Producing carbon footprint in the Netherlands

UNECE Expert Forum for Producers and Users of Climate Change-Related Statistics, 31 August – 3 September 2021, Geneva, Switzerland

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2 September 2021
Carbon footprint statistics are important

- Increasing demand for footprint statistics to support climate policy (EU and Netherlands)

- Carbon footprint is a key indicator

- Need for timely, consistent, internationally comparable data to inform policy
Inconsistencies are confusing
We would like to calculate footprints with complete information

- A detailed input-output table:
  - every country
  - highly detailed
  - timely (t minus 1)
  - full information on emissions and other aspects

- Result would be an NxN matrix:
  - each row is supply chain from consumption to primary industry
  - each cell in a row is actual emissions that occur in that industry in that country due to consumption in the Netherlands
Current method: Emissions Embodied in International Trade (EEIT)

GHG-footprint (excl. F-gases)

- Net emissions by residents
- Balance of trade - emissions
Current method: Emissions Embodied in International Trade (EEIT)

Emissions caused by

– production of exported goods and services produced in the Netherlands \((vnlexp)\)
– production abroad of imported goods and services \((vnlimp)\)

\[
\begin{align*}
\nu_{nl}^{\text{exp}} &= E_1'(I - AD_1 - AI_1)^{-1}s_1 \\
\nu_{nl}^{\text{imp}} &= E_j'(I - AD_1 - AI_1)^{-1}t_1
\end{align*}
\]

Major assumption

Emissions in other regions are calculated using technical coefficients of domestic intermediate use and imported intermediate use of the Netherlands (i.e. the input-output structure of the Netherlands \(AD_1\text{-}AI_1\))
Preferred approach: Multi-Regional Input-Output tables (MRIOs)

– Considerable advantages
– Various options

Statistics Netherlands uses Exiobase to calculate footprint statistics
Exiobase has considerable advantages

– Detailed data
  - per consumption sector
  - per foreign country
  - per industry

– Timely

– Multiple footprints
  - emissions, natural resources, land use, biodiversity, water use, employment, value added
Exiobase is not suitable for regular production of national statistics

- Different editions of Exiobase are not of the same quality (every update since 2011 is a nowcast)

- Availability is uncertain: it is made by academics if and when they have funding to do so

- Large investments needed to make Exiobase consistent with the SNA (SNAC-Exiobase)
Carbon footprints must be based on an MRIO that is institutionally embedded

– Need for long-term consistency and reliability

– Demand for multiple footprints, not just emissions

– One statistic for each footprint instead of several to avoid confusion among users
Towards a data infrastructure for all footprint statistics

– All footprints for all monitoring reports calculated in one go
– Achieve efficiency gains: spend less time analysing plausibility and prevent double effort
– Facilitate consistency and transparency
– Standard methods to improve detail and timeliness
– Based on a “single authoritative MRIO”
FIGARO will be the foundation

**Full** International and **Global** Accounts for **Research** in input-**Output** analysis

– 46 countries, 64 sectors up to and including 2017
– 64 countries, minimum 17 sectors, 2018 and 2019

No readily available “extensions” (such as emissions) but FIGARO is developing
National IO-table

Inter-industry transactions

Final demand

Primary payments

Total industry output (sales)

Extension

greenhouse gas emissions, labour input, water consumption, waste production, material inputs, etc.

Total expenditures

Quality: CONSISTENCY BETWEEN IO-TABLE AND ALL EXTENSIONS
Multi-Regional I/O-table

Industries

- NL → NL
- NL → US
- US → NL
- US → US

Final demand

- NL → NL
- NL → US
- US → NL
- US → US

Primary payments

- NL
- US

Total industry output (sales)

- NL
- US

Total expenditures

- NL
- US

Total

- Total industry output (sales)
- Total payments
- Quality: SPECIFIC VALUE CHAINS AND LOCATIONS
### SNAC-MRIO

**SNAC = System of National Accounts Consistent**

<table>
<thead>
<tr>
<th>Industries</th>
<th>Final demand</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL → NL</td>
<td>NL → US</td>
<td>NL → US</td>
</tr>
<tr>
<td>Primary payments</td>
<td>NL → NL</td>
<td>NL → US</td>
</tr>
<tr>
<td>US → NL</td>
<td>US → US</td>
<td></td>
</tr>
</tbody>
</table>

**Total industry output (sales)**

| NL | US |

**Total expenditures**

| NL | US |

**Quality:** CONSISTENCY BETWEEN MRIO, SNA STATISTICS, AND ALL EXTENSIONS
SNAC-MRIO

more detail through decomposition for example: greenhouse gas emissions by type of GHG or by source of emissions

Quality: MORE DETAIL NEEDED FOR SPECIFIC QUESTIONS
more detail within industries for example: steel within basic metals industry; oil, gas, or gravel within mining; distinction by firm size

Quality: MORE DETAIL NEEDED FOR SPECIFIC QUESTIONS
Data infrastructure and footprint compendium

**SNAC-FIGARO**
MRIO with 43 countries and 64 industries
Netherlands data consistent with the SNA

**EXTENSIONS**
all relevant facets of economic activity and its environmental and other effects
decomposition of extensions, such as GHG emissions by type and source, labour input by skill level

**TOOLBOX**
set of commonly agreed methods for:
calculating footprint indicators
adding detail within industries in SNAC-FIGARO
improving timeliness of statistical indicators
performing standard input-output analyses

**SNAC-FIGARO plus**
Extra detail
Extra timeliness

**FOOTPRINT COMPENDIUM**
library of footprint indicators, all based on SNAC-FIGARO and its extensions
transparent methods
downloadable datasets
The challenges going forward

- Many partners needed
  - International data: Statistics Netherlands is not the NSO of the world
  - Collaboration within the Netherlands: data infrastructure must be a collective effort
  - Funding

- Improving FIGARO
  - Towards a single authoritative EE-MRIO with all the trimmings
  - Time is of the essence

- Bridging the time between ‘old’ and ‘new’ estimates
Facts that matter