

Carbon capture, utilization and storage

Presentation by Dr Vladislav Bizek, Key Expert, WECOOP Project
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EU – Central Asia Cooperation on
Water – Environment – Climate Change



This project is implemented by the consortium led by Stantec, with ELLE (Estonian, Latvian & Lithuanian Environment), ACTED, and Kommunal Kredit Public Consulting as the consortium partners.

Carbon capture

Carbon capture and storage (CCS) is the process of capturing and storing CO₂ before it is released into the atmosphere. It can capture **up to 90% of CO₂** released by burning fossil fuels in electricity generation and industrial processes such as cement production.

CO₂ can be captured using different methods: **post-combustion, pre-combustion and oxyfuel**. Post-combustion technology removes CO₂ from the flue gases that result from burning fossil fuels. Pre-combustion methods involve converting the fuel into a mixture of hydrogen and CO₂. Oxyfuel technology produces CO₂ and steam by burning fossil fuels with almost pure oxygen.



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Carbon storage and /or utilization

Once the CO₂ has been captured, it is compressed into liquid state and transported by pipeline, ship or road tanker to be then pumped underground and stored into depleted oil and gas reservoirs, coalbeds or deep saline aquifers, where the geology is suitable.

CO₂ could also be used to produce commercially marketable products. The most well-established form of CO₂ utilisation is enhanced oil recovery (EOR), where CO₂ is injected into oil or gas reservoirs to increase their extraction. Other forms of CO₂ utilisation under investigation include using CO₂ in concrete or plastic materials or converting it into biomass by feeding CO₂ to algae, which are then harvested and processed into biofuel for transport.



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Carbon capture and storage internationally

The first large-scale CCS project began operating at Sleipner in Norway in 1996. There are now 26 large-scale CCS facilities in operation globally, with 3 more under construction and 34 under various stages of development. Today's worldwide operating capacity of CCS is close to 40 Mt CO₂ per year (around 0.1 % of global CO₂ emissions).

15 of the 19 submitted long-term low emission development strategies (LEDS) under the UNFCCC have included CCS (EU, South Africa, Finland, Singapore, Slovakia, Portugal, Japan, Ukraine, UK, Czechia, France, US, Mexico, Germany and Canada).

Emerging technologies: Natural gas decarbonization (catalytic decomposition of methane to hydrogen and solid carbon).



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EU legislation

Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide

Link: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32009L0031>

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions

Article 36: Geological storage of carbon dioxide

1. Member States shall ensure that operators of all combustion plants with a rated electrical output of 300 megawatts or more for which the original construction licence or, in the absence of such a procedure, the original operating licence is granted after the entry into force of Directive 2009/31/EC on the geological storage of carbon dioxide, have assessed whether the following conditions are met:

- a) suitable storage sites are available,
- b) transport facilities are technically and economically feasible,
- c) it is technically and economically feasible to retrofit for carbon dioxide capture

Link: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075>



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More information

European Commission: Implementation of the CCS Directive

Link: https://ec.europa.eu/clima/policies/innovation-fund/ccs/implementation_en

Global Carbon Capture and Storage Institute

Link: <https://www.globalccsinstitute.com/>



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Thanks for your attention !

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