

# GHG emission reduction and emission inventories on different levels

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# Content

- Why reduce GHG emissions?
- Emission inventories at different levels
- Inventory verification
- Emission reduction?

# Why businesses reduce GHG emissions?



For the planet (and bright future)



To be more competitive



Legal requirements



Demand for workforce



Trust and reputation



Third party requirements



To save money



Consumer and customer demand



# Emission reduction targets

“You can't manage what you  
can't measure”, Peter Drucker



TRUE FOR GHG EMISSIONS



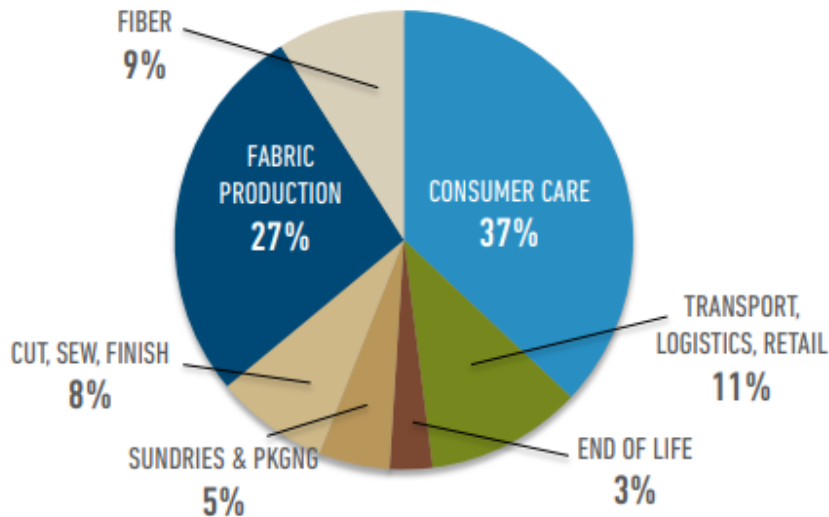
# Emission reduction target – what to reduce?

## LEVI'S Jeans climate change impact

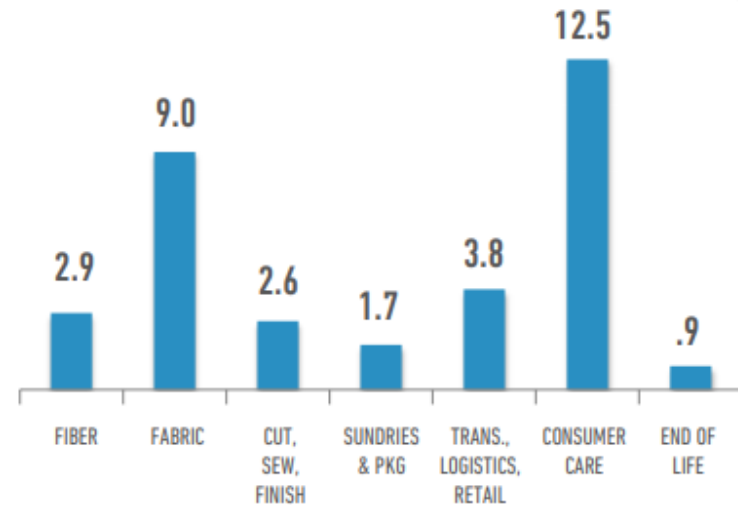
Consumer Care phase dominates the climate change impact area (driven by high use of non-renewable energy).



CRADLE TO GRAVE CLIMATE CHANGE IMPACT  
PERCENTAGE BY PHASE



CRADLE TO GRAVE CLIMATE CHANGE IMPACTS  
AMOUNT BY PHASE (kg CO<sub>2</sub>-e)



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EU – Central Asia Cooperation on  
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Source:

<https://www.levistrauss.com/wp-content/uploads/2015/03/Full-LCA-Results-Deck-FINAL.pdf>



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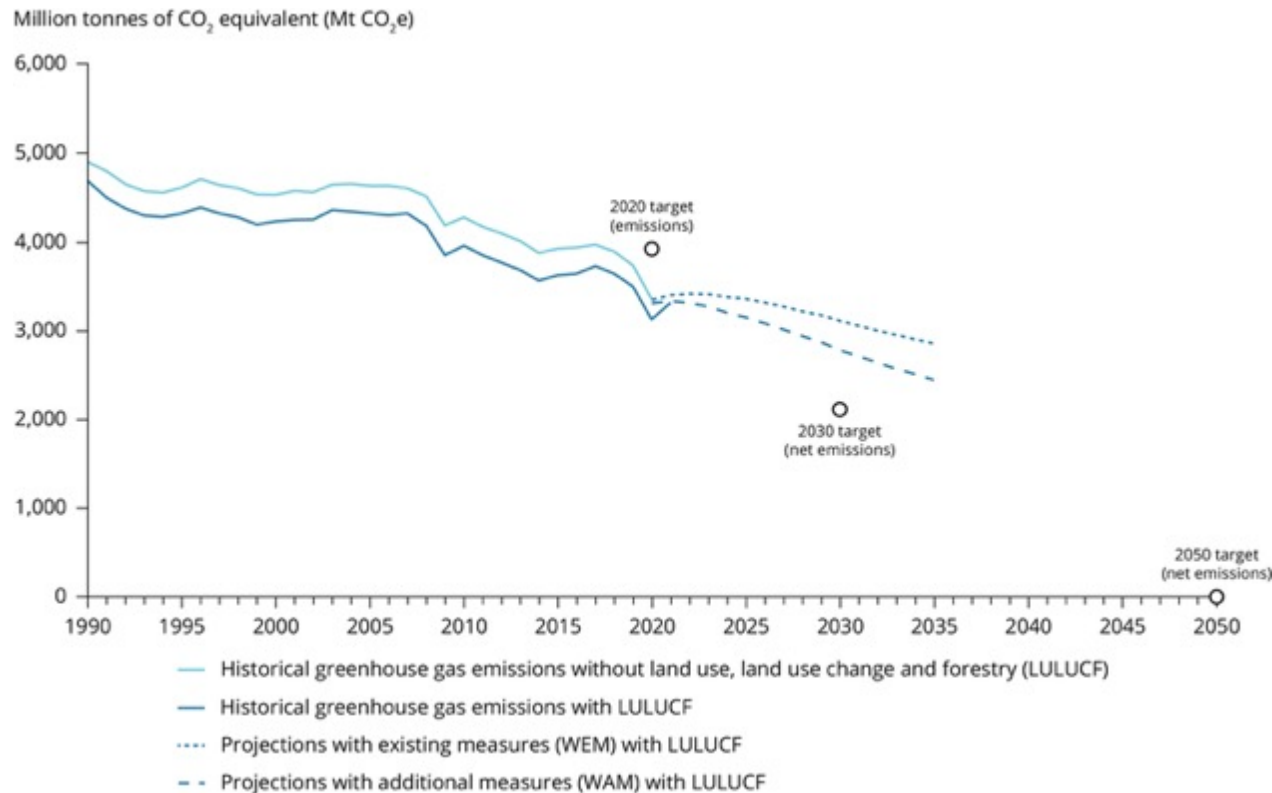
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# Emission reduction target and control

## GHG emission targets, historical and future trends for the EU Member States



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Source:

<https://www.eea.europa.eu/data-and-maps/figures/figure-1-historical-trends-and-1>



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# GHG emissions inventory

***A greenhouse gas inventory is an accounting of greenhouse gases (GHGs) emitted to or removed from the atmosphere.***

Emission inventory allows for:

- Analysis of current situation and monitoring of progress
- Assessment of contribution of different sources to define cost-effective emission reduction measures



# GHG emissions inventory: Where to start?

- Question Nr. 1: **why?**
- What level: **Country, municipality, company, product?**
- What are the requirements: **methodology, standard, third party verification?**



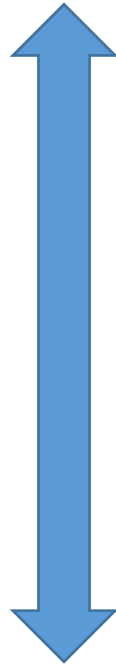
# Levels of assessment

**National**

**Local**

**Business/  
Organisation**

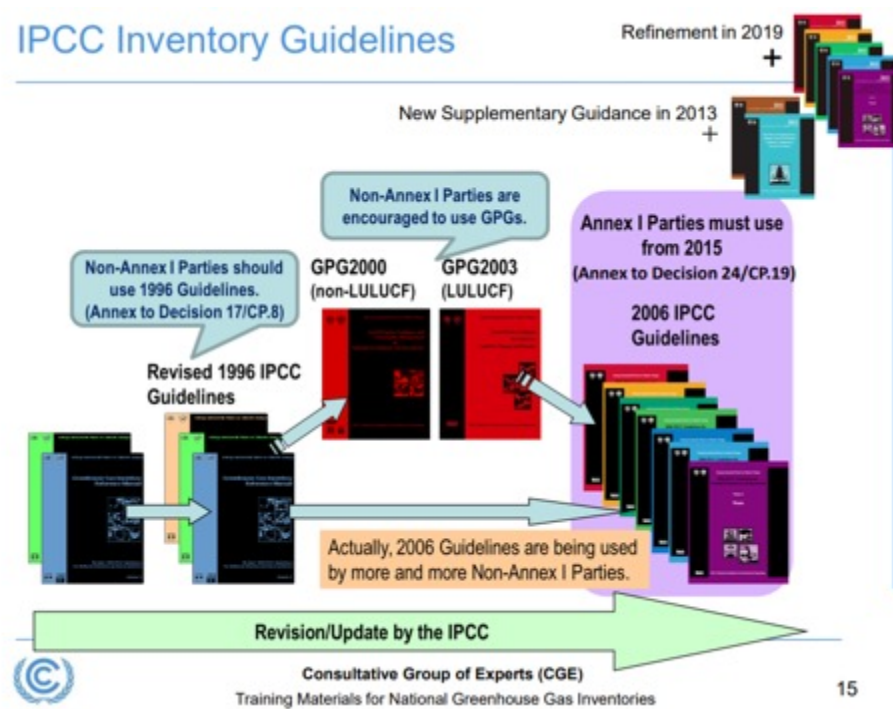
**Product/ Project**



- IPCC guidelines (IPCC)
  - The international Local Government GHG Emission Analysis Protocol (IEAP) (ICLEI)
  - PAS2020 – City (BSI)
  - Global Protocol for Community-Scale Greenhouse Gas Inventories (WRI, C40 & ICLEI)
  - GHG Protocol Corporate Accounting and Reporting Standard (WBCSD & WRI)
  - The GHG Protocol for Project Accounting (Project Protocol) (WBCSD & WRI)
  - PAS2050 – Product (BSI)
- +ISO standards

# Examples: national emission inventories

- Internationally, the reporting of national inventories is part of the UNFCCC management of GHG emissions.
- Inventories are used to monitor progress towards reduction targets and to enable countries to access climate finance mechanisms.



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EU – Central Asia Cooperation on  
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Source:

[https://unfccc.int/sites/default/files/resource/CGE\\_Webinar\\_AP\\_22.4.2020.pdf](https://unfccc.int/sites/default/files/resource/CGE_Webinar_AP_22.4.2020.pdf)



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# Examples: national emission inventories

|   |                          |           |           |           |           |           |           |      |
|---|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------|
| TABLE 10 EMISSION TRENDS  |                          |           |           |           |           |           |           |      |
| GHG CO <sub>2</sub> eq emissions                                  |                          |           |           |           |           |           |           |      |
| (Sheet 1 of 6)  |                          |           |           |           |           |           |           |      |
| GREENHOUSE GAS SOURCE AND SINK CATEGORIES                         |                          |           |           |           |           |           |           |      |
|   | Base year <sup>(1)</sup> | 1990      | 1991      | 1992      | 1993      | 1994      | 1995      | 1996 |
| Total (net emissions) <sup>(2)</sup>                              | 373392.17                | 373392.17 | 368230.44 | 353062.70 | 328657.21 | 293044.60 | 287960.56 |      |
| 1. Energy   | 317963.50                | 317963.50 | 304692.79 | 279338.39 | 249568.42 | 214545.60 | 200422.41 |      |
| A. Fuel combustion (sectoral approach)                            | 249598.92                | 249598.92 | 240859.83 | 219049.86 | 194303.42 | 164087.53 | 155570.45 |      |
| 1. Energy industries  | 142368.62                | 142368.62 | 140085.44 | 117445.55 | 108204.45 | 95768.51  | 96572.90  |      |
| 2. Manufacturing industries and construction                      | 19635.78                 | 19635.78  | 19349.86  | 33555.83  | 27031.42  | 18376.37  | 16650.85  |      |
| 3. Transport  | 22315.56                 | 22315.56  | 19246.27  | 15639.68  | 12564.33  | 10534.61  | 8946.90   |      |
| 4. Other sectors  | 56345.29                 | 56345.29  | 56264.48  | 50948.30  | 45037.17  | 37968.49  | 31985.81  |      |
| 5. Other  | 8933.67                  | 8933.67   | 5913.78   | 1460.49   | 1466.06   | 1439.55   | 1413.99   |      |
| B. Fugitive emissions from fuels                                  | 68364.58                 | 68364.58  | 63832.96  | 60288.53  | 55265.00  | 50458.06  | 44851.96  |      |
| 1. Solid fuels  | 44698.53                 | 44698.53  | 39522.42  | 36602.91  | 34190.33  | 31952.12  | 25994.86  |      |
| 2. Oil and natural gas and other emissions from energy production | 23666.05                 | 23666.05  | 24310.55  | 23685.62  | 21074.66  | 18505.94  | 18857.10  |      |
| C. CO <sub>2</sub> transport and storage                          | NO,NA                    | NO,NA     | NO,NA     | NO,NA     | NO,NA     | NO,NA     | NO,NA     |      |
| 2. Industrial Processes   | 19405.85                 | 19405.85  | 18350.56  | 16698.63  | 12587.10  | 7966.46   | 8904.59   |      |
| A. Mineral industry   | 3876.59                  | 3876.59   | 3470.20   | 3056.00   | 1742.73   | 1042.78   | 826.90    |      |
| B. Chemical industry  | 1234.17                  | 1234.17   | 1167.36   | 823.47    | 370.22    | 167.67    | 223.37    |      |
| C. Metal industry   | 14292.73                 | 14292.73  | 13710.76  | 12817.03  | 10471.78  | 6752.87   | 7848.76   |      |
| D. Non-energy products from fuels and solvent use                 | 2.36                     | 2.36      | 2.24      | 2.13      | 2.01      | 1.89      | 1.71      |      |
| E. Electronic industry  | NO                       | NO        | NO        | NO        | NO        | NO        | NO        |      |
| F. Product uses as ODS substitutes                                | NO                       | NO        | NO        | NO        | 0.37      | 1.24      | 3.65      |      |
| G. Other product manufacture and use                              | NO,NE                    | NO,NE     | NO,NE     | NO,NE     | NO,NE     | NO,NE     | NO,NE     |      |
| H. Other  | NO,NA                    | NO,NA     | NO,NA     | NO,NA     | NO,NA     | NO,NA     | NO,NA     |      |
| 3. Agriculture  | 43869.00                 | 43869.00  | 43018.71  | 44067.17  | 42727.45  | 35275.35  | 31684.96  |      |
| A. Enteric fermentation   | 26245.50                 | 26245.50  | 25592.75  | 25167.00  | 24613.50  | 19261.00  | 16616.75  |      |
| B. Manure management  | 5278.88                  | 5278.88   | 5084.87   | 4769.37   | 4655.76   | 3694.36   | 3084.72   |      |
| C. Rice cultivation   | 651.00                   | 651.00    | 624.75    | 603.75    | 567.00    | 535.50    | 441.50    |      |
| D. Agricultural soils   | 11589.22                 | 11589.22  | 11624.98  | 13448.74  | 12825.92  | 11732.26  | 11502.80  |      |
| E. Prescribed burning of savannas                                 | NO                       | NO        | NO        | NO        | NO        | NO        | NO        |      |
| F. Field burning of agricultural residues                         | NO                       | NO        | NO        | NO        | NO        | NO        | NO        |      |
| G. Liming   | NO                       | NO        | NO        | NO        | NO        | NO        | NO        |      |
| H. Urea application   | 104.40                   | 104.40    | 91.36     | 78.31     | 65.27     | 52.23     | 39.19     |      |
| I. Other carbon-containing fertilizers                            | NO                       | NO        | NO        | NO        | NO        | NO        | NO        |      |
| J. Other  | NO                       | NO        | NO        | NO        | NO        | NO        | NO        |      |
| 4. Land use, land-use change and forestry <sup>(2)</sup>          | -11629.85                | -11629.85 | -1624.26  | 9397.93   | 20429.34  | 32020.97  | 43684.96  |      |
| A. Forest land  | -1973.82                 | -1973.82  | -1962.42  | -1956.31  | -1403.80  | -814.29   | -814.29   |      |
| B. Cropland   | -1591.33                 | -1591.33  | 10197.00  | 23015.67  | 35834.33  | 48653.00  | 61435.00  |      |
| C. Grassland  | -6902.95                 | -6902.95  | -8658.18  | -10413.41 | -12168.65 | -13906.39 | -15573.58 |      |
| D. Wetlands   | 4.25                     | 4.25      | 1.47      | NO,NE,NA  | 1.10      | NO,NE,NA  | NO,NE,NA  |      |
| E. Settlements  | -1166.00                 | -1166.00  | -1202.67  | -1241.90  | -1281.13  | -1321.83  | -1362.17  |      |
| F. Other land   | NO                       | NO        | NO        | NO        | NO        | NO        | NO        |      |
| G. Harvested wood products  | NO,IE                    | NO,IE     | NO,IE     | NO,IE     | NO,IE     | NO,IE     | NO,IE     |      |
| H. Other  | NO                       | NO        | NO        | NO        | NO        | NO        | NO        |      |

# Examples: national emission inventories



United Nations  
Climate Change

Time series - Annex IDetailed data by PartyComparison by CategoryComparison by GasGHG profilesGlobal map - Annex IFlexible queriesUser-defined indicatorsCompilation and Accounting Data

Greenhouse Gas Inventory Data - Detailed data by Party ?

Please select Party, Inventory Year, Category, Gas and Unit.

Kazakhstan

Base year (Convention), 1990 and last year

Totals

Aggregate GHGs

kt CO<sub>2</sub> equivalent

Query results for — Party: Kazakhstan — Years: Base year (Convention), 1990 and last year — Category: Totals — Gas: Aggregate GHGs — Unit: kt CO<sub>2</sub> equivalent

Export to Excel

Export to CSV

Printer Friendly Version

| Category  | Base year  | 1990       | Last Inventory Year (2020) |
|---|------------|------------|----------------------------|
| Total GHG emissions without LULUCF including indirect CO <sub>2</sub> | NA         | NA         | NA                         |
| Total GHG emissions with LULUCF including indirect CO <sub>2</sub>    | NA         | NA         | NA                         |
| Total GHG emissions without LULUCF                                    | 385,603.00 | 385,603.00 | 342,868.79                 |
| Total GHG emissions with LULUCF                                       | 381,694.78 | 381,694.78 | 351,244.26                 |

Showing 1 to 4 of 4 entries

Note 1: The reporting and review requirements for GHG inventories are different for Annex I and non-Annex I Parties. The definition format of data for emissions/removals from the forestry sector is different for Annex I and non-Annex I Parties.

Note 2: Base year data in the data interface relate to the base year under the Climate Change Convention (UNFCCC). The base year under the Convention is defined slightly different than the base year under the Kyoto Protocol. An exception is made for European Union (KP) whereby the base year under the Kyoto Protocol is displayed.

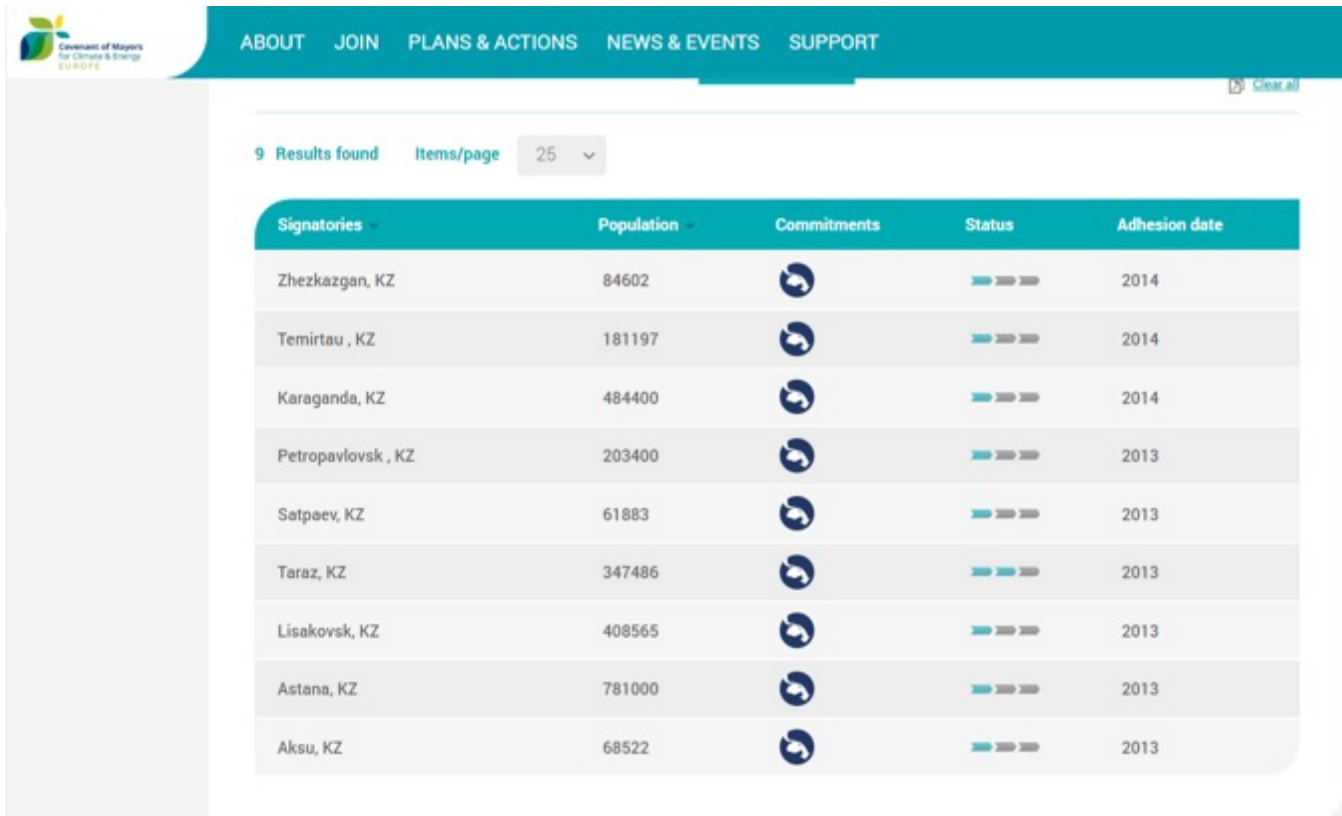
Note 3: Some non-Annex I Parties submitted their GHG inventory data using the format of the 2006 IPCC Guidelines in reporting GHG emissions/removals. For this reason, these data could not be included in the data interface. However, the data are available in the national communications (Andorra, Angola, Antigua and Barbuda, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brazil, Brunei Darussalam, Cabo Verde, Cambodia, Cook Islands, Costa Rica, Côte d'Ivoire, Colombia, Cuba, Equatorial Guinea, Eswatini, Fiji, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Honduras, Indonesia, Iran, Jamaica, Kuwait, Lesotho, Malaysia, Mauritania, Mauritius, Mexico, Mongolia, Montenegro, Morocco, Namibia, Nepal, Nicaragua, Nigeria, Panama, Oman, Republic of Moldova, Rwanda, Samoa, Saudi Arabia, Serbia, Sierra Leone, Singapore, Somalia, South Africa, Suriname, Tajikistan, Timor-Leste, Trinidad and Tobago, Uganda, United Arab Emirates, Vanuatu, Venezuela, Viet Nam, and Zambia) and biennial update reports (Afghanistan, Albania, Andorra, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Belize, Benin, Burundi, Cambodia, Chile, Colombia, Costa Rica, Côte d'Ivoire, Dominican Republic, Egypt, El Salvador, Gabon, Georgia, Ghana, Guinea-Bissau, Honduras, India, Indonesia, Jordan, Laos Peoples Republic, Lesotho, Liberia, Malawi, Malaysia, Mauritania, Mauritius, Mexico, Mongolia, Montenegro, Morocco, Namibia, Nigeria, North Macedonia, Oman, Pakistan, Panama, Paraguay, Papua New Guinea, Peru, Republic of Moldova, Rwanda, Saint Lucia, Serbia, Singapore, South Africa, Tajikistan, Thailand, Togo, Trinidad and Tobago, Tunisia, Uruguay, Uganda, Uzbekistan, Viet Nam, and Zambia).

Note 4: — means "No data available"

Note 5: Data displayed on the data interface are "as received" from Parties. The publication of Party submissions on this website does not imply the expression of any opinion whatsoever on the part of the UNFCCC or the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries as may be referred to in any of the submissions.

# Examples: local emission inventories

## The Covenant of Mayors for Climate and Energy



The screenshot shows the website of the Covenant of Mayors for Climate and Energy. The header includes navigation links: ABOUT, JOIN, PLANS & ACTIONS, NEWS & EVENTS, and SUPPORT. Below the header, it indicates '9 Results found' and 'Items/page 25'. The main content is a table listing signatories with columns for Signatories, Population, Commitments, Status, and Adhesion date.

| Signatories       | Population | Commitments | Status | Adhesion date |
|-------------------|------------|-------------|--------|---------------|
| Zhezkazgan, KZ    | 84602      |             |        | 2014          |
| Temirtau, KZ      | 181197     |             |        | 2014          |
| Karaganda, KZ     | 484400     |             |        | 2014          |
| Petropavlovsk, KZ | 203400     |             |        | 2013          |
| Satpaeu, KZ       | 61883      |             |        | 2013          |
| Taraz, KZ         | 347486     |             |        | 2013          |
| Lisakovsk, KZ     | 408565     |             |        | 2013          |
| Astana, KZ        | 781000     |             |        | 2013          |
| Aksu, KZ          | 68522      |             |        | 2013          |



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Source:

<https://www.covenantofmayors.eu/about/covenant-community/signatories.html>



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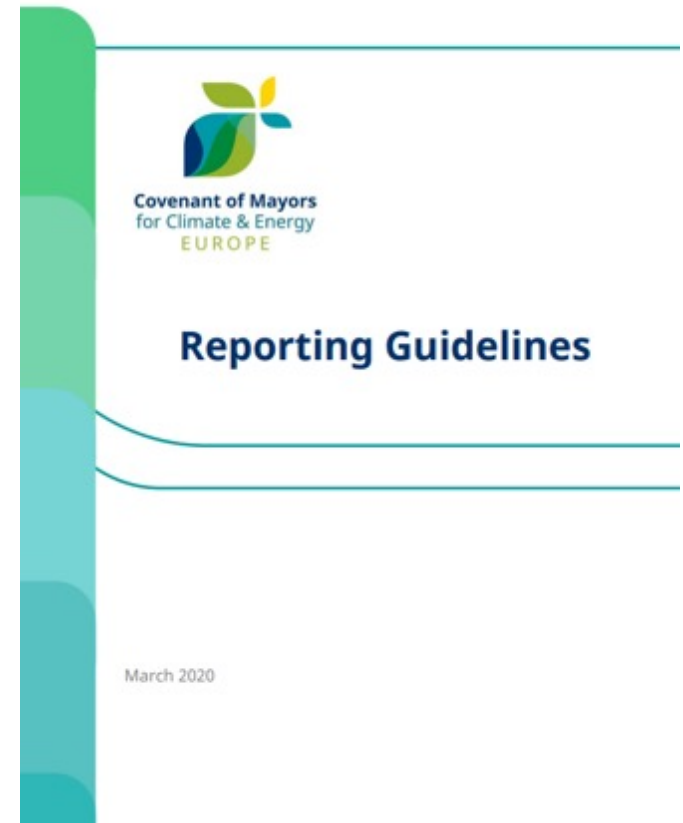


# Examples: local emission inventories

## The Covenant of Mayors for Climate and Energy

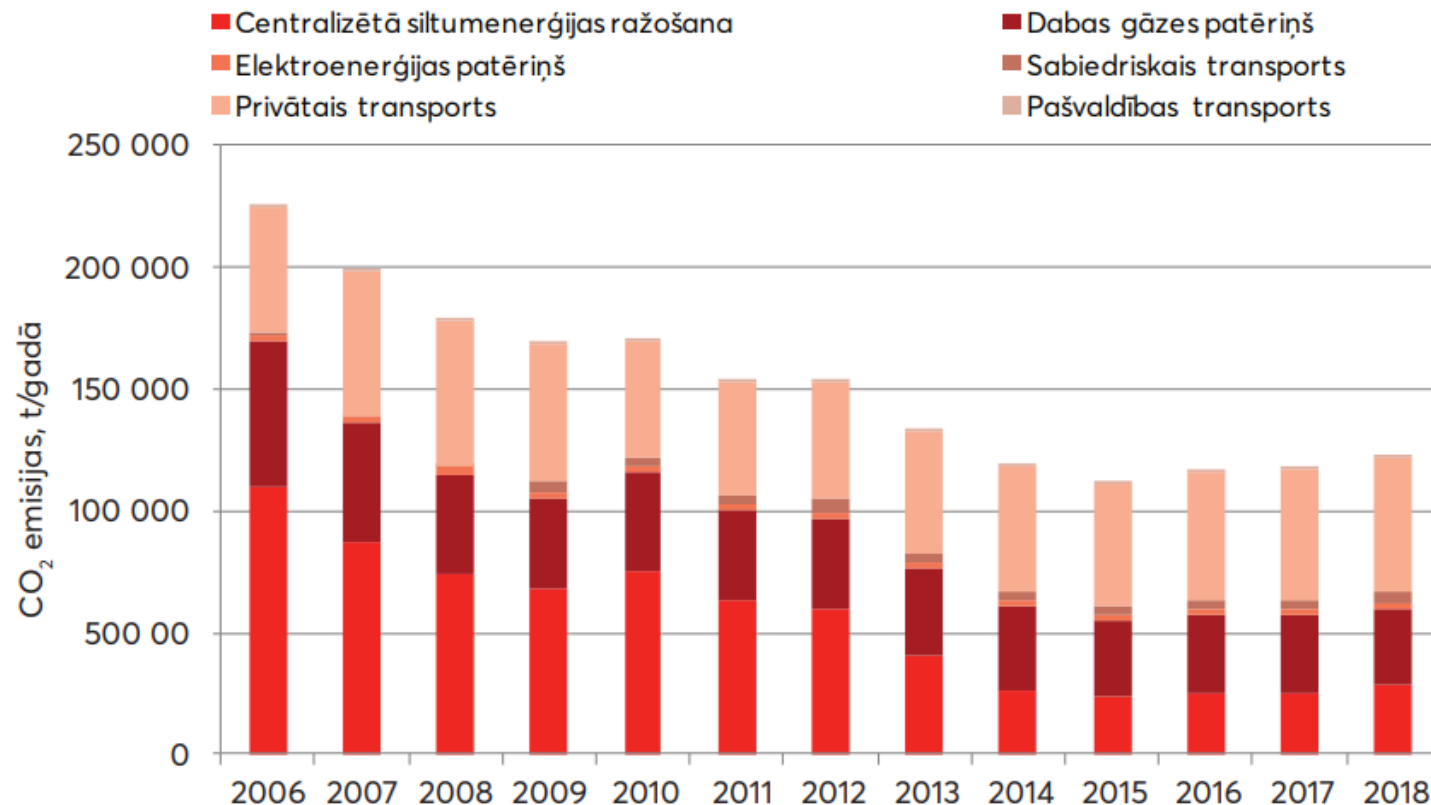
### Why report?

- IDENTIFY & ASSESS local climate and energy challenges and priorities
- MONITOR & REPORT progress towards commitments
- INFORM & SUPPORT decision-makers
- COMMUNICATE results to general public
- ENABLE self-assessment & FACILITATE experience sharing with peers
- DEMONSTRATE local achievements to policy-makers



# Examples: local emission inventories

## Liepāja city GHG emissions reported under Covenant of Mayors



# Examples: ETS emission inventories

*«The monitoring and reporting of greenhouse gas emissions must be robust, transparent, consistent and accurate for the EU emissions trading system (EU ETS) to operate effectively.»*

- Industrial installations and aircraft operators covered by the EU ETS are required to have an approved monitoring plan for monitoring and reporting annual emissions.
- This plan is also part of the permit to operate required for industrial installations.
- Every year, operators must submit an emissions report.
- The data for a given year must be verified by an accredited verifier by 31 March of the following year.



Source: [https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/monitoring-reporting-and-verification-eu-ets-emissions\\_en#:~:text=Industrial%20installations%20and%20aircraft%20operators,must%20submit%20an%20emissions%20report](https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/monitoring-reporting-and-verification-eu-ets-emissions_en#:~:text=Industrial%20installations%20and%20aircraft%20operators,must%20submit%20an%20emissions%20report).

# Examples: ETS emission inventories

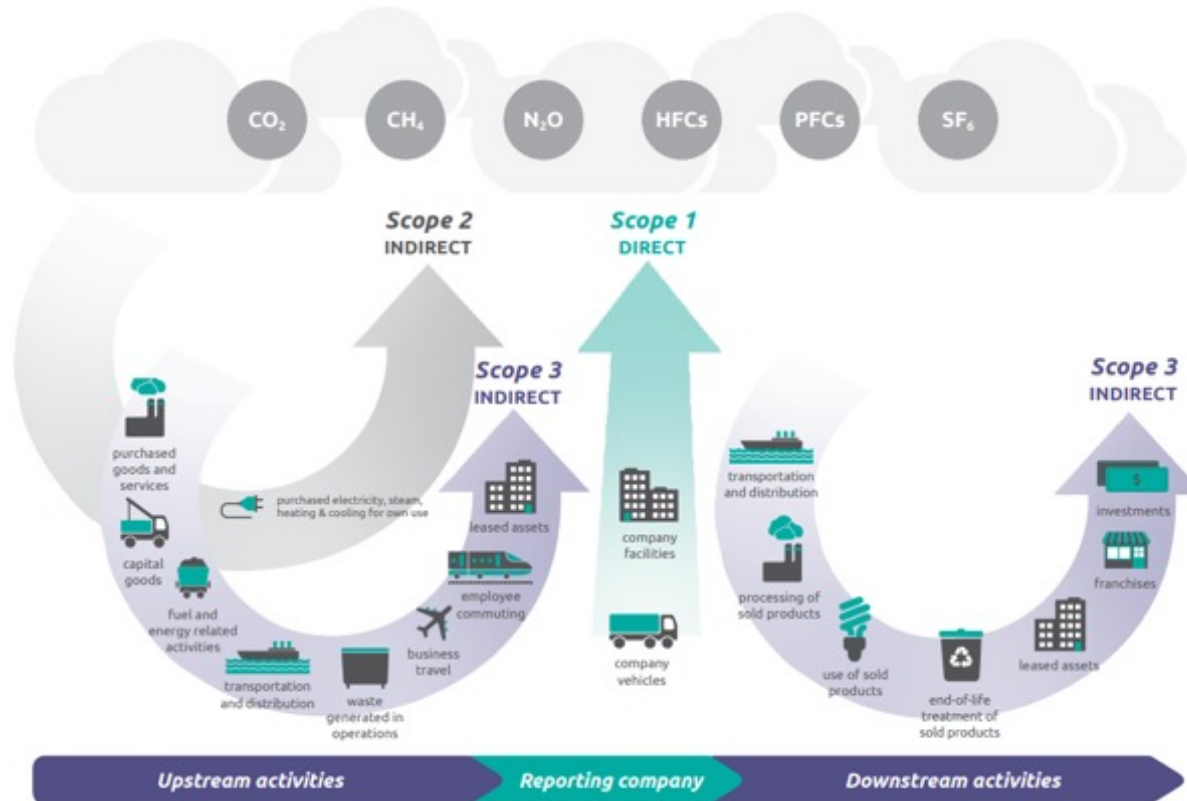
## Allowances and emissions in the EU ETS



Source: <https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1>

# Examples: emission inventories for ESG reporting

## GHG Reporting Scope 1, 2 & 3





# Examples: emission inventories for ESG reporting

## The Greenhouse Gas Protocol

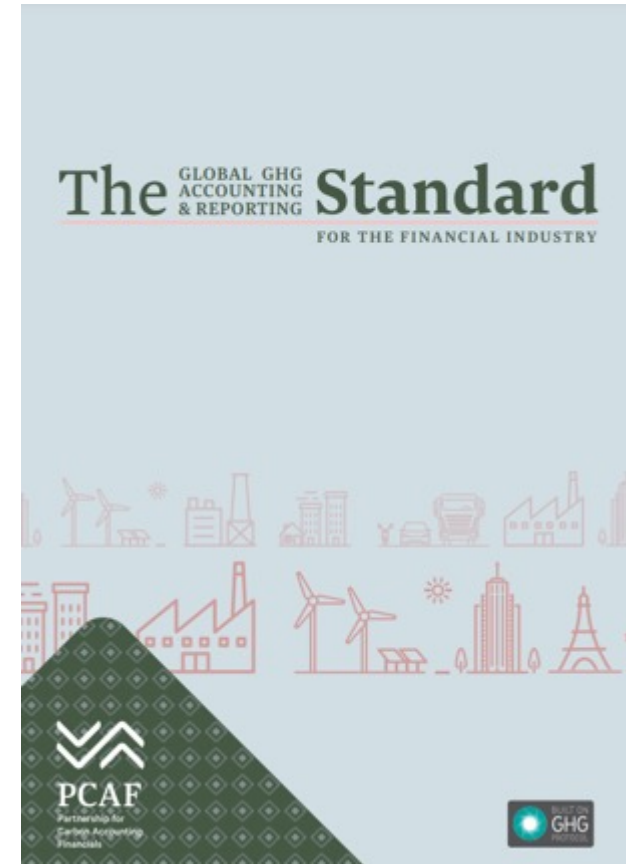


A Corporate Accounting and Reporting Standard  
REVISED EDITION



## Corporate Value Chain (Scope 3) Accounting and Reporting Standard

Supplement to the GHG Protocol Corporate  
Accounting and Reporting Standard



## The GLOBAL GHG ACCOUNTING & REPORTING Standard FOR THE FINANCIAL INDUSTRY



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<https://ghgprotocol.org/>



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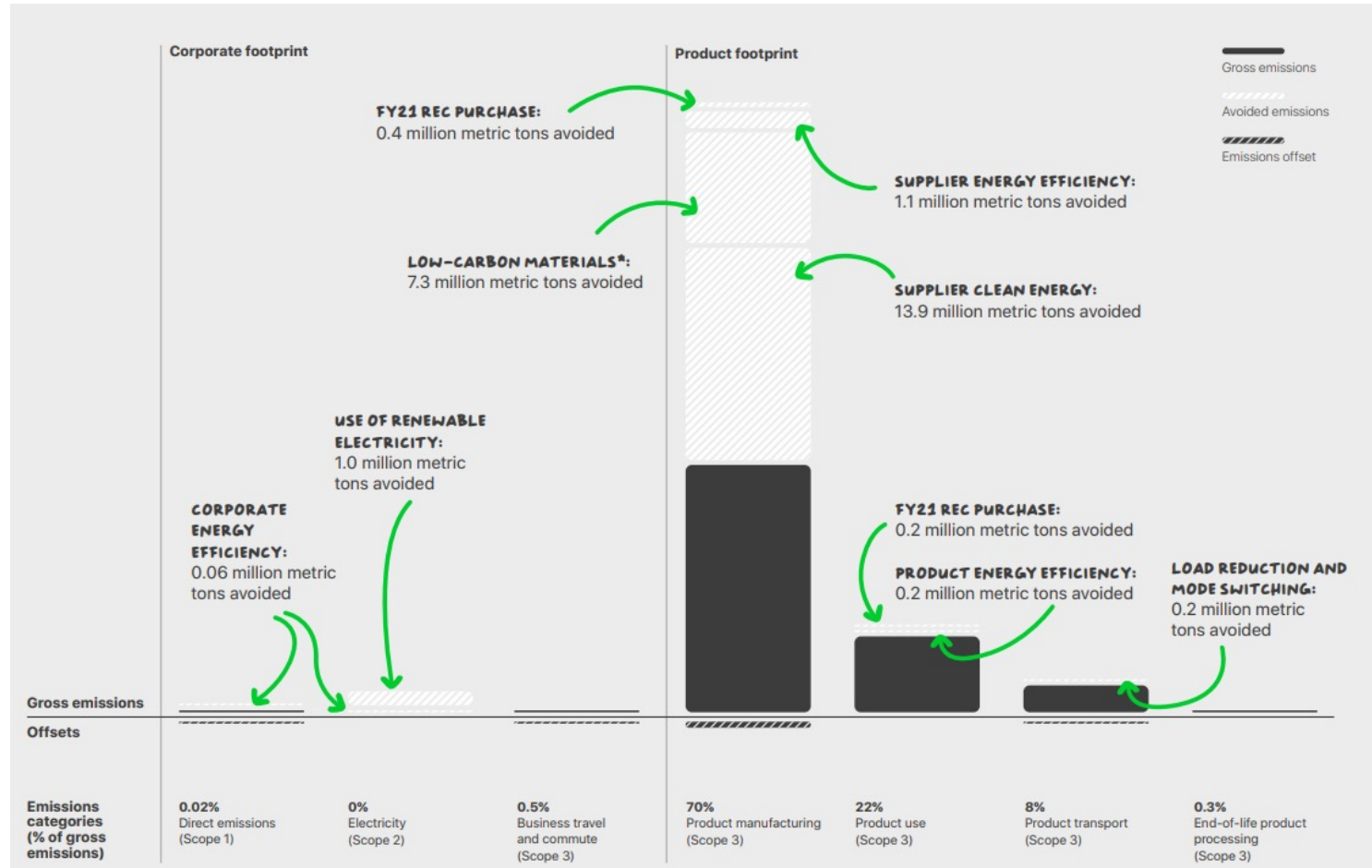
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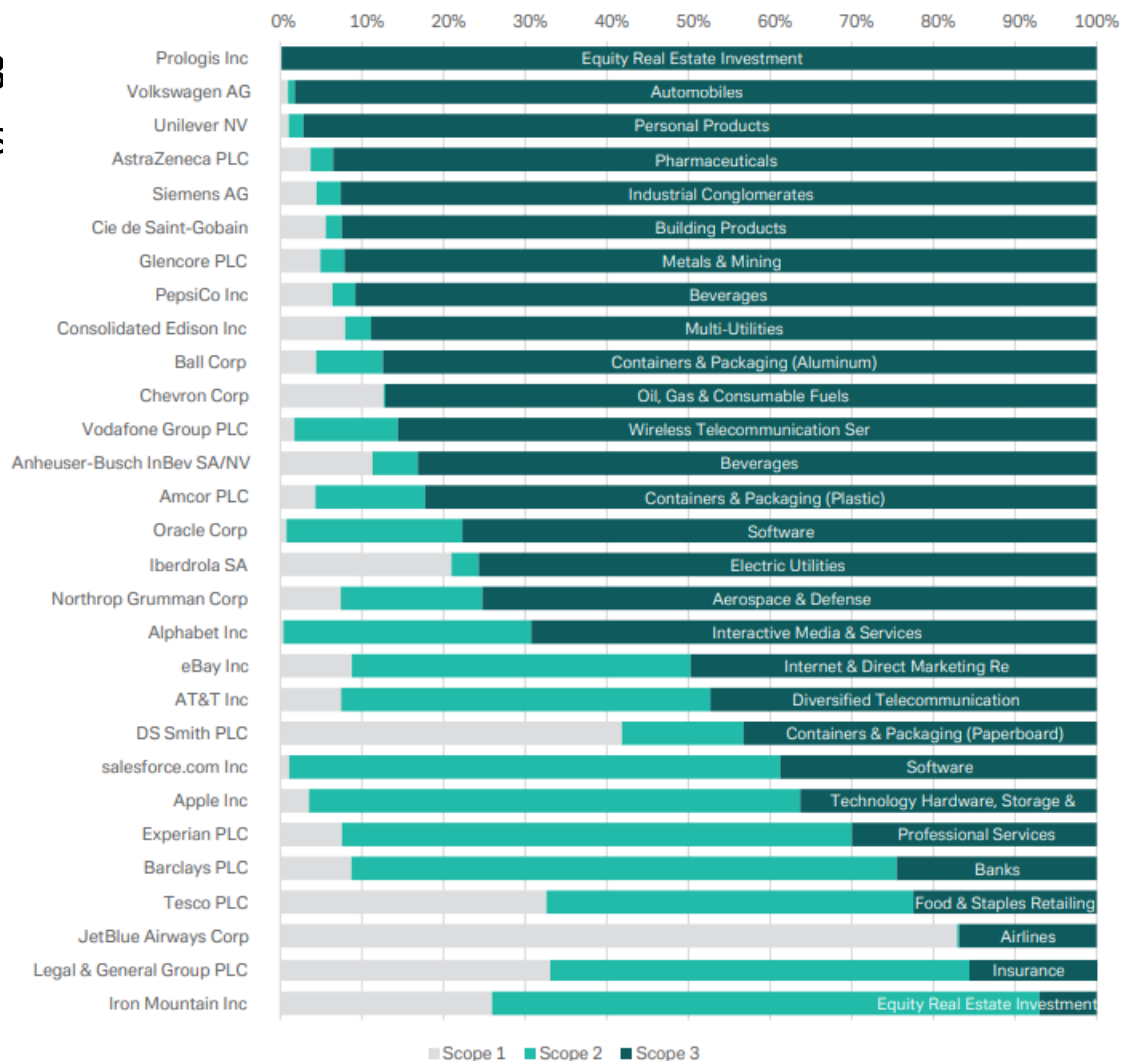
# Examples: emission inventories for ESG reporting

## Apple's comprehensive carbon footprint



# Examples: emission inventories for ESG reporting

Emissions by Scope 1, 2 and 3  
(% of total) (select companies  
2019 data)



[https://www.apple.com/environment/pdf/Apple\\_Environmental\\_Progress\\_Report\\_2022.pdf](https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2022.pdf)



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# A few words on verification

- Verification is an objective assessment of the accuracy and completeness of reported GHG information and the conformity of this information to pre-established GHG accounting and reporting principles
- Provide confidence to users that the reported information and associated statements represent a faithful, true, and fair account of a company's GHG emissions
- Often undertaken by an independent, external third party
- **Transparency!**



# Setting GHG reduction targets

Setting GHG reduction targets can:

- Stimulate reduction efforts at an organization and often leads to the identification of additional reduction opportunities.
- Helps to secure senior management attention and increase funding for internal GHG reduction projects.
- Encourage innovation, improve employee morale, and help in the recruiting and retention of qualified employees.





# Thank you!



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