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DISSEMINATING “GREENHOUSE GASES ACCOUNTS” ALONGSIDE MONETARY NATIONAL ACCOUNTS

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Abstract

To facilitate the joint use of GHG emission and economic data, INSEE (French NSO) and the SDES (part of the French ministry of the environment) are preparing the release of new “greenhouse gases accounts” which will be fully integrated with the traditional monetary national accounts. The accounts will offer three datasets: a production approach of GHG emissions, a demand approach and a bridge table between the first two.

Underlying the new accounts project, the calculation of the official carbon footprint is to be improved, by making use of the FIGARO multi regional input-output (MRIO) table instead of the current single region methodology.

This paper briefly presents the project, the technical and dissemination challenges and the remaining work before the first publication (September 2024).

I. DISSEMINATING “GREEN HOUSE GASES ACCOUNTS” ALONGSIDE MONETARY NATIONAL ACCOUNTS

1. In France, the NSO (INSEE) compiles the monetary national accounts, while the statistical office of the Ministry of the environment (the “SDES”) is in charge of compiling the Air emission accounts (AEA), the Physical energy flows accounts (PEFA) and the carbon footprint. So far, the monetary and physical accounts have been released separately by the two institutions. “One-off” economic analysis of the carbon emissions and footprint have been conducted by the French statistical offices (see for example *Bourgeois A. et al (2022)*), but not as a regular production.
2. To facilitate the joint use of GHG emission and economic data, INSEE and the SDES are preparing the release of new “greenhouse gases accounts” which will be fully integrated with the traditional monetary national accounts. The accounts will offer three datasets: a production approach of GHG emissions, a demand approach and a bridge table between the first two.
3. The accounts are expected to be used mostly for analytical work by environmental and macro-economists, in the public sector and other research institutions. As such, the accounts will support both macroeconomic and sectoral public decision making.

4. As in most countries, the French official GHG emission targets are in reference to the UNFCCC inventories and not to the air emission accounts. In contrast, the carbon footprint itself will become an official public policy target in the next multi-year “*Low carbon national strategy*” to be adopted in 2024 (although an indicative one and not a binding one as the emission target).

5. Finally, the greenhouse gases accounts will be basis from which new headline indicators can be derived. In particular, INSEE is considering the regular computation and dissemination of “adjusted net domestic product (NDP) / adjusted net savings” type of indicators, taking into account the climate change mitigation constraint. The specifics of the new indicator have not been determined yet, but many preliminary reflections can be found in *Germain, J.-M. & Lellouch, T. (2020)*.

A. Production approach: monetary economic production and the Air emission accounts

6. The “production approach” will show resident GHG emissions by industries (= air emission accounts) in tons of CO₂eq, alongside production and value added by industries in euros (current and constant prices). The ratio of the two will give the carbon intensity of domestic production.

7. The tables will also integrate data on energy use by industries (= physical energy flows accounts) in order to give a more complete physical picture of domestic production and emissions.

8. One requirement of the project is the ability to compile early estimates of the AEA for year N-1 (currently, the French AEAs are only disseminated for years up to N-2).

B. Demand approach: monetary final demand and the Carbon Footprint

9. The “demand approach” will show the GHG emissions embedded in the French domestic final demand (= the “carbon footprint” in tons of CO₂eq), alongside monetary final demand by product and geographical origin (in euros, current and constant prices).

10. More precisely, the results will be presented with to two breakdowns:

- a. *By product of final demand*: GHG footprint = French final demand (in euros) *times* the GHG content of finished goods and services (in kg CO₂eq / euro). The goods and services may be split in as much as 128 categories: 64 CPA categories * 2 origins (French made / imported).
- b. *By country and industry of origin of the emissions*: GHG footprint = production induced by the French final demand in all countries and industries (in euros) *times* the emission intensity of production in the said countries (in kg CO₂eq / euro). Compared to the previous breakdown, the industry of origin of the emissions will be split into fewer NACE codes, but the geographical origin will be more detailed (large countries or group of countries).

11. The footprint for year N-1 will be estimated based on the first decomposition: the final demand in 64 products (in euros) is known from the monetary national accounts, but the GHG content of finished goods and services (in kg CO₂eq / euro) will be forecasted following recent trends.

C. International flows of greenhouse gases: a bridge table between the “production” and the “demand” approaches

12. Lastly, “bridge tables” will show the carbon emissions associated to domestic production, imports and exports, allowing users to make the bridge between the production approach and the demand approach (in both approaches, the household direct emissions component, which strictly speaking has no equivalent in the central framework of national accounts, will be shown separately).

13. The main purpose of the bridge tables is to allow users to analyse the GHG emissions embedded in (French) international trade, by product and partner country. It will also provide the classical GDP decomposition (in level and year-to-year change), but expressed in GHG content:

$$GDP + imports = households and general government final consumption + investment + exports$$

II. IMPROVEMENTS TO THE CARBON FOOTPRINT CALCULATION

14. Underlying the new accounts project, the calculation of the carbon footprint is to be improved. In the current methodology, the information on direct emissions from households comes from the French air emission accounts. The information on indirect emissions associated with the production, transport and distribution of goods and services is derived from a so called “single region input-output model” (SRIO) which associates French and EU economic aggregates with (French and EU) AEAAs.

15. The main publication under the current methodology presents the results of the carbon footprint up to year N-1¹. It also provides links to various methodological documents and relevant statistics (Eurostat, IEA, FAO, national accounts, customs etc.).

A. Computing the French carbon footprint based on the FIGARO MRIO

16. The new calculation method will make use of the FIGARO multi regional input-output tables (MRIO) developed by Eurostat and the European commission Joint research center (JRC). This change will improve the precision of the estimate as well as the level of geographical detail available.

17. More precisely, to retain a full consistency with French national accounts, the footprint will be computed following a so called “simplified single national accounts consistent method” or “simplified SNAC” method. In this method, the carbon content of foreign goods and services is computed thanks to the MRIO model but is applied to the final demand in euros found in the official French national accounts (and not to the final demand found in Figaro, which differ for several methodological reasons).

18. The main challenge we find in applying the “simplified SNAC” method relates to the valuation of imports. In ordinary national input-output tables, imports of goods are valued “cif” (cost insurance and freight), which is basically the value of the goods at the French border. However, to correctly match these import values (in euros) to their GHG content from the MRIO (in kg CO₂eq / euro), we need to convert them to a “basic price” valuation. This requires additional estimates of trade and transport margins in partner countries and international transit. This extra-step is specific to the footprint calculation and, as such, is a new estimation to be implemented in French national accounts.

¹ L’empreinte carbone de la France de 1995 à 2021, published 04/11/2022 – in French : <https://www.statistiques.developpement-durable.gouv.fr/lempreinte-carbone-de-la-france-de-1995-2021>).

B. Sources on GHG emissions in extra EU countries

19. To compute a complete GHG footprint from FIGARO, we need to extend the monetary MRIO table with annual emission vectors of the 6 main greenhouse gases (CO₂, CH₄, N₂O and 3 F-gases) in 46 regions X 64 industries. For CO₂, we plan to use the emission vector built by Eurostat (unit E2) for their own FIGARO based footprint calculation. But, at the moment, we lack the same data for non-CO₂ GHG in extra EU countries.

20. As a preliminary solution, we plan on combining several data sources with a decreasing priority order: official AEAs when available; then AEAs estimated by the OECD; then national inventories (UNFCCC); then EDGAR database. We believe that the question of territory vs. residence should be minor or non-existent for non-CO₂ gases, which makes the problem of converting from UNFCCC format to AEA format easier. But issues remain regarding the global total emissions on the one hand, and the country and industry split on the other hand, because these sources are not always consistent, and often less detailed than 64 industries.

21. We would appreciate any opportunity for international cooperation on this issue, which is not specific to the French carbon footprint calculation but could benefit any international user.

III. PROJECT TIMELINE AND REMAINING WORK

A. Timeline

22. The first release of these new greenhouse gases accounts is planned for September 2024. They will cover the years 1990 to 2023. The next release will be in July 2025 for years up to 2024, and the target should stay the same for subsequent publications (July N+1).

B. Remaining work

23. In the coming month, prototype tables and figures will be built and tested with users (macro economic modellers and environmental economists) to try to fit their needs as best as possible. It is clear that many use cases would benefit from the release of more detailed data than currently available, if possible in long time series. A thorough assessment of data quality will thus be needed to come up with a reasonable level of disaggregation in the final tables. For this purpose, a distinction could be made between main aggregates considered “official statistics” and more detailed data labelled as “experimental statistics”.

24. On the data side, the two main areas of work will be (i) building estimates of non-CO₂ emissions in extra EU countries (see II.B) and (ii) devising a robust estimation method for the year N-1 footprint.

References

Bourgeois A. et al (2022), *One third of the European Union's carbon footprint is due to its imports*, Insee Analyses n°74.

Germain, J.-M. & Lellouch, T. (2020), *The Social Cost of Global Warming and Sustainability Indicators: Lessons from an Application to France*. *Economie et Statistique / Economics and Statistics*, 517-518-519, 81–102.

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