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Directorate E – Sectoral and regional statistics
The Director

Update in Eurostat climate change related statistics

ABSTRACT

This document reports progress on the following Eurostat activities related to climate change related statistics:

- ESS pilot review of climate change related statistics
- Estimating quarterly greenhouse gas emissions accounts
- Climate change related activities in monetary environmental accounts
- Carbon footprints.

1. INTRODUCTION

Eurostat works with the following definition of climate change related statistics '*environmental, social and economic data that measure the human causes of climate change, the impacts of climate change on human and natural systems, the efforts of humans to avoid the consequences as well as their efforts to adapt to the consequences.*'[1]

To narrow the scope in the context of the statistical system, it is recommended to focus on environmental, social and economic statistics that measure climate change-related:

1. emissions: GHG emissions and their human cause;
2. drivers: human causes of climate change that deal with sources of emissions;
3. impacts: impacts of climate change on human and natural systems;

Figure 1: Screen capture of the Eurostat climate change related statistics section

[1] Conference of European Statisticians: Recommendations on Climate Change Related Statistics (2014); https://unece.org/DAM/stats/publications/2014/CES_CC_Recommendations.pdf

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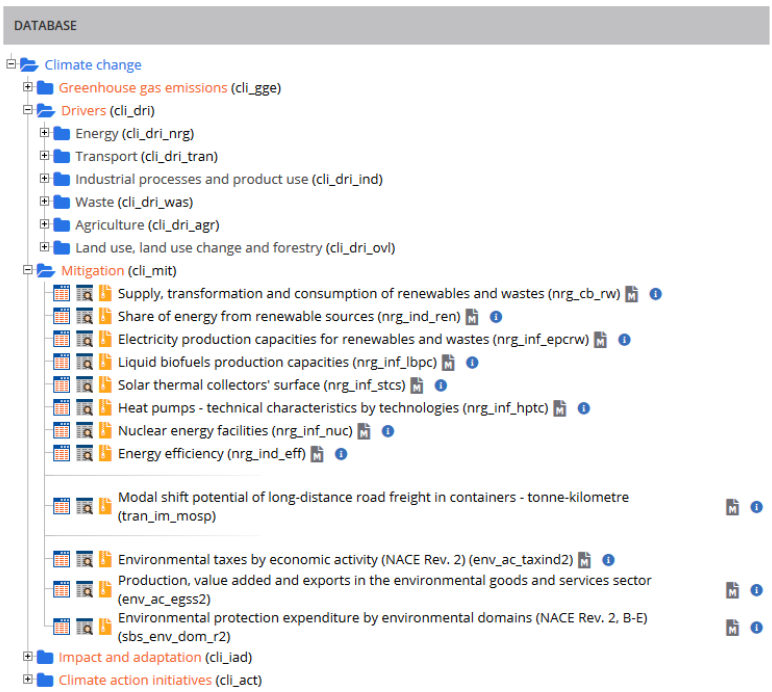
Figure 2: Eurostat data tree on climate change related statistics



4. mitigation: efforts of humans to avoid the consequences;

5. adaptation: efforts to adapt to the consequences.

The above categorisation is employed by Eurostat's website dedicated section on climate change[2] to guide users to relevant European statistics (e.g. agriculture, transport, energy, environmental accounts), most of which established for other purposes than climate change. The online Statistics Explained article 'Climate change – driving forces'[3] provides a good overview on how European statistics help to understand the drivers of greenhouse gas emissions.

Climate change related statistics are cross-cutting by nature and spread over a range of statistical domains established in the European or international statistical system. Eurostat has no explicit unit or team under the heading climate change related statistics. However, climate change related statistics is part of the environmental accounts and as such, ESS working and institutional structures are available (e.g., expert groups, ESS wide data collections and legal acts for environmental accounts cover inter alia GHG emissions, energy flows and economic instruments). The environmental accounts framework allows for analyses of many aspects of climate change.

2. ESS PILOT REVIEW OF CLIMATE CHANGE RELATED STATISTICS

Eurostat and the national statistical institutes of the European Union Member States are networked in the European Statistical System (ESS). The ESS produces and publishes a wide range of statistics related to climate change. Eurostat presents together this ESS information, plus data from other providers such as the European Environmental Agency, in a dedicated section of its website, see Figures 1 and 2.

The top decision-making body, namely the ESS Committee, endorsed at its October 2020 meeting launching a review of the current offer of ESS climate change related statistics. This review is linked to the very important policy drive by the European Green Deal, which is the first of the six headline ambitions of the European Commission for the period 2020-2024. This review will be a pilot for similar thematic reviews to follow in the next years.

The outcome of this first review will be a report issued in late October 2021, which will include the pilot's findings, concrete recommendations on climate change related statistics to be implemented as part of the Green Deal action plan by the ESS and lessons learnt from the overall process and methodology of the pilot review.

A stepwise approach was applied for the pilot review. First, it was necessary to identify relevant information sources related to the topic, including the previous work done by UNECE and UNSD. Then main stakeholders were identified, a mapping exercise[4] was

[2] https://ec.europa.eu/eurostat/web/climate-change

[3] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Climate_change_-_driving_forces

[4] All existing European statistics under this topic were mapped to get an overview of available data. Stakeholders were categorised according to their data needs and use, and based on their category different consultation methods were applied.

carried out, consultation methods and a questionnaire for the different consultations were elaborated, and meetings were organised.

As the user perspective is the main focus of the review exercise, the pilot includes stakeholder consultations at different levels, national and EU levels. A first workshop was held in April with many stakeholders[5] to agree on the proposed methodology and to get their commitment for the following activities. This was followed by a targeted online questionnaire with the aim to gather more detailed information from different stakeholders[6], and by targeted interviews with selected stakeholders in June. Volunteering National Statistical Institutes (from Spain, Ireland, Lithuania, Latvia, Netherlands and Sweden) provided feedback on the questionnaire, actively contributed to the interviews, and conducted national consultations.

Findings of these different stakeholder activities contributed to the elaboration of a long list of recommendations which was presented in July in two workshops to users and producers of climate change related statistics. Further to the findings of these workshops, a short list of recommendations were elaborated in a third workshop with high-level stakeholder on 7 September 2021. Based on those inputs, the final report is being finalised and recommendations being drafted. There will be some recommendations about data gaps about climate change statistics, about improvements of data communication and about international coordination. The review final report is scheduled to be ready by late October. In the following months, Eurostat will elaborate an action plan about the recommendations and consider them for the future annual work programme(s) as appropriate.

3. ESTIMATING QUARTERLY GREENHOUSE GAS EMISSIONS ACCOUNTS

Since several years, Eurostat produces early estimates of annual CO_2 emissions from fuel combustion. Eurostat is going to complement these by estimates of quarterly greenhouse gas emissions accounts.

In June 2021 Eurostat joined an international task team comprising representatives from International Monetary Fund (IMF), OECD, International Energy Agency (IEA), and United Nations Statistical Division (UNSD). The objective is to develop guidelines for methods and data sources to estimate quarterly greenhouse gas emissions. The task team is supervised by a steering group encompassing the same international organisations.

In a first step, the task team backed by the steering group agreed to focus the work on SEEA-type accounts for greenhouse gas emissions as the target variable for the estimates.

In a further step, the number of data points of the target variable was discussed. Greenhouse gas emissions accounts are a multidimensional data cube[7] with about 500 data points per geographical entity and reference year. These need to be aggregated to a

[5] Stakeholders included in this survey: NSIs, other data providers, DGs, European Parliament, International bodies (such as OECD and UN), academia, think tanks, NGOs.

[6] From users and producers, around 60 contributions were received under the target online survey.

[7] with at least five dimensions: geographical entity, time, greenhouse gas (CO2, N2O, CH4, HFC, PFC, SF6), economic activity (NACE and private households), unit

manageable number of data points. The task team identified ca. 18 data points to be appropriate - i.e. combinations of greenhouse gases and groupings of economic activities.

As regards the estimation method, the task team first concluded that the quarterly estimates should be benchmarked to the annual accounts, i.e. the sum of four quarterly accounts must equal the value of the annual account. Further, the task team distinguishes two methodological steps: (1) temporal disaggregation of the available annual accounts, and (2) extrapolating quarterly values for which no annual accounts are available. There are also methods available that integrate both steps. It was agreed to develop estimation tools that perform a range of methods and to make a choice based on the fitness of simulated estimate of the quarterly values for the most recent annual year available using the root mean squared error (RMSE).

The task team identified a range of sub-annual predictors (independent variables) that can be used to estimate the ca. 18 data points. These include e.g. monthly energy statistics, quarterly production volume indices, quarterly gross value added, and bi-annual livestock numbers. The timeliness and data availability for predictors is comparably good at the European level. Eurostat intents to be able to provide full-fledged test estimates for reference period 2021 Q2 by November 2021. Regular dissemination is planned to be implemented by early next year starting with reference period 2021 Q3.

4. CLIMATE CHANGE RELATED ACTIVITIES IN MONETARY ENVIRONMENTAL ACCOUNTS

Eurostat is further developing environmental accounts to better suit climate change information needs. There are several parallel initiatives.

4.1. Changes and extensions of Regulation 691/2011 on European environmental economic accounts

There are 6 modules of European environmental accounts which produce annual data about the following topics: air emissions (greenhouse gases and air pollutants), material flows, physical energy flows, environmental taxes, environmental sector (growth and jobs) and environmental protection expenditure (investment and consumption).

Eurostat is developing three new modules European environmental accounts on forest accounts (including forest area extent), ecosystem accounts (including estimates of ecosystem services such as carbon sequestration) and environmental subsidies and similar transfers (data on transfers supporting production of energy from renewable sources and energy efficiency/ saving). Because of the EU legal process required, this is long-term work which could deliver results in 2025 or later.

Furthermore, the existing module for environmentally related taxes by economic activity is currently being adjusted and the following climate change relevant items will become available in the near future:

- taxes levied on carbon content of fuels ('carbon taxes') by payer (NACE breakdown and taxes payable by households and non-residents)
- government tax revenue recorded in the European System of Accounts in relation to countries' participation in the EU Emissions Trading System broken down by sector (households, corporations and non-residents), and – for corporations – by industry (NACE).

4.2. Measuring climate change mitigation and adaptation-related economy

Eurostat in collaboration with researchers from outside the European Commission started work on the statistical delineation of the climate change mitigation and adaptation economy in 2020. Based on internationally accepted definitions of climate change mitigation and adaptation, researchers seek to identify and measure related economic activities and products[8]. The granularity of the analysis and lack of data sources for some of these activities and products makes it rather challenging to estimate output, GVA, employment as well as investments and exports and imports related to climate change mitigation and adaptation.

4.3. Methodological developments of monetary environmental accounts

The Eurostat task force on the classification of environmental activity is reviewing the SEEA classification of environmental activities to better address methodological issues, such as boundary cases between environmental protection (e.g. protection of air quality through reduction of emissions) and safeguarding natural resources through production of energy from renewable sources, which are relevant also for climate change. The Eurostat task force developed guidance notes on identifying and measuring key products driving the transition to a carbon free economy: electric transport equipment[9] and energy efficient buildings[10]. It also started a review of the indicative compendium of environmental economic activities and environmental products.

4.4. Voluntary data collections

Eurostat extended environmental protection expenditure accounts (EPEA) to gather data on output of energy from renewable sources and related expenditure (including investments) of various economic sectors as well as investments for energy efficiency.

Eurostat plans to launch a new data collection on potentially damaging environmental subsidies, with special focus on fossil fuel subsidies. Following the recommendations of the London Group task force on fossil fuel subsidies[11], Eurostat will also examine feasibility of calculation of effective carbon rates for EU countries.

4.5. Work on new indicators

Based on the data available in different modules of the European environmental economic accounts (environmental taxes by economic activity accounts, air emission accounts and physical energy flows accounts), Eurostat developed and calculated indicators of implicit tax rates on emissions and energy use. Usability of these indicators,

[8] Under this project, links with the Sustainable Finance Taxonomy developed for climate change mitigation and adaptation are also being reviewed.

[9] https://ec.europa.eu/eurostat/documents/1798247/12177560/Guidance+note+on+electric+transport+equipment+-+technical+note.pdf/2ddec6dc-8ca9-1736-0f36-18ed2233af0b?t=1609859296315

[10] https://ec.europa.eu/eurostat/documents/1798247/12177560/Guidance+note+on+energy+efficient+buildings+-+technical+note.pdf/8ab3d765-b6b7-a8b4-bef3-5ef2d5c1d145?t=1609859263907

[11] https://www.scb.se/en/finding-statistics/statistics-by-subject-area/environment/environmental-accounts-and-sustainable-development/system-of-environmental-and-economic-accounts/pong/publications/monitoring-greenhouse-gas-transfers/

as inputs for policy-related discussions and/or quality assurance of environmental accounts, is being discussed[12].

4.6. Sustainable finance taxonomy and CMFB task force on the statistics on sustainable finance and climate change risks

Since 2018, the European Commission, supported by experts and practitioners from the financial sector, has been working on a reference system for labelling financial products as 'sustainable', to avoid 'greenwashing' on financial markets. In this context, a Sustainable Finance Taxonomy is being developed, with two of its six environmental objectives relating to climate change mitigation and adaptation, respectively[13].

The taxonomy's objective is to help to redirect capital flows towards sustainable projects in order to make our economies, businesses and societies more resilient against climate and environmental shocks and risks. The taxonomy might also support statisticians in the process of defining and measuring 'sustainable' or 'green' real economy (non-financial) investments, and it has been considered as one of references in the work on climate change mitigation and adaptation economy mentioned under point 2 above[14].

The work on the Sustainable Finance Taxonomy has implications on the scope of information disclosed by large non-financial and financial corporations in their financial statements, which might also lead in the long term to new or better sources for compilation of climate-related information in monetary environmental accounts and data quality enhancement[15].

In 2020, the Committee on Monetary, Financial and Balance of Payments Statistics (CMFB) set up a task force on the statistics and sustainable finance and climate change risks. The task force reviewed needs and developments relating to sustainable finance in the EU to support the work of central banks on the development of indicators on green bonds, energy use and emissions and 'physical risks' arising from climate change. The review comprised also references to data-related work[16] and potential administrative data sources[17] available within the European Commission and related international

[12] https://circabc.europa.eu/sd/a/de5acda2-ea21-4979-8063-48cd9209b616/ENV_EA-MESA_WG_2021_07%20Progress%20environmental%20taxes%20data%20collection.pdf

[13] For more information on the taxonomy, please see the Commission' dedicated website.

[14] Overall, the taxonomy sets out criteria under which an economic activity provides substantial contribution towards one of its six environmental objectives without significant harm to the remaining environmental objectives. It seeks then to identify e.g. activities with substantial contributions to climate change mitigation without major harm to climate change adaptation, waste management and circular economy, protection of biodiversity and ecosystems, water protection and pollution abatement.

[15] See the Commission's proposal for Corporate Sustainability Reporting Directive

[16] See Joint Research Centre's work on climate risk (DRMKC Risk Data Hub (europa.eu), and on projections of economic impacts in sectors of the EU based on bottom-up analysis (https://ec.europa.eu/jrc/en/peseta-iv)

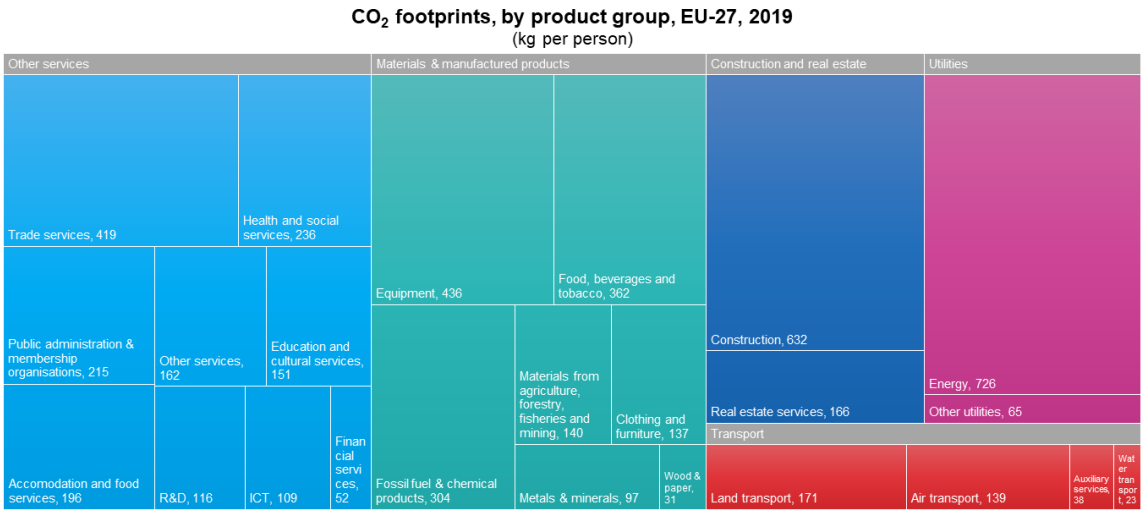
[17] See EU Emission Trading System registry, European Pollutant Release and Transfer Registry and databases on energy performance certificates.

initiatives[18], including the work by the IMF[19] and OECD[20]. Task force recommendations and way forward will be discussed by the CMFB in September 2021.

5. CARBON FOOTPRINTS

Since many years, Eurostat produces estimates of carbon footprints for the EU economy. Data are available on the Eurostat online database and the Statistics Explained article 'Greenhouse gas emission statistics - carbon footprints' provides a good overview of the results. The tool (Excel) with which these estimates are performed is available on Eurostat's website and can be easily used to estimate carbon footprints for individual countries.

Figure 2: CO_2 footprints by product group, EU-27, 2019 (kg per person)



Source: Eurostat (env_ac_io10)

Eurostat uses a single region input-output model extended by data from air emissions accounts. This modelling technique applies the 'domestic technology assumption' which has some impact on the interpretation of the resulting carbon footprint estimates. The latter has to be interpreted as avoided CO_2-emissions associated with import into the EU. I.e., the modelling technique assumes that the imported goods are produced with EU production technology.

Eurostat would like to estimate the 'actual' carbon footprints of imported goods, for which another technique is recommended: multi-regional input-output modelling.

[18] Considered in this context can be the work of Network of Central Banks and Supervisors for Greening the Financial System, which has published a provisional stocktaking on the data needs of central banks, supervisors, financial intermediators, investors and insurers have on measuring and assessing climate related risks; for an intermediate report, see https://www.ngfs.net/sites/default/files/medias/documents/progress_report_on_bridging_data_gaps.pdf

[19] See Climate Change Indicators Dashboard https://climatedata.imf.org/

[20] See the International Programme for Action on Climate (IPAC) https://www.oecd.org/climate-change/ipac/

Eurostat and the European Commission Joint Research Centre are building up such a multi-regional data set in the project FIGARO. Furthermore, Eurostat has started to compile CO_2 emissions accounts for non-European countries and a rest of the world block. These will be added to the FIGARO inter-country input-output data set to estimate carbon footprints for some 40 countries (including 27 EU Member States) and the rest of the world block. First results are expected before the end of 2021.