CLIMATE CHANGE: A STATISTICAL SHORT-TERM ANSWER

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Abstract

Climate change is a high priority on the European Commission political agenda and call for relevant economic indicators. On our way to an EU climate-neutral economy, the European Statistical System needs to closely evaluate and monitor the impact of climate change on EU economic growth, on jobs and on the investment needed to achieve targets.

There is not yet standardized statistical framework to follow up climate change and in particular investments. As a first step, Eurostat, with the help of the Member States, has set up a classification of environmental purposes that will allow the existing environmental-economic accounts to provide statistics on climate change in a medium term. This approach is part of an internationally adopted framework. In the short-term, there are already some relevant statistics such as Structural Business Surveys, PRODCOM data, Labour Force Surveys that form the basis for setting up macro-economic measures on climate change. Eurostat has investigated this approach to provide some key indicators' estimates on climate change in the short term. The approach starts with setting the scope of the climate change policy in question and then identifies economic activities related to the climate change within the classification systems of NACE and Prodcom. This methodology uses top-down modelling techniques, building on a cascade of information already existing. Results depend on the definition itself, whether downstream and upstream activities are included in the policy of climate change but, as well, due to the evaluation of how much an economic activity is related to the policy area.

The approach has applied quality principles such as a sound methodology for the statistical process where standard concepts and classifications are applied. It does not involve any burden on respondents, neither national statistical institute as the approach uses established and available Eurostat data. The approach will allow high quality standards, especially comparability and timeless and more importantly relevance of the estimation provided.

Keywords: Environmental accounts, policy decision making, data re-use

1. Introduction

Climate change related data is a key challenge for European statistics. The European Statistical System needs to closely evaluate and monitor the impact of climate change (both climate change mitigation and climate change adaptation) on EU economic growth, on jobs and on the investment needed to achieve targets set by the European Commission of a climate-neutral by 2050, meaning an EU economy with net-zero greenhouse gas emissions.

The statistical data gap on climate change (climate change mitigation and climate change adaptation) has been pointed out for a few years at European and international levels.

At international and European level, statistical initiatives have started to provide policy makers and users with data on climate change. Although the statistical framework is not fully developed yet, Eurostat, in collaboration with international organisations and Member States, has initiated some work to provide statistics on climate change in the medium term.

Section 2 will define climate change mitigation and adaptation. Section 3 will present a summary of international and European initiatives to provide data on climate change. Section 4 focuses on the available statistical frameworks for answering the climate change data needs. Section 5 illustrates a possible harmonised European way to get some statistics on climate change and section 6 envisages further statistical work to fill the climate change data gap.

2. Definition of climate change

When speaking about climate change, there are two workstreams interlinked: climate change mitigation and climate change adaptation. Climate change actions started many years ago with a more "physical" measurement and was extended along the years to monetary views.

The United National Framework Convention on Climate change (UNFCCC) and the intergovernmental panel on climate change (IPCC) started working on climate change in 1992 and 1998 respectively.

2.1   Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 to provide policymakers with regular scientific assessments on the current state of knowledge about climate change. The IPCC defines "climate change" as "a change in the state of the climate that can be identified ... by changes in the mean and / or the variability of its properties, and that persists for an extended period, typically decades or longer"[1].

The United Nations Framework Convention on Climate Change (UNFCCC), in its Article 1, defines climate change as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'. The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition, and climate variability attributable to natural causes.

IPCC working groups provide scientific information relevant for the global community to meet the challenge of climate change. It highlights the need to design effective climate change adaptation policies and to define strategies to mitigate against the impacts of climate change.

2.2   Climate change mitigation

The IPCC[2]/UNFCCC[3] defines climate change mitigation as implementing policies to reduce greenhouse gas emission and enhance sinks.

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[1]   IPCC Fourth Assessment Report, Working Group I, Glossary of Terms: https://www.ipcc.ch/site/assets/uploads/2018/02/ar4_syr_appendix.pdf

[2] See IPCC glossary

Mitigation measures are translated in, for example, an increased use of renewable energy, the application of new technologies such as electric cars, or changes in practices or behaviors, such as driving less or changing one's diet. Further, they include expanding forests and other sinks to remove greater amounts of CO2 from the atmosphere, or simply making improvements to a cookstove design.

2.3 Climate change adaptation

According to IPCC 6th assessment report, adaptation is defined, in human systems, as the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities", where the potential for adverse consequences (risk) results from "interaction between climate-related hazards with the exposure and vulnerability of the affected human or ecological system". Climate change adaptation can be understood as the process of adjusting to current and forecasted climate and the consequences (both adverse or beneficial) involved. Examples are raising river or coastal dikes, the substitution of more temperature-shock resistant plants for sensitive ones, etc.

3. International and European initiatives

Section 3 will present a summary of international and European initiatives related to climate change statistics.

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[3] As there is a direct relation between global average temperatures and the concentration of greenhouse gases in the atmosphere, the key for the solution to the climate change problem rests in decreasing the amount of emissions released into the atmosphere and in reducing the current concentration of carbon dioxide (CO2) by enhancing sinks (e.g. increasing the area of forests). Efforts to reduce emissions and enhance sinks are referred to as "mitigation".

3.1   International initiatives

3.1.1   G20 Data Gaps Initiative

In 2022, the G20 leaders launched the third round of the Data Gaps Initiative (DGI-3)[4]. This is an international initiative coordinated by the IMF. DGI-3 includes 14 recommendations addressing four statistical areas. There are 7 recommendations on climate change mitigation and adaptation. The recommendations are expected to be implemented within the next five years. In particular, recommendation 6 is about climate change subsidies and recommendation 7 about climate change expenditures, including investments.

3.1.2   OECD International Programme for Action on Climate

The OECD International Programme for Action on Climate (IPAC) supports country progress towards net-zero GHG emissions and a more resilient economy by 2050. Through regular tracking, policy evaluation and feedback on results and best practices, IPAC helps countries strengthen and co-ordinate their climate action. It complements and supports the UNFCCC and the Paris Agreement monitoring frameworks.

The 2023 IPAC monitor report presents a summary of information on greenhouse gas emissions, an assessment of climate-related hazards, and key trends in climate action. The report includes a chapter about trends on climate-related hazards and disasters. It uses indicators about population exposure to hot days, to coastal flooding and to violent windstorms and economic losses from climate disasters. Those indicators are not based on SEEA or environmental accounting, and they report on climate change drivers and impacts rather than adaptation.

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[4] https://www.imf.org/en/News/Seminars/Conferences/DGI/g20-dgi-recommendations#dgi3

3.1.3   UNSD global set of climate change statistics and indicators

The Global Set was adopted at the fifty-third session of the United Nations Statistical Commission in March 2022 as the framework for climate change statistics and indicators to be used by countries when preparing their own sets of climate change statistics and indicators according to their individual concerns, priorities and resources. The Global Set in its most detailed form, including the metadata, is presented in the Climate Change Statistics and Indicators Self-Assessment Tool (CISAT) Part II**.**

The total 158 indicators are grouped according to five areas[5]: drivers, impacts, vulnerability, mitigation and adaptation on one hand and on the other hand according to various themes (such as GHG emissions, energy, fossil fuels, agriculture, water quality, temperature, precipitation, disasters, infrastructure, technology, funding, ecosystem services etc.).

3.1.4   UNECE reports

We highlight two UNECE reports. The UN Economic Commission for Europe (UNECE) disseminated at the Conference of European Statisticians (CES) in June 2023 a report "Measuring hazardous events and disasters: set of core disaster-risk-related indicators".

The report recommends a list of core disaster-risk-related indicators on Measuring Hazardous Events and Disasters for regular production by NSOs. Those indicators aim to:

(a) strengthen evidence for disaster risk;

(b) inform about the state of disaster risk in an internationally comparable way;

(c) support monitoring and reporting on international policy agreements;

(d) ensure consistency and coherence of information across administrative boundaries;

(e) add value to existing statistics.

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[5] Defined by intergovernmental panel on climate change (IPCC) as a sequence of events.

The resulting 53 indicators are listed according to three main dimensions: types of hazards (for which monitoring systems are developed), components of the disaster-related statistics framework (DRSF) and elements at risk.

Secondly, there is a CES task force developing guidelines on the role of national statistical offices in achieving national climate objectives. This work is close to finalisation and currently under consultation of CES countries. These guidelines are about climate mitigation and adaptation.

3.2 European initiatives

3.2.1 European Central Bank initiatives

The European Central Bank (ECB) and the European System of Central Banks (ESCB) are very active in the area of the financial sector's role in financing the transition to a net-zero economy and related risks.

In January 2023, the ECB issued the report 'Towards climate change related statistics' with new experimental and analytical indicators to help analyse climate-related risks in the financial sector and monitor the green transition. This report provides a set of statistical indicators covering sustainable finance, carbon emissions and physical risks. The indicators are intended to support the analysis of climate-related issues for the financial sector. There are three sets of indicators:

1. Sustainable finance indicators about the issuance and holding of debt instruments with sustainability characteristics by residents in the euro area;
2. Carbon emission indicators of financial institutions that provide information on the carbon intensity of the securities and loan portfolios of those financial institutions;
3. Indicators on the physical risks of loan and security portfolios. They assess risks stemming from the impact of climate change-induced natural hazards, such as floods and wildfires, on the performance of loans, bonds and equities.

The data are compiled exclusively using official ESCB data sources, namely granular information from the Centralised Securities Database (CSDB) and Securities Holdings Statistics (SHS). The estimation process of the experimental indicators is fully embedded in the existing official compilation frameworks. This work continues with the aim of further expanding the methodology, scope and quality of the indicators.

In December 2023, the ECB issued the report Towards macroprudential frameworks for managing climate risk. This report proposes three frameworks for relating climate risks to financial stability addressing risk surveillance, macroprudential policy and broader risks to nature. Available indicators within the risk surveillance framework, suggest heterogeneous exposures to climate risk across EU countries, sectors and firms, and limited access to consistent information on adaptation measures. The macroprudential policy framework focuses on financial intermediaries. Banks that will be key in managing and reducing climate-related financial stability risks, with lending disproportionately tilted toward firms and households with high climate risk exposures. The risks to nature framework is possibly the framework closest to the subject of this document. It takes a first look at nature-related risks: according to preliminary estimates, 75% of corporate loans among euro area banks and 31% of investments in corporate bonds and equity among euro area insurers are in sectors that are highly reliant on at least one service provided by nature.

3.2.2 Committee of Monetary statistics, Finance and Balance of payments initiatives

Another thread of work comes from the Committee of Monetary statistics, Finance and Balance of payments (CMFB). This is the forum for co-ordination of statisticians from the ESS and the European System of Central Banks. For some years the CMFB has been undertaking several climate-related activities. In 2020, the CMFB set up a task force on statistics on sustainable finance and climate related risks (TF SuFiR) issuing the task force report in April 2023. In particular, the task force reviewed existing reporting/disclosure registries that could serve as sources for the work on sustainable finance indicators. The task force recommended a better integration of the requirements of financial and non-financial statistics about climate-related risks and sustainable finance into the classifications of

economic activities and products (goods and services), e.g. in CPA (classification of products by activity).

3.2.3   European Statistical Forum

Finally, the European Statistical Forum (ESF), a partnership of ESS and ESCB, will organise a high-level conference in January 2025 about 'Closing the Data Gaps on Climate Change'. The conference will take stock of available data about climate expenditure, footprints, energy, financial risks, corporate requirements, impacts, communication, etc.

3.2.4   European Environmental Agency indicator on economic losses due to extreme events

The European Environmental Agency (EEA) publishes on an annual basis analysis and data related to economic losses from weather- and climate-related extremes in Europe. Data are about economic losses and fatalities as absolute numbers. The data sources are CATDAT (RiskLayer, i.e. an independent think tank based in Karlsruhe, Germany) and NatCatSERVICE (Re-insurance company Munich Re).

This indicator fulfils the objective 'smart adaptation' of the 2021 EU Adaptation Strategy, in particular its key action 'more and better climate-related risk and losses data'. The strategy aims to build resilience and ensure that the EU is well prepared to manage these risks and adapts to the impacts of climate change. This indicator is also included in the EU SDG indicator set and it is a headline indicator for the 8th Environment Action Programme monitoring framework.

3.2.5   2021 ESS pilot review on climate change

The European statistical system (ESS) undertook a review of its climate change related statistics in 2021, which took stock of existing statistics about emissions, energy, transport,

agriculture, etc. and corresponding data gaps[6]. Some data gaps about climate change were identified, including related expenditure and finance statistics. The [final report](#) was presented to the ESSC in February 2022.

3.2.6   Non-statistical EU data initiatives

There are several non-statistical EU initiatives. One very important initiative is the EU [Taxonomy on sustainable finance](#). The EU taxonomy has six environmental objectives, that more or less correspond to environmental aspects. Climate change mitigation and climate change adaption are two of them. The Commission has established [technical screening criteria](#) for the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation/adaptation. It has legal basis[7].

These technical screening criteria follow, as much as possible, the classification NACE Rev 2, and for each category, establish criteria to be considered as contributing to climate change mitigation/adaptation. The EU taxonomy therefore focuses first on those economic activities and sectors that have the greatest potential to achieve the six environmental objectives.

Those criteria are extremely detailed and it is not assessed yet how they can serve to produce statistics. Climate change is likely to affect all sectors of the economy. As a result, all sectors will need to be adapted to the adverse impact of the current climate and the expected future climate. Therefore, the list of activities mentioned in the regulation 2021/2039 is quite extensive.

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[6]https://ec.europa.eu/eurostat/documents/1798247/13699600/Action+plan+statistics+for+the +European+Gre en+Deal.pdf/d3f04cbe-c1f3-edfc-d3f8-903f4a5045ec?t=1637322011610

[7] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R2139

On 24 February 2021, the European Commission adopted its new [EU strategy on adaptation to climate change](). The new strategy sets out how the European Union can adapt to the unavoidable impacts of climate change and become climate resilient by 2050.

3.3 Comparison of selected initiatives

Table 1: initiatives and their characteristics

Initiative	Address climate impacts	Address climate change risks	Micro approach	Macro approach	SNA/SEEA approach	ESS to contribute
G20 DGI	Yes	Yes		Yes	Yes	Yes
ECB and CFMB		Yes	Yes		Partially	Yes
OECD IPAC monitor	Yes	Yes	Yes			
Non-statistical EU initiatives – taxonomy	Yes		Yes (tool for businesses)			ESS may benefit to produce statistics
Eurostat experimental project (section 5)	Yes			Yes	Data source for accounting	Yes

The IMF data gap initiative is the one closest to statistical and methodological frameworks on which the European statistics rely.

4.   Climate change and statistical frameworks

This section focuses on the available statistical frameworks for answering the climate change data needs. Climate change presents two workstreams: climate change mitigation and climate change adaptation. At European level, there is amendment of Regulation (EU) 691/2011 on European environmental accounts, already agreed by the co-legislators in spring 2024 but not yet published, which gives Eurostat the mandate to:

1. Produce a publication on climate change mitigation, including investments, by end 2024 and again every second year. The legal act also agrees that the Commission can require Member States to report data for the publication 2026 and afterwards;
2. Assess the quality of data available on […] climate change adaptation […] and, if appropriate, submit a legislative proposal introducing the following new modules: […] Climate change adaptation including expenditure on it"..

The analysis of climate change can make good use of statistical classifications such as NACE, COFOG, etc and of current environmental accounts framework.

4.1   Classifications

The analysis of climate change can make good use of statistical classifications such as NACE, COFOG, etc. if we use coherent methods to identify the relevant activities in business or social surveys. Environmental accounts do not have specific categories for climate change yet but contains important components of it. Eurostat collects data on environmental protection and on environmental goods and services sector (data based on Regulation (EU) 691/2011 on European environmental accounts, Annex IV). Both accounts use the classification of environmental protection activities (CEPA) and classification of resource management activities (CReMA) have categories for the similar 'protection of ambient air and climate' and 'management of energy resources'.

Eurostat has been working in the last years, in collaboration with EU Member States and international organisations, to review the classification CEPA and CReMA. In Spring 2024

the UN Statistical Committee adopted the new classification of environmental purposes (CEP) as international statistical classification.

4.2 Environmental accounts

The new classification of environmental purposes includes categories for climate change. The accounts of environmental protection expenditures, of environmental goods and services sector and of the environmental subsidies and similar transfers could also benefit from this solution. The new CEP classification will be implemented in the environmental accounts on environmental protection expenditure (EPEA), green economy and green jobs (EGSS) and environmental subsidies (ESST), which will provide data on the national expenditure in environmental protection, the climate change related production activities (output, value-added), climate change related investments and employment and on the transfers between institutional sectors related to climate change. However, CEP will be implemented starting in 2025 with data dissemination in 2026. This can offer a medium-term solution. In the meantime, Eurostat will use the methodology and the results of an experimental project to start publishing climate-related statistics in 2024 (see section 5).

5. Eurostat's climate change experimental measurement

This section 5 illustrates a possible harmonised European way to get some statistics on climate change.

5.1 Methodological framework

Since 2021 Eurostat has been running a project on monetary estimates for the following four policy areas: circular economy, climate change mitigation, climate change adaptation and bioeconomy. Those are all sub-sectors of the whole economy, according to the following definitions:

1. Economic goods and services of the **circular economy sector** are those that maintain the value of products and materials as long as possible and minimise waste and resource use, thereby, closing or narrowing the [raw] material cycle.
2. Economic goods and services of the **climate change mitigation sector** are those that substantially reduce greenhouse gas emissions by source or from the atmosphere.
3. Economic goods and services of the **climate change adaptation sector** are those that moderate harm in natural or human systems in response to actual or expected climatic stimuli or their effects.
4. Economic goods and services of the **bioeconomy sector** are those that produce, use, process, distribute or consume biological resources and those required for the production of biomass and bio-based goods. Examples include agriculture, forestry, fisheries and aquaculture; and all economic and industrial sectors that use biological resources to produce food, feed, biobased products, energy and services, and technologies for their production or generation.

The project had the following objectives:

1. to develop frameworks for compilation of economic estimates for those 4 policy areas ([8]);
2. to compile economic data (investments, output, GVA, exports, imports, employment) and
3. to describe the framework and data collection and compilation process.

([8])   The scope of each policy area is not distinct one from another: activities and products can be listed in more than one policy areas. For example, the activity of thermal insulation for energy efficiency is included in both climate change mitigation and climate change adaptation. The activity of wastewater management and treatment services is part of the climate change mitigation and circular economy scope. A quantitative overview of the overlaps are given in annex 9.

5.2 Policy areas framework

The circular economy was the first policy area developed under the project. Data were published in May 2023 ([9]) on the Eurostat website based on the new methodology developed.

The framework for circular economy was extended to other policy areas. The estimates have not been published yet but have been shared with Member States. The methodology for climate change was presented to the DGI in May 2023 (as work in progress). It raised a high interest from the international community and countries present and served as an input for the latest draft methodological framework of the Data Gap Initiative developed in 2024.

5.3 Methodology

The project develops a generic approach for specific environmental policy areas. The approach covers different steps to: set up a working definition of the policy area; define its scope and activities and products related; compile economic indicators and automatize the compilation process. More details are given in Annex: Methodology Eurostat Project.
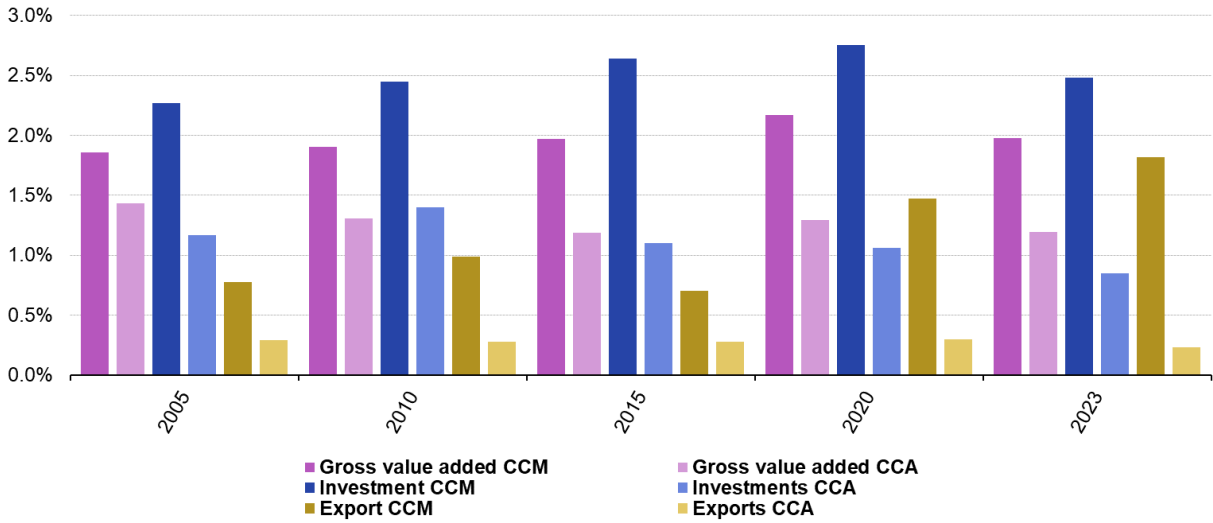
5.4 Results

The results of the above-described framework and automated data tool are presented below. Graph 1 present some results for the climate change policy areas for selected years and the EU aggregate level. The full dataset provided by the tool covers all EU Member States, EU aggregates and the years 2005-2023. The different variables are presented in % of total, such as the gross value added of climate change mitigation represents 2% of the total value added in 2023, respectively climate change adaptation gross value added represents 1.2% of the total value added etc.

([9]) https://ec.europa.eu/eurostat/web/circular-economy/overview

Graph 1: EU estimates for the climate change mitigation and climate change adaptation (in % of total)

EU27
Climate change mitigation (CCM) and climate change adaptation
(CCA) estimations - % of total

Legend:
- ■ Gross value added CCM
- ■ Gross value added CCA
- ■ Investment CCM
- ■ Investments CCA
- ■ Export CCM
- ■ Exports CCA

The methodology delivers comparable results across Member States and the possibility to produce EU aggregates (see Graph 2 and 3).

Graph 2: EU Member States output for the climate change mitigation and climate change adaptation (in million EUR) – reference year 2023

Output (million EUR) - reference year 2023
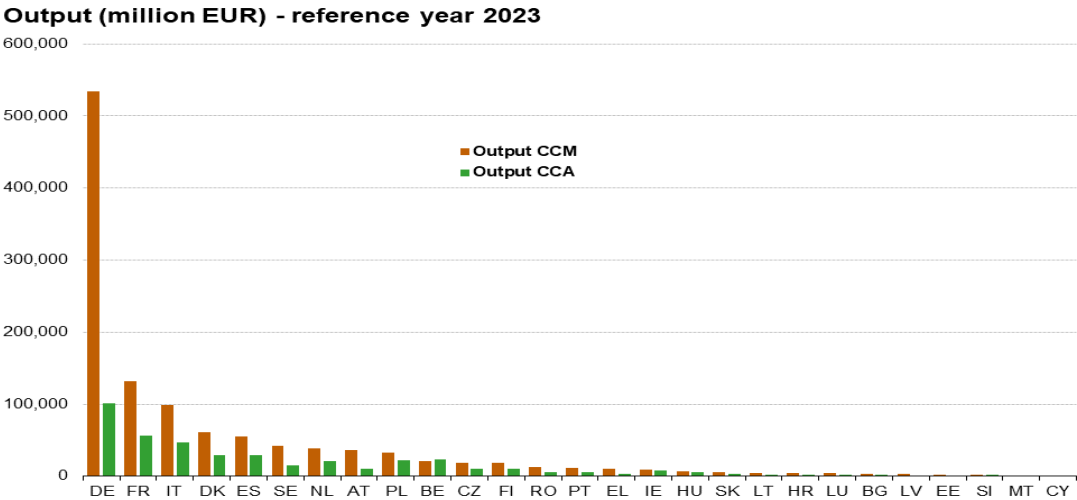
Graph 3: EU Member States persons employed for the climate change mitigation and climate change adaptation (in FTE) – reference year 2023

Persons employed (FTE) - reference year 2023
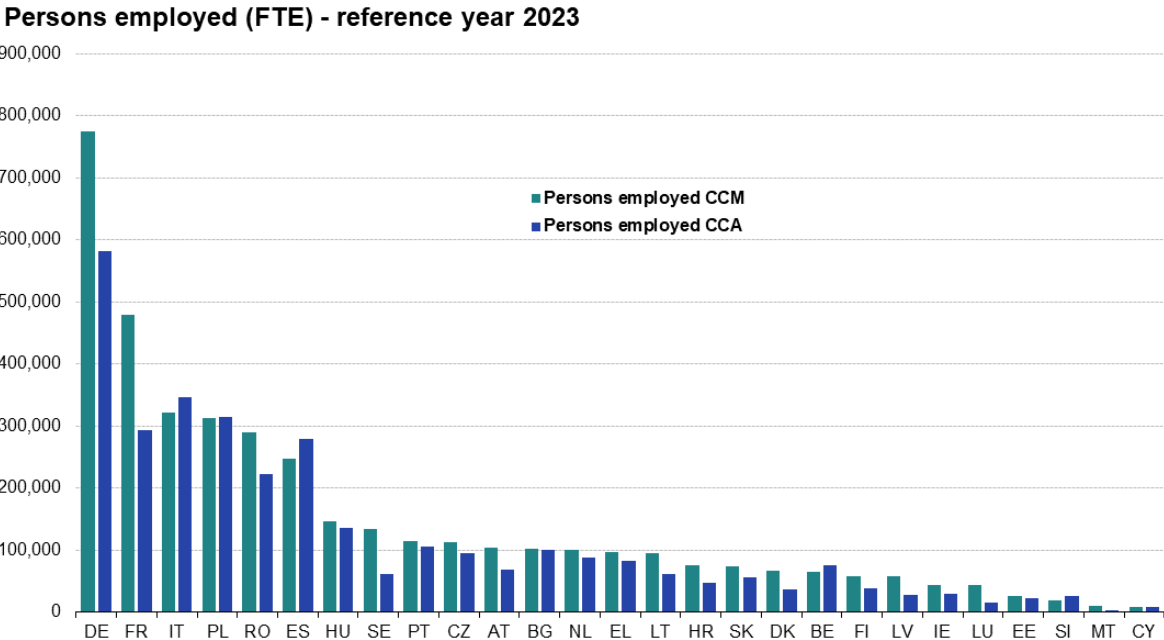
6. Future plans for climate change related statistics

This section envisages further statistical work to fill the climate change data gap.

6.1 Amendment of European environmental-economic accounts regulation

In spring 2024 the EU co-legislators adopted an amendment of Regulation (EU) 691/2011 on European environmental-economic accounts, which creates new accounts, publications and data studies. In the short-term, Eurostat shall issue, by end of 2024, a publication[10] with data and statistics on climate change mitigation including investments compiled from data that is already available. However, for the publication due in late 2026, Eurostat needs data transmitted by the Member States. Eurostat is empowered to collect such data from the Member States, by means of a delegated act amending section 3 of Annex V (environmental goods and services sector - EGSS) with the inclusion of investment on climate change mitigation as one of the characteristics that shall cover all sectors from the economy and activities.

This means that climate change investments will be collected as part of the environmental goods and services sector accounts, starting in 2025. Eurostat and the EU Member States

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[10] "By 31 December 2024 [to start] and at least every two years thereafter, the Commission (Eurostat) shall issue a digital publication that contains data and statistics on climate-change mitigation including investments, compiled from the relevant data available from the environmental economic account modules and, if appropriate, from other data sources. As appropriate, the Commission (Eurostat) shall adopt a delegated act in accordance with Article 9 in order to amend section 3 of Annex V to include characteristics regarding other investments on climate change mitigation. The data included in the digital publication shall provide a breakdown of information per Member States, including on investments, and shall cover all sectors from the economy and activities "

are currently reviewing the proposal of Eurostat in the expert groups for environmental accounts (May 2024) and later with the group of directors (October 2024).

The development of climate change mitigation statistics will use therefore the statistical frameworks (SEEA, SNA, classification of environmental purposes etc.). Statistical work on the measurement of climate change mitigation is more advanced compared to climate change adaptation.

6.2   Statistical development

It is sensible to treat climate change adaptation and mitigation separately but co-ordinated. There is a small but not zero overlap between activities of climate change mitigation and adaptation e.g. buildings energy efficiency concerns both as it saves greenhouse gas emissions for heating (climate change mitigation) and insulates from higher temperatures (climate change adaptation).

Climate change adaptation is more difficult to approach using the statistical frameworks environmental accounts are used to (very few data initiatives are SEEA-based). There are many statistical and non-statistical initiatives about climate change adaptation (this document did not attempt to be exhaustive but to illustrate the most relevant initiatives). Most of those initiatives use indicator dashboards but not an accounting approach. They are built around the concepts of hazards, exposures, vulnerabilities and impacts. Many indicators are about risks, impacts or economic costs. Concepts about risks nor vulnerabilities are not present in SEEA. The SEEA relies on actual economic transactions and flows.

Eurostat and the NSIs will start discussion in May 2024 with the expert group on environmental accounts how to approach and measure climate change adaptation with the aim to produce a report in 2026 for the Parliament on the feasibility of measuring climate change adaptation.

7. Annex: Methodology Eurostat Project

The project develops a generic approach for specific environmental policy areas. The approach covers the following steps:

1. Provide a working definition of the specific environmental framework (see 3.1);
2. Define its scope and boundaries;
3. Delineate activities and products;
4. Map activities and products to economic classifications (NACE, Prodcom). This is based on a shortlist of activities identified and delimited within NACE at 4 digits and Prodcom. For each activity and product identified, a coefficient or share of this activity/product devoted to the policy areas must be estimated, in this case climate change mitigation or adaptation.
5. Compile key economic indicators (output, exports, imports, gross value added, employment, investment – gross investment in tangible goods), for EU Member States and EU. The estimates are mainly based on SBS statistics, Prodcom, National accounts, Comext data and LFS data. These are all official sources. The variable 'output' services as primary variable, from which other values can be derived. Exports and imports can be derived from Prodcom (Europroms) based on Comext. GVA is estimated by using the same shares as derived from output. GVA at factor costs can be derived from SBS. For investments, the data source are SBS "investment in tangible goods". Although more comprehensive concepts such as Gross fixed capital formation exist, the more detailed data availability on investment in tangible goods provides a more accurate reflection of the sector's investment activities;
6. Automatize the compilation process in a tool in R and excel, including quality checks and data visualisation and data outputs. The project developed a tool for easy compilation of the indicators, once the data sources input are available. The tool allows to apply the project methodology with a minimum running cost.

The main advantages of this dataset are: it is based on official statistics; it is the same methodology as for other indicators that we have published (for investments, employment

and GVA in the circular economy). The approach has some resemblance with EGSS and the underlying data are compatible with ESA and SEEA.

References (12pt. bold)

All citations in the text and all references must meet APA styles (American Psychological Association 7th edition – more information http://www.apastyle.org/). An example (10 pts, spacing 1):

[1] Lawn, M., & Nóvoa, A. (2013). The European Educational Space: New Fabrications. *Sisyphus – Journal of Education*, *1*(1), 11-17. https://doi.org/10.25749/sis.2827

[2]

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