ECE secretariat calculations.
Note: SNCA = State Nature Conservation Area, SNR = State Nature Reserve, SNS = State Nature Sanctuary, SPZ = State Preserved Zone

World Heritage sites

Five sites nominated by Kazakhstan have so far been inscribed by UNESCO on the World Heritage List, under the Convention concerning the Protection of the World Cultural and Natural Heritage, including three under "cultural", and two under "natural" criteria. The two natural World Heritage sites are: Saryarka – Steppe and Lakes of Northern Kazakhstan (designated in 2008) and Western Tien-Shan (designated in 2016), both established on the basis of several existing SNCAs (table 9.6). The Western Tien-Shan World Heritage site is a trilateral transnational property, shared by Kazakhstan with Kyrgyzstan and Uzbekistan. These two natural World Heritage sites together encompass a total of 765,631 ha, with the buffer area totalling 281,437 ha (both these numbers refer solely to areas within the state boundaries of Kazakhstan).

Kazakhstan is considering a further 13 areas for nomination to the World Heritage List, including six sites under the cultural criteria, four sites under "mixed" (cultural and natural) criteria and three under natural criteria. All four mixed sites ("Turkic sanctuary of Merke", "Barrows with stone ranges of the Tasmola culture", "Paleolithic sites and geomorphology of Karatau mountain range" and "Cultural landscape of Ulytau") were inscribed on the Tentative List by Kazakhstan in 1998; some of them include protected areas. Similarly, all three natural sites were inscribed in 2002, and all of them include protected areas: "Northern Tyan-Shan (Ile-Alatau State National Park)", "State National Natural Park 'Altyn-Emel'" and "Aksu-Zhabagly State Natural Reserve" (names used on the Tentative List; both Ile-Alatau and Altyn-Emel are SNNPs, while Aksu-Zhabagly is an SNCA). In response to the request to provide information on the next steps towards the nomination of the above sites, which have remained on the Tentative List since 1998 or 2002, Kazakhstan's National Commission for UNESCO and ISESCO informed that Kazakhstan was currently updating the List.

World Network of Biosphere Reserves

In 2017 the Government supplemented the Law on Specially Protected Natural Areas by adding the new Chapter 9-1 on biosphere reserves, which are not a separate protected area category and are designated on the basis of existing protected areas (SNCAs, SNNPs and SNRs and their buffer zones). This is in line with the UNESCO understanding of a biosphere reserve (BR) as providing no additional protective status than is already granted by the national legislation.

However, Article 53-2 does provide for protective regimes for all zones of a BR (core zone, buffer zone and transition area), which is not fully in line with the overall contemporary concept of BR functions. The UNESCO Man and Biosphere (MaB) Programme aims at reconciling biodiversity conservation in the BR core and buffer zones with sustainable development and use of natural resources in its surrounding transition area, which is not required to have a legal protective status.

All eight biosphere reserves currently in Kazakhstan (table 9.6) were nominated and included in the UNESCO World Network of Biosphere Reserves between 2012 and 2017. Together they encompass an area of 4,546,567 ha (within the state boundaries of Kazakhstan).

9.5 Pressures on species and ecosystems

According to the 2014 National Report on progress in implementation of the CBD, some 75 per cent of the territory of Kazakhstan is exposed to a high risk of environmental destabilization. Depletion of biodiversity and signs of ecosystem degradation are observed in about two thirds of the area of the country, especially in desert and steppe ecosystems.

<u>Land uptake</u>

Land uptake resulting from the growing demand for pastures (due to the constantly increasing livestock populations and ongoing degradation of currently overgrazed pastures) is an evident threat to biodiversity, causing degradation of natural ecosystems, decrease of biological diversity and loss of wildlife habitats. Land uptake by the rapidly developing mineral-resource-extracting industrial sector has adverse effects on ecosystems, causing irreversible landscape transformations, water pollution and soil contamination, which all threaten the stability of ecosystems and survival of wild species populations. Most recently, the demand for land in limited economic use zones of SNNPs suitable for tourist and recreational infrastructure development has significantly increased. All the above factors further increase the pressure on natural ecosystems and protected areas and can result in conflicts over land use and impede the planned extension of the protected area network.

Table 9.6: UNESCO Biosphere Reserves and World Heritage sites

	Designation year	Area (ha)	Core zone (ha)	Protected areas involved
Biosphere Reserve				
Korgalzhyn	2012	1 603 171	543 171	Korgalzhyn SNCA
Alakol	2013	*193 090	19 713	Alakol SNCA
Ak-Zhayik	2014	340 846	36 077	Ak-Zhayik SNR
Aksu-Zhabagly	2015	357 734	131 934	Aksu-Zhabagly SNCA
Barsakelmes	2016	407 135	160 826	Barsakelmes SNCA
Great Altay Transboundary Biosphere Reserve (Kazakhstan, Russian Federation)	2017	**956 890	**118 185	**Katon-Karagay SNNP
Altyn Emel	2017	535 909	54 767	Altyn Emel SNNP
Karatau	2017	151 792	34 300	Karatau SNCA
Total Biosphere Reserves		**4 546 567**	**1 098 973**	
World Heritage site ("natural" criteria)				
Saryarka – Steppe and Lakes of Northern Kazakhstan	2008	450 344	211 147	Naurzum SNCA, Korgalzhyn SNCA
Western Tien-Shan (Kazakhstan, Kyrgyzstan, Uzbekistan)	2016	***315 287	***70 290	***Karatau SNCA, Aksu-Jabagly SNCA, Sayram-Ugam SNNP
Total World Heritage sites		**765 631**	**281 437**	

Sources: UNESCO, World Heritage Centre; 2017 Government Resolution No. 593; ECE secretariat calculations.
Notes: SNCA = State Nature Conservation Area, SNNP = State National Nature Park, SNR = State Nature Reserve.
* 193,089.9 ha terrestrial area, 529,300 ha total (including water areas)
** Solely in the Kazakhstan part. Total transboundary Biosphere Reserve area 1,543,807 ha, including core zone 269,822 ha.
*** Solely in the Kazakhstan part. Total transnational World Heritage property area 528,178 ha, with 102,916 ha buffer zone.

Energy and transport

As for 2018, the development of energy installations and infrastructure does not pose major threats to biodiversity (except for accidental bird mortality on high voltage power lines). Due to the abundance of fossil fuel resources (coal, petroleum, natural gas), the share of wind turbines in energy production is insignificant. However, planned construction of new hydroelectric power plants could increase threats to the biodiversity of water and riverine ecosystems in the near future. As the density of railway and highway networks is low (for a country the size of Kazakhstan), they cannot seriously impede wildlife migrations, and habitats are not highly fragmented. However, illegal fencing of recreational land plots in limited economic use zones of SNNPs should be considered as an example of anthropogenic barriers to the free movement of species on the local scale.

Use of forests

Illegal logging of saxaul forests for firewood for the illegal timber trade does threaten the stability of natural ecosystems in the desert zone, but it is quite limited in volume of illegally harvested timber and cannot be considered a major threat to biodiversity on a national scale (besides, saxaul forests and plantations cover only 2.3 per cent of the country's territory). The collection of non-timber forest products can affect populations, for example, of medicinal plant species, but is not yet a major threat.

Pressures on aquatic ecosystems

Aquatic ecosystems are highly threatened by water contamination (mostly due to industrial solid waste and wastewater discharge), acidification, eutrophication (due to uncontrolled livestock husbandry waste discharge into watercourses) and salinization (including secondary salinization as a result of irrigation waters discharge), all of which threaten the viability of fish, amphibian and reptile populations (which affects the viability of predatory bird populations).

Most striking is the environmental situation of the Caspian Sea ecosystem, which is also due to the fact that this landlocked water body receives most of its input from the Volga, Ural, Irtysh and other rivers (carrying nutrients and chemical pollutants), but it has no outlet, which results in the accumulation of pollutants. Secondly, the rapid development of offshore and shoreline oil and natural gas mining results in the pollution of the coastal waters of the Caspian Sea with oil, and increasing disturbance and loss of habitats.

The deliberate introduction of non-native fish species for aquaculture and commercial fishery, and the uncontrollable spread of incidentally introduced invasive alien species (e.g. the comb jellyfish), ruined the ecological balance of this marine ecosystem, and poses a considerable threat to the biodiversity of the Caspian Sea (which is the sole habitat of numerous endemic species, including the EN Caspian seal, and the commercially important reserve of the world's genetic resources of sturgeon). All these pressures, further aggravated by the loss of important fish habitats, impeded access to fish spawning grounds, poaching and unsustainable fishing practices, have resulted in the extinction of several species and considerable depletion of fish stocks, which threatens the well-being of the local human populations, who are largely dependent on the availability and sustainable use of marine natural resources.

Climate change and desertification

Climate change poses a major threat to all natural ecosystems and the overall biodiversity of Kazakhstan, resulting in desertification, habitat degradation, increased threat of steppe and forest fires and increasing scarcity of water sources, which are critically important for the survival of both resident and migratory wildlife populations, leading to competition for water with local people and livestock. Decreased precipitation has had an adverse impact on environmental conditions in habitats of rare and endangered plant species and the potential for the regeneration of the vegetation, and has affected plant communities.

All aquatic, coastal and marsh ecosystems experience significant periodic fluctuations in water level and salinity, while important lake ecosystems continue to disappear from the landscape of Kazakhstan. Continuous drying of surface water points and the drainage of marshes results in the degradation and loss of habitats of amphibians and waterfowl. Floodplain grassland and river valley riparian tugay forest ecosystems are heavily affected. Furthermore, not all flora and fauna species are resilient to rapid climatic changes.

Desertification is a major threat to natural ecosystems in a country like Kazakhstan, where deserts and steppes of different types encompass some 91 per cent of the territory. Water and wind erosion of soils, paired by their salinization and dehumidification, reduce the productivity of steppe ecosystems, resulting in the reduction of the nutrition base for both livestock and wild ungulates (while the latter are the prey of wild carnivorous mammal and bird species). Adverse effects of desertification are further enhanced by unsustainable agricultural practices, in particular animal husbandry, due to the common non-compliance with the pasture rotation principle, which results in overgrazing and degradation of pastures (which also affects wildlife populations).

According to the Committee on Land Management, in 2012, the total area of pastures in Kazakhstan accounted for 186,952,400 ha, of which only 61,123,300 ha (32.69 per cent) were used for agricultural purposes, while degraded pastures accounted for 27,127,700 ha (14.51 per cent of the total). The largest areas of degraded pastures were present in the desert zone (13.2 million ha), forest-steppe and steppe zones (5.6 million ha) and foothill plains (3.8 million ha). The oblasts most affected by pasture degradation included Atyrau (4.1 million ha), Aktobe (3.9 million ha), Almaty (3.0 million ha), West Kazakhstan (2.5 million ha), Kyzylorda (2.0 million ha) and Akmola (1.9 million ha).

Hunting and fishing

Hunting and fishing is relatively well regulated, and the annual quotas for widespread species are kept at sustainable levels, which is confirmed by the quotas set for the current period (between 15 February 2018 and 15 February 2019). The moratorium on hunting for critically endangered (CR) saiga antelope is in force until the end of 2019, some other threatened fauna species still listed as game species in Kazakhstan (e.g. the VU Siberian musk deer) are not hunted, while the quota for hunting the brown bear (solely in Eastern Kazakhstan Oblast) is well below the maximum acceptable rate applied in Kazakhstan (10–15 per cent).

Anti-poaching measures applied by the state law enforcement services are quite effective, and the number of offences continues to decline each year, but poaching remains a real threat to several wild ungulate and bird species (including saiga antelope, saker falcon, waterfowl species), which are killed for either subsistence purposes or the highly profitable illegal trade in wild animals (including rare and threatened species), their parts and derivatives (e.g. saiga horns, used in Chinese traditional medicine, are smuggled out of the country).

Tourism

Tourist visitation pressure is still relatively low throughout the vast country, except for at the best promoted and most visited tourist "must-see" attractions and protected areas in the near vicinity of larger cities (e.g. Almaty). The boosting of tourist and recreational infrastructure development is becoming a serious threat in the limited economic use zones of SNNPs, also as a result of poor land use planning.

The most striking example is probably the Ile-Alatau SNNP (which has remained on the World Heritage Tentative List of Kazakhstan since 2002), where 1,002 ha of the park land were withdrawn from the ecological stabilization zone (where economic and recreational activities are prohibited) to become part of the less protected limited economic use zone, and were later excluded from the park territory to allow the construction of the planned "World-Class Ski Resort Kok-Zhailau" complex, with a total capacity of 5,736 beds, surrounded by 77 ski slopes of a total length of 63 km and 16 lifts capable of carrying up to 10,150 skiers at a time (despite the fact that some 10 existing, outdated ski resorts nearby are not frequently visited, to say the least).

This project was highly criticized both in the country and abroad. At the International Tourism Fair in Berlin in 2014, the planned Kok-Zhailau resort received the Rusty Nail (an anti-award for the worst example of unsustainable tourism). According to decision VI/8g of September 2017 of the Meeting of the Parties of the ECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention), Kazakhstan has failed to comply with several provisions of the Convention when making decisions on the above construction project. The public campaign against the planned investment in the project continues.

Invasive alien species and GMOs

The influence of invasive alien species or genetically modified organisms (GMOs) cannot be determined due to the lack of data, which is a consequence of there being no related long-term state monitoring programmes. Best documented is the case of the comb jellyfish (*Mnemiopsis leidyi*), introduced into the Caspian Sea via the ballast water of oil tankers. The spread of this invasive zooplankton predator (eradication of which may be impossible in practice) threatens planktivorous fish populations, and in consequence predatory fish and the endemic Caspian seal (EN) populations. Similarly, the introduced *Mytilaster lineatus* mollusc has probably driven the endemic *Dreissena caspia ssp. caspia* (CR) to extinction. Available sources also report on the increasing pressure of introduced non-native fish species on the original fauna species composition and ecosystems of Lakes Alakol and Balkash.

9.6 Legal, policy and institutional framework

Legal framework

The 2007 Environmental Code includes several provisions directly related to biodiversity conservation and the protected area system, for example, the monitoring system for monitoring protected areas, flora and fauna (and the related unified information system), state cadastres of natural resources, environmental research, sustainable use of forests and fauna, the list of rare and endangered animal species, protection of rare and endangered animal species, and protected areas (including a separate chapter on the state preserved zone in the northern part of the Caspian Sea).

The 2006 Law on Specially Protected Natural Areas is the most important legislative act for biodiversity conservation in Kazakhstan, not only for the development and functioning of the state protected area system. It determines, for example, the division and scope of competences and responsibilities of various authorities at all administrative levels, and establishes different categories of protected areas, their legal status, functional zonation pattern and protective regimes in each zone, as well as outer buffer zones. In recent years, some positive changes were made; for example, in 2012, the Government added to the Law a new article on the Red Book of Kazakhstan and another on the key ornithological areas. In 2017, the Government supplemented the Law by adding a new chapter on biosphere reserves.

The 2004 Law on Protection, Reproduction and Use of Fauna provides for the protection of rare and endangered animal species, as well as sustainable use and reproduction of game and fish resources. It contains provisions on the preservation of wildlife habitats, and concentration areas and migration routes of their populations. This Law also regulates hunting and fishing (including the procedures for determining the annual hunting and fishing quota). In 2010, an article concerning aquatic and wetland areas (which are also the subject of a separate article in the 2006 Law on Specially Protected Natural Areas) was added to provide an additional legal basis for the protection of wildlife species inhabiting these ecosystems.

The 2003 Forest Code primarily regulates state forestry sector operations, but also contains provisions referring to the ecologically protective functions of forests, conservation of their biological diversity, sustainable use of forest resources and forest ecosystems regeneration and restoration (including reforestation and afforestation). It prohibits the introduction of invasive alien species to the forest fund land, and establishes protective regimes for various categories of the state forest resources (including forests in protected areas, but also tree stands of scientific importance, forest genetic reserves, high-value forest areas and belts of forests along the shore of watercourses and water bodies). It regulates the collection of non-timber forest products (e.g. berries, mushrooms, medical plants) and prohibits the collection of rare and endangered flora species. In 2012, the Government added a new chapter on state support for private afforestation initiatives, and, in 2017, introduced the term "forest ecosystem services" into the Forest Code.

The 2003 Land Code primarily regulates land management and land use issues, but also determines the division of the country into 10 biogeographical zones. Separate chapters of the Code concern the land of protected natural areas, the land of the state forest fund and the "reserve lands".

In 2017, the Government adopted the Law on Pastures, which contains an important provision aimed at enhancing the natural regeneration of natural ecosystems degraded by overgrazing, according to which the pasture management plan shall obligatorily include the pasture rotation scheme.

<u>Shortcomings of the current biodiversity-related legislation</u>

Some recent amendments to the 2006 Law on Specially Protected Natural Areas actually worsened the situation of protected areas, lowered their protective status, and are more in favour of biodiversity and natural resource users than the conservation of these natural assets. For instance, Article 23, due to amendments made in 2008 (soon followed by amendments of March 2011, July 2011, January 2012, July 2013 and February 2017), currently contains an internal contradiction within the same paragraph 2: its first sentence establishes that the withdrawal of land from protected areas is not allowed, while the second sentence provides for exceptions from the above principle, due to which the withdrawal of protected area limited economic use zone land, and its transfer into the "reserve land" category is allowed – for example, for the construction of tourist infrastructure objects. Moreover, while the 2008 amendment narrowed this exception to objects envisaged by the state programmes, the 2013 amendment referred to documents of the state planning system (which can also include land use plans adopted at the local level). Article 46-1, added in 2012, allows for the long-term land lease of plots located inside SNNPs, used for the construction of tourist infrastructure objects. Hence, due to the above amendments, lands of SNNPs can easily be withdrawn on the motion of local authorities, and leased to entrepreneurs who intend to build tourist accommodations for the long term (up to 49 years). The above might also threaten areas other than those of the current SNNP limited economic use zone, due to the fact that the Law allows the rezoning of protected areas and the transfer of their land into the "reserve land" category (which can then be freely leased or sold by local authorities to private land users, for any other purposes).

Article 122 of the 2003 Land Code contains the same internal contradiction as is present in Article 23 of the 2006 Law on Specially Protected Natural Areas (concerning the withdrawal of land from protected areas) and allows for transfer of protected area land into the "reserve land" category.

<u>Deficiency of the current biodiversity-related legislation</u>

A major gap in the biodiversity-related legislation of Kazakhstan is the absence of more detailed provisions, or a special separate legal act, on the conservation, protection and sustainable use of natural plant communities and wild flora species (in particular rare and threatened ones), similar to the 2004 Law on Protection, Reproduction and Use of Fauna.

As of March 2018, provisions of the 2007 Environmental Code (e.g. Article 249 concerning the list of rare and endangered species, and Article 250 on measures applied for the protection of species) concern solely fauna species, while flora is only indirectly mentioned in the general term "plant and animal world" and in Article 7, which lists the objects subject to environmental protection (in "forests and other vegetation" terms). Article 339 of the Criminal Code establishes fines for destroying rare and endangered species of plants and animals, and their habitats. Provisions of the 2003 Forest Code (including Article 45 banning the collection of rare and endangered flora species) apply only to the state forest fund land, while important plant species occur also in the remaining 89.2 per cent of the country's territory. The 2006 Law on Specially Protected Natural Areas does contain a few provisions related to the conservation of flora diversity, for example, Article 32-1 on the Red Book of rare and endangered flora and fauna species, and Article 78 establishing the general obligation for the protection of the above species by the State, legal entities and citizens. However, the more detailed provisions of Article 78 concerning the withdrawal of species again focus solely on animal species. Furthermore, there is no clear guidance on how the protection of rare and endangered flora species should be enforced outside protected areas (partially overlapping with the state forest fund), while such "unprotected" areas currently account for some 91 per cent of the total territory of Kazakhstan.

According to the CBD Article 8 on in-situ conservation, parties shall develop necessary legislation and/or other regulatory provisions for the protection of threatened species and populations. Therefore, supplementing the biodiversity-related legislation of Kazakhstan by adequate provisions regulating the conservation of rare and threatened flora species, and plant communities, is indispensable for compliance with the international commitments made by the State.

Policy framework

As of March 2018, Kazakhstan has no policy instruments in force with a special focus on biodiversity conservation and/or protected area network development, despite the explicit CBD requirement for each party to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity, and target 17 of the CBD Strategic Plan for Biodiversity 2011–2020 setting the obligation to have and commence the implementation of such a policy document by 2015.

The National Strategy and Action Plan on Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan (NBSAP) was approved in 1999 by the Ministry of Natural Resources and Environment. The Government has never endorsed this strategic document. Despite this, the non-binding 1999 NBSAP is perceived as a valuable guidance and strategic vision document by the Committee on Forestry and Fauna of the Ministry of Agriculture. However, the lack of a relevant long-term policy strategic instrument (a national strategy, officially endorsed by the Government) on biodiversity conservation makes the integration of biodiversity issues into sectoral policies even less feasible. This seriously hampers the implementation of the CBD, as well as its globally adopted programmes of work, and strategic plans.

In 2010, the Government adopted the Sectoral Programme "Zhasyl Damu" for the period 2010–2014 (2010 Government Resolution No. 924). One of the main objectives of the Programme was the conservation of biological diversity; it included sections on forestry, wild fauna species and protected areas. The Programme integrated several previously adopted strategic documents, including the 2000 Concept of protected area development until 2030 (2000 Government Resolution No. 1692) and the Programme on the conservation and sustainable use of water resources, wildlife and development of the protected areas network until 2010 (2007 Government Resolution No. 914). Indicators of expected outputs included the protection of 200 animal species (including 93 game and 107 rare and endangered species), and an increase in protected area coverage to 8.8 per cent of the country's territory in 2014. The Programme planned, inter alia, the extension of six protected areas, designation of eight new protected areas and preparation of feasibility studies for the designation of another four; the increase of areas under afforestation measures, regular monitoring of "rare and endangered wild ungulate mammal species and saiga antelope" and reintroduction of the Asiatic wild ass and goitered gazelle. The "Zhasyl Damu" Programme has been implemented between late 2010 and mid-2014.

The Government regularly adopts and revises the sectoral Strategic Plan of the Ministry of Agriculture (the current one is for the period 2017–2021). In the Strategic Plan, biodiversity issues consitute one Strategic Direction of activities, devoted to ensuring the protection, reproduction and rational use of flora and fauna and specially protected natural areas. However, the coverage of biodiversity issues in the strategic plans of the Ministry of Agriculture is not comprehensive. The 2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021 mentions neither biodiversity nor protected areas.

In 2015, the Committee on Forestry and Fauna, in cooperation with the UNDP, developed the "Concept for conservation and sustainable use of biological diversity until 2030" (not formally endorsed by the Government), under the UNDP/GEF project "National Biodiversity Planning to Support the Implementation of the CBD 2011–2020 Strategic Plan". In 2016–2017, the Committee (in cooperation with the UNDP and ACBK) developed the Action Plan for the Management of Migratory Species of the Almaty Oblast, and a feasibility study for a three-year programme on the reintroduction of the Asiatic wild ass from Altyn-Emel SNNP to its three historical habitats. Currently, following the Prime Minister's instruction of 16 February 2018, the Ministry of Agriculture is developing a separate section (including forestry and protected area issues) for inclusion in the 2017 State Programme on Development of the Agro-industrial Complex for the period 2017–2021.

As for protected areas, there are currently no valid strategic plans, concepts or programmes (other than the 2013 Basic Provisions of the General Scheme for Organization of the Territory) for the further development of the state protected area network. The previously adopted policy documents are either no longer in force, such as the 2000 Concept of protected area development until 2030 (2000 Government Resolution No. 1692, annulled in 2010) and the 2006 Programme for the period 2007–2009 (2006 Government Resolution No. 990, annulled in 2007), or already expired, such as the 2007 Programme on the conservation and sustainable use of water resources, wildlife and development of the protected areas network until 2010 (2007 Government Resolution No. 914) and the "Zhasyl Damu" Programme for 2010–2014 (2010 Government Resolution No. 924).

The Committee has recently developed, in cooperation with the UNDP, species management plans for globally important bird species and populations of migratory species.

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis selected targets under Goals 14 and 15 of the 2030 Agenda for Sustainable Development is described in box 9.1.

Box 9.1: Target 14.5 and selected targets under Goal 15 of the 2030 Agenda for Sustainable Development

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Target 14.5: By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

By the designation of the large state preserved zone (662,630 ha) in the northern part of the Caspian Sea, the coverage of protected areas in relation to marine areas (indicator 14.5.1) in Kazakhstan is well above the level expected in target 14.5 (to conserve, by 2020, at least 10 per cent of coastal and marine areas). Nevertheless, little information about this state preserved zone and the effectiveness of the protective regime is available.

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Target 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

Despite the fact that the forest fund in Kazakhstan extends over a vast area of 12.7 million ha, the share of forest cover in the total territory (indicator 15.1.1) accounted for only 4.7 per cent in 2017, which is well below the global average. Even though the Committee on Forestry and Fauna carries out intensive afforestation and reforestation works each year, the value of this indicator cannot increase significantly, due to the size of the country.

It should be noted that Kazakhstan has granted legal protection to all wetland sites of international importance (Ramsar sites), and additionally designated an extensive network of wetland areas of republican (national) significance. However, the share of protected areas in the country's overall territory (8.94 per cent) is still well below the level expected under Aichi Biodiversity Target 11 (at least 17 per cent of terrestrial and inland water areas, and 10 per cent of coastal and marine areas) of the CBD Strategic Plan for Biodiversity 2011–2020. The proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type (indicator 15.1.2) cannot be properly assessed, due to the lack of data (e.g. inventories determining such priority sites for each ecosystem type, and their area). The coverage of different natural ecosystem types by protected areas is uneven, and several key ecosystems are considerably underrepresented in the protected area network. Moreover, several ecosystem types are absent in the most effective protected areas with legal entity status. Hence, the achievement of target 15.1 will require the extension of the state protected area network in order to sufficiently include all natural ecosystems representative of Kazakhstan, in particular mountain, forest, desert and wetland ecosystems.

Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

All forests in Kazakhstan are perceived as providing important ecosystem services and are therefore well protected and sustainably managed. The Committee on Forestry and Fauna successfully halted the deforestation process and conducts intensive works on forest ecosystems regeneration and restoration, as well as afforestation and reforestation (also in order to mitigate desertification processes). Most recently, the Government started to encourage private land users to undertake afforestation initiatives. Hence, progress towards sustainable forest management (indicator 15.2.1) over recent years is obvious, and target 15.2 can be achieved.

Target 15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

The Committee on Forestry and Fauna carries out intensive works in order to mitigate desertification and restore degraded forest and steppe ecosystems, as well as the dry bottom of the Aral Sea. There is not enough data available to properly assess the proportion of land that is degraded over total land area (indicator 15.3.1) in each biogeographic zone. In 2012, degraded pastures accounted for 14.51 per cent of the total area of pastures. In 2017, the Government adopted the Law on Pastures, providing for more sustainable use of pastures (including an obligatory pasture rotation requirement), enforcement of which can gradually improve the situation and facilitate at least partial achievement of target 15.3 by 2030.

Target 15.4: By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development

In March 2018, mountain ecosystems of Kazakhstan were the best protected (compared with other ecosystem types); some 10 per cent were covered by protected areas (5.49 per cent by the most effective protected areas with legal entity status). However, the coverage by protected areas of important sites for mountain biodiversity (indicator 15.4.1) cannot properly be calculated, due to the lack of assessment of the total size of areas considered important for the diversity of mountain regions. Similarly, the Mountain Green Cover Index (indicator 15.4.2) cannot be calculated prior to determining the total area of forest cover in all mountain regions of Kazakhstan (which would require the adoption of a clear definition of mountain areas, and delimitation of such). However, the designation of three new large protected areas in mountain regions is planned for the period until 2022, while more can still be designated until 2030. Hence, target 15.4 can still be achieved by the set deadline.

Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

The IUCN Red List Index (indicator 15.5.1) aggregating change in extinction risk across groups of species cannot be calculated for Kazakhstan, as, in order to calculate this Index, all species in a group must have been assessed for the IUCN Red List at least twice. Hence, the Red List Index calculation requires the elaboration of at least two editions of national Red Lists with the use of IUCN criteria. According to available data, the populations of many rare and threatened animal species occurring in Kazakhstan are growing in numbers. However, there are almost no data available on the current status of rare and threatened flora species and plant communities.

According to IUCN global assessments, as many as 16 plant species and 66 animal species occurring in Kazakhstan are globally threatened by extinction, which clearly indicates the most urgent priorities for the scientific field research and biodiversity monitoring particularly focused on the above species, as well as updating or adoption of special national conservation programmes for these species. The same relates to endemic species present solely in Kazakhstan, provisionally categorized by IUCN as "data deficient". Otherwise, target 15.5 will never be achieved.

Target 15.6: Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed

Despite the fact that the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Application to the CBD entered into force for Kazakhstan on 15 September 2015, according to the Interim National Report of 15 January 2018, Kazakhstan has not yet undertaken any legislative, administrative or policy measures (indicator 15.6.1) on access and benefit-sharing (ABS measures), which is indispensable for the achievement of target 15.6.

Target 15.7: Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products

As the exact data on illegal activities could only be provided by perpetrators, official statistics providing credible numbers of specimens of particular protected flora and fauna species illegally collected or poached are generally not available, and are not in Kazakhstan. Hence, indicator 15.7.1 (Proportion of traded wildlife that was poached or illicitly trafficked) cannot be calculated. Nevertheless, the number of law violations (in particular, poaching) is constantly declining. The Government can further decrease the supply of illegal wildlife products by raising the operational capacities of ranger services (including the provision of modern communication and navigation equipment and off-road vehicles). Furthermore, enhanced customs controls at state border crossings can further reduce the trade in illegal wildlife products.

Target 15.8: By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species

With regard to indicator 15.8.1 (Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species), Kazakhstan has already incorporated provisions aimed at preventing the introduction of alien species into national legislation (e.g. the Environmental Code, Forest Code, Law on Specially Protected Areas and Law on Protection, Reproduction and Use of Fauna). However, these were not followed by measures on the control and, if necessary, eradication of invasive alien species. Furthermore, relevant state monitoring programmes on invasive alien species are currently absent. The implementation of state monitoring and research programmes on these species will be the indispensable next step towards the achievement of target 15.8.

Institutional framework

Ministry of Agriculture

The Ministry of Agriculture of the Republic of Kazakhstan is the central executive body responsible for the implementation of national policies related to agriculture, including agricultural, veterinary and phytosanitary engineering, animal husbandry, land reclamation, water resources management, irrigation and drainage and the food production industry, as well as forestry, flora and fauna, fishing and hunting and protected area management. Since the major reorganization of the central administration in 2014, which included the liquidation of the Ministry of Environment and Water Resources, major responsibilities for issues related to biodiversity conservation and protected area management are entrusted to the Committee on Forestry and Fauna under the Ministry of Agriculture. The Committee has territorial inspections on forestry and fauna in all oblasts of Kazakhstan, and a number of subordinate institutions and entities, including the state forest and protected area administrations.

It should be noted that the Committee on Forestry and Fauna is directly responsible for the supervision and sustainable management of a considerable part of the vast territory of Kazakhstan. Even though the total area of protected areas under the responsibility of the Committee accounts for only 9 per cent of the country, these 243,750 km^2 are more than the territory of some countries. Hence, the “committee status” continuously assigned to a central body entrusted with such an extensive scope of responsibilities and vast geographical range of operations might imply the low position of biodiversity and protected area issues on the list of strategic priorities of the country.

The Committee has a long track record of cooperation on biodiversity conservation and protected area management capacity-building with the UNDP, the main ecological NGOs (in particular the ACBK), relevant academic institutions and leading scientific research institutes (some are represented in the Scientific and Technical Council of the Committee), for example, the Institute of Geography LLC, the Institute of Zoology and the Institute of Botany and Phytointroduction (the latter two subordinate to the Ministry of Education and Science).

Ministry of Energy

The Department of Environmental Monitoring and Information of the Ministry of Energy deals with gathering and analysing information on the environment (including data deriving from biodiversity monitoring, and reports received from the Ministry of Agriculture and its subordinate entities, e.g. protected area administrations).

Ministry of Education and Science

The Ministry of Education and Science is the central executive body in the field of education, science, protection of children’s rights and youth policy. Several academic institutions (e.g. the Al-Farabi Kazakh National University, Kazakh National Agrarian University, S. Seifullin Kazakh Agrotechnical University, Zhangir Khan West Kazakhstan Agricultural and Technical University) supervised by the Ministry are competent in biodiversity-related issues and cooperate with the protected area administrations.

The Committee of Science under the Ministry of Education and Science supervises a number of scientific research institutions of key importance for biodiversity monitoring and conservation, including the Institute of Zoology, the Institute of Biology and Plant Biotechnology, the Research Institute for Biological Safety, the Institute of Botany and Phytointroduction (together with its Main Botanic Garden in Almaty, and branch Zhezkazgan and Ili Botanic Gardens), the Altai Botanic Garden, Mangyshlak Experimental Botanic Garden, and the Republican State Enterprise “Issyk State Dendrological Park”.

Subnational level

Oblast authorities play an important role in biodiversity conservation in Kazakhstan, due to the fact that the state forestry institutions, which manage 77.4 per cent of the forest fund land, are under the jurisdiction of oblast akimats (local executive authorities). Akimats also have the powers, for example, to designate and manage protected areas of local significance and establish ecological corridors.

Interministerial coordination

Although the Committee on Forestry and Fauna coordinates its activities with several departments of the Ministry of Agriculture, the Department of Environmental Monitoring and Information of the Ministry of Energy, and a number of various state agencies subordinate to other sectoral ministries, horizontal coordination at the central level seems to be insufficient, in particular in terms of the formulation and implementation of sectoral strategic plans and programmes, which are not particularly well harmonized, to say the least, and also due to the absence of a single strategic document coordinating these sectoral strategies (while the strategy on biodiversity conservation is still lacking).

Stakeholder involvement

Several environmental NGOs are involved in biodiversity conservation initiatives in Kazakhstan and cooperate on transboundary nature conservation and protected area management issues with NGOs from neighbouring countries. The most experienced and capable environmental NGO in this field is the ACBK, which has good working relations with the Committee on Forestry and Fauna. Other important NGOs operating at the national level include the "Green Salvation" Ecological Society, the Snow Leopard Foundation, the Avalon Public Foundation and "Naurzum".

Most recently, in cooperation with the UNDP, the Committee on Forestry and Fauna has tested a new mechanism for local stakeholder involvement in joint management of biodiversity in protected areas and adjacent territories, on the legal basis of the 2015 Law on Public Councils. So far, three public councils have been established (in Barsakelmes and Ustyurt SNCAs and in Altyn-Emel SNNP) to ensure the participation of local communities in the process of planning and management of protected areas, thus providing for enhanced transparency and increased local support for biodiversity conservation.

Regulatory, economic and information measures

Regulatory measures

Several legal acts related to biodiversity (the Forest Code, the Law on Specially Protected Natural Areas, the Law on Protection, Reproduction and Use of Fauna), as well as the Land Code, provide the legal basis for the collection of various fees for the use of natural resources, for example, for the use of land, forest resources, protected areas (including entrance fees) and fauna species (for hunting and fishing permits), which is further detailed and enforced by the 2017 Tax Code.

Fines for the violation of provisions of the above legal acts related to biodiversity are further detailed and enforced by the 2014 Code on Misdemeanours and 2014 Criminal Code (which, e.g. establishes fines for destroying rare and threatened species of plants and animals and their habitats, or for violating the legal protective regime of protected areas). Some violations (e.g. illegal hunting causing significant damage) may lead to a sentence of imprisonment.

Economic measures

In order to increase the forest cover of Kazakhstan to 5 per cent of the country's territory by 2030 (which would require the increase in afforestation and reforestation works to reach some 80,000 ha per year), and to limit the pressure on the state forest resources, the Government has recently adopted the compensation scheme for private state forest land users, encouraging the establishment and cultivation of plantations and nurseries of the fast-growing tree and shrub species. Currently, this support scheme is being tested at six pilot sites, while the reimbursement of expenses on a much wider scale is to commence in 2019. It is expected that the scheme will facilitate the establishment of some 1,000 ha of plantations and 200 private nurseries by 2021.

Information measures

The RSE Information and Analytical Centre of Environment Protection (IACEP), subordinate to the Ministry of Energy, is responsible for the development and maintenance of the information system called "State cadastres of natural resources" (ecokadastr.kz), which is expected to become an automated system for collecting, organizing, storing, processing, display and analysis of spatially coordinated data on the state of natural resources.

Currently, the state cadastres system on natural resources includes five subsystems, four containing data derived from inventories on forests, protected areas, fauna and fish resources, and a separate subsystem containing maps. These subsystems are to be merged into a single coherent geo-portal. Data is gathered from three reporting levels: republican (national), regional (oblast akimats) and local (including local state forest administrations, protected area administrations, hunting grounds). However, for the time being, the system contains data only for the period 2004–2016.

As this information system is still (as at March 2018) in the testing phase, its functionality and operational capacity cannot currently be assessed (e.g. the extent to which the system is truly "automated" and provides for the harmonization of data, and whether it allows overlapping vector thematic data layers of particular subsystems). Furthermore, digital maps are supposed to be available only in 1:1,000,000 and 1:200,000 scales (partly justified by the vast territory of the country), which will not allow for the obtaining of more detailed information for research purposes. Most probably, closer cooperation on the development of this map subsystem with the Institute of Geography LLC could provide for more advanced outcomes. The state natural resources cadastres system is expected to become operational by 2020.

Shortcomings of the biodiversity-related information

As of 2018, the publicly available information on biodiversity and protected areas is not always up to date and comprehensive, much less harmonized among the different sources (including national reports and official statistics). Although the division of the territory into 10 biogeographical zones was legally determined in 2003 (in Article 1, paragraph 3 of the 2003 Land Code), even the official information sources do not follow such division. Similarly, the commonly agreed and unified categorization of natural ecosystems seems to be either absent or still not in use. In some cases, the official statistics provide rounded percentage values instead of exact number values. Furthermore, some issues are presented in a slightly inappropriate context; for example, data concerning state expenditures on the management of hunting grounds, incomes deriving from the hunting economy and the number of hunted animals are presented under the heading “conservation of animal world”. Last, but not least, almost no data are available on, for example, flora species, plant communities, wild bird species populations and protected areas of local significance, which makes the available information incomplete.

Red Books

According to the Committee on Forestry and Fauna, the Red Books are reprinted in Kazakhstan every 10 years. However, this regular reprinting scheme is not preceded by an equally regular revision process. As a result, the Red Lists adopted by the Government in 2006, and the resulting Red Books, do not provide credible and the most up-to-date information, and do not always follow the globally applied IUCN methodology and criteria. For instance, the Red List Vol. 1. Animals. Part 1. Vertebrates (reportedly last reviewed and updated in 2008) is using traditional threat category classification (non-compatible with IUCN standards), while the 2014 Red Book Vol. 2. Plants, although developed with the use of contemporary IUCN methodology and criteria, is still based on outdated historical information. The Red Book of Kazakhstan Vol. 1. Animals. Part 2. Invertebrate Animals was last published in 2004. Last, but not least, the Red Book Vol. 2 Part 2 (on plant communities), the Green Book (on plant communities requiring special conservation measures), although prepared for publication some years ago, as well as the Black Books (on non-native, alien invasive species) have not yet been published.

9.7 Participation in international agreements

Global multilateral environmental agreements

Since 1994, Kazakhstan has been party to the Convention Concerning the Protection of the World Cultural and Natural Heritage. The National Report on implementation of the Convention for 2010 was submitted in 2011. Five sites nominated by Kazakhstan have so far been inscribed by UNESCO on the World Heritage List (including two under “natural” criteria, inscribed in 2008 and 2016). The transboundary Western Tien-Shan World Heritage property (2016) is shared with Kyrgyzstan and Uzbekistan. A further 13 areas are being considered for nomination, including four “mixed” sites and three “natural” sites (which all contain protected areas), but still remain on the Tentative List (since 1998 or 2002). Kazakhstan is involved in the UNESCO Man and the Biosphere (MaB) Programme, and is a member of two regional and subregional MaB networks: EuroMAB (Europe and North America) and SACAM (South and Central Asia). In 2018, Kazakhstan had eight UNESCO MaB biosphere reserves, all nominated and included in the UNESCO World Network of Biosphere Reserves between 2012 and 2017.

Also in 1994, Kazakhstan became party to the CBD, and since then has submitted five National Reports on CBD implementation (in 2001, 2002, 2006, 2010 and 2014) and the Thematic Report on Forest Ecosystems (in 2001). The submission of the next, Sixth National Report to the CBD is due by the end of 2018. Kazakhstan is quite successful in CBD implementation (in particular in the conservation of rare and globally threatened wild ungulate mammal species and protection and restoration of forest ecosystems), has already designated vast protected areas for in-situ conservation purposes and is progressing towards establishing a functional national ecological network. However, the Government has not endorsed the 1999 National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity, which is not in compliance with CBD Article 6 nor with Aichi Biodiversity Target 17 of the CBD Strategic Plan for Biodiversity 2011–2020, requiring that by 2015 each party has developed, adopted as a policy instrument, and commenced the implementation of an updated national biodiversity strategy and action plan (NBSAP).

Kazakhstan made significant progress towards the achievement of several Aichi Biodiversity Targets: 7 (by enhancing sustainable management of areas under agriculture, aquaculture and forestry); 12 (by preventing the extinction of threatened species, in particular, fauna species); and 13 (by maintaining the genetic diversity of cultivated plants, farmed animals and their wild relatives). However, the achievement of Aichi Biodiversity Targets 5 (conservation of natural habitats, and reducing their degradation and fragmentation), 9 (control and eradication of invasive alien species) and 11 (protected area coverage), expected by 2020, is much less feasible.

In 2008, Kazakhstan acceded to the CBD's Cartagena Protocol on Biosafety, aimed at preventing possible risks from uncontrolled movements between countries of living modified organisms (LMOs) resulting from modern biotechnology. Kazakhstan has designated the relevant national focal point and indicated competent national authorities, established the national biosafety website, incorporated relevant provisions into the legislation and has so far submitted two National Reports on the implementation of the Protocol (Second National Report in 2011 and Third National Report in 2015).

In 2015, Kazakhstan acceded to the CBD's Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization. The Government has designated the access and benefit-sharing (ABS) national focal point and, most recently (January 2018), submitted the Interim National Report on the implementation of the Protocol, according to which, Kazakhstan has not yet undertaken any legislative, administrative or policy measures to ensure fair and equitable benefit sharing (indicator 15.6.1 under target 15.6 of the 2030 Agenda for Sustainable Development). Furthermore, Kazakhstan is not yet party to the Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety, which entered into force in March 2018.

In 2000, Kazakhstan acceded to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Government incorporated CITES-relevant provisions into national legislation and appointed the CITES Management Authority (the Committee on Forestry and Fauna), Scientific Authorities (Institute of Zoology and Institute of Botany and Phytointroduction under the Ministry of Education and Science, and the Kazakh Research Institute of Fisheries) and Enforcement Authorities (in particular, Customs Control Agency). To date, Kazakhstan has submitted three annual National Reports to CITES, for 2013 (in 2015), 2015 and 2016 (in 2017), but no biennial (implementation) National Report. In the period 2014–2017, the CITES Management Authority issued 770 import or export permits. However, according to the 2014 National Report to the CBD, customs and border guard services are not yet sufficiently trained to ensure CITES implementation. According to the 2011 and 2014 National Reports to the CBD, appendices to CITES include 107 species of fauna occurring in Kazakhstan (20 species in Appendix I and 87 species in Appendix II), but rare plant species of Kazakhstan are not included. Due to the above, plants, raw materials and derivatives are exported abroad freely, which threatens the populations of rare, endangered and endemic plant species.

Since 2006, Kazakhstan has been party to the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and is a signatory to four CMS instruments: the MoU concerning Conservation Measures for the Slender-billed Curlew, MoU concerning Conservation Measures for the Siberian Crane (National Report submitted in 2010), MoU concerning Conservation and Restoration of the Bukhara Deer (National Report submitted in 2011) and MoU concerning Conservation, Restoration and Sustainable Use of the Saiga Antelope (non-signatory National Report submitted in 2006 and National Reports in 2010 and 2015). Kazakhstan is also involved (as a range country) in two CMS Special Species Initiatives: the Central Asian Flyway (National Reports in 2005 and 2012) and the Central Asian Mammals Initiative (CAMI).

In 2007, Kazakhstan became party to the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, and currently harbours 10 sites designated as Wetlands of International Importance (Ramsar sites), including eight designated after 2008. Kazakhstan submitted two National Reports (to COP10 in 2008 and to COP12 in 2015). All these sites have legal protective status in Kazakhstan and are included in the list of specially protected areas. Additionally, in 2013, the Minister of Environment Protection designated another 44 wetland areas of republican (national) significance.

Regional multilateral environmental agreements

In 2015, Kazakhstan ratified the Framework Convention for the Protection of the Marine Environment of the Caspian Sea (Tehran, 2003), signed by the five Caspian littoral States (Azerbaijan, Iran, Kazakhstan, the Russian Federation and Turkmenistan). The objective of this Convention is the protection of the Caspian environment from all sources of pollution, including the protection, preservation, restoration and sustainable and rational use of the biological resources of the Caspian Sea. Provisions of this Convention include, inter alia, the prevention of the introduction, control and combating of invasive alien species, and the protection, preservation and rational use of marine living resources, which concerns rare and endangered species, their habitats, and vulnerable ecosystems, coastal zone management and monitoring. Kazakhstan submitted National Reports on the implementation of the Caspian Convention in 2012 and 2015.

The parties to the Caspian Convention decided on the development and adoption of four thematic protocols to this Framework Convention (three have been adopted, while one is still in draft). As their entry into force requires ratification, acceptance, approval or accession by all Caspian littoral states, the Protocol on the Conservation of Biological Diversity (Ashgabat, 2014) has not yet come into force, due to pending ratifications by Azerbaijan and Kazakhstan. Provisions of this Protocol include measures for the conservation of species (including the implementation of national and regional species conservation action plans), development of the Caspian Red Book, and designation of marine and coastal protected areas. When submitting the National Report on the implementation of the Convention, Kazakhstan also included extensive information on activities towards the achievement of the objectives of this MEA, which is not yet formally binding.

Another relevant regional international initiative is the Framework Convention for the Protection of the Environment for Sustainable Development in Central Asia, adopted in Ashgabat in 2006. Its provisions include the conservation of mountain ecosystems and of biological diversity. However, this Convention has not yet come into force, as it requires ratification by all five States of the region. As of 2018, Kyrgyzstan, Tajikistan and Turkmenistan have signed this regional convention.

Bilateral agreements

In March 2010, the Government of Kazakhstan signed an agreement with the Government of Uzbekistan on the protection, restoration and sustainable development of the saiga antelope population. Under this agreement, Kazakhstan prepared and consulted with Uzbekistan on the plan of joint measures for its implementation, in the frame of the mid-term work programme under the CMS.

In September 2011, the Government of Kazakhstan signed an agreement with the Government of the Russian Federation on the establishment of a transboundary "Altay" protected area, including Katon-Karagay SNNP, and the state natural biosphere reserve "Katunsky" (Russian Federation). This agreement entered into force in March 2012 and paved the way for the designation of a bilateral biosphere reserve by UNESCO in 2017.

International projects

The most significant international projects include:

- the GEF West Tien Shan Project (2005–2009), facilitating cooperation among five protected areas of the three neighbouring countries, with a focus on protected area administration capacity-building and research on threatened species distribution;
- the GEF Tien Shan Ecosystem Development Project (2008–2009), aimed at supporting the management of protected areas in Kazakhstan and Kyrgyzstan;
- the UNDP/GEF Biodiversity Conservation in the Altai-Sayan Ecoregion project (2007–2012) with a focus on flagship mammal species (including the snow leopard and argali sheep), and the development of the Altai-Sayan Ecoregion Conservation Strategy by WWF;
- the Conservation of Biodiversity in the Transboundary Region of the North Tien Shan project (2013–2016), supported by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by the ACBK, the "Green Salvation" ecological society, Nature and Biodiversity Conservation Union (NABU) from Germany, the Rural Development Fund and Ak Terek Foundation in Kyrgyzstan.

Several important projects on biodiversity conservation and protected area management and capacity-building were implemented in Kazakhstan with the support of the GEF and UNDP, for example: the Integrated Conservation of Priority Globally Significant Migratory Bird Wetland Habitat project, completed in 2011; the Steppe Conservation and Management project (2008–2013); the Development and Implementation of Information System on the Monitoring of Biodiversity in Pilot Specially Protected Natural Areas (SPNA) project (2012–2014); and the National Biodiversity Planning to Support the implementation of the CBD 2011–2020 Strategic Plan project (2012–2016), aiming to develop an updated NBSAP.

9.8 Assessment, conclusions and recommendations

Assessment

Kazakhstan has successfully preserved the abundance of wild native species of fauna and flora, including numerous globally threatened species, as well as regionally rare and endangered species present on the Red List. The vast territory of the country harbours the largest remaining viable parts of the global population of at least three globally threatened animal species, including the critically endangered (CR) saiga antelope. Populations of many globally threatened fauna species are either stable or constantly growing in numbers, while hunting for game species is kept at a sustainable level. Kazakhstan succeeded in the reintroduction of the Asiatic wild ass and Bukhara deer, while the reintroduction of the Przewalski's horse is under way. However, the saiga antelope is still listed as a game species, while the moratorium on its hunting is valid only until the end of 2019. The survival of the endemic Caspian seal (EN) is threatened by climate change and anthropogenic pressures resulting in the degradation and loss of its habitats. Furthermore, the globally most important Kazakh population of the sociable lapwing (CR) is rapidly declining, while little or no data is available on the trends in populations of other rare bird species and of game fowl. Last, but not least, the spread of several invasive alien species continues, while their control or eradication may be impossible in practice.

All natural ecosystems in Kazakhstan (where deserts and steppes account for some 91 per cent of the territory) are seriously threatened by climate change, resulting in desertification, habitat degradation, increased threat of steppe and forest fires and the growing scarcity of water sources. Important habitats of the desert, forest-steppe and steppe zones are either lost or heavily destroyed as a result of pasture overgrazing, while the rapidly developing oil and gas mining industry threatens the stability of the Caspian Sea marine and coastal ecosystems, resulting in considerable depletion of available fish stocks. Kazakhstan conducts intensive afforestation works aimed at mitigating the adverse effects of the shrinking Aral Sea, a human-made environmental disaster (inherited from the time of the Soviet regime) and increasing the forest cover share to 5 per cent of the country by 2030. However, achievement of the latter would require the trebling of efforts and related expenditure in the coming years.

As a result of the combined effects of the adverse effects of ongoing rapid climatic changes, coupled with the still increasing anthropogenic pressures on the environment, not only is the presence of, for example, rare animal species threatened, but so are the agricultural potential, continuity of provision of important ecosystem services, and prospects for sustainable development of the country. The further degradation of important natural ecosystems and the resulting loss of biological diversity can easily translate into decreased revenues, due in particular to the lower productivity of the agricultural sector.

As of 2018, an integrated biodiversity monitoring system is not available, while the "State cadastres of natural resources" information system is in the testing phase and might become operational around 2020. As a result, available data is scattered among different databases run by different entities, and not always accessible in electronic format.

Kazakhstan has established an extensive network of protected areas, encompassing 243,750 km^2 (which is more than the entire territory of many countries), and aims to develop a functional ecological network (including the recent designation of the first ecological corridors linking protected areas). Since 2008, Kazakhstan designated an additional eight new Ramsar sites, ensured legal protective status for wetlands (of both international and republican importance) and for key ornithological areas (all internationally designated as IBAs), and successfully nominated its first two "natural" sites inscribed by UNESCO on the World Heritage List and all eight existing MaB biosphere reserves, which are included in the UNESCO World Network of Biosphere Reserves.

However, the current share of protected areas in the country's overall territory (some 8.94 per cent) is well below the globally recommended levels. The existing protected area network adequately covers neither all main natural ecosystem types representative of Kazakhstan, nor habitats of all important threatened wildlife species. The most effective protected areas (having legal entity status and their own administration, personnel, management plans and capacities to implement them) jointly account for less than one third of the network area (only 2.58 per cent of the country's territory). The nomination of the 13 new World Heritage sites (remaining on the Tentative List of Kazakhstan since 1998 or 2002) is still pending.

The Government has not endorsed the 1999 National Strategy and Action Plan on Conservation and Sustainable Use of Biological Diversity (NBSAP). As a result, Kazakhstan has no policy instruments in force with a special focus on biodiversity conservation and/or protected area network development (despite the explicit CBD requirement), and these issues are not integrated into other sectoral policies.

Kazakhstan is party to several global and regional MEAs and bilateral agreements related to biodiversity conservation and is progressing well towards the implementation of these, in particular, the CMS and

Ramsar Conventions. However, the implementation of some other agreements has been impeded by the lack of related strategic policy instruments, interministerial coordination mechanisms and organizational and human capacities (e.g. training).

Conclusions and recommendations

Ensuring adequate legal protection to wild flora species and plant communities

The national biodiversity-related legislation of Kazakhstan pays much attention to the conservation, protection and sustainable use of fauna species, both rare and threatened, and widespread game species (the latter regarded as an important natural resource, yielding revenues from the widespread hunting grounds). Simultaneously, wild flora species and plant communities are not equally considered in law. The 2007 Environmental Code does not contain provisions on measures for the protection of rare and endangered flora species similar to those concerning fauna species. The 2003 Forest Code does provide for the protection of rare and endangered flora species, but applies solely to the state forest fund. Few provisions establishing the general obligation for the protection of the above species are present in the 2006 Law on Specially Protected Natural Areas, but more detailed provisions regulating the withdrawal of species concern only fauna species. Not of least concern is that Khazakhstan's rare, endangered and endemic plant species are not included in Appendices to CITES, which allows for their uncontrolled export and threatens the viability of their populations.

Wild flora species and plant communities deserve a similar legal act on their conservation, protection and sustainable use, like the 2004 Law on Protection, Reproduction and Use of Fauna. Such intervention would largely facilitate the achievement of targets 11.4 and 15.5 of the 2030 Agenda for Sustainable Development, as well as Aichi Biodiversity Target 12, and ensure full compliance with the CBD, to which Kazakhstan is party.

Recommendation 9.1:
The Government should adopt legislation on the conservation, protection and sustainable use of flora, including native wild flora species and plant communities, with a particular focus on rare, threatened and endemic ones.

Biodiversity monitoring and research programmes

The availability of reliable, comprehensive and up-to-date information on biodiversity is a prerequisite for the proper formulation of national policies, species conservation action plans and protected area management plans, and for setting hunting quota. Moreover, the "State cadastres of natural resources" information system, currently developed by the Department of Environmental Monitoring and Information of the Ministry of Energy, will not perform its planned policy support tool functions unless it is continuously provided with good quality and continuously updated information, derived from biodiversity monitoring, field inventory works and scientific research. As of 2018, the continuity of research on biodiversity (in particular, of nationwide long-term biodiversity monitoring, inventory and research programmes) is seriously threatened, due to the recently changed rules for financing scientific activities in correspondence with the public procurement procedures. As a result, several research programmes and projects have already been suspended, or completely abandoned. The above can impede the implementation of Article 7 of the CBD, as well as the achievement of Aichi Biodiversity Target 19.

The lack of access to high quality data on biodiversity is an obvious impediment to progress in achieving target 15.5 of the 2030 Agenda for Sustainable Development. Progress towards the achievement of the Sustainable Development Goals cannot properly be assessed prior to conducting research aimed at, for example: identification of sites important for terrestrial and freshwater biodiversity, by ecosystem type (for measuring indicators 15.1.2 and 15.4.1); determination of the total area of forest cover in all mountain regions of Kazakhstan (in order to calculate indicator 15.4.2, the Mountain Green Cover Index); assessment of the proportion of land that is degraded over total land area (indicator 15.3.1) in each biogeographic zone; and assessment of the proportion of traded wildlife that was poached or illicitly trafficked (indicator 15.7.1).

Recommendation 9.2:
The Government should:

(a) Undertake an assessment and adopt the list of priority long-term state monitoring and research programme topics on biodiversity, with a special focus on rare and threatened flora and fauna species, plant communities and ecosystems, and on invasive alien species;
(b) Revise and update the 2006 Red List of rare and endangered flora and fauna species, and corresponding Red Books, paying due account to the globally applied methodology and criteria of the International Union for Conservation of Nature, and update and

publish the Green Book on plant communities requiring special conservation measures and the Black Book on alien invasive species;

(c) Commission scientific research projects indispensable for measuring progress towards the achievement of Sustainable Development Goal 15;

(d) Revise the rules for financing scientific activities in relation to the priority long-term state monitoring and research programmes on biodiversity;

(e) Mobilize adequate resources in order to ensure the continuation of programmes related to state biodiversity monitoring and research in the long run.

National Biodiversity Strategy and Action Plan

Due to the absence of a valid NBSAP, Kazakhstan currently has no policy instruments in force with a special focus on biodiversity conservation or protected area network development. According to CBD Article 6, each party shall develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity. The CBD Strategic Plan for Biodiversity 2011–2020 established Aichi Biodiversity Target 17 (By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan). Compliance with the above basic CBD requirements will largely facilitate the achievement of Kazakhstan's international commitments, including targets 11.4 and 15.5 of the 2030 Agenda for Sustainable Development.

Recommendation 9.3:
The Government should:

(a) Develop, adopt and commence the implementation of an effective, participatory and updated national biodiversity strategy and action plan, paying due account to the current strategic plans and relevant programmes of work under the Convention on Biological Diversity;

(b) Develop, adopt and commence the implementation of species action plans.

Extension of the state protected area network

As of 2018, the state protected area network encompasses only some 8.94 per cent of the country's territory. The share of the most effective protected areas (those with legal entity status) is only 2.58 per cent. According to the 2013 Basic Provisions of the General Scheme for Organization of the Territory, Kazakhstan aims at increasing the protected area network to reach 41.6 million ha (15.27 per cent of the country's territory) by 2030. However, all the above numbers are still far below the minimum expectations set by the CBD Strategic Plan for Biodiversity 2011–2020, Aichi Biodiversity Target 11 (at least 17 per cent of terrestrial and inland water areas, and 10 per cent of coastal and marine areas). Furthermore, the current protected area network does not yet adequately safeguard the biodiversity values, as some natural ecosystems are underrepresented, while some rare and threatened species do not occur inside currently protected areas.

Moreover, 50 state nature sanctuaries (SNSs, called "zakazniks") of republican significance (many of which extend over vast areas, of up to 1 million ha), do not provide for efficient biodiversity conservation, while the land-use pressures on their areas is constantly growing. In Kazakhstan, SNSs can be designated for a limited, short-term period, which does not provide for their integrity in the long run. The areas currently protected as SNSs have already been evaluated – long ago – as having important natural values, confirmed by sound scientific research and justifications. Therefore, their redesignation as SNRs or SNNPs, for example, could significantly enhance the conservation of their biodiversity and landscape values.

Designation of new protected areas is important, but the efficient protection (including capacity-building, and raising the legal status and protective regime) of already existing protected areas seems to be equally important, otherwise this extended protected area network could, to a large extent, remain virtual. The revision of the legal protective status of SNSs and significant extension of the state protected area network could largely facilitate the achievement of targets 15.1 and 15.5 of the 2030 Agenda for Sustainable Development.

Recommendation 9.4:
The Government should:

(a) Designate new protected areas, and extend the territories of existing protected areas, with particular focus on providing for adequate coverage of all main ecosystem types representative of Kazakhstan, as well as the sufficient inclusion of habitats of all rare and threatened wildlife species, including important plant areas;

(b) Consider raising the legal protective status of the current state nature sanctuaries ("zakazniks"), in particular of complex and

botanic types, by converting them into state nature reserves or state national nature parks with legal entity status;

(c) *Support the initiatives of oblast authorities for the designation of ecological corridors, in order to enhance ecological connectivity and continuity and conservation of migratory species outside the protected areas.*

PART III: INTEGRATION OF ENVIRONMENT INTO SELECTED SECTORS/ISSUES

Chapter 10

ENERGY AND ENVIRONMENT

10.1 Overview of the energy sector

Extraction of energy sources

Kazakhstan has significant fossil fuel resources. Proven reserves of oil, coal and uranium in Kazakhstan rank the country among the top dozen in the world for these resources, and it ranks in the top 20 for natural gas. Kazakhstan is a world leader in uranium production and ranks tenth in world coal production and twentieth in oil production.

Energy resources are unevenly distributed over the territory of the country: major coal deposits are located in the northern and central oblasts, uranium is located mainly in the southern and in central parts of the country, oil and gas deposits are located in the western region and minor resources of gas and coal are in the southern region.

Thanks to its vast primary energy resources, Kazakhstan is one of the countries that is able not only to meet domestic energy demands but also to export energy resources in significant amounts.

Coal

There are about 100 coal deposits in Kazakhstan with geological reserves more than 175 billion t, including 21 billion t industrial reserves of coal suitable for surface mining. There are more than 40 explored deposits, with proven reserves of about 34 billion t (table 10.1). The major proportion, more than 22 billion t, is hard coal (bituminous and sub-bituminous), including about 6 billion t of coking coal. Lignite ("brown coal") accounts for more than 12 billion t of coal deposits.

The largest coal basins are located in the central and northern parts of the country: Ekibastuz with 12.5 billion t; Karaganda, 9.3 billion t; and Turgay, 5.8 billion t.

Table 10.1: Coal reserves, billion t

Coal basin/deposit	Reserves
Ekibastuz	12.50
Karaganda	9.30
Turgay	5.80
Maikyuben	2.20
Shubarkul	2.10
Karazhara	1.10
Borlinskiy	0.44
Kuu-Chekinskoe	0.14
Others	0.48
Total	**34.06**

Source: Ministry of Energy, 2018.

Kazakhstan ranks tenth among the leading coal producing countries in the world and coal is a backbone of power generation in the country. It covered 55 per cent of national primary energy consumption and 66 per cent of electricity generation in 2016.

According to the Ministry of Energy (table 10.2), in 2016, the country produced 101.5 million t of coal, an 11 per cent decrease from 2012 peak production (114.3 million t).

The production of coal decreased from 2013 to 2016. This was caused by slow economic growth, a move towards natural gas and liquefied petroleum gas (LPG), and difficulties in expanding exports. Coal exports have been declining since 2011 due to challenges related to the physical characteristics of Kazakhstan's coal (mainly its high ash content), the long overland distances to transport coal to foreign markets and the policies of neighbouring countries (e.g. China, the Russian Federation) to protect domestic coal production. However, in 2017, there was growth in coal production caused by an increase in domestic consumption.

Table 10.2: Coal balance, 2008–2017, million t

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Production	104.9	94.3	105.3	110.1	114.3	112.8	107.6	102.2	101.5	105.6
Consumption	72	69.3	75.9	76.5	81.5	79.9	75.2	72.2	72	76.3
Exports	32.9	25	29.4	33.6	32.8	32.9	32.4	30	29.5	29.3

Source: Ministry of Energy, 2018.

Almost 95 per cent of produced coal is hard coal, including more than 5 million t of coking coal for metallurgical purposes. Underground mines in the Karaganda basin produce some 30 million t. Kazakhstan is blessed with coal produced in open pits: three giant mines in Ekibastuz basin in Pavlodar Oblast (Bogatyr, Severnyy and Vostochnyy) and four mines (Borly, Kushoky, Saryadyr and Shubarkol) in Karaganda Oblast. Mining in open pits produces low cost coal, especially in Ekibastuz where coal seams are thick and deposited near the surface. The remainder of current production (5 per cent) is lignite production in the Maykuben basin.

Oil

According to the State Commission on Mineral Reserves, as of 1 January 2016, the petroleum liquids reserve was 5.3 billion t, including 4.85 billion t of crude oil reserves and 445 million t of gas condensate, which are located in 332 fields, including 271 oilfields and 61 gas condensate fields (table 10.3).

In 2016, oil output declined for the third year in a row (table 10.4). This decrease in production was caused first by the depletion of oilfields in Aktobe and Kyzylorda Oblasts and, in 2016, by agreement with OPEC to reduce the output of production to keep the oil price at an agreed level. However, in 2017, the decline was compensated for by increased production from the Kashagan oilfield, so total production reached 86.2 million t.

The big prospects of oil and gas content are connected with the Caspian Sea shelf region of Kazakhstan. The majority of the growth is expected to come from three fields: Tengiz, Karachaganak and Kashagan.

Natural gas

According to the State Commission on Mineral Reserves, the country has 4.01 trillion m^3 (Tcm) of natural gas as of 1 January 2016.

The majority (3.72 Tcm) of the national natural gas reserves is located in the North Caspian Basin, and almost all reserves (around 98 per cent) are located in the western part of the country, in Mangistau, Atyrau, West Kazakhstan and Aktobe Oblasts. While there are more than 200 gas fields in Kazakhstan, around 85 per cent of reserves are concentrated in a few large fields (Tengiz, Kashagan, Karachaganak, Zhanazhol and Imashevskoye).

The development of national natural gas reserves faces a number of challenges, such as deep deposition (up to 5 km) and high sulphur content. In 2017, Kazakhstan produced 52.9 billion m^3 of natural gas (table 10.5). Natural gas gross output (including reinjected volumes to the production processes) shows a steady tendency to increase. Although the largest share of national gas production is associated with oil and connected to oil output, this tendency was observed even during the last several years, when oil production was in decline. Commercial output (gross output minus reinjection) and total apparent consumption (commercial production minus exports plus imports) were also growing.

Table 10.3: Proven oil and condensate reserves, 2016, million t

	A+B+C1	C2	A+B+C1+C2
Crude oil	3 159	1 689	4 848
Condensate	359	86	446
Total	**3 518**	**1 775**	**5 293**

Source: State Commission on Mineral Reserves, 2017.
Note: Categories A, B, C1 and C2 are according to the national resource classification system.

Table 10.4: Crude oil balance, 2010–2017, million t

	2010	2011	2012	2013	2014	2015	2016	2017
Production	79.7	80	79.2	81.8	80.8	79.5	78.0	86.2
Consumption	19.6	17.5	17.2	16.8	18.3	14.8	15.7	16.4
Exports	67.5	69.6	68.1	72.2	63	64.8	62.3	69.8
Imports	7.4	7.1	6.1	7.2	0.5	0.1	0	0

Source: Ministry of Energy, Kazenergy National Energy Report, 2017.

Table 10.5: Natural gas balance, 2010–2017, billion m^3

	2010	2011	2012	2013	2014	2015	2016	2017
Gross output	37.1	39.5	40.1	42.4	43.2	45.3	46.4	52.9
Commercial output	24.1	24.7	24.4	24.6	24.8	27.7	29.5	35.3
Total apparent consumption	**13.6**	**12.8**	**16.1**	**16.7**	**17.2**	**19.3**	**23.7**	**25.2**
Exports	14.5	16.0	12.8	13.1	11.6	13.3	12.7	17.2
Imports	4.0	4.1	4.5	5.2	4.0	4.9	6.9	7.1

Source: Ministry of Energy, 2018.

Hydropower

The technically feasible hydropower potential of Kazakhstan exceeds 60 billion kWh/y, and the potential economically viable for development is estimated to be around 30 billion kWh/y. Key hydropower plants (HPPs) are: Shulba with an installed capacity of 702 MW; Bukhtarma, 675 MW; Kapchagay, 364 MW; Ust-Kamenogorsk, 331 MW; and Moinak, 300 MW.

The biggest hydropower potential is available in the rivers of Eastern Kazakhstan, with approximately 30 billion kWh economically viable. In south-east Kazakhstan, fewer than 8 per cent of the more than 800 rivers can be used for construction of hydroelectric power stations. There are opportunities here for small hydroelectric power stations working in irrigation mode. Northern and Central Kazakhstan have minimal hydropower resources – some 1–2 per cent of all potential hydropower resources of the country. Western Kazakhstan includes the Ural, Uzen and Emba Rivers running into the Caspian Sea. Their annual hydropower potential is estimated to be 2.8 billion kWh. These rivers are basically used for industrial and household water supply, irrigation, fishery and navigation. The recently constructed Moinak HPP (300 MW) on the Charyn River is used as a regulator of Kapchagay HPP. Moinak HPP allows the electricity deficiency in Southern Kazakhstan to be reduced to 900 million kWh. The most promising step at the initial stage of development of small hydropower engineering is the construction of small hydroelectric power stations in Southern Kazakhstan, with annual production of more than 8 million kWh of electricity.

Perspectives on development of atomic energy

Kazakhstan accounts for around 40 per cent of the world's uranium production. Uranium production, which started in 2003, grew by 188 per cent in the period 2008–2016 and reached 24.58 million t in 2016 (table 11.3).

According to the 2017 Kazenergy National Energy Report, as of January 2015, reasonably assured resources of uranium (RARs, roughly corresponding to the A+B+C1 reserves category used in Kazakhstan) that are recoverable at a cost of less than US$260/kg are estimated at 0.4 million t (8 per cent of the world's total). Resources recoverable at a cost of up to US$80/kg increased from 200 million t as of January 2013 to 230 million t in January 2015. In terms of inferred resources, the category corresponding to the C2 category used in Kazakhstan, the country increased its reserves by 120 Mt (to 438 Mt) in the same period, as more reserves were classified as inferred at the Inkai and Moinkum deposits.

Kazakhstan is in the process to establishing an international low enriched uranium (LEU) fuel bank, which could be able to store up to 90 t of low-enriched uranium hexafluoride (UF6). The goal of this bank is to provide member states of the International Atomic Energy Agency (IAEA) with the opportunity to gain access to the reserved volumes of low-enriched uranium used for production of nuclear fuel. In 2015, Kazakhstan and the IAEA signed an agreement on establishment of an LEU bank and, in 2016, the national parliament approved this agreement. Any country in urgent need of LEU can submit an official application to the IAEA for the supply of nuclear fuel. The IAEA redirects the application to the fuel bank. It is expected that the bank would receive its first uranium in 2019.

Transportation of fossil fuels

The Central Asia–Centre (CAC) gas pipeline system is a system of natural gas pipelines that runs from Turkmenistan via Uzbekistan and Kazakhstan to the Russian Federation. The eastern branch includes the CAC 1, 2, 4 and 5 pipelines, which start from the south-eastern gas fields of Turkmenistan. The western branch consists of the CAC 3 pipeline, which runs from the Caspian Sea coast of Turkmenistan to the north. The branches meet in western Kazakhstan. From there, the pipelines run to the north where they are connected to the Russian natural gas pipeline system.

The Central Asia–China pipeline starts in Saman-Depe, carrying natural gas from the Bagtyyarlyk gas fields on the right bank of the Amu Darya River in Turkmenistan. The pipeline enters Uzbekistan in Olot and runs across Uzbekistan to southern Kazakhstan parallel to the long-existing Bukhara–Tashkent–Bishkek–Almaty pipeline. The pipeline crosses the Kazakhstan–China border at Khorgos, where it is connected to the second West–East Gas Pipeline. Construction works on the Kazakh section of the gas pipeline started on 9 July 2008 and the first stage was finished in July 2009. The first of the two initial parallel lines were completed in November 2009. The second line was completed by the end of 2010. Construction of the third line began in 2012. It became operational on 15 June 2014 and reached the designed throughput of 25 Bcm/y in 2016.

For the last few years, Kazakhstan has been developing its transportation gas system to heighten the country's level of gasification and to create a unified national network of gas transportation. It has been a part of the Government's plan to increase the energy security and environmental friendliness of the economy. In 2015, the length of the system's gas pipelines reached 39,300 km.

In 2015–2016, the length of the national trunk gas transmission system reached 15,265 km. The volume of gas carried by the transmission system was 96.2 Bcm in 2016, most of which was transit gas. One of the most important recent changes was the construction of the Beyneu–Bozoy–Shymkent (BBS) pipeline, completed in 2015. Thanks to the completion of this pipeline, it became possible to transport gas from the western part of Kazakhstan not only to its southern region but also to China. The volume of gas transported to the southern oblasts was 1.6 Bcm in 2014, compared with 300 Mcm in 2013, and this increased to 2.1 Bcm in 2016. In 2016, a booster compressor station was built in Akyrtobe. The volume of gas this station can transport between the Bukhara–Tashkent–Bishkek–Almaty pipeline and Line C of the Central Asia Gas Pipeline system (CAGP) is 6 Bcm/y. Construction of this compressor station contributed to an increase in energy security, since it created an alternative route for supplying gas to Almaty, bypassing the territory of Kyrgyzstan.

The length of distribution pipelines has increased by 9,340 km since 2010 and reached 27,113 km by 2016. The total number of settlements having access to gas reached 976 in 2016 compared with 891 in 2014, which increased the level of gasification in Kazakhstan from 43 per cent to 46 per cent over these years. In Aktobe, Kostanay, Kyzylorda, Mangistau, West Kazakhstan and Zhambyl Oblasts alone, there were more than 50 settlements with access to gas in 2016. By 2015, the modernization of the Shymkent gas distribution system, which started in 2009, was completed. As a result, the capacity of the system increased from 85 Mcm/hour to 258 Mcm/hour. In 2017, the Ministry of Energy provided funding of 500 million tenge to build local gas pipelines and link them up to the BBS line.

A significant share of energy commodities in Kazakhstan is transported by rail. The rail system in Kazakhstan is operated by the state-owned national railroad company Temir Zholy, and coal has represented more than one third of its freight tonnage in recent years. The coal transport is largely subsidized by profits on oil and oil products shipments, as they constitute the most profitable large volume freight segment. The rail shipments of oil and oil products rose steadily in the period 2005–2013, but this was followed by a sharp decline from 8.7 Mt in 2013 to 0.5 Mt in 2016, which was mostly caused by the decline in crude oil exports to the Black Sea and by expansion of the Caspian Pipeline Consortium. There was also a shift in oil-refining plants operations from exports of mazut (residual fuel oil) to supplying light oil products to the domestic market.

Oil pipelines that deliver crude oil to one of three existing domestic refineries (Atyrau, Shymkent and Pavlodar), and the Atyrau–Samara pipeline to the Russian Federation, date back decades. Recently constructed oil pipelines include the Caspian Pipeline Consortium pipeline from the Tengiz oilfields to the Russian port of Novorossiysk on the Black Sea, and the Kazakhstan–China oil pipeline, one of the world's longest, running 2,300 km from Kazakhstan's Caspian Sea shore to Xinjiang in China.

The plan to reverse the flow of the Atyrau–Kenkiyak oil pipeline section to increase exports to China has been delayed for several years. The reverse is planned for 2018–2019. The increase in exports would require oil shipments from western Kazakhstan and the netback (realized sales price after transportation) for this oil must not exceed that in the case of shipping to the West.

Electricity and heat production from fossil fuels and renewables

Between 2008 and 2017, total installed power capacity in the country increased by 2,680 MW, from 18,993 MW in 2008 to 21,673 MW in 2018 (table 10.6).

Around 87 per cent of the installed capacity comes from thermal power plants (TPPs) that use fossil fuels. While TPPs combust mainly coal, power sector coal consumption appears to have peaked in 2014 and the sector is gradually switching to gas consumption.

Since 2008, the capacity of gas turbines has increased by more than 700 MW, from 916 MW to 1,675 MW.

Table 10.6: Power generation installed capacity, MW, as of 1 January 2018

	MW	%
Thermal PP	**18 887.0**	**87.10**
of which:		
Steam turbines using	17 212.0	79.40
Coal	13 556.0	62.50
Gas and mazut	3 462.0	16.00
Others	194.0	0.90
Gas turbines	1 675.0	7.70
Hydro PP	**2 630.0**	**12.00**
including small HPP	152.0	0.70
RES other than hydro	**155.9**	**0.07**
of which:		
Wind	98.2	0.45
Solar	57.3	0.25
Biogas	0.4	
Total	**21 672.9**	**100.00**

Source: Ministry of Energy, 2018.

Since 2008, there has been progress in the development of renewable energy sources (RES). A number of wind, solar and small hydropower facilities have been commissioned. For example, in 2013 in Zhambyl Oblast, the "Kordayskaya wind power plant" was officially put into operation with installed capacity of 5.4 MW. In 2015, total capacity of this plant reached 21 MW. In 2015 in Zhambyl Oblast, the solar power plant "Burnoe" was commissioned with installed capacity of 50 MW.

Tables 10.7 and 10.8 present generation and consumption of electricity and heat production. Although the growth in the above-mentioned characteristics can be seen, it fluctuates.

In 2017, the main source of electricity and heat generation is TPPs, including gas turbines, accounting for 100 per cent of heat and more than 88 per cent of electricity. Around 80 per cent of the district heating capacity is based on coal combustion, 13 per cent uses gas and about 7 per cent uses heating oil. Data show a gradual switching from coal to gas consumption and a small but important change in power generated by RES.

Hydropower is the second largest electricity generation source (table 10.9). In 2017, HPPs were responsible for almost 11 per cent of nationally generated power. HPPs play an important role because they not only support a base load but are also used to fill peak demand. Since 2009, available HPPs capacity grew by 30 per cent, and although their production depends on seasonal water flows, HPPs increased their power generation from 6.8 GWh in 2009 to 11.158 in 2017, though in 2016, HPP generation was even greater, at 11.606 GWh.

Wind and solar sources together generated 0.43 per cent of generated electricity in 2017, a 13 per cent increase from 2016 (table 10.9). These recent developments show Kazakhstan's good intention to develop RES.

Oil refining

There are three main oil refineries, located in Atyrau, Pavlodar and Shymkent, with crude distillation capacity of 15.35 Mt per year (307,000 b/d), as well as some 30 mini-refineries.

These refineries have different product outputs due to their different refining configurations and the type of crude oil that they process (table 10.10). While all three main refineries have some conversion capacity, their output remains strongly directed to mazut and diesel fuel production. At the same time, domestic demand aims at light products (motor fuels). That causes Kazakhstan to export a large amount of its own mazut output and to import light products, mainly from the Russian Federation.

Table 10.7: Generation and consumption of electricity, 2008–2017, billion kWh

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Generation	80.0	78.4	82.3	86.2	90.2	91.9	93.9	90.8	94.1	102.4
Consumption	80.6	77.9	83.8	88.1	91.4	89.3	91.6	90.8	92.3	97.8
Net exports	0.6	-0.5	1.5	1.9	1.2	-2.6	-2.3	0.0	-1.8	-4.6

Source: Ministry of Energy, 2018.

Table 10.8: Generation of heat energy, 2010–2017, 1,000 Gcal

2010	2011	2012	2013	2014	2015	2016	2017
66 711	68 488	73 329	68 547	72 558	70 389	77 759	81 271

Source: Ministry of Energy, 2018.

Table 10.9: Developments in power generation, 2009, 2016, 2017

	2009		2016		2017	
	Billion kWh	%	Billion kWh	%	Billion kWh	%
Steam turbines	67.1	85.60	74.703	79.41	82.425	80.50
Gas turbines	4.5	5.74	7.407	7.87	8.373	8.17
Hydropower	6.8	8.66	11.606	12.34	11.158	10.90
Wind	0	0.00	0.274	0.29	0.338	0.34
Solar	0	0.00	0.086	0.09	0.090	0.09
Total	**78.4**	**100.00**	**94.076**	**100.00**	**102.384**	**100.00**

Source: Ministry of Energy 2018.

Table 10.10: Product output by three major refineries, 2012–2017, million t

	2012	2013	2014	2015	2016	2017
Atyrau						
Crude throughput	4 423	4 430	4 920	4 868	4 761	4 650
Motor gasoline	506	505	614	605	643	771
Diesel fuel	1 218	1 222	1 344	1 207	1 391	1 351
Jet kerosene	57	38	23	21	20	22
Benzene	-	-	-	1	7	8
Heating oil	143	124	166	160	68	81
Mazut	1 543	1 512	1 510	1 650	1 362	1 374
Vacuum gas-oil	606	652	779	739	842	518
Petroleum coke	75	95	137	111	121	116
LPG	14	20	28	29	36	34
Sulphur	1	1	2	3	3	3
Pavlodar						
Crude throughput	5 037	5 010	4 926	4 810	4 590	4 790
Motor gasoline	1 332	1 117	1 259	1 249	1 225	1 291
Diesel fuel	1 514	1 473	1 509	1 457	1 524	1 577
Jet kerosene	100	133	125	11	-	-
Mazut	810	763	668	822	560	732
Vacuum gas-oil	123	400	192	123	29	27
Petroleum coke	147	146	152	126	224	201
LPG	244	215	239	263	244	274
Sulphur	24	23	25	30	28	31
Bitumen	186	219	244	246	202	132
Shymkent						
Crude throughput	4 754	4 857	5 065	4 493	4 501	4 360
Motor gasoline	1 046	1 038	1 126	988	1 032	948
Diesel fuel	1 336	1 376	1 346	1 192	1 203	1 145
Jet kerosene	275	231	279	254	236	220
Mazut	902	968	1 013	889	869	872
Vacuum gas-oil	798	827	884	827	811	782
Petroleum coke	146	148	142	113	120	106
LPG	-	-	-	-	1	0
Sulphur	-	-	-	-	-	-

Source: Kazenergy National Energy Report 2017.

Exports and imports of refinery products reflect challenges related to the ongoing modernization programme: exports of low-value-added heavy products and import of more expensive light products. Total exports were 3.9 Mt in 2016 – the lowest level since 2008. Total imports were 1.9 Mt in 2016 – there is a declining tendency since the 2013 peak of 2.5 Mt. Data on imports of gasoline show a decrease to 1.1 Mt in 2016 in comparison with the previous four years.

10.2 Trends in energy balance

In 2015, the diversity of energy supply was concentrated in fossil fuels, with some hydropower (table 10.11).

Table 10.11: Energy balance, 2015, ktoe on a net calorific value basis

Supply and consumption	Coal	Crude oil	Oil products	Natural gas	Hydro	Geothermal /solar/etc	Biofuels/ waste	Electricity	Heat	Total
Production	47 110	82 733	-	33 350	797	15	70	-	-	**164 076**
Imports	590	75	1 818	4 887	-	-	7	139	-	**7 517**
Exports	-13 649	-65 179	-4 402	-10 655	-	-	-	- 139	-	**-94 022**
Intl. marine bunkers	-	-	- 97	-	-	-	-	-	-	**- 97**
Intl. aviation bunkers	-	-	- 316	-	-	-	-	-	-	**- 316**
Stock changes	188	429	451	- 132	-	-	-	-	-	**935**
TPES	**34 239**	**18 059**	**-2 546**	**27 450**	**797**	**15**	**77**	**0**	**-**	**78 093**
Transfers	-	-1 363	1 363	-	-	-	-	-	-	**-**
Statistical differences	-5	47	372	- 249	-	-	-7	27	378	**563**
Electricity plants	-	-	-	-	- 797	- 15	-	813	-	**-**
CHP plants	-18 731	-	- 437	-4 853	-	-	-	8344	9 747	**-5 931**
Blast furnaces	- 775	-	-	-	-	-	-	-	-	**- 775**
Coke/pat. fuel/BKB/PB plants	-1 929	-	-	-	-	-	-	-	-	**-1 929**
Oil refineries	-	-14 943	13 454	-	-	-	-	-	-	**-1 489**
Energy industry own use	- 458	- 908	- 365	-18 625	-	-	-	-2 873	-3 035	**-26 265**
Losses	-1 759	- 392	- 23	- 536	-	-	-	- 446	- 697	**-3 852**
TFC	**10 582**	**499**	**11 820**	**3 186**	**-**	**-**	**70**	**5 865**	**6 393**	**38 416**
Industry	**7 741**	**499**	**3 344**	**1 786**	**-**	**-**	**-**	**3 879**	**1 892**	**19 141**
Iron and steel	2 385	-	482	303	-	-	-	908	1 208	**5 286**
Chemical and petrochemical	26	-	23	342	-	-	-	248	133	**771**
Non-ferrous metals	1 002	-	302	182	-	-	-	701	12	**2 199**
Non-metallic minerals	13	-	238	-	-	-	-	152	-	**403**
Transport equipment	2	-	1	6	-	-	-	5	13	**27**
Machinery	21	-	46	13	-	-	-	18	36	**134**
Mining and quarrying	455	-	45	633	-	-	-	493	147	**1 773**
Food and tobacco	48	-	61	247	-	-	-	113	128	**597**
Paper pulp and printing	0	-	2	17	-	-	-	5	16	**40**
Wood and wood products	2	-	1	1	-	-	-	3	4	**11**
Construction	36	-	1 618	36	-	-	-	48	38	**1 777**
Textile and leather	1	-	2	7	-	-	-	8	1	**20**
Non-specified	3 749	499	522	-	-	-	-	1 177	156	**6 103**
Transport	**36**	**-**	**5 005**	**-**	**-**	**-**	**-**	**307**	**-**	**5 349**
Domestic aviation	-	-	61	-	-	-	-	-	-	**61**
Road	-	-	4 561	-	-	-	-	10	-	**4 571**
Rail	-	-	87	-	-	-	-	65	-	**152**
Pipeline transport	-	-	-	-	-	-	-	41	-	**41**
Domestic navigation	-	-	9	-	-	-	-	-	-	**9**
Non-specified	36	-	287	-	-	-	-	192	-	**515**
Other	**2 805**	**-**	**3 245**	**1 105**	**-**	**-**	**70**	**1 678**	**4 501**	**13 404**
Residential	1 931	-	1 998	313	-	-	70	1 038	2 059	**7 409**
Comm. and public services	760	-	804	769	-	-	-	572	1 405	**4 310**
Agriculture/forestry	114	-	443	23	-	-	-	68	82	**730**
Fishing	-	-	-	-	-	-	-	0	0	**0**
Non-specified	-	-	-	-	-	-	-	-	955	**955**
Non-energy use	**-**	**-**	**226**	**295**	**-**	**-**	**-**	**-**	**-**	**522**
in industry/transf./energy	-	-	226	295	-	-	-	-	-	**522**
of which: chem./petrochem.	-	-	-	295	-	-	-	-	-	**295**
Electricity and heat output										
Electricity generated (GWh)	76 198	-	1 239	19 583	9 269	179		-	-	**106 468**
Electricity plants	-	-	-	-	9 269	179		-	-	**9 448**
CHP plants	76 198	-	1 239	19 583	-	-		-	-	**97 020**
Heat generated (TJ)	400 521	-	7 626	-	-	-		-	-	**408 147**

Source: International Energy Agency, 2018.

The total primary energy supply (TPES) has increased from 69.86 million t of oil equivalent (Mtoe) in 2008 to 78.09 Mtoe in 2015, with a peak of 81.54 Mtoe in 2013. The development of local fuels such as coal, oil and gas is a goal of national energy policies. Therefore, fossil fuels continue to play a dominant role. Supply and consumption of coal has seen almost no change (34.76 Mtoe of primary energy supply in 2008 to 34.23 Mtoe in 2015, with a peak of 37.48 Mtoe in 2013). Primary energy supply of natural gas increased by almost 30 per cent, from 21.34 Mtoe in 2008 to 27.45 Mtoe in 2015. Crude oil followed a similar trend, with an increase from 14.82 Mtoe in 2008 to 18.06 Mtoe in 2015. The share of coal is 30 per cent of total consumption; this is followed by oil (22 per cent), heat (16 per cent) and electricity (14 per cent).

According to the International Energy Agency, energy consumption by the industrial sector at the end of 2015 made up half of the total final energy consumption (TFC) (50 per cent, or 19.141 Mtoe). The housing sector of the economy accounted for 19 per cent of total consumption and the transport sector for a little less than 14 per cent.

10.3 Environmental pressures

Extraction of energy sources

While Kazakhstan produces a significant amount of fossil fuels, the production of coal, gas and oil can cause severe damage to the environment. Worldwide analysis shows that all fossil fuels extraction operational activities, such as geological and geophysical surveys, drilling and production activities, decommissioning of installations, gas and oil transportation and gas and oil processing, as well as accidental oil spills, have environmental effects. These activities have an environmental impact on air, surface water and groundwater, soil, wildlife and human health.

Open-pit mining

The main type of mining in Kazakhstan is surface mining. Extraction of coal by open-pit mining requires the removal of vegetation, soil and rock (overburden) from above the coal. Removal of overburden and coal mining requires drilling and blasting as well as the operation of different types of equipment/machines, which cause dust impact on the environment. For surface mines, the main environmental problems are large-scale land use, overburden removal and disposal, disturbance of hydrology, acid mine drainage and fugitive dust.

The overburden has traditionally been dumped in piles around the mines, which can be 50 m high and are exposed to weather conditions that lead to environmental hazards. This refuse often contains enough coal to burn after piling up and will often internally combust and burn slowly for years. Since these mounds of overburden are quite dense, the interior may burn, while the top and outer levels are exposed to rain. The rains leach toxins into the groundwater system, contaminating the drinking water and eventually finding their way into neighbouring areas. The toxins that are released through fires are major contributors to air contamination and are returned to the ground by rains to contaminate crops consumed by forage animals, which are eventually consumed by humans. In addition, during the summer, which is typically hot and dry, the outer layer of these mounds dries out and the wind spreads the dust throughout Kazakhstan, where the dust and its toxins are inhaled by people.

Underground mining

For underground mines, the environmental-impact-related problems are mine water drainage, methane emissions and fugitive dust. If not managed correctly, any of these could adversely affect the health and livelihood of the poor and vulnerable groups living near mining operations. Underground coal mining causes a significant amount of coal bed methane (CBM) emissions in Kazakhstan. The methane content in the coal seams of the Karaganda basin is estimated to be about one trillion m^3. Annual CBM emissions reach several hundred million m^3 and could be used for power generation.

However, commercial CBM development is relatively expensive, and depends on various economic, technical and geological conditions, such as depth, permeability and seam thickness and proximity to gas processing facilities and pipelines, as well as gas prices. Methane recovery from underground mines is a technologically complicated process. In addition, it is not an environmentally friendly procedure because reduction of pressure for gas extraction by dewatering of coal seams generates a significant amount of saline water that must be processed or disposed of. Taking into account the water scarcity in Karaganda Oblast and all other above-mentioned challenges, CBM recovery may not be an option from both an economic and environmental point of view.

Oil industry

The main pollutants released by the oil industry are carbon mono- and dioxide, nitrogen oxides, sulphur compounds, methane, methanol and volatile organic compounds (VOCs).

Flaring (the burning of associated petroleum gas in an open flame at production sites) has long been part of the process of hydrocarbon extraction worldwide, including in Kazakhstan. It used to be one of the main sources of oil industry pollution. In Kazakhstan, the volume of gas flaring has declined dramatically. While in 2008 gas flaring was around 3 Bcm, this had decreased to 1 Bcm (out of 46 Bcm total gas production) in 2016. While some associated petroleum gas is consumed for own use, such as reinjection to maintain reservoir pressure, heat and electricity generation, the limited market and low prices for commercial gas, especially in remote areas, result in some gas still being flared.

Waste is also generated in oil production and processing. Usually, this waste contaminates the adjacent land. It harms flora and fauna and affects human health. Around 200,000 ha of land in Kazakhstan are polluted by oil products.

There have been several cases of accidental contamination:

- On 16 July 2010, there was a gas leakage on the well of “Ozenmunaigas” in Zhanaozen town in Mangistau Oblast. The leakage was caused by a crack in the production string.
- On 20 September 2010, an oil and gas leakage happened on Zhetybay oilfield in Mangistau Oblast. An area of about 200 m^2 was polluted.
- On 20 February 2013, a gas leakage from tank cars was registered on Zhambyl railway station in Zhambyl Oblast.
- On 24 September 2013, two weeks after the Kashagan oilfield exploitation started, a gas leakage was registered. After the leakage was reported to be fixed, another one was registered and oil development was suspended until the cause of the accident had been clarified. The leakage was caused by sulphide stress corrosion of the pipes.

With potential oil and gas production expected to increase in the coming years, the risk of oil spills and other leakages would increase in the Caspian Sea shelf region of Kazakhstan. The Caspian Sea is a closed sea, meaning that pollution in the Sea itself, and that coming from ships and run-off from industrial sources, can remain in the area for decades.

Oil and gas pollution is one of the major causes of the environmental degradation of the Caspian Sea due to the accumulation of hydrocarbons, heavy metals and other toxins associated with oil and gas production. The Kashagan oilfield is located within a protected area where there is habitat for sturgeons and Caspian seals. The combination of shallow water (2–10 m depth) and extreme weather conditions (from -40°C to +40°C) creates a situation in which oil and gas production and transport cause a high risk of environmental impact. The greater volume of tanker traffic from Bautino Port is also a serious concern because, in the event of a spill, the destruction to the natural environment would be devastating.

The 2015 National Plan for the Prevention of Oil Spills and Response to them in the Sea and Inland Waters (2015 Order of the Minister of Energy No. 134) is rather declarative. In the case of a third-level spill (over 250 t), an oil film would have covered the entire North Caspian surface before a response team could arrive and do something about it.

The 2017 Crude Accountability report describes a dispute, which erupted in 2012, when the Atyrau Oblast Department of Ecology refused to authorize the planned amounts of hazardous emissions at Islands A and D and at Bolashak, because they exceeded by several times the estimates produced at the EIA stage. Emissions from Bolashak, instead of the authorized 2,000 t, were expected to reach 78,000 t in 2013. The main reason for excessive planned emissions was gas flaring, which the company had added to the originally approved design in violation of applicable law, which required a new EIA in the case of a change in project design. The report also provides information on other environmental concerns related to Kashagan.

Detailed data on sources, types and volumes of pollution and waste discharges during oil and gas activities, which would allow the Government to develop the necessary preventive measures, are lacking. In order to develop a more comprehensive assessment of the oil industry’s impact on the environment, the collection of detailed information from all enterprises is crucial.

Uranium extraction

Uranium mining has the potential to cause environmental impact on surface water and groundwater, soil, air and biodiversity. The impact of uranium extraction depends on site-specific characteristics, the accuracy of the monitoring programme in providing early warning of potential contaminants, and efforts to mitigate and control potential impacts.

According to the 2017 Kazenergy National Energy Report, almost 99 per cent of all current mining of uranium ore in Kazakhstan is carried out from sedimentary (sandstone) rocks using the in situ leaching (ISL) mining process. The ISL method has a clear advantage over traditional ore mining methods (mining and quarrying). Since the reserves are extracted without eliminating the surrounding rock (cap rock), expenditures on ore extraction (excavation) and mining are significantly reduced or even eliminated altogether, while operating costs are minimal.

Although some environmental impacts are minimized, such as there being no need for large uranium tailings, the productive solution (containing the leaching agent and wastewater) has to be disposed of after the initial treatment.

The productive solution (after refortification using an oxidizing agent and a complexing reagent) is pumped back to the injection wells for reuse (i.e. reinjection into the ore body). This makes it possible to significantly reduce the consumption of water and sulphuric acid. The part of solution that is not pumped into the ore body (a small amount of the solution is poured off to maintain pressure difference at the wellhead) is to be disposed of as waste, since it contains various dissolved components. Such wastes are disposed of at special landfills (in particular, in wells for the burial of waste in the depleted part of the ore body).

One of the challenges in terms of environmental protection in the application of ISL is to prevent contamination of groundwater located at a distance from the ore body and aquifers. In Kazakhstan, this is facilitated by maintaining a pressure differential at the wellhead, ensuring a uniform flow to the deposit or ore body from the nearby aquifer and preventing drilling fluids from entering the surrounding (undeveloped) area. Groundwater quality analysis is performed through control wells. In this context, groundwater pollution is minimized. Once the production is completed using ISL technology, wells are sealed. The quality of the groundwater in the field is subject to recovery to the level specified by the standard, determined prior to production. After decommissioning, measures are taken to ensure radiation safety, even though most of the radioactive ore body lies at great depth.

Electricity and heat production

Power plants

Approximately 75 per cent of the electricity is produced using coal mined in Kazakhstan. However, much of the coal is of poor quality and has high ash content. Coal combustion causes emissions of sulphur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), particulate matter less than 10 microns (PM), carbon dioxide (CO_2) and VOCs. Most coal deposits have high moisture content and relatively low heating values, as well as high ash. The latter means that their combustion is associated with substantial emissions of particulate matter. The ash content of Ekibastuz coal is particularly high (40–45 per cent), and the specific structural properties of the coal have rendered its enrichment uneconomic to date.

In 2016, power plants were responsible for about 52.04 per cent of SO_2 emissions and 35.76 per cent of NO_2 of stationary sources (table 6.6). The amount of fly ash, SO_2, NOx and CO emitted from boilers depends on equipment design, combustion modus operandi and the quality of the fuel. For example, the high ash content of Ekibastuz coal, consumed by the largest power plants, causes challenges for fly ash capture. The average fly ash removal rate is rather low, at about 96 per cent.

Emissions of the main pollutants have not changed significantly during the period 2014–2016 (table 10.12). Some reduction of emissions in 2015 can be explained by a decline in power generation (table 10.7).

Table 10.12: Main emissions from TPPs, 2014–2016, t

	2014	2015	2016
PM	175 831	152 711	151 465
SO_2	341 359	304 359	337 910
CO	190 417	165 601	174 363
NOx	130 559	121 935	128 445

Source: Ministry of Energy, 2018.

Emission limit standards for power plants are rather high in Kazakhstan (table 6.10). In Kazakhstan, the range of PM emission limit standards for coal-fired power plants are 600–1,600 mg/m^3 for existing plants and 100–500 mg/m^3 for new ones. Both exceed by several times the level established by the EU of 10–20 mg/m^3 (Directive 2010/75/EU).

SO_2 emission limit standards (2,000–3,400 mg/m^3 for existing plants and 700–1,800 mg/m^3 for new plants in Kazakhstan) are also much higher than in the EU (150–400 mg/m^3 under Directive 2010/75/EU). Similarly, NOx emission limit standards (500–1,050 mg/m^3 for existing plants and 300–640 mg/m^3 for new plants) are higher than in the EU (150–300 mg/m^3).

Another key issue is that, while the EU Directive 2010/75/EU sets more stringent emission limit standards as a condition for receiving a new permit for a new plant or reapplying for a permit for an existing plant, the approach in Kazakhstan sets more stringent emission limit standards for new plants, somewhat less stringent emission limit standards for existing plants after modernization and relaxed emission limit standards for existing plants before modernization. However, existing plants are not required to undergo modernization as a condition for obtaining a new permit. In other words, existing plants can continue to receive permits while operating with relaxed emission limit standards.

TPP operation requires a significant amount of water, mainly for cooling. In addition, ash and slag wastes are transported to dumping sites via a hydraulic ash-handling system, which prevents negative impact of ash wastes on the environment during transportation. Both cooling and ash removal cause release of wastewater. Cooling water is responsible for thermal pollution because its temperature is 8–10 degrees above the source water and it can damage the flora and fauna of the adjacent water basin.

Approximately 4 t of ash and slag is produced for every 10 t of coal burned. This mineral matter, which is removed by wastewater, contains arsenic, boron and other heavy metals. Ash and slug waste is dumped in piles around the power plants. These piles of refuse are subject to the same fires and rains and the same resultant problems as the overburden mounds produced during open-pit mining.

TPPs do not have an industrial wastewater treatment facility and the wastewater is discharged into municipal sewerage systems.

One of the major environmental concerns, which directly affects human health, is air pollution in Almaty City. This is linked, among other sources, to the operation of three CHP plants located in the city (box 10.1).

Wind and solar

While wind and solar units do not produce air emissions, they require a large area for installation, which affects biodiversity and animal habitats.

Hydropower

HPPs have traditionally been considered environmentally friendly because they use a renewable energy source. They are also considered a clean source of energy because they do not generate emissions or waste materials. However, hydropower has environmental impacts since the construction of dams and creation of artificial water reservoirs behind them affects a river's ecosystem and habitats.

Specific ecosystem impacts caused by a specific HPP mostly depend on the following variables: water volume and water flow rate of the river where the HPP is located; climatic and habitat conditions; the type, size, design, and operation of the HPP; and whether cumulative impacts occur depending on the upstream or downstream location of the HPP vis-à-vis other facilities.

The formation of big water reservoirs can slow down the water flow and increase water surface temperature because slower water absorbs more heat from the sun. It causes a more pronounced stratification effect – the coldest water at the bottom and warmest on the surface. If the water abstracted for power generation purposes is coming from the bottom, where it is colder and consequently has less oxygen, it affects the river's ecosystem and habitats downstream.

Box 10.1: Almaty CHP plants

There are three CHP plants located in Almaty. Although CHP plants are not the main source of emissions, considering the high level of air pollution in Almaty, mitigating air emissions from CHP plants would improve air quality in Almaty to a certain extent. One of the plants, CHP plant-1 (145 MWe and 960 MW heat), is situated in the heart of the city. CHP plant-3 (173 MWe and 960 MW heat) has a connection with 220 kV power lines around the city, with two 500 kV substations.

Given the topology of the existing thermal and electric lines, generating capacities can be moved out of the city. One solution would be to use CHP plant-1 as a source of peak-load heat energy. This is technically possible due to the availability of heat pipelines connecting CHP plant-1 and CHP plant-2 (510 MWe and 2,940 MW heat). Thus, CHP plant-1 would become a central heat-dissipating point while CHP plant-2 would supply base-load heat energy and power.

The replacement of coal-fired generation in the three CHP plants by a steam-gas combined cycle would also improve air quality. This solution is technically available with application of the existing 110 kV substation, which has connections with 220 kV and 500 kV substations. Thus, CHP plant-2 would be able to supply energy to CHP plant-1, which would cover heat supply of the central and eastern parts of Almaty, while CHP plant-2 would cover the western part of the city.

The suggested measures would allow existing power and heat demand to be secured and, at the same time, perform a shift toward cleaner fuels. It is expected that annual gas consumption by the power industry in Almaty could grow by about 2 billion m^3.

A dam, as an artificial wall, causes sedimentation – a deposit of fine organic and inorganic materials that are typically suspended in the water. After a time, sediments support an expansion of living organisms fed by nutrients from these sediments. Since these organisms use oxygen, their growth depletes the supply of oxygen in the reservoir. At the same time, less sediment and hence less organic and inorganic nutrient material is provided to downstream habitats.

While all these factors can have an impact on the environment, they vary greatly from project to project. For each HPP, the impact needs to be carefully examined. Such examination should identify which plants, fish and wildlife are affected. Some species may end up doing quite well, while others might decline sharply or completely and some are minimally affected.

While the impact of any dam depends on various technical and natural factors, the impact can be significantly reduced by technological and operational enhancements of the HPP. Such enhancements may include installing fish passage, using minimum flow turbines, reregulating weirs and having pulsed operation at peak efficiency. Also, a variety of techniques exist for moving non-contaminated sediments downstream.

Transportation

The construction of pipelines always raises issues around the protection of the land and water basins in the areas through which the pipelines will pass. In general, pipelines are the safest and most efficient method of moving fossil fuels, and Kazakhstan has a good safety record in this area. However, even properly maintained and modern pipelines can have oil spills. The pipeline system is very important for the national economy since it also delivers oil and gas to some TPPs and customers, as well as delivering oil to refineries.

Many pipelines cross water bodies, which means that, for many of these crossings, those constructing the pipeline have to dam the stream, lay the pipeline underneath the stream or divert water away from the area where the pipeline will be installed. And because these pipelines are often slated to go through rural parts of the country, one of the concerns of residents is that the pipeline and noisy compressor stations that can accompany it would disrupt their way of life and disturb the environment.

Transportation via pipelines or tankers across the Caspian Sea creates environmental problems. If oil and natural gas production in the Caspian Sea is increased, it will inevitably result in the construction of infrastructure to export these resources to consumers, raising the possibility of loss of habitat for marine life as well as the spectre of accidental spills. The possible threats in terms of oil discharge in offshore operations are posed by loss of well control, pipeline leaks, tanker leaks, tanker accidents and release of bunker oil.

Transportation of gas and, especially, oil raises the possibility of loss of biodiversity and habitats. Kazakhstan follows international guidelines and practice on the management of risk of spills from pipelines. The greatest possible threats of oil discharge in operations are posed by pipeline leaks and release of bunker oil.

Since 2009, the following oil spills have taken place:

- On 27 February 2009, an oil spill occurred 18 km from Atyrau on the 179th kilometre of the Tengiz–Novorossiysk pipeline. About 47 m^3 of oil were collected at the accident site.
- On 19 June 2010, there was an oil spill in Mangistau Oblast on the field pipeline of "Mangistaumunaigaz". The volume of oil spilled was about 50 m^3 and the polluted area exceeded 500 m^2. The leakage was stopped within an hour.
- On 16 January 2015, an oil spill was discovered on the Martyshy–Atyrau pipeline 10 km from Atyrau. The leakage was caused by an illegal branch joint to the pipeline.
- On 15 January 2018, an oil spill occurred on the Uzen–Atyrau–Samara pipeline in Atyrau Oblast. Adjacent snow-covered ground, polluted by oil, was collected, and reclamation of the land affected by the accident was undertaken.

Oil refineries

Refineries are sources of air, water and soil pollution. According to data from the Ministry of Energy, concentrations of air pollutants do not exceed the limit around the existing refineries. Generated waste from the plants undergoes a full cycle of deep cleaning at the cleaning facilities, including the units of mechanical, physical and chemical, and biological purification. Refineries carry out self-monitoring that ensures continuous control over emissions into the air and discharges to surface waters, with further analysis of air and water basins. The extent of purification of generated waste of the refineries is similar to parameters at many industrial enterprises in Western Europe and the United States of America.

10.4 Energy intensity and efficiency by end use

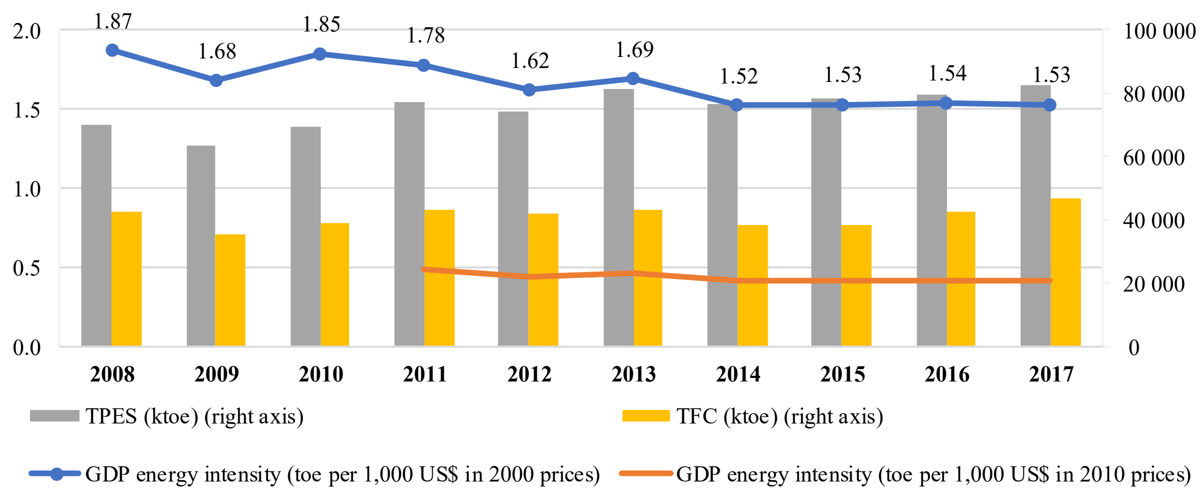
For several reasons, such as the cold climate, the many energy-intensive industrial enterprises and the considerable length of the transport infrastructure, the amount of energy consumed per unit of GDP (energy intensity) in Kazakhstan is much higher than in developed countries. By 2017, the energy intensity of Kazakhstan's GDP, expressed in toe per US$1,000 in 2000 prices, had decreased by 18.18 per cent from the 2008 level (figure 10.1).

The final energy consumption of the industrial sector declined by 6.03 per cent, from 53.0 per cent in 2008 to 49.8 per cent in 2015 (table 10.13). The industrial sector was responsible for half of the TFC in 2015. The residential sector accounted for 19.3 per cent of total consumption in 2015, showing growth since 2008. The transport sector accounted for about 14 per cent in 2015, with some growth since 2008. The commercial and public services sector showed fluctuations and was responsible for about 11 per cent of TFC in 2015.

The high share of industry in TFC is caused by the operation of the most energy intensive facilities in the national economy – metallurgical factories, such as the copper smelting factories in Balkhash and Dzezkazgan, titanium-magnesium and lead-zinc factories in Ust-Kamenogorsk, lead factory in Shimkent, ferroalloy factory in Aksu, alumina and aluminum factories in Pavlodar, and ferro-metal factory in Temirtau. Oil refineries and gas processing plants, the mining industry, chemical plants, and heavy machine-building and construction materials enterprises also consume a lot of energy resources, primarily electricity. The electricity consumption of the industrial sector, including the power sector, accounts for around three quarters of total national electricity consumption. All industrial enterprises, with the exception of some new projects, have significant capacities for energy savings.

Enterprises were required to implement the energy management system ISO 500001; however, in 2015, this requirement was removed from the 2012 Law on Energy Saving and Energy Efficiency Improvement. Currently, some enterprises are implementing ISO 500001 on a voluntary basis.

Figure 10.1: Energy intensity, 2008–2017



Source: Committee on Statistics, 2018.

Table 10.13: Sector-based final energy consumption, 2008, 2010, 2012, 2014–2015

	2008		2010		2012		2014		2015	
	ktoe	%	ktoe	%	ktoe	%	ktoe	%	ktoe	%
Industrial	22 514	53.0	20 907	53.9	22 752	54.6	18 038	47.1	19 141	49.8
Transport	4 993	11.8	4 751	12.3	5 238	12.6	4 883	12.8	5 349	13.9
Other, including	14 519	34.2	12 644	32.6	12 875	30.9	14 513	37.9	13 404	34.9
Residential	5 415	12.7	6 238	16.1	7 300	17.5	8 184	21.4	7 409	19.3
Commercial and public services	5 992	14.1	3 400	8.8	2 469	5.9	3 798	9.9	4 310	11.3
Non-energy use	466	1.0	479	1.2	821	1.9	831	2.2	522	1.4
Total	**42 492**	**100**	**38 781**	**100.0**	**41 686**	**100.0**	**38 265**	**100.0**	**38 416**	**100.0**

Source: International Energy Agency, 2018.

The residential sector is the second largest consumer and responsible for almost one fifth of TFC. Energy consumption from the commercial and public services sector demonstrated significant fluctuation, accounting for 14.1 per cent in 2008, 5.9 per cent in 2012 and 11.3 per cent in 2015. Residential, commercial and public buildings consume a significant amount of electricity and heat, as well as gas. Energy efficiency of buildings is an indicator of national performance. UNDP performed an energy audit of buildings, which showed that average residential energy consumption in Kazakhstan is 270 kWh/m^2. This exceeds consumption in Europe (100–120 kWh/m^2) as well as in the Russian Federation (210 kWh/m^2). The main causes are the cold climate and high level of heat loss due to insufficient thermal insulation. About 75 per cent of the buildings in Kazakhstan were built between 1950 and 1990 and do not meet modern energy efficiency standards. There is great potential to decrease heat loss and electricity consumption by lighting in the residential, commercial and municipal sectors.

The transport sector consumes 12–14 per cent of TFC. Although there are some vehicles that use electricity and natural gas in Kazakhstan, the primary fuel consumed is benzene. The poor quality of motor fuel and obsolete condition of the motor vehicle fleet cause low energy efficiency in the transport sector.

Although the 2013 Programme "Energy saving-2020" (2013 Resolution of the Government No. 904, invalidated in 2016) established a target of a 40 per cent reduction of GDP energy intensity by 2020, it is unlikely that this target will be achieved. However, energy efficiency has become one of the national policy priorities in Kazakhstan. The most important recent achievement in energy savings policy in the country is the decline in the market share of incandescent light bulbs, from 74 per cent to 18 per cent of the total number of bulbs, between 2012 and 2016.

The Ministry for Investments and Development conducts an annual assessment of activities on energy saving and energy efficiency measures. According to the 2017 assessment, work on energy saving in the oblasts is conducted at a low level. In 2016, only eight oblasts showed an average performance result (Akmola, East Kazakhstan, Kostanay, Kyzylorda, Mangistau, Pavlodar, South Kazakhstan and West Kazakhstan Oblasts), while the remainder have "low" performance.

On average, since 2012, the capital, City of Almaty and Almaty Oblast have completed only 50 per cent of the energy audits, Akmola Oblast 70 per cent, North Kazakhstan Oblast 62 per cent and Pavlodar Oblast 66 per cent, and in all other oblasts this figure does not exceed 50 per cent.

In 2017, integrated energy efficiency programmes were developed in the capital, Almaty Oblast and Zhambyl Oblast. By 2017, integrated energy efficiency programmes were approved in the City of Almaty and in 12 oblasts (Akmola, Aktobe, Atyrau, East Kazakhstan, Karaganda, Kostanay, Kyzylorda, Mangistau, North Kazakhstan, Pavlodar, West Kazakhstan and South Kazakhstan).

The Electric Power and Energy Saving Development Institute (Kazakhenergoexpertise) carried out an energy audit of industrial enterprises and public facilities in the period 2014–2016. The results indicated that the energy-saving potential nationwide amounts to 17.2 million t of fuel equivalent, while measures currently under development will reduce annual energy consumption by 4.9 million t of fuel equivalent, assuming an investment of about 363.5 billion tenge (US$1.1 billion).

The 2014 Review of the National Policy in the Area of Energy Saving and Energy Efficiency (Energy Charter and Kazenergy report) provides detailed analysis of key problems and barriers to achieving the targets of "Energy saving-2020". Although this analysis was carried out in 2014, the results are still relevant. It is worth highlighting one of the barriers because this topic does not require investment, which is a barrier in many other areas, and has been mentioned in various reports, including ECE reports. The current municipal budget regulations do not allow municipalities to keep savings resulting from energy efficiency improvements. This creates a barrier to the use of new institutional and financial mechanisms and structures, e.g. energy service companies (ESCOs) and public–private partnerships for developing, financing and implementing energy efficiency investments.

In public sector buildings, the problem is caused by the budgeting process undertaken by the government authorities: public buildings receive an annual budget allocation for running expenditures. Should the building administration implement energy efficiency improvements, it is not allowed to keep the resulting savings from its administrative budget; these have to revert to the Government. The budget allocation for next year will even be reduced by the amount saved through the implementation of energy efficiency measures. Therefore, the building administration is not interested in energy efficiency improvement since the implementation of energy efficiency improvements in fact results in a decreased budget allocation.

Energy efficiency improvement on a national level is critical from the environmental protection and economy point of view. The implementation of energy efficiency measures could reduce energy consumption and, therefore, increase energy exports potential, make industries more competitive and decrease emissions of many pollutants and GHGs.

10.5 Alternative energy sources

Renewable energy development

The 2012 Strategy "Kazakhstan-2050" anticipates that natural gas reserves will be used as a bridge between coal and alternative sources (renewables and nuclear) for electricity generation. Renewable and alternative energy sources are planned to provide 50 per cent of national power production by 2050.

As of April 2018, according to the Minister of Energy, there are 58 renewable energy installations or around 1 per cent of installed capacity. By 2020, the Government expects to achieve 2,000 MW RES installed capacity, including 960 MW wind power, 750 MW solar power and 290 MW hydropower. It is expected that the share of RES will increase up to 3 per cent of the total output in 2020, and up to 50 per cent in 2050.

The Strategic Plan of the Ministry of Energy for the period 2017–2021 (2017 Order of the Minister of Energy No. 490) aims at systematic RES development and at eliminating the risk of a surplus of RES in the country. The Plan explicitly recognizes that the Ministry should take restrictive measures for RES development in the long term, so that they would not exceed 3 per cent of total electricity production by 2020 and 10 per cent by 2030. The Plan stresses the need to take into account the integration of renewable energy in the Unified Power System of Kazakhstan.

Purchase and sale of electrical energy produced from RES and supplied to the electricity grid of the unified power system is carried out by the Financial Settlement Centre of Renewable Energy LLP. The Centre was created according to the 2013 Law on Amendments to Legislation in Support of the Use of Renewable Energy.

Kazakhstan introduced the system of feed-in tariffs, applied by the Financial Settlement Centre for purchase of electricity generated by RES (table 10.14). Feed-in tariffs were defined by the 2014 Resolution of the Government No. 645. There is also a renewable energy support tariff for the sale by the Financial Settlement Centre of electricity produced by RES. The renewable energy support tariff for 2018 is 26.98 tenge/kWh.

Photo 10: Ereymentau

Table 10.14: Tariffs for renewable energy

Renewable energy technology	Tariff (tenge/kWh)
Wind power stations, with the exception of a feed-in tariff for the project of the Expo-2017 power station with a capacity of 100 MW, for wind power conversion	22.68
Expo-2017 100 MW wind power station	59.70
Photovoltaic solar energy converters, with the exception of feed-in tariffs for solar power plant projects using photovoltaic modules based on Kazakhstani silicon (Kaz PV), to convert the energy of solar radiation	34.61
Small hydro	16.71
Biogas	32.23

Source: 2014 Resolution of the Government No. 645, as amended in 2015.
Note: Without VAT.

In 2017, the Government decided not to proceed with the feed-in-tariff in the near future (2017 Resolution of the Government No. 925) but to switch to an auction system to increase transparency as well as decrease uncertainty for investors, as feed-in-tariffs were set in local currency without a mechanism to adjust the tariffs to inflation.

The system of international auctions is expected to provide more transparency and improve competition in the implementation of RES projects. In 2018, Kazakhstan organized tenders for 1,000 MW of production capacity (chapter 3).

While Kazakhstan has set targets on renewable energy development, a clear roadmap to achieve these targets is not available. The 2013 Action Plan for Development of Alternative and Renewable Energy Sources for the period 2013–2020 (2013 Resolution of the Government No. 43) was invalidated in 2017. Considering the long lead times required for the turnover the electricity generation capacities, the near-term strategy would involve "mixed energy production", which means that renewable capacities would be built in parallel with continued reliance on fossil fuel. According to IHS Markit projections, non-fossil fuels will account for 18 per cent of electricity generation in Kazakhstan by 2040. Nevertheless, the lack of a clear roadmap towards RES development is clearly felt.

Nuclear energy

Kazakhstan has been declaring its interest in nuclear power plant construction for many years.

There are several advantages in a potential nuclear power plant project: nuclear fuel is produced nationally, there are no emissions of GHG or other harmful substances, advanced nuclear power production has a very tiny radiation impact (less than coal combustion), and only a small volume of radioactive waste is generated during operation and can be stored in remote and safe areas.

As with all energy sources, pollution is associated with supporting activities, such as mining, manufacturing and transportation. Also, in nuclear power plant daily operations, health risks are much lower than those associated with operating coal combustion power plants. However, there is a risk of releasing large quantities of fission products into the environment in the event of an accident. The construction and operation of a nuclear power plant can potentially have environmental impacts associated with this type of development. It is important to ensure compliance with the international standards of power plant construction and operation and make the compliance strategy known to all stakeholders.

Therefore, the application of internationally adopted standards, taking into consideration recommendations of the IAEA in respect of design, siting, operational safety, radiation safety and safe management of radioactive waste, is indispensable, to provide necessary safeguards to reduce environmental and health risks.

However, considering the current surplus of power generation capacities, there are no economic incentives to invest in a new, expensive and long-term project.

10.6 Adaptation to climate change and mitigation measures in the energy sector

Political measures being implemented by Kazakhstan are aimed more at mitigation of climate change than at adaptation to it. The draft law on modifications and amendments in some legal acts concerning adaptation to climate change consequences is under development.

Within the Kyoto Protocol, the country undertook to limit the volume of emissions to a level that does not significantly exceed the emissions level of 1990. In 2015, Kazakhstan submitted its Intended Nationally Determined Contribution (INDC), having expressed readiness to reduce emissions of GHGs by 15 per cent (40,097.7 Gg CO_2-eq.) in relation to 1990 (267,298 Gg CO_2-eq.) by 2030. On condition of external help, including transfer of new technologies and favourable economic conditions, Kazakhstan would reduce emissions by 25 to 34 per cent (i.e. from 66,824.5 Gg CO_2-eq. to 90,881.32 Gg CO_2-eq.) during the period 2021–2030.

The national economy relies heavily on natural resources. This makes the country one of the most carbon-intensive economies in the world in terms of GDP carbon intensity. The energy sector remains the main source of GHG emissions in Kazakhstan. The peak of energy sector contribution was reached in 2010 when energy accounted for 83.38 per cent of the country's GHG emissions without LULUCF (or 82.68 per cent of total GHG emissions with LULUCF), and in 2015, its share decreased to 82.04 per cent of total GHG emissions without LULUCF (or 78.39 per cent of total GHG emissions with LULUCF).

The broad use of coal contributes significantly to the GHG emissions as burning coal releases more CO_2 than burning of the same energy equivalent of natural gas or even mazut. Coal is projected to account for more than half of electricity generation by 2040 as coal-fired generation accounts for roughly two thirds of the installed capacity. Radical changes to the fuel balance are a slow process so Kazakhstan is focusing on other ways to achieve emissions reductions over the near term.

One of the main measures implemented to curtail GHG emissions is to increase energy efficiency. During the period 2008–2017, the energy intensity of GDP decreased by 18.18 per cent, from 1.87 toe per US$1,000 in 2000 prices in 2008 to 1.53 toe per US$1,000 in 2000 prices in 2017 (figure 10.1). This was made possible by economic growth, general modernization and attraction of broad investments, especially in the energy industry. Another main direction to curtail GHG emissions is the development of RES.

Introduction of CO_2 capture and geological storage technologies seems to be ineffective in the conditions of Kazakhstan due to reliance on coal-fired power plants. Though modern technologies enable the capture of 85–95 per cent of CO_2, they are inapplicable at coal-fired power plants since their introduction will lead to an increase in fuel consumption by 14–40 per cent, which will eventually lead to an increase in GHG emissions. Other negative effects of implementation of such technologies are an increase in electricity generation costs by 43–90 per cent and in plant construction costs by 30–90 per cent.

In 2013, Kazakhstan introduced a CO_2 emissions regulation system modelled on the GHG emissions trading system operating in Europe. The carbon trading market worked in 2014–2015 but its operation was then suspended due to GHG emissions restrictions being put on hold. The new system was introduced in 2018 (chapters 3, 5).

Considering that about 80 per cent of GHG emissions are generated by the electric power sector, especially by coal-fired plants, measures to curtail emissions in the near term are based on the existing electricity generating capacity mix.

10.7 Legal, policy and institutional framework

Legal framework

The 2004 Law on Amendments to Legislation relating to Subsoil Use and Oil Operations prohibits gas flaring under all contracts signed after 1 December 2004. Further development of the 2010 Law on Subsoil and Subsoil Use (no longer valid) also prohibited the commercial development of an oilfield without a plan for its utilization, including reinjection and processing of the gas that is produced.

The 2009 Law on Support for the Use of Renewable Energy Sources aims at greater use of RES to decrease the energy intensity of the economy and to lower the impact of electric power plants on the environment, including reduction of GHG emissions. The Law stipulates the State's responsibilities in respect of the regulation of economic and social relations in the sphere of RES. The 2014 Resolution of the Government No. 645 approved the system of fixed tariffs (feed-in-tariffs) for RES-generated energy. The Orders of the Minister of Energy also regulate tariff setting, i.e. the 2015 Order on approval of the Rules determining the tariff to support renewable energy sources No. 118 and the 2015 Order on the definition of a financial and accounting centre for the support of renewable energy sources No. 256.

The 2012 Law on Gas and Gas Supply regulates the domestic market. The domestic gas market has been increasingly moved into the hands of state-owned KTG, as the "national operator" for the county's single-buyer model. The rationale of this Law appears to be that it puts Kazakhstan's gas production at the disposal of a single national operator through administrative means and specifically empowers that entity to develop the domestic market and pipeline infrastructure. This reflects the fact that the bulk of gas production in Kazakhstan occurs as a by-product of liquids production (either associated gas or condensate-related gas), and the view that gas supply would not respond to (gas) market conditions directly. The government policy also appears to be aimed at having the state-owned entity capture any upside from higher domestic end-user prices and export prices, while maintaining a single channel for exports so as to balance the near-monopoly conditions in two neighbouring gas-purchasing countries, China and the Russian Federation.

The 2012 Law on Energy Saving and Energy Efficiency Improvement sets the strategic direction of state policy related to energy efficiency, spells out the responsibilities of various state entities and identifies requirements for achieving efficiency improvements. The Law provides for mandatory accounting and annual reporting on the implementation of energy saving and energy efficiency measures for all entities that consume energy resources equivalent to 1,500 or more tons of fuel equivalent per year, as well as for state institutions, state-owned enterprises and national companies. This requirement is implemented through the creation of the State Energy Register in January 2011. The entities included in the Register are required to develop and implement action plans for energy saving and energy efficiency improvement. The form and content of such action plans are defined in the 2012 Resolution of the Government No. 1118. The Law sets the framework for mandatory energy audits. Another important regulatory instrument is the mandatory energy saving assessment on the pre-design and design documentation for the construction of new or expansion of existing buildings, structures and premises with energy consumption equivalent to 500 tons of fuel equivalent per year. Overall, energy efficiency is regulated by more than 20 regulatory acts and technical documents. During recent years, significant work in field of energy efficiency has been done:

- The State Energy Register was created in 2011;
- Statistics in the field of energy saving and energy efficiency is being compiled;
- Energy audits are being conducted and energy saving potential is being identified;
- Actions in the field of energy saving and increasing energy efficiency are implemented according to the results of energy auditing;
- The energy intensity of GDP has been reduced by 18.18 per cent in the period 2008–2017;
- The Electric Power and Energy Saving Development Institute was created;
- An expert community on energy saving was formed.

The key law that sets the basic framework for regulation of Kazakhstan's upstream sector *(*exploration and production of oil and gas) is the 2017 Code on Subsoil and Subsoil Use, which replaced the previous 2010 Law on Subsoil and Subsoil Use. The Code specifies the rights and responsibilities of state entities involved in upstream operations, defines subsoil rights and rules for granting these rights, details the rights and responsibilities of subsoil users and sets the terms for exploration and production activity (including offshore). The Code establishes different regulatory regimes for different types of minerals: hydrocarbons, solid minerals and uranium. It introduces new grounds for early termination of subsoil use contracts for hydrocarbons and clarifies terms for the extension of hydrocarbon contracts depending on the stage of field development. In addition, it clarifies the obligation of subsoil users to support the socioeconomic development of the region and its infrastructure during exploitation.

According to the Code, all hydrocarbons extraction and uranium mining operations should be performed in line with the environmental legislation of Kazakhstan. All operators are obliged to minimize environmental pollution and be responsible for any harm caused to peoples' health, the subsoil, water resources and the environment in general, if this harm is caused by their actions.

With regard to the uranium industry, the 2009 Code on Public Health and the Public Health System establishes health and sanitary requirements related to nuclear security. The 2014 Law on Permits and Notifications identifies licensing requirements related to nuclear energy, nuclear waste and nuclear security. The 2017 Code on Subsoil and Subsoil Use governs all key aspects related to uranium mining.

Policy framework

The 2013 Concept of Transition to Green Economy (2013 Decree of the President No. 577) resolves issues of transition to renewable energy and environmental protection. The target set is to increase the share of alternative and renewable energy to 50 per cent by 2050.

The 2012 Strategy "Kazakhstan-2050" (delivered in the 2012 President's message) calls for the development of a knowledge-based economy. The Strategy envisages that, in 25–30 years, the basic industries, including oil and gas and mining and metallurgy, will be the main driving forces for promoting the economy along the path of further industrialization and the development of related industries. Among other industries, the highest priority is given to the uranium industry and nuclear power engineering with the task of further developing all phases of the entire value chain.

The 2014 Concept for Development of the Fuel and Energy Sector until 2030 (2014 Resolution of the Government No. 724) binds together development of the oil and gas, coal, nuclear and electricity industries, considering the latest trends in world energy. The Concept is aimed at decreasing hydrocarbons dependency and developing a regulatory framework and incentives for sustainable energy. The Concept provides a general picture of what the State envisions as the path of the sector's future development. It is based on a presumption of moderating domestic growth in coal consumption, limited opportunities for export growth and a gradual incorporation of natural gas and RES in electric power generation. In this context, the Concept envisages: "restrained" growth of thermal coal production (to only 113.0 Mt) by 2030, but its more efficient production; modernization and use of new technologies, especially more widespread coal enrichment; deeper processing of coal to yield a number of new products (synthetic liquids and synthetic natural gas); and development of technologies and infrastructure for the use of coal bed methane. The Concept is currently under revision and a new version is expected (currently known as the Concept for Power Sector Development to 2035 with a view to 2050).

The 2014 Concept for Development of the Gas Sector until 2030 (2014 Resolution of the Government No. 1275) codifies Kazakhstan's long-held plans to increase domestic gas consumption. This document calls for the extension of piped gas supply to 13 oblasts from the current 10 by 2030. It projects that domestic deliveries will rise to 18 Bcm by 2030 under its "realistic" scenario. The objective is to create conditions for phased development of the gas transportation system and to increase demand for domestic gas as an environmentally clean fuel, mainly using domestic natural gas resources.

Strategic plans formulated by the Ministry of Energy offer more frequent, usually annual, updates on the direction of the energy and fuel complex as a whole and the gas industry in particular. These plans adjust the general direction set in the Concept for Development of the Gas Sector until 2030, identifying short-term goals and targets for the country. Specific goals in the Strategic Plan of the Ministry of Energy for the period 2017–2021 include targets for residential gasification, associated gas utilization, gross and commercial gas production and labour productivity.

The Plan on Activities on Gas Production from Coal Bed Methane, which provides an action plan for developing CBM in the Karaganda region, was signed on 23 September 2016 by the Minister of Energy. This project will help to increase the security of coal mining operations and the methane extracted will be used for industrial development.

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis Sustainable Development Goal 7 is described in box 10.2.

Institutional framework

The institutional framework of the environmental management system in Kazakhstan was restructured in August 2014. Some ministries were disbanded or merged. The 2014 Decree of the President No. 875 established the Ministry of Energy and entrusted it with functions and powers in the area of energy and in the areas of protection, control and supervision of sustainable use of natural resources, municipal solid waste management, development of RES and control over the state policy for the development of green economy. The latter functions were transferred thereto from the Ministry of Environment and Water Resources. Along with the transfer of functions on the development of green economy, authority in the promotion of energy efficient technologies on energy and regulation of tariffs was also delegated to the Ministry of Energy.

The Ministry of Environment and Water Resources, the main state body on environmental protection, was disbanded.

The regulatory functions of the former Committee of Ecological Regulation and Control were expanded and transferred to the reorganized Committee of Environmental Regulation and Control and Department of State Inspection of the Oil and Gas Complex. The Committee continues the issuing of ecological permissions and licences and sets emission limits in the energy sector.

Box 10.2: Goal 7 of the 2030 Agenda for Sustainable Development

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

As of 2018, ECE is assisting Kazakhstan in developing a draft national action plan to meet Goal 7 to support country ownership and future endorsement and implementation. A final workshop would undertake a final review and validate the draft. The action plan would identify best practices, measures and procedures relevant to prepare a sustainable energy transition, with a particular focus on the cross-cutting nature of energy efficiency, renewable energy and energy access. To support the achievement of Goal 7 objectives, the action plan would include a cost-effective and customized basket of regulatory, fiscal and financial incentives for sustainable energy development.

Target 7.1: By 2030, ensure universal access to affordable, reliable and modern energy services

This target is measured, first, by indicator 7.1.1 (Proportion of population with access to electricity). Since 2006, 100 per cent of the urban population in Kazakhstan has had access to electricity. However, the level of rural electrification reached 100 per cent in 2009 than decreased somewhat and fluctuated between 99 and 100 per cent until it reached 100 per cent again in 2014. Thus, universal access to energy services is almost achieved. The level of electrification in Kazakhstan reached 100 per cent, but in some rural areas supply of electricity is not reliable.

The target is also measured by indicator 7.1.2 (Proportion of population with primary reliance on clean fuels and technology). According to the 2016 WHO report "Burning Opportunity: Clean Household Energy for Health, Sustainable Development, and Wellbeing of Women and Children", 92 per cent of the population in Kazakhstan rely primarily on clean cooking fuels. At the same time, more than 1,400,000 people in Kazakhstan use polluting fuels for cooking. Also, Kazakhstan is one of just a few countries in the WHO European Region where a small proportion of the population (5 per cent or less) uses coal for cooking. To increase the use of clean fuels, Kazakhstan should primarily continue its efforts in developing the country's gas infrastructure.

Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix

Progress towards target 7.2 is measured by indicator 7.2.1 (Renewable energy share in the total final energy consumption). According to Kazakhstan's fuel-energy balance, the share of RES in electricity production in 2016 was 12.7 per cent, including hydropower. Other RES (wind and solar) accounted for only 0.43 per cent of total electricity production. According to the Strategy "Kazakhstan-2050", renewable and alternative energy sources are planned to provide 30 per cent of national power production by 2030. According to the Ministry of Energy, the share of RES in electricity generation reached 0.98 per cent in 2016, including small HPPs. The share of renewable energy should reach 3 per cent in 2020. Kazakhstan should intensify its efforts to increase the share of renewable energy.

Target 7.3: By 2030, double the global rate of improvement in energy efficiency

With regard to indicator 7.3.1 (Energy intensity measured in terms of primary energy and GDP), according to the Committee on Statistics, energy intensity in Kazakhstan decreased from 1.62 toe per US$ constant 2000 GDP in 2012 to 1.54 toe in 2016. In line with the national policy documents, the Ministry for Investments and Development seeks to reduce energy intensity by 25 per cent by 2020 and 50 per cent by 2050 from the 2008 level.

Target 7.b: By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and land-locked developing countries, in accordance with their respective programmes of support

Kazakhstan puts a lot of effort into developing its energy infrastructure, mostly focusing on electrification and gas transport. The proportion of the population with access to electricity reached 100 per cent in 2014 and, although access to gas is not universal yet, the gas infrastructure is expanding. The number of settlements with gas reached 976 in 2016 compared with 891 in 2014, which increased the level of gasification in Kazakhstan from 43 per cent to 46 per cent over these years.

There are no data available for indicator 7.b.1 (Investments in energy efficiency as a proportion of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services). Kazakhstan does not measure indicator 7.b.1.

GHG emissions are generally regulated by the Department of Climate Change of the Ministry of Energy, just as when it was a part of the Ministry of Environment and Water Resources. As of 2018, the Ministry of Energy includes the Department of Electric Power and the Department of Coal Industry Development (figure 1.1) which were transferred from the structure of the Ministry of Industry and New Technologies. These two departments have the following functions:

- Monitoring of execution of the investment programmes provided in the agreements signed with TPPs; about 40 entities submit their reports to these departments on a quarterly basis;
- Processing of TPPs' applications for individual electricity tariffs in cases when tariff limits prevent the energy producer from accumulating the amount of funds required for successful implementation of its own investment programmes.

The Committee of Atomic and Energy Supervision and Control of the Ministry of Energy and the Committee on Transport under the Ministry for Investments and Development issue licences for the transport of nuclear materials.

The Committee on Industrial Development and Safety under the Ministry for Investments and Development is responsible for the regulation of energy saving and energy efficiency issues. The Ministry conducts an annual assessment of activities on energy saving and energy efficiency measures.

The Ministry of Internal Affairs provides security services for the transport of radioactive materials.

Participation in international agreements and processes

Kazakhstan has been a member of the International Atomic Energy Agency (IAEA) since February 1994. Since 2008, it joined several key agreements that allow the country to pursue international collaboration in the nuclear power industry. In 2011, it became a party to the Vienna Convention on Civil Liability for Nuclear Damage, and, in 2010, to the Convention on Nuclear Safety, Convention on Early Notification of a Nuclear Accident, Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, and Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

Kazakhstan is a member of the Energy Charter Conference and ratified the Energy Charter Treaty. The Working Group on Energy Efficiency and Related Environmental Aspects together with Kazenergy prepared the Review of the National Policy in the Area of Energy Saving and Energy Efficiency in 2014.

Kazakhstan is member of the Eurasian Economic Union (EEU). The potential of the EEU countries in the energy sector is quite high, as the total energy efficiency factor is only 52 per cent, and the capacity of interstate lines is currently used by only 20 per cent. The 2015 Decision of the Supreme Eurasian Economic Council No. 12 approved the Concept for the formation of the common electric energy market of the Eurasian Economic Union.

Kazakhstan participates in the work of the CIS Electric Power Council, the Interstate Environmental Council of the CIS Member States, and the Commission of the CIS Member States on the Use of Atomic Energy for Peaceful Purposes.

10.8 Assessment, conclusions and recommendations

Assessment

Since 2008, important developments have taken place in the energy sector in Kazakhstan. The national energy mix is already shifting towards gas use. While coal combustion will remain the country's dominant fuel for power production over the next two decades, the shift to gas in TPPs and the growth of renewables has begun.

The country has set targets for the development of renewable energy. The share of renewable energy should reach 3 per cent in 2020 and 50 per cent in 2050. The recent developments show Kazakhstan's good intention to develop RES: in 2017, wind and solar sources together provided 0.43 per cent of generated electricity, a 13 per cent increase from 2016.

Furthermore, energy efficiency has become one of the national policy priorities in Kazakhstan. A recent achievement is the decline in the market share of incandescent light bulbs from 74 per cent to 18 per cent of the total number of bulbs between 2012 and 2016. However, there are many other energy saving measures and energy efficiency technologies that could potentially improve energy efficiency in the country. They require investments and their implementation is much more difficult than lighting upgrades.

The oil and gas industry continues to have environmental and health impacts. Kazakhstan managed to achieve a significant reduction in the volume of gas flaring, from around 3 Bcm in 2008 to 1 Bcm (out of 46 Bcm total gas production) in 2016. However, the waste generated in oil production and processing remains an issue of high concern. Detailed data on sources, types and volumes of pollution and waste discharges during oil and gas activities, which would allow the Government to develop the necessary preventive measures, are lacking.

Kazakhstan is among the frontrunners in providing universal access to energy services in line with

Sustainable Development Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all. However, the aspects of reliability of supply and reliance on *clean* fuels and technology are still to be tackled by the country.

Conclusions and recommendations

Energy performance of buildings

The residential sector is the second largest energy consumer and responsible for almost one fifth of TFC. About 75 per cent of the buildings in Kazakhstan were built between 1950 and 1990 and do not meet modern energy efficiency standards. Various reports highlight barriers to the use of new institutional and financial mechanisms and structures for energy efficiency in buildings.

Recommendation 10.1:
The Government should:

(a) *Encourage the use of energy contracting models to promote energy efficiency measures in buildings, based on the practices of OECD Member countries;*
(b) *Promote the undertaking, at national, oblast and local levels, of energy audits of public buildings, and implement appropriate actions for improving their energy performance accordingly.*

See Recommendation 6.6.

Fossil fuels

Kazakhstan is one of the most carbon-intensive economies in the world in terms of GDP carbon intensity. The energy sector remains the main source of GHG emissions. The widespread use of coal contributes significantly to the GHG emissions.

National policy documents from Kazakhstan show that coal will continue to be a major energy source in Kazakhstan over the medium and, potentially, long term. At the same time, the country has underlined the importance of moving towards a more sustainable energy system.

There are a number of modern clean coal technologies that could be implemented in Kazakhstan, which would enhance the country's transition to a low-carbon economy. Increased efficiency, flexible operation to support renewables and carbon capture and storage are key technologies that could deliver such a transition. These technologies do not receive policy parity alongside other low emission technologies.

Furthermore, there are cases of oil and gas companies attempting to obtain authorizations for emissions exceeding the values approved at the EIA stage, in violation of the legal requirements, which have required a new EIA where there has been a change in project design.

Recommendation 10.2:
The Government should:

(a) *Continue to take steps to concretely reduce Kazakhstan's GDP carbon intensity;*
(b) *Continue defining and implementing more efficient and environmentally friendly ways to use coal in all sectors, facilitating, wherever possible, the use of less polluting sources of energy as a partial alternative;*
(c) *Take appropriate measures to reduce emissions and increase the energy efficiency of existing large coal-fired power plants through gradual modernization and technology upgrades, and also by incentivizing, where possible, the application of best available techniques (BAT);*
(d) *While developing its national policy documents to meet Sustainable Development Goal 7, undertake a comprehensive study on the development of advanced fossil fuel technologies that will include their status, trends, economic analysis, environmental and health impacts, and institutional and legislative barriers;*
(e) *Develop economically and environmentally sound policies that also address health impacts in support of Sustainable Development Goal 7, ensuring that they are supported by appropriate legal frameworks and economic incentives;*
(f) *Take appropriate measures to ensure that the limits in terms of maximum allowed emissions set by EIAs for the oil and gas industry in the project design phase are respected, carefully monitoring their implementation phase;*
(g) *Continue taking measures to increase the energy efficiency of existing residential buildings, especially concerning the improvement of thermal insulation, in order to gradually bring the annual average energy consumption (kWh/m^2) to more efficient values.*

Renewable energy sources

The main changes in the energy sector are expected to be introduced by development of renewable energy sources. The Strategy "Kazakhstan-2050" anticipates that renewable and alternative energy sources will provide 50 per cent of all national power production by 2050. This ambitious "green" plan targets 11 per cent of electricity generation to come from wind and solar sources by 2030, and for this to increase to 39 per cent by 2050.

However, substantial expansion of electricity generation based on renewable sources has a resource and technological limitation at the current stage. The development of renewable energy requires a significant level of state support for a long period of time.

Recommendation 10.3:
The Government should:

(a) *While developing its national policy documents to meet Sustainable Development Goal 7, undertake an analysis on the development of renewable energy technologies in the country;*
(b) *Take appropriate steps to meet the targets of raising the share of alternative energy sources in total consumption to at least 3 per cent by 2020 (set in the Strategic Plan for Development until 2020), of 30 per cent by 2030 and 50 per cent by 2050 (set in the Concept on Transition to Green Economy), also in coordination with provisions about renewable energy sources as per the 2017 Strategic Plan of the Ministry of Energy for the period 2017–2021.*

Air pollution in Almaty

Motor vehicles and the three existing CHP plants cause high air pollution levels in Almaty. Pollution is particularly problematic for Almaty because of its topography, as there are almost no airflows and pollution does not disperse efficiently. Considering the environmental challenges, including pollution and ash/slag disposal, there is a challenge to confront in replacing current coal-combustion facilities with gas-fired capacity.

Recommendation 10.4:
The Government should:

(a) *Take measures to replace obsolete coal-utilizing generation facilities in all three Almaty combined heat and power (CHP) plants with steam–gas combined cycle generation to provide high efficiency of fuel use as well as heat and electricity cogeneration by 2022;*
(b) *Employ CHP plant-1 as a source of peak-load heat energy, by applying heat pipelines connecting CHP plant-1 and CHP plant-2.*

Chapter 11

INDUSTRY AND ENVIRONMENT

11.1 Trends in industry development

Since 2008, industry in Kazakhstan has undergone significant reforms. To sustain economic progress, overcome major difficulties and drive environmental and social improvements, Kazakhstan is addressing a number of challenges to ensure its industry becomes more competitive and diverse and sufficiently integrates innovations into production processes.

In 2017, the total share of industry in GDP was 26.8 per cent. The mining and quarrying industry plays a primary role in the dynamism of the economy, accounting for 13.3 per cent of GDP, while manufacturing industry accounted for 11.2 per cent of GDP.

Kazakhstan is one of the most resource-rich countries in the Eurasia region. It has large mineral reserves and produces a diverse range of mineral commodities, including oil, gas, coal, uranium, gold, copper, iron, lead and zinc ores. Kazakhstan holds 30 per cent of the world's chrome ore reserves, 25 per cent of manganese ore reserves, 13 per cent of copper ore reserves, 10 per cent of iron ore reserves and 10 per cent of lead and zinc ore reserves. The mining sector contributes substantially to the total volume of industrial output, accounting for 50.8 per cent in 2017, recovering from a production decline in 2014, 2015 and 2016 that was mainly due to a reduction in coal, oil and iron ore extraction. Crude oil and natural gas production accounted for 40.4 per cent of total industrial output in 2017.

Kazakhstan's exports have a very concentrated structure, with 68.5 per cent of the total exports in 2017 made up of mineral products. In addition, the mining industry is the leader in terms of FDI (accounting for more than 50 per cent in the period 2010–2014).

Manufacturing industry has demonstrated rapid development in recent years. The share of manufacturing industry has increased in the structure of industrial output, from 33.0 per cent in 2008 to 41.3 per cent in 2017 (table 11.1). It has strengthened its position due to an increase in food and beverage production, light industry, chemical and pharmaceutical products and metallurgy. The Government expects highest growth in petrochemicals, automotive, agrochemicals, electrical engineering and railroad rolling stock manufacturing in the coming years.

Industry is the leading sector in the consumption of primary energy in Kazakhstan, accounting for 50.5 per cent of all energy consumption in 2016. Energy use in industry grew in the period 2008–2016 by 19.3 per cent, from 16.8 Mtoe to 20.8 Mtoe. The country's industry is characterized by high energy intensity. The reduction of energy intensity is considered as a priority to ensure the competitiveness of industry.

According to the Committee on Statistics, the employed population was estimated at 8,585,153 people in 2017, including 283,678 people in the mining industry and 581,589 people in manufacturing industry, which is 3.3 per cent and 6.8 per cent of the employed population.

The industrial sectors "Electricity, gas, steam supply and air conditioning" and "Water supply, sewerage, control over waste collection and distribution" according to the national classification, have shown stable annual growth, accounting for 1.8 per cent and 0.3 per cent of total GDP in 2010, and 1.7 per cent and 0.3 per cent of GDP in 2017, respectively.

Table 11.1: Industrial production output, 2008, 2013–2017, billion tenge

	2008	2013	2014	2015	2016	2017	2017 % of total
Total	**10 195**	**17 834**	**18 529**	**14 931**	**19 027**	**22 790**	
Mining and mining works	6 230	10 697	11 060	7 521	9 398	11 569	50.76
Manufacturing	3 360	5 853	6 090	5 978	8 047	9 401	41.25
Electricity, gas, steam supply and air conditioning	513	1 119	1 210	1 256	1 384	1 582	6.94
Water supply, sewerage, control over waste collection and distribution	93	165	169	176	198	238	1.04

Source: Committee on Statistics, 2018.

11.2 Developments in main industrial branches

Mining and metallurgy

Overview

According to the Committee on Statistics, in 2017, the volume of mining and mining works amounted to 11,569 billion tenge, representing 50.76 per cent of the total volume of industrial production (table 11.1), of which 79.5 per cent is crude oil and natural gas extraction, 10.3 per cent is mining of metal ores, 2.5 per cent is coal mining and the remaining 7.7 per cent corresponds to other branches of the mining industry and technical services in the mining industry. For comparison, the share of mining products decreased from 61.11 per cent in 2008 to 50.76 per cent in 2017 while its volume increased by 85.70 per cent, from 6,230 billion tenge in 2008 to 11,569 billion tenge in 2017. Compared with 2008, total industrial production volume increased more than twofold.

Oil

According to the 2017 British Petroleum (BP) Statistical Review of World Energy, the total proven oil reserves were equal to 30 billion barrels at the end of 2016. The main oil, gas condensate and natural gas fields are Tengiz, Karachaganak and Kashagan.

Tengiz is a giant oilfield in Atyrau Oblast. The recoverable oil reserves of the Tengiz and Korolevsky deposits range from 890 million t to 1.37 billion t (7.1 billion barrels to 10.9 billion barrels). In 2016, it produced 27.5 million t of oil. Karachaganak is an oil and gas condensate field located in West Kazakhstan Oblast. The initial reserves of the field were 1.35 trillion m^3 of gas and 1.2 billion t of oil and gas condensate. Kashagan is a supergiant oil and gas field located to the north of the Caspian Sea. Total oil reserves are 38 billion barrels or 6 billion t, of which about 10 billion barrels are recoverable. The deposit is developed in complex geological conditions such as large depths (up to 5,500 m), high reservoir pressure (80 MPa) and high content of hydrogen sulphide (up to 19 per cent).

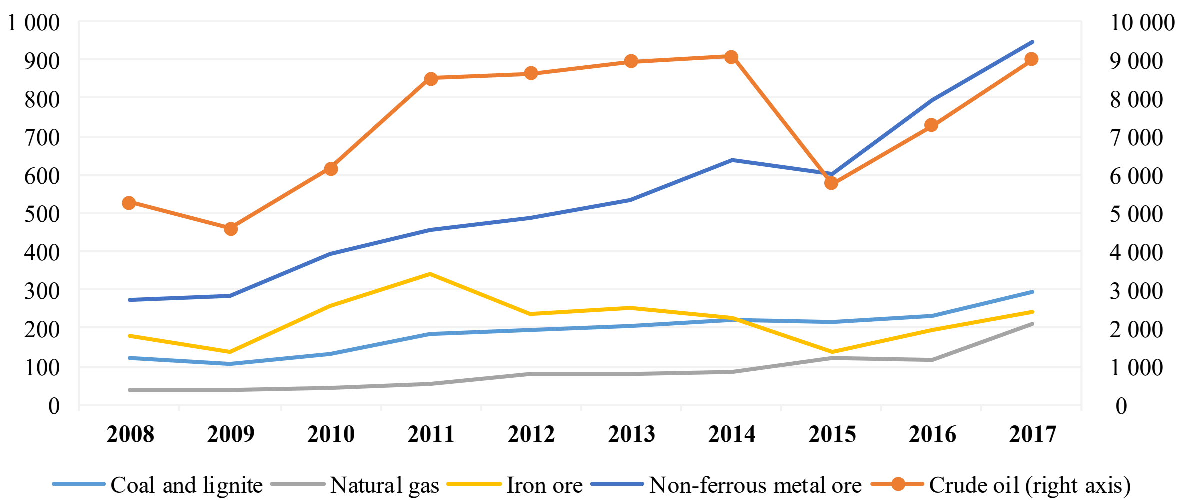
Other important fields include Aktoti, Kairan, Kalamkas, Kalamkas North, Karazhanbas, Zhanazhol, Zhetibay and Uzen.

Kazakhstan’s oil output declined in the period 2014–2016 (figure 11.1). Declines were concentrated at mature fields, mainly in Aktobe and Kyzylorda Oblasts. But, since late 2016, the decline in production is being counterbalanced by increasing production from the restarting of operations in Kashagan. In this context, oil production increased in 2016, reaching 78 million tons of oil, including gas condensate.

Oil exports were of 62.3 million tons in 2016 (table 10.4), of which 40 million tons were transported by the Caspian Pipeline Consortium. In 2017, oil exports reached 69.9 million tons and the capacity of the Consortium increased from 28 million tons to 67 million tons of oil per year.

The oil refineries located at Atyrau and Pavlodar underwent thorough modernization works in 2017. At the Shymkent oil refinery, works were completed in the second half of 2018. After modernization, the volume of oil refining will increase from 14.5 million tons to 17.5 million tons and the plants are expected to have lower pollutant emissions.

Figure 11.1: Industrial production for main mineral commodities, 2008–2017, billion tenge



Source: Committee on Statistics, 2018.

Photo 11: Capital city

Gas

Natural gas reserves totalled 1.3 trillion m^3 at the end of 2016, according to the 2017 BP Statistical Review of World Energy, which ranks Kazakhstan 22nd in world reserves and third among the CIS countries, after the Russian Federation and Turkmenistan.

About 98 per cent of all proven gas reserves are concentrated in West Kazakhstan, with more than 87 per cent in large oil and gas fields (Kashagan, Korolevskoye, Tengiz, Zhanazhol) and oil and gas condensate fields (Imashevskoye, Karachaganak). These deposits are characterized by complex hydrocarbon extraction due to the large depths (more than 5,000 m), the multicomponent nature of the gas composition (relatively low methane share) and high content of hydrogen sulphide compounds. The forecast resources of gas (natural and associated gas) are estimated at 6 trillion m^3 to 8 trillion m^3.

Natural gas production in Kazakhstan amounted to 52.9 billion m^3 by the end of 2017, according to the Committee on Statistics, which is 13.4 per cent higher than the previous year. The production of gas condensate reached 13.3 million tons in the same year (table 11.2).

A significant proportion of the gas produced in Kazakhstan is a by-product and is extracted together with oil, which, in the event of its further sale, imposes obligations on preliminary expensive processing. As a result, more than 40 per cent of the gas produced in the country is used for reinjection into the reservoir to increase reservoir pressure and oil production ratios and companies' internal needs for heating, electricity generation and other purposes.

There are three gas processing plants operating in the country, with a total processing capacity of 18.9 billion m^3 of gas per year: the Bolashak Gas Processing Plant (2.9 billion m^3/y), the Zhanazhol Gas Processing Plant (4 billion m^3/y) and the Tengiz Gas Processing Plant (12 billion m^3/y).

Table 11.2: Production of industrial products in the mining industry and quarrying, 2008-2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coal (million t)	111.07	100.85	110.93	116.45	120.53	119.57	114.56	107.32	103.06	106.20
Oil, including condensate gas (million t), of which:	70.67	76.48	79.68	80.06	79.22	81.79	80.83	79.46	78.03	86.19
Crude oil (natural mixture of hydrocarbons), including petroleum derived from bituminous minerals (million t)	58.65	64.35	68.08	67.77	66.48	69.48	67.91	66.52	65.57	72.92
Condensate gas (million t)	12.03	12.13	11.60	12.30	12.75	12.30	12.92	12.94	12.46	..
Natural gas in liquid or gaseous state (billion m^3), of which:	32.89	35.94	37.41	39.53	40.30	42.40	43.44	45.51	46.68	52.92
Natural gas (natural gas) in gaseous state (commercial output) (billion m^3)	11.71	10.95	10.61	10.50	10.89	11.27	11.70	12.01	12.61	12.62
Iron ores, agglomerated and non-agglomerated (million t)	21.49	22.28	24.02	24.74	25.89	25.23	24.56	17.11	16.36	18.01
Iron ore pellets (million t)	6.95	6.18	8.15	7.80	7.36	6.92	6.25	3.28	3.39	..
Copper ores (million t)	32.57	30.59	32.04	34.40	38.91	41.29	38.37	42.42	78.50	95.01
Aluminum ores (bauxites) (million t)	5.16	5.13	5.31	5.50	5.17	5.19	4.52	4.68	4.80	4.85
Manganese ores (million t)	2.49	2.46	3.04	2.96	2.98	2.85	2.61	1.63	1.60	1.46
Chromium ore (million t)	4.21	4.68	5.09	5.06	5.23	5.26	5.41	5.38	5.54	6.31
Salt and sodium chloride pure, sea water (1,000 t)	438.05	222.94	276.13	364.22	463.96	531.43	596.51	608.63	730.28	803.79
Zinc in zinc concentrate (1,000 t)	387.40	398.40	405.30	376.70	369.70	361.50	345.20	342.50	324.80	315.90
Asbestos (1,000 t)	230.10	230.00	214.10	223.20	241.20	243.40	213.10	179.80	192.60	192.80
Lead in lead concentrate (1,000 t)	38.80	33.60	35.40	38.80	38.10	40.10	37.80	40.70	70.50	111.20

Source: Committee on Statistics, 2018.

A significant problem related to the regulation of the gas production and use sector is the limitation of the existing system for recording the production and turnover of oil and gas resources. The current and forecast balance of gas production and use is established based on data provided by subsoil users, most of which are not equipped with modern automated accounting systems. As a result, the State lacks effective mechanisms to detect cases of irrational use of hydrocarbon resources, including flaring of associated gas.

Coal

The country ranks eighth in the world for proven coal reserves (34.2 billion t), which is almost 4 per cent of the world's coal reserves and enough to maintain current production rates for about 300 years based on current consumption. Bituminous and sub-bituminous coal, according to the national classification, accounts for 64 per cent of the country's reserves (21.9 billion tons). The remaining reserves (12.3 billion tons) are represented by lignite (also called brown coal).

Most of the coal reserves are concentrated in the central and northern parts of the country. The largest basins are Ekibastuz, Karaganda and Turgay. The coal of the Ekibastuz basin is particularly distinguished by its low production cost, as coal seams are thick and lie close to the surface, which facilitates extraction by the open cast method. However, it is characterized by a high moisture content and relatively low calorific value, as well as a high content of ash and sulphur.

Kazakhstan remains a major world producer of coal. According to the Committee on Statistics, the production of coal decreased by 7.21 per cent, from 111.07 million tons in 2008 to 103.06 million tons in 2016. Coal extraction declined severely in 2015, mainly due to a reduction in external trade, and a higher production level was re-established during 2017. More than 25 per cent of coal produced in Kazakhstan is exported. In 2016, the volume of net exports was 24.0 million tons. The Russian Federation has been the primary destination, accounting for 80.6 per cent of exports from Kazakhstan. Ekibastuz coal accounts for over 90 per cent of these exports. However, the Russian Government foresees the replacement of the consumption of Ekibastuz coal by Russian Kuznetsk coal and some of the Russian TPPs (e.g. Verkhnetagilskaya) are being switched to burn natural gas. These developments may affect the country's coal production and exports in the coming years. Moreover, increasing coal exports is a difficult task due to the low competitiveness of Kazakhstan's coal in international markets. Exports to EU countries are limited to coal from the Shubarkol field, which complies with EU requirements for ash content and calorific value.

A relatively new and alternative direction for development of the coal sector is coal bed methane (CBM) production, including coal bed degassing in preparation for coal mining. Forecast resources of methane in coal deposits in Kazakhstan are estimated at up to 7 trillion m^3. Small-scale CBM production in the Karaganda coal basin is one of the options being explored for supplying gas for selected industrial applications in the local region (mine and local boiler power generation). However, the question of more widespread use of CBM for gas supply further afield (i.e. to the capital) appears unlikely. Also, CBM production is a more expensive process than production in traditional fields and is characterized by lower energy efficiency indicators. At the moment, the development of CBM production is prevented by the lack of regulations for coal bed degassing, together with requirements on restricting methane emissions by operators.

Uranium

According to the 2017 Kazenergy National Energy Report, Kazakhstan is the world's leading uranium producer, accounting for about 40 per cent of global production in 2016. Its total uranium production increased from 8,521 tons in 2008 to 24,575 tons in 2016 (table 11.3).

Unprecedented growth of uranium production (more than sevenfold from 2003 to 2016) was followed for the first time by a decrease in production in 2017 to restore prices in the uranium market. Kazakhstan has the lowest cost of uranium mine production in the world due to the use of in-situ leaching (ISL) technology exclusively.

Major mining companies are located in Kyzylorda and South Kazakhstan Oblasts. Production of uranium comes from 19 mines. All the uranium produced is exported as the country does not possess nuclear power generation facilities (only research reactors and test benches). According to the Kazakhstan Customs Committee, China has remained the largest importer of Kazakhstan's uranium, although its share in total exports decreased from 54 per cent in 2014 to 46 per cent in 2016. Uranium is also exported to EU countries, the Republic of Korea and the United States.

Ferrous mining and metallurgy

Kazakhstan has 12 iron ore deposits, the largest of which are in Kostanay Oblast (e.g. Sarbaiskoye, Sokolovskoye). High quality chromite is mined in a relatively small area in West Kazakhstan. All manganese reserves are located in central Kazakhstan, which has the largest deposits (e.g. Ushkatyn III and Zapadny Karazhan).

The volume of industrial production of iron ore increased by 66 per cent from 2007 to 2016 (figure 11.1). The country's ferrous metal industry is focused on meeting the demand of national metallurgical companies, as well as exports to China and the Russian Federation.

Non-ferrous mining and metallurgy

Gold ore deposits are located in 16 ore mining districts, which host major deposits such as Vasilkovskoye, Aksu and Zholymbet. Half of the gold mined in Kazakhstan is from polymetallic deposits, where gold is extracted as an associated component. The most progressive method of mining is heap leaching, which can be used in both large and small low-grade ore fields.

Some 70 per cent of the gold ore reserves are refractory, ultra-fine gold ore. These ores are naturally resistant to recovery by standard cyanidation and carbon adsorption processes, requiring pretreatment for effective recovery of gold, such as roasting, bio-oxidation and pressure oxidation.

In 2016, gold production amounted to 74.6 tons, representing 17.1 per cent more than the previous year. Two thirds of production was provided by the enterprises in Akmola and East Kazakhstan Oblasts. Gold is mainly exported to Italy, Switzerland and the Russian Federation.

Table 11.3: Uranium production, 2008–2016, t

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Kazakhstan	8 521	14 020	17 803	19 451	21 317	22 451	23 127	23 800	24 575
Total world	43 764	50 772	53 671	53 493	58 489	59 331	56 041	60 496	62 366

Source: World Nuclear Association, July 2017.

Copper ore deposits are concentrated in East Kazakhstan Oblast (Artemyevskoye) and Karaganda Oblast (Zhezkazganskoye). Copper reserves of the principal mined deposits, such as Zhezkazganskoye, Orlovskoye and Nikolayevskoye, are gradually depleting. At the same time, other deposits are being developed, for example, Artemyevskoye, Abyz, Kosmuroui, Akbastau and Nurkazgan in the central region, Shatyrkol in the south and Zhaman-Aibat in the Zhezkazgan ore mining district.

Major reserves of lead-zinc ores are concentrated in East Kazakhstan Oblast (e.g. Ridder-Sokolnoye, Maleyevskoye). The lead-zinc mining industry consists in polymetallic deposits (lead, zinc, copper, gold, platinoids and rare elements) of the Altai ore basin. Among the major deposits are Zhairem and Bestube in the central region, Chekmar and Novoleninogorskoye in the east and Shalkiya and Talap in the south, where over 40 per cent of the national polymetallic reserves are located. Over the last few years, the development of the zinc-rich deposit of Shaimerden has been launched in northern Kazakhstan.

Chemical industry

In 2017, the output of Kazakhstan's chemical industry amounted to 333.3 billion tenge, primarily due to increased capacity utilization and the launch of new enterprises.

Production of mineral fertilizers continued to grow and, at the same time, increased production of chromium trioxide, chlorine and caustic soda equalled the level of production of yellow phosphorus, one of the main export products of the country's chemical industry. The share of chemicals in exports amounted to 5.1 per cent in 2017.

Rapid development of other industries, such as oil and gas and metallurgy, creates favourable conditions for the growth of the chemical industry. Various chemical plants producing nitrogen, phosphate, potash and complex mineral fertilizers are located in Aktobe, Atyrau, South Kazakhstan and Zhambyl oblasts. Others are located close to industrial zones and regions with a skilled workforce and R&D centres, for example, household chemicals in East Kazakhstan, Karaganda and Pavlodar Oblasts and Almaty, caustic soda in Pavlodar Oblast, sulphuric acid in Akmola, Kyzylorda and Zhambyl Oblasts and rubber products in Karaganda Oblast.

Despite the recent developments, major obstacles still hamper the increase in competitiveness and profitability of the country's chemical industry, such as obsolete equipment, high operational and transportation costs, a shortage of qualified personnel and the lack of technology for production of chemicals with high added value.

Pharmaceutical industry

Kazakhstan's pharmaceutical production has shown stable growth in the period 2008–2016. In 2017, production rose significantly, attaining a value of 72.44 billion tenge, which is 46.2 per cent higher than in the previous year. However, the market share of local production is rather low. In 2016, it accounted for only 11.7 per cent of the market, which is low compared with the WHO recommendation that local producers should provide at least 20 per cent of pharmaceutical production in a country.

Kazakhstan adopted the international Good Manufacturing Practice (GMP) standards for drug manufacturing in 2014. As of April 2018, there are seven GMP-certified pharmaceutical manufacturers in Kazakhstan. Local manufacturers produce basic pharmaceutical products that do not require innovative technologies. Market demand for complex pharmaceuticals is met entirely by imports.

Light industry

Light industry in Kazakhstan is represented by three types of economic activity: the manufacturing of textiles, clothes and leather products, according to the national Classification of Economic Activities. Light industrial products are one of the most important and invariable items of consumption by Kazakhstan's people. About 50 per cent of the largest light industrial enterprises are located in South Kazakhstan Oblast. South Kazakhstan Oblast and Pavlodar and Almaty Cities are primarily engaged in tailoring fabrics. Almaty, South Kazakhstan and North Kazakhstan Oblasts are engaged in curing leather. Almaty, Karaganda, Kostanay and South Kazakhstan Oblasts, as well as Almaty City, are engaged in shoe manufacture.

In 2017, light industrial products were worth 98.1 billion tenge, accounting for 0.43 per cent of the total industrial output. Overall, 984 light industrial enterprises operate in Kazakhstan, employing about 13,000 people. Light industry requires modernization, accompanied by professional training to improve its contribution to the country's economy.

11.3 Environmental pressures from industry

Air

Overall, industrial air emissions have been decreasing since 2008, despite a constant increase in total industrial output (figure 11.2). The highest emissions are of SO_2, TSP and NOx, which totalled 761,500 tons (53.5 per cent), 349,200 tons (24.5 per cent) and 249,300 tons (17.5 per cent), respectively, in 2017.

Air emissions from industry are responsible for significant air pollution, notably in urban centres where industrial facilities are located, such as Termitau, Karaganda, Pavlodar and Aktobe. These emissions are potential sources of health problems for industrial workers and the population living nearby (e.g. respiratory diseases), especially when they contain heavy metals (e.g. arsenic, cadmium, lead). Many of the largest enterprises are carrying out modernization through investment in new technologies and devices to reduce air emissions from their facilities. Also, automated systems for emissions monitoring have been installed by large enterprises, but these are not widespread.

Technological developments are still lagging behind in small and medium-sized enterprises that cannot afford the implementation of emissions reduction measures.

The volume of flared gases from oil extraction declined from 3.1 billion m^3 in 2006 to 1 billion m^3 in 2016, due to the prohibition of gas flaring by the Government in 2004. Since then, companies have constructed gas refinery plants to use gas for their internal energy needs and/or proceeded to conduct gas injection into soil, contributing to reducing these emissions and their impact on climate change. However, a huge amount of gas is still flared, containing significant amounts of CH_4, VOCs, SO_2 and other sulphur compounds, which exacerbate respiratory problems in the affected communities. Other emissions, such as aromatic hydrocarbons and benzapyrene, are known to be carcinogenic.

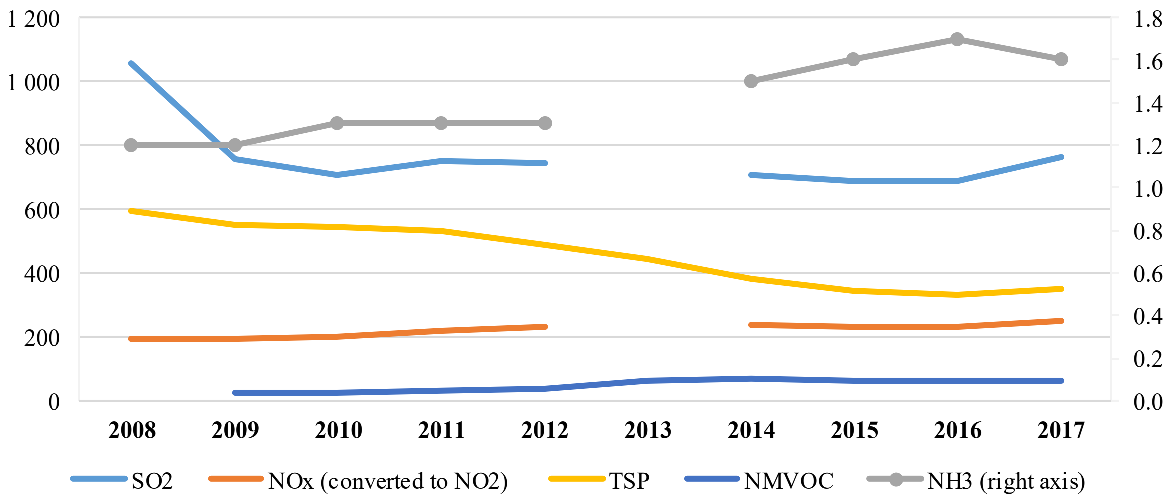
Water

Water use by the manufacturing sector increased between 2008 and 2016, from 4,577 million m^3 to 5,230 million m^3 (table 7.4). Compared with other economic sectors, industry ranks second in water use, behind the agriculture sector, accounting for 28.5 per cent of total use in 2016.

This increasing trend of water use with high levels of water abstraction and consumption by industry may cause a deficit in the country's water resources in the long term.

The development of minerals extraction and processing, which dominates the country's industry, requires the use of large volumes of water and discharges of wastewater. This has negative impacts on surface water and groundwater from heavy metals, chemicals, phenols, radionuclides and suspended particles.

Figure 11.2: Industrial air emissions, 2008–2017, 1,000 tons



Source: Committee on Statistics, 2018.
Note: Full data not available for the year 2013.

In the Caspian Sea area, the rising of the sea water level aggravates the environmental problems, with the flooding of oilfields in the coastal area. According to the Ministry of Energy, 126 oil and gas wells that are in an emergency condition will be closed by 2019 in the zones of flooding and on land. The implementation of an action plan to solve this problem has resulted in the rehabilitation of 10 wells in 2015, 20 wells in 2016 and 30 wells in 2017.

Potential sources of water pollution from the mining and processing industries include acid mine drainage from surface and underground mines and wastewater from ore treatment. Acid mine drainage is a common issue in mining of metal ores such as copper, lead and zinc. Processing of metals (e.g. copper, gold, lead-zinc) makes use of dangerous chemicals such as sulphuric acid, flocculants and cyanide, which are significant sources of surface water and groundwater contamination if appropriate control systems (e.g. geomembranes in tailings facilities) are not in place.

Another likely source of groundwater pollution is the ISL method used to mine uranium deposits (e.g. in Tortkuduk, Budenovskoye, Inkai, South Inkai and Moinkum mines). The ISL process involves the injection of a leaching liquid (sulphuric acid in the case of mines in Kazakhstan) through wells that cross aquifers, and groundwater contamination is likely. In addition, spills of these leaching solutions contaminate soils at the surface of mining sites. The advantage of using ISL, besides its low production costs, is the lesser amounts of solid waste generated.

Most industrial enterprises do not have wastewater treatment facilities on their premises or do not carry out preliminary treatment. Industrial wastewater is often discharged directly into rivers or into urban sewerage systems by illegal connection. A significant amount of industrial wastewater enters directly into urban wastewater treatment facilities (up to 24 per cent in some cities) that are not intended for the treatment of industrial wastewater. According to data from environmental authorities, 50 per cent of wastewater discharged by large industrial enterprises does not meet the requirements.

Soil and land

Overall, soils are severely degraded by mining activities, which remove large amounts of soils and vegetation for open pit mining. These also affect local habitats and cause loss of biodiversity and arable lands. In western Kazakhstan, historical and current oil wastes are major sources of soil contamination, mainly due to inappropriate waste disposal sites, spills and leakages during oil transportation (pipelines). In addition, soil pollution with oil products, associated heavy metals (lead, zinc) and radioactive elements affects groundwater in oil-producing areas.

Moreover, mining tailings and other hazardous industrial waste have a significant impact on soils if effective prevention measures are not in place. This waste usually contains heavy metals, chemicals, oil products and radionuclides that contaminate not only soils but also surface water (by run off) and groundwater (by seepage). There have been huge improvements in tailings construction and management in recent years, with the use of efficient methods by the industries concerned in Kazakhstan. Historically low levels of ore recovery in the non-ferrous mining industry is a major factor that contributes to the high volume of tailings accumulated in the country.

As at the end of 2016, 247,834 ha of land were disturbed during the construction of industrial facilities, line facilities and other enterprises in the development, processing and geological exploration of mineral deposits. Of these, 53,702 ha have been worked out (meaning that mining and exploration have been completed) and are subject to reclamation. Disturbed lands contain dumps of overburden and rocks, tailing dumps, ash dumps, coal and mining quarries, oilfields and barns.

In East Kazakhstan Oblast, land is contaminated with compounds of arsenic, cadmium, copper, lead and zinc. Toxic waste is disposed of on dumpsites, in contravention of sanitary-ecological requirements. Lead anomalies cover the territory of Shemonaikha, Glubokovsky and Zyryanovsk rayons. The most contaminated area is the triangle linking the cities of Ust-Kamenogorsk, Ridder and Zyryanovsk.

In Pavlodar Oblast, pollution sources are the engineering, chemicals, coal mining and oil refining industries and Ekibastuz state district power station. A result of the permanent increase in the volume of accumulated waste due to unoccupied storage and burial sites, polluting substances are migrating into the environment.

In Karaganda Oblast, land pollution is associated with the mining and metallurgical industries. In this area, there are over 350 storage sites for industrial and domestic waste. Soils are contaminated with cadmium, cobalt, copper, lead and zinc.

In Kyzylorda Oblast, pollution sources are oil and gas production enterprises causing pollution of land, and heavy metals and petroleum products. Besides major industries, pollution comes from 51 extraction sites of non-ferrous metals and natural radioactive ores.

In Kostanay Oblast, polluted lands are common in industrial zones of cities, in the areas of extraction and processing of useful fossils.

In North Kazakhstan Oblast, the development of gold-bearing and polymetallic deposits causes land pollution with arsenic and heavy metals.

Toxic waste is disposed of in various sites, often not in compliance with relevant environmental standards and requirements. As a result, the soil, surface water and groundwater of many oblasts are subject to intensive pollution.

The general lack of prevention measures to avoid soil pollution by heavy metals from tailings (old and current), such as the installation of a geomembrane, is an important issue for the country as the costs of related environmental rehabilitation (soil recultivation using phytoamelioration methods, and reestablishment of the soil structure and its self-regulating capacity) are high. Besides, old metal tailings can be considered as ore deposits (if the ore grade is economically viable) to be exploited.

Hazardous wastes from manufacturing branches are also sources of soil, surface water and groundwater pollution with chemical substances, such as reagents, paints, solvents and resins, among many other toxic substances.

Ecosystems

Kazakhstan presents a large variety of habitats, including the Caspian Sea. Industrial activities have severely affected the ecosystems in the country, notably in the localities where industrial operations occur. Pressures on the country’s biodiversity, such as loss of habitats with the degradation of soil, forests and water resources, have increased in the last decade as industrial activities have intensified.

Oil and gas industries continue to threaten the Caspian Sea basin, which holds 90 per cent of the world’s sturgeons and the endemic Caspian seals (chapter 9). Oil and gas operations have been developed in protected areas in West Kazakhstan, including in one state preserved zone (North Caspian), three state nature sanctuaries (Novinsky, Aktau-Buzach and Karakiya-Karakol), one state nature reserve (Akzhayk) and one state nature conservation area (Ustyurt), contributing to the degradation of the fauna and flora.

In Kazakhstan, the impacts of large industrial enterprises on biodiversity are not addressed. The concept of biodiversity offsetting is not applied.

Climate change

The main climate change impacts related to industrial activities in Kazakhstan include:

- Emissions of GHGs from industrial processes;
- Water resources consumption, use and discharge, which can affect river flows and be a direct source of surface water pollution and salinization of internal water bodies;
- Lower availability of raw materials for some industrial branches, such as the food and forestry industries.

According to the 2017 Seventh National Communication to the UNFCCC, GHG emissions in the industrial sector have steadily increased from 2008 to 2015. In the period 2013–2015, there was an increase in emissions (by 3.5 per cent), reflecting, among other factors, low investments in energy savings and energy efficiency in industry during the period. Most industrial GHG emissions are from the subsectors of ferrous metallurgy, non-ferrous metallurgy and non-metallic minerals production (table 11.4).

Health

Industrial air emissions, wastewater discharges and soil pollution by industry can negatively affect the health of communities where the operations occur, and sometimes beyond. Health impacts mostly include respiratory diseases due to air pollution. Contaminated water (heavy metals, phenols, radionuclides), if used as drinking water or for recreational purposes, is a major source of health problems such as cancer, typhoid fever, stomach sickness, development of nervous systems, etc. Similarly, polluted soils (by heavy metals and other toxic substances) can contaminate food, which is later consumed by humans, affecting their health.

Table 11.4: GHG emissions from the manufacturing and construction sector, 1990, 2000, 2008–2015

	1990	2000	2008	2009	2010	2011	2012	2013	2014	2015
CO_2 eq. (million t)	19.634	22.673	29.739	28.970	30.052	31.000	30.355	28.229	27.506	29.264
CO_2 (million t)	19.534	22.548	29.552	28.784	29.863	30.805	30.163	28.054	27.330	29.073
of which:										
Ferrous metallurgy	8.523	9.284	8.576	9.815	9.015	9.094	9.696	9.577	9.993	12.712
Non-ferrous metallurgy	2.497	7.255	11.371	9.857	11.137	11.392	10.443	8.072	6.998	6.437
Chemicals industry	1.904	0.327	0.383	0.533	0.333	0.720	0.727	0.694	0.603	0.692
Food industry	0.772	0.838	1.434	0.950	1.415	0.390	0.669	0.645	0.673	1.143
Non-metallic minerals	4.848	0.808	2.156	2.475	2.996	3.691	3.066	3.862	4.160	3.647
Other industries	0.950	3.986	5.616	5.078	4.934	5.503	5.550	5.167	4.896	4.397
CH_4 (1,000 t)	1.400	1.570	2.470	2.460	2.520	2.570	2.520	2.300	2.322	2.573
N_2O (1,000 t)	0.220	0.290	0.420	0.420	0.420	0.440	0.430	0.390	0.395	0.427

Source: GHG Inventory, 2017.

11.4 Measures towards the greening of industry

Corporate social responsibility (CSR) and health and safety management

Although Kazakhstan does not have a comprehensive policy to promote CSR (chapter 2), industries' concerns about the development and well-being of local communities where they operate have improved during recent years. Several companies, such as large oil and gas and copper mining companies, are implementing CSR and health and safety management. This includes, for example, the use of health and safety performance reporting according to the occupational injury and disease classification definitions of the International Council on Mining and Metals (2014).

A culture of open reporting on injuries has been also developed. This enables preventive actions to be taken to manage and reduce risks. For example, KazMinerals, which has introduced such reports, achieved a reduction in serious injuries in 2016–2017.

Investments in improvements to industry's emergency response capabilities and increasing direct supervision of working practices at site level have also been enhanced. Many industrial enterprises have obtained OHSAS 18001 certification (e.g. KazMunaiGas, PetroKazakhstan and KazMinerals).

The increase in the number of ISO 14001 certifications (environmental management systems) has been very modest (figure 2.5). The introduction of other important certificates, such as ISO 26000 and SA 8000 social responsibility standards and ISO 5001 energy management standard, are not common among the enterprises of Kazakhstan (box 11.1).

There are no enterprises applying EMAS in Kazakhstan.

Extractive Industries Transparency Initiative

Kazakhstan obtained Extractive Industries Transparency Initiative (EITI) compliant status in October 2013. EITI implementation in Kazakhstan is currently led by the Ministry for Investments and Development, with the national secretariat embedded in its Committee on Geology and Subsoil Use. Although EITI implementation has significantly enhanced transparency in the country's extractive sector, there appears to be limited impact on greater accountability and reform and these data are not further used for analytical purposes in order to address challenges and reform needs in the extractive industry sector.

Green technologies and cleaner production

In the period June–September 2017, Kazakhstan hosted Expo 2017 "Future Energy" international exposition. The Ministry of Energy selected 28 home-grown developments in renewable energy, waste management and energy efficiency to be shown during the Expo. To designate the best technologies to be displayed in Expo 2017, a national expert working group was set up. The experts selected different technologies divided into four areas: coal and nuclear (5); electric energy, energy saving and renewables (44); environmental protection (29); and oil and gas (27). These technologies are expected to be introduced by business entities, universities and local executive authorities.

A corporate fund called "Competence Centre for Environmental Technology" was created to support the development of best practices for production processes and introduce benchmarking indicators in the mining and manufacturing industries. It was created in 2015 upon the initiative of the oblast authorities and under the programme "Strategies of the main directions of Pavlodar oblast development up to 2030".

In addition, the Government created an International Centre of Green Technologies and Investment Projects (figure 1.1) in 2018. The Centre's mission is to facilitate the rapid transition of Kazakhstan to green economy through promotion of technologies and best practices. The Centre is located in one of the Expo pavilions in the capital.

The Green Bridge Partnership Programme (chapter 1) maintains a register of best green technologies and assists the Arnasay Green Technologies Centre (Akmola Oblast). Around 35 innovative green technologies are shown at the Centre, including pyrolysis heating, solar panels and collectors, light-emitting diodes and photodiodes in lighting, energy efficient pumps, solar wells, air ionizers and others.

Box 11.1: Overview of the health, safety and environment performance of KazMunaiGas

KazMunaiGas (KMG) is a state-owned industrial group comprising more than 200 subsidiaries in oil and gas exploration and production, refining and marketing, transportation and services. In 2016, the Group profit was about US$894.9 million. The Group employs 91,121 people, being one the largest employers in the country, of whom 79 per cent are men and 21 per cent women.

According to the Group's policy on health, safety and environment (HSE), the main principles of HSE management include: risk identification and management; introduction of safe and resource-saving technologies aimed at reducing pollutant emissions and GHGs and improving energy efficiency; ensuring the constant readiness of personnel and production facilities to act in emergency situations; and ensuring transparency and awareness. To reach its policy goals, KMG adopted an HSE integrated management system for compliance with the requirements of international standards ISO 9001, ISO 14001 and OHSAS 18001.

Its total energy consumption in 2016 was 108 million Gj and savings amounted to 1.5 million Gj. In 2016, KMG developed a corporate "Road Map for Energy Saving and Energy Efficiency Improvement" for the period until 2021, implementation of which is expected to reduce energy consumption by 4.5 million Gj.

Total CO_2 emissions of the Group amounted to 6.5 million t in 2016, with a carbon footprint of 78 million t CO_2 e. In this context of a high carbon footprint, the company is taking action to reduce direct and indirect emissions through implementing measures to shift from outdated technologies to green technologies, enhance energy efficiency and reduce gas flaring. To improve the reduction of its methane emissions, KMG has joined the Global Methane Initiative and the World Bank Zero Routing Flaring by 2030, and has developed programmes to reduce gas flaring and venting. KMG also participates in or is member of several international initiatives and organizations, such as the WWF Environmental Index for oil and gas companies, Global Reporting Initiative, Extractive Industries Transparency Initiative, UN Global Compact, Oil Spill Response and others.

In 2016, the Group's total water withdrawal accounted for 77.8 million m^3 (78.3 million m^3 in 2015). In 2016, it discharged 8.8 million m^3 of wastewater (8.0 million m^3 in 2015). About 84 per cent of its wastewater was discharged to evaporation ponds, and the rest was transferred to third parties for disposal. The standards of discharged water quality, established by the national environmental legislation, are achieved through using mechanical and biological treatment methods. Water is reused for cleaning vehicles, dust suppression and firefighting water replenishment. However, the largest volume of treated wastewater is reused in refineries of the Group, with 3.6 million m^3 of treated wastewater reused in 2016 (3.1 million m^3 in 2015).

Some of KMG's operations take place near or within protected areas of the country, which has an impact on the biodiversity. For example, the company's Zhambyl and Satpayev sites are located in the Northern Caspian Sea State Preserved Zone, as well as partially inside the Novinsky State Nature Sanctuary. Biodiversity monitoring carried out by KMG in the zone indicates that several fauna and flora species have been affected. Also, the Kansu site in Mangistau Oblast lies partially within the Kenderli Kayasan State Preserved Zone and borders the Ustyurt State Nature Conservation Area. In 2016, there was no development drilling on sites that are located on or border specially protected areas or conservation zones; only seismic exploration operations took place. The impact on wildlife is mainly due to changes in other natural components: soil, vegetation and surface water. To mitigate such impacts, KMG has remediated 149.2 km^2 of disturbed land and implemented a project for the production and release of young sturgeon species in 2016.

A major target for the company's health and safety management is to reduce the number of fatal incidents to zero. In 2016 and 2015, there were seven and four incident fatalities, respectively.

The Group's environmental expenditure decreased. Total environmental management expenses, including waste, emissions and discharge management, have decreased, from US$61.4 million in 2014 to US$41.5 million in 2016. Investments in prevention of environmental impacts and other measures, such as R&D and staff training, have also been reduced, from US$7.3 million in 2014 to US$4.08 million in 2016.

Extended producer responsibility

Extended producer responsibility, with requirements for product marking/labelling, is being gradually introduced in Kazakhstan (chapter 8). However, the application of specific product standards to ensure that the products are designed and manufactured in such a way as to achieve the requirements for waste prevention (e.g. minimizing waste volume/weight), are still lacking in the legislation. Also, measures are not in place for the reuse of waste, or for training and campaigns for raising public awareness on reuse, labelling and marking, such as reuse labels, for example.

Reduction of major industrial accident risks

Competent authorities have considerably developed and implemented policies on industrial safety concerning hazardous production facilities in the mining (including coal, oil and gas), metallurgy, oil and gas refining, petrochemicals and chemicals industries, geological exploration, boiler facilities, trunk pipelines and blasting. During recent years, measures to prevent major industrial accidents and reduce risks have been strengthened. These measures relate mainly to supervision over compliance with industrial safety requirements by hazardous production facilities and organizations operating hazardous technical devices, and accident investigations, together with relevant state bodies and emergency training at hazardous production facilities.

Innovation

Currently, there is low domestic demand for innovation in industry. In 2016, of the 31,077 enterprises in the country, only 2,879 (9.3 per cent) were active in innovation. Innovative sectors, such as the industry of mobile and multimedia technologies, nanotechnology, space technology, robotics, genetic engineering, renewable energy technologies and smart grids, and biomedical technologies, are not developed or lack investments.

Concerning green innovation, the Ministry for Investments and Development has prepared a list of green technologies for industry based on the technologies exhibited at Expo 2017. Although the Government has made efforts to set up a policy and legal framework for the transition to green economy, there is a lack of mechanisms, such as financial incentives, to facilitate the introduction of green technologies in all industry branches. Another barrier to the shift to green technologies concerns the generally limited access of SMEs to financing.

Industry-relevant targets

Several targets of the 2013 Concept of Transition to Green Economy are industry related. These include the reduction of energy intensity of GDP from 2008 levels by 25 per cent in 2020, 30 per cent in 2030 and 50 per cent in 2050, and the reduction of air emissions to EU levels. Also, increased efficiency of water use in industry by 25 per cent by 2030 is foreseen. However, there are no targets and indicators specifically for industrial waste.

11.5 Legal, policy and institutional framework

Legal framework

The 1996 Law on Subsoil and Subsoil Use and the 1995 Law on Oil were integrated to set up the 2010 Law on Subsoil and Subsoil Use. This Law largely considered provisions contained in the previous acts, including the preservation of the subsoil use contractual system. The 2017 Code on Subsoil and Subsoil Use replaced the 2010 Law. The Code changed the legal regime of subsoil use in the country, with an aim to ensure a balance of interests between investors and the State. It also provides for pollution prevention to reduce the negative impact of related operations, the obligation to give preference to Kazakhstani workers, the obligation to comply with the national environmental and civil protection legislation, and the obligation of rehabilitation of sites as well as of securing such rehabilitation thorough a guarantee, bank deposit and (or) insurance. Except for the obligation of rehabilitation, the environmental requirements are mostly covered by the 2007 Environmental Code, not by the 2017 Code on Subsoil and Subsoil Use.

The 2014 Law on Civil Protection defines hazardous production sites by types of operations (production, use, processing, generation, storage, transportation and destruction) concerning: sources of ionizing radiation; flammable substances; explosive substances; combustible substances; oxidizing substances; toxic and highly toxic substances; melting of ferrous, non-ferrous and precious metals and alloys; mining, exploration, drilling and blasting works; extraction of mineral resources; processing of mineral materials; and underground works. The Law provides for the tasks of the authorized body in the field of industrial safety.

The 2007 Environmental Code includes provisions on environmental health and safety, pollution prevention and control, conservation of biodiversity, development of sustainable production and consumption patterns, determination of liability for environmental damage, compliance with environmental regulations, environmental audits, and access to environmental information and public participation in environmental-related decision-making. The Code also provides for the issuing of integrated environmental permits based on the use of BAT, although integrated permits have not been implemented in Kazakhstan as of April 2018. In addition, the Code defines types of hazardous activities, including environmentally hazardous economic and other activities that result in, or may result in, accidental environmental contamination.

The 2012 Law on Energy Saving and Energy Efficiency Improvement introduces new requirements related to implementing energy saving policies and increasing energy efficiency (chapter 10). The Law provides for mandatory accounting for and annual reporting on the implementation of energy saving and energy efficiency measures for all entities that consume energy resources equivalent to 1,500 or more tons of fuel equivalent per year, as well as for state institutions, state-owned enterprises and national companies. The industrial sector is currently implementing the obligations related to energy audits, which is expected to result in energy savings and reduction of air emissions.

The 2014 Resolution of the Government No. 864 approves the criteria for categorization of hazardous production sites according to the types of activities and maximum amounts of hazardous substances on site. In this context, if a hazardous production site meets the criteria, the site must be the subject of a mandatory industrial safety declaration. In addition, the legal framework for identification of hazardous activities incorporates the following instruments:

- Rules defining criteria for classifying hazardous industrial facilities as such (2014 Order of the Minister of Investments and Development No. 341);
- Rules for the development of the declaration of industrial safety of a hazardous production facility (2014 Order of the Minister of Investments and Development No. 341);
- Rules for the identification of hazardous production facilities (2014 Order of the Minister of Investments and Development No. 353);
- Rules for evaluation of the general level of danger of a hazardous production facility (2014 Order of the Acting Minister for Investments and Development No. 300);
- Criteria for assessment of the degree of risk and checklists in the field of industrial safety (2015 Joint Order of the Minister for Investments and Development No. 1206 and the Minister of National Economy No. 814).

Policy framework

Concept of Innovation Development until 2020

The main goal of the 2013 Concept of Innovation Development until 2020 (2013 Decree of the President No. 579) is to bring Kazakhstan to the position of being one of the top 30 most competitive countries in the world, through the development of new technologies and services, which will allow its transition from a commodity-based to an innovative economy. It includes the promotion of innovations to expand the consumption of new materials and technologies, increasing the share of renewable energy sources in Kazakhstan's energy mix and the further development of leading innovative clusters.

State Programme of Industrial and Innovative Development for the period 2015–2019

The 2014 State Programme of Industrial and Innovative Development for the period 2015–2019 (2014 Decree of the President No. 874) is a follow-up of the previous State Programme of Industrial and Innovative Development for the period 2010–2014 and takes into account implementation results of the previous Programme. The key objectives of the Programme include the rapid development of secondary industry; improvement of the effectiveness and increasing value added in priority sectors; expansion of markets for production of non-primary goods; an increase in employment; creating innovation clusters; and promotion of small and medium-sized businesses in secondary industry. The Programme is also part of the industrial policy of Kazakhstan, including the long-term priority to diversify the national economy, and was developed in accordance with the principles and provisions of the Concept of Innovation Development until 2020. However, this Programme does not address the importance of introducing environmental and health and safety management systems and social responsibility management requirements in the development of industry.

Second Five-Year Plan of Industrialization for the period 2015–2019

Within the framework of the Second Five-Year Plan, more than 320 projects amounting to 4.5 trillion tenge are planned to be implemented, with the creation of over 37,000 permanent jobs. Some of the most significant projects include the complex to produce wheels for railway use (Pavlodar Oblast) and the organization of metal structures production using robotic welding methods (Atyrau Oblast). The Plan has had a positive impact on manufacturing industry: projects worth 2.2 trillion tenge were implemented in 2016 alone. For example, in, Akmola and Mangistau Oblasts and the capital, more than 45 per cent of manufacturing industry output was due to projects implemented under the Plan in 2016. In Kostanay and Pavlodar Oblasts, more than one quarter of the total volume of manufacturing produced (29.7 per cent and 29 per cent, respectively) was from projects developed under the Plan in the same period. About 500 types of new products were introduced in Kazakhstan, such as freight and passenger cars, electric locomotives, trucks, cars and buses, transformers, X-ray equipment, LED lamps, titanium ingots and slabs, medicines, dairy products and others.

In spite of the successful implementation of the Plan, environmental safeguards are not proposed to reduce negative environmental impacts of related industrial projects.

<u>Strategic Plan of the Ministry of Energy for the period 2017–2021</u>

One of the objectives of the Strategic Plan of the Ministry of Energy for 2017–2021 (2017 Order of the Minister of Energy No. 490) is to improve the quality of the environment and ensure Kazakhstan's transition to low-carbon development and green economy. The Plan includes the modernization of industries, which are under the tutelage of the Ministry of Energy, and the introduction of more efficient technologies.

<u>Concept of Transition to Green Economy</u>

The main principles addressed in the 2013 Concept of Transition to Green Economy (2013 Decree of the President No. 577) include the improvement of resource productivity, which is determined as GDP per unit of water, land and energy resources and GHG emissions, responsible use of resources and modernization of the economy using the most efficient technologies.

The main activities concerning the industry sector are the modernization of industry to reduce energy consumption per production unit, introduction of innovative technologies for increased energy efficiency, provision of financial and human resources support for modernization of enterprises, and cooperation of science and industry in the modernization of equipment and creation of lean production. Implementation in the industry sector has been slow, but the shift to green technologies has recently started.

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis targets 8.2, 9.2, 9.4 and 9.5 of the 2030 Agenda for Sustainable Development is described in box 11.2.

Box 11.2: Targets 8.2, 9.2, 9.4 and 9.5 of the 2030 Agenda for Sustainable Development

<u>Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</u>
<u>Target 8.2: Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors</u>

Main policy directions in Kazakhstan include the development and diversification of the national economy. The sustained growth of GDP and industrial production during recent years, combined with the rapid development of manufacturing industry and increased value-added production, show that Kazakhstan is setting up a framework that will allow the achievement of higher levels of productivity in the near future, contributing to the effective implementation of target 8.2. This progress is mostly due to the higher effectiveness and innovation in priority subsectors, promotion of small and medium-sized businesses and an increase in employment.

<u>Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</u>
<u>Target 9.2: Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries</u>

In terms of raising industry's share of employment, as required in target 9.2, indicator 9.2.1 (Manufacturing value added as a proportion of GDP and per capita) has been assessed. Industry accounted for 26.8 per cent of Kazakhstan's GDP in 2017. The two largest industrial sectors are mining and manufacturing. The manufacturing sector's share of GDP has grown during the last decade, accounting for 11.2 per cent of GDP in 2017. The Government expects a steady increase in production in many branches of manufacturing industry in the next few years as a result of the 2014 State Programme of Industrial and Innovative Development for the period 2015–2019. The mining industry plays a key role in the country's economy, accounting for 13.6 per cent of GDP. Crude oil and gas production alone accounted for 41 per cent of total industrial output in 2017. However, this dependence on mineral resources makes the country's economy vulnerable to external shocks. This requires a strong response to foster diversification and innovation in industry that can result in sustainable industrialization.

Kazakhstan's employed population was estimated at 8.42 million people in 2017, including 197,900 in the mining industry and 2.91 million in the manufacturing industry. Thus, indicator 9.2.2 (Manufacturing employment as a proportion of total employment) shows that the country's manufacturing share of total employment is significant as it accounts for 34.6 per cent of the employed population. The mining industry accounts for 2.3 per cent of the employed population.

Target 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

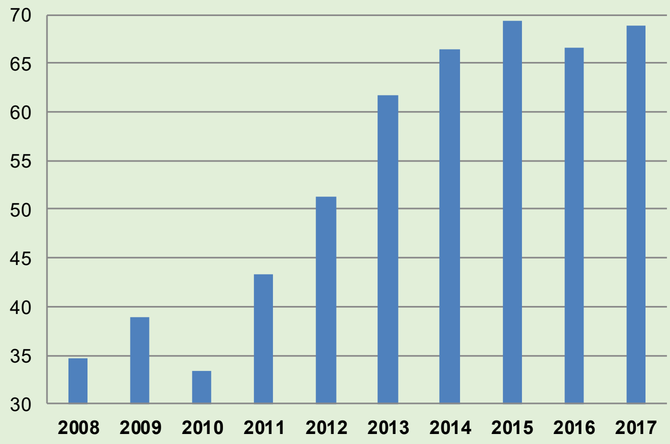
The 2013 Concept of Transition to Green Economy has been preparing the country to shift to green technologies, with higher resource-use efficiency and lower emissions from industrial processes. The Concept establishes challenging objectives to be met by 2020, 2030 and 2050. The country also promotes international cooperation in green economy through technology transfer, knowledge exchange and financial assistance for the implementation of investment projects under the Green Bridge Partnership Programme. The Government also plans to create an international centre of green technologies in 2018.

Target 9.5: Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

In Kazakhstan, domestic expenditure on research and development (R&D) reached almost 69 billion tenge in 2017 (figure 11.3), accounting for 0.13 per cent of GDP (indicator 9.5.1: Research and development expenditure as a proportion of GDP). This is low compared with OECD Member countries, where the share was 2.35 per cent of GDP in 2016. In addition, the 2017 Sustainable Development Goals Report by the United Nations indicates that 1.7 per cent of global GDP was devoted to R&D. In Europe and Northern America, the average stood at 2.2 per cent of GDP. Kazakhstan should therefore make further efforts to achieve stronger progress in this area. It is not possible to identify the impact of R&D on low carbon development and green technology in Kazakhstan.

The total number of researchers in Kazakhstan was 22,081 in 2017, an increase of 35.4 per cent compared with 2008 (16,304). There were 954 researchers per million inhabitants in Kazakhstan in 2017 (indicator 9.5.2: Researchers (in full-time equivalent) per million inhabitants). This is below the world average (1,098 in 2014) and lower than in Europe and Northern America (3,500 in 2014).

Figure 11.3: Domestic expenditure on R&D, 2008–2017, billion tenge



Source: Committee on Statistics, 2018.

Institutional framework

Ministry for Investments and Development

The Ministry for Investments and Development is the state body carrying out management in the spheres of industry and industrial-innovative development, scientific and technological development, mining (except hydrocarbon raw materials and uranium), metallurgy, and the chemicals, pharmaceuticals, light, woodworking and construction industries. Other functions of the Ministry include investment policy and support, export controls, geological survey, industrial safety, energy conservation and energy efficiency. The Ministry for Investments and Development is in charge of prevention of adverse impacts of hazardous production facilities in the case of accidents and incidents at these sites.

The Ministry includes eight committees (Roads; Civil Aviation; Geology and Subsoil Use; Industrial Development and Safety; Investment; Technical Regulation and Metrology; Transport; and Construction, Housing and Utility Services).

Ministry of Energy

The Ministry of Energy is the main governmental institution responsible for regulation and control in the following industry areas: oil and gas production, oil refining, hydrocarbon transportation, processing and distribution of gas, electricity, coal mining and nuclear power. It also conducts tenders for granting subsoil use rights for hydrocarbons, coal and uranium, approves subsoil use contracts and represents the interests of Kazakhstan in the framework of such contracts.

The Ministry is also the authority in charge of conservation of natural resources and environmental protection and control, municipal solid waste management, climate change, development of RES, and implementation of the Concept of Transition to Green Economy. Its Committee of Environmental Regulation and Control has regulatory and enforcement functions in the environmental area.

National Chamber of Entrepreneurs "Atameken"

The main task of the National Chamber of Entrepreneurs "Atameken" is the protection of the rights and interests of business and ensuring the involvement of all entrepreneurs in the process of establishment of legislative and other regulatory rules for business. The National Chamber includes 14 oblast chambers and chambers of the capital city and Almaty City. In addition, a National Council of Businesswomen and its regional councils were created under the National Chamber. The National Chamber has subdivisions responsible for different issues, including the Department of Ecology, among others.

Alliance of Technology Commercialization Professionals

The Alliance of Technology Commercialization Professionals was established under the recently closed Technology Commercialization Project. The Project was launched in 2008 by the Ministry of Education and Science, with support from the World Bank, to improve the country's science and technology system. Following the Project's completion, the Alliance continues to further develop technology commercialization practices in Kazakhstan by building the capacity of technology commercialization professionals at universities, technological parks, business incubators and companies.

Horizontal coordination

Overall, there is a lack of cooperation among the institutions in charge of industry sector management. This is mainly due to the poor inter-ministerial communication for information exchange, mainly between the Ministry of Energy and Ministry for Investments and Development, as mechanisms are not in place (either formally or informally).

Participation in international agreements and processes

Kazakhstan has been a party to the ECE Convention on the Transboundary Effects of Industrial Accidents since 2001. The country is also a beneficiary of the Convention's Project on Strengthening Industrial Safety in Central Asia (2016–2019) and has thus benefited from additional support for assessment of industrial safety and the development of a national action plan for the implementation of the Convention. However, the level of implementation of the Convention remains inadequate. As of April 2018, the country has not identified hazardous activities under the Convention that could cause a transboundary effect in the event of an accident, affecting neighbouring or riparian countries.

In 2016, Kazakhstan appointed three competent authorities under the Convention: the Ministry of Internal Affairs, Ministry for Investments and Development and Ministry of Energy. To date, the level of coordination among these authorities remains inadequate. However, some important progress was made in January 2018 when, within the framework of the above Project, Kazakhstan completed its national self-assessment and action plan. Key steps remaining to be taken by Kazakhstan include to:

- Establish an inter-ministerial working group for the implementation of the Convention;
- Identify hazardous activities under the Convention, namely, those that could cause a transboundary effect in the event of an accident;
- Notify potentially affected countries of industrial activities that may cause transboundary effects;
- Raise awareness among authorities on the national and local levels, as well as the operators of hazardous activities, of the main requirements of the Convention;
- Ensure use of the Convention's Industrial Accidents Notification (IAN) system, as

appropriate, by the Ministry of Internal Affairs as the point of contact.

In addition, another Project to Strengthen the Safety of Mining Operations, in particular, Tailings Management Facilities (TMF) in Kazakhstan and beyond in Central Asia, is being implemented in 2018–2019 in the framework of the Convention. It supports Kazakhstan with the preparation of a hazard rating list and map of tailings management facilities, and in the implementation of the recommendation arising from its first (2000) and second (2008) Environmental Performance Reviews that “a broad programme for the management of existing mining tailings, including hazardous and radioactive tailings, should be developed, financed and implemented”.

11.6 Assessment, conclusions and recommendations

Assessment

The mining and manufacturing industries continue to play an important role in the national economy, being the main drivers of economic growth. During recent years, Kazakhstan has made efforts to diversify its economy through the development of non-resource sectors. Nevertheless, the extractive industries, including oil and gas, still account for a significant share of value added and the bulk of exports and foreign investment. This dependency on natural resources makes the country vulnerable to the threat of external factors and indicates a missed opportunity to move along the production value chain.

In order to enhance the country’s industrialization through developing secondary industry, introducing modernization and innovation and increasing the manufacturing of higher-value-added products, the Government has adopted several programmes and plans. On the one hand, it has improved modernization and innovation in industry, particularly in manufacturing, during recent years. On the other hand, the lack of environmental, health and safety and social responsibility management objectives, lessens their contribution to the well-being of communities that suffer from the negative impacts of industrial operations.

Conclusions and recommendations

Inclusive and sustainable industrialization

If effectively implemented, the current industrial policies, programmes and plans will allow the country to achieve higher levels of economic productivity through diversification, technological upgrading and innovation and then contribute to the implementation of industry-related targets of the 2030 Agenda for Sustainable Development (targets 8.2, 9.4, 9.5 and 9.b). A significant increase in industry’s share of employment and GDP is also expected in the coming years, in line with target 9.2 of the 2030 Agenda. However, the introduction of environmental (ISO 14001), health and safety (OHSAS 18001) and social (e.g. ISO 26000) standards, which is indispensable for achieving inclusive and sustainable industrialization, has been rather slow.

Recommendation 11.1:
The Government should promote inclusive and sustainable industrialization in line with the 2030 Agenda for Sustainable Development, through supporting the introduction of environmental, health and safety, and social standards in industry and encouraging corporate social responsibility (CSR) in industry.

See Recommendations 2.6 and 2.7.

Greening industry

The development of industrial activities in the past has led to serious environmental impacts around the country that currently threaten the achievement of industrial policy and welfare objectives. Industry is still characterized by high energy intensity, and high volumes of GHG emissions and wastes. Air, water and soil pollution in industrialized areas adversely affect human health. In this context, there is a real need to change from outdated, high-polluting technologies to lower emissions and green technologies.

The Concept of Transition to Green Economy, which includes several industry-related targets (except for industrial waste), would contribute to improving energy efficiency and reducing environmental impacts from industry in the coming years. The Government has made efforts to create the conditions for its implementation, but regulatory measures are still needed to support the shift to green economy. The share of R&D resources allocated to support R&D on low carbon development and green technology is not identifiable but, taking into account the domestic expenditure on R&D (0.13 per cent of GDP), it is likely to be low.

Recommendation 11.2:
In order to support the introduction of green technologies in industry, the Government should:

(a) Create financial incentives for industrial enterprises to move towards green technology;

(b) *Foster the creation of small and medium-sized enterprises and start-ups focused on green technology and improve access to finance;*
(c) *Increase financial resources allocated to research and development (R&D) on low carbon development and green technology;*
(d) *Develop targets and indicators for industrial waste.*

Convention on the Transboundary Effects of Industrial Accidents

Kazakhstan is a party to the ECE Convention on the Transboundary Effects of Industrial Accidents. However, since its accession in 2001, it has shown little progress in the implementation of the Convention. As of 2018, two projects are implemented in Kazakhstan to assist the implementation of the Convention.

Recommendation 11.3:
The Government should strengthen the implementation of the Convention on the Transboundary Effects of Industrial Accidents to enhance industrial safety, in particular by:

(a) *Benefiting fully from the two projects implemented under the Convention and contributing to the project activities;*
(b) *Ensuring coordination among the three appointed competent authorities under the Convention, in particular through the appointed focal point in the Ministry for Investments and Development;*
(c) *Ensuring an active role for the Ministry of Internal Affairs as the point of contact for the Convention's Industrial Accident Notification system (reregistration and access to the system "24/7");*
(d) *Implementing the national action plan for implementation of the Convention;*
(e) *Proceeding with the identification of hazardous activities with possible transboundary effects and their notification to potentially affected countries;*
(f) *Preparing a hazard rating list and a map of tailing management facilities.*

Chapter 12

AGRICULTURE AND ENVIRONMENT

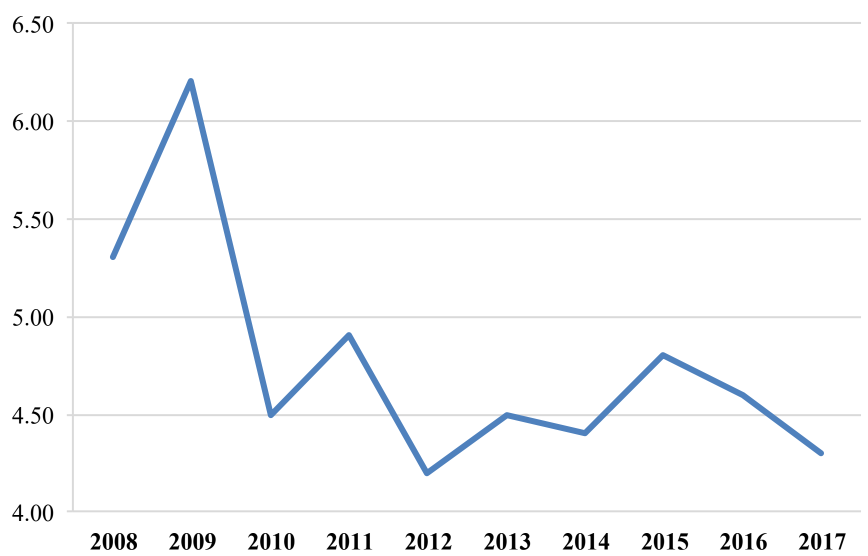
12.1 Conditions and activities in agriculture

Kazakhstan ranks second in the world after Australia in terms of arable land per capita (1.675 ha/person, whereas the global average is 0.194 ha/person) and it is one of the biggest exporters of grain and flour. On the other hand, agriculture in Kazakhstan is the smallest of the main economic sectors and its contribution to GDP over the last decade remained stable, at around 5 per cent. Its share of GDP altered between 4.2 and 6.2 per cent in the period from 2008 to 2016 (4.6 per cent in 2016) (figure 12.1). Fluctuations in its share of GDP were caused mainly by the differences in grain yields determined by weather conditions. The value of agriculture in GDP has been growing (from 983,994.9 million tenge in current prices in 2010 to 2,315,182.2 million tenge in current prices in 2017), having increased by 42.5 per cent.

The structure of agricultural production also remained stable during the last decade and the cultivation of crops remained slightly superior to animal husbandry over the period in terms of production value: from 2014, its share has stabilized at the level of 56:44 (figure 12.2). Agricultural production is more important in the mid-north and mid-south of the country where crop cultivation is predominant, but livestock breeding on farms is also widespread, through fodder production and because the population is concentrated in those areas representing higher demand for food and providing labour for labour-intensive agricultural activities.

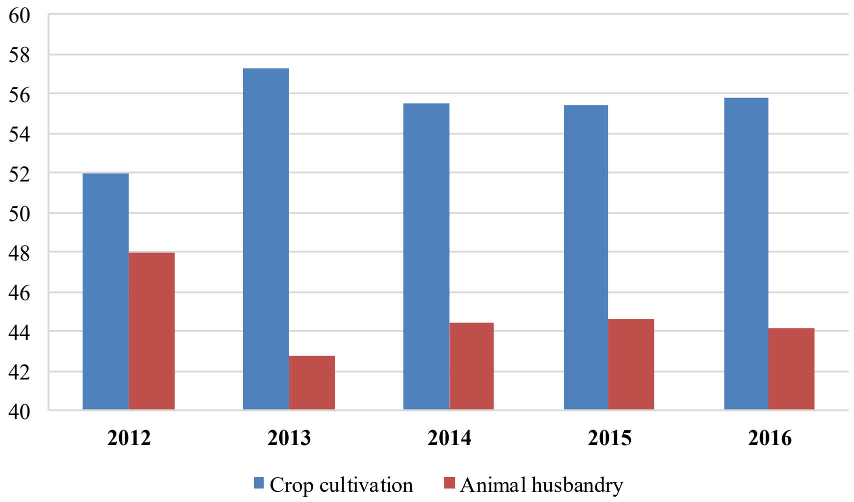
Crop yields are very low in Kazakhstan (e.g. wheat yield in 2015 was 1.33 t/ha while the global average was 3.75 t/ha), but overall per capita agricultural productivity is similar to the global average. Food processing is at a low level, in terms of both quantity and quality: approximately 80 per cent of the agricultural products produced in the country are sold as raw material, while the competitiveness of processed agricultural products in foreign and domestic markets is also low. Despite the abundance of arable land and the sufficient level of freshwater resources, Kazakhstan is a net importer of agricultural and food products. The value of food imports (US$2.3 billion in 2016) is more than double the country's agricultural exports (US$0.9 billion in 2016).

Figure 12.1: Share of agriculture in GDP, 2008–2017, per cent



Source: Committee on Statistics, 2018.

Figure 12.2: Change in the share of the two main agricultural sectors based on production value, 2012–2016, per cent



Source: ECE secretariat calculation based on Agriculture, forestry and fisheries in the Republic of Kazakhstan 2012–2016. Statistical book.

Land use

Total agricultural land in Kazakhstan amounted to 171.8 million ha in 2015, consisting of 140.9 million ha of pastures, 26.7 million ha of tillage and reserve land (arable land) and 4.2 million ha of hayfields. According to the results of the inventory of 2012–2014, there were 7.4 million ha of unused land: 6.1 million ha of pastures and grazing lands, 1.2 million ha of arable land, 0.08 million ha of hayfields and 0.01 million ha of perennial plantations.

The agricultural land in Kazakhstan is owned by the State and is rented to Kazakh citizens or companies on long-term leasing contracts. In order to reduce the share of unused land and enhance the better use of cultivated agricultural land, the Government amended the 2003 Land Code in 2015 to allow foreign tenancy of land for up to 25 years and the purchase of land for agricultural purposes by private residents. However, in 2016, due to public dissatisfaction with the amendments, they were suspended by a five-year moratorium, until 2021. As of 2018, work is underway to revise the amendments and develop mechanisms to ensure the amendments' original aim, that is, to eliminate the barriers to more effective agricultural land use.

Agricultural activities

Crops

Crop cultivation in Kazakhstan is characterized by a duality in terms of its geographical localization and in terms of cultivated crop types. It is the most important activity in the northern (Akmola, Kostanay and North Kazakhstan Oblasts) and southern (Almaty, Kyzylorda, South Kazakhstan and Zhambyl Oblasts) parts of the country. The northern zone is dominated by cereals and forage crops, which demand less water and bear the cold, while sunflower, potato and sugar beet are also widely grown. In the southern oblasts, irrigation is more widespread and the climate is suitable for crops that require warmer temperatures during their vegetation period and are more tolerant to heat, such as rice, cotton, vegetables and fruits. The total area used for cultivating agricultural crops has been stable, occupying around 20 million ha, of which about 15 million ha is used for the cultivation of grain and vegetables, 3 million ha for forage crops and 2 million ha for oilseed crops (table 12.1). The Government's crop diversification policy aims to reduce the area planted in wheat and increase the area planted in "priority" crops, including forage crops, oilseed crops, barley and corn. The most effective diversification measure is to offer higher subsidies for "priority" crops. Due to these measures, oilseed crops increased from 4.5 per cent in 2008 to 11.4 per cent in 2017 of the total cultivated area.

From the environmental aspect, it is notable that the production of raw cotton (concentrated in the South Kazakhstan Oblast) has been decreasing. As part of the measures taken by the Government to diversify agricultural production in the period 2008–2017, the decline in the area of cotton cultivation was 43,000 ha or 24 per cent. The gross harvest of raw cotton decreased by 9.7 per cent (in volume), from 317,500 t in 2008 to 286,700 ton in 2016.

Animal husbandry

The share of livestock breeding in total agricultural production is higher than that of crop cultivation in 9 of the 14 oblasts, but it is significantly higher in Aktobe, East Kazakhstan, Karaganda, Mangistau and West Kazakhstan Oblasts, which are located in the middle of the country and covered by typical steppe vegetation, which is thus predominantly and extensively utilized as pastures. Outside the scarcely populated central steppe area, which occupies the greater part of the country, small-scale farms are widespread around the villages and towns and in the northern and southern oblasts; large livestock farms are also present, feeding the demand of big cities. Table 12.2 shows the numbers of livestock and poultry . By volume, in 2017, dairy products were the most important products of livestock breeding (more than 5 million t/y), followed by meat production: beef (over 400,000 t/y), poultry and lamb (both over 150,000 t/y) (table 12.3).

Fisheries

Fishing is the smallest subsector within agriculture. Its output shows a moderately increasing trend (figure 12.3), thanks mostly to the efforts made by the country to save the Northern Aral Sea, where fishing was launched again. However, Caspian Sea and Atyrau Oblast, which lies beside its coast, remains the most important area for fishing, providing more than one quarter (12,891 t, 2016) of the total catch (41,335 t, 2016). It is followed by Kyzylorda Oblast with fisheries on the Syrdarya River (7,515 t, 2016), East Kazakhstan with fisheries on the Irtysh River and Lake Zaysan (5,220 t, 2016) and Southern Kazakhstan (4,265 t, 2016). Fishing is predominantly practised in natural waters, which provide more than 98 per cent of the catch, but the Government has plans to enhance fish farming in order to lower the pressure on biodiversity in natural waters.

Table 12.1: Cultivated area of agricultural crops, 2008–2017, 1,000 ha

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total cultivated area	**20 119**	**21 425**	**21 439**	**21 083**	**21 191**	**21 271**	**21 245**	**21 023**	**21 474**	**21 840**
Cereals (including rice) and pulses	16 190	17 207	16 619	16 219	16 257	15 878	15 292	14 982	15 404	15 405
Forage crops	2 486	2 536	2 556	2 484	2 517	2 867	3 110	3 497	3 485	3 382
Oil-bearing crops	914	1 186	1 748	1 816	1 854	1 981	2 300	2 010	2 036	2 479
Cotton	179	140	137	161	148	141	128	99	110	136

Source: Agriculture, forestry and fisheries in the Republic of Kazakhstan 2012–2016 and 2013–2017. Statistical books.

Table 12.2: Livestock and poultry, 2008–2017, number

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cattle (1,000 head)	5 992	6 095	6 175	5 702	5 690	5 851	6 033	6 184	6 413	6 764
Sheep and goats (1,000 head)	16 770	17 370	17 988	18 092	17 633	17 561	17 915	18 016	18 184	1 832
Pigs (1,000 head)	1 347	1 326	1 344	1 204	1 032	922	885	888	834	815
Horses (1,000 head)	1 371	1 439	1 528	1 607	1 686	1 785	1 938	2 070	2 259	2 416
Camels (1,000 head)	148	156	170	173	165	161	166	171	180	193
Poultry (million head)	30	33	33	33	34	34	35	36	37	40

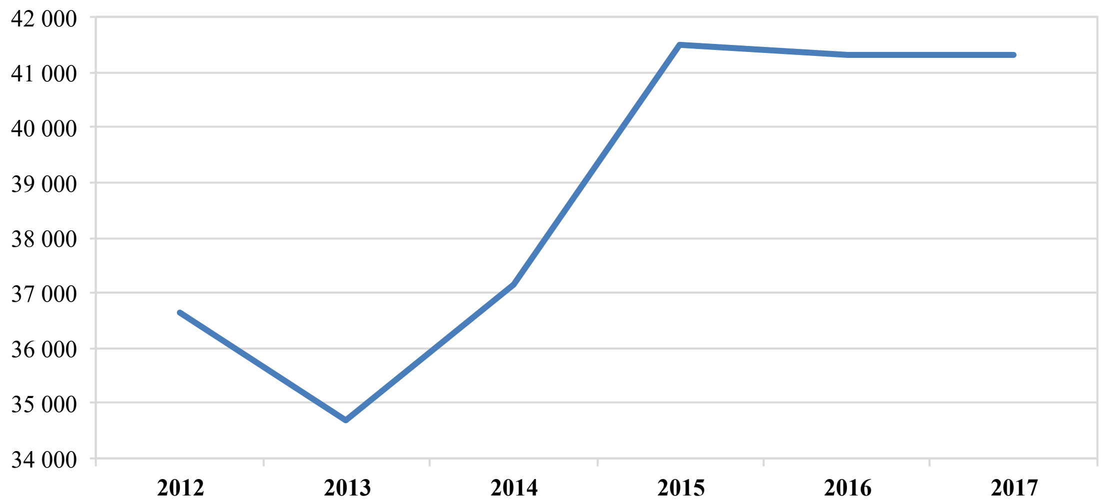
Source: Agriculture, forestry and fisheries in the Republic of Kazakhstan 2012–2016 and 2013–2017. Statistical books.

Table 12.3: Main products from livestock breeding, 2011–2017, 1,000 t

	2011	2012	2013	2014	2015	2016	2017
Milk and dairy products	5 233	4 852	4 930	5 068	5 182	5 342	5 503
Beef meat	393	374	384	406	417	431	450
Lamb meat	150	154	156	162	165	169	171
Poultry	102	123	136	134	146	153	180

Source: Agriculture, forestry and fisheries in the Republic of Kazakhstan 2012–2016 and 2013–2017. Statistical books.

Figure 12.3: Catch of fish and other aquatic animals, 2012–2017, t



Source: Agriculture, forestry and fisheries in the Republic of Kazakhstan 2012–2016 and 2013–2017. Statistical books.

Organizational types of agricultural production units

According to the data of 1 January 2017, 9,740 legal entities and 177,884 smallholders and farms were registered in Kazakhstan to perform some kind of agricultural activity. About two thirds of Kazakhstan's companies deal with agriculture and over 90 per cent of those companies reported agriculture as their main activity.

However, the production value of the non-registered agricultural activity of the population (standalone households) is estimated to be higher (48 per cent in 2016) than that of companies (24 per cent) or smallholders and farms (28 per cent) (table 12.4). In crop cultivation, the share of the three organizational and ownership types is quite balanced, but in animal husbandry, households' production value was 72 per cent. The high share of households in agricultural production explains the low crop yields and low overall productivity of Kazakh agriculture, due to the obsolete machinery and crop types used and households' limited capacity to invest in development of the conditions of production. Even beyond the households' agricultural production, the almost equivalent share of agricultural companies on the one hand and smallholders and small farms on the other, implies that the development of the sector is hindered by the specific ownership structure, because smaller units do not have the adequate means and capacity to enhance production.

Operating agricultural cooperatives are scarce in Kazakhstan. Before the adoption of the Law on Agricultural Cooperatives in 2015, there were two models to encourage and support the development of rural cooperation:

- Through the Ministry of Agriculture and the Agrarian Credit Corporation JSC, by granting concessional loans at 5 per cent interest for 5–7 years to establish a rural consumer cooperative;
- Through seven social entrepreneurship corporations (Otetstik JSC, Zhetysu JSC, Yertys JSC, Tobol JSC, Batys JSC, Sary-Arka JSC and Kaspiy JSC) that were created to operate as service and procurement centres and to provide agro-services to rural cooperatives.

Despite the state support to the rural cooperatives, they did not gather momentum, mostly because of the distrust of the rural population, based on both the experience of forced collectivization in the Soviet era and recent experiences with false cooperation principles, in which a large company was actually dominant in the cooperative and basic cooperative principles (voluntarism, democracy) were not respected and the internal procedures of cooperatives as non-profit organizations were not clear. With the adoption of the new Law, the Government encourages the creation of agricultural cooperatives by setting clear rules and procedure for their establishment and operation and by offering them tax incentives. By the Government's estimation, there were 150 agricultural cooperatives in operation in 2016, and their number will grow to reach 1,204 by 2021, according to the State Programme on Development of the Agro-industrial Complex for the period 2017–2021.

Table 12.4: Gross output of agricultural products and services by main categories of producers, 2012–2016, million tenge

	2012	2013	2014	2015	2016
Gross output of agriculture	**2 393 619.0**	**2 949 485.0**	**3 143 678.1**	**3 307 009.6**	**3 684 393.2**
by type of organization and ownership:					
Agricultural enterprises	396 032.6	572 619.9	589 501.7	680 402.4	856 270.0
Smallholders and farms	548 298.1	752 363.9	810 163.3	904 542.9	1 043 755.3
Population (households)	1 449 288.3	1 624 501.2	1 744 013.1	1 722 064.3	1 784 368.0
Gross output of crop cultivation	**1 241 517.0**	**1 683 851.4**	**1 739 436.4**	**1 825 236.7**	**2 047 580.8**
by type of organization and ownership:					
Agricultural enterprises	288 424.8	443 895.3	420 463.9	501 669.5	628 261.7
Smallholders and farms	429 002.5	605 007.1	631 099.7	693 001.3	796 483.7
Population (households)	524 089.7	634 949.0	687 872.8	630 565.9	622 835.3
Gross output of animal husbandry	**1 145 437.3**	**1 256 871.7**	**1 393 762.0**	**1 469 923.0**	**1 621 541.4**
by type of organization and ownership:					
Agricultural enterprises	100 943.2	119 962.8	158 558.1	166 883.1	212 737.2
Smallholders and farms	119 295.6	147 356.8	179 063.6	211 541.6	247 271.5
Population (households)	925 198.6	989 552.1	1 056 140.3	1 091 498.4	1 161 532.7

Source: Agriculture, forestry and fisheries in the Republic of Kazakhstan 2012–2016. Statistical book.

Use of fertilizers and pesticides

The use of fertilizers is at a very low level in Kazakhstan compared with internationally: despite the increase between 2008 and 2015, it is still 10 times lower (4 kg/ha of arable land) than the average per ha consumption of fertilizers in Europe and Central Asia (excluding high income countries, 41 kg/ha) and negligible compared with global usage (141 kg/ha) (figure 12.4). On average, in 2011–2015, about 110,000 t of mineral fertilizers were applied annually in active substance content (table 12.5). The annual requirement of Kazakh agriculture for mineral fertilizers is 1 million t in active substance or about 2.5 million t in physical weight. Nitrogen fertilizers account for 48 per cent, phosphorus for 51 per cent and potash fertilizers for 1 per cent of mineral fertilizer usage. The low consumption level is caused by the high costs of mineral fertilizers (due to low domestic production), despite the subsidies that the Government provides to farmers through rayon- and oblast-level akimats.

The use of pesticides shows a significantly increasing trend: between 2008 and 2017, it more than tripled, from 0.2 kg/ha to 0.63 kg/ha (whereas in the People's Republic of China it was 13.7 kg/ha in 2008 and 14.7 kg/ha in 2014, and in Ukraine, 1.6 kg/ha in 2008 and 2.3 kg/ha in 2014) (table 12.6). The very low pesticide consumption is also determined by its high costs and the unfavourable land ownership structure, by which smallholders and households use practically no pesticides, but enterprises use them exclusively. Almost 80 per cent of the country's pesticides consumption consists of herbicides and desiccants. The use of biological methods of pest control is present in the country, mostly in the fields and farms that produce organic food for export.

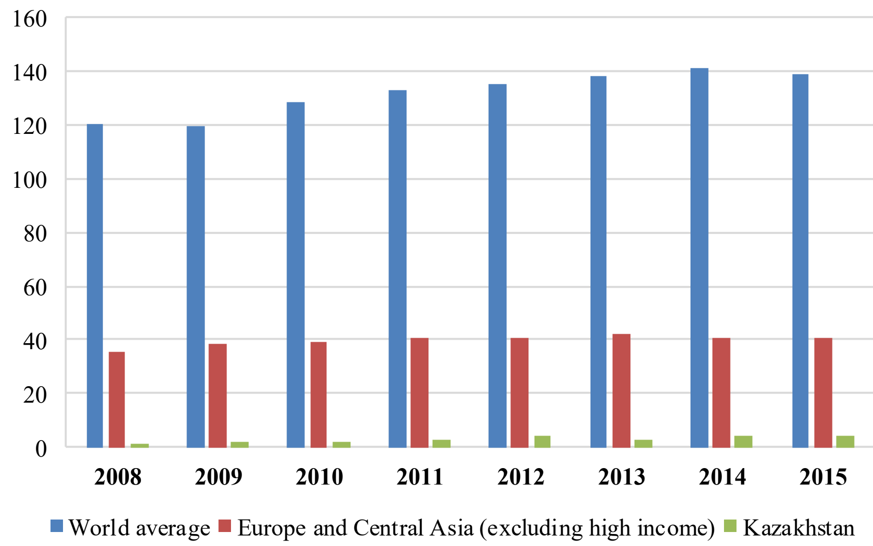
Manure management

Manure is predominantly used as an organic fertilizer, but the supply is not sufficient to cover needs because livestock breeding mostly relies on grazing and is done on pastures, which does not allow the production of organic fertilizers. Organic fertilizers are the almost exclusive source of soil fertility restoration for small-scale farming, given that such farmers are the predominant livestock breeders, while in the areas of extensive crop cultivation, the organic fertilizer supply is not sufficient. The area on which organic fertilizer was used in 2015 was about 69,000 ha, which is one third lower than in 2011. Based on scientific estimations around the proposed amount of 5 t/ha, the country's annual need for organic fertilizers for the current stock of arable lands (21–22 million ha) would be about 100–110 million t.

Use of genetically modified organisms

The use of GMOs is regulated by a few legislative acts. Based on the 2003 Law on Seed Production, the sale and planting of genetically modified seeds is prohibited. Because GMO seeds cost more than traditional ones, the overwhelming majority of Kazakh crop producers could not afford to purchase GMO seeds and, to date, no violations of the Law have been discovered.

Figure 12.4: Fertilizer consumption, 2008–2015, kg/ha of arable land



Source: World Bank: https://data.worldbank.org/indicator/AG.CON.FERT.ZS?end=2015&start=2008.

Table 12.5: Mineral and organic fertilizers usage, 2011–2015

	2011	2012	2013	2014	2015
Used mineral fertilizers (million t in active substance)	0.09	0.13	0.08	0.12	0.13
Consumption of mineral fertilizers per 1 ha of sowing area (kg in active substance)	4.10	6.00	3.90	5.40	6.00
Area of land where mineral fertilizers were used (1,000 ha)	973.30	1 461.40	1 397.50	1 582.10	1 459.90
Share of the area fertilized with mineral fertilizers, of all sowing area (%)	4.60	6.80	6.50	7.40	6.90
Used organic fertilizers (million t)	1.10	0.80	0.50	0.50	0.50
Consumption of organic fertilizers per 1 ha of sowing area (t)	0.05	0.04	0.02	0.02	0.03
Area of land whereorganic fertilizers were used (1,000 ha)	97.20	122.40	65.70	56.80	68.90
Share of the area fertilized with organic fertilizers, of all sowing area (%)	0.50	0.60	0.30	0.30	0.30

Source: State Programme on Development of the Agro-industrial Complex for the period 2017–2021.

Table 12.6: Use of pesticides, 2008–2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total consumption of pesticides (t)	**7 045**	**8 716**	**6 284**	**10 657**	**8 565**	**9 662**	**11 159**	**11 113**	**10 672**	**13 811**
Consumption of pesticides per unit of agricultural area (kg/ha)	0.2	0.24	0.18	0.29	0.4	0.45	0.45	0.52	0.49	0.63

Source: Committee on Statistics, 2018.

Water use

Agriculture is by far the biggest user of water resources in Kazakhstan. Approximately two thirds of both the abstracted and used waters in the country is used by agriculture (in 2016, 15.2 km^3 and 12.4 km^3, respectively), mostly (70–100 per cent, depending on the year) for irrigation. Half of the total abstracted (11.9 km^3, 2016) and used (9.6 km^3, 2016) water in the country is used for irrigation (table 12.7). The RSE Kazvodkhoz, entirely owned by the Government, provides water supply and irrigation water delivery services throughout the entire country.

The foundation of the current irrigation system has been developed during several 5-year plan periods in the 1960s and 1970s and, by the mid-1980s, the irrigated area had reached 2.3 million ha. During the transition period, the irrigated area decreased significantly, and it amounted to 1.35 million ha in 2015. Irrigation is predominant in the southern oblasts, where farmers have access to the Syrdarya River or to smaller rivers originating from the Tien Shan mountains (e.g. the Talas and Shu Rivers).

About 11–15 per cent of the abstracted water is lost during transport, mostly due to the obsolete irrigation infrastructure and methods.

Since 2010, there has been large growth in the expansion of water-saving technologies, which have increased from 2–3 per cent to 13–15 per cent of the irrigated area where some kind of water-saving technology is in use. Sprinkling technology is the most popular, being used on around 100,000 ha, and drip irrigation is used on about 80,000 ha.

Based on the State Programme on Development of the Agro-industrial Complex for the period 2017–2021, the Government plans to reintroduce irrigation on 610,000 ha by 2021. The freshwater resource needed for such a huge expansion would be partially ensured by enhancing the efficiency of the current irrigation system. The plan is to reduce by 1.4 km^3 between 2015 and 2021 the losses during transport (for agricultural purposes, i.e. irrigation) while abstraction through both regular and inundative irrigation is planned to increase by 3.05 km^3, meaning that an additional 4.45 km^3 of water will be available for the irrigation of 610,000 ha (i.e. 7.295 m^3/ha), which will cover the increased needs and is also within the range set by the result indicator for the year 2021 (7.348 m^3/ha of water consumption for irrigation) (tables 12.8 and 12.9).

Tariffs for water for irrigation

Beside the obsolete irrigation system, the other main reason for losses is the low cost of water supply, which does not encourage the use of effective technologies for water saving and does not allow for ensuring the full maintenance, operation and repair of irrigation systems. According to the analysis of the State Programme on Development of the Agro-industrial Complex for the period 2017–2021, irrigation water costs currently make up less than 1 per cent of the costs of cultivation of basic crops (0.9 per cent for wheat, 0.1 per cent for cotton), which is significantly less than in other countries (4–13 per cent for wheat, 2–10 per cent for cotton in countries such as Australia, the People's Republic of China, India, Israel, South Africa and the United States). In absolute terms, the current level of tariffs for irrigation water is one of the lowest in the world, 2–10 times less than in countries such as Australia, the People's Republic of China, Greece and the United Kingdom, and 20 times less than in Israel. Since the water tariff for the end user is extremely low (the average tariff is 0.5 tenge/m^3), it does not stimulate efficient water consumption.

Table 12.7: Freshwater abstraction and use by agriculture, 2016, million m^3

	2016	% of total
Total freshwater abstracted	**22 771.0**	
of which: for agriculture, forestry and fishing	15 186.0	66.69
of which: for irrigation	11 946.0	52.46
Total freshwater use	**19 309.0**	
of which: for agriculture, forestry and fishing	12 414.4	64.29
of which: for irrigation	9 610.0	49.77

Source: Committee on Statistics, 2018.

Table 12.8: Result indicators related to the efficient use of water resources, km^3

	2015 (Actual)	2016 (Estimated)	2017	2018	2019	2020	2021
Total capacity of reservoirs	97.90	97.90	97.90	97.90	97.90	98.80	99.80
Volume of abstraction of surface water resources for the needs of agriculture with regular irrigation	12.20	12.65	12.18	12.17	12.63	13.52	14.70
Volume of abstraction of surface water resources for the needs of agriculture with inundative irrigation	0.35	0.35	0.37	0.43	0.52	0.70	0.90
Volume of losses during the transportation of surface water resources for the needs of agriculture	5.10	4.93	4.39	4.02	3.79	3.65	3.69

Source: State Programme on Development of the Agro-industrial Complex for the period 2017–2021.

Table 12.9: Result indicators for water consumption

	2015 (Actual)	2016 (Estimated)	2017	2018	2019	2020	2021
Water consumption for irrigation (m^3/ha)	9 180.0	9 036.0	8 608.0	8 223.0	7 873.0	1 548.0	7 348.0
Increase in surface water resources (m^3)	..	..	..	..	..	0.9	1.0

Source: State Programme on Development of the Agro-industrial Complex for the period 2017–2021.

Photo 12: Spring in the steppe, Assy Plato

Current tariffs provide a uniform rate regardless of the change in consumption amount, unlike tariffs used in other countries that increase as demand increases or are dependent on irrigation technology. In addition, some tariff subsidies encourage the use of inefficient technologies and crops, for example, state subsidies for the irrigation of rice fields amount to 50 per cent of the irrigation cost.

Extension services

Agricultural extension services in Kazakhstan were set up within the World-Bank-financed Agricultural Competitiveness Project between 2005 and 2012. As a result of the project, KazAgroInnovation state holding company was established under the supervision of the Ministry of Agriculture and appointed to provide extension services. As part of the project, the state extension system was created. Between 2005 and 2012, it supported 2,500 farmers and entrepreneurs who received basic knowledge on agricultural marketing and marketing information systems. Nine regional training centres were established and equipped with call centres in locations important for agriculture. Additionally, the new training centres provided training to about 7,800 farmers and almost 3,000 contracts were signed with farmers for a subscription service that provided them with a minimum package of consultation and information.

In 2017, the extension services were provided by the Centre of Agricultural Competences of the National Chamber of Entrepreneurs "Atameken" and financed by the Government.

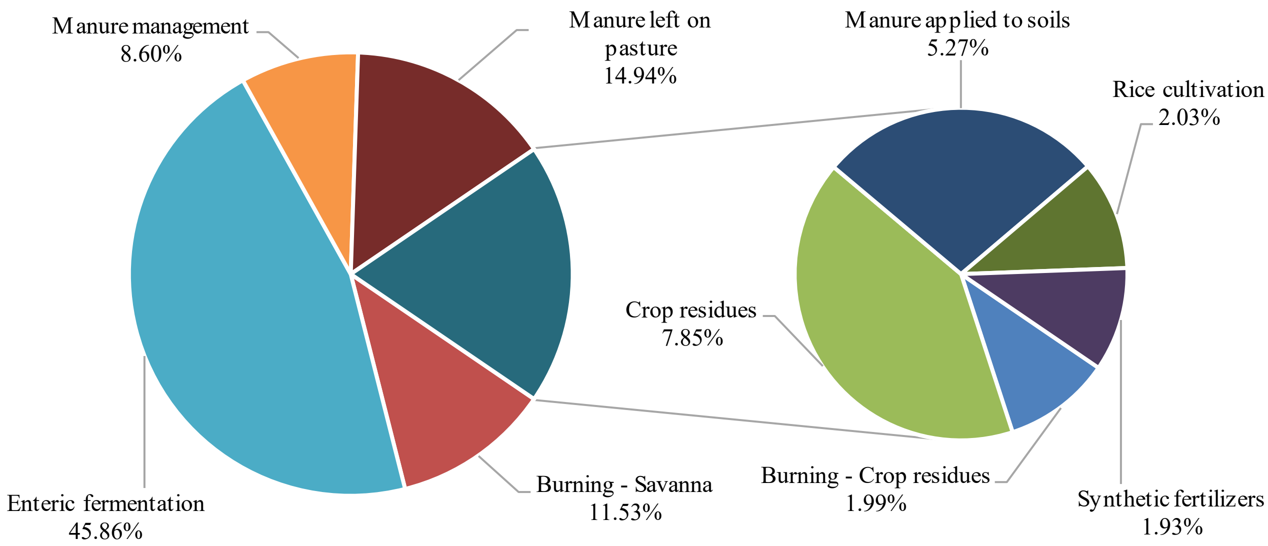
12.2 Pressures from agriculture

Greenhouse gas emissions

In 2015, agriculture was the second biggest emitter of GHGs in Kazakhstan after the energy sector, although its GHG emissions are about 11 times lower than those of the energy sector (table 5.2).

According to FAO, enteric fermentation has accounted for the greatest proportion of agricultural GHG emissions (45.86 per cent on average in the period 2008–2016) (figure 12.5). It was followed by emissions from manure left on pastures (14.94 per cent), the burning of savanna (steppe, in the case of Kazakhstan, 11.53 per cent) and manure management (8.6 per cent).

Figure 12.5: Composition of GHG emissions from agricultural activities, average for the period 2008–2016



Source: FAOSTAT, accessed 15 April 2018.

Biodiversity

Agricultural activity in the southern part of the country is responsible for the greatest pressure on biodiversity, by reducing the area of natural habitats. The most vulnerable areas are the desert ecosystems.

Also, due to bad grazing practices (owners of livestock are either not willing to change pastures during the year or from year to year, or often do not have the means to transport their animals to remote pastures), the areas around the settlements suffer from serious overgrazing, which significantly reduces the biodiversity in the vicinity of settlements and in areas with higher population. This problem has been recognized by the Government and it resulted in the adoption of the 2017 Law on Pastures, which introduces several measures to mitigate and manage the problem, with an overall goal to ensure the rational use of pastures. The pasture management plans, to be developed at local level, are to ensure the implementation of the pasture rotation scheme based on a geobotanical survey of related pastures and the implementation of awareness-raising among pastoralists on how to conduct the actions needed for the rational use of pastures. Pasture management plans also aim to ensure sustainable provision of feed requirements and prevention of pasture degradation processes, so they might also play a significant role in preserving agrobiodiversity. The Law allows grazing only if the maximum permissible load norm for the total area of pasture is not exceeded on the pasture concerned.

Reportedly, agrobiodiversity has begun to receive stronger attention from the Government since the 2014 governmental reorganization.

Soil

All over Kazakhstan there is a steady tendency towards deterioration of the quality of land, resulting in reduced content of humus, nutrients, species composition of vegetation and, eventually, its overall productivity, which reduces the potential for agricultural production. This is mainly due to the lack of activity to improve soil fertility and the lack of irrigation of the pastures. Neither the use of mineral nor organic fertilizers are sufficient to restore soil fertility.

According to the State Programme on Development of the Agro-industrial Complex for the period 2017–2021, the results of the land survey conducted at the end of 2015 show that:

- 72.8 per cent of the soils of arable land had low humus content (less than 4 per cent), 25.9 per cent had average humus content (4–6 per cent) and only 1.3 per cent had high humus content (more than 6 per cent). Of irrigated lands, 98.2 per cent of the soils had low humus content and 1.8 per cent had medium content;
- Soils with a low content of easily hydrolyzable nitrogen occupied 55.8 per cent of the area of the surveyed arable land; 22 per cent of soils had average nitrogen content and 22.2 per cent had high nitrogen content. Of irrigated lands, 89.5 per

cent of soils had low, 3.5 per cent had medium and 7 per cent had high hydrolyzable nitrogen content;
- Soils with low mobile phosphorus content accounted for 46.2 per cent of arable land; 39.5 per cent had medium and 14.3 per cent had high mobile phosphorus content. Under conditions of irrigated agriculture, soils with a low content of mobile phosphorus occupied 26.2 per cent of the total irrigated area, soils with an average phosphorus content 51.6 per cent, and soils with a high content of mobile phosphorus 22.2 per cent;
- Low mobile potassium content was characteristic of only 9.4 per cent of soils, while the remainder had high content. Of irrigated lands, soils with a low content of mobile potassium accounted for 13.7 per cent, soils with average content 3.3 per cent, and soils with a high content 53 per cent.

Unlike chemical soil melioration, conservation agriculture (minimal soil disturbance, permanent soil cover and crop rotation) techniques are rapidly spreading throughout the country. It is estimated that 3 million ha of cultivated land is under no-tillage cultivation and 9 million ha of land is under minimal-tillage cultivation, while 5 million ha remains under conventional tillage (e.g. 97 per cent of the sown area in Kostanay Oblast is under minimal-tillage technology).

The issue of disposal of obsolete pesticides has a direct impact on soil pollution and is still a critical issue for Kazakhstan. Over 1,500 tons of obsolete pesticides and their mixtures are available at various warehouses and storage sites; some sites are not suitable for this purpose. It is estimated that about 10 per cent of such pesticides are POPs. Only 20 per cent of the country's territory has been covered by the inventory for POPs pesticides.

Water

Following the disaster of the Aral Sea, water withdrawal has been limited in the Syrdarya River and its tributaries in order to allow partial restoration of the Aral Sea.

Due to the low consumption of fertilizers and pesticides in Kazakhstan, agriculture's pressure on the quality of water resources is fairly low. The data related to nutrients (ammonium, nitrogen, phosphorus) in freshwater resources does not show significantly higher values at sampling points in agricultural areas in Southern Kazakhstan than in other parts of the country.

12.3 Organic agriculture

Organic agriculture is recognized by the Government as one of the most promising subsectors of agriculture in the long run. However, the current situation does not allow the exploitation of the potential of organic agriculture because the necessary by-laws for setting the national standards, certification and labelling are under development. On the other hand, the 2015 Law on Organic Production, in force since January 2016, sets basic principles and the framework for this activity. As of March 2018, the appointment of the certification bodies is still pending.

In a project supported by OSCE and FAO, three draft documents setting the standards for the organic sector (for production of crops and animal products, for certification bodies and for labelling) were developed by the end of 2017, but they are not yet adopted. The standard regulating production and the standard for certification bodies would be based on standards of the International Federation of Organic Agriculture Movements, while the preliminary version of the standard for labelling would be a combination of several international standards that have served as examples for Kazakhstan. Currently, foreign (mostly EU) certification bodies certify Kazakh companies and their products for export; these certifications are not valid in Kazakhstan but only in the country of the issuing body.

According to the Kazakh Research Institute of Agricultural Economics and Rural Development, in 2015, there were 29 producers of organic products and 19 companies certified by foreign companies for processing, storage, transportation and other operations with organic products. In 2015, the production of organic products amounted to about 300,000 t, of which 62,000 t worth about US$10 million were exported, mostly to Belgium, France, Germany, Italy, the Netherlands, Poland, the Russian Federation, the United Kingdom and Ukraine (table 12.10).

There are several initiatives all over the country, mostly led by local or regional NGOs, that aim at promoting organic farming, which, in the absence of national standards, means farming without the use of mineral fertilizers, pesticides and veterinary drugs. At the same time, these initiatives promote local food production and build local "eco" brands promoting healthy food. One of the biggest initiatives is "Green Food KZ", which started in Akmola Oblast (box 12.1.)

Table 12.10: Organic production, 2015

	Sown area (ha)	Volume of production (t)	Volume of export (t)
Barley	4 672	7 485	-
Camelina	200	300	-
Nuts	2 699	5 000	-
Nuts (in fields during transition period)	4 300	-	-
Coriander	405	486	-
Reserve lands	53 800	-	-
Linen	16 573	21 888	3 000
Linen (in fields during transition period)	8 600	-	-
Lentils	6 453	9 146	1 570
Licorice	863	60	60
Alfalfa	2 723	27 230	-
Lupin	402	563	-
Corn	100	245	-
Yellow mustard seed	3 011	6 000	-
Oats	1 770	3 944	1 000
Pastures	2 481	-	-
Peas	4 545	7 224	
Rapeseed	29 353	37 404	1 650
Rapeseed oilcake	-	-	8 410
Rice	993	3 476	-
Safflower (in fields during transition period)	4 800	-	-
Soycake	-	-	660
Soy	6 528	15 014	4 703
Soy (in fields during transition period)	2 866	-	-
Farro	793	1 190	-
Sunflower	10 030	13 053	-
Wheat	94 842	135 247	41 579
Wheat (in fields during transition period)	25 000	-	-
Vineyards	20	32	-
Yellow flax	532	692	-
Yellow millet	2 712	4 000	-
Total	**292 066**	**299 679**	**62 632**

Source: State Programme on Development of the Agro-industrial Complex for the period 2017–2021.

Box 12.1: Promotion of organic production

In the absence of a national certification system and label, there are a few initiatives in the country that have created their own certification and label in order to mainstream and facilitate the development of organic farming and food production. Currently, the most significant initiative is that led by the Coalition for Green Economy and Development "G-Global" (working as an NGO), which introduced the label "Green Food KZ". In 2015–2016, the Coalition took part in the development and implementation of regulatory and legal documents on organic agriculture and participated in the development of the Law on Organic Production. In order to popularize the adopted Law, in 2016, the Coalition organized 20 round tables and seminars in the regions. Several methodological manuals and two standards (on organic fertilizer called “biohumus” and on growing organic potatoes, including rules for growing, transporting and storing them) were also developed. These standards are not officially recognized but they serve as the NGO’s own specifications for production and they are intended for use by farmers who are willing to start organic farming.

The Coalition already has the methodological and material basis for the opening of the Organic Centre in Arnasay village, located 30 km from the capital, which already demonstrates different types of experimental projects in sustainable and green technology and organic production and is therefore already known as a "green village". The Centre is planned to be a platform for farmers and interested individuals who want to engage in organic farming to obtain the necessary competence to do so. The main activities of the Organic Centre will be the organization of training in the production and certification of organic products, master classes with the involvement of national and international experts, preparation for certification of agricultural producers, preparation of necessary documents for certification of organic products and much more. Since December 2016, the Coalition has been the owner of the voluntary eco-label called "Green Food KZ". The trained producers have the right to conclude an appropriate contract to use this mark on their products. The "Green Food KZ" symbol confirms the absence of harmful substances, and that negative environmental effects are absent or minimized throughout the life cycle of the product.

12.4 Impact from and adaptation to climate change

The biggest challenge for Kazakh agriculture is to ensure sufficient water volume for irrigation. The main volume of water resources in Kazakhstan is provided by surface waters. The average annual volume is 101 km^3: 55.6 per cent of the total volume is generated on the territory of the country and the remaining 44.4 per cent from the inflow of transboundary rivers.

The State Programme on Development of the Agro-industrial Complex for the period 2017–2021 refers to two scenarios developed for 2040 in order to estimate the effects of unfavourable climatic and transboundary hydrological situations on available water resources in Kazakhstan in the long term. The first projected scenario is based on the assumption that the neighbouring countries withdraw the amount of water equivalent to their quota allowance based on the international agreements or equal division of water resources. The second scenario is calculated on the current trend of increasing water withdrawal by neighbouring countries, thus remaining higher than the quota. The first scenario envisages that the surface water entering Kazakhstan from neighbouring countries will decrease by 12.1 km^3 per year by 2040, while the second scenario predicts that the water entering Kazakhstan from neighbouring countries will almost halve and decrease by 19.6 km^3 per year by 2040.

In the water sector, Kazakhstan has set impressive goals in order to ensure sufficient water for agriculture and to adapt to the effects of climate change. It is envisaged that the irrigation system will be rehabilitated by replacing outdated water canals to increase water supply efficiency and reduce leakages, and by repairing deteriorated water management facilities and water supply canals connected to previously irrigated lands. Also, Kazakhstan plans to build new water reservoirs to cover the demand from growing agricultural production.

As part of climate adaptation measures, Kazakhstan has advanced in adopting climate-smart crop cultivation practices, also known as conservation agriculture. No-tillage (or zero-tillage) farming is widely used in oblasts in the north of the country where snow accounts for 40 per cent of the precipitation but the strong winds in winter often blow away the snow, leaving the soil bare and dry. No-tillage farming leaves the stubble of the previous year's crop standing in the fields; this traps snow which, when the weather warms, seeps into the soil and thus significantly enhances the soil's humidity and reduces the risks or effects of drought. According to the International Maize and Wheat Improvement Centre's estimations, in 2012, either no-tillage or minimal-tillage technologies were applied to 1.85 million ha or 10 per cent of Kazakhstan's agricultural land.

12.5 Legal, policy and institutional framework

Legal framework

The 2005 Law on State Regulation of Development of the Agricultural Complex and Rural Territories is the basic law in agriculture that determines the framework for most of the agricultural activities in Kazakhstan.

The 2003 Law on Seed Production regulates the domestic production and import of seeds. The Law prohibits the sale and planting of genetically modified seeds.

The 2015 Law on Organic Production regulates organic farming and food production, which was identified by the Government as one of the most promising export subsectors in agriculture. This Law sets the framework for such activities; however, the necessary standards, such as by-laws for the detailed regulation of organic production, certification and labelling, are not adopted.

The 2015 Law on Agricultural Cooperatives regulates the establishment and operation of agricultural cooperatives and facilitates the creation of new cooperatives by improving conditions and offering more benefits for their members.

The 2002 Law on Plant Protection determines the legal, economic and organizational basis for carrying out activity in the field of plant protection from pests, weeds and plant diseases.

The 2001 Law on Grain regulates relations arising in the process of production, storage and marketing of grain in the country. Among other matters, it aims at the optimization of the structure of grain production, considering climatic conditions and market conditions, and improvement of production technology, storage and sale of grain. This Law sets the necessary safety and quality requirements, as well as the basis for the subsidies related to crop cultivation.

The 1998 Law on Livestock Breeding regulates livestock breeding, directed towards the preservation and augmentation of the gene pool of breeding animals, as well as their reproduction and improving their productive qualities.

The 2017 Law on Pastures has been adopted with the explicit objective of promoting the rational use of pastures, improving the conditions of pastures and their infrastructure and preventing pasture degradation processes. The two biggest novelties introduced by the Law were the pasture management plans and the maximum permissible load norms for pastures. The adoption of the Law is a step towards ecological sustainability and enhancement of the agrobiodiversity of the pastures, and its measures establish the foundation for the climatically resilient use of pastures. Nevertheless, proper implementation of the provisions of the Law requires significant assistance from the central government down to subnational level, in order to ensure the necessary expertise at the local level.

Policy framework

Strategy Kazakhstan-2050

The highest-level document that sets goals in the agricultural sector is the 2012 Strategy "Kazakhstan-2050". The eighth goal of the economic development priority set by this Strategy is "Modernization of the agricultural sector", with a subobjective of "Development of farming and SME finance in agricultural processing and trade". However, these objectives do not have any direct environmental connotations.

Plan of the Nation – "100 concrete steps"

The 2015 Plan of the Nation "100 concrete steps towards realization of the five institutional reforms" defines four agriculture-related objectives. Two of the four bear a partial relation to the environment, namely, both aim to facilitate the more effective use of agricultural land:

- Step No. 35. Market trading of agricultural land shall be legal; the Land Code and other legislation shall be amended;
- Step No. 36. Procedures to alter the initial purpose of land use shall be simplified. Effectiveness of use of agricultural land shall be monitored; unused state-owned land shall be privatized.

Despite the fact that measures No. 60 and 61 have no direct environmental connection (primarily, they aim to attract strategic investments into the dairy and meat processing industries), they also aim at increasing the output of these subsectors. For example, in the dairy industry, a 50 per cent increase in exports to the Commonwealth of Independent States (CIS) countries within three years and the development of cooperative farm production are envisaged. This means that the Government clearly wants to increase the overall agricultural output and considers agriculture to be one of the most promising export sectors of the country. Therefore, the impacts on the environment are expected to increase considerably, even with utilization of the most environmentally friendly solutions and practices.

State Programme on Development of the Agro-industrial Complex for the period 2017–2021

The main strategic policy document related to agriculture is the State Programme on Development of the Agro-industrial Complex for the period 2017–2021 (2017 Decree of the President No. 420). The Programme is based on the previous sectoral programmes: the State Programme for the Development of Rural Areas for the period 2004–2010, the Concept of Sustainable Development of the Agro-industrial Complex for the period 2006–2010, the Programme of Priority Measures for the Implementation of the Concept of Sustainable Development of the Agro-industrial Complex for the period 2006–2010, the Agro-industrial Development Programme for the period 2010–2014 and the Programme on Development of the Agro-industrial Complex "Agribusiness-2020". The latest available evaluation report for the latter programme is for the period 2013–2015. There is only one environment-related indicator for the target for available volume of subsidized water (for irrigation) and its target value was met only in 2014. However, a comprehensive evaluation of the implementation of these preceding strategic documents was not done and there is no direct link to them in the 2017 State Programme, not even on the level of objectives or indicators.

The 2017 State Programme sets ambitious targets and defines priority and target indicators for the year 2021. Of the eight objectives, two have partial environmental aspects: No. 4, the effective use of water resources and No. 5, the creation of conditions for effective use of land resources. The Programme also set priority indicators to be achieved by 2021, but there is no direct link between the objectives and the indicators. There is no priority indicator defined for objective No. 5. On the other hand, there are three indicators related to objective No. 4 (though one of them refers to industry rather than agriculture, so is not included here):

- Indicator No. 6: reduction of the water consumption of irrigation on the irrigated area by 20 per cent compared with the level of 2015 (decrease from 9,180 m^3/ha in 2015 to 7,348 m^3/ha);

- Indicator No. 7: increase of the additional surface water resources by 1.9 km^3 compared with the level of 2015.

The Programme's overall goal is to increase the volume of agricultural production with an emphasis on the more profitable food products for which export market demand is high and growing. This means there is clear governmental will to switch from current, mostly raw-material-oriented, production (such as crops) to the production of processed food and to boost exports, as well as meeting domestic needs.

Besides the priority indicators that will be the main basis on which to measure achievement of the goals, the Programme defines result ("target") indicators for many segments of agricultural production (e.g. for the most commonly cultivated crops) and for agricultural infrastructure and related issues, such as machinery and agrochemical production. The result indicators use the actual data of the baseline year of 2015, indicate the estimates for 2016 and set the targets for each consecutive year. The first evaluation report for the year 2017 shows that the only environment-related target referring to irrigation – water consumption for irrigation – was met (8,593 m^3/ha was achieved while the result indicator for that year was 8,608 m^3/ha).

Most of the result indicators relating to productivity and output envisage a significant increase (e.g. more than twofold for oilseeds and more than sixfold for sugar beet); however, for rice production, a 10 per cent decline is planned. Also, cotton production is planned to increase only very moderately (by 10 per cent), which demonstrates the Government's aim to switch from the cultivation of crops that have very high demand for water to crops that demand less water but are more profitable in both the domestic and export markets.

The outputs of livestock breeding are planned to increase slightly, but there are very ambitious indicators for increasing the output of fisheries, between seven- and tenfold for the most important fish (sturgeon, salmon, whitefish, carp and herbivorous fish species). Consequently, despite the measures enhancing the efficiency of water use for irrigation, there will be growing water demand from Kazakh agriculture, the supply of which will be hard to maintain in the long run considering the scenarios that project a decrease in water supply.

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis targets 2.3, 2.4, 2.5, 2.a and 5.a of the 2030 Agenda for Sustainable Development is described in box 12.2.

2 ZERO HUNGER

5 GENDER EQUALITY

Box 12.2: Targets 2.3, 2.4, 2.5, 2.a and 5.a of the 2030 Agenda for Sustainable Development

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Target 2.3: By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

In the last decade, the Government has recognized agriculture as one of the priority sectors of the country that need to be developed in order to decrease imports and increase exports. The aim is to enhance the overall productivity of the sector by 38 per cent between 2015 and 2021 and to increase the physical volume of production (and services) by 30 per cent by 2021. There is a commitment in the Government to achieve the set targets, and, by the measures defined in the State Programme on Development of the Agro-industrial Complex for the period 2017–2021, both the productivity and incomes of smallholders and small farmers are expected to grow significantly by 2021.

As of early 2018, Kazakhstan is prepared to measure indicator 2.3.1 (Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size) but not indicator 2.3.2 (Average income of small-scale food producers, by sex and indigenous status).

Target 2.4: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

This target is measured by indicator 2.4.1 (Proportion of agricultural area under productive and sustainable agriculture). Despite the fact that the term "productive and sustainable agriculture" is not clearly defined, the use of agricultural practices that are more sustainable than the traditional technologies and methods is emerging in Kazakhstan. Given the lack of a systemic approach by the relevant state bodies, several projects funded by international donors were and are being implemented in this field in order to mitigate the negative environmental effects of agricultural activities, mostly those of grazing, livestock breeding, crop cultivation and irrigation. In addition, organic farming is one of the flagship activities of sustainable agriculture and it is envisaged to grow rapidly in the coming years.

By calculating the joint share of areas under conservational agriculture (no-tillage and minimal-tillage technologies) and organic production, it is estimated that, currently, approximately 12.3 million ha (or 48 per cent) of the cultivated arable land is affected by some kind of productive or sustainable agricultural technology.

Target 2.5: By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed

For both global indicators for this target (indicator 2.5.1: Number of plant and animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities; indicator 2.5.2: Proportion of local breeds classified as being at risk, not at risk or at unknown level of risk of extinction), the methodology has been defined, but the identification of the plants and animals for the related categories is ongoing work. However, within the Ministry of Agriculture, there is no expert or unit appointed for this task.

In Kazakhstan, 45 breeds have been identified so far as local breeds, but their further classification in terms of risk status has not yet been finished.

Target 2.a: Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries

Due to the Government's dedication to the development of agriculture, the agricultural budget of Kazakhstan is expected to grow significantly in the coming years through the implementation of the 2017 State Programme on Development of the Agro-industrial Complex. In 2017, the budget of the State Programme was planned to be 359.7 billion tenge and, in 2018, 397.9 billion tenge; it is planned to reach 628.4 billion tenge by 20121. The state budget for 2018 was planned to be 9,217.9 billion tenge, the share of agricultural expenditure being 4.3 per cent in 2018, which is still slightly less than the sector's share of GDP. The budgeting of the State Programme envisaged that investments in agriculture in Kazakhstan would grow significantly in the coming years. However, technology development and innovation to achieve sustainable productivity growth are not a priority of the Programme and the agricultural sector. Strengthening the focus on innovation in order to achieve sustainable productivity growth is important for Kazakhstan’s delivery on the agriculture-related Sustainable Development Goals and is among the policy principles promoted by the 2016 OECD Declaration on Better Policies to Achieve a Productive, Sustainable and Resilient Global Food System.

Goal 5: Achieve gender equality and empower all women and girls
Target 5.a: Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws

Women’s rights is one of the issues Kazakhstan is devoted to improving. One of the measures to support the country's performance is the promotion of women to leading positions, especially in business. Currently (as of 1 January 2017), the presence of women leaders in the Kazakh agricultural sector is measured in both agricultural enterprises and among smallholders and farmers. While the proportion of women among all employees in agriculture remained quite stable, at 44–46 per cent, in the period 2008–2016, only 13 per cent of the agricultural enterprises and 20 per cent of the small farms were managed by women. As of 1 January 2017, both the city of Almaty and the surrounding oblast are outstanding in having women leaders in agriculture – as managers in 22 per cent of enterprises and 24 per cent of small farms.

Institutional framework

The Ministry of Agriculture (figure 1.2) has most of the state responsibilities related to agriculture, including land management, agricultural production and food processing, plant protection and animal safety, water management and rural development. The division of tasks within the Ministry is as follows:

- The Department of Processing and Markets for Agricultural Products is responsible for the regulation of food processing in general. It is responsible for preparing the legislation related to organic production.
- The Department of Science and Technology Policy defines the policy related to agricultural science in order to support the use of new technologies and facilitate the practical utilization of the results of research in agriculture. Based on three-year plans, it allocates the budget for the conduct of studies and disseminates the studies after their completion.
- The Department of Investment Policy is responsible for facilitating investments in the agricultural sector. Following the primary

selection of investors and their projects by the Ministry for Investments and Development, this Department is appointed to negotiate the detailed conditions and agree with foreign investors the priority investments in the sector.
- The Committee on Land Management is responsible for the efficient use of land resources, meaning that it regulates the issues related to land ownership. It coordinates the ongoing activities related to the 2015 amendments to 2003 Land Code.
- The Committee on State Inspection of the Agro-industrial Complex has supervision and monitoring tasks related to crop cultivation and cattle breeding.
- The Committee on Forestry and Fauna is responsible for the protection of fauna and for the regulation of hunting. The strategic objective of this unit is to preserve the biological resources of the fauna.
- The Committee on Water Resources is the responsible body for water usage and the protection of water resources. It sets the limits for water withdrawal for all the sectors.
- The National Agricultural Scientific and Education Centre is a body subordinated to the Ministry. It conducts scientific research and education.

The Ministry of Health's Committee for the Protection of Public Health supervises the National Scientific Centre, which is responsible for the controls related to the presence of harmful organisms in food and for controlling the GMO content of agricultural and food products.

The Ministry of National Economy's Committee on Statistics conducts statistical data collection and publication independently from the Ministry of Agriculture, based on its own methodology.

The National Chamber of Entrepreneurs "Atameken" is an important player in the economy, connecting businesses with state bodies though its activities. Its Department of the Agro-industrial Complex and Food Industry supports the development of the agricultural sector and is involved in most of the consultation and preparation for new legislation and state measures in this sector. It was one of the main stakeholders in the process of preparation of draft standards for organic production.

Subnational level

There is a department dealing with agriculture in each oblast administration office that is in contact with the Ministry of Agriculture and other related governmental bodies. Even if they are not subordinate to the national level, in fact, the oblast-level departments are responsible for carrying out, coordinating or participating in the implementation of governmental policies on a number of issues (e.g. coordinating the subsidies for fertilizers or preparing and approving pasture management plans). There are also departments for statistics in each oblast, which are involved in agricultural data collection.

Rayons (districts) and towns also have their responsibilities in the implementation of the respective agricultural law (e.g. in the distribution of fertilizer subsidies) and, in most cases, they serve as the point of direct contact between the state or oblast authorities and the farmers.

Economic measures

Subsidies for fertilizers

The distribution of subsidies to cover the costs of purchased and applied fertilizers is done through akimats (local executive authorities). Smallholders and small-scale farmers applying for subsidies submit their request annually to the rayon akimat. The request has to comply with certain requirements (it must state the lands referred to and plants cultivated, and the amount of fertilizers applied, and specify the amount of subsidy calculated by the farmer on the basis of a methodology approved for this purpose). The rayon akimat collects and consolidates the requests from farmers and sends them to the department of agriculture in the oblast akimat. The department of agriculture verifies whether the calculations done by the farmer are correct. The oblasts send the requests received from all rayons to the Ministry of Agriculture. The actual distribution of subsidies for fertilizers is done at oblast level by a special commission set up for the purpose. The commission again checks the accuracy of the calculation of the amount when distributing the subsidies to farmers.

Subsidies for investments

The investment subsidy instrument was introduced by the Government in 2014. It aims at partial compensation (20–80 per cent) of investment costs for construction and installation works and equipment for establishing new agricultural production units. In the period 2014–2016, about 3,000 agribusiness entities were subsidized in the amount of 19.1 billion tenge, which attracted 67.8 billion tenge in investment, mostly for livestock breeding (55 per cent) and crop cultivation (35 per cent), while processing facilities received only 10 per cent of the total subsidies.

Participation in international agreements and processes

International Plant Protection Convention

Kazakhstan has been party to the Convention since 2010 and has designated the Committee on State Inspection of the Agro-industrial Complex of the Ministry of Agriculture as the official contact point. To date, Kazakhstan has not fulfilled its national reporting obligations and has not performed any activity related to this Convention.

Cartagena Protocol on Biosafety

Kazakhstan acceded to the agreement in 2008 and appointed the National Centre for Biotechnology of the Ministry of Education and Science as the national focal point. The National Centre for Biotechnology is responsible for preparing and updating the database on genetically modified seeds in Kazakhstan and it coordinates the activities of the involved ministries based on the Roadmap for the cooperation of state bodies in control of traffic of GMOs, adopted in 2016. The Roadmap, signed by the Ministry of Agriculture, Ministry of Education and Science, Ministry for Investments and Development, Ministry of National Economy and Ministry of Energy, defines the distribution of responsibilities among the ministries and the timeframe for the implementation of tasks in the period 2017–2019.

United Nations Convention to Combat Desertification

Kazakhstan has been party to the United Nations Convention to Combat Desertification since 1997. It has adopted the Programme on Combating Desertification for 2005–2015. The national focal point is the Committee on Forestry and Fauna under the Ministry of Agriculture. In the Convention's fifth reporting cycle, Kazakhstan in 2014 reported several activities in combating desertification, such as the launch of the Centre for Desertification, establishment of the interministerial task force group on the issues related to assessing the land and water resources, and supporting NGO projects by increasing the State's share of financial support through a small grants programme of the UNDP/GEF Kazakhstan. However, the first two reported measures have not been implemented.

12.6 Assessment, conclusions and recommendations

Assessment

Agriculture is the smallest major sector of the economy, accounting for less than 5 per cent of GDP, with the slight dominance of the cultivation of crops over animal husbandry. Despite its huge agricultural potential based on its enormous land resources, the country has remained a net agricultural importer. This was one of the main reasons why the Government focused on the sector and decided to significantly improve the performance of agricultural production.

The adoption of the State Programme on Development of the Agro-industrial Complex for the period 2017–2021 proves the Government's dedication to the promotion of this sector, almost doubling the agricultural budget between 2017 and 2021. The Government's crop diversification policy aims to reduce the area planted in wheat and increase the area planted in "priority" crops, which are generally more demanding than wheat in terms of nutrients and require more mechanical cultivation. In addition, the planned investments in the dairy and meat industries will require the enhancement of the output of livestock breeding. This will certainly put more pressure from agriculture on the environment, which is currently moderate due to the low level of use of chemicals, low level of agromechanization and undeveloped food processing industry, which does not currently produce sufficient food to supply domestic needs for most types of processed food.

One of the most important measures for boosting agricultural productivity, which requires the largest investment in the sector, is rehabilitation of the irrigation system on 610,000 ha of arable land by 2021. In parallel with the extension of irrigation, the existing irrigation system will be modernized in order to reach the target of 20 per cent reduction in losses during water transportation in agriculture from 2015 to 2021.

Environmental considerations are not yet fully mainstreamed in Kazakhstan's agricultural policymaking, which has a strong focus on increasing production. On the other hand, there are factors that will contribute to upgrading the environmental performance of Kazakhstan's agriculture, especially in the medium and long term. Initially, conservation agriculture projects were led by international donors, but the techniques they promoted were gradually embraced and have lately been promoted by relevant governmental organizations, resulting in their rapid expansion. Organic farming started mostly as a small-scale activity led by rural NGOs. It is now expected to make a breakthrough into mainstream food production in the coming years when the necessary legislative and organizational preconditions are completed.

Overall, stronger efforts at the policy and implementation levels are needed to ensure the implementation of the relevant targets of the 2030 Agenda for Sustainable Development and to promote an integrated approach to agriculture and food in line with the 2016 OECD Declaration on Better Policies to Achieve a Productive, Sustainable and Resilient Global Food System, in particular, to foster the agricultural production systems that use the available resources sustainably and to promote farmers' greater resilience to risks.

Conclusions and recommendations

Water for irrigation

The biggest limitations on the effective use of water in irrigation are the obsolete infrastructure and the tariff system that does not encourage farmers to make rational use of water. Despite the expansion of water-saving technologies, they are still used on less than 20 per cent of the irrigated area. The current tariff system does make irrigation extremely cheap and the revenues collected from users do not allow for coverage of even the operational costs of the irrigation system in the long term.

Recommendation 12.1:
The Government should:

(a) Adopt an adequate tariff methodology for establishing cost recovery irrigation tariffs;
(b) Gradually raise irrigation tariffs to cost recovery levels over a well-defined time period;
(c) Provide subsidies to smallholders and farmers who cannot afford to pay cost recovery irrigation tariffs;
(d) Promote sustainable irrigation techniques, the efficiency of water distribution networks and drought-resistant cultivation.

See Recommendation 7.5.

Soil fertility

The degradation of soil fertility is one of the most significant limiting factors in agriculture in Kazakhstan, which mostly affects crop production, resulting in low crop yields, but also affects livestock breeding by decreasing the base of fodder. Currently (besides the existing subsidies for fertilizers and the new tool of pasture management plans), there is no systematic approach coordinated or operated by state bodies to promote activities related to the preservation and restoration of soil fertility. The stable provision of Government-supported extension services to farmers is not assured.

Recommendation 12.2:
The Ministry of Agriculture should set up a scheme, including dedicated funds and farmers' involvement, for promoting the preservation, restoration and amelioration of soil fertility and ensure systematic provision of extension services to farmers.

Organic production

Due to the very low use of fertilizers and pesticides in Kazakhstan, the country enjoys ideal conditions for organic farming and production, but this potential has been only slightly exploited to date. The Government has recognized organic agriculture as one of the most promising subsectors of agriculture. However, the legislation related to organic production is still not complete and the by-laws related to national standards for production, certification and labelling are under development and consultation within the Government.

Recommendation 12.3:
The Government should adopt the by-laws which are the precondition for the operation of a national certification and labelling system for organic agricultural products.

Adaptation to climate change

There are several positive trends that support the adaptation to climate change of Kazakhstan's agriculture. However, the lack of a coordinated and systemic approach hinders the country's ability to enhance the efficiency of the already implemented measures and increase its overall resilience to the effects of climate change. The State Programme on Development of the Agro-industrial Complex for the period 2017–2021 does not take into account the expected effects of climate change (except in the case of freshwater resources originating from abroad) and does not define measures for its mitigation. Implementation of target 2.4 of the 2030 Agenda for Sustainable Development necessitates that climate change objectives and measures be incorporated into the relevant national strategic documents for the agricultural sector and that their implementation be ensured through clearly distributed responsibilities among the institutions.

Recommendation 12.4:
The Government should take steps to enhance agriculture's adaptation to the impacts of climate

change, ensuring that the respective roles and responsibilities are clearly defined and distributed throughout the governmental bodies at various levels.

Obsolete pesticides

Disposal of obsolete pesticides is still a critical issue for Kazakhstan. In many cases, obsolete pesticides are stored at sites that are not suitable for this purpose. Only 20 per cent of the country's territory has been covered by the inventory for POPs pesticides.

Recommendation 12.5:
The Government should take measures on elimination of obsolete pesticides.

Chapter 13

HEALTH AND ENVIRONMENT

13.1 Population health status and trends

Population development

The population of Kazakhstan has shown a steadily increasing trend; according to the Committee on Statistics, the population was estimated to be 15.57 million at the beginning of 2008 and had increased to 18.12 million by the beginning of 2018. According to estimates by FAO and the World Bank, Kazakhstan is one of the least densely populated nations in the world – 7 people/km^2, in comparison with, for example, the Netherlands (506 people/km^2).

Kazakhstan's demographic profile remains relatively young (29.4 years old according to the WHO estimate in 2013), compared with an average of 38.6 years in the WHO European Region. This evolution is marked by an increase in the population living in urban areas (from 8.97 million (54.5 per cent) at the beginning of 2010 to 10.07 million (56.97 per cent) at the beginning of 2015) and in rural areas (from 7.48 million (45.5 per cent) at the beginning of 2010 to 7.60 million (43.03 per cent) at the beginning of 2015).

The birth rate in Kazakhstan has been persistently high and, as shown for 2015, was above the CIS and WHO European Region average (table 13.1). There is a declining trend in the mortality rate, from 9.7 deaths per 1,000 population in 2008 to 7.2 per 1,000 population in 2017.

The life expectancy at birth is increasing and a person born in Kazakhstan in 2016 can expect to live for 72.30 years, on average – 76.60 years if female and 68.10 years if male (table 13.2).

Kazakhstan has one of the largest gender gaps in life expectancy at birth – in 2016, female life expectancy was 9 years longer than male. Therefore, even though life expectancy at birth has rapidly increased, by almost 7 years since 2000 (from 65.5 years in 2000 to 72.3 years in 2016), the country's actual life expectancy rates remain considerably lower than those in the WHO European Region.

Table 13.1: Key demographic indicators, 2008, 2015, 2017

	Kazakhstan			CIS	WHO European Region
	2008	2015	2017	2015	2015
Population aged 65+ (%)	7.5	6.8	..	11.5	15.5
Live births (1,000 population)	22.8	22.7	21.6	15.7	12.5
Deaths (1,000 population)	9.7	7.5	7.2	11.3	10.0
Natural growth rate (1,000 population)	13.0	15.2	..	15.7	12.5
Total fertility rate (births per woman)	2.7	2.7	..	1.7	1.7
Urban population (%)	54.1	53.3	..	64.2	70.2

Source: Ministry of Health reports (2009–2016); WHO European Health Information Gateway (accessed March 2018).

Table 13.2: Selected population health indicators, 2008, 2015–2017

	Kazakhstan				CIS	WHO European Region
	2008	2015	2016	2017	2015	2015
Life expectancy at birth (y)	67.1	71.6	72.3		71.7	77.9
Infant mortality rate (1,000 live births)	20.8	9.4	8.6		9.7	6.8
Under-5 mortality rate (1,000 live births)	23.5	12.2	10.8	10.2	..	..
Maternal mortality rate (100,000 live births)	31.2	12.5	12.7		28.0	17.0

Source: Ministry of Health reports (2009–2016); WHO European Health Information Gateway (accessed March 2018).

Child and maternal mortality

Kazakhstan made a significant achievement in infant mortality, which declined from 20.8 per 1,000 live births in 2008 to 8.6 per 1,000 live births in 2016, allowing the country to contribute strongly to the achievement of Sustainable Development Goals target 3.2 (By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births). The mortality rate for under-5 years old also fell significantly, from 23.5 per 1,000 live births in 2008 to 10.2 in 2017.

Estimates of the Ministry of Health show progress in reducing infant mortality in Kazakhstan, from 20.8 deaths per 1,000 live births in 2008 to 13.5 per 1,000 live births in 2012 and 9.4 per 1,000 live births in 2015 (figure 13.1). However, the persistent geographical inequalities challenge this development. For instance, in 2008, infant death rates per 1,000 live births varied across the country; the highest rate was 25.51 deaths per 1,000 live births in South Kazakhstan Oblast and the lowest was 13.45 deaths per 1,000 live births in Almaty City. In 2015, these rates declined to 15.81 deaths per 1,000 live births in South Kazakhstan Oblast and 6 deaths per 1,000 live births in Almaty City.

With regard to Sustainable Development Goals target 3.1 (By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births), Kazakhstan has already made remarkable progress in reducing the maternal mortality ratio (MMR). Maternal mortality shows a decline by 2.46 times, from 31.2 per 100,000 live births in 2008 to 12.7 per 100,000 live births in 2016. MMR in Kazakhstan (12.5 per 100,000 live births) is more than two times lower than the average in the CIS (28 per 100,000 live births) and is about 41.7 per cent lower than the WHO European Region MMR (17 per 100,000 live births).

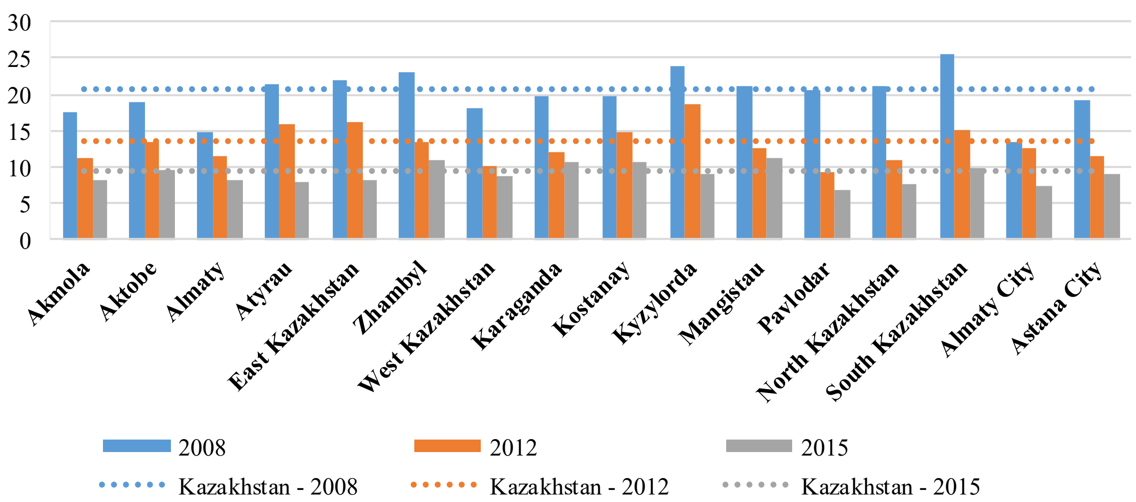
Mortality by main causes of death

According to the national data, from 2008 to 2016, a decline in the mortality rate has been observed. Overall mortality by all causes declined from 974.26 per 100,000 population in 2008 to 737.0 per 100,000 population in 2016 – by around 24.4 per cent.

According to the 2015 assessment by the Center for Disease Control and Prevention (CDC), the top 10 causes of death in Kazakhstan are: cardiovascular diseases; neoplasms; self-harm and violence; chronic respiratory diseases; cirrhosis; unintentional injuries; diabetes and urological, blood and endocrine disorders; transport injuries; diarrheal diseases; and neurological disorders.

This assessment is in line with the national statistics data: cardiovascular diseases as well as cancer contribute most of the mortality (table 13.3). Despite the progress achieved in reducing mortality from cardiovascular diseases, malignant neoplasm and poisoning, the mortality rate from non-infection diseases is high. It should be stressed that, in the period 2008–2016, mortality from respiratory system diseases and diseases of the digestive system increased by 210 per cent and by 64 per cent, respectively. Outdoor and indoor air pollution and tobacco smoking can be among the reasons for the increase in the mortality rate from respiratory diseases.

Figure 13.1: Infant mortality per 1,000 live births by oblasts and cities, 2008, 2012, 2015, number



Source: Ministry of Health, 2009–2016.

In 2016, mortality caused by cardiovascular diseases was 178.92 per 100,000 population, notably lower than the 489.66 per 100,000 population in 2008. According to WHO, deaths from cardiovascular diseases occur much earlier in Kazakhstan than in the WHO European Region and are the single leading cause of excess mortality in the age groups 54–60 and 60–74.

The mortality trend of respiratory system diseases in Kazakhstan increased rapidly from 2008 (49.5 deaths per 100,000 population) to 2016 (102.1 deaths per 100,000 population). These diseases contribute to mortality in all age groups, with chronic obstructive pulmonary diseases more common among men than women. The country also experienced an increasing trend of digestive system mortality, from 45.17 per 100,000 population in 2008 to 74.3 per 100,000 population in 2016.

Mortality trends from communicable diseases in Kazakhstan suggest very rapid changes in a positive direction.

The three greatest behavioural risk factors, which drive the most deaths and disability cases, are dietary risks, alcohol and drug use and tobacco smoking. Notably, air pollution is the greatest environmental risk factor and could be related to a high mortality rate from respiratory and cardio-vascular diseases.

Non-communicable diseases

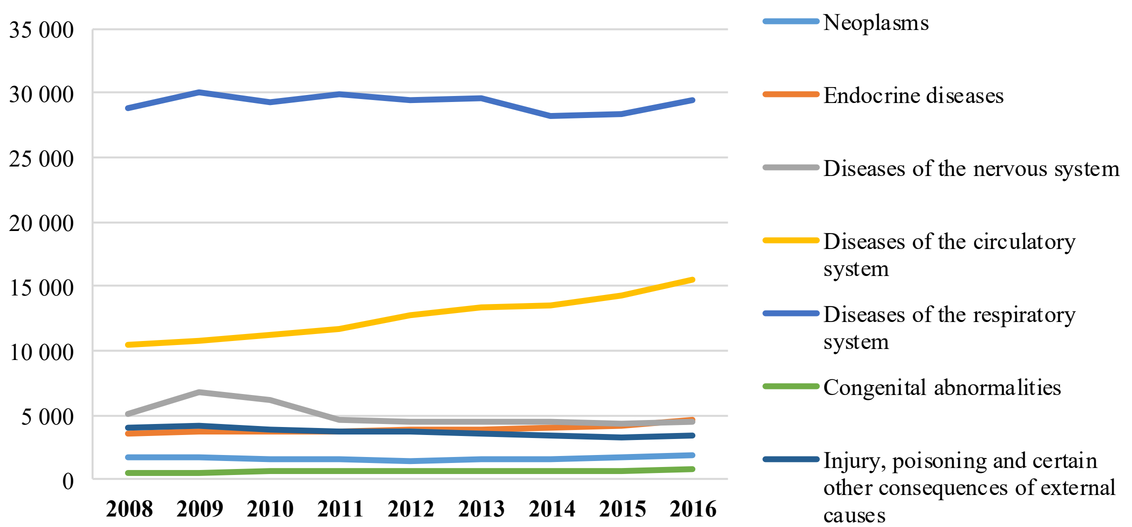
Kazakhstan has a large and growing NCD burden. In the period 2008–2016, the three largest contributors to NCD-related morbidity in the country were diseases of the respiratory, cardiovascular and nervous systems (figure 13.2). Such morbidity can reduce productivity, increase demand on the social and health systems and impoverish families. The morbidity rate from respiratory system diseases remains steady and is highest among the youngest age group (0–14 years) while that from cardiovascular diseases is highest among adults (18 years and older).

Table 13.3: Standardized mortality rates for key causes of mortality, 2008, 2012, 2016, per 100,000 population

	2008	2012	2016
Diseases of the circulatory system, of which:	489.66	256.76	178.92
Ischemic heart diseases	222.90	87.22	71.70
Cerebrovascular diseases	135.77	51.53	71.80
Diseases of the respiratory system	49.50	57.30	102.10
Cancer	130.45	103.98	92.00
Diseases of the digestive system	45.17	59.14	74.30
Infectious and parasitic diseases	22.16	11.96	8.60
External causes	49.50	98.25	82.50

Source: Ministry of Health reports 2009, 2013, 2017.

Figure 13.2: Morbidity of non-communicable diseases, 2008–2016, per 100,000 population



Source: Ministry of Health, 2009–2017.

According to WHO, children are more sensitive to environmental hazards and negative trends in children's morbidity of diseases potentially linked to environmental conditions can be an indicator of environmental ill-health. Morbidity from non-communicable diseases, which could potentially be linked to environmental quality, has been increasing in children since 2008 (figure 13.3). In 2016, 2.6 times more children in comparison with 2009 were diagnosed to have asthma. Total morbidity from cancer in children increased by 60 per cent, from 182.7 per 100,000 population in 2009 to 292.1 per 100,000 in 2016. The rate of newly diagnosed cancer incidents increased from 127.2 per 100,000 population in 2008 to 133.8 per 100,000 population in 2016, meaning that the burden of cancer in children will continue increasing. The increase in the chronic bronchitis rate is not so high, although bronchitis remains at a high rate. The rate of congenital disorders is also growing: from 604.1 per 100,000 population in 2008 to 999.0 per 100,000 population in 2015.

Communicable diseases

In Kazakhstan, infectious and parasitic diseases are not the major cause of mortality but remain a morbidity burden. The incidence of infectious and parasitic diseases has declined from 2009 (2,531.8 cases per 100,000 population) to 2016 (2,139.5 cases per 100,000 population) by 15.49 per cent.

In total, 92 nosological forms of infectious disease are controlled and recorded. Positive trends are observed in 41 nosological forms. There was no morbidity and carriage for 13 infectious diseases. However, an increase in the incidence of 30 infectious diseases was registered.

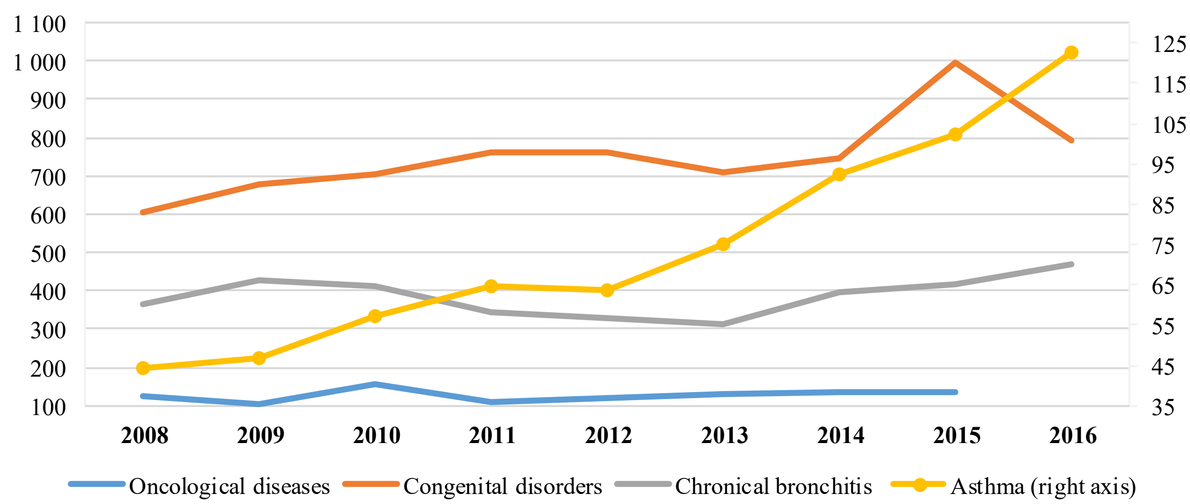
No cases of plague, legionnaires disease, diphtheria, poliomyelitis, epidemic typhus, visceral leishmaniasis or carriers of typhoid, diphtheria, parasitosis have been reported in 2017. Trends in morbidity of selected communicable diseases are shown in figure 13.4.

Tuberculosis

Kazakhstan is one of the 18 high-priority countries for fighting tuberculosis (TB) in the WHO European Region and 30 high-multidrug-resistant TB-burden countries in the world.

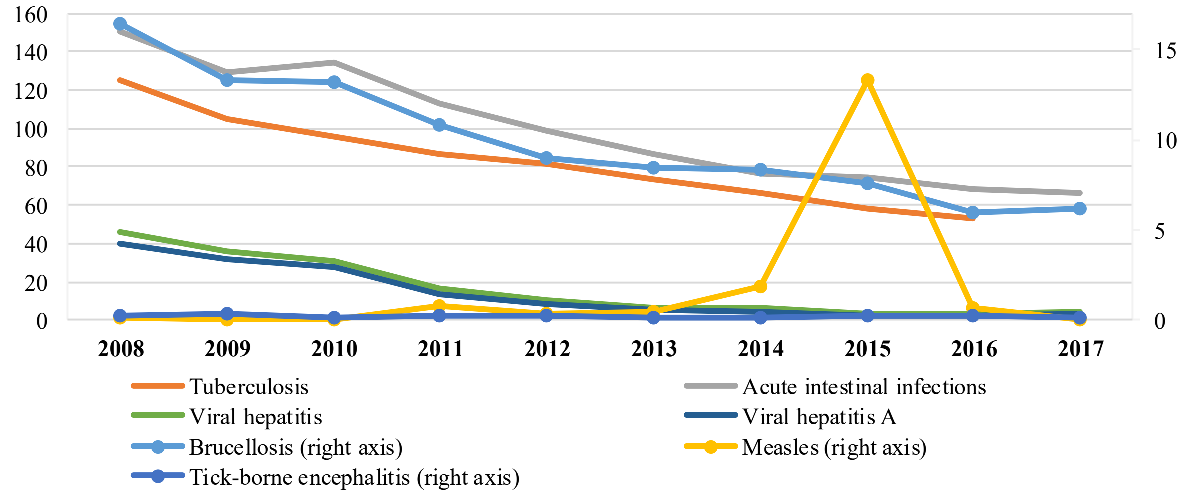
According to the Ministry of Health, the rate of tuberculosis is declining in Kazakhstan: the number of new cases in 2008 was 125.5 per 100,000 population; this had declined twofold by 2014 (to 66.4 per 100,000 population) and declined further, to 58.5 per 100,000 population, in 2015. Assessment of the sanitary-epidemiological situation in 2017 revealed that 9,418 cases of tuberculosis were newly detected. Monitoring of the epidemiological situation of tuberculosis shows that the annual number of new cases of tuberculosis in children also declined more than twofold, from 18.5 per 100,000 population in 2010 to 10.2 per 100,000 population in 2014 and 6.8 per 100,000 population in 2016. It increased slightly in 2017 to constitute 8.3 per 100,000 population.

Figure 13.3: Morbidity from non-communicable diseases (newly diagnosed cases) in children (0–14), 2008–2016, per 100,000 population



Source: Ministry of Health, 2008–2017.

Figure 13.4: Morbidity from communicable diseases, 2008–2017, per 100,000 population



Source: Ministry of Health reports (health statistics and reports on sanitary-epidemiological situation) (2009–2017).

The non-working population (commonly, with lower income and poor living and nutrition conditions) is particularly affected. Almost half (49.4 per cent) of persons newly infected with tuberculosis are from this group. TB among migrants remains another challenge for TB control. Access to harm-reduction preventive services, such as opioid substitution therapy for high-risk populations (intravenous drug users, among whom HIV prevalence is 2.9 per cent), is also a problem.

Measles

Morbidity from measles varied slightly during the period 2008–2017 from 0 cases per 100,000 population in 2009 to 1.86 cases per 100,000 population in 2014, with a peak of 13.3 registered cases per 100,000 population in 2015 (a total of 2,341 registered cases). In the period 2013–2015, five episodes caused by five phenotypes imported to Kazakhstan took place. Notably, this trend increased rapidly, since there were no registered cases in 2009, and decreased again to 2017 when two cases were recorded. Almost all (around 98–99 per cent) of 1-year-old children are immunized against measles in Kazakhstan.

Respiratory infections

Since 2009, the incidence of respiratory system diseases has declined slightly. In 2016, the incidence rate was 29,372.5 per 100,000 population, compared with 30,112.5 per 100,000 population in 2009. Commonly, the incidence rate was much higher in children aged 0–14, with 67,119.9 and 64,097.9 cases per 100,000 children in 2009 and 2016 respectively, compared with the general population. Tobacco smoke can contribute to chronic pulmonary diseases, together with air pollution in the outdoor, indoor and occupational environment.

Intestinal infection

In the long-term dynamics of the incidence of acute intestinal infections, the epidemiological situation improved steadily, with a decline in incidents from 150.98 per 100,000 population in 2008 to 68.2 per 100,000 in 2016. A total of 11,806 cases of intestinal infection were registered in 2017, with an incidence rate of 66.35 per 100,000 population, the highest proportion being in children under 14 years old (74.8 per cent), among which, children from 0 to 3 years old accounted for 76.3 per cent. In 82.5 per cent of the cases, agents which caused diseases were identified. However, the sources (food, water, etc.) of infections were detected in only 6.5 per cent of cases.

The incidence of dysentery disease decreased rapidly, almost sixfold, since 2008 (24.34 cases per 100,000 population) to 4.06 cases per 100,000 population in 2016. Salmonella infections more than halved, from 15.31 per 100,000 population in 2008 to 6.66 per 100,000 population in 2016.

Viral hepatitis

Since 2009, Kazakhstan has been observing a rapid decline in morbidity from acute viral hepatitis. The incidence rate of acute viral hepatitis declined from 46.40 per 100,000 population in 2008 to 4.24 per 100,000 population in 2017. In 2017, in the structure of viral hepatitis, the proportion of viral hepatitis A was 77.3 per cent (583 cases); viral hepatitis B without delta agent, 13.8 per cent (104 cases); viral hepatitis E, 0.5 per cent (4 cases); viral hepatitis B with delta agent, 0.13 per cent (1 case); and viral hepatitis C, 7.4 per cent (37 cases). Changes were registered in the age structure. In 2007–2008, the number of cases in children aged under 14 constituted up to 80 per cent, then, from 2013, the proportion of children declined significantly (2013, 42.1 per cent; 2014, 41.5 per cent; 2015, 39.1 per cent; 2016, 32.8 per cent), mainly due to vaccination.

Kazakhstan has a high overall prevalence of and mortality from liver cirrhosis, in large part driven by hepatitis B and C infections. Alcohol might play a meaningful role in liver cirrhosis mortality, independent of the original cause for incidence of this disease category.

Zoonosis and vector-borne diseases

The incidence of parasitic infections in Kazakhstan has declined, from 187.6 cases per 100,000 population in 2009 to 124.2 cases per 100,000 population in 2011 and 87.08 cases per 100,000 population in 2017. Nevertheless, the figures remain high in most regions of the country.

In the structure of parasitic morbidity, cases in children up to 14 years old prevailed and were around 75–80 per cent. In 2017, 77.4 per cent of cases of parasitic infection were registered in children up to 14 years old, with the standardized indicator 245.7 cases per 100,000 population in 2017.

<u>Plague</u>

The last case of plague in Kazakhstan was registered in 2003.

<u>Brucellosis</u>

Despite the fact that the epizootic situation in brucellosis of farm animals remained complicated in the country, brucellosis incidence during the period 2008–2016 declined, from 16.44 cases per 100,000 population in 2008 to 5.97 cases per 100,000 population in 2016.

There has been practically no change in the percentage of children (0–14 years old) with brucellosis in the total number of persons affected since 2009 and it remains quite high. The lowest index was observed in 2009, 2010 and 2014 and constituted 11.2, 11.3 and 10.3 per cent, respectively. In the other years (2013, 2015, 2016 and 2017) it varied from 13.1 to 13.8 per cent. The causes of the disease in children were their involvement in caring for animals, especially in the period of lambing and calving, the late detection and isolation of animals reacting positively and brucellosis-prone animals, and the lack of sanitary education among the population.

The rural population got sick with brucellosis 4.2 times more often than the urban population: the incidence rate among the rural population was 893 cases (81 per cent) and the urban population 211 cases (19 per cent) in 2017.

<u>Tick-borne diseases</u>

In the group of parasitic vector-borne diseases, cases of tick-borne encephalitis, tick-borne borreliosis, malaria and cutaneous leishmaniosis have been reported.

The number of cases of tick-borne encephalitis varied: 49 cases in 2008, 30 in 2009, 40 in 2015, 48 in 2016 and 33 in 2017. The largest proportion of encephalitis cases was among the adult population – 82 per cent in 2017.

In 2017, all cases of tick-borne encephalitis were confirmed by the enzyme-linked immunosorbent assay. The prevalence of mites infected with tick-borne encephalitis virus was studied in the scientific project “German-Kazakh Cooperation on Biosecurity and Biosafety” in 2017. According to genetic studies, a tick-borne encephalitis virus was detected in 0.5 per cent of ixodes mites collected in Sandyktau Rayon of Akmola Oblast (437 specimens).

In 2017, 12 cases of tick-borne borreliosis, 16 cases of Crimean-Congo haemorrhagic fever and 3 imported cases of malaria were registered in Kazakhstan. Three imported malaria cases were also registered in 2010 and one in 2014.

The situation with Congo-Crimea haemorrhage fever remains the issue of public health concern. In 2017, the related morbidity was 0.33 per 100,000 population, twice as high as a previous highest level, in 2009 (0.16 per 100,000 population). For other years (2010–2016), it varies from 0.11 per 100,000 population in 2010 to 0.04 per 100,000 population in 2013.

13.2 Health risks associated with environmental factors and environmental causes of morbidity and mortality

Outdoor and indoor air pollution

Outdoor air quality

In 2017, WHO estimates that, globally, 4.2 million deaths every year are due to exposure to ambient (outdoor) air pollution.

According to Kazhydromet, in 2016, 2,837 cases of high pollution and 550 cases of extremely high pollution of atmospheric air were registered in the country, whereas in 2017, 990 cases of high pollution and 98 cases of extremely high pollution were recorded.

In addition to Kazhydromet's air monitoring at 146 monitoring stations (56 manual, 90 automated) in 49 urban or industrialized areas, the Sanitary and Epidemiological Service controls air pollution at the border of sanitary protection zones of enterprises and in residential areas.

In 2017, air samples were taken by the Sanitary and Epidemiological Service in 74 large and small cities. The number of samples increased significantly: from 36,002 in 2009 to 138,591 in 2017, with a maximum of 217,085 samples in 2014. The percentage of samples exceeding MACs was 5.2 per cent in 2009, 0.9 per cent in 2014 and 4.5 per cent in 2017. Laboratory results confirmed the presence of highly toxic chemical compounds (lead, phenol, nitrogen dioxide, sulfuric acid) and moderately and slightly dangerous compounds (suspended particles, sulphur dioxide, soot, ammonia) in concentrations exceeding MACs. In 2017, the greatest specific weight of samples of atmospheric air that did not correspond to sanitary and hygiene standards were the samples of gasoline (11.5 per cent of samples) and hydrocarbon oxide (7.6 per cent). Non-compliance with sanitary and hygiene standards was also recorded in the samples of suspended particles (dust) (5.8 per cent of samples), sulphur dioxide (5.5 per cent), nitrogen dioxide (4.9 per cent), hydrogen sulphide (1.0 per cent), black carbon (1.9 per cent) and ammonia (0.3 per cent).

Exposure to high air pollution leads to an additional burden of diseases among the population and increased economic costs. According to the 2013 World Bank assessment, air pollution by particulate matter caused approximately 2,800 premature deaths in Kazakhstan and cost the economy more than US$1.3 billion annually. But most of these costs are hidden and do not appear in national accounts. The 2013 study "Human Health Cost of Air Pollution in Kazakhstan" concluded that mean estimates of mortality risk attributable to air pollution are about 16,000 cases per year and with a 95 per cent confidence level of the risk not exceeding 25,500.[49]

In 2017, the Scientific and Practical Centre for Sanitary and Epidemiological Expertise and Monitoring estimated risks based on Kazhydromet data on air pollution from PM_{10} and $PM_{2.5}$ in 45 cities. It concluded that pollution of atmospheric air poses a significant risk to the health of the population: the risk factor for chronic effects of $PM_{2.5}$ ranged from 0.02 to 2.6, and from 0.2 to 2.0 for PM_{10}. The risk of acute exposure was even higher and ranged from 0.003 to 7.7 for $PM_{2.5}$ and 0.8 to 19.7 for PM_{10}. Zones of extreme and very high risk of respiratory disorders from the effects of dust fractions of ambient air are reported for seven cities (Aktobe, Aktau, Balkhash, Karaganda, Karatau, Shu and Zhezkazgan). High and moderate risks were calculated in the majority of the cities included in the estimates, including Almaty and the capital. National experts believe that there are not enough monitoring stations and data to allow detailed mapping of air-related human health risks and to decrease uncertainties in air pollution risk assessment.

Pollen

Scientific studies performed in Kazakhstan confirmed that exposure to plant pollens can increase the incidence of asthma and allergic diseases. Research conducted in 2010–2011 involved 124 children and adolescents aged 1–17 years. Allergic rhinitis was diagnosed in 81 (65.3 per cent) of them. High mono sensitization was revealed to *Artemisia Absinthium* (67.9 per cent) and sunflower (24.7 per cent) species, whereas multiple sensitization was caused by the mix of weeds (67.9 per cent) and the mix of meadow grass (38.3 per cent).

Currently, no pollen calendars are prepared, by either the Ministry of Health or other relevant agencies. No recommendations are provided to the population on prophylactic measures that can be taken by people to prevent allergies, as well as by patients to decrease the rate of manifestation of allergic diseases.

[49] Kenessariyev, U. and others, "Human health cost of air pollution in Kazakhstan", *Journal of Environmental Protection*, vol. 4 (2013), pp. 869-876.

Indoor air pollution

The burden of diseases attributable to indoor air pollution is compatible with that from outdoor air pollution: according to WHO, 4.3 million people a year worldwide die from exposure to household air pollution.

The control of microbiological and sanitary-chemical indicators (lead) in premises is mandatory only in medical settings in Kazakhstan. In the premises of schools, only mercury content (in the case of spills) and carbon monoxide (furnace heating) are measured according to the requirements. Systematic collection of information on the quality of indoor air in the schools, kindergartens and other public settings for children, and in households, is not carried out.

However, the problem of indoor air pollution exists in the country. A study in the framework of the SEARCH II project conducted by the Regional Environmental Center for Central and Eastern Europe (2011–2012) revealed high air pollution by chemical pollutants in schools participating in the survey. The average level of measurements in 10 schools revealed high concentrations of PM_{10} (65 $\mu g/m^3$), formaldehyde (10.40 $\mu g/m^3$), benzene (6.30 $\mu g/m^3$), toluene (18.10 $\mu g/m^3$), xylenes (9.10 $\mu g/m^3$) and nitrogen dioxide (17.30 $\mu g/m^3$). The frequency with which children's rooms used plastic flooring, the rate of use of bleach for cleaning, and walls painted with synthetic paints were highest in Kazakhstan (27.6, 89.9 and 6.4. per cent respectively) in comparison with schools in the other nine countries that participated in the survey. Heavy traffic in the vicinity of the school was reported in 60 per cent of schools participating in the survey in Kazakhstan.

The high and growing rate of chronic bronchitis and asthma in children 0–14 years old in Kazakhstan (figure 13.3) can potentially be related to exposure to pollutants in the outdoor, as well as indoor, environment.

The lack of a legislative framework and programmes for monitoring and assessing the risk of the environment for public health in educational and other institutions for children hinders decision-making on health risk management to reduce the prevalence of non-communicable diseases in children attributable to indoor air pollution.

Tobacco smoke

Kazakhstan has been party to the WHO Framework Convention on Tobacco Control since 2007. A number of actions to meet the Convention's requirements have been implemented since then. Kazakhstan introduced the requirements for packaging and labelling of tobacco products and bans on tobacco advertising, promotion and sponsorship, although some types of indirect advertising are still allowed.

Tobacco use is still widespread throughout the country. According to the 2014 WHO Global Adult Tobacco Survey, the prevalence of tobacco smoking in Kazakhstan (22.4 per cent, 2.8 million people) is higher for both men (42.4 per cent) and women (4.5 per cent) than the corresponding averages in countries with a high Human Development Index. Of those who smoke, 19.1 per cent smoke daily (down from 23.1 per cent in 2007). Also, 1.2 million (19.0 per cent) of the adults who work indoors were exposed to tobacco smoke at work and 1.2 million (27.6 per cent) of adults were exposed to tobacco smoke when visiting restaurants. The economic cost of smoking in Kazakhstan amounts to 1,136,541 million tenge. This includes direct costs to the healthcare system and related socioeconomic costs.

According to a study conducted by the National Centre for Problems of Healthy Lifestyle Development in 2015, 18.3 per cent of children were dependent on smoking, that is, 290,970 children and adolescents aged 11–17 years. The American Cancer Society (6th Tobacco Atlas) estimated that, in 2015, 2.19 per cent more boys (aged 0–14) in Kazakhstan than the average in high-HDI countries used tobacco daily.

In Kazakhstan, in 84 per cent of cases the cause of death is chronic non-infectious diseases. WHO estimates tobacco smoking as the second main cause of morbidity and mortality from these diseases, after high blood pressure.

Water

Drinking water supply and sanitation

The situation with drinking water supply has been improving in Kazakhstan. According to the data of the Ministry of Health and the Ministry for Investments and Development, the proportion of the population connected to centralized drinking water systems increased steadily, from 83.7 per cent in 2009 to 92.0 per cent in 2017 (in the period 2010–2016, the proportion each year was 86.2, 87.7, 87.7, 89.6, 90.4, 90.9 and 91.4 per cent). The proportion of the population using surface and portable water declined each year, from 2.3 per cent in 2009 to 1.0 per cent in 2017, while the proportion getting drinking water from decentralized sources dropped from 13.5 per cent in 2009 to 6.9 per cent in 2017. In 2017, the share of the urban population connected to centralized drinking water systems was 98.7 per cent, and of the rural population, 82.7 per cent. Access to sanitation in 2017 was 88 per cent in urban areas but only 11.5 per cent in rural settlements.

About 50 per cent of educational settings have a decentralized sewerage system and every tenth school is supplied with water from decentralized sources (table 13.4).

According to the 2015 Multiple Indicator Cluster Survey, 97.3 per cent of households have access to *improved* drinking water sources, and 98.0 per cent of households have access to *improved* sanitation. Throughout the country, 95.4 per cent of the population has access to *improved* sources of drinking water and *improved* sanitation.[50]

Drinking water quality

There are several factors influencing the quality of drinking water, including the inequitable access to sources of water of variable quality. Around 8 per cent of the population is still getting drinking water from surface water and decentralized systems.

Increased rigidity, high content of dry residue, and iron are specific characteristics of underground waters in Kazakhstan. The non-compliance of drinking water from surface water sources with standards is associated with increased turbidity and chromaticity, concentrations of chlorides and sulphates, and, as a result, high consumption of oxygen.

The national legislation (sanitary norms and rules) requires the control of water quality for 54 parameters. The number of drinking water samples with exceeded chemical and microbiological contamination, from both centralized and decentralized systems, has declined since 2009 (table 13.5). Since 2014, this number has increased.

A pronounced negative trend is evident from 2010 in the number of analyses performed every year for water quality control: for centralized water systems it declined by 2.8 times (from 85,131 samples in 2010 to 30,172 in 2017) for chemical contamination and by 2.6 times (from 66,432 samples in 2010 to 25,728 in 2017) for microbiological analysis. There is a comparable decline in the number of analysed samples collected from decentralized sources.

The rate of water-borne intestinal infections is not high in Kazakhstan. One outbreak of water-borne acute intestinal infection was registered in each of 2010, 2012 and 2013 and one case of viral hepatitis A in 2011. In 2017, drinking water was a source of infection in 1.0 per cent of acute intestinal infection incidents.

Table 13.4: Basic services in schools, 2009–2017, per cent

	2009	2010	2011	2013	2014	2015	2016	2017
Schools with decentralized sanitation system	74.8	74.1	73.7	73.7	..	..	61.5	49.3
Schools with decentralized water supply system	28.0	26.0	26.3	24.4	22.4	21.5	12.6	9.7
Schools with portable water	24.0	22.0	18.7	16.2	13.8	12.6	11.5	9.7
Schools with decentralized heating system	13.0	11.4	10.0	7.5	6.6	5.8	5.7	4.8

Source: Ministry of Health, Reports on Sanitary-epidemiological situation in Kazakhstan, 2009–2017.

Table 13.5: Drinking water samples from centralized and decentralized systems, 2009–2017, per cent

	2009	2010	2011	2013	2014	2015	2016	2017
Centralized systems								
Samples with exceeded chemical contamination (%)	2.3	2.4	1.7	1.5	2.2	2.5	3.5	3.4
Samples with exceeded microbiological contamination (%)	1.9	1.7	1.3	1.2	1.5	2.0	2.0	2.4
Decentralized systems								
Samples with exceeded chemical contamination (%)	5.6	5.9	5.4	5.1	7.7	6.5	8.5	9.4
Samples with exceeded microbiological contamination (%)	3.6	2.9	3.5	3.1	4.9	4.0	4.2	3.1
Total	**13.4**	**12.9**	**11.9**	**10.9**	**16.3**	**15.0**	**18.2**	**18.3**

Source: Ministry of Health, Reports on Sanitary-epidemiological situation in Kazakhstan, 2009–2017.

[50] These high numbers are related to the definition of improved water source (which includes, among other things, protected wells, protected springs, rainwater collection and, in some cases, bottled water supply) and improved sanitation (which includes, among other things, septic tanks and pit latrines).

Photo 13.1: Beach in the capital

The causal relationship between the chemical composition of water and the prevalence of urinary system diseases is confirmed in North Kazakhstan, Pavlodar and South Kazakhstan Oblasts. A notable increase in urolithiasis in Almaty City and the capital, along with other causes, can be linked to the high mineralization and rigidity of drinking water.

Bathing waters

Swimming pools

There are 299 swimming pools in Kazakhstan. In 2017, only one third of them (100) were inspected, including 95 with laboratory control. In two thirds of inspected pools (68), additional actions were required to improve the sanitary situation and 16 did not meet the sanitary-epidemiological requirements. Around 6 per cent of analysed water samples did not correspond to the standards of microbiological contamination, and 17.8 per cent did not meet standards of chemical contamination. No cyst protozoa were found.

Recreational waters

In 2017, 890 sites of water bodies used for recreational and water supply purposes were under the public health authorities' control, which is slightly fewer than in 2009 (960). Inspection of water bodies is carried out before and during the summer swimming season.

The quality of surface waters in Kazakhstan in terms of chemical and microbial contamination worsened in the period 2009–2017 judging by the percentage of samples that do not meet the national MACs. For sanitary-epidemiological indicators, the number of samples with exceeded chemical contamination increased from 7.0 per cent in 2009 to 11.2 per cent in 2017, with the maximum of 15.8 per cent in 2015. The same trend applies to microbiological contamination, which increased from 0.6 per cent in 2009 to 9.0 per cent in 2017, with the maximum of 14.4 per cent in 2015. However, the contamination of surface waters by coliphages and cyst protozoa declined notably from 5.1 per cent and 8.3 per cent in 2009 to 1.6 per cent and 0.9 per cent in 2017, respectively. That is a sign of better protection of surface waters from faecal contamination.

The percentage of surface water bodies inspected during the years 2013–2017 declined from 74.4 per cent to 31.7 per cent, due to the overall policy to reduce inspections. That could partly explain the negative changes in the quality of surface waters. The situation in some oblasts is critical. For example, in Kyzylorda Oblast in 2014, 100 per cent of surface water bodies, including those used for drinking water supply, did not meet the national quality standards.

Legionelosis prevention

In Kazakhstan, control of the contamination of water by legionella in medical settings is mandatory. Studies are carried out by using the polymerase chain reaction technique. In 2017, 52 studies were conducted in four oblasts in the framework of the state monitoring system. An additional 205 studies were conducted in three oblasts, Almaty City and the capital upon the request of organizations. Legionella pneumophila was not detected. The same results were observed in 19 blood samples from patients with pneumonia. There are plans to expand Legionella pneumophila monitoring in the future.

Radiation

Radiation sources include uranium mining sites located in Akmola, East Kazakhstan, Kyzylorda, Mangistau and South Kazakhstan Oblasts. Oil and gas complex facilities located in Atyrau, Aktyubinsk, Kyzylorda, Karaganda and Mangistau Oblasts are sources of radioactive waste.

Radiation levels are monitored in drinking and technical water, food, construction materials and raw materials for pharmaceuticals, oil products and fertilizers. Monitoring of individual doses is conducted at workplaces.

In general, the radiation situation in Kazakhstan for the period 2008–2017 is stable. The population dose did not exceed the limit of 1 μSv/year. The risk for the population can be generally assessed as minimal, considering the input from all sources (except medical procedures).

Since 2014, the excess of alpha-beta activity of radionuclides in drinking water was detected in 3–7 per cent of the samples (the average number of analysed samples varies from 4,000 to 5,000 per year). The maximum detected level exceeded the limit 17 times. The total population dose from radionuclides in drinking water was, on average, 0.15–0.2 μSv/year. The average annual intake of radionuclides with food products was also below the limit, with a total contribution to the dose of internal irradiation 0.2–0.3 μSv/year. The percentage of food samples with an exceeded level of radionuclides varied from 0 to 0.5 in the period 2014–2017.

Regular measurements of atmospheric air radiation were carried out to determine the effect of radioactive contamination of the terrain and the surface layer of the atmosphere on the vital activity of the population. It was found that, on average in the period 2014–2017, the total activity of beta-emitting radionuclides was in the range $0.2–24.0*10^7$ Bq/m^3 and the total alpha activity was $0.03–3.3*10^7$ Bq/m^3.

The background level of gamma radiation was monitored in residential areas, in residential premises and for the purpose of land use planning for construction. Since 2014, more than 600,000 measurements have been done each year. The exceeded level was detected annually in the residential areas in 0.1–0.5 per cent of cases, in residential and public buildings in 0.02–0.24 per cent and on land for construction in 0–0.01 per cent. The total dose varies from 0.01 μSv/h to 0.28 μSv/h, which does not pose an additional threat to the health of the population.

The number of objects under control increased from 424 in 2009 and 288 in 2011 to 2,577 in 2014 and 2,645 in 2017. This might partly be due to the introduction of the requirement on certification of objects having radioactive sources and strengthening of technical capacities of medical institutions. All these objects are subject to sanitary-epidemiological inspections.

The total number of people working with radioactive sources, subject to individual dose control, varied from 14,100 to 16,100 during the period 2010–2017. For 99–100 per cent of these people, individual doses are calculated each year. In the period 2014–2017, around 98.3–99.7 per cent of them received a dose of 0–5 μSv/year, while 0.2–1.5 per cent received a dose of 5–20 μSv/year. In 2010, 2011 and 2014, one person received a dose higher than 20 μSv/year.

Semipalatinsk Test Site

The Semipalatinsk Test Site (STS) covers an area of 18,500 km². Between 1949 and 1989, 456 nuclear explosions were carried out there. In the period 2013–2016, an EU-funded project implemented by an international consortium (SEMI-NUC project: Prospective cohort study of residents near the Semipalatinsk nuclear test site – feasibility assessment) was carried out to assess the feasibility of establishing a long-term, prospective cohort to study the health effects of low and moderate radiation exposures that resulted from the testing of nuclear weapons at the STS. Analysis of results of previous studies (since 1960) were performed in the framework of the project and confirmed evidence of unfavourable health outcomes in the population living around the test site. The population living closest to the test site was exposed to relatively high levels of radiation (1946–1956) from radioactive clouds and submersion and the consumption of contaminated food: the radiation dose in this "historic" cohort was around 90 milliGray (mGy), on average, with a maximum of 630 mGy. In this population, increased cancer incidence rates were reported in highly exposed villages in four administrative divisions adjacent to the STS spanning the period 1981–1990, including childhood cancer (including leukaemia and brain tumours) reported in children living less than 200 km from the test epicentre. No effects on the cardiovascular system or evaluated risks of thyroid cancer were observed. In a study focused on the frequency of mini-satellite mutations in exposed offspring and unexposed (control) offspring, there is a negative correlation between mutation rate and the parental year of birth in the exposed generation, with the highest mutation rate in the most exposed cohort of parents born before 1960.

The State Scientific Automated Medical Register has been created by Kazakhstan's Scientific Research Institute for Radiation Medicine and Ecology located in Semey (formerly Semipalatinsk). Currently, the Register contains information about more than 100,000 exposed people and their offspring. According to the overall estimates made by the Institute, the group at risk of radiation includes 356,000 people, including 107,000 who have suffered from direct radiation, as well as their second- and third-generation descendants.

According to overall estimates, about 1.3 million people were exposed to different dose of radiation as a result of the operation of STS. About 600,000 of them now live in Kazakhstan.

According to 2008 data, STS does not have a negative impact on the population living in the adjacent areas and there are no health risks, except for the population living in the Shagan River area, due to the migration of tritium for long distances beyond the test site. The Scientific Research Institute for Radiation Medicine and Ecology aims to return 80 per cent of the territory to the community.

Medical radiation

The X-ray equipment in Kazakhstan is being replaced on a regular basis. The decision on monitoring individual doses of radiation in medical personnel and patients due to X-ray examination was taken in 2011, but actual implementation only became feasible once the sanitary service was equipped appropriately. In 2017, control of radiation safety was carried out in 2,086 offices of diagnostics and therapy. There is a low incidence of detection of elevated X-ray changes: 13 of 134,967 measurements.

According to a 2017 assessment, the largest contributions to the collective dose of radiation received by patients from medical procedures are due to x-rays (33.8 per cent), computed tomography (26.3 per cent), fluoroscopy (15.8 per cent) and fluorography (14.1 per cent).

The registration of doses received by patients due to radiological procedures is carried out by entering information into the personal list of doses of medical exposure and registration in the register of medical X-ray and radiological procedures. According to the records of individual doses, the average effective individual dose for X-ray diagnostics is 0.38 mSv/year and for radiotherapy 27.6 mSv/year.

The average effective individual dose for persons in group "A" of the cabinets of radiation diagnosis and therapy vary from 1.0 to 1.4 mSv/year.

Electromagnetic fields

The main sources of electromagnetic fields (EMF) are industrial enterprises, mobile communications stations and radio transmitting devices. The intensity of EMF is monitored in industrial, public and education facilities, as well as in residential areas. On average, around 90,000 investigations were performed each year during the period 2009–2017, with the maximum amount in 2014 (126,037) and the minimum in 2017 (83,619), in around 2,600 industrial enterprises, 1,500 medical facilities, residential areas and schools (computer rooms). The percentage of exceeded levels of electromagnetic radiation is decreasing: exceedances were identified in 1,042 measurements (12.7 per cent) in 2016 and 848 measurements (10.6 per cent) in 2017.

The percentage of non-compliance of measurements of electromagnetic radiation in residential areas is quite low – 0.36 per cent. The figure is much higher in children's, preschool and general education institutions: in 2017, 661 (13.9 per cent) of 4,730 educational institutions had recorded levels higher than the standards.

Ultraviolet radiation

The forecast of ultraviolet (UV) radiation intensity has been provided by Kazhydromet on a weekly basis from April to September since 2008. It is publicly available and includes recommendations on how to prevent the negative impact of UV radiation. This information is important for health protection given the high UV level in Kazakhstan. Commonly, the UV index is high or very high throughout the whole country from May each year.

Noise and vibration

In Kazakhstan, noise and vibration levels are controlled in industrial enterprises, schools and other educational settings for children, residential areas, residential and public buildings and medical organizations. Noise produced by household appliances is also controlled before product marketing. The number of inspected facilities has increased slightly, from 10,850 facilities in 2011 to 12,801 facilities in 2017. The percentage of excessive noise levels in residential areas declined, from 12.5 per cent in 2011 to 6.4 per cent in 2017; in kindergartens and schools, the indicator remained practically unchanged – 0.4 per cent in 2011 and 0.5 per cent in 2017.

Territorial committees for the protection of public health took some actions to develop noise maps. The work is still ongoing. The main barrier is the absence of a methodological document on noise monitoring in residential areas.

In 2017, vibration levels were measured at 2,465 sites (3,244 sites in 2011), including 21 in residential areas, 670 in preschools and public institutions for children, and 36 in professional and higher educational institutions. In 2017, exceeded vibration levels were observed at 31 facilities (1.3 per cent), which is slightly higher than the 0.95 per cent in 2011.

Chemical safety

A system for sound chemicals management is not established in Kazakhstan. As very few human biomonitoring studies have been conducted, it is not possible to assess population exposure to hazardous chemicals, especially to chemicals in consumer products.

Waste and polluted soil

Pollution of soils with heavy metals, especially in the vicinity of large cities and industrial centres, has become one of the most urgent environmental problems in Kazakhstan. The focal points of soil pollution are industrial enterprises formed near many cities, including but not limited to Karaganda, Ridder, Shymkent, Ust-Kamenogorsk and Zhezkazgan. Exceeded levels of MACs of cadmium, lead, copper, zinc and chromium in cities were revealed at the borders of sanitary protection zones of large industrial enterprises and in areas alongside highways.

According to the investigation carried out by the National Centre of Labour Hygiene and Professional Diseases in 2010–2011, the level of lead in blood exceeded the WHO reference level in 52 per cent of children living near the former lead processing plant in Shymkent.

Sanitary service laboratories in Kazakhstan have analysed soil contamination by chemicals on the territory of kindergartens and recreational areas. The number of samples analysed varies between 5,000 and 10,000 a year. Exceeded levels of contamination by chemicals, including organochlorine pesticides, were observed in a relatively small number of samples: a maximum 5.8 per cent in 2010. For the other years (2009, 2011–2017), the number of samples that did not correspond to the standards was lower, varying from 0 to 2.8 per cent.

To date, the country lacks a register of contaminated sites, which complicates the identification of highly exposed population groups and development of focused health protection measures.

Persistent organic pollutants

According to an assessment conducted by the national team of experts in 2014–2015 in the framework of revision of the 2009 National Implementation Plan (NIP) under the Stockholm Convention on Persistent Organic Pollutants and preparation of the 2014 NIP for the period 2015–2028 (2014 Order of the Minister of Energy No. 228), later replaced with the 2017 NIP for the period 2017–2028 (2017 Order of the Minister of Energy No. 312), substantial amounts of chemicals classified as POPs are stored or still in use in Kazakhstan (chapter 8).

However, no countrywide epidemiological studies to reveal linkages between human health and POPs have been conducted in Kazakhstan to date, including human biomonitoring surveys. Very little information about the impact of POPs on human health is available from the NIPs.

Less than 0.01 per cent of the samples of foodstuffs and other products examined throughout the country in the period 2009–2017 contained organochlorine pesticides. No samples with exceeded levels were found. In six oblasts, organochlorine pesticides were not detected in food products.

Total dioxin/furans releases amount to around 3,275 g TE/year, according to estimates done in 2015 in the context of planning national actions for the period until 2018 by the national team of experts.

Industrial emissions

To predict industrial emissions into air and water bodies, public health authorities perform sanitary-epidemiological expertise at different stages of the construction of industrial enterprises: land use planning, project expertise, control at the construction stage and commissioning permits, using the health risk assessment methodology. In more than 90 per cent of cases, a decision was taken based on laboratory investigations (99.4 per cent of cases in 2010 and 87.2 per cent in 2017). One in 15 requests for permitting an enterprise location was rejected in 2009. In 2017, it was one in four requests.

In 2017, 258 industrial enterprises were examined in the context of permitting for building and reconstruction. In 24.8 per cent of cases the allocation of land was not agreed; this mainly related to violation of the requirements for sanitary protection zones.

Control of air pollution has been performed regularly at the borders of sanitary protection zones of enterprises. In 2017, instrumental measurements of air pollution were carried out at the border of sanitary zones of 704 enterprises – 43.3 per cent of the total number of enterprises subject to control (1,627). In general, 138,591 air samples were studied for sanitary-chemical indicators, of which 6,280 samples or 4.5 per cent did not meet hygiene standards.

Sustainable health systems

Energy sufficiency

Medical institutions are a significant consumer of energy. According to the national assessment conducted in 2013 for the Programme “Energy saving 2020” (invalidated in 2016), in medical installations the most energy-intensive group consists of electrothermal plants for disinfection and sterilization (autoclaves, drying cameras, sterilizers, distillers); they constitute 10–40 per cent of electricity consumption, along with refrigeration equipment (5–10 per cent), lighting (30–60 per cent) and ventilation and air conditioning (10–20 per cent). One of the Programme’s targets was to reduce energy consumption by government-funded institutions (including the health sector) by 25 per cent by 2020, which was expected to be achieved through local budgets and private investments.

As of January 2018, actions to improve the energy efficiency of the health sector were not funded through the relevant national programmes. In the majority of cases, the replacement of equipment with more energy-efficient models is done through international projects or using hospitals’ and other medical settings’ own budgets. The comprehensive development and implementation of a new system of health infrastructure standards based on OECD standards (architectural, engineering, technological, etc.), as well as standards for resource saving, energy efficiency and environmental sustainability of health facilities, is planned to be implemented in the framework of the 2016 State Programme for Development of the Public Health System “Densaulyk” for the period 2016–2019.

Medical waste

Medical waste is divided into four classes in Kazakhstan: non-dangerous waste; epidemiologically dangerous and extremely hazardous waste; waste that is similar in composition to industrial waste; and radioactive waste. All waste is sorted in hospital departments using packages and containers of different colours (white, yellow, red and black) and transported to the storage places in the hospital. They are collected for the further treatment by specialized companies.

The amount of medical waste generated in Kazakhstan is estimated to 78,000 tons of hazardous (infectious) waste and 122,000 tons of non-hazardous waste in 2017 (chapter 8). The volume of collected medical waste has been growing.

There are more than 20 organizations providing services in the treatment of medical wastes, located in all oblasts. The number of special installations for the destruction of medical waste is growing (2011, 91; 2012, 120; 2013, 128; 2014, 144; 2015, 150; 2016, 147; 2017, 158). But this is still insufficient to satisfy the need for treatment of all hazardous medical waste. The most problematic sites are small hospitals in rayon centres and rural areas.

Photo 13.2: Management of hazardous medical waste

Housing and human settlements

Asbestos

Exposure to asbestos in workplaces and the environment leads to the development of mesothelioma. WHO has called upon countries to develop national asbestos profiles and plans for the prevention of asbestos-related diseases.

Kazakhstan produces chrysotile asbestos and asbestos-containing materials. The average production in the period 2008–2017 was 216,020 t/y with a trend of decrease in production observed from 2014 (table 11.2). The company engaged in extraction, ore treatment and asbestos production is JSC Kostanai Minerals, which employs around 5,000 people. About 8.5 per cent of extracted asbestos is used in the domestic market to produce asbestos, asbestos-containing thermal insulation and other materials. Therefore, humans are exposed to asbestos in both the working and ambient environments in Kazakhstan.

No evaluation has been systematically conducted of possible contamination of premises where asbestos-containing materials are used or of the presence of asbestos fibres, and neither have epidemiological studies been conducted in accordance with international approaches to reveal linkages between exposure to asbestos and the incidence of mesothelioma. Mesothelioma is registered in Kazakhstan with the group of lung cancer rather than as a separate oncological nosology. Neither a national asbestos profile nor a plan for the prevention of asbestos-related diseases has been approved in Kazakhstan.

Radon

WHO estimates exposure to radon as a cause of 3–14 per cent of all lung cancers, depending on the national average radon level and smoking prevalence. In Kazakhstan, lung cancer is the second major cause of cancer mortality. Of 17,000 deaths annually, 16.9 per cent are attributable to lung cancer. However, epidemiological studies to reveal the contribution of exposure to radon to lung cancer morbidity and mortality have not been conducted, despite the fact that there are territories within the country that are of high concern in relation to radon.

The level of effective radiation dose in the population of Kazakhstan due to radon is reported to be 1.5 times higher than the world average. In Kazakhstan, there are about 50 uranium deposits, about 100 uranium ore sites and several hundred radioactive natural anomalies, and a large amount of stored radioactive waste. Almost all of Kazakhstan to the east of the Kostanai-Shymkent line (East Kazakhstan, Pavlodar, North Kazakhstan, Akmola, Kostanai, Karaganda, Almaty and Zhambyl Oblasts) is potentially radon dangerous.

Monitoring of radon levels is carried out within the framework of sanitary and epidemiological monitoring at the planning stage of building and construction, on the territory of residential buildings and in residential and public buildings, including upon the request of organizations and individuals. The highest number of measurements in residential areas was in 2015 (more than 90,000), for mapping purposes. The exceeded level of radon in residential areas registered during the period 2009–2017 varied between 0.17 per cent in 2017 and 1.21 per cent in 2016. In residential and public buildings, variations were higher: from 0.06 per cent in 2011 to 2.65 per cent in 2017. In some cases, concentrations were quite high: 243–1,022 Bq/m^3. In all cases when high a level of radon was revealed, instructions for ventilation were provided.

Lead

According to international studies, around 40,000 children under 10 years old worldwide suffer from neurological diseases that are the result of overexposure to lead.

No epidemiological studies were conducted in Kazakhstan by research institutions to reveal links between exposure to lead in paints in residential and public buildings and neurological disorders in children.

Data gathered in the 2016 study by the International POPs Elimination Network confirmed the potentially increased level of exposure to lead from paints. According to the study, in 69 per cent of paint samples from the Kazakhstan market, lead concentration was higher than 90 ppm, with the maximum observed concentration of 150,000 ppm.

The sanitary-epidemiological service has been investigating emissions of lead from paint. But the most dangerous is a dust formed during the destruction of lead-based paint. This type of control is not in place in the country.

Mould

The presence of mould creates an increased risk of respiratory symptoms, respiratory infections and exacerbation of asthma. Some evidence also suggests increased risks of contracting allergic rhinitis and asthma.

There is no requirement in Kazakhstan to control mould in public buildings and educational facilities for children. However, around 10–15 of complaints received by the public health authorities annually are about mould in houses. It should be stressed that, since 2009, the incidence of asthma among children aged 0–14 increased threefold.

Occupational health and safety

The number of employees working in harmful conditions has remained consistently high for many years and has tended to increase recently – it stood at 218,588 employees in 2010 and 370,133 employees in 2017. More than half of jobs in harmful working conditions are in the mining and metallurgical industries and more than half of all jobs in harmful working conditions are in the private sector. The most prevalent harmful factors are noise and vibration, dust and industrial aerosols.

The number of workplaces that did not comply with the standards for contamination by aerosols and dust varied from 0.7 per cent (minimum) in 2009 to 5.3 per cent in 2016 (maximum); in terms of vapours and gases, from 0.6 in 2010 (minimum) to 1.5 per cent in 2017 (maximum). The number of workplaces that exceeded noise levels more than doubled since 2013, when it was 4.4 per cent. In 2015, it was 11.5 percent and in 2017, 10.2 per cent. Positive trends are observed in terms of vibration and intensity of electromagnetic field: no workplaces with high levels of vibration were detected.

The indicator of occupational morbidity per 10,000 workers was: 4.2 in 2009; 8.0 in 2010; 6.3 in 2011; 4.3 in 2013; 7.2 in 2014; 12.9 in 2015; 6.0 in 2016 and 7.9 in 2017. Positive trends were observed in a number of first-registered occupational diseases, which declined more than twofold from 2010 (1,137 cases) to 2017 (528 cases). Among these 528 cases of disease in 2017, the most common were: radiculitis (138); silicosis (124); cochlear neuritis (83); bronchitis (45); disease attributed to vibration (30); polyneuritis (27); osteoarthritis (16); toxic effect of phosphorus and its compounds (15); and lumbosacral (11); others included encephalopathy, respiratory tuberculosis and anthracosilicosis. Of all victims of occupational pathology, 96.22 per cent (508) were men and 3.78 per cent (20) were women.

The percentage of employees undergoing periodic and preventive medical examinations because of their professional activity is quite high; it varied slightly during the period 2009–2017 from 99 per cent in 2011 (maximum) to 89.1 per cent in 2014 (minimum).

The frequency of sanitary inspection at enterprises is determined by the degree of danger represented by an enterprise's activity. However, it has definitely declined. In 2009, 60.7 per cent of all enterprises were inspected. In 2017, of 16,462 industrial enterprises in total, inspections conducted with special procedures covered only 1,114 enterprises, or 6.8 per cent (excluding food production enterprises). Unscheduled inspections are conducted on receipt of complaints and to monitor the implementation of recommendations.

13.3 Health risks associated with food safety and nutrition

Food security

The constant growth of the country's population, accompanied by an intensive increase in food consumption and a change in the structure of consumption towards better quality products, has exacerbated food security issues. Of FAO's nine food security indicators, positive values were achieved on four (volume of transferable grain stocks, production of grain per capita, proportion of the population whose calorific intake is below the minimum acceptable level, and average calorific value of the daily diet of the population). Other indicators that should be achieved are: production of 80-85 per cent of food at a national level, quality of food products, an insured food stock, availability to meet the demand for food products through imports if needed, and cost of 1,000 calories.

Kazakhstan is dependent on imports of many types of products. On average, in the last five years (2012–2017), cheese and curd (51 per cent), sausages (46 per cent), sugar (42 per cent), meat and canned meat (40 per cent) and butter (36.4 per cent) accounted for the largest shares of imports. Domestic production of vegetables satisfies 21 per cent of the domestic market.

Despite increasing crop yields over the past few years, allowing for Kazakhstan's export of grain to neighbouring countries, lower productivity of arable lands is expected, due to droughts and dry winds, as well as spring and autumn frosts.[51]

Nutrition

At present, the problem of hunger is not relevant for Kazakhstan, which is among the countries with very low levels of food deprivation. For the period 2005–2017, the share of the population whose calorific intake was below the minimum allowable level decreased by 4.7 times, to reach 3.6 per cent. The average consumption of proteins and carbohydrates (11.3 per cent and 55.4 per cent) complies with WHO standards, and fat consumption increased from 28.5 per cent in 2005 to 33.9 per cent in 2017, exceeding the recommended level. According to the 2015 Multiple Indicator Cluster Survey, 77.5 per cent of all children in school grades 3 and 4 are of normal weight (78.0 per cent of boys and 77.0 per cent of girls).

Hypotrophy

According to the 2015 Multiple Indicator Cluster Survey, 98.7 per cent of newborns were weighed at birth. In 4.5 per cent of infants (5.2 per cent in rural areas and 3.8 per cent in urban areas), birth weight was less than 2.5 kg. The prevalence of low birth weight is slightly higher among the children of mothers whose highest level of education is secondary education (12.3 per cent) and who live in households of the poorest quintile of the welfare index (12 per cent). Two per cent of children under 5 years old in Kazakhstan are underweight. At the same time, 8.0 per cent of children lag behind in growth, and weight depletion is reported in 3.1 per cent of children.

According to the study conducted by the National Centre for Problems of Healthy Lifestyle Development for 2015–2016, underweight was observed in 4.0 per cent of urban and 2.9 per cent of rural children in school grades 3 and 4, 3.0 per cent of 8-year-old children and 3.5 per cent of 9-year-old children.

Overweight and obesity

Trends in overweight and obesity were also investigated by the National Centre for Problems of Healthy Lifestyle Development. Data from the Centre's fifth (2012) and sixth (2015) studies showed that, over three years, the proportion of overweight adults increased by 2.1 per cent (from 31.2 per cent to 33.3 per cent); in urban areas it increased by 1 per cent (from 31.3 per cent to 32.3 per cent) and in rural areas by 3.4 per cent (from 31 per cent to 34.4 per cent).

The 2006 and 2010 Multiple Indicator Cluster Surveys demonstrated an increase in overweight in children aged 0–5 years. The index was 11.3 per cent in 2006 and 13.3 per cent in 2010 (14.8 per cent of boys and 11.8 per cent of girls).

According to a household survey conducted by the Kazakh Academy of Nutrition in 2012, one in five

[51] Elena Lioubimtseva, Kirsten M. de Beurs and Geoffrey M. Henebry, "Grain production trends in Russia, Ukraine and Kazakhstan in the context of the global climate variability and change", in *Climate Change and Water Resources*, Tamim Younos and Caitlin A. Grady, eds. (Berlin, Heidelberg, Springer, 2013) pp. 121-142.

children aged 1–14 years (21.5 per cent) suffered from overweight or obesity.

In the framework of the WHO Childhood Obesity Surveillance Initiative study, the National Centre for Problems of Healthy Lifestyle Development investigated the prevalence of childhood obesity among children in grades 3 and 4 (5,537 children and 4,932 parents) in 142 general schools in Kazakhstan in 2015–2016. The prevalence of overweight was 19.1 per cent, obesity was 6.0 per cent (6.5 per cent of boys and 5.5 per cent of girls) and excessive obesity was 1.1 per cent (1.2 per cent of boys and 1.0 per cent of girls). The prevalence of overweight was higher among urban children (among boys, 24.9 per cent in urban and 12.8 per cent in rural areas; among girls, 20.9 per cent in urban and 17.7 per cent in rural areas).

To improve nutrition, measures are taken to provide schoolchildren with hot meals and healthier food. In general, the coverage of students with hot meals increased from 82.5 per cent (2,327,098 students) in 2016 to 84 per cent (2,477,562 students) in 2017. Hot meals are provided in 6,057 schools (86 per cent of the 6,885 schools) and buffets in 578 schools (8.2 per cent); food is not provided in 394 schools. Food products enriched with vitamins and mineral complex (milk and dairy products) are included in the diet in 5,022 schools in 2017 (3,123 schools in 2016).

Food safety

In Kazakhstan, the system of quality control of food products following the principle “from field to fork” is established, with the mandate divided between the Ministry of Agriculture and Ministry of Health. Products that do not conform to the established regulations on quality and safety are to be withdrawn from the market. The amount of such products differed significantly in different years in the period 2009–2017: the maximum amount of food products was withdrawn in 2010 (around 2,817 tons); the minimum amount reported in 2017 is 10 times less (297 tons). These included meat and meat products, poultry, eggs and their processed products, milk and dairy products, fish and other fishery products, grain, cereals, flour, vegetables and melons, fat products, bottled drinking water and infant formula. In 2011, 2013, 2014 and 2015, more than half the withdrawn products were of Kazakhstan production (50.5 per cent, 89.5 per cent, 72.3 per cent and 70.7 per cent in respective years). This proportion was much lower in 2009 (27.2 per cent) and 2017 (27.8 per cent).

The decision to withdraw a product from the market is made based on the results of an instrumental laboratory analysis of sanitary, chemical, microbiological and parasitological indicators. The number of laboratory studies in the period since 2010 has declined but their effectiveness is now much higher. In 2010, 194,048 analyses for sanitary and chemical indicators, 248,487 analyses for microbiological contamination indicators and 25,003 tests to analyse contamination by pesticides were conducted. These resulted in identification of 2.0 per cent of products that did not comply with sanitary and chemical safety standards, and 2.9 per cent and 0.8 per cent of products were not safe in terms of microbiological and parasitological contamination. The maximum proportion of non-compliant products was revealed in 2015: 5.4 per cent with chemical, 4.1 per cent with microbiological and 1.3 per cent with parasitological contamination. In 2017, of 112,122 samples, 3.0 per cent did not comply with chemical safety requirements and microbiological contamination was higher than permitted in 4.5 per cent (131,995 samples). The largest proportions of non-standard products are found among meat, meat products, poultry, eggs and their processed products, fish and other fishery products, canned goods, milk and dairy products.

Food-borne diseases

Food poisoning

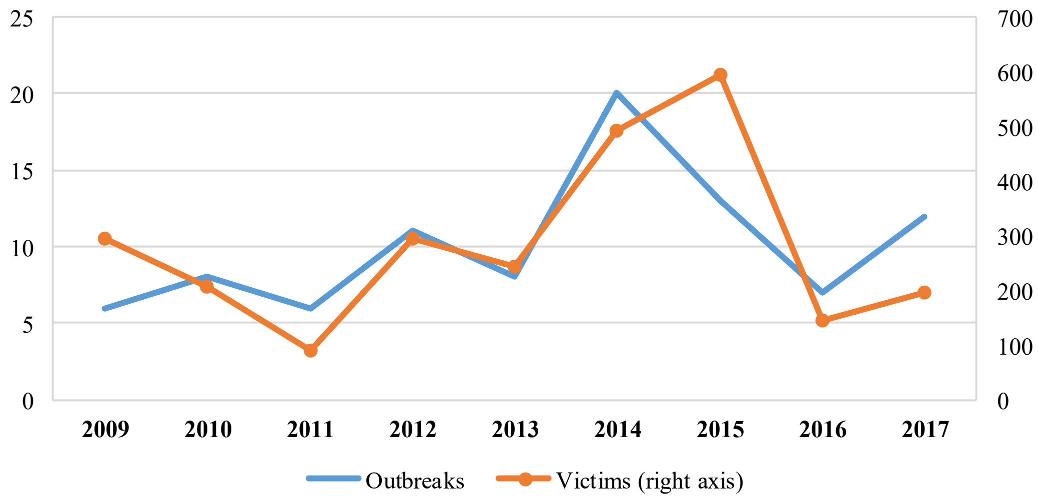
The number of outbreaks of food-borne diseases of microbial etiology and the number of victims are registered in Kazakhstan annually (figure 13.5). The agents that caused the disease were identified in the majority of outbreaks. These were S. Enteritidis, Staphylococcus aureus, E. coli, Shigella Zonne, Rotavirus and B. cereus.

The number of outbreaks of poisoning by botulinum toxin in food (botulism) has remained at the high level during the period 2009–2017 (45 in 2009, 40 in 2010, 24 in 2011, 36 in 2012, 39 in 2013, 30 in 2014, 25 in 2015, 42 in 2016 and 40 in 2017). Mortality declined sharply after 2009 but rose again sharply in 2017: 94 (11); 2010: 104 (5); 2011: 46 (2); 2012: 68 (2); 2013: 67 (1); 2014: 49 (1); 2015: 65 (2); 2016: 71 (2); 2017: 58 (7).

Prevention of iodine deficiency

In Kazakhstan, the proportion of the population with endemic goitre remains high. In 2017, 2,422,171 people were examined for endemic goitre, including 1,436,985 adults and 98,518 children and adolescents. Of the latter, 95,749 were affected by endemic goitre, including 67,227 children (4.7 per cent) and 28,522 adolescents (2.9 per cent). Therefore, the introduction of preventive measures remains relevant.

Figure 13.5: Outbreaks of food poisonings of microbial ethology, 2009–2017, number



Source: Ministry of Health, National reports on sanitary-epidemiological situation in Kazakhstan for 2009–2017.

Prevention of iodine deficiency is one of the important areas of nutrition policy in Kazakhstan. According to the legislation, food and feed salt imported, produced and (or) sold in the territory of Kazakhstan must be iodized (except salt intended for persons having contraindications to the use of iodized salt, and salt intended for the production of certain types of food products). In addition, 16 milk processing enterprises enrich milk and dairy products with iodine and five enterprises (in Aktyubinsk, Karaganda and Pavlodar Oblasts) produce bottled drinking and mineral waters enriched with iodine. In addition, iodized products (salt, flour, yeast, etc.) are also used in 588 large and small enterprises for the production of bakery products.

13.4 Impact from and adaptation to climate change

Current situation

According to the national statistics, in 2017, 2,464 emergency situations due to natural disasters were registered. Analyses conducted by UNICEF in 2016 found that children and adolescents in Kazakhstan, particularly those with disabilities and children up to 3 years old, are vulnerable to disaster risks from a range of natural hazards, including those caused by climate change.

Zoonotic arthropodal viruses and bacterial diseases are spreading in new areas of the southern regions of the country. There was an outbreak of Crimean-Congo haemorrhagic fever in 2009, which resulted in some deaths.

During the cold season, an association was found between a 1°C decrease in temperature and an increase in the number of ambulance calls, from 1.7 per cent to 2.0 per cent, in different age and gender groups in the capital.

A survey conducted in 2011 in the framework of a WHO-Europe project based on morbidity and mortality data for the previous 10 years revealed that, in the warm season, in the capital, a 1°C increase in air temperature was associated with a decline in the number of deaths from hypertension and cerebrovascular diseases, from 1.2 to 2.7 per cent, as well as with an increase in cases of salmonellosis of 5.5 per cent. In Almaty, it was associated with a decline in the number of hepatitis A cases by 3.3 per cent a month later, while in South Kazakhstan Oblast, it was associated with a decline in the number of hepatitis A cases by 2.4 per cent in the same month and by 2.3 per cent in the next. A countrywide assessment would provide more information but it has not yet been conducted.

Climate change adaptation

A National Action Plan of the Ministry of Health in Climate Change Adaptation has been developed in the framework of a WHO-Europe project and was endorsed by the Minister of Health in 2012 within the budgetary framework of the 2010 State Programme for Development of the Public Health System "Salamatty Kazakhstan" for the period 2011–2015. The priority actions are aimed at protecting the population health from extreme weather events, improving the infrastructure of the health system, in particular primary health care, developing research and the monitoring system for factors related to climate and its health effects, especially climate-compatible development (CCD) and natural-focal diseases, and raising public awareness.

A health systems adaptation plan for Kyzylorda Oblast is being developed with assistance from WHO-Europe (2015–2017). The main focus is on achieving sustainable water supply through a centralized system to all medical settlements in Kyzylorda Oblast.

The development of a sustainable energy-efficient health system is one of the objectives of the 2016 State Programme for Development of the Public Health System “Densaulyk” for the period 2016–2019.

13.5 Legal, policy and institutional framework

Legal framework

The 2009 Code on Public Health and the Public Health System regulates the implementation of citizens’ rights to health, through measures aimed at the sanitary and epidemiological well-being of the population, ensuring the functioning of sanitary epidemiological services, evaluating harmful environmental and occupational risk factors, sanitary-epidemiological monitoring and infection diseases surveillance and prevention, and promotion of a healthy lifestyle.

The 2007 Environmental Code aims at providing a favourable environment for human life and health. The main legislative requirements related to human health protection include EIA and health impact assessment, environmental audit, limiting emissions, the establishment and functioning of a unified state system for monitoring of the environment and its interaction with sanitary and epidemiological monitoring, and environmental protection in the event of natural and human-made disasters.

The 2003 Water Code regulates access to water, including to water bodies used for drinking water supply. It establishes the requirement for protection and for monitoring of water bodies and waters used for recreational purposes.

The 2015 Labour Code defines the rights of employers and employees and requires state inspections to ensure protection of workers’ health. It includes measures for protection of workers in hazardous conditions, requires compensation for working in harmful conditions, obligatory preventive and periodic medical examinations, and investigation of accidents and occupational diseases.

The 2007 Law on the Safety of Food Products establishes requirements to ensure the safety of food products to protect human life and health. The Law defines the competence of state authorities in production, monitoring and control of food safety, including in the sphere of the sanitary and epidemiological well-being of the population.

The 2014 Law on Civil Protection includes measures aimed at preventing and eliminating natural and human-made emergencies and their consequences and provision of emergency medical and psychological assistance to the population.

The 2014 Law on Amendments to Legislation on Fundamental Improvement of Conditions for Entrepreneurial Activity and the 2015 Business Code were designed to create conditions for the development of entrepreneurship and constituted an important step for the liberalization of the economy. The measures included, inter alia, the transition from planned inspections to inspections based on risk assessment and the reduction of requirements to be verified through state control and supervision. However, measures aimed at increasing the responsibility of entrepreneurs for the quality and safety of products and processes were not regulated by these laws.

In accordance with the 2014 Treaty on the Eurasian Economic Union, the safety of products for human health is regulated by technical regulations of the Eurasian Commission. In the context of human health and the environment, the EEU’s regulations cover sanitary hygienic and technical requirements for goods subject to sanitary and epidemiological supervision, food and food additive safety, veterinary safety and plant protection, building materials and chemical products. The national legislation should be in conformity with EEU regulations.

One of the gaps in Kazakhstan’s legislation in relation to environmental health is the absence of comprehensive regulation of all types of hazardous chemicals, chemical mixtures and chemicals in products. Such legislation is planned to be developed as a follow-up to the adoption of the EEU’s Technical Regulation on Safety of Chemical Products (041/2017). The 2002 Law on Plant Protection also requires revision, given the latest developments in this area.

A number of subsidiary legislative acts were developed to provide more detailed requirements for the implementation of laws. Thirty-eight national sanitary regulations were revised in the period 2015–2017. They include the requirements for facilities subject to sanitary-epidemiological inspections, including industrial facilities, water supply systems, schools and other institutions for children. A number of joint orders of the Ministry of Health and Ministry of National Economy underwent revision after 2008.

The 2017 Joint Order of the Minister of Health No. 463 and Minister of National Economy No. 285 regulated the transition to risk assessment for sanitary-epidemiological inspections. However, to ensure the use of risk assessment in decision-making processes, adequate expert capacities are needed in the health sector and the necessary training needs to be provided.

Policy framework

State Programme for the Reform and Development of Health Care for the period 2005–2010

Among other matters, the 2004 State Programme for the Reform and Development of Health Care for the period 2005–2010 (2004 Decree of the President No. 1438) aimed at harmonization of the state system of sanitary-epidemiological regulation with international standards. Its implementation resulted in: the development of a package of free medical services delivered to the population by health institutions; creation of the new healthcare management model focused on division of responsibilities between the state and individuals; a transition to international principles in medical education; implementation of a medical service quality control system and financing mechanism based on per capita financing of patients; and a significant increase of the number of primary health care facilities.

State Programme for Development of the Public Health System "Salamatty Kazakhstan" for the period 2011–2015

Eight of 10 main indicators of implementation of the 2010 State Programme for Development of the Public Health System "Salamatty Kazakhstan" for the period 2011–2015 (2010 Decree of the President No. 1113) were achieved, including an increase in life expectancy to 71 years, a reduction in maternal and infant mortality as well as population mortality, a reduction in the incidence of tuberculosis and HIV, and an increase in five-year survival of patients with oncological diseases. An advantage of the Programme was that measures to develop intersectoral cooperation on healthy lifestyles, nutrition and road safety were included. However, effective coordination was not achieved.

State Programme for Development of the Public Health System "Densaulyk" for the period 2016–2019

The 2016 State Programme for Development of the Public Health System "Densaulyk" for the period 2016–2019 (2016 Decree of the President No. 176) prioritizes health promotion by ensuring sanitary well-being, the prevention of risk factors and the promotion of a healthy lifestyle. The main indicators include those demonstrating the performance of the health system. The Programme includes measures aimed at improvement of sanitary-epidemiological control and immuno-prophylaxis. There is no focus on prevention of and a decrease in non-communicable diseases morbidity, despite it being the main health problem in Kazakhstan.

Others

The actions aiming at increasing and improving drinking water supply to the population by 2020 are included in the strategic objectives of the main policy document, the 2012 Strategy "Kazakhstan-2050". Certain progress in drinking water supply and improvement of sanitation was achieved in the framework of the 2002 Programme "Drinking Water" for the period 2002–2010 and 2011 "Ak Bulak" Programme for the period 2011–2020. Currently, state support in the field of water supply and sanitation is being realized through the State Programme of Infrastructure Development "Nurly Zhol" for the period 2015–2019 and 2014 Programme for Development of the Regions until 2020. However, the programmes' indicators do not include a requirement to provide 100 per cent of the population with safe drinking water.

There is no strategic document in place covering issues of environmental protection for ensuring public health.

There is no governmental policy on achieving chemical safety for the population, which could also be a part of national actions to implement Ostrava Declaration commitments. The National Implementation Plan on the Obligations under the Stockholm Convention on Persistent Organic Pollutants has been revised in the framework of the UNDP/GEF project (2014–2017), but it covers only chemicals regulated by the Convention.

Assessment of positive and negative socioeconomic impacts on public health is not a part of national strategic documents. Environmental health aspects are poorly integrated into sectoral documents.

Sustainable Development Goals and targets relevant to this chapter

The current stand of Kazakhstan vis-à-vis most targets under Goal 3 and targets 4.A and 8.8 of the 2030 Agenda for Sustainable Development is described in box 13.1.

Box 13.1: Targets 3.1, 3.2, 3.3, 3.4, 3.6, 3.9, 3.a, 3.d, 4.a and 8.8 of the 2030 Agenda for Sustainable Development

Goal 3: Ensure healthy lives and promote well-being for all at all ages

The majority of indicators to monitor progress on Goal 3 are in place in Kazakhstan. Data collection for indicator 3.8.2 (Proportion of population with large household expenditures on heath as a share of total household expenditure or income) is expected to commence in 2020.

Target 3.1: By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births

Through implementing several governmental programmes aimed at development of the national health system, Kazakhstan recorded significant progress in reducing maternal mortality, from 134 per 100,000 live births in 2000 to 31.2 per 100,000 live births in 2008 and 12.7 per 100,000 live births in 2016 (a decrease of 90 per cent since 2000). This index is lower than in the CIS (28 per 100,000 live births) and the average for WHO-Europe (17 per 100,000 live births). Further actions are planned to be taken in the framework of the 2016 State Programme for Development of the Public Health System "Densaulyk" for the period 2016–2019, to further reduce maternal mortality.

Target 3.2: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births

Progress in reducing neonatal infant mortality and mortality of children under 5 years of age brought the country very close to achieving target 3.2. According to the national statistics, neonatal mortality declined from 11.2 per 1,000 live births in 2008 to 5.9 per 1,000 live births in 2016 (the WHO-Europe average was 5.1 per 1,000 live births). Infant mortality declined from 22.8 per 1,000 live births in 2008 to 8.6 per 1,000 live births in 2016. Mortality of children under 5 years of age was 23.5 per 1,000 live births in 2008 and 10.8 per 1,000 live births in 2016 (the WHO-Europe average was 9.6 per 1,000 live births).

Further reduction of child mortality is one of the goals of the State Programme for Development of the Public Health System "Densaulyk". In 2016, while the average under-5 mortality rate for Kazakhstan was 10.79 per 1,000 live births, there are differences between oblasts, from 13.55 per 1,000 live births in Kyzylorda Oblast to 7.86 per 1,000 live births in the capital. Kazakhstan should address these regional differences.

Target 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

Positive trends over last 10 years in reducing the incidence of communicable diseases have demonstrated progress in this area. The rate of tuberculosis decreased from 125.5 per 100,000 population in 2008 to 58.5 per 100,000 population in 2015, and the incidence of viral hepatitis declined ninefold, from 46.40 per 100,000 population in 2008 to 4.24 per 100,000 population in 2017. The incidence of acute intestinal infections caused by water contamination is around 1.0 per cent in 2017. Kazakhstan is not endemic for malaria and seven imported cases are registered since 2010 (3 in 2010, 1 in 2014 and 3 in 2017). But climate change and its potential impact on vector-borne diseases, including the incidence of hemorrhagic fevers, is currently of concern to health authorities.

For the same 10-year period, the rate of HIV increased significantly: to 15.44 cases per 100,000 population in 2016 compared with 1.1 cases per 100,000 population in 2009. During the next 10 years, the health system, in cooperation with other relevant bodies and NGOs, should focus on prevention of HIV and adapting to climate change to overtake the challenges to achieving target 3.3.

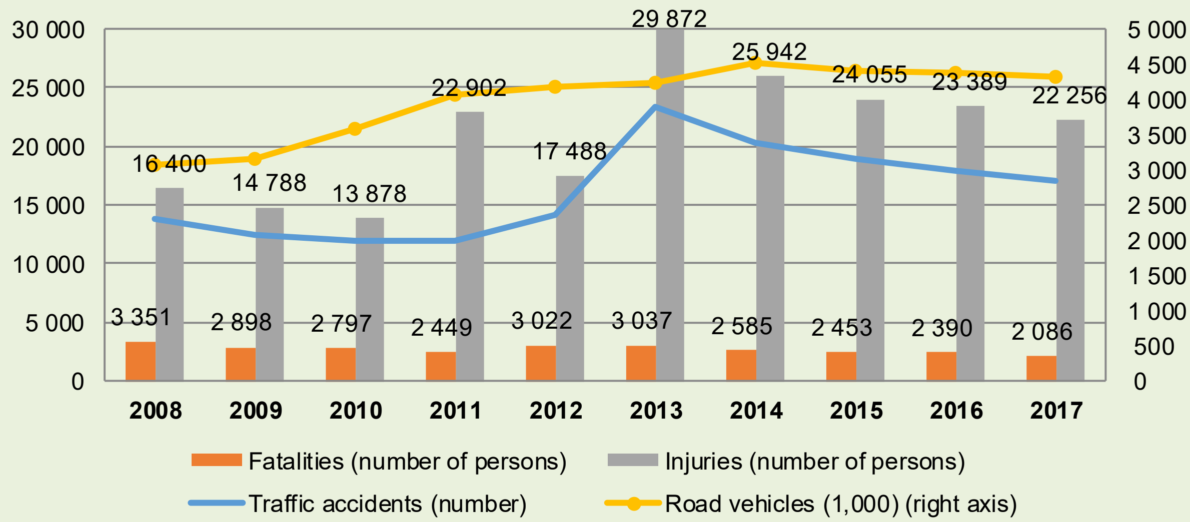
Target 3.4: By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being

Health sector performance in combating mortality from cardiovascular and respiratory diseases, cancer and diabetes is improving. Mortality rates from these diseases are steadily declining. But the rate of morbidity of these nosologies is increasing, including in children. In addition, the rate of mortality from these diseases is significantly higher than the average in the WHO European Region and in a number of developed countries. To ensure the achievement of target 3.4, additional actions should be taken, given the approach "Health in all policies", meaning the involvement of all relevant sectors, stakeholders and individuals in reducing air pollution, improving water quality, promoting healthy lifestyle and decreasing the prevalence of tobacco smoking and obesity.

Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents

In 2017, Kazakhstan reported 2,086 deaths from road traffic accidents. The number of fatalities is decreasing compared with the growth in vehicle numbers (figure 13.6). However, according to the 2018 WHO Global Status Report on Road Safety, the estimated rate of road mortality in Kazakhstan is 17.6 fatalities per 100,000 population. This is much higher than in other countries in the WHO-Europe Region. For example, in the United Kingdom of Great Britain and Northern Ireland, the same report estimates this rate to be 3.1 per 100,000, in Germany 4.1 per 100,000, and in Belarus 8.9 per 100,000. To achieve target 3.6, the health sector should take a stronger position in advocating for stronger enforcement of road safety measures.

Figure 13.6: Road traffic accidents, 2008–2017



Source: Committee on Statistics, 2018.

Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

Chemical pollution and related health effects were declared as a priority for governmental action to ensure economic progress in the country. The negative health impact of unsound chemicals management is reported in a number of studies: high levels of lead were registered in children's blood in some regions (more than half the children in Shymkent in 2012 had a lead level higher than the WHO reference level), there were incidents of poisoning at workplaces, and children's toys were withdrawn due to their hazardous chemicals content (20 per cent of toys in 2017). Outdoor and indoor air pollution, poor water quality, unsound chemicals and waste management, contaminated sites and chemicals in products are the main problems that should be addressed in the near future. Immediate action should be taken at the national and oblast levels with a focus on the cross-sectoral nature of chemical and environmental management to ensure achievement of target 3.9.

Target 3.a: Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate

As a party to the Framework Convention on Tobacco Control, Kazakhstan implemented actions to combat tobacco smoking, such as legislative development, implementing the requirement on labelling of tobacco products and prohibiting smoking in public places, among others. However, the prevalence of tobacco smoking in Kazakhstan is still higher than in the WHO European Region, in both adults and children. Along with air pollution, tobacco smoking contributes to the high rate of non-communicable diseases, in particular of cardiovascular and respiratory diseases. Promotion of a healthier lifestyle in young people, further strengthening the enforcement of legislation and controlling tobacco products can pave the way to achieving target 3.a.

Target 3.d: Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

Kazakhstan accepted the obligations under the 2005 International Health Regulations. According to the country's 2012 self-assessment report, the core capacities are not sufficient to meet criteria in the areas of intersectoral coordination, health surveillance, preparedness and response, risk communication and control of zoonotic diseases.

To fill these gaps, a roadmap for implementation of the International Health Regulations was developed by the Ministry of Health in cooperation with the Centers for Disease Control and Prevention (CDC) Central Asia Region in 2017–2018. As of June 2018, this roadmap is not approved. Its implementation, including the creation of a poison control centre to increase response to chemical and other hazards, is one of the main conditions for achieving target 3.d.

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Target 4.a: Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

Leaving no one behind, i.e. ensuring inclusivity and equitable access to education, are important aspects of target 4.a. In 2017, 49.3 per cent of schools in Kazakhstan had decentralized sanitation and 9.7 per cent had a decentralized water supply. Of all schools, 86 per cent provided hot meals to their pupils and 9.7 per cent had to transport drinking water in order to prepare meals. Lighting, furniture and the quality of meals are regularly controlled in schools. However, a study in the framework of the SEARCH II project (2011–2012) revealed high air pollution by chemical pollutants in those schools participating in the survey.

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Target 8.8: Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment

Kazakhstan ratified 22 ILO conventions, including seven in occupational safety and health. The number of employees working in jobs with harmful working conditions has increased from 218,588 in 2010 to 370,133 in 2017. More than half of these work in the private sector. The prevalent harmful factors are noise, vibration and chemicals that can cause severe and irreversible health effects. Every year, around 300 cases of injuries at work and occupational diseases are reported. The percentage of workplaces that do not meet the national standards is quite high.

Strengthening legislation, including increasing employers' responsibility for workers' health, ensuring the equality of migrant workers, revising compensation levels for loss of health due to working conditions, improving the assessment of risks and strengthening inspections and control are the way to achieve progress towards target 8.8.

Institutional framework

Ministry of Health

The Ministry of Health is responsible for public health, the sanitary and epidemiological welfare of the population, control and supervision of compliance with the technical regulations and regulatory documents, including in the areas of food product safety and production of organic products, intersectoral coordination of the activities of other governmental bodies to ensure the implementation of state policy on the sanitary and epidemiological welfare of the population and the implementation of state programmes related to human health.

The Committee for the Protection of Public Health of the Ministry of Health, established in May 2017, is responsible for the sanitary-epidemiological welfare of the population. During the period 2014–2016, the environmental health mandate was partly covered by the Committee on Consumers Rights Protection of the Ministry of National Economy. Before 2014, the sanitary-epidemiological department was a structural unit of the Ministry of Health.

Currently, the Committee for the Protection of Public Health of the Ministry of Health regulates the protection of public health and sanitary and epidemiological welfare. It controls and supervises compliance with the requirements for safety of processes, products and services, and conducts state registration, sanitary and epidemiological expertise and inspection. It develops regulatory and legal documents and implements intersectoral coordination for the protection of environmental health. The Committee has territorial branches. In addition, the Department of Public Health Protection in Transport, also with territorial branches, is part of the Committee's structure. It deals specifically with the protection of public health and ensuring sanitary and epidemiological well-being in the transport sector.

The National Centre for Expertise under the Committee for the Protection of Public Health and its branches in the oblasts (16), cities (25) and rayons (183) carry out laboratory activities concerning public health. But the laboratory service does not cover the needs for monitoring and assessing environmental impacts on health, neither with regard to the list of indicators nor with regard to the number and frequency of instrumental and laboratory analysis.

In the structure of the public health protection system there are nine antiplague stations and three scientific institutions: Khamzy Zhumatov Scientific Centre for Hygiene and Epidemiology, Kazakh Scientific Centre for Quarantine and Zoonotic Infections named after Masgut Aymimbayev, and Scientific and Practical Centre for Sanitary and Epidemiological Expertise and Monitoring.

Other

The Ministry of Energy is responsible for environmental protection policies. Its Committee of Environmental Regulation and Control conducts environmental assessment and issues environmental permits for industrial facilities.

The Ministry of Labour and Social Protection of Population monitors compliance with occupational safety and health requirements and organizes the monitoring and evaluation of risks in the field of occupational safety and health.

The Ministry of Agriculture is in charge of governmental policy on a number of issues, including drinking water supply and sanitation and protection of surface waters used for recreational purposes, foodstuffs production and safety and food security. Regulation of pesticides and agrochemicals also falls under the Ministry's mandate.

Health-related competences of the Ministry for Investments and Development include registration of chemical products and keeping track of chemical products (in accordance with sectoral focus), defining rules for the maintenance and protection of green spaces, as well as rules for the planning and maintenance of cities and settlements, developing the rules of the state system of technical regulation and creating advisory bodies for ensuring the safety of products and processes.

The Ministry of Internal Affairs implements functions related to the prevention of and response to emergency situations of natural and human-made origin and provision of emergency medical and psychological assistance to the population in the event of emergency, and ensures the preservation and rehabilitation of the health of emergency response personnel.

The Ministry of Education and Science develops and facilitates the implementation of the standard curricula of all levels of education, including with the purpose of promoting a healthy lifestyle and environmental health, and determines the requirements for catering in educational institutions.

The Kazakh Academy of Nutrition and the National Centre for Problems of Healthy Lifestyle Development of the Ministry of Health contribute to the development of public health in the field of nutrition and healthy lifestyle.

Horizontal coordination and cooperation

Coordination and cooperation between sectors and stakeholders through establishing relevant mechanisms at national level, that is, incorporation of "health in all policies",[52] is essential for improving human health and well-being. Such mechanisms, such as a committee or interministerial group, are not established in Kazakhstan.

No multisectoral approach or mechanism of intersectoral coordination on chemicals management are in place in Kazakhstan. As of late 2018, the Ministry of Health is taking measures to improve the situation and establish proper chemicals management, providing for interministerial coordination among the Ministry of Health, Ministry for Investments and Development and Ministry of Agriculture. These efforts take place in the framework of a WHO-led international project.

Preventive measures

Progress achieved in reducing infectious diseases in Kazakhstan is largely due to a set of preventive measures that have been implemented in recent years.

The level of vaccinations against preventable diseases has been higher than 95 per cent since 2008. Vaccination against tuberculosis and viral hepatitis declined but is still at the required level. In 2017, the country reported 95 per cent immunization coverage for all types of vaccines, except for vaccination of newborns in maternity hospitals against viral hepatitis B and revaccination against pertussis, diphtheria, tetanus, hepatitis B and hemophilic infection before the age of 18 months (88–89 per cent).

In 2017, the percentage of newborns vaccinated against tuberculosis in maternity wards was 94.9 per cent. A revaccination against tuberculosis was carried out in 200,849 children aged 6 years (59.2 per cent). The coverage of children with tuberculin diagnostics in 2017 was 99.4 per cent.

In Kazakhstan, a vaccination against plague is conducted in areas where natural foci of infection exist.

Annually, measures are taken to prevent zoonotic and vector-related diseases, including a survey of settlements, assessment of rodent damage by ectoparasites and settlement deratization and disinfection.

For prevention of communicable and non-communicable water-borne diseases, control of the quality of drinking water and drinking water sources is conducted and water supply systems are maintained.

[52] "Health in all policies" is an approach to include health considerations in policymaking across sectors that influence health, such as agriculture, education, housing, industry, land use, public safety and transport.

The safety of food products during their production and sale is conducted continuously through laboratory analysis.

Hazardous chemicals are controlled in a wide range of products. But the list of chemical safety indicators does not include many well-known hazardous substances.

Based on assessment of the radiological situation, workplace assessment and measurement of the intensity of physical factors, risk mitigation measures are being developed and their implementation is under strict control.

The preventive approach establishes a basis for permitting of building and construction works, as well as of industrial activities. Nevertheless, difficulties are observed with applying the newest methodological approaches to risk assessment, including cumulative risk assessment to ensure stronger protection of human health.

Environmental health-related agreements and processes

Kazakhstan is not party to the 1999 ECE/WHO-Europe Protocol on Water and Health. Given the problems with access to water and sanitation at the national level, the decreasing quality of surface waters, including those used for drinking water supply, and the absence of positive trends in reducing diseases potentially caused by water quality and safety, accession to the Protocol is the way to provide the country with technical and methodological support towards achieving national and international goals related to drinking water supply, in particular target 6.1 of the 2030 Agenda for Sustainable Development.

Kazakhstan is a party to the main chemicals conventions: Stockholm Convention on Persistent Organic Pollutants since 2007, Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal since 2003 and Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade since 2007.

Kazakhstan is not a party to the Minamata Convention on Mercury. This convention is included in the Workplan for conclusion of international agreements by the Republic of Kazakhstan for the period 2018–2020. Some work has already been accomplished on the way to accession: an initial national inventory (level 1) is prepared, and priority areas for mercury monitoring are defined. It is planned to prepare a draft national plan on reduction of mercury. Analysis of legislation was prepared under the UNDP/GEF project "Minamata Initial Assessment for Kazakhstan". Participation in the Convention and implementation of its requirements, such as control and reduction of mercury emissions, elimination of mercury from the production chain, gradual restriction and ban of mercury-added products, including in the health sector, and sound management of mercury-containing wastes, are ways to decrease the population's exposure to mercury and health disorders attributable to mercury and its compounds. Similarly, the 1973 OECD Recommendation on Measures to Reduce all Man-Made Emissions of Mercury to the Environment urges governments to reduce anthropogenic releases of mercury to the environment to the lowest possible levels, whereas the 1987 OECD Decision-Recommendation on the Systematic Investigation of Existing Chemicals recommends establishing or strengthening national programmes to systematically investigate existing chemicals in order to identify those that need to be managed and controlled.

Kazakhstan declared it would join the Strategic Approach to International Chemicals Management (SAICM) but the national institutional framework needed for SAICM implementation has not been created. Kazakhstan appointed a national focal point for SAICM. However, neither an interagency coordination mechanism nor a national action plan for implementation were developed, which is a meaningful barrier for establishing a sound chemicals management system in the country.

The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is not implemented in Kazakhstan. GHS implementation is the way to strengthen chemicals safety through provision of information on chemical hazards for human health and to facilitate trade. Adequate capacities are lacking in all sectors involved in chemicals management (health, environment, industry, agriculture).

Kazakhstan accepted the obligations of implementation of the International Health Regulations (IHR) to contribute to prevention of the global spread of diseases and reported on the creation of core capacities as required by the IHR. A roadmap for IHR implementation has recently been developed by the Ministry of Health in cooperation with CDC Central Asia. The roadmap includes the establishment of a poison control centre to strengthen response to chemical hazards.

Kazakhstan regularly participates in the meetings and activities under the European Environment and Health Process. No specific actions have yet been developed in Kazakhstan as a follow-up to the Sixth Ministerial

Conference on Environment and Health (Ostrava, 2017). Nevertheless, the Ostrava Declaration, in particular the commitment to develop national portfolios of actions, creates opportunities for developing the national policy platform in the environmental health area. Such national priorities could include chemical safety – an important priority for Kazakhstan.

Kazakhstan ratified 22 International Labour Organization conventions including seven conventions relevant to occupational safety and health: Labour Inspection Convention, 1947 (No. 81) (ratified in 2001); Asbestos Convention, 1986 (No. 162) (ratified in 2011); Safety and Health in Construction Convention, 1988 (No. 167) (ratified in 2007); Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187) (ratified in 2014); Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148) (ratified in 1996); Occupational Safety and Health Convention, 1981 (No. 155) (ratified in 1996); and Labour Inspection (Agriculture) Convention, 1969 (No. 129) (ratified in 2001). However, Kazakhstan did not ratify the Chemicals Convention, 1990 (No. 170), Prevention of Major Industrial Accidents Convention, 1993 (No. 174) and Radiation Protection Convention, 1960 (No. 115).

13.6 Assessment, conclusions and recommendations

Assessment

Since 2008, Kazakhstan has achieved progress in increasing life expectancy and decreasing infant and maternal mortality, as well as mortality from the main causes, such as cardiovascular diseases and cancer. Mortality and morbidity from communicable diseases has been reduced, due to the effectiveness of preventive measures. But the country faced a large and growing burden of non-communicable diseases, including the growing rate of cancer, congenital disorders, asthma and chronic bronchitis in children. The high level of chemical pollution of outdoor and indoor air, drinking and surface waters and soil, the lack of sound management of hazardous chemicals and chemicals in products and growing lifestyle problems increase the risks to the population of non-communicable diseases attributable to the environment in Kazakhstan.

Kazakhstan emphasizes human health as a policy priority and has adopted and implemented state programmes to facilitate profound changes in the health sector. Progress is observed in developing legislation and its continuing improvement and in improving the infrastructure of healthcare institutions. Some progress has been made in moving towards sustainable health systems. These factors create the basis to build on for further actions aimed at improvement of human health and well-being. However, the reduction of state supervision and control manifested in the reduced number of inspections, including sanitary-epidemiological inspections (by more than 10 times in some areas), without the relevant increase in the responsibilities of the industry and private sector, can be one of the reasons for negative trends in the quality of drinking water and safety of consumer products, and in the absence of positive tendencies in improving the situation at workplaces. In the long-term perspective, this could lead to a lower level of environmental health security.

Conclusions and recommendations

Improving the environment and health system

No cooperation or coordination mechanisms on the environment and health between sectors and between stakeholders are in place. The assessment of positive and negative socioeconomic impacts on public health is not a part of national strategic documents. Environmental health aspects are poorly integrated into sectoral documents. Risk assessment is increasingly used in the permitting process, during the sanitary and epidemiological expertise, as well as during the planning of inspections. Nevertheless, there are difficulties in applying the risk assessment approach and ensuring the widespread implementation of health risk assessment in the decision-making process. Increasing the list of control risk factors in the framework of countrywide social-hygienic monitoring, including human biomonitoring, are priority actions to be considered for the next period.

Recommendation 13.1:
The Government should:

(a) Establish an intersectoral coordination mechanism to ensure interagency coordination and collaboration on environmental health, including chemical safety, and application of the "health in all policies" approach in the development of national strategies and programmes;
(b) Ensure the widespread implementation of health risk assessment in decision-making processes and in strategic planning.

Chemicals, environmental pollution and human health

In Kazakhstan, research conducted recently revealed the impact of chemicals on human health. Air pollution by particulate matter causes approximately 2,800 premature deaths a year. There are big storage facilities of hazardous chemicals, including POPs. The mandates of different agencies in the context of sound chemicals management are not clearly defined. An inventory of chemicals exists; however, a chemical register, which could be a source of information for planning risk reduction measures, does not exist. No chemical legislation in line with the best international practice is available in the country. Monitoring programmes of chemicals in products do not provide information to assess the health risks from chemicals in products. No SAICM institutional framework has been created in the country. The availability on the market of paints with a high level of lead leads to increased exposure of children to lead. Improvement of chemicals management is critical to decrease the burden of non-communicable diseases and for the achievement by Kazakhstan of Sustainable Development Goal 3, target 3.9.

Recommendation 13.2:
The Government should develop a chemicals management system that meets needs for the protection of human health and the environment and would support the achievement of Sustainable Development Goal 3, target 3.9, including through:

(a) Initiating the development of the legislation defining the mandates of governmental bodies on sound management of chemicals and requirements for regulation of hazardous chemicals, including prohibition of and/or restrictions on production and use of hazardous chemicals and their mixtures;
(b) Developing the national institutional framework on chemical safety;
(c) Establishing the chemical register, with its main role being a source of information for human health risk assessment and mitigation;
(d) Initiating development of the implementation plan of the Strategic Approach to International Chemicals Management;
(e) Ensuring the transition to the Globally Harmonized System of Classification and Labelling of Chemicals;
(f) Conducting regular human biomonitoring surveys to assess the population's exposure to hazardous chemicals;
(g) Advocating for less hazardous and non-hazardous alternatives to hazardous chemicals, taking into account the practices in OECD Member countries;
(h) Creating a poisons control centre in line with the World Health Organization recommendations.

See Recommendation 8.5.

Impact of indoor environmental pollution on human health

In Kazakhstan, scaled growth in the rate of non-communicable diseases (chronic bronchitis, asthma) in children aged 0–14 can be linked with pollution of indoor environments. Very little information is available in Kazakhstan because no requirements exist in the legislation for assessment, controlling and managing the risks of indoor environmental pollution. The SEARCH II project reported high rates of indoor environmental pollution by chemicals in schools in Kazakhstan. Improving the indoor environmental conditions in schools, kindergartens and other public buildings for children is critical for achieving targets 3.9 and 4.a of the Sustainable Development Goals.

Recommendation 13.3:
The Ministry of Health, in cooperation with the Ministry of Education and Science, should take actions to improve indoor environments, in particular in schools, kindergartens and other public buildings for children, through:

(a) Developing legislation defining the roles and responsibilities of the governmental bodies for creation of child-friendly and healthy indoor environments in places where children live, study and play, and requirements for organizational, technical and other measures for health risk reduction and healthy indoor environments;
(b) Setting the national monitoring system of indoor environments in public buildings for children and providing an updated risk assessment of indoor environmental pollutants on children's health.

Asbestos

Kazakhstan produces chrysotile asbestos and asbestos-containing materials. These materials are used in the domestic market to produce asbestos, asbestos-containing thermal insulation and other materials. Kazakhstan does not register mesothelioma as a separate nosology. Neither a national asbestos profile nor a plan for the prevention of asbestos-related diseases has been approved in Kazakhstan. Impacts on health from asbestos are not systematically documented.

Recommendation 13.4:
The Government should:

(a) *Carry out an epidemiological study of mesothelioma trends and asbestos exposure, including occupational exposure, applying methodology recommended by the World Health Organization;*
(b) *Develop the national asbestos profile for the prevention of asbestos-related diseases;*
(c) *Ensure strict control of the use of asbestos and asbestos-containing products and implementation of a set of measures to comply with environmental protection requirements and health and safety at work in asbestos production enterprises, in order to reduce as much as possible the health effects of the use of asbestos in line with the practices of OECD Member countries.*

Protocol on Water and Health

The situation with drinking water supply has been constantly improving. Still, access to sanitation in 2017 was only at 11.5 per cent in rural settlements. The rate of water-borne intestinal infections is not high. Nevertheless, drinking water pollution is a factor that can contribute to the high rate of urinary system disorders around the country. The causal relationship between the chemical composition of water and the prevalence of urinary system diseases is confirmed in North Kazakhstan, Pavlodar and South Kazakhstan Oblasts. A notable increase in urolithiasis in Almaty City and the capital, along with other causes, can be linked to the high mineralization and rigidity of drinking water.

Kazakhstan is not party to the 1999 ECE/WHO-Europe Protocol on Water and Health. Accession to the Protocol is the way to provide the country with technical and methodological support towards achieving national and international goals related to drinking water supply and sanitation, in particular Sustainable Development Goal 6, target 6.1.

Recommendation 13.5:
The Government should accede to the ECE/WHO-Europe Protocol on Water and Health to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

Safe and healthy workplaces

Kazakhstan is party to 22 ILO conventions and took on the obligations of improving workplace safety and workers' protection. But several conventions dedicated to prevention of major industrial accidents and safety control of occupational hazards caused by chemicals are not yet ratified.

Recommendation 13.6:
The Ministry of Labour and Social Protection of Population should initiate accession to the ILO conventions on environmental and occupational health risks prevention, namely the:

(a) *Convention concerning the Protection of Workers against Ionising Radiations, 1960 (No. 115);*
(b) *Convention concerning Safety in the use of Chemicals at Work, 1990 (No. 170);*
(c) *Convention concerning the Prevention of Major Industrial Accidents, 1993 (No. 174).*

ANNEXES

Annex I: Implementation of the recommendations in the second Environmental Performance Review

Annex II: Participation of Kazakhstan in multilateral environmental agreements

Annex III: Key data and indicators available for the review

Annex IV: List of major environment-related legislation

Annex V: Sources

Annex VI: Maps

Annex I

IMPLEMENTATION OF THE RECOMMENDATIONS IN THE SECOND ENVIRONMENTAL PERFORMANCE REVIEW[53]

PART I: POLICY MAKING, PLANNING AND IMPLEMENTATION

Chapter 1: Policymaking framework for environmental protection and sustainable development

Recommendation 1.1:
In order to achieve a better balance between economic, social and environmental policy areas, the Government, through the National Council for Sustainable Development should:

- *Increase the coordinating role of the Ministry of the Environmental Protection in improving cooperation between competent ministries to ensure adequate integration of environmental and social issues in sectoral policies and strategies;*
- *Give the MEP responsibility for analyzing the draft sectoral policies and strategies on their compliance with sustainable development principles;*
- *Increase partnerships and transparency in the development and implementation of sustainable development programmes at the national and local levels, involving all major stakeholders, including civil society and NGOs.*

The recommendation has not been implemented. The country is still far from achieving a better balance between economic, social and environmental policy areas. In October 2013, the Ministry of Environmental Protection was transformed into the Ministry of Environment and Water Resources. In August 2014, as part of a larger reform of governmental institutions, the Ministry of Environment and Water Resources was abolished. The country does not have a self-standing environmental ministry. Formally, the responsibilities for environmental protection are with the Ministry of Energy. However, in fact they are scattered across various ministries, including the Ministry of Agriculture, the Ministry for Investments and Development and others. The Council for Sustainable Development was dismantled in 2014.

Recommendation 1.2:
In order to support the implementation of the Concept of Transition to Sustainable Development for the period 2007–2024 at the regional and local levels, especially in rural areas, the Government should:

- *Strengthen cross-sectoral cooperation and coordination at the regional and local levels by establishing local intersectoral coordination councils and task forces on development and implementation of sustainable development programmes;*
- *Increase capacity-building at the local level, e.g. by providing civil servants with training on developing sustainable development programmes at the territorial level, including access to international experience in this field;*
- *Develop education programmes and raise public awareness concerning sustainable development issues, including the responsibilities of local authorities and other major stakeholders, including the general public.*

This recommendation is partially implemented. No local intersectoral coordination councils and task forces on development and implementation of sustainable development programmes were established. However, there are systematic efforts to provide civil servants with training on developing sustainable development programmes (development programmes of the territories) and there has been progress in developing education programmes and raising public awareness concerning sustainable development issues. The Concept of Transition of the

[53] The second review of Kazakhstan was carried out in 2008.

Republic of Kazakhstan to Sustainable Development for the period 2007–2024 was invalidated in 2011 and not replaced with a similar document focused on sustainable development.

Recommendation 1.3:
The Government should, in cooperation with the Kazyna Sustainable Development Fund and other stakeholders, develop a strategy for the effective integration of SD principles and environmental considerations into the Fund's investment policy and projects. The Government should also consider extending the mandate of the Fund to include financing of environmental investments.

This recommendation is not implemented. The Kazyna Sustainable Development Fund ceased to exist in October 2008 when the JSC Sovereign Wealth Fund Samruk Kazyna was created through a merging of Kazyna Sustainable Development Fund and Kazakhstan's Holding for Management of State Assets Samruk. Formally, the JSC Sovereign Wealth Fund Samruk Kazyna can support sustainable development initiatives, However, a more explicit mandate is needed to ensure it proactively directs financial resources to environmental and sustainable development projects.

Recommendation 1.4:
The Government should clearly define the horizontal responsibilities in environmental policy matters across and within different ministries, including responsibilities for coordination of environmental management. This is especially true for the areas of protection of natural resources, water resources and forest resources.

This recommendation is implemented. Horizontal responsibilities in environmental policy matters across and within different ministries are defined, including in the areas of protection of natural resources, water resources and forest resources. With very minor exceptions, no issues of duplication or overlap of environment-related competences between ministries are reported.

Recommendation 1.5:
The Ministry of Environmental Protection, in cooperation with stakeholders at the national level and with international institutions, should further improve the environmental legislation by continuing its harmonization with relevant EU Directives.

Implementation of this recommendation is ongoing. Improvement of environmental legislation takes place but harmonization with relevant EU Directives is not a priority. Rather, the Government is looking at the practices of OECD Member countries. Important steps were taken to reduce the administrative and bureaucratic burden on business by improving permitting procedures. Areas to improve are the implementation of transfer to BAT, operationalization of integrated permitting, improvement of the effectiveness of the environmental payment system, provision of incentives for pollution reduction and compliance with the polluter pays principle.

Chapter 2: Compliance and enforcement mechanisms

Recommendation 2.1:
The Ministry of Environmental Protection should further strengthen the institutional capacity for compliance assurance. More specifically, it should:

- *Link budget planning to activity planning, and provide budgets that are commensurate with the scope of regulation and inspection;*
- *Create conditions that would retain staff and motivate their high performance.*

The recommendation has not been implemented. There is no indication that budget planning for compliance assurance activities is linked to activity planning. Also, environmental inspectors do not have any special career path that would allow for the retention of staff and motivation for high performance.

Recommendation 2.2:
In order to promote a higher environmental compliance and performance among the regulated community, the MEP should gradually reform the procedures on EIA and State ecological expertise and the compliance assurance instruments, with due attention to capacity constraints. To accomplish this, the MEP should:

- *Simplify and shorten the EIA and SEE procedures for certain medium- and small-scale projects;*

- *Implement the recently developed regulations and procedures for transition to integrated permitting for large industry and further elaborate the structure of environmental permits for large industry, so that it fully corresponds to best international practice, and set related deadlines and schedule;*
- *Introduce decommissioning conditions in environmental permits;*
- *To increase the probability of discovering non-compliance, lift frequency restrictions (in conjunction with promoting greater transparency) and further develop the risk-based approach to inspection, whereby the highest priority is given to largest polluters and companies that are systematically in non-compliance, and conduct unannounced checks as deemed appropriate;*
- *Improve the methods of conducting site visits and pay attention to checking environmental performance, including the technical state of facilities;*
- *Reduce the administrative burden of self-reporting and boost the MEP capacity to use self-reported information for decision-making;*
- *Introduce, on a pilot basis, the requirement to rehabilitate ecosystems as part of the environmental liability regime, rather than systematically imposing monetary penalties;*
- *Develop and use transparent, computer-based tools to assess the level of fines. While providing response to administrative violations, follow the enforcement pyramid from mild to severe sanctions in order to promote the credibility of the Government.*

The recommendation has been partially implemented.

EIA requirements were reduced. The first (Survey of the state of the environment – assessment of the territory, performed to justify the optimal choice of the site for the location of the facility, Declaration of Intent) – and last (post-project analysis) EIA stages were abolished. The time frame for SEE was reduced. Permit validity was extended from three to five years.

No applications were received for integrated permits and therefore they are not yet a reality in Kazakhstan. There continues to be a divergence between the assumptions behind the integrated permit and the approach followed in the country, which is reflected in the establishment of ELVs based on MACs and not on BAT.

The risk-based approach is followed. However, some constraints remain, namely the limited number of inspections of a company (no more than one a year), inhibition of suspension of an activity by an inspector and some restrictions that hinder the potential associated with inspections, such as the impossibility of performing unannounced inspections.

Companies continue to have to submit several reports, and there has been no effort to unify such reports (where feasible) or at least to simplify them.

The application of fines and revenue collection remain central, with environmental policy as a tool for collecting revenues for the state budget, not the other way around. The lack of earmarking of the revenue collected for environmental payments is the best example of this.

The obligatory environmental remediation when there is environmental damage is not yet a reality in the legislation of Kazakhstan. The Environmental Code touches on environmental responsibility but is far from creating an environmental liability regime and making environmental remediation a priority when environmental damage occurs.

The application of fines continues to involve some discretion on the part of the decision-maker, which continues to raise issues of proportionality and creates a margin of potential abuse of power by public administrations.

Recommendation 2.3:
In order to promote a better functioning of institutions involved in the whole cycle of environmental regulation, the MEP, in cooperation with the National Statistical Agency, the General Prosecutor's Office and other partners needs to improve the system of performance management. To do this, the MEP should:

- *Review the compliance and enforcement indicators throughout the entire regulatory cycle and keep a selection of the most relevant of these indicators;*

- *Standardize and normalize enforcement and compliance data;*
- *Analyse and present enforcement and compliance data in a meaningful way to reflect the decision-making process;*
- *Build more comprehensive, accurate, and user-friendly data management systems and create a public database containing permitting and inspection data;*
- *Disclose activity reports produced by all agencies involved in environmental regulation and compliance assurance.*

The recommendation has been partially implemented but much more needs to be done to achieve its objectives. The Government made efforts to standardize enforcement and compliance data. Data and information about the performance of the environmental regulatory and compliance assurance system are publicly available but scattered throughout various sources and not presented in a form that would allow for assessment and identification of trends. No public database containing permitting and inspection data exists. The Ministries of Energy and of Agriculture disclose annual reports on implementation of their strategic plans, which include information about activities of the Committee of Environmental Regulation and Control, Committee on Forestry and Fauna and Committee on Water Resources.

Chapter 3: Information, public participation and education

Recommendation 3.1:
The Ministry of Environmental Protection should review the environmental monitoring programme run by Kazhydromet to identify gaps, weaknesses and inconsistencies and to develop a strategy with an action plan for further modernization and upgrading the monitoring networks in line with international guidelines and best practices. Such action plan should establish time frames and specify budgets:

(a) To link monitoring objectives with priority environmental problems at national and territorial levels and make monitoring an instrument to assess progress in achieving environmental policy targets set in State programmes and plans;
(b) To enlarge the number of parameters to measure, in particular, ground-level ozone, PM10, heavy metals and POPs in ambient air and biological parameters in water;
(c) To establish additional background and transboundary monitoring stations in line with internationally agreed guidelines;
(d) To complete the transition to automatic measurements and improve data quality control and storage procedures;
(e) To link environmental quality data with emission data by enterprises to establish cause-effect relationships to be reported to compliance control and policymaking authorities for possible action;
(f) To develop monitoring network in the Aral Sea area.

Overall, the recommendation has been implemented.

(a) Monitoring objectives are linked with priority environmental problems at national and oblast levels and monitoring activities are systematically adapted to/revised in line with high pollution episodes, through supplementary monitoring campaigns. Monitoring results are not only made available to the public but also used to assess progress in achieving environmental policy goals and targets in relevant national and oblast-level programmes and plans.

(b) Relevant progress in the development and expansion of Kazhydromet’s air quality and surface water quality monitoring infrastructure has been made since 2008. Both monitoring networks have been significantly expanded in terms of the number of monitoring stations and parameters being monitored.

For air monitoring, in the period 2008–2017, Kazhydromet expanded the number of measured parameters from 16 to 35, and, in 2018, two additional parameters (nickel and mercury) were added to the list of air quality monitoring parameters. Among the 37 air quality parameters currently being monitored, Kazhydromet monitors ozone, PM_{10}, heavy metals and certain POPs (notably, polycyclic aromatic hydrocarbons).

With regard to surface water quality monitoring, sampling and analysis is carried out daily, every 10 days and monthly, with the following parameters being monitored: visual observations, temperature, hydrogen index, suspended substances, colour, transparency, odour, BOD_5, COD, dissolved oxygen, percentage of oxygen saturation, CO_2, chlorides, sulphates, hydrocarbonates, calcium ions, magnesium ions, hardness, sum of sodium and potassium, amount of ions, ammonium saline, nitrogen, nitrate nitrogen, sum of nitrogen, phosphates, volatile phenols, oil products, anionic surfactants, hydrogen sulphide, fluorides and heavy metals (Fe, Si, Al, Mn, P, Mo, As, Ni, Pb, Cu, Cd, Zn, Hg, Be, Cr, Cr(VI), Co). In addition, in 2017, surface water was also monitored for pesticides (alpha-HCH, gamma-HCH, 4.4-DDE, 4.4-DDT) in nine water bodies in the territories of Almaty, East Kazakhstan, North Kazakhstan, South Kazakhstan and Zhambyl Oblasts.

Regarding monitoring biological parameters in water, Kazhydromet monitors hydrobiological indicators and water toxicity at 85 gauges on 21 water bodies in East Kazakhstan and Karaganda Oblasts.

(c) Kazhydromet monitors the quality of surface waters on transboundary rivers with Kyrgyzstan, the People's Republic of China, the Russian Federation and Uzbekistan, in a total of 31 transboundary rivers. Surface water quality in transboundary rivers is monitored at 35 hydrochemical gauges.

(d) Regarding the transition to automatic measurements, since 2008, the number of automatic air quality monitoring stations operated by Kazhydromet has increased from eight to 90. Kazhydromet also acquired specialized environmental data analysis software supporting air quality monitoring data collection, instrument calibration, data verification and quality control, as well as storage and reporting.

(e) Episodes of high and extremely high air and surface water pollution in Kazakhstan are systematically captured by Kazhydromet and regularly published in monthly, quarterly, semi-annual and annual information bulletins, with relevant information being presented by oblast and city. This information is also made available to relevant compliance control and policymaking authorities for possible action as needed/required, considering emissions data provided by enterprises and possible or potential cause-and-effect relationships.

(f) Environmental monitoring activities in the Aral Sea are carried out by Kazhydromet's Kyzylorda Branch in accordance with the work programme "State of Environment and Public Health Monitoring in the Aral Sea Region". The programme covers atmospheric air, drinking water and radiation. Results are regularly made publicly available through the quarterly, semi-annual and annual publication of Kazhydromet's information bulletin on the state of the environment and public health in the Aral Sea region.

Recommendation 3.2:
The Ministry of Environmental Protection and the Agency for Statistics should jointly review their environmental reporting requirements for enterprises and prepare the necessary modifications to harmonize and streamline these requirements so that enterprise reporting data could facilitate the preparation of emission inventories in line with international guidelines and the development, step by step, of territorial and, thereafter, national pollutant release and transfer registers.

The recommendation has been partially implemented. In 2016, the Law on Amendments to Legislation related to Environmental Issues introduced the provisions for the creation of a State Pollutant Release and Transfer Register (SPRTR). As of 2018, the work is underway at the IACEP under the Ministry of Energy to automate the SPRTR. A webpage where SPRTR reports from companies who own Category I facilities are posted provides free access to relevant information on emissions and pollution generated. A project being implemented by IACEP assists companies in submitting online reports to the SPRTR.

Recommendation 3.3:
The MEP should review the current information dissemination procedures of Kazhydromet to make data and information on ambient environment freely available to all information users, including all governmental bodies at all levels, business and industry, and the general public. Restrictions, if any, should not go beyond those referred to in the Aarhus Convention, to which Kazakhstan is a Party. Kazhydromet should also upgrade its website by uploading all its bulletins and information on ambient air, water and soil quality as measured by its networks.

The recommendation has been implemented. While, in 2008, only very limited environmental monitoring data and information were published on the website of Kazhydromet (and only on environmental monitoring in the Kazakh part of the Caspian Sea), there has been a substantial increase in the online provision of public access to environmental monitoring data and information collected by Kazhydromet. It is now publishing online all its environmental monitoring information bulletins. Kazhydromet has also developed an app on urban air quality ("AirKz", launched in 2018) to make air quality data available to the public.

Recommendation 3.4:
The MEP, with the support of the USSENRM Inter-agency Working Group, should critically review its plans to establish, in addition to the database on natural resource cadastres, a self-standing database on environment with the aim of either making these two databases mutually supplementary or of considerably expanding the former database by including datasets on emissions, discharges and ambient environmental quality. The database(s) should be made accessible to contributing agencies and the general public following the Aarhus Convention obligations.

The implementation of this recommendation is ongoing.

There is not yet a fully functional, shared environmental data and information system between relevant ministries, agencies and institutes, but steps are underway for the development of a Unified State System for Environmental and Natural Resources Monitoring (USSENRM) according to the provisions of the Environmental Code. Full development and establishment of the USSENRM is still pending, due to the lack of financial resources.

With regard to expanding existing databases, such as the State Cadastre of Natural Resources and the State Environmental Information Fund (SEIF), in order to include datasets on emissions, discharges and ambient environmental quality and make these available to the public, opportunities remain for further improving the application of SEIS principles of open access to environmental data, including with regard to the provision of online public access to data from the SEIF database (rather than by request and to metadata only).

Recommendation 3.5:
The Government, and in particular the MEP and the Ministry of Justice, should complete the adjustment of the national legislation to the requirements of the Aarhus Convention and could promote practical implementation by authorities as well as application by the courts of the Convention's provisions, especially at the local level. This would require, inter alia, the preparation, in cooperation with the Supreme Court of Kazakhstan, of a strategy aimed at building the capacities of civil servants and the judiciary, and at introducing effective mechanisms to facilitate citizens' access to courts when their environmental rights and the rights of their associations are violated.

The implementation of this recommendation is ongoing.

The adjustment of the national legislation to the requirements of the Aarhus Convention is well on the way to nearing completion. Enforcing compliance and establishing effective procedures and processes for adequate implementation is a challenge yet to be addressed.

To ensure a harmonized approach by the courts when considering environmental civil cases, the Supreme Court adopted in 2016 the Resolution on some issues of application by the courts of environmental legislation in civil cases No. 8. At the same time, it appears that not all courts are using the Regulation consistently, as is demonstrated by the experience of environmental NGOs being charged state duty, when they should be exempt from it.

To develop the capacity of courts in environmental cases, the Supreme Court's Academy of Justice, in partnership with other stakeholders, organizes training, workshops, round tables and conferences on the application of environmental legislation in courts. Attention is given to the study of the provisions of the Aarhus Convention. No specific strategy aimed at building the capacities of civil servants and the judiciary has been developed.

Recommendation 3.6:
The Ministry of Education and Science, in cooperation with the MEP and other relevant Ministries responsible for certain areas of professional education (e.g. the Ministry of Health), should establish an interdepartmental coordination mechanism on ESD. This mechanism should include experts in preschool, grade school, vocational

and higher school education as well as non-formal and informal education, and representatives of other stakeholders, including NGOs and the mass media, to help promote and facilitate the implementation at the national level of the ECE Strategy for ESD.

This recommendation has not been implemented. No interdepartmental coordination mechanism on ESD, as envisaged by this recommendation, has been established. The Board of the Ministry of Education and Science is formally a coordination body for all levels of education, but it does not have a focus on ESD.

Chapter 4: Implementation of international agreements and commitments

Recommendation 4.1:
The Ministry of Environmental Protection, in cooperation with other relevant ministries, should establish appropriate mechanisms to ensure proper coordination of all activities at the national level related to implementation of multilateral environmental agreements (MEAs) and bilateral and multilateral cooperation.

This recommendation has mostly not been implemented.

At the time of the second EPR, the responsibilities for international cooperation on environmental protection were vested with the Ministry of Environmental Protection. Other ministries, those in charge of agriculture and of emergencies, were focal points for some agreements or were participating in implementation of some MEAs. The issue raised in this recommendation related to cooperation and coordination between the Ministry of Environmental Protection and other ministries in the implementation of MEAs and bilateral cooperation, as such coordination was insufficient at that time.

As of 2018, the responsibilities for a number of MEAs (ozone agreements, the UNFCCC, Aarhus and Espoo Conventions, CLRTAP) are vested with the Ministry of Energy, although for a significant number of MEAs (e.g. the CBD and its protocols, WHC, UNCCD, TEIA and Water Conventions) the responsibilities are vested with other ministries. The lack of coordination in implementation of those agreements is still widely felt.

The Government pays strong attention to improvement of the quality of its international cooperation. In the period 2009–2017, Kazakhstan had the Commission on Cooperation of Kazakhstan with International Organizations, which primarily dealt with cost-benefit analyses of the country's participation in new international organizations. However, no specific efforts were applied to establishing stronger coordination of all activities at the national level related to the implementation of MEAs and bilateral cooperation.

Recommendation 4.2:
The Ministry of Environmental Protection should undertake analysis of existing drawbacks in the implementation of MEAs ratified by the country and of the importance of MEAs not yet ratified. Particular emphasis should be put on protocols to those conventions to which Kazakhstan is a party. Based on this analysis, the MEP should:

(a) Develop a set of actions on specific MEAs where implementation could be improved. This might include identifying financing needs, including proposals to the international community with requests for funding;
(b) Draft legislation on ratification of the protocols of priority importance for Kazakhstan, in particular the protocols to the five ECE Conventions and Montreal, Copenhagen and Beijing Amendments to the Montreal Protocol to the Vienna Convention for the Protection of the Ozone Layer, and submit it for consideration by the Government and subsequently by the Parliament.

Implementation of this recommendation is ongoing. Annual reports on international cooperation activities are prepared by the Ministry of Energy and include mention of problematic issues and related recommendations. However, they cover only those MEAs for which the Ministry is responsible.

Kazakhstan acceded to the Montreal, Copenhagen and Beijing Amendments to the Montreal Protocol to the Vienna Convention for the Protection of the Ozone Layer in 2011, 2011 and 2014, respectively.

Kazakhstan has been a party to the ECE Convention on Long-Range Transboundary Air Pollution since 2001 but has not acceded to any of its protocols. The lack of specific air-related legislation is considered one of the barriers for participation in the protocols. No legislation on accession has been drafted.

The country is a party to the ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes since 2001 but it is not a party to the 1999 Protocol on Water and Health. With support from ECE, through the EU Water Initiative National Policy Dialogue on IWRM, preparation of accession to this Protocol is ongoing. National targets on water and health were developed and the necessary legislation on accession was drafted.

Kazakhstan has been a party to the ECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) since 2001. It is not a party to the 2003 Protocol on Pollutant Release and Transfer Registers (PRTR Protocol). In 2016, the country introduced PRTR into its national legislation. Since 2013, it has developed an SPRTR. In 2017–2018, it drafted the necessary legislation on accession to the PRTR Protocol.

Kazakhstan has been a party to the ECE Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) since 2001. In the period 2015–2018, the Joint EU/UNDP/ECE project "Supporting Kazakhstan's Transition to a Green Economy Model", among other activities, has assisted Kazakhstan to introduce SEA in preparation for its accession to the 2003 Protocol on Strategic Environmental Assessment. The legislative analysis was prepared, and a pilot SEA was conducted.

Recommendation 4.3:
The Government should speed up the process of ratification of the Kyoto Protocol, to attract more funds for financing investments in clean energy technologies, which would at the same time improve energy efficiency.

The recommendation has been implemented.

Kazakhstan ratified the Kyoto Protocol in 2009. Kazakhstan is considered an Annex I Party for the purposes of the Protocol.

During the period 2010–2016, multilateral and bilateral providers of development finance committed about US$1.76 billion to climate-related projects in Kazakhstan, equivalent to an annual average of US$268.46 million. One fifth is for projects related to energy.

PART II: MOBILIZING FINANCIAL RESOURCES FOR ENVIRONMENTAL PROTECTION

Chapter 5: Economic instruments for environmental protection

Recommendation 5.1:
The MEP should review the existing system of pollution charges with a view to:

- *Limiting payment of pollution charges to major pollutants and polluters;*
- *Gradually raising pollution charges to levels that provide adequate incentives for adopting cleaner production methods;*
- *Improving the "policy mix" between incentives from economic instruments and regulations by*
    - *Benchmarking ELVs on sector-specific BAT;*
    - *Developing, in consultations with industry and other major stakeholders, targets for reducing emissions of major air and water pollutants;*
    - *Improving fiscal incentives for enterprise investment in clean technologies and for increasing observance of international environmental management systems such as IS0 14001.*

The recommendation has been partially implemented.

Pollution charges represent one of the mechanisms for the economic regulation of environmental protection and natural resource management. The list of air and water pollutants has been significantly reduced. The Tax Code defines the basic rates of charges for each type of environmental emissions. Local representative bodies have the right to double the set rates. Thus, to date, maximum pollution charge rates are applied, which is generally aimed at encouraging users of natural resources to reduce emissions and discharges of pollutants, introduce waste processing technologies, and reduce the volumes of waste generation and disposal into the environment.

It is commendable that the administrative process and the number of pollutants subject to the environmental payment system have been mitigated substantially. However, the "policy mix" between incentives from economic instruments and regulations did not improve. There is still room for improvement in terms of incentivizing the users of natural resources to enhance environmental performance of their economic activities through, for instance, using an integrated approach. The fiscal incentives for enterprise investment in clean technologies and for increasing observance of IS0 14001 are not applied. ELVs are not benchmarked on sector-specific BAT.

Recommendation 5.2:
The MEP, in cooperation with regional and local authorities and other stakeholders needs to improve the overall management of municipal and industrial waste. This should involve, inter alia:

- *The development of a national waste management system and the associated specialized legislation with regard to the monitoring, treatment, disposal and recycling of waste;*
- *Streamlining of the existing system of payments for waste production and disposal by:*
    - *Establishing user charges for industrial and municipal waste services at levels that create effective incentives for waste reduction;*
    - *Abolishing pollution charges for generated industrial waste;*
- *Establishing effective incentives for promoting waste recycling;*
- *Improving incentives for observance of international environmental management standards such as ISO 14001.*

The recommendation has been partially implemented.

The legislation on waste management has improved, but insufficient attention is given to improving waste disposal. Monitoring of waste streams is limited, as waste amounts are estimated and not weighed. Also, credible information on recyclables is not available.

User charges for industrial and municipal waste services do not fully cover the cost of disposal at levels that create effective incentives for waste reduction. Fees for municipal waste are driven by affordability and social acceptance considerations. This approach does not allow sustainable operation of waste sorting plants nor the upgrading of disposal operations. There is insufficient information available to enable the assessment of fees for industrial waste services.

The system of payments for waste disposal did not change. Considering that waste generation is estimated by norms on waste generation and that weighing of waste at disposal sites in not a common practice, existing incentives for promoting waste recycling are most probably not effective.

International standards for safe and environmentally responsible management are increasingly used in Kazakhstan. These include management system ISO 9000, environmental standards ISO 14000, safety standards and occupational health OHSAS 18001, standards of social responsibility SA 8000, safety management systems standards ISO for a series of food products 22000, QMS audit and environmental management ISO 19011, and others. However, the incentives for observance of international environmental management standards are not sufficient. For example, in 2016, in Kazakhstan, 148 ISO 14001 certificates were valid, which is a low number considering the size of the regulated community in the country.

Recommendation 5.3:
The Government should take measures designed to reduce the environmental pressures from motor vehicle emissions. This would involve:

- *Announcing a time frame for moving to the Euro3 and Euro 4 vehicle emission standards over the medium term;*
- *Gradually raising excise taxes on petrol and diesel, and abolishing the discriminatory pollution charges for exhaust emissions from enterprise vehicles;*
- *Application of differential excise taxes for promoting the shift to low-sulphur fuels;*
- *Tax incentives for scrapping of old cars and purchase of new ones (possibly to be combined with special temporary financial incentives from car dealers);*

- *Stringent technical vehicle controls with regard to exhaust emissions.*

The implementation of the recommendation is ongoing.

The legislation on the use of Euro-4 for fuels sold in Kazakhstan has been introduced. By the end of 2018, the modernization of three refineries was completed.

Excise taxes on petrol and diesel have been increased and differentiated rates for low-sulphur fuels have been applied.

Economic incentives for scrapping of old cars and purchase of new ones were introduced as part of the extended producer responsibility scheme. Some 39,665 vehicles were purchased from individuals and legal entities in 2016–2017 for recycling.

Recommendation 5.4:
The Government should take measures that lead to a more economical water use, improve the financial health of water utilities, and ensure their long-term financial sustainability. This would involve:

- *Raising water abstraction charges to a level that encourages water saving;*
- *Reforming the tariff system in the water sector by gradually raising tariffs to a level that allows sufficient funding to cover operation, maintenance and reconstruction costs while moving to full cost recovery for utility services;*
- *Using targeted subsidies to address affordability problems of lower-income water users;*
- *Further increasing the installation of water meters for water users connected to the water supply network;*
- *Increasing the operational independence of public utility management from local authorities by means of performance-based contracts.*

The implementation of the recommendation is ongoing.

Insufficient information is available to assess whether the water abstraction rates are raised to the level that facilitates water saving.

The Ministry of National Economy is drafting a new law on natural monopolies, which aims to introduce the best global practices on tariff setting.

At present, targeted subsidies are provided to water users in rural communities.

According to the Water Code, as amended in 2015, water meters are to be installed in each apartment and each apartment block for all new buildings. However, coverage by water meters in existing buildings remains an issue. For example, in the capital, less than half of the housing sector is equipped with water meters. In Pavlodar Oblast, there is 86 per cent water metering coverage of the populations of Pavlodar, Ekibastuz and Aksu.

Chapter 6: Expenditures for environmental protection

Recommendation 6.1:
In order to achieve a better consideration of environmental impacts and related needs for environmental protection investments:

(a) *The Government should set higher priorities for the environment-related issues within the national budgetary planning framework;*
(b) *The Government should ensure adequate representation of the MEP and other stakeholders in inter-ministerial mechanisms and institutions such as the Kazyna Sustainable Development Fund, which elaborate industrial development strategies, including the attraction of foreign direct investment.*
(c) *The Ministry of Environmental Protection should strengthen the resources allocated to the monitoring and evaluation of major expenditure programmes to ensure that established environmental targets are achieved and that the funds are employed in a cost-effective manner.*

The recommendation has been partially implemented.

While the Concept on Transition to Green Economy enjoys a high level of political support and has been usefully mainstreaming environmental concerns into decision-making processes in the ministries and public financial institutions, the scaling up of the mining and fossil fuel sectors is also a national priority. The statistics show that a certain amount of investment in environmental protection and green economy has been already implemented, but its share in GDP remains low (around 1 per cent), which does not indicate green finance being given higher priority.

The Kazyna Sustainable Development Fund no longer exists (since 2008) and neither does the Ministry of Environmental Protection (since 2014).

All ministries use the system of monitoring and evaluation of expenditure programmes to ensure that established targets are achieved, including the Ministry of Energy and Ministry of Agriculture, which currently have most environment-related competences. This system focuses on implementation of the ministry's strategic plan and budgetary programme vis-à-vis the established indicators. The issue is rather that there are few target indicators on environment in the strategic plans of those ministries, and many are not ambitious but, rather, reflect what would be achieved anyway.

Recommendation 6.2:
The Government should continue the efforts to ensure that all revenues from pollution charges are effectively used for financing of environmental protection measures. This could take the form of direct financing of government high-priority projects and/or partial recycling of these revenues to polluting enterprises in order to create incentives for environmental investments.

The recommendation has not been implemented.

Environmental taxes and penalties collected at the local level are not effectively used for improving environmental conditions and promoting green economy. For example, in 2016, only 33 per cent of the revenue from the environmental payments were spent on environmental protection measures. The current system of collecting fines for environmental violations and pollution charges from users of natural resources does not aim to solve environmental problems.

Recommendation 6.3
The Government should strengthen local capacity for planning, financing and implementation of environmental protection measures. This would involve, inter alia:

- *Building capacity for project management, including project analysis, evaluation and design as well as capacity in financial planning and management;*
- *Giving municipalities more scope for direct borrowing in local capital markets and for engaging in direct contractual relations with multilateral financial institutions and foreign donors. The corresponding projects should be in line with the environmental priorities established in the territorial development plans.*

The recommendation has been partially implemented.

Activities for enhancing local governments' capacity have indeed been implemented by the central and local governments, in many cases with the support of development cooperation partners. However, the large capacity gap still exists and, thus, such activities remain highly relevant.

Local executive authorities, jointly with international financial institutions and foreign donors, implement projects on environmental protection by co-funding them from the local budgets.

PART III: INTEGRATION OF ENVIRONMENTAL CONCERNS INTO ECONOMIC SECTORS AND PROMOTION OF SUSTAINABLE DEVELOPMENT

Chapter 7: Energy and environment

Recommendation 7.1:
The Ministry of Environmental Protection should set more stringent environmental requirements on power plants, with a view to reducing pollutant emissions and improving monitoring and control equipment.

The recommendation has been partially implemented.

Kazakhstan updated air emissions standards for large combustion plants in 2013. However, ELVs for power plants are rather high in Kazakhstan. In Kazakhstan, the range of PM ELVs for coal-fired power plants are 600–1,600 mg/m^3 for existing plants and 100–500 mg/m^3 for new ones. Both exceed by several times the level established by the EU of 10–20 mg/m^3 (Directive 2010/75/EU). SO_2 ELVs (2,000–3,400 mg/m^3 for existing plants and 700–1,800 mg/m^3 for new plants in Kazakhstan) are also much higher than those in the EU (150–400 mg/m^3 under Directive 2010/75/EU). Similarly, NOx ELVs (500–1,050 mg/m^3 for existing plants and 300–640 mg/m^3 for new plants) are higher than in the EU (150–300 mg/m^3).

Recommendation 7.2:
With a view to move toward a more sustainable production and use of energy:

(a) The Government should:
- o *Adopt the draft Concept on the efficient use of energy and the development of alternative energy sources in the context of sustainable development until 2024, and develop appropriate legislative instruments, such as tradable renewable energy certificates, to meet its targets;*
- o *Urgently elaborate and implement effective energy efficiency and energy-saving measures and programmes in power and heat production, transmission, distribution and consumption;*
- o *Create a conducive environment for the operation of energy services companies;*
- o *Use effective information and awareness raising tools towards producers and consumers.*

(b) The Ministry of Energy and Mineral Resources and the Ministry for Environmental Protection should develop mechanisms and incentives to make renewable energy projects viable, including stand-alone renewable energy systems in remote off-grid areas.

The recommendation has been partially implemented.

To support energy saving and energy efficiency efforts, a number of legislative acts and national programmes have been introduced (e.g. 2012 Law on Energy Saving and Energy Efficiency Improvement, 2009 Law on Support for the Use of Renewable Energy Sources, 2013 Programme “Energy Saving-2020”). However, despite great legislative and policy support, general energy efficiency policy did not improve. No promotion of various incentives (voluntary programmes, subsidies, fiscal incentives) for industrial enterprises that undertake energy audits in order to support the implementation of the energy efficiency measures is carried out.

Feed-in tariffs were used as incentives to make renewable energy projects viable. However, their efficiency was questioned. Stand-alone renewable energy systems in remote off-grid areas do not exist.

Recommendation 7.3:
The Government should:

- *Support the setting of energy tariffs at adequate levels that allow cost recovery and create incentives for reducing energy consumption;*
- *Prepare targeted social measures to ensure that most vulnerable population groups have adequate access to energy supply.*

The implementation of the recommendation is ongoing.

The Government pays attention to this sensitive issue. Power generation companies already provide electricity at tariffs that cover production costs. Currently at the first level of consumption, the cost of 100 kWh reached 1,206 tenge for citizens without electric stoves and 1,182 tenge for those using electric stoves.

In February 2018, the President instructed the Minister of Energy to reduce the cost of electricity for consumers and smooth out differences in tariffs between oblasts and cities. An interdepartmental working group with the participation of representatives of the Ministry of Energy and other relevant stakeholders was established to revise tariffs for electric power. The Ministry of National Economy is drafting a new law on natural monopolies aimed at introducing the best world practice of tariff formation.

Chapter 8: Management of mineral resources and the environment

Recommendation 8.1:
In order to reduce the serious environmental, health and safety adverse impacts of mineral resources extraction, including oil and gas production activities, especially in the Caspian Sea region:

(a) The Ministry of Energy and Mineral Resources, together with mining, oil and gas companies and the scientific community, should carry out a comprehensive assessment of the cumulative effects of mineral resources extraction, including new oilfields and current oil exploration and related activities, for the Caspian Sea and its coastal zone. The Ministry of Environmental Protection should carry out the State ecological expertise of this activity;
(b) The Government should design and implement measures to reduce pollution, taking fully into account the "polluter pays" principle. It should also provide increased funding for environmental conservation, monitoring and control in the areas of mineral resources extraction and processing.

The recommendation has been partially implemented.

The assessment of cumulative impacts has been conducted as part of the EIA of mining projects, but the measures implemented to reduce pollution from mining and processing industries are not sufficiently effective.

The country, in cooperation with the OECD, is reviewing its application of the polluter pays principle in 2018.

Recommendation 8.2:
The Government, in cooperation with other major stakeholders, should continue preparing Coal Mine Methane projects that would be eligible for support by the flexible mechanisms of the Kyoto Protocol.

This recommendation has been implemented.

The 2016 Law on Amendments to Legislation related to Transition to Green Economy amended the 2015 Business Code, removing restrictions on the activities related to methane recovery from coal beds and allowing for the inclusion of coal bed methane recovery in the list of priority activities identified for the implementation of priority investment projects and provision of tax and investment preferences. The Law introduced amendments related to the definition of "coal bed methane" in the 2010 Law on Subsoil and Subsoil Use (no longer valid) and the 2012 Law on Gas and Gas Supply.

Recommendation 8.3:
The Ministry of Labour and Social Protection of Population and the Ministry of Health, in cooperation with the Ministry of Emergencies should prepare a mine health and safety law and its supporting regulations according to international standards to ensure the health and safety of mine workers in Kazakhstan. The Government should also provide the necessary funds for aiding compliance with such standards by companies that cannot afford it.

This recommendation has been partially implemented.

The 2015 Labour Code establishes basic requirements on occupational health and safety, which extend to all areas of activity, whether public or private. Legislative acts that establish specific requirements on occupational health and safety in a specific sector are to be developed by sectoral bodies (in the case of mining and processing industries, the Ministry of Energy and Ministry for Investments and Development). No law was developed to specifically address the health and safety of mine workers.

Industrial safety of mining and exploration activities are regulated by the 2014 Law on Civil Protection and several regulations, for example:

- 2014 Order of the Minister for Investments and Development on approval of the industrial safety rules for hazardous production facilities, No. 343;
- 2014 Order of the Minister for Investments and Development on approval of the Rules for ensuring industrial safety for hazardous production facilities of coal mines, No. 351;
- 2014 Order of the Minister for Investments and Development on approval of the industrial safety rules for hazardous production facilities engaged in mining and exploration works, No. 352.

However, the above regulations do not cover the health and safety of mine workers.

Recommendation 8.4:

(a) The Government should promote and support research and development and enterprise innovation in the mining and oil and gas sectors with the creation of Centres of Innovation and Cleaner Technologies in such areas as oil extraction, metallurgy, and environmental management.

(b) The Ministry of Environmental Protection and the Ministry of Energy and Mineral Resources should launch activities to develop and implement best practices for raw materials production processes and develop benchmarking indicators. These best practices should become binding in the medium term.

The implementation of the recommendation is ongoing.

The Competence Centre for Environmental Technology was created in 2015, under the initiative of the oblast authorities. Its main objective is to support the development of best practices for production processes and introduce benchmarking indicators in the mining and manufacturing industries. The Centre is tasked to develop environmental policies and to attract both local and foreign investors and experts for the joint development and coordination of environmental projects.

There is a plan to create an international centre of green technologies in 2018 to support innovation in industry.

Chapter 9: Sustainable management of water resources

Recommendation 9.1:

The Government should entrust the National Council on Sustainable Development with high-level decision-making and coordination on main issues regarding the protection and use of water resources.

The implementation of this recommendation is ongoing.

The National Council for Sustainable Development was abolished in 2014. Coordination on key issues related to water resources management has been transferred to the Interagency Council on Water Resources Management under the Government, created in 2015 (2015 Order of the Prime Minister No. 141-p). However, as of mid-2018 the Council had met only once.

Recommendation 9.2:

The Government should establish an appropriate structure with sufficiently high status focused on integrated water management planning and responsible for ensuring the coordination of actions in the water sector. This could be done by reorganization of the Committee on Water Resources of the Ministry of Agriculture so that it has the authority to develop and implement national policy on the use and protection of water resources.

The recommendation has been partially implemented.

Pursuant to the 2014 Decree of the President No. 875, the Ministry of Agriculture was reorganized and tasked with the functions and powers on formulation and implementation of state policies on water management, transferred thereto from the Ministry of Environmental Protection and Water Resources. Despite the reorganization measures, no significant organizational changes in the water sector are observed. The Committee on Water Resources has the authority to implement the national policy on the use and protection of water resources. However, no significant strengthening of the Committee on Water Resources has taken place. Realization of reforms in the water sector remains incomplete: separation of management functions and control functions is not done and problems with lack of coordination and exchange of information remain.

Recommendation 9.3:
The Government should support capacity-building and training of new teams to accompany the reform toward Integrated Water Resources Management in the organization of the water sector institutions. Modern means such as information and communications technology should be promoted so as to ensure obtaining complete and reliable information on the status of water resources.

The recommendation has been partially implemented. Some capacity-building and training has been provided as part of international projects. However, the basin inspections of the Committee on Water Resources, which are the primary vehicles for implementing integrated water resources management, still suffer from the lack of human resources, capacity, proper equipment and resources. Modern technologies are virtually not in use.

Recommendation 9.4:
The Government should introduce governance mechanisms for water services companies (Vodokanals) to restore efficient investment in water supply and water sanitation facilities.

The recommendation has not been implemented.

Annex II

PARTICIPATION OF KAZAKHSTAN IN MULTILATERAL ENVIRONMENTAL AGREEMENTS

	Worldwide agreements	**Kazakhstan**	
Year		**Year**	**Status**
1958	(GENEVA) Convention on the Continental Shelf		
1958	(GENEVA) Convention on Fishing and Conservation of the Living Resources of the High Seas		
1958	(GENEVA) Convention on the Territorial Sea and the Contiguous Zone		
1958	(GENEVA) Convention on the High Seas		
1960	(GENEVA) Convention concerning the Protection of Workers against Ionising Radiations (ILO 115)		
1961	(PARIS) International Convention for the Protection of New Varieties of Plants		
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	2011	Ac
	1997 (VIENNA) Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage	2011	Ac
1968	(LONDON, MOSCOW, WASHINGTON) Treaty on the Non-Proliferation of Nuclear Weapons (NPT)	1994	Ac
1969	(BRUSSELS) Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties		
1971	(RAMSAR) Convention on Wetlands of International Importance Especially as Waterfowl Habitat	2007	Ac
1971	(GENEVA) Convention on Protection against Hazards from Benzene (ILO 136)		
1971	(BRUSSELS) Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage		
	1992 Fund Protocol		
1971	(LONDON, MOSCOW, WASHINGTON) Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-bed and the Ocean Floor and in the Subsoil thereof		
1972	(PARIS) Convention concerning the Protection of the World Cultural and Natural Heritage	1994	At
1972	(LONDON) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter		
	1996 (LONDON) Protocol		
1972	(LONDON, MOSCOW, WASHINGTON) Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction	2007	Ac
1972	(LONDON) International Convention on the International Regulations for Preventing Collisions at Sea	1994	Ac
1972	(GENEVA) International Convention for Safe Containers	1994	Ac
1973	(WASHINGTON) Convention on International Trade in Endangered Species of Wild Fauna and Flora	2000	Ac
	1979 (BONN) Amendment	2000	At
	1983 (GABORONE) Amendment		
1973	(LONDON) Convention for the Prevention of Pollution from Ships (MARPOL)		
	1978 (LONDON) Protocol relating to the International Convention for the Prevention of Pollution from Ships	1994	Ac
	1997 (LONDON) Protocol to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto		
1974	(GENEVA) Convention concerning Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents (ILO 139)		
1977	(GENEVA) Convention on Protection of Workers against Occupational Hazards from Air Pollution, Noise and Vibration (ILO 148)	1996	Ra

	Worldwide agreements	Kazakhstan	
Year		**Year**	**Status**
1979	(BONN) Convention on the Conservation of Migratory Species of Wild Animals	2006	Ac
	1995 (THE HAGUE) Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)		
1980	(NEW YORK, VIENNA) Convention on the Physical Protection of Nuclear Material	2005	Ac
1981	(GENEVA) Convention Concerning Occupational Safety and Health and the Working Environment (ILO 155)	1996	Ra
1982	(MONTEGO BAY) Convention on the Law of the Sea		
	1994 (NEW YORK) Agreement related to the Implementation of Part XI of the Convention		
	1995 (NEW YORK) Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks		
1985	(GENEVA) Convention Concerning Occupational Health Services (ILO 161)		
1985	(VIENNA) Convention for the Protection of the Ozone Layer	1998	Ac
	1987 (MONTREAL) Protocol on Substances that Deplete the Ozone Layer	1998	Ac
	1990 (LONDON) Amendment to Protocol	2001	Ac
	1992 (COPENHAGEN) Amendment to Protocol	2011	Ac
	1997 (MONTREAL) Amendment to Protocol	2011	Ac
	1999 (BEIJING) Amendment to Protocol	2014	Ra
	2016 (KIGALI) Amendment to Protocol		
1986	(GENEVA) Convention Concerning Safety in the Use of Asbestos (ILO 162)	2011	Ra
1986	(VIENNA) Convention on Early Notification of a Nuclear Accident	2010	Ac
1986	(VIENNA) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	2010	Ac
1989	(BASEL) Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	2003	Ac
	1995 Ban Amendment		
	1999 (BASEL) Protocol on Liability and Compensation		
1990	(GENEVA) Convention concerning Safety in the use of Chemicals at Work (ILO 170)		
1990	(LONDON) Convention on Oil Pollution Preparedness, Response and Cooperation		
1992	(RIO DE JANEIRO) Convention on Biological Diversity	1994	Ra
	2000 (MONTREAL) Cartagena Protocol on Biosafety	2008	Ac
	2010 (NAGOYA) Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization	2015	Ac
	2010 (NAGOYA - KUALA LUMPUR) Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety		
1992	(NEW YORK) United Nations Framework Convention on Climate Change	1995	Ra
	1997 (KYOTO) Kyoto Protocol	2009	Ra
	2012 (DOHA) Doha Amendment to the Kyoto Protocol		
	2015 (PARIS) Paris Agreement	2016	Ra
1993	(ROME) Agreement to Promote Compliance with International Conservation and Managament Measures by Fishing Vessels on the High Seas		
1993	(PARIS) Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction	2000	Ra
1994	(VIENNA) Convention on Nuclear Safety	2010	Ra
1994	(PARIS) United Nations Convention to Combat Desertification	1997	Ra
1997	(VIENNA) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	2010	Ra
1997	(NEW YORK) Convention on the Law of Non-navigational Uses of International Watercourses		
1997	(VIENNA) Convention on Supplementary Compensation for Nuclear Damage		
1998	(ROTTERDAM) Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2007	Ac
2001	(STOCKHOLM) Convention on Persistent Organic Pollutants	2007	Ra
2001	(LONDON) Convention on Civil Liability for Bunker Oil Pollution Damage		
2003	(GENEVA) WHO Framework Convention on Tobacco Control	2007	Ra
2004	(LONDON) Convention for the Control and Management of Ships' Ballast Water and Sediments		
2013	(KUMAMOTO) Minamata Convention on Mercury		

	Regional and subregional agreements	**Kazakhstan**	
Year		**Year**	**Status**
1957	(GENEVA) European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)	2001	Ac
1958	(GENEVA) Agreement - Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts	2010	Ac
1968	(PARIS) European Convention - Protection of Animals during International Transport (revised in 2003)		
1969	(LONDON) European Convention on the Protection of the Archaeological Heritage (revised in 1992)		
1976	(STRASBOURG) European Convention for the Protection of Animals Kept for Farming Purposes		
1979	(BERN) Convention on the Conservation of European Wildlife and Natural Habitats		
1979	(GENEVA) Convention on Long-range Trans-boundary Air Pollution	2001	Ac
	1984 (GENEVA) Protocol - Financing of Co-operative Programme (EMEP)		
	1985 (HELSINKI) Protocol - Reduction of Sulphur Emissions by 30%		
	1988 (SOFIA) Protocol - Control of Emissions of Nitrogen Oxides		
	1991 (GENEVA) Protocol - Volatile Organic Compounds		
	1994 (OSLO) Protocol - Further Reduction of Sulphur Emissions		
	1998 (AARHUS) Protocol on Heavy Metals		
	1998 (AARHUS) Protocol on Persistent Organic Pollutants		
	1999 (GOTHENBURG) Protocol to Abate Acidification, Eutrophication and Ground-level Ozone		
	2009 (GENEVA) Amendments to the Text and to Annexes I, II, III, IV, VI and VIII to the 1998 Protocol on Persistent Organic Pollutants		
	2009 (GENEVA) Amendments to Annexes I and II to the 1998 Protocol on Persistent Organic Pollutants		
	2012 (GENEVA) Amendment of the text and annexes II to IX to the Protocol to the 1979 Convention on Long-range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone and the addition of new annexes X and XI		
	2012 (GENEVA) Amendments to the Text of and Annexes Other than III and VII to the 1998 Protocol on Heavy Metals		
1991	(ESPOO) Convention on Environmental Impact Assessment in a Transboundary Context	2001	Ac
	2001 (SOFIA) First Amendment		
	2003 (KIEV) Protocol on Strategic Environmental Assessment		
	2004 (CAVTAT) Second Amendment		
1992	(HELSINKI) Convention on the Protection and Use of Transboundary Watercourses and International Lakes	2001	Ac
	1999 (LONDON) Protocol on Water and Health		
	2003 (MADRID) Amendments to Articles 25 and 26	2015	At
1992	(HELSINKI) Convention on the Transboundary Effects of Industrial Accidents	2001	Ac
	2003 (KIEV) Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters		
1993	(OSLO and LUGANO) Convention - Civil Liability for Damage from Activities Dangerous for the Environment		
1994	(LISBON) Energy Charter Treaty	1995	Ra
	1994 (LISBON) Protocol on Energy Efficiency and Related Environmental Aspects	1995	Ra
	1998 Amendment to the Trade-Related Provisions of the Energy Charter Treaty		
1998	(AARHUS) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters	2001	Ra
	2003 (KIEV) Protocol on Pollutant Release and Transfer Registers		
	2005 (ALMATY) Amendment on GMOs		
1998	(STRASBOURG) Convention on the Protection of Environment through Criminal Law		
2000	(FLORENCE) European Landscape Convention		
2018	(AKTAU) Convention on the legal status of the Caspian Sea	2018	Si

Ac = Accession; Ad = Adherence; Ap = Approval; At = Acceptance; De = Denounced; Si = Signature; Su = Succession; Ra = Ratification.

Annex III

KEY DATA AND INDICATORS AVAILABLE FOR THE REVIEW

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Air pollution											
Emissions of SO_2 *											
- Total (1,000 t)	1 300.7	1 078.5	779.8	723.6	774.2	769.6	-	729.1	710.6	767.4	..
- by sector (1,000 t)	1 300.7	1 078.5	779.8	723.6	774.2	769.6	-	729.1	710.6	767.4	..
Electricity, gas, steam and air conditioning supply	306.8	321.4	323.4	339.4	387.0	421.7	-	400.6	376.5	385.9	..
Industry[1]	1 278.5	1 057.8	759.1	703.7	752.9	746.9	-	705.3	686.3	685.2	..
Transport and storage	2.1	2.1	1.8	1.6	1.6	1.6	-	1.9	1.9	2.0	..
Other	20.1	18.6	18.9	18.3	19.7	21.1	-	21.9	22.4	80.2	..
- per capita (kg/capita)	84.0	68.8	48.5	44.3	46.8	45.8	-	42.2	40.5	43.1	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	4.4	3.6	2.6	2.2	2.2	2.1	-	1.8	1.7	1.8	..
Emissions of NO_X (converted to NO_2) *											
- Total (1,000 t)	205.8	212.2	206.6	215.6	232.8	249.4	-	256.5	243.4	246.6	..
- by sector (1,000 t)	205.8	212.2	206.6	215.6	232.8	249.4	-	256.5	243.4	246.6	..
Electricity, gas, steam and air conditioning supply	114.8	120.6	124.2	128.6	139.3	161.6	-	169.3	154.3	155.5	..
Industry[1]	154.9	191.3	190.8	200.4	215.1	230.6	-	239.2	228.0	231.3	
Transport and storage	12.9	11.5	5.3	4.9	6.0	6.7	-	6.3	4.0	3.8	..
Other	38.0	9.4	10.5	10.3	11.7	12.1	-	11.0	11.4	11.5	..
- per capita (kg/capita)	13.3	13.5	12.8	13.2	14.1	14.9	-	14.8	13.9	13.9	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	0.7	0.7	0.7	0.7	0.7	0.7	-	0.6	0.6	0.6	..
Emissions of ammonia (NH_3) *											
- Total (1,000 t)	1.7	1.8	1.7	20.1	2.2	2.2	-	2.2	2.3	2.5	..
- by sector (1,000 t)	1.7	1.8	1.7	20.1	2.2	2.2	-	2.2	2.3	2.5	..
Electricity, gas, steam and air conditioning supply	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	..
Industry[1]	1.1	1.2	1.2	1.3	1.3	1.3	-	1.5	1.6	1.7	
Transport and storage	0.0	0.1	0.1	0.1	0.1	0.1	-	0.0	0.0	0.0	..
Other	0.6	0.5	0.4	18.7	0.8	0.8	-	0.7	0.7	0.8	..
- per capita (kg/capita)	0.1	0.1	0.1	1.2	0.1	0.1	-	0.1	0.1	0.1	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	0.0	0.0	0.0	0.1	0.0	0.0	-	0.0	0.0	0.0	..
Emissions of total suspended particles (TSP)											
- Total (1,000 t)	717.6	688.7	639.1	639.3	631.0	593.8	551.2	494.2	466.0	460.6	..
- by sector (1,000 t)	717.6	688.7	639.1	639.3	631.0	593.8	551.2	494.2	466.0	460.6	..
Electricity, gas, steam and air conditioning supply	375.4	376.8	339.1	320.7	301.9	285.8	238.6	203.6	169.5	156.8	..
Industry[1]	624.1	595.9	551.5	545.7	530.5	484.6	440.8	383.0	345.9	331.5	..
Transport and storage	9.2	7.7	7.9	7.1	7.1	7.7	7.8	8.4	9.1	8.6	..
Other	84.3	85.1	79.7	86.5	93.4	101.5	102.6	102.8	111.0	120.5	..
- per capita (kg/capita)	46.3	43.9	39.7	39.2	38.1	35.4	32.4	28.6	26.6	25.9	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	2.5	2.3	2.1	1.9	1.8	1.6	1.4	1.2	1.1	1.1	..

Air pollution	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Emissions of non-methane volatile organic compounds (NMVOC)											
- Total (1,000 t)	52.5	51.4	43.7	49.7	53.3	58.1	92.0	114.4	105.1	100.4	..
- by sector (1,000 t)	52.5	51.4	43.7	49.7	53.3	58.1	92.0	114.4	105.1	100.4	..
Electricity, gas, steam and air conditioning supply	1.3	1.8	4.5	1.8	2.3	11.8	8.2	1.5	0.6	0.6	..
Industry[1]	..	..	22.6	24.1	27.8	37.6	62.6	67.2	63.2	62.5	..
Transport and storage	20.7	24.9	17.5	22.1	21.9	15.8	21.6	31.9	10.8	9.7	..
Other	..	..	3.6	3.5	3.6	4.7	7.8	15.3	31.1	28.2	..
- per capita (kg/capita)	3.4	3.3	2.7	3.0	3.2	3.5	5.4	6.6	6.0	5.6	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.2	..
Emissions of persistent organic pollutants (PCBs, dioxin/furan and PAH)											
- Total (1,000 t)	..	..	..	..	..	..	..	..	..	..	..
- by sector (1,000 t)	..	..	..	..	..	..	..	..	..	..	..
Electricity, gas, steam and air conditioning supply	..	..	..	..	..	..	..	..	..	..	..
Industry[1]	..	..	..	..	..	..	..	..	..	..	..
Transport and storage	..	..	..	..	..	..	..	..	..	..	..
Other	..	..	..	..	..	..	..	..	..	..	..
- per capita (kg/capita)	..	..	..	..	..	..	..	..	..	..	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	..	..	..	..	..	..	..	..	..	..	..
Emissions of heavy metals											
- Total lead (t)	2,667.9	1,351.1	766.6	717.4	644.9	542.0	572.4	699.4	636.3	224.5	..
- Total cadmium (t)	0.1	0.1	0.4	0.4	-	1.2	1.3	1.2	1.2	1.2	..
- Total mercury (t)	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.5	..
Climate Change											
Greenhouse gas emissions (total of CO_2, CH_4, N_2O, CFC, etc.) expressed in CO_2 eq.											
- Total aggregated emissions (1,000 t) without LULUCF	279 300.0	281 700.0	277 500.0	308 800.0	299 600.0	307 800.0	312 300.0	317 100.0	300 900.0	..	..
- Total aggregated emissions (1,000 t) with LULUCF	290 500.0	291 400.0	283 400.0	311 400.0	303 700.0	313 700.0	319 700.0	327 700.0	314 900.0	..	..
- per capita (t CO_2 eq/capita)	..	..	..	..	..	..	..	..	..	..	..
- per unit of GDP (t CO_2 eq/1,000 US$ (2005) PPP)	..	..	..	..	..	..	..	..	..	..	..
- by sector (1,000 t)	..	..	..	..	..	..	..	..	..	..	..
Energy	229 809.5	233 408.9	228 816.7	257 527.5	247 991.2	257 136.6	261 269.8	264 317.5	246 874.8	..	..
Energy industries	94 862.4	89 726.0	96 069.2	103 851.2	104 783.6	110 885.6	115 510.7	114 780.4	100 631.0		
Manufacturing industries and construction	32 343.6	29 739.1	28 970.7	30 052.7	31 000.3	30 355.8	28 229.2	27 506.1	29 264.3	..	..
Transport	21 424.5	23 154.6	22 099.0	21 570.4	22 071.1	25 967.4	22 838.6	19 211.1	22 416.8	..	..
Other sectors	19 754.9	16 032.2	14 157.6	15 476.6	18 910.6	15 966.2	14 571.5	26 566.0	26 186.1	..	..
Other	26 913.1	38 672.8	32 545.7	48 548.9	32 097.8	33 100.1	39 294.6	40 470.4	35 218.5		
Fugitive emissions	34 510.9	36 084.2	34 974.5	38 027.8	39 127.8	40 861.5	40 825.2	35 783.4	33 158.1	..	..
Industry	17 557.8	16 373.8	16 333.4	19 072.4	19 740.4	18 806.5	18 461.9	18 974.0	19 178.0	..	..
Solvent and other product use	189.7	195.3	199.2	203.7	208.3	211.3	216.8	227.6	231.5	..	..
Agriculture	26 797.8	26 745.7	26 999.3	26 786.7	26 220.9	26 139.5	26 791.1	27 794.4	28 752.6	..	..
Land use, land use change and forestry (LULUCF)	11 118.8	9 640.2	5 937.5	2 599.9	4 121.1	5 916.8	7 351.1	10 649.1	13 993.9	..	..
Waste	5 176.5	5 188.1	5 314.7	5 455.5	5 609.8	5 699.3	5 814.8	5 983.0	6 115.2	..	..
Other	..	..	..	..	..	..	..	..	..	..	..

Climate Change	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
- Total emissions (without LULUCF) (in CO_2 eq) (1,000 t) of	279 341.0	281 716.0	277 464.0	308 842.0	299 562.0	307 782.0	312 338.0	317 069.0	300 920.0	..	..
Carbon dioxide (CO_2)	215 600.0	214 100.0	210 200.0	236 900.0	226 600.0	233 100.0	237 200.0	245 100.0	230 400.0	..	..
Nitrous Oxide (N_2O)	40.0	38.0	38.0	37.0	38.0	38.0	38.0	39.0	40.0	..	..
Methane (CH_4)	2 039.0	2 192.0	2 169.0	2 346.0	2 366.0	2 439.0	2 450.0	2 327.0	2 252.0	..	..
Perfluorocarbons (PFCs)	54.5	663.4	794.0	1 419.6	1 553.6	1 554.7	1 565.5	1 308.5	1 383.9	..	..
Hydrofluorocarbons (HFCs)	720.1	715.5	781.9	957.7	966.3	987.4	998.6	929.6	938.3	..	..
Sulfur hexafluoride (SF6)	..	..	..	..	..	..	..	..	..	..	..
- Total emissions (with LULUCF) (in CO_2 eq) (1,000 t) of	290 460.4	291 356.7	283 401.8	311 442.0	303 683.3	313 698.7	319 688.7	327 718.0	314 914.4	..	..
Carbon dioxide (CO_2)	226 530.0	223 749.5	216 150.5	239 446.2	230 683.3	238 963.6	244 579.7	255 694.9	244 303.3	..	..
Nitrous Oxide (N_2O)	40.5	38.3	38.4	36.8	38.0	37.6	37.9	38.9	40.1	..	..
Methane (CH_4)	2 043.5	2 192.6	2 169.5	2 346.6	2 366.0	2 439.6	2 449.6	2 327.4	2 253.4	..	..
Perfluorocarbons (PFCs)	54.5	663.4	794.0	1 419.6	1 553.6	1 554.7	1 565.5	1 308.5	1 383.9		
Hydrofluorocarbons (HFCs)	720.1	715.5	781.8	957.7	966.3	987.4	998.6	929.6	938.3	..	..
Sulfur hexafluoride (SF6)	..	..	..	..	..	..	..	..	..	..	..
Ozone layer											
Consumption of ozone-depleting substances (ODS) (t of ODS)	120.9	128.8	130.2	110.0	96.8	22.8	104.6	30.8	12.1	8.0	..
Water											
Renewable freshwater resources (million m^3/year)	19 331.0	17 852.0	19 031.0	21 173.0	18 750.0	18 457.0	19 680.0	20 286.0	19 171.0	19 309.0	..
Gross freshwater abstracted (million m^3/year)	22 814.0	20 474.0	21 538.0	23 812.0	21 948.0	21 389.0	22 530.0	23 078.0	21 661.0	22 771.0	..
- Share of water losses in total water abstraction (%)	12.7	13.1	10.6	12.4	12.4	14.0	10.9	12.3	10.9	10.2	..
Water exploitation index (water abstraction/renewable freshwater resources x 100)	..	..	..	..	..	..	..	..	..	..	..
Total water use by sectors (million m^3)	..	..	..	..	..	..	..	..	..	..	..
- Agriculture	11 512.0	10 002.0	10 932.0	11 703.0	9 373.0	9 141.0	9 774.0	12 147.0	13 582.0	12 414.4	..
- Households	709.0	735.0	742.0	751.0	790.0	724.0	711.0	732.0	730.0	715.0	..
- Services	..	..	..	..	..	..	..	..	..	..	..
- Industry	4 489.0	4 577.0	4 371.0	4 853.0	5 173.0	5 240.0	5 477.0	5 592.0	5 263.0	5 230.0	..
of which: Water used for cooling	..	..	..	..	..	..	..	..	..	..	..
- other	..	..	..	..	..	..	..	..	..	..	..
Household water use per capita (l/capita/day)	82.1	79.4	80.8	83.8	80.4	86.0	82.0	80.6	79.7	78.6	..
Ecosystems and biodiversity											
Protected areas											..
- Total area (ha)	22 008 300.0	22 084 000.0	22 397 500.0	22 572 000.0	23 101 500.0	23 733 000.0	23 873 200.0	23 873 200.0	24 018 800.0	24 428 700.0	..
- Total protected area (as percentage of total area)	8.1	8.1	8.2	8.3	8.5	8.7	8.8	8.8	8.8	9.0	..
Ia Strict Nature Reserve (as percentage of total protected area)	5.7	5.9	7.0	7.0	7.0	7.0	6.7	6.7	6.7	6.6	
Ib Wilderness Area (as percentage of total protected area)	..	..	..	..	..	..	..	..	..	..	..
II National Park (as percentage of total protected area)	8.2	8.3	8.2	8.4	10.3	10.0	10.0	10.0	10.5	10.3	..
III Natural Monument (as percentage of total protected area)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
IV Habitat / Species Management Area (as percentage of total protected area)	..	..	..	..	..	..	..	..	..	..	..
V Protected Landscape / Seascape (as percentage of total protected area)	..	..	..	..	..	..	..	..	..	..	..
VI Managed Resource Protected Area (as percentage of total protected area)	..	..	..	..	..	..	..	..	..	..	..

Ecosystems and biodiversity	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Forests and other wooded land	..	..	..	..	..	..	..	..	..	..	..
- Total forested area (% of total land area)	9.8	10.2	10.2	10.4	10.5	10.6	10.7	10.8	10.8	10.8	..
- Total forested and wooded area (km^2)	26 770.5	27 777.5	27 810.2	28 419.4	28 661.9	28 786.7	29 285.4	29 301.9	29 318.7	29 423.1	..
- Semi-natural (km^2)	..	..	..	..	..	..	..	..	..	..	..
- Plantation (km^2)	..	..	..	..	..	..	..	..	..	..	..
- Undisturbed by humans (km^2)	..	..	..	..	..	..	..	..	..	..	..
- Area of regeneration (km^2)	..	..	..	..	..	..	..	..	..	..	..
Share of threateaned species (IUCN categories) in total number of species (animals):											
- mammals (%)	12.7	12.7	12.7	12.7	..	..	..	..	..	..	..
- birds (%)	6.4	6.4	6.4	6.4	..	..	..	..	..	..	..
- fish (%)	24.5	24.5	24.5	30.3	..	..	..	..	..	..	..
- reptiles (%)	..	..	..	..	..	..	..	..	..	..	..
Share of threateaned species (IUCN categories) in total number of species (plants):	..	..	..	..	..	..	..	..	..	..	..
- vascular plants (%)	..	..	..	..	..	..	..	..	..	..	..
Fertilizers and pesticides											
Total consumption of mineral fertilizers per unit of agricultural land (kg/ha)	12.4	13.1	15.0	12.9	11.9	16.3	13.2	16.7	19.3	18.6	..
Total consumption of organic fertilizers per unit of agricultural land (kg/ha)	4.1	3.7	5.9	8.6	6.8	11.2	6.2	6.8	8.4	15.4	..
Total consumption of pesticides per unit of agricultural land (kg/ha):	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.4	0.5	0.5	..
- Insecticides (kg/ha)	..	..	..	..	..	..	..	..	..	..	..
- Fungicides (kg/ha)	..	..	..	..	..	..	..	..	..	..	..
- Herbicide (kg/ha)	..	..	..	..	..	..	..	..	..	..	..
- Biological (kg/ha)	..	..	..	..	..	..	..	..	..	..	..
- Other (kg/ha)	..	..	..	..	..	..	..	..	..	..	..
Energy											
Total final energy consumption (TFC) (Mtoe)	45.1	43.1	34.9	44.1	42.9	41.7	42.9	36.6	38.4	42.6	..
- by fuel	..	..	..	..	..	..	..	..	..	..	..
Coal	30.9	34.7	32.0	34.5	37.7	37.8	37.5	37.0	34.2	35.6	..
Petroleum	12.8	14.5	15.2	22.4	18.6	17.3	22.1	18.7	18.1	20.6	..
Gas	23.6	20.6	19.9	22.3	24.4	22.3	25.4	25.9	27.4	25.6	..
Nuclear	..	..	..	..	..	..	..	..	..	..	..
Renewables	0.7	0.8	0.6	0.7	0.7	0.7	0.7	0.7	0.8	1.0	..
- by sector (Mtoe)	..	..	..	..	..	..	..	..	..	..	..
Industry	16.8	16.8	17.9	26.3	23.9	22.7	24.4	16.5	19.1	20.8	..
Transport	4.4	5.4	4.4	4.7	4.9	5.2	4.9	4.9	5.3	6.6	..
Agriculture	1.5	1.2	0.9	0.9	0.9	0.9	0.8	0.9	0.7	0.9	..
Services	0.2	0.2	3.2	3.4	3.8	2.5	3.7	3.7	4.3	4.6	..
Households	2.7	5.1	5.9	6.2	7.5	7.3	6.7	8.1	7.4	8.3	..
Electricity consumption (million kWh)	58 766.1	73 512.9	71 589.3	73 835.6	71 303.8	72 973.3	75 079.2	75 242.9	68 709.8	65 493.0	..
Energy intensity TPES/GDP (toe/1,000 US$ (2000) [2]	1.9	1.9	1.7	1.9	1.8	1.6	1.7	1.5	1.5	1.5	..

Transportation	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Passenger transport demand (million passenger/km)	124 365.6	127 454.6	130 833.9	149 065.2	188 939.2	213 035.7	235 738.5	246 958.5	251 250.8	266 784.2	272 831.7	4
by mode:												
train	14 587.2	14 719.0	14 701.6	16 055.5	16 574.6	19 255.8	20 625.0	18 998.6	17 011.6	17 913.9	17 961.5	4
road transport	104 320.8	107 239.8	110 827.8	126 537.1	164 524.2	185 155.4	205 424.8	217 372.4	223 085.4	237 556.1	240 485.3	4
water transport	0.6	0.8	1.5	3.4	1.9	1.9	0.9	1.2	0.4	1.2	0.7	4
air transport	5 457.0	5 495.0	5 303.0	6 469.2	7 838.5	8 622.6	9 687.8	10 586.3	11 153.3	11 313.0	14 384.2	4
Passengers transported by air transport (million passengers)	2.7	2.8	2.7	3.4	4.1	4.5	5.0	5.4	5.9	6.0	7.4	4
Freight transport demand (million ton km) [3]	350 453.6	369 704.2	337 011.3	385 290.1	448 766.8	477 956.2	495 422.9	554 905.0	546 320.0	518 602.2	555.437.7	4
by mode:												
train	200 784.5	214 949.5	197 484.7	213 219.0	223 626.0	235 892.9	231 289.5	280 653.8	267 362.2	238 972.2	262 097.5	4
road transport	61 459.0	63 481.0	66 253.0	80 260.6	121 074.1	132 297.3	145 347.1	155 665.6	161 864.8	163 262.7	3.0	4
water transport	361.6	875.7	1 457.9	3 135.1	3 268.2	2 814.7	2 741.8	2 494.6	1 628.5	1 793.7	1 584.2	4
air transport	88.1	69.4	67.6	90.1	92.6	59.5	63.1	49.3	42.7	42.9	53.3	4
Number of passenger vehicles (including taxis) (1,000)	2 183.1	2 576.6	2 656.8	3 087.6	3 553.8	3 642.8	3 678.3	4 000.1	3 856.5	3 845.3	3 915.9	5
Average age of passenger car fleet (years)	..	..	..	..	..	..	..	..	..	..	..	
Demography and Health												
Total population (million inhabitants) [6]	15.4	15.6	16.0	16.2	16.4	16.7	16.9	17.2	17.4	17.7	17.9	
Birth rate (per 1,000)	20.8	22.8	22.1	22.5	22.5	22.7	22.7	23.1	22.7	22.5	..	
Total fertility rate	2.5	2.7	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.8	..	
Mortality rate (per 1,000)	10.2	9.7	8.9	9.0	8.7	8.5	8.0	7.7	7.5	7.4	..	
Infant mortality rate (deaths/1,000 live births)	14.6	20.8	18.3	16.6	14.9	13.6	11.4	9.8	9.4	8.6	..	
Life expectancy at birth (years)	66.3	67.1	68.4	68.5	68.7	69.5	70.6	71.4	72.0	72.4		
Female life expectancy at birth (years)	72.6	72.4	73.3	73.4	73.6	74.3	75.2	75.8	76.3	76.6		
Male life expectancy at birth (years)	60.7	61.9	63.6	63.6	63.9	64.7	65.9	66.9	67.5	68.0	..	
Population aged 0-14 years (% of total) [6]	24.0	24.0	24.1	24.2	24.5	24.9	25.5	26.0	26.6	27.1	27.7	
Population ages 15-64 (% of total) [6]	68.2	68.3	68.8	69.0	68.9	68.5	67.9	67.3	66.6	65.9	65.1	
Population ages 65 and above (% of total) [6]	7.8	7.7	7.1	6.8	6.6	6.6	6.6	6.7	6.8	7.0	7.2	
Use of improved drinking water source	..	..	..	..	..	..	..	..	..	..	..	
- Total population (%)	79.3	81.8	82.0	82.5	87.7	87.7	89.6	90.4	90.9	91.0		
- Urban (%)	..	..	..	..	..	..	..	..	..	..	..	
- Rural (%)	..	..	..	..	..	..	..	..	..	..	..	
Access to improved sanitation	..	..	..	..	..	..	..	..	..	..	..	
- Total population (%)	45.6	52.2	51.6	51.6	60.3	59.6	59.5	62.7	57.1	58.2		
- Urban (%)	..	..	..	..	..	..	..	..	..	..	..	
- Rural (%)	..	..	..	..	..	..	..	..	..	..	..	
Macroeconomic context												
GDP	..	..	..	..	..	..	..	..	..	..	..	
- in current prices (million National currency)	12 849 794.0	16 052 919.2	17 007 647.0	21 815 517.0	28 243 052.7	31 015 186.6	35 999 025.1	39 675 832.9	40 884 133.6	46 971 150.0	35 142 065.2	8
- in current prices (million US$)	104 853.5	133 440.7	115 306.1	148 052.4	192 627.6	208 002.1	236 633.3	221 417.7	184 387.0	137 278.3	108 731.6	8
- in prices of 2005 (million US$)	9 154 255.8	9 457 879.5	9 571 738.4	10 270 073.0	11 029 132.4	11 560 473.9	12 251 217.9	12 767 378.3	12 919 190.1	13 063 411.4	..	
- PPPs in prices of 2005 (million inter. $) [7]	292 422.7	302 072.7	305 697.6	328 013.5	352 286.5	369 196.2	391 348.0	407 784.6	412 678.0	417 217.5	..	
- change over previous year (%)	108.9	103.3	101.2	107.3	107.4	104.8	106.0	104.2	101.2	101.1	104.3	8
- change (2005=100)	120.6	124.6	126.1	135.3	145.3	152.3	161.4	168.2	170.2	172.1	..	
- per capita in current prices (US$)	6 771.6	8 513.5	7 165.1	9 071.0	11 634.5	12 387.4	13 890.8	12 806.7	10 509.9	7 714.8	6 038.1	8
- per capita in prices of 2005 (US$)	4 821.1	5 011.3	4 029.4	4 268.2	4 614.1	4 688.3	4 802.8	4 186.6	3 374.3	2 180.8	..	
- per capita in PPPs (inter. $)[7]	17 793.1	18 513.9	18 387.2	19 690.4	21 277.7	22 392.2	23 773.8	24 845.5	25 096.7	25 331.3	..	

Macroeconomic context	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Industrial output (annual 2005=100)	..	..	..	..	..	..	..	..	..	..	..
Industrial output (% change over previous year)	..	..	..	..	..	..	..	..	..	..	..
Labour productivity in industry (% change over previous year)	102.5	100.7	103.2	106.1	102.5	97.0	99.5	96.0	99.2	99.3	..
Agricultural output (% change over previous year)	..	..	..	..	..	..	..	..	..	..	..
Share of agriculture, forestry ang fisheries in GDP (%)	5.7	5.3	6.2	4.5	4.9	4.2	4.5	4.4	4.8	4.6	4,5 [8]
Employment in agriculture (%)	30.8	29.7	29.0	28.3	26.5	25.5	24.2	18.9	16.2	16.2	16.0
Consumer price index (CPI, 2005=100)	128.7	140.9	149.6	161.2	173.1	183.4	192.2	206.4	234.5	254.4	272.4
Consumer price index (CPI) (% change over the preceding year, annual average)	110.8	117.0	107.3	107.1	108.3	105.1	105.8	106.7	106.6	114.6	107.4
Producer price index (PPI) (% change over the preceding year, annual average)	112.4	136.8	78.0	125.2	127.2	103.5	99.7	109.5	79.5	116.8	115.3
Registered unemployment (% of labour force, end of period)	0.7	0.6	0.6	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.8
Labour force participation rate (% of 15-64 year-old)	72.0	73.0	72.5	73.5	73.9	74.2	74.4	73.7	72.9	73.7	73.7
Current account balance	..	..	..	..	..	..	..	..	..	..	..
- Total (million US$)	..	..	..	..	..	..	..	..	..	..	..
- (as % of GDP)	..	..	..	..	..	..	..	..	..	..	..
Exports of goods (million US$)	47 755.3	71 183.5	43 195.7	60 270.8	84 335.9	86 448.8	84 700.4	79 459.8	45 955.8	36 736.9	43 065.2 [9]
Imports of goods (million US$)	32 756.4	37 889.0	28 408.7	31 126.7	36 905.8	46 358.4	48 805.6	41 295.5	30 567.7	25 376.7	26 384.9 [9]
Balance of trade in goods and services (million US$)	..	..	..	..	..	..	..	..	..	..	..
Net foreign direct investment (FDI) (million US$)	..	..	..	..	..	..	..	..	..	..	..
Net foreign direct investment (FDI) (as % of GDP)	..	..	..	..	..	..	..	..	..	..	..
Cumulative FDI (million US$)	..	..	..	..	..	..	..	..	..	..	..
Foreign exchange reserves	..	..	..	..	..	..	..	..	..	..	..
- Total reserves (million US$)	..	..	..	..	..	..	..	..	..	..	..
- Total reserves as months of imports	..	..	..	..	..	..	..	..	..	..	..
Net external debt (million US$)	..	..	..	..	..	..	..	..	..	..	..
Ratio of net debt to exports (%)	..	..	..	..	..	..	..	..	..	..	..
Ratio of net debt to GDP (%)	..	..	..	..	..	..	..	..	..	..	..
Exchange rate, annual averages (National currency unit/US$)	..	..	..	..	..	..	..	..	..	..	..
Income distribution and poverty											
GDP per capita in prices of 2005 (US$/capita)	4 821.1	5 011.3	4 029.4	4 268.2	4 614.1	4 688.3	4 802.8	4 186.6	3 374.3	2 180.8	..
Population below national poverty line											
- Total (%)	12.7	12.1	8.2	6.5	5.5	3.8	2.9	2.8	2.7	2.6	2.6 [10]
- Urban (%)	6.9	8.1	4.1	3.7	2.5	1.9	1.3	1.3	1.3	1.3	1.2 [10]
- Rural (%)	18.1	15.9	12.1	10.1	9.1	6.1	4.9	4.7	4.4	4.4	4.4 [10]
Telecommunications											
Fixed telephone lines per 100 inhabitants	20.9	22.9	24.0	24.9	25.8	26.0	25.8	25.2	23.6	22.1	20.4
Cellular subscribers per 100 population	81.0	103.0	105.0	119.0	152.0	180.0	178.0	165.0	150.0	143.0	148.0
Computer users per 100 population [11]	..	..	..	..	51.3	62.6	63.2	64.1	74.2	76.2	78.2
Internet users per 100 population [11]	..	..	..	..	50.6	61.9	63.3	63.9	72.9	76.8	78.8
Education											
Literacy rate (%)	..	..	..	..	..	..	..	..	..	..	..
Literacy rates of 15-24 years old, both sexes, percentage	..	..	..	..	..	..	..	..	..	..	..
Gender Inequality											
Share of women employment in the non-agricultural sector (%)	49.6	49.6	49.3	49.3	48.9	48.9	49.4	49.0	49.0	48.8	48.5 [12]
Gender Parity Index in											
- Primary education enrolment (ratio) [13]	..	..	..	1.0	..	..	..	..	1.0	..	..
- Secondary education enrolment (ratio) [13]	..	..	..	1.0	..	..	..	..	1.0	..	..
- Tertiary education enrolment (ratio)	..	..	..	..	..	..	..	..	..	..	..

Source: Committee on Statistics, 2018.
Note:
* In 2013, emissions were not broken by specific substances.
[1] Including "Electricity, gas, steam and air conditioning supply".
[2] According to the plan of statistical works the indicator is formed in October.
[3] Taking into account transportation by pipeline.
[4] Operational data for January–December 2017.
[5] The presence of registered cars in the Republic of Kazakhstan on 1 November 2017.
[6] Population data are for the beginning of the year.
[7] Source: www.datatrendeconomy.ru
[8] January–September 2017.
[9] January–November 2017.
[10] The data are for the third quarter of 2017.
[11] The indicator was formed before 2011 at the age range of 16–74 years, and since 2011 is formed at the age range of 6–74 years.
[12] Data of population employment sampling survey for third quarter of 2017.
[13] Data of Multiple Indicator Cluster Survey 4th and 5th rounds.

Annex IV

LIST OF MAJOR ENVIRONMENT-RELATED LEGISLATION

The Constitution of the Republic of Kazakhstan, adopted at the republican referendum on 30 August 1995

Codes

"On public health and the public health system" dated 18 September 2009 No. 193-IV
Criminal Code of the Republic of Kazakhstan dated 3 July 2014 No. 226-V
"On subsoil and subsoil use" dated 27 December 2017 No. 125-VI
Environmental Code of the Republic of Kazakhstan dated 9 January 2007 No. 212-III
Forest Code of the Republic of Kazakhstan dated 8 July 2003 No. 477-II
"On taxes and other mandatory payments to the budget (Tax Code)" dated 25 December 2017 No. 120-VI
Land Code of the Republic of Kazakhstan dated 20 June 2003 No. 442-II
Labour Code of the Republic of Kazakhstan dated 23 November 2015 No. 414-V
Code "On private entrepreneurship" dated 31 January 2006 No. 124-III. Ceased to be in force by the Code of the Republic of Kazakhstan dated 29 October 2015 No. 375-V
Code on Misdemeanours dated 5 July 2014 No. 235-V
Budget Code of the Republic of Kazakhstan dated 4 December 2008 No. 95-IV
Business Code of the Republic of Kazakhstan dated 29 October 2015 No. 375-V
Water Code of the Republic of Kazakhstan dated 9 July 2003 No. 481-II
Civil Procedure Code of the Republic of Kazakhstan dated 31 October 2015 No. 377-V
Criminal Procedure Code of the Republic of Kazakhstan dated 4 July 2014 No. 231-V
Civil Code dated 27 December 1994 No. 268-XIII

Laws

"On public service of the Republic of Kazakhstan" dated 23 November 2015 No. 416-V
"On legal acts" dated 6 April 2016 No. 480-V
"On amendments to legislation of the Republic of Kazakhstan on the transition of the Republic of Kazakhstan to 'Green Economy'" dated 28 April 2016 No. 506-V
"On access to information" dated 16 November 2015 No. 401-V
"On civil protection" dated 11 April 2014 No. 188-V
"On amendments to legislation of the Republic of Kazakhstan on flora and fauna" dated 15 June 2017 No. 73-VI
"On protection, reproduction and use of fauna" dated 9 July 2004 No. 593
"On amendments to legislation of the Republic of Kazakhstan on forestry, wildlife and specially protected natural areas" dated 25 January 2012 No. 548-IV
"On the regulation of trading activities" dated 12 April 2004 No. 544-II
"On the safety of food products" dated 21 July 2007 No. 301
"On protection of consumer rights" dated 2 May 2010 No. 274-IV
"On amendments to legislation of the Republic of Kazakhstan on the issues of industrial and innovation policy" dated 17 November 2015 No. 407-V
"On amendments to legislation of the Republic of Kazakhstan on civil protection issues" dated 11 April 2014 No. 189-V
"On amendments to legislation of the Republic of Kazakhstan on reducing permits and optimizing the control and supervisory functions of state bodies" dated 10 July 2012 No. 36-V
"On state control and supervision in the Republic of Kazakhstan" dated 6 January 2011 No. 377-IV. Ceased to be in force by the Code of the Republic of Kazakhstan dated 29 October 2015
"On mandatory environmental insurance" dated 13 December 2005 No. 93
"On amendments to legislation of the Republic of Kazakhstan on environmental issues" dated 3 December 2011 No. 505-IV
"On amendments to legislation of the Republic of Kazakhstan on environmental issues" dated 8 April 2016 No. 491-V
"On permits and notifications" dated 16 May 2014 No. 202-V
"On amendments to legislation of the Republic of Kazakhstan on the issues of ecology and subsoil use" dated 25 April 2016 No. 505-V
"On state regulation of production and turnover of biofuel" dated 15 November 2010 No. 351-IV
"On tourism activities in the Republic of Kazakhstan" dated 13 June 2001 No. 211

"On amendments to legislation of the Republic of Kazakhstan on water supply and sanitation, credits and subsidies in housing and communal services" dated 15 June 2015 No. 322-V
"On amendments to legislation of the Republic of Kazakhstan on subsoil use issues" dated 27 December 2017 No. 126-VI
"On energy saving and energy efficiency improvement" dated 13 January 2012 No. 541-IV
"On support for the use of renewable energy sources" dated 4 July 2009 No. 165-IV
"On industrial safety at hazardous production facilities" dated 3 April 2012 No. 314. Ceased to be in force by the Law of the Republic of Kazakhstan dated 11 April 2014 No. 188-V
"On housing relations" dated 16 April 1997 No. 94
"On specially protected natural areas" dated 7 June 2006 No. 175-III
"On pastures" dated 20 February 2017 No. 47-VI
"On public councils" dated 2 November 2015 No. 383-V
"On agricultural cooperatives" dated 29 October 2015 No. 372-V
"On state regulation of development of the agricultural complex and rural territories" dated 8 July 2005 No. 66-III
"On seed production" dated 8 February 2003 No. 385-II
"On organic production" dated 27 November 2015 No. 416-V
"On plant protection" dated 3 July 2002 No. 331-II
"On grain" dated 19 January 2001 No. 143-II
"On livestock breeding" dated 9 July 1998 No. 278-I
"On amendments and additions to certain legislative acts of the Republic of Kazakhstan on fundamental improvement of conditions for entrepreneurial activity in the Republic of Kazakhstan" dated 29 December 2014 No. 269-V
"On the safety of toys" dated 21 July 2007 No. 306-III
"Patent Law" dated 16 July 1999 No. 427-I
"On public procurement" dated 4 December 2015 No. 434-V
"On public–private partnerships" dated 31 October 2015 No. 379-V
"On amendments to legislation of the Republic of Kazakhstan on subsoil use and oil operations in the Republic of Kazakhstan" dated 1 December 2004 No. 2-III
"On state guarantees of equal rights and equal opportunities for men and women" dated 8 December 2009 No. 223-IV
"On prevention of domestic violence" dated 4 December 2009 No. 214-IV
"On safety of chemical products" dated 21 July 2007 No. 302
"On technical regulation" dated 9 November 2004 No. 603-II
"On architectural, urban planning and construction activities" dated 16 July 2001 No. 242-II
"On amendments to legislation of the Republic of Kazakhstan on support to the use of renewable energy sources" dated 4 July 2013 No. 128-V
"On gas and gas supply" dated 9 January 2012 No. 532-IV
"On procedure of consideration of requests of individuals and legal entities" No. 221-III dated 12 January 2007
"On non-commercial organizations" No. 142-II dated 16 January 2001
"On the state social procurement, grants and bonuses for non-governmental organizations in the Republic of Kazakhstan" No. 36-III dated 12 April 2005
"On administrative procedures" No. 107-II dated 27 November 2000
"On advocacy" No. 195-I dated 5 December 1997
"On state-guaranteed legal aid" No. 122-V dated 3 July 2013
"On state secrets" dated 15 March 1999 No. 349-I
"On state statistics" dated 19 March 2010 No. 257-IV
"On informatization" dated 24 November 2015 No. 418-V
"On amendments and additions to certain legislative acts of the Republic of Kazakhstan concerning the expansion of academic and managerial independence of higher education institutions" dated 4 July 2018 No. 171-VI
"On education" dated 27 July 2007 No. 319-III

Decrees of the President

Decree of the President of the Republic of Kazakhstan No. 677 dated 29 October 2013 "On further improvement of the system of public administration of the Republic of Kazakhstan"
Decree of the President of the Republic of Kazakhstan No. 875 dated 6 August 2014 "On the reform of the system of public administration of the Republic of Kazakhstan"
Decree of the President of the Republic of Kazakhstan No. 827 dated 18 June 2009 "On the system of state planning in the Republic of Kazakhstan"
Decree of the President of the Republic of Kazakhstan No. 931 dated 4 March 2010 "On some issues of the further functioning of the system of state planning in the Republic of Kazakhstan"
Decree of the President of the Republic of Kazakhstan No. 415 dated 31 January 2017 "On approval of the main directions of the State Policy of the Republic of Kazakhstan on official development aid for the period 2017–2020"
Decree of the President of the Republic of Kazakhstan No. 823 dated 26 May 2014 "On the formation of the Concept of Transition to 'Green Economy' under the President of the Republic of Kazakhstan"

Decree of the President of the Republic of Kazakhstan No. 47 dated 13 April 2011 “On the recognition of certain decrees of the President of the Republic of Kazakhstan as invalid”

Resolutions of the Government

Resolution of the Government of the Republic of Kazakhstan No. 656 dated 22 May 2012 “On some issues of the Ministry of Environmental Protection of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 994 dated 19 September 2014 “Issues of the Ministry of Energy of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 978 dated 26 July 2012 “On the reorganization of the Republican State Enterprise on the right of economic management 'Kazakh Scientific Research Institute of Ecology and Climate' of the Ministry of Environmental Protection of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 71 dated 17 February 2017 “On some issues of the Ministries of Health and National Economy of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 100 dated 22 September 2014 “On Certain Issues of the Ministry of Agriculture of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 305 dated 14 April 2010 “On approval of the Rules for the development of concepts and doctrines”
Resolution of the Government of the Republic of Kazakhstan No. 989 dated 30 July 2012 “On the establishment of a limited liability partnership 'Technology Commercialization Centre'”
Resolution of the Government of the Republic of Kazakhstan No. 632 dated 9 June 2014 “On the establishment of the Coordination Council on Implementation of Framework Partnership Agreements between the Government of Kazakhstan and International Financial Organizations”
Resolution of the Government of the Republic of Kazakhstan No. 1294 dated 1 September 2009 “On the Draft Decree of the President of the Republic of Kazakhstan 'On approval of the Rules for the Development, Implementation, Monitoring, Evaluation and Control of the Strategic Development Plan of the Republic of Kazakhstan, the Forecast Scheme of Territorial Development of the Country, state programmes, programme development of territories, strategic plans of state bodies”
Resolution of the Government of the Republic of Kazakhstan No. 970 dated 4 September 2014 “On amendments to certain decisions of the Government of the Republic of Kazakhstan and Orders of the Prime Minister of the Republic of Kazakhstan and recognition of certain decisions of the Government of the Republic of Kazakhstan and Orders of the Prime Minister of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 864 dated 31 July 2014 “On approval of the criteria for classifying hazardous industrial facilities as such”
Resolution of the Government of the Republic of Kazakhstan No. 1118 dated 31 August 2012 “On approval of the requirements for the form and content of the plan of measures for energy saving and energy efficiency, developed by the subject of the State Energy Registry on the basis of the energy audit”
Resolution of the Government of the Republic of Kazakhstan No. 630 dated 27 June 2008 “On approval of the Rules for the turnover of genetically modified objects”
Resolution of the Government of the Republic of Kazakhstan No. 28 dated 27 January 2016 “On approval of the Rules for the implementation of extended producer (importer) responsibility”
Resolution of the Government of the Republic of Kazakhstan No. 486 dated 29 August 2016 “On approval of the Rules for conducting legal monitoring”
Resolution of the Government of the Republic of Kazakhstan No. 750 dated 31 July 2013 “On approval of the Rules for the Action Plan for the implementation of the Concept of Transition of the Republic of Kazakhstan to 'Green Economy' for 2013-2020”
Resolution of the Government of the Republic of Kazakhstan No. 1002 dated 22 September 2014 “On some issues of the Ministry of Agriculture of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 236 dated 13 March 2013 “On amendments to the decree of the Government of the Republic of Kazakhstan No. 1111 dated 8 October 2004 “Issues of the Ministry of Education and Science of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 969 dated 25 July 2012 “On the introduction of a prohibition on the use of saigas, their parts and derivatives throughout the territory of the Republic of Kazakhstan until 2020, except for scientific purposes”
Resolution of the Government of the Republic of Kazakhstan No. 1034 dated 31 October 2006 “On approval of lists of rare and endangered species of plants and animals”
Resolution of the Government of the Republic of Kazakhstan No. 1413 dated 7 November 2012 “On amendments to some decisions of the Government of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 933 dated 14 August 2014 “On the offices of the central executive bodies of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 1434 dated 30 December 2013 “On approval of the basic provisions of the general scheme for the organization of the territory of the Republic of Kazakhstan”

Resolution of the Government of the Republic of Kazakhstan No. 1692 dated 10 November 2000 “On the concept of development and placement of specially protected natural areas of the Republic of Kazakhstan until 2030”. Ceased to be in force by the resolution of the Government of the Republic of Kazakhstan No. 924 dated 10 September 2010

Resolution of the Government of the Republic of Kazakhstan No. 264 dated 15 May 2017 “On the introduction of amendments in the resolution of the Government of the Republic of Kazakhstan No. 575 dated 25 May 2011 'On approval of the Rules of basic, grant, programme-targeted financing of scientific and (or) technico-scientific activities'“

Resolution of the Government of the Republic of Kazakhstan No. 1212 dated 18 November 2010 “On approval of the list of geological, geomorphological and hydrogeological objects of the state natural reserve fund of national and international importance, Rules of their limited domestic use in specially protected natural areas, as well as the list of subsoil plots, representing a special ecological, scientific, cultural and other value, referred to the category of specially protected natural areas of national importance”

Resolution of the Government of the Republic of Kazakhstan No. 933 dated 29 December 2017 “On the list of water management facilities having special strategic importance, including those that can be leased and transferred to trust management”

Resolution of the Government of the Republic of Kazakhstan No. 665 dated 26 April 1997 “On the establishment of the small entrepreneurship development fund”

Resolution of the Government of the Republic of Kazakhstan No. 747 dated 21 July 2010 “On amendments to the Resolution of the Government of the Republic of Kazakhstan No. 1232 dated 14 December 2007”

Resolution of the Government of the Republic of Kazakhstan No. 645 dated 12 July 2014 “On approval of fixed tariffs”

Resolution of the Government of the Republic of Kazakhstan No. 89 dated 28 February 2018 “On approval of the report on the implementation of the Convention on the Elimination of All Forms of Discrimination against Women”

Resolution of the Government of the Republic of Kazakhstan No. 370 dated 15 June 2017 “On approval of the rules for the allocation of greenhouse gas emissions quotas and the formation of reserves of the established quantity and the amount of quotas of the National Greenhouse Gas Emission Allocation Plan”

Resolution of the Government of the Republic of Kazakhstan No. 271 dated 27 March 2014 “On approval of the Rules for the determination of fixed tariffs”

Resolution of the Government of the Republic of Kazakhstan No. 925 dated 29 December 2017 “On amendments to the Resolution of the Government of the Republic of Kazakhstan No. 271 dated 27 March 2017 “On approval of the Rules for the determination of fixed tariffs”

Resolution of the Government of the Republic of Kazakhstan No. 1449 dated 25 September 2000 “On the creation of a unified system of state cadastres of natural objects of the Republic of Kazakhstan on the basis of digital geoinformation systems”. Ceased to be in force by the Resolution of the Government of the Republic of Kazakhstan No. 29 dated 18 January 2008

Resolution of the Government of the Republic of Kazakhstan No. 173 dated 6 April 2018 “On approval of excise rates for gasoline (excluding aviation fuel) and diesel fuel and for the recognition of certain decisions of the Government of the Republic of Kazakhstan as invalid”

Resolution of the Government of the Republic of Kazakhstan No. 95 dated 4 February 2008 “On approval of the Rules for issuance of integrated environmental permits and the List of industrial facilities that are eligible to obtain integrated environmental permits instead of permits for emissions into the environment”

Resolution of the Government of the Republic of Kazakhstan No. 345 dated 19 March 2004 “On the Council for Sustainable Development of the Republic of Kazakhstan”. Ceased to be in force in accordance with the Resolution of the Government of the Republic of Kazakhstan No. 970 dated 4 September 2014

Resolution of the Government of the Republic of Kazakhstan No. 593 dated 26 September 2017 “On approval of the List of specially protected natural areas of national importance”

Resolution of the Government of the Republic of Kazakhstan No. 59 dated 21 January 2004 “On approval of the List of water bodies of special national importance and features of legal regulation of economic activity on water bodies of special national importance”

Resolution of the Government of the Republic of Kazakhstan No. 1171 dated 4 November 2014 “On approval of the General Scheme of Gasification of the Republic of Kazakhstan for the period 2015–2030”

Resolution of the Government of the Republic of Kazakhstan No. 294 dated 25 May 2017 “On the Draft Law of the Republic of Kazakhstan “On introducing amendments and additions to some legislative acts of the Republic of Kazakhstan on the activities of non-profit organizations”

Resolution of the Government of the Republic of Kazakhstan No. 177 dated April 9 2018 “On Approval of the List of International and State Organizations, Foreign and Kazakhstani Non-Governmental Public Organizations and Foundations Granting Grants and Recognizing the Invalidation of Certain Decisions of the Government of the Republic of Kazakhstan”

Resolution of the Government of the Republic of Kazakhstan No. 589 dated 13 October 2016 “On Approval of the Rules for the Maintenance of the State Environmental Information Fund”

Resolution of the Government of the Republic of Kazakhstan No. 1080 dated 23 August 2012 “On approval of state compulsory education standards for the relevant levels of education”

Resolution of the Government of the Republic of Kazakhstan No. 292 dated 13 May 2016 “On Amendments and Additions to Decree of the Government of the Republic of Kazakhstan No. 1080 dated 23 August 2012 “On approval of state compulsory education standards for the relevant levels of education”

Resolution of the Government of the Republic of Kazakhstan No. 1196 dated 31 December 2015 “On the Approval of the Rules for the Transfer of Information to Official Information of Limited Distribution and Work with It”
Resolution of the Government of the Republic of Kazakhstan No. 1175 dated 31 December 2015 “On approval of the Regulation on the procedure of the Commission on access to information”
Resolution of the Government of the Republic of Kazakhstan No. 327 dated 25 April 2015 “On introducing amendments and additions to the Resolution of the Government of the Republic of Kazakhstan No. 1080 dated 23 August 2012 “On approval of state compulsory education standards for the relevant levels of education”
Resolution of the Government of the Republic of Kazakhstan No. 13 dated 14 January 2016 “On some issues of implementation of state support to investments”
Resolution of the Government of the Republic of Kazakhstan No. 13 dated 24 January 2017 “On approval of the Rules for submission of information by central government authorities and local executive authorities for the preparation of the National Report on the State of the Environment and Use of Natural Resources of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 673 dated 7 November 2016 “On approval of the Rules for preparation of the National Report on the State of the Environment and Use of Natural Resources of the Republic of Kazakhstan”
Resolution of the Government of the Republic of Kazakhstan No. 594 dated 11 July 2007 “On approval of the Rules for import, export and transit of waste”

Orders of the Prime Minister

Order of the Prime Minister of the Republic of Kazakhstan No. 141-p dated 18 December 2015 “On the establishment of the Interdepartmental Council on Water Resources Management in Kazakhstan”

Regulatory legal acts of ministries and other state bodies

Order of the Minister of Energy of the Republic of Kazakhstan No. 62 dated 20 October 2014 “On approval of the provisions of the state institution 'Committee of Environmental Regulation and Control of the Ministry of Energy of the Republic of Kazakhstan' and its territorial bodies”
Order of the Acting Prime Minister of the Republic of Kazakhstan - Minister of Agriculture of the Republic of Kazakhstan No. 475 dated 11 November 2016 “On approval of the Regulations on the Committee on Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan”
Order of the Minister of National Economy of the Republic of Kazakhstan No. 58 dated 4 February 2016 “On some issues of the state planning system in the Republic of Kazakhstan”
Order of the Acting Prime Minister of the Republic of Kazakhstan - Minister of Agriculture of the Republic of Kazakhstan No. 408 dated 29 September 2016 “On approval of the Regulations on the Committee on Forestry and Fauna of the Ministry of Agriculture of the Republic of Kazakhstan”
Order of the Minister of Internal Affairs of the Republic of Kazakhstan No. 1096 dated 29 December 2015 “On approval of the Rules for the organization of work of law enforcement bodies on participation in environmental activities”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 264 dated 12 December 2014 “On approval of the mechanism for assessing the activities of local executive bodies on energy conservation and energy efficiency”
Order of the Minister of Energy of the Republic of Kazakhstan No. 202 dated 16 March 2015 “On approval of criteria for assessing the ecological situation in the territories”
Order of the Minister of Environment and Water Resources of the Republic of Kazakhstan No. 221-Ө dated 12 June 2014 “On approval of certain methodological documents in the field of environmental protection”
Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 129-p dated 9 June 2013 “On approval of the Rules for the environmental impact assessment (EIA) of planned activities on the environment in the development of state, sectoral and regional programmes for the development of economic sectors, schemes for allocating productive forces”. Ceased to be in force by the Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 18-ө dated 24 January 2011
Order of the Minister of Energy of the Republic of Kazakhstan No. 155 dated 28 November 2014 “On approval of the list of best available techniques”
Order of the Minister of Energy of the Republic of Kazakhstan No. 478 dated 7 November 2016 “On approval of targets for the development of the renewable energy sector”
Order of the Minister of Energy of the Republic of Kazakhstan No. 188 dated 13 March 2015 “On approval of ecological criteria for land assessment”
Order of the Deputy Prime Minister of the Republic of Kazakhstan - Minister of Agriculture of the Republic of Kazakhstan No. 185 dated 27 April 2017 “On approval of the methodology for activities to counter the degradation and desertification of pastures, including arid ones”
Order of the Deputy Prime Minister of the Republic of Kazakhstan - Minister of Agriculture of the Republic of Kazakhstan No. 172 dated 24 April 2017 “On the amendments to the order of the Minister of Agriculture of the Republic of

Kazakhstan No. 3-3/332 dated 14 April 2015 “On approval of the maximum permissible load norm for the total area of pastures”
Order of the Acting Minister of National Economy of the Republic of Kazakhstan No. 346 dated 17 April 2015 “On approval of the instruction on development of projects to rehabilitate damaged lands”
Order of the Minister of Agriculture of the Republic of Kazakhstan No. 18-04 /17 dated 16 January 2015 “On approval of the List of commercial and non-commercial types of fishing gear and methods of fishing permitted for use”
Order of the Acting Chairperson of the Committee on Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan No. 265 dated 24 November 2016 “On the amendments and additions to the order of the Acting Chairperson of the Committee on Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan No. 190 dated 24 July 2015 “On the introduction of restrictions and prohibitions for the use of objects on fauna, their parts and derivatives, the establishment of places and terms of their use”
Order of the Acting Minister of Agriculture of the Republic of Kazakhstan No. 18-03/157 dated 27 February 2015 “On approval of the Rules of hunting”
Order of the Acting Minister of Agriculture of the Republic of Kazakhstan No. 18-04/148 dated 27 February 2015 “On approval of the Rules of fishing”
Order of the Minister of Energy of the Republic of Kazakhstan No. 27 dated 21 January 2015 “On approval of the list of environmentally hazardous types of economic and other activities”
Order of the Minister of Energy of the Republic of Kazakhstan No. 39 dated 8 February 2016 “On approval of the Rules for the organization of collection, storage and disposal of radioactive waste and spent nuclear fuel”
Order of the Acting Minister of Energy of the Republic of Kazakhstan No. 695 dated 4 December 2015 “On approval of the list of goods subject to extended producer (importer) responsibility”
Order of the Minister of Energy of the Republic of Kazakhstan No. 229 dated 20 March 2015 “On approval of the Rules for the management of abandoned hazardous wastes recognized by the decision of the court and entered into state property”
Order of the Minister of Agriculture of the Republic of Kazakhstan No. 19-4/286 dated 31 March 2015 “On approval of the Rules for ensuring the safety of water management systems and infrastructure”
Order of the Minister of Finance of the Republic of Kazakhstan No. 648 dated 11 December 2015 “On approval of the Rules for conducting public procurement”
Joint order of the Minister of Energy of the Republic of Kazakhstan No. 721 dated 15 December 2015 and the Acting Minister of National Economy of the Republic of Kazakhstan No. 835 dated 30 December 2015 “On the approval of the risk assessment criteria and checklists for inspections on environmental protection, reproduction and use of natural resources”
Joint order of the Minister of Agriculture of the Republic of Kazakhstan No. 18-04/1126 dated 25 December 2015 and the Minister of National Economy of the Republic of Kazakhstan No. 808 dated 28 December 2015 “On the approval of the risk assessment criteria and checklists for inspections on environmental protection, reproduction and use of fauna”
Joint order of the Minister of Agriculture of the Republic of Kazakhstan No. 463 dated 27 June 2017 and the Minister of National Economy of the Republic of Kazakhstan No. 285 dated 20 June 2017 “On the approval of the risk assessment criteria and checklists for the sanitary and epidemiological well-being of the population”
Joint order of the Minister of Agriculture of the Republic of Kazakhstan No. 19-2/1131 dated 25 December 2015 and the Minister of National Economy of the Republic of Kazakhstan No. 809 dated 28 December 2015 “On the approval of the risk assessment criteria and checklists for inspections on environmental protection of water resources of the Republic of Kazakhstan, safety of dams”
Order of the Minister of Energy of the Republic of Kazakhstan No. 37 dated 23 January 2015 “On approval of the Rules for the issuance of integrated environmental permits and a list of types of industrial facilities for which it is possible to obtain comprehensive environmental permits instead of permits for emissions into the environment”
Order of the Minister of National Economy of the Republic of Kazakhstan No. 748 dated 30 November 2015 “On approval of the Rules for the conduct and use of regulatory impact analysis of regulatory instruments”
Order of the Minister of Agriculture of the Republic of Kazakhstan No. 231 dated 23 May 2016 “On approval of the list of permitted funds used in the production of organic products”
Order of the Minister of Agriculture of the Republic of Kazakhstan No. 230 dated 23 May 2016 “On approval of the Rules for production and sale of organic products”
Order of the Acting Prime Minister of the Republic of Kazakhstan - Minister of Agriculture of the Republic of Kazakhstan No. 48 dated 1 February 2017 “On approval of the Rules for subsidies to partially compensate for investment expenditures by agro-industrial operators”
Order of the Acting Minister of Agriculture of the Republic of Kazakhstan No. 4-3/177 dated 27 February 2015 “On approval of the Rules for subsidizing the increase in crop yields and the quality of crop production, the cost of fuels and lubricants and other commodity materials necessary for carrying out spring field and harvesting works, by subsidizing the production of priority crops and the cost of the expenses of cultivating crops in protected ground”
Order of the Acting Minister of National Economy of the Republic of Kazakhstan No. 268 dated 27 March 2015 “On approval of the Rules for rational use of agricultural lands”
Order of the Acting Minister of Agriculture of the Republic of Kazakhstan No. 4-6/701 dated 28 July 2015 “On the definition of limiting volumes of production capacities for biofuel production”

Order of the Minister of Agriculture of the Republic of Kazakhstan No. 4-4/621 dated 9 July 2015 “On approval of the Rules for the establishment of quotas on raw food materials used for further processing into biofuel, in the event of food safety threat”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 389 dated 31 March 2015 “On establishing requirements for energy efficiency in transport”
Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 313-Ө dated 16 October 2013 “On approval of the Rules of navigation in the spawning period prohibited for fishing, as well as in the reservoirs and (or) areas prohibited for fishing”
Order of the Acting Minister for Investments and Development of the Republic of Kazakhstan No. 329 dated 26 March 2015 “On approval of the Rules for the organization and conduct of a mandatory technical inspection of motor vehicles and their trailers, and the frequency of passing the mandatory technical inspection of motor vehicles and their trailers”
Order of the Acting Minister of Agriculture of the Republic of Kazakhstan No. 559 dated 1 September 2010 “On approval of the Rules to create passes for regulated ecological tourism in specially allocated parts of state nature conservation areas that do not include particularly valuable ecological systems and facilities”
Order of the Minister of Tourism and Sport of the Republic of Kazakhstan No. 01-08/200 dated 11 November 2008 “On approval of the Rules on classification of overnight stay facilities for tourists”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 346 dated 30 December 2014 “On approval of the Rules for ensuring industrial safety in hazardous production facilities for the production of melts of ferrous, non-ferrous, precious metals and alloys based on these metals”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 345 dated 30 December 2014 “On approval of the Rules for ensuring industrial safety in hazardous production facilities in the chemicals industry”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 351 dated 30 December 2014 “On approval of the Rules for ensuring industrial safety for hazardous production facilities of coal mines”
Order of the Minister for Investments and Development No. 343 dated 20 December 2014 “On approval of the industrial safety rules for hazardous production facilities”
Order of the Minister for Investments and Development No. 352 dated 30 December 2014 “On approval of the industrial safety rules for hazardous production facilities engaged in mining and exploration works”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 354 dated 30 December 2014 “On approval of the Rules for ensuring industrial safety when operating trunk pipelines”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 355 dated 30 December 2014 “On approval of the Rules for ensuring industrial safety for hazardous production facilities of oil and gas industries”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 407 dated 31 March 2015 “On the establishment of requirements for energy efficiency of technological processes, equipment, including electrical equipment”
Order of the Acting Minister for Investments and Development of the Republic of Kazakhstan No. 1106 dated 26 November 2015 “On approval of the labelling of buildings, structures, facilities for energy efficiency”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 401 dated 31 March 2015 “On the establishment of requirements on energy efficiency of construction materials, products and structures”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 1139 dated 30 November 2015 “On approval of the Rules for the formation and maintenance of the energy efficiency map, selection and inclusion of projects in the energy efficiency map”
Order of the Minister of Energy of the Republic of Kazakhstan No. 118 dated 20 February 2015 “On approval of the Rules determining the tariff to support renewable energy sources”
Order of the Acting Minister of Energy of the Republic of Kazakhstan No. 241 dated 10 June 2016 “On approval of the Rules for the maintenance of the State Register of Pollutant Release and Transfer”
Order of the Acting Minister of Agriculture of the Republic of Kazakhstan No. 704 dated 10 November 2010 “On the establishment of a prohibition on the removal of saigas (except for scientific use) in the territory of the Republic of Kazakhstan by December 31, 2020”. Ceased to be in force in accordance with the order of the Minister of Agriculture of the Republic of Kazakhstan No. 18-06 /1085 dated 11 December 2015
Order of the Minister of Agriculture of the Republic of Kazakhstan No. 18-03/369 dated 24 April 2015 “On approval of lists of wetlands of international and national significance”
Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 273-ө dated 6 September 2013 “On approval of lists of wetlands of international and national significance”. Ceased to be in force by the order of the Minister of Agriculture of the Republic of Kazakhstan No. 18-03/369 dated 24 April 2015
Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 135-p dated 7 May 2007 “On approval of the Rules for holding public hearings”
Order of the Acting Minister of Energy of the Republic of Kazakhstan No. 240 dated 10 June 2016 “On approval of the List of the types of proposed activities which are subject to public hearings”
Order of the Minister of Energy of the Republic of Kazakhstan No. 26 dated 21 January 2015 “On approval of the List of pollutants and types of waste for which emission standards are established”
Order of the Minister of Energy of the Republic of Kazakhstan No. 256 dated 31 March 2015 “On the definition of a financial and accounting centre for the support of renewable energy sources”

Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 169-p dated 31 May 2007 “On approval of the waste classifier”
Joint Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 1206 dated 15 December 2015 and the Minister of National Economy of the Republic of Kazakhstan No. 814 dated 18 December 2015 “On approval of the criteria for assessment of the degree of risk and checklists in the field of industrial safety”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 353 dated 30 December 2014 “On approval of the Rules for the identification of hazardous production facilities”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 341 dated 30 December 2014 “On approval of the Rules defining the criteria for classifying hazardous industrial facilities as such, and the Rules for the development of the declaration of industrial safety of a hazardous production facility”
Order of the Acting Minister for Investments and Development of the Republic of Kazakhstan No. 300 dated 26 December 2014 “On approval of the Rules for the determination of the general level of danger of a hazardous production facility”
Order of the Minister of National Economy of the Republic of Kazakhstan No. 159 dated 23 December 2014 “On approval of the Rules for the monitoring of land and use of its data in the Republic of Kazakhstan”
Order of the Chairperson of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan No. 290 dated 30 November 2016 “On the approval of statistical forms of national statistical observations on environmental statistics and instructions for their completion”. Ceased to be in force on 1 January 2018 in accordance with the order of the Chairperson of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan No. 173 dated 12 November 2017
Order of the Acting Chairperson of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan No. 231 dated 30 December 2015 “On approval of the statistical forms of the departmental statistical observations and instructions for filling them in, developed by the Committee on Forestry and Fauna of the Ministry of Agriculture of the Republic of Kazakhstan”
Order of the Acting Chairperson of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan No. 223 dated 25 December 2015 “On approval of the Methodology to Produce Environmental Indicators”
Order of the Chairperson of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan No. 94 dated 25 December 2014 “On approval of the statistical form of the departmental statistical observation 'Report on the collection, use and disposal of water” (code 7791204, index 2-TP (water management), annual frequency)' and instructions for filling it out”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 398 dated 31 March 2015 “On approval of the Rules for the implementation of state monitoring of subsoil”. Ceased to be in force in accordance with the Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 312 dated 5 May 2018
Instructions on the organization and maintenance of routine observations of the level, pressure, flow rate, temperature and chemical composition of groundwater in the system of the state monitoring of groundwater, approved by the Order of the Chairperson of the Committee on Geology and Subsoil Use of the Ministry of Education and Science of the Republic of Kazakhstan No. 144-b dated 9 September 2004”
Order of the Minister of National Economy of the Republic of Kazakhstan No. 169 dated 28 February 2015 “On approval of the hygiene norms for physical factors affecting human beings”
Joint Order of the Agency of the Republic of Kazakhstan on Statistics No. 202 dated 6 August 2012 and the Ministry of Environmental Protection of the Republic of Kazakhstan No. 252-P dated 15 August 2012 “On information interaction between the Agency of the Republic of Kazakhstan on Statistics and the Ministry of Environmental Protection of the Republic of Kazakhstan”
Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 204-p dated 28 June 2007 “On approval of the instruction on environmental impact assessment”
Order of the Minister of Energy of the Republic of Kazakhstan No. 100 dated 16 February 2015 “On approval of the Rules for the implementation of the state ecological expertise”
Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 238-p dated 25 July 2007 “On approval of the Rules for access to environmental information relating to the procedure for assessing environmental impact and the decision-making process for planned economic and other activities”
Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 110-p dated 16 April 2012 “On approval of the methodology for determining emission standards by means of calculation”
Order of the Minister for Investments and Development of the Republic of Kazakhstan dated 31 March 2015 No. 401 “On energy efficiency requirements for construction materials, products and structures”
Order of the Minister for Investments and Development of the Republic of Kazakhstan dated 31 March 2015 No. 399 “On approval of the Rules for the determination and revision of energy efficiency classes for buildings, structures and premises”
Order of the Deputy Prime Minister - Minister of Agriculture of the Republic of Kazakhstan, dated 1 February 2017 No. 48 “On approval of Rules for subsidies to partially compensate the investments made by an agricultural-industrial entity”
Order of the Minister of Energy of the Republic of Kazakhstan No. 96 dated 29 February 2016 “On approval of the Regulation on the Public Council on the issues of fuel and energy complex and ecology”
Order of the Minister of Energy of the Republic of Kazakhstan No. 369 dated 22 May 2015 “On approval of regulations on public services in the field of environmental protection”

Order of the Minister of National Economy of the Republic of Kazakhstan No. 64 dated 19 February 2018 “On some issues of the Public Planning System in the Republic of Kazakhstan”
Order of the Acting Minister for Investments and Development of the Republic of Kazakhstan No. 1276 dated 30 December 2015 “On the establishment of a commission on issues of access to information”. Ceased to be in force in accordance with the order of the Minister of Information and Communications of the Republic of Kazakhstan No. 180 dated 29 September 2016
Order of the Minister of Information and Communications of the Republic of Kazakhstan No. 180 dated 29 September 2016 “On some issues of the Commission on Access to Information”
Order of the Minister of Information and Communications of the Republic of Kazakhstan No. 234 dated 28 May 2018 “On Amendments and Additions to the Order of the Acting Minister for Investments and Development of the Republic of Kazakhstan No. 171 dated 24 February 2015 “On Approval of the Rules for the Provision of Communication Services”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 227 dated 22 April 2015 “On the statement of the conceptual bases of education”
Order of the Minister of Energy of the Republic of Kazakhstan No. 92 dated 26 February 2016 “On approval of the composition of the Public Council on the issues of fuel and energy complex and ecology”
Order of the Minister for Investments and Development of the Republic of Kazakhstan No. 50 dated 22 January 2016 “On approval of the Rules of Treatment by means of videoconferencing or video addresses of individuals and legal entities to heads of state bodies and their deputies”
Order of the Acting Minister of Education and Science of the Republic of Kazakhstan No. 499 dated 12 August 2016 “On approval of the Model curriculum of preschool education and training”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 391dated 22 June 2016 “On Amendments to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 557 dated 20 December 2012 “On Approval of a Curricula Model for Preschool Education and Education of the Republic of Kazakhstan”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 150 dated 4 April 2017 “On Amendments to the Order of the Acting Minister of Education and Science of the Republic of Kazakhstan No. 400 dated 27 September 2013 “On Approving the List of Textbooks, Teaching and Methodological Complexes, Benefits and Other Additional Literature, including Electronic Media”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 281 dated 15 July 2014 “On Amendments to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 115 dated 3 April 2013 “On Approval of Standard Curricula for General Education Subjects, Elective Courses and Electives for General Educational Organizations”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 393 dated June 18 2015 “On Amendments and Additions to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 115 3 dated 3 April 2013 “On Approval of a Standard Curricula for General Education Subjects, Elective Courses and Electives for General Educational Organizations”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 296 dated 25 July 2013 “On Amendments to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 500 dated 8 November 2012 “On Approval of Standard Curricula for the Primary, Primary Secondary, and General Secondary Education of the Republic of Kazakhstan”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 471 dated 27 November 2013 “On Amendments to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 500 dated 8 November 2012 “On Approval of Standard Curricula for Primary, Primary Secondary, and General Secondary Education of the Republic of Kazakhstan”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 61 dated 25 February 2014 “On Amendments and Additions to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 500 dated 8 November 2012 “On Approval of Standard Curricula for the Primary, Primary Secondary, and General Secondary Education of the Republic of Kazakhstan”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 668 dated 23 November 2016 “On Amendments to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 115 dated 3 April 2013 “On Approval of Standard Curricula for General Education Subjects, Elective Courses and Electives for General Educational Organizations”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 266 dated 8 April 2016 “On Amendments to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 115 dated 3 April 2013 “On Approval of Standard Curricula for General Education Subjects, Elective Courses and Electives for General Educational Organizations”
Order of the Minister of Education and Science of the Republic of Kazakhstan No. 453 dated 15 July 2016 “On Amendments to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 500 dated 8 November 2012 “On Approval of Standard Curricula for the Primary, Primary Secondary, and General Secondary Education of the Republic of Kazakhstan”

Order of the Minister of Energy of the Republic of Kazakhstan No. 555 dated 22 December 2016 “On amendments to the Order of the Acting Minister of Energy of the Republic of Kazakhstan No. 695 dated 4 December 2015 “On approval of the list of goods subject to extended producer (importer) responsibility“
Order of the Minister of National Economy of the Republic of Kazakhstan No. 127 dated 27 March 2017 “On amendments to the Order of the Acting Minister of National Economy of the Republic of Kazakhstan No. 724 dated 25 November 2015 “On approval of the model tender documentation for public private partnership and model agreement for public private partnership in selected economic sectors“
Order of the Minister of Energy of the Republic of Kazakhstan No. 292 dated 28 June 2016 “On approval of the Rules for allocation, amendment and paying off quotas for greenhouse gas emissions”
Order of the Minister of Environmental Protection of the Republic of Kazakhstan No. 40-p dated 24 February 2012 “On approval of the Rules for handling the persistent organic pollutants and waste containing such pollutants”

Resolutions of the Supreme Court

Resolution of the Supreme Court of the Republic of Kazakhstan No. 8 dated 25 November 2016 “On some issues of application by the courts of the environmental legislation of the Republic of Kazakhstan in civil cases”

Concepts, strategies, programmes and action plans

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Annex V

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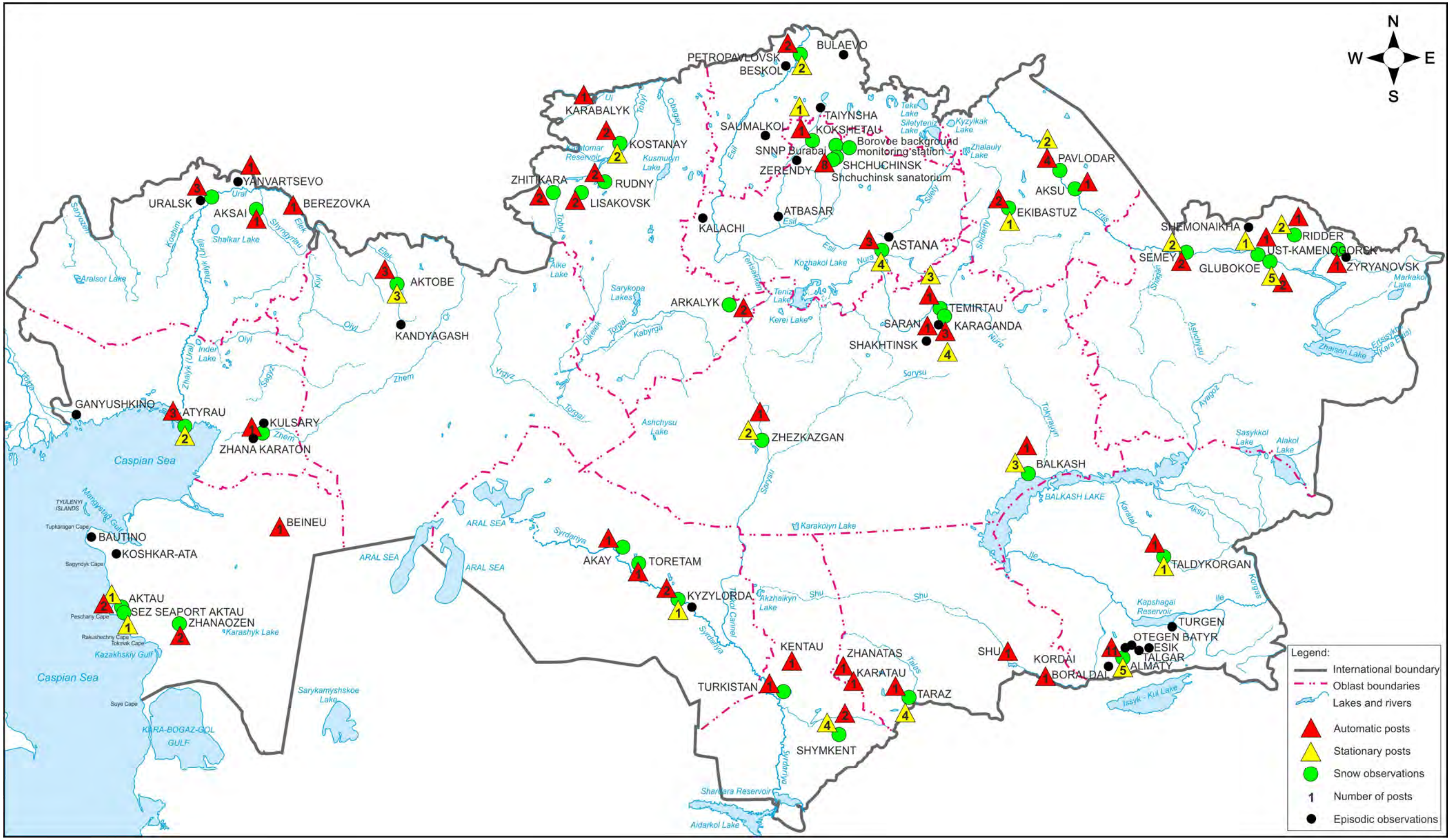
Annex VI

Maps

Map 1: Administrative map

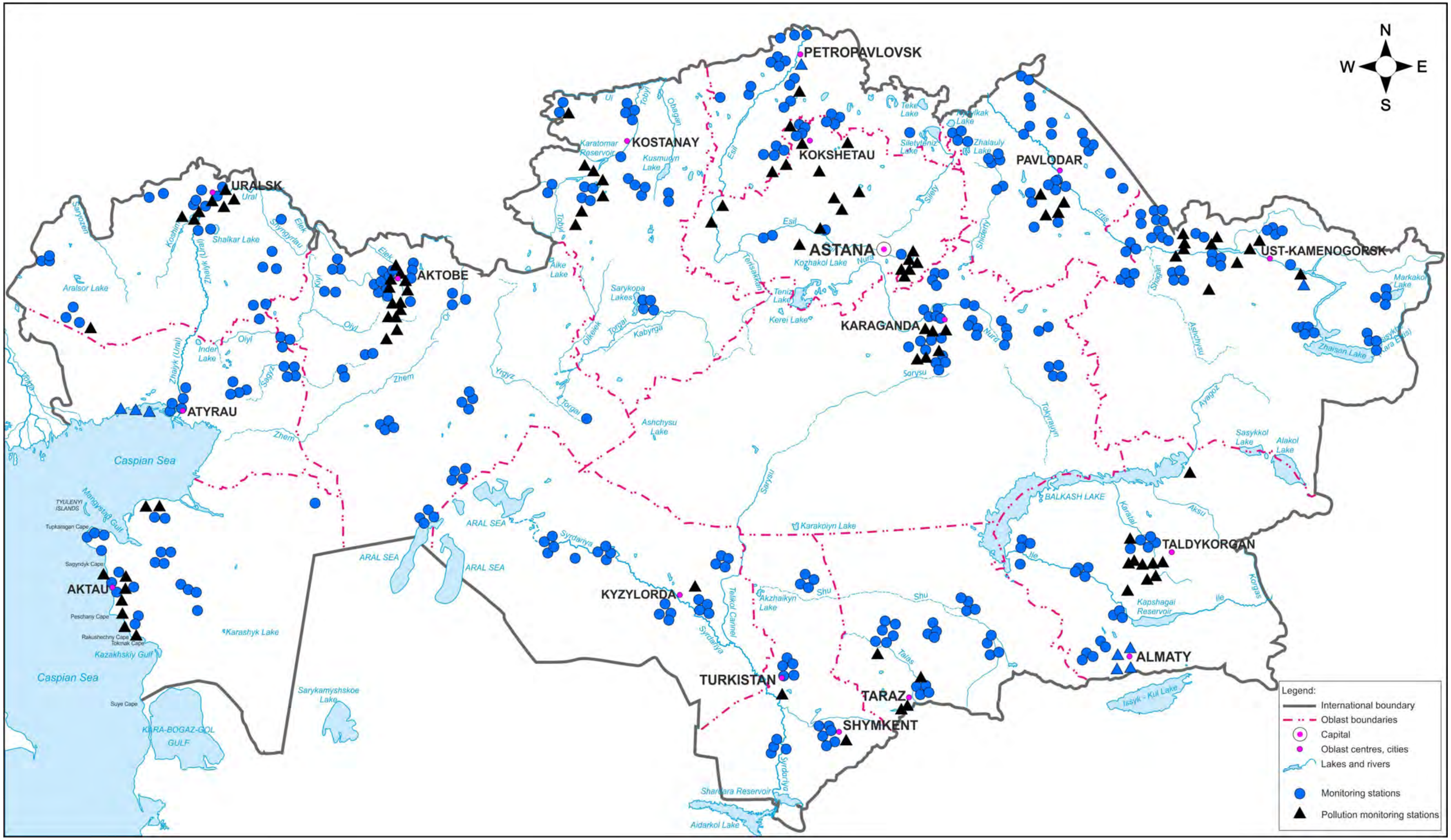
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 2: Atmospheric air automatic and manual stations



Source: Informational bulletin on the state of the environment in the Republic of Kazakhstan for 2017.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 3: State network stations for monitoring groundwater and hazardous geological processes

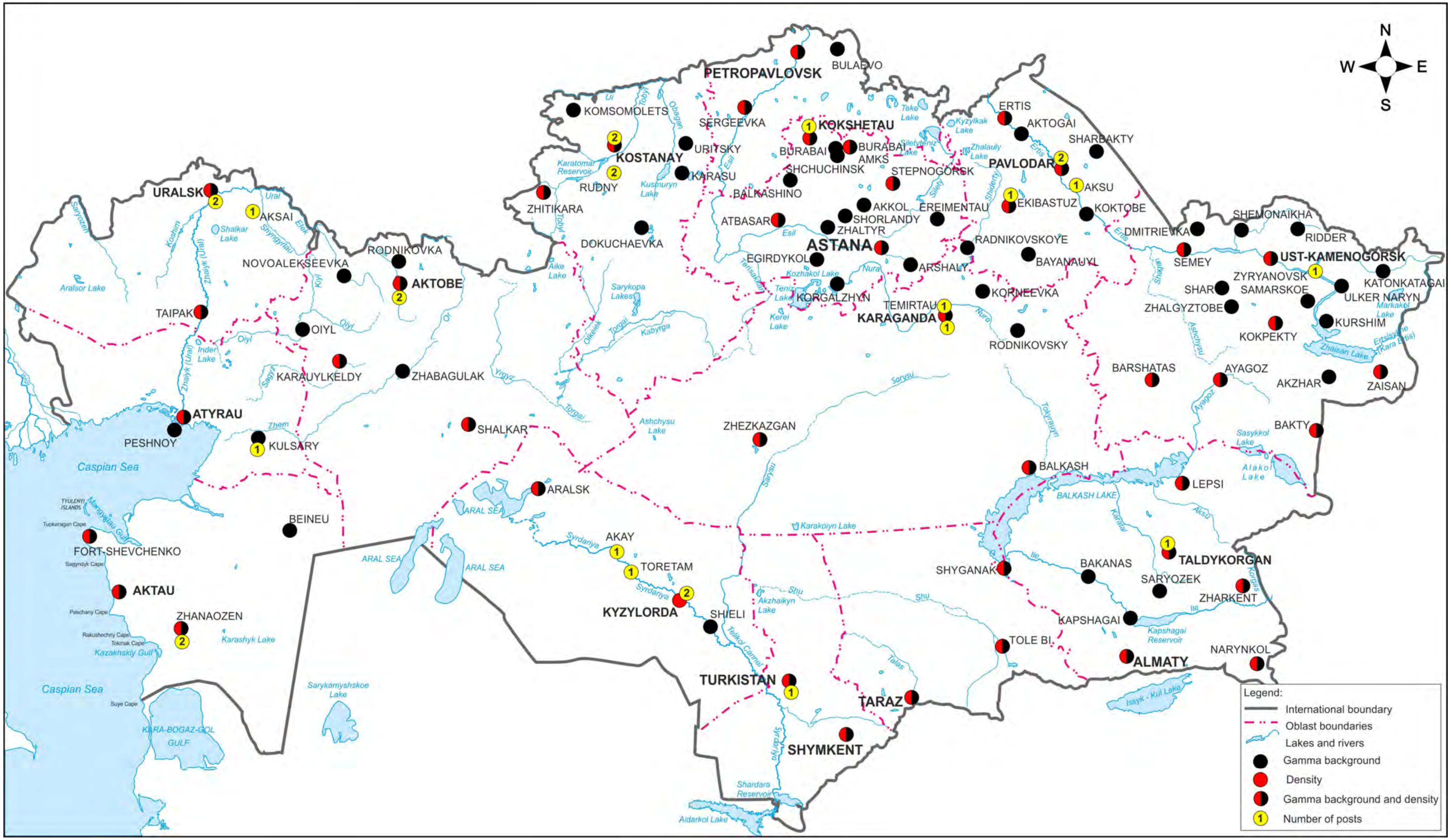


Source: Committee on Geology and Subsoil Use of the Ministry for Investments and Development, 2018.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 4: Soil monitoring

Source: Informational bulletin on the state of the environment in the Republic of Kazakhstan for 2017.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 5: Monitoring the level of gamma background radiation and the density of radioactive fallout



Source: Informational bulletin on the state of the environment in the Republic of Kazakhstan for 2017.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 6: Climate change impacts

Source: Zoï Environment Network.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 7: Erosion of agricultural land

Source: SoER for 2016.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

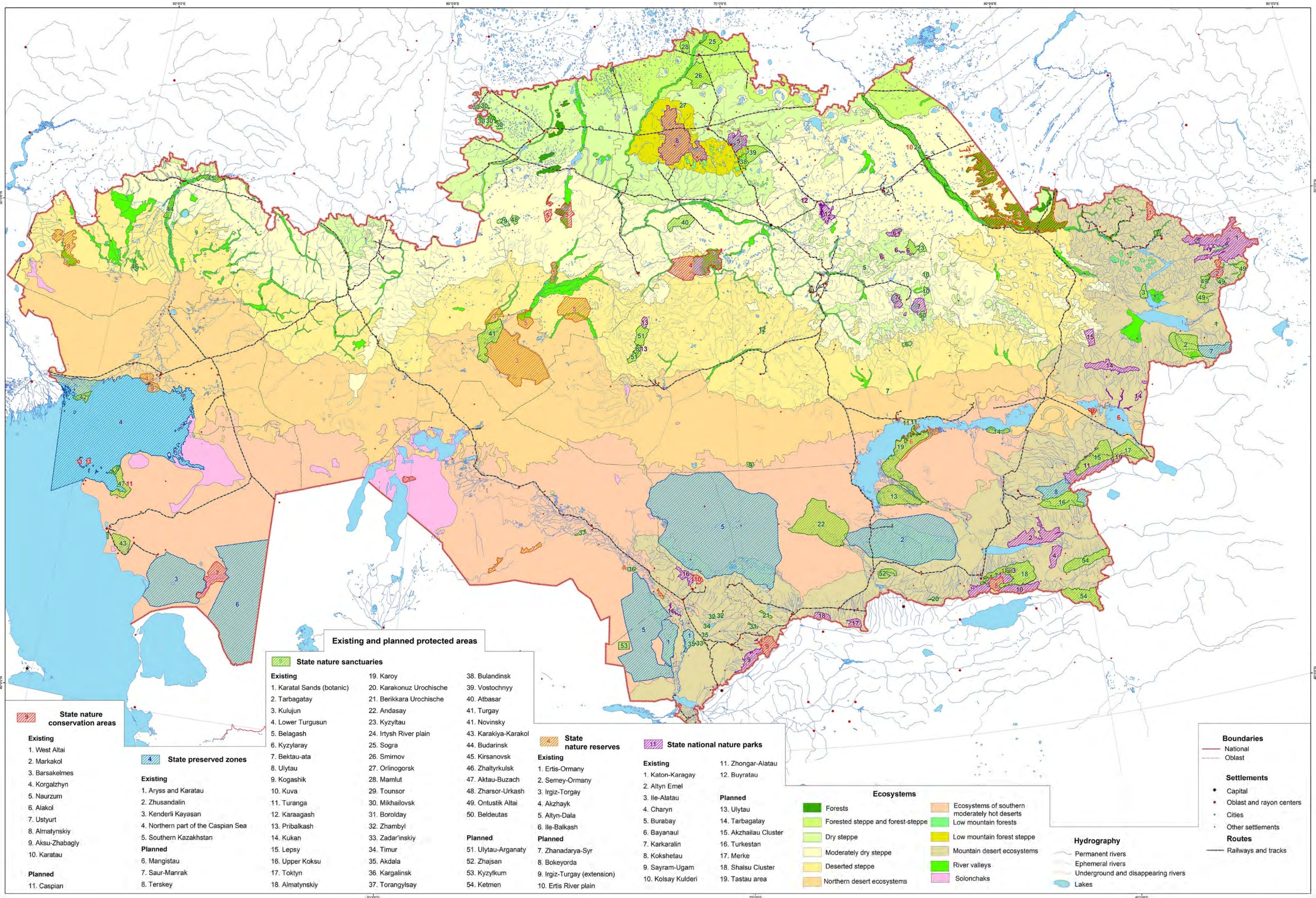
Map 8: Water basins

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 9: Forests

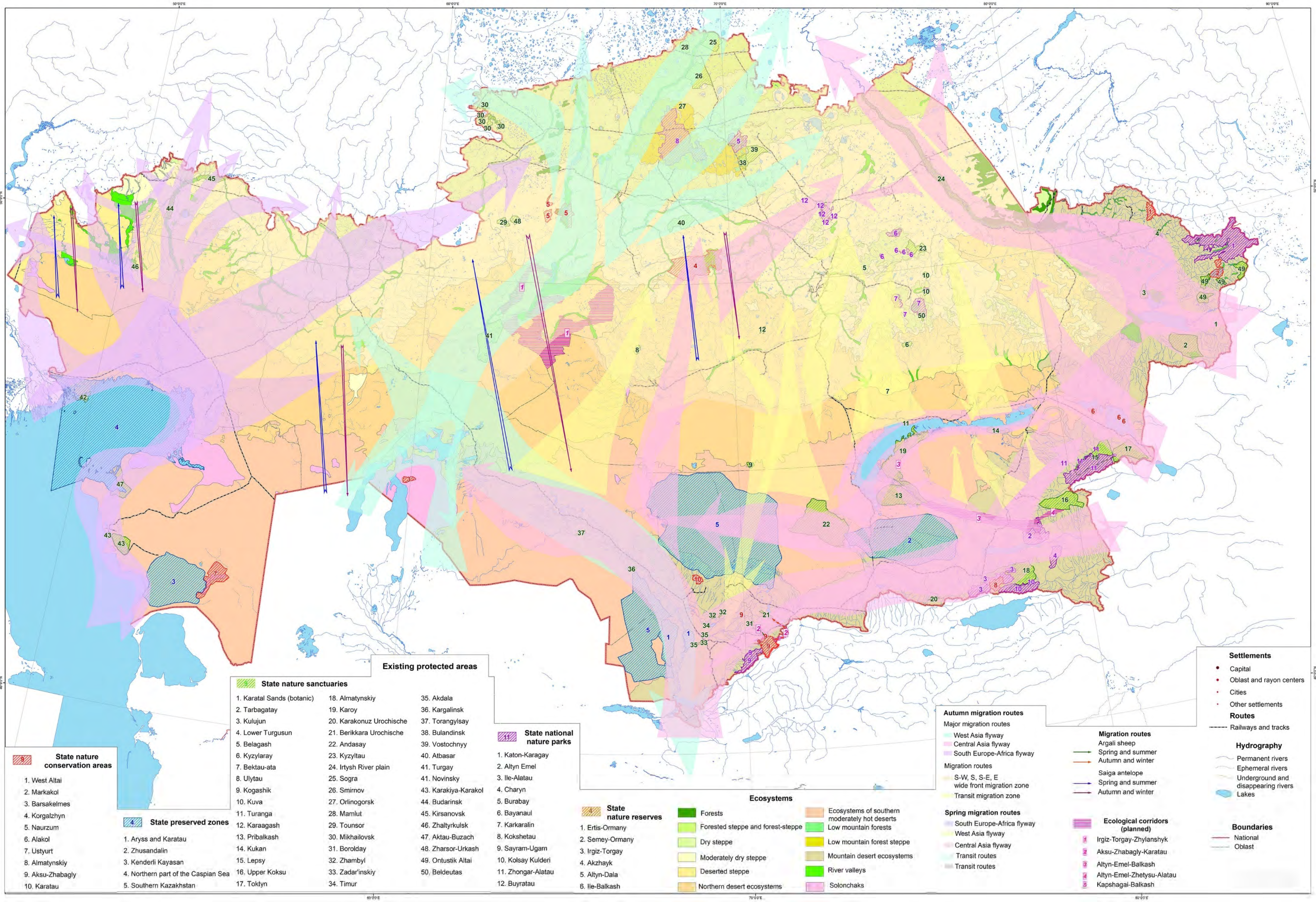
Source: Zoï Environment Network.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 10: Protected areas



Source: UNDP/GEF/MoA Project - National Biodiversity Planning to Support the implementation of the Convention on Biological Diversity 2011-2020 Strategic Plan in Republic of Kazakhstan.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 11: Ecological network



Source: UNDP/GEF/MoA Project - National Biodiversity Planning to Support the implementation of the Convention on Biological Diversity 2011-2020 Strategic Plan in Republic of Kazakhstan.
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