DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
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System of Environmental Economic Accounting

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SEEA Central Framework 2028 update

Scoping note for issue A3:
Update of existing information on EE-IOT

Version for SEEA CF Technical Committee review, July 2025

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Note: This note is prepared in the context of the SEEA Central Framework update, mandated by the United Nations Statistical Commission in 2024, expected to finish by 2028. There are 29 update issues, and the initial task is establishing a clear scope for all of the issues. This scoping note provides a short description of a specific issue with the aim of supporting a common understanding of the work that will be needed to fully investigate and articulate the alternative approaches and recommendations for change or addition to the SEEA Central Framework. Scoping notes will be discussed by the relevant task team and inform on the further work related to the issue.

1   Background to the issue

1.   The short description of issue A3 "Update of existing information on EE-IOT" from October 2024 is:

> "The SEEA CF could incorporate, at a high level, new insights and improved descriptions on environmentally-extended input-output tables (EE-IOT) analysis, which take into account recent advances in this area (e.g. FIGARO, MRIO GLORIA, etc)."

The production of input-output tables and related analytical methods are described in some detail in Chapter 36 of the recently approved SNA 2025 (United Nations et al., 2025). Chapter 36 presents an introduction to methods for compiling single country input-output tables and multi-country tables. Chapter 36 also introduces the general Leontief analysis that has applications in the environmental and other spheres.

2.   Used in conjunction with SEEA accounts for residuals and resource inputs for example, input-output tables can support the analysis of the indirect effects of demand on such residuals and resource inputs such as air emissions, material use, waste, land use, water use and energy use. These applications are mentioned in the SNA 2025:

> "Each of these (SEEA) accounts is structured … to present data according to the industry and sector classifications used in the SNA. The data can thus support the derivation of many indicators (e.g. footprint indicators) and types of analysis (e.g., extended input-output analysis)." SNA 25 (pre edit) par. 2.86

SEEA CF 2012 Section 2.4 Combining physical and monetary data notes that "compiling and contrasting monetary and physical data in meaningful ways are at the heart of the SEEA philosophy" (United Nations et al., 2012, par. 2.86), and then refers to the descriptions of input-output tables and related analyses in the SEEA Applications and Extensions (United Nations et al., 2017). Input-output tables and related analyses are also mentioned in Chapter 6 – Integrating and presenting the accounts.

3.   Descriptions of input-output tables and related analyses arise in two main sections in the SEEA Applications and Extensions: Section 3.2 Environmentally extended input-output tables (EE-IOT) and Section 3.3. Techniques for the analysis of input-output data.

4.   Input-output analysis was first extended to environmental modelling in the late 1960s and early 1970s and is therefore a well-established analytical method. The past 20 years or so has seen significant development of input data and methods for research, policy support and statistics production based on input-output analysis. The development of the SEEA so far has contributed in no small way to this. The same time period has seen a steadily increasing interest from data users and decision makers.

2   Motivation for considering a change to the SEEA Central Framework

8.   The overarching motivations for considering a change to the SEEA Central Framework are the development of input data and methods required for environmentally-extended input-output analysis, the increasing interest in input-output analyses and data from policy makers and other

users and the adjustments made in the recently approved SNA 2025 with respect to input-output tables and analysis.

9. The filling of the data gap for consumption-based greenhouse gas emissions is the first recommendation in the third phase of the IMF's G-20 Data Gaps Initiative (DGI) alongside air emissions accounts (International Monetary Fund (IMF), 2024). Several nations are regularly producing and updating statistics on consumption-based greenhouse gas emissions, for example France, Germany, the United Kingdom, New Zealand, Sweden, Italy and the Netherlands. The international resources panel uses input-output analysis to produce and publish material footprint data (United Nations Environment Programme (UNEP), 2024). Brown et al. (2022) note the use of input-output analysis to support EU policy to address deforestation, the UK long-term environmental plan, and the production of environmental indicators for the building and real estate sectors in Sweden.

10. These developments parallel advances in key input data required for environmentally-extended input-output analysis. This applies in particular to global multiregional input-output tables (GMRIO). Previously existing GMRIO such as GLORIA (IELab, 2021) and EXIOBASE (Stadler et al., 2018) established in the research community continue to be updated. Since 2021 Eurostat have published the FIGARO GMRIO, which is updated yearly (Eurostat, 2021). OECD continue to update the GMRIO called ICIO (Inter-Country Input-Output) database (OECD, 2021). Compilation processes for GLORIA and EXIOBASE include physical constraints (engineering constraints) that can make them useful for the checking the feasibility of SUTs in the national accounts.

11. Another notable development here is the GIANT initiative (a collaboration involving the Asian Development Bank, the European Commission, the IMF, the OECD, the UN Economic Commission for Africa, the UN Economic Commission for Latin America and the Caribbean, and the World Trade Organisation) which aims at international harmonization for input-output tables, related analyses and their results (United Nations et al., 2025 par. 36.74).

12. All the GMRIO mentioned include monetary GMRIO data. EXIOBASE and GLORIA also provide environmental extensions. Some environmental extensions are also available for use in conjunction with FIGARO. The work of UNCEEA Area C has continued to contribute to the development of global environmental accounts relevant as environmental extensions for input-output analysis in the five prioritized areas – air emissions, energy, material flows and water (United Nations, 2025). The OECD has ongoing work improving the coverage of global greenhouse gas emissions accounts.

13. Methodological developments in particular for the production of consumption-based measures of environmental pressures using input-output analysis have also taken place, see for example (Brown et al., 2021). OECD-supported work (Lutter, Giljum, Schandl, et al., 2022; Lutter, Giljum, Streeck, et al., 2022) has produced guidance and a roadmap for harmonization focusing on consumption-based measures of material flows, but with a wider relevance for input-output analysis in general. Research work has highlighted the potential for methodological development to improve the robustness of consumption-based measures internationally and for single countries (Palm et al., 2019; Tukker et al., 2018, 2020).

3   Nature of the proposed change and research questions

14. The central question to be addressed in the ongoing SEEA CF revision is how the current status of SEEA guidance in the area should be amended in light of the developments noted in the previous section.

15.   A related question is what specific issues related to input-output tables and related analyses should be explicitly addressed in the update. Current guidance for example presents separate guidance describing input-output tables themselves, distinct from possible analyses based on the input-output tables. The current guidance also presents a range of different examples of analyses. A discussion of guidance for input-output-based analytical methods should therefore include a discussion of which specific analytical methods should be considered. One suggestion here is to focus on guidance for analytical methods to produce data on environmental pressures from consumption (e.g. consumption-based greenhouse gas emissions) since these data are in high demand from users and they complement production-based accounts (for greenhouse gas and other air emissions) treated elsewhere in the SEEA Central Framework.

16.   Considering input-output tables themselves, a first question to be discussed is how existing descriptions of the various types of input-output tables should be developed. For single-region input output tables this entails a discussion of the extent to which the updated guidance should also note the structural format for the domestic, import and total single-region input output tables, see for example (OECD, 2023). For GMRIO, it should be discussed how to present the methodological approaches applied in compiling the noted GMRIOs from the perspective of their overall statistical quality and the statistical quality of analyses based on them.

17.   It should also be discussed how to present relevant environmental extensions with global coverage from the same perspective. Since different environmental extensions are at different stages of development and differ in levels of overall statistical quality this should also be taken into account.

18.   From a methodological perspective it should be discussed how methods differing from standard SRIO-based and MRIO-based analyses should be presented in revised guidance such as (Palm et al., 2019; Tukker et al., 2018, 2020).

19.   A number of questions of overarching relevance for the substantive issues noted above should also be taken up:

   a.   How the SEEA CF update should aim to reflect the updates in the relevant overlapping areas in the SNA 2025

   b.   The extent to which updated guidance should recommend certain methods and input data for input-output analysis, with a view to standardising and harmonising countries' produced data, as well as what principles should be given priority in such guidance.

   c.   Related to b. it could be discussed the extent to which varying levels of guidance can be provided for countries with more or less data availability and more or less well developed statistical systems

   d.   The extent to which revised guidance should aim for terminological harmonisation in light of the somewhat differing terminology currently in use (e.g. demand-based, consumption-based, footprint etc.)

20.   A key contextual question is how the proposed changes to the SEEA CF to be developed in the area should be included in the revised document. A number of options exist that can be discussed, for example:

   a.   include the proposed changes in a new section in the SEEA CF Chapter 6 – Integrating and presenting the accounts. Another is to include it in an entirely new chapter.

b. Include an introductory statement referring to EE-IOT and analyses in Chapter 2 , followed by more expansive text in Chapters 3 and or 4

c. Include EE-IOT and descriptions of related analyses in a new Chapter

d. Another dimension for previous options is to assign some text to a separate guidance document

Each of these options have advantages and disadvantages that could be fully described in the ongoing process.

4   Links to other SEEA CF update issues

21.   The following other update issues are linked to issue A3 on EE-IOT:

a. Issue A2: Indicators: Input-output analysis is currently used to produce many policy relevant indicators (e.g. SDG indicators) that would be relevant to present here

b. Issue A5: Harmonization with other international classifications: Since input-output analysis does rely on the interoperability of monetary input-output tables and physical environmental extensions, harmonization with other international classifications may be relevant

c. Issue A6: Introduction of thematic accounts and strengthening the link to policy: There are links here because input-output analysis connects environmental data with monetary data and the national accounts

d. Issue A7: Extension to the social domain: Examples where input-output analysis has been performed from environmental and social perspectives can be highlighted.

e. Issue A9: Consistency with the 2025 SNA revision issues: EE-IOT and related analyses are based on data that is incorporated in the SNA.

f. Issue B1: Description of PSUTs (in the SEEA Central Framework)

g. Issue B5: Differences between PSUTs and EW-MFA (in the SEEA Central Framework)

5   Existing materials

22.   The references mentioned in this scoping note and included at the end of this document form a starting point for the literature to be considered in the revised guidance. Early in the update process it is relevant to expand on these references with a more thorough survey.

23.   Previous sections in this scoping note and the references also provide a starting point for the stakeholders and experts whose inputs in the process are relevant for this issue. These stakeholders and experts will be complemented through a more thorough survey early in the update process.

6   References

Brown, N., Berglund, M., Bivered, M., Gray, M., & Nakamura, S. (2021). *Producing environmental accounts with environmentally extended input output analysis: 2021 edition.* Eurostat (European Commission), Publications Office. https://data.europa.eu/doi/10.2785/172888

Brown, N., Croft, S., Dawkins, E., Finnveden, G., Green, J., Persson, M., Roth, S., West, C., & Wood, R. (2022). *New methods and environmental indicators supporting policies for sustainable*

consumption in Sweden (No. ISBN 978-91-620-7032-8; Issue ISBN 978-91-620-7032-8).
https://www.naturvardsverket.se/publikationer/7000/978-91-620-7032-8/

Eurostat. (2021). *FIGARO methodology*.
https://ec.europa.eu/eurostat/documents/51957/12767369/Figaro-methodology.pdf/487255c9-903a-0cb7-f5e2-73f37e35f196?t=1620750704022

IELab. (2021). *Technical Documentation GLORIA*.
https://ielab.info/assets/resources/Technical_Documentation_GLORIA_20210913.pdf

International Monetary Fund (IMF). (2024). *Third Phase of the G20 Data Gaps Initiative (DGI-3) Progress Report*. https://www.imf.org/en/News/Articles/2023/11/08/pr23385-the-third-phase-of-the-g20-data-gaps-initiative-dgi-3-starts-deliver-insights-action

Lutter, S., Giljum, S., Schandl, H., & Eisenmenger, N. (2022). *Establishing a Coordinated Global Framework for Measuring Demand-Based Material Flows* (No. EPOC/WPEI(2022)8/REV1). OECD.
https://seea.un.org/sites/seea.un.org/files/establishing_a_coordinated_global_framework_for_measuring_demand-based_material_flows-_lutter_and_giljum.pdf

Lutter, S., Giljum, S., Streeck, J., Eisenmenger, N., Wiedenhofer, D., & Schandl, H. (2022). *Draft Guidance on Measuring Demand-Based Material Flows* (No. EPOC/WPEI(2022)7/REV1). OECD.
https://seea.un.org/sites/seea.un.org/files/draft_guidance_on_measuring_demand-based_material_flows-_lutter_and_giljum.pdf
OECD. (2021). *Inter-Country Input-Output Tables*. https://www.oecd.org/en/data/datasets/inter-country-input-output-tables.html

OECD. (2023). *Input-Output Tables*. https://www.oecd.org/en/data/datasets/input-output-tables.html

Palm, V., Wood, R., Berglund, M., Dawkins, E., Finnveden, G., Schmidt, S., & Steinbach, N. (2019). Environmental pressures from Swedish consumption – A hybrid multi-regional input-output approach. *Journal of Cleaner Production*, *228*, 634–644.
https://doi.org/10.1016/j.jclepro.2019.04.181

Stadler, K., Wood, R., Bulavskaya, T., Södersten, C.-J., Simas, M., Schmidt, S., Usubiaga, A., Acosta-Fernández, J., Kuenen, J., Bruckner, M., Giljum, S., Lutter, S., Merciai, S., Schmidt, J. H., Theurl, M. C., Plutzar, C., Kastner, T., Eisenmenger, N., Erb, K.-H., … Tukker, A. (2018). EXIOBASE 3: Developing a Time Series of Detailed Environmentally Extended Multi-Regional Input-Output Tables. *Journal of Industrial Ecology*, *22*(3), 502–515. https://doi.org/10.1111/jiec.12715

Tukker, A., de Koning, A., Owen, A., Lutter, S., Bruckner, M., Giljum, S., Stadler, K., Wood, R., & Hoekstra, R. (2018). Towards Robust, Authoritative Assessments of Environmental Impacts Embodied in Trade: Current State and Recommendations. *Journal of Industrial Ecology*, *22*(3), 585–598. https://doi.org/10.1111/jiec.12716

Tukker, A., Wood ,Richard, & and Schmidt, S. (2020). Towards accepted procedures for calculating international consumption-based carbon accounts. *Climate Policy*, *20*(sup1), S90–S106. https://doi.org/10.1080/14693062.2020.1722605

United Nations. (2025). *Environmental-Economic Accounting Report 2025*. https://unstats.un.org/UNSDWebsite/statcom/session_56/documents/2025-13-EnvironmentalEconomicAccounting-E.pdf

United Nations Environment Programme (UNEP). (2024). *Technical Annex for Global Material Flows Database—Version 4, June 2024*. https://www.resourcepanel.org/reports/global-material-flows-database

United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, & World Bank. (2025). *System of National Accounts 2025*. https://unstats.un.org/unsd/nationalaccount/docs/2025_SNA_Pre-edit.pdf

United Nations, European Union, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organisation for Economic Co-operation and Development, & The World Bank. (2012). *System of Environmental-Economic Accounting 2012—Central Framework*. https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf

United Nations, European Union, Food and Agriculture Organization of the United Nations, Organisation for Economic Co-operation and Development, & The World Bank. (2017). *System of Environmental-Economic Accounting 2012 Applications and Extensions* (No. ST/ESA/STAT/Ser.F/114).