

Empowering Carbon Accounting: From Data to Action.

Insights from an international workshop on carbon content measurement

Ulf von Kalckreuth, Deutsche Bundesbank

Basel, Annual IFC Committee Meeting, Wednesday, 21 August 2024



Irving Fisher Committee on
Central Bank Statistics



Carbon content measurement for products, organisations and aggregates: creating a sound basis for decision making

International workshop organized by the IMF, the BIS/IFC, Eurostat, the Deutsche Bundesbank, the Banco Central de Chile and the University of Oxford Blavatnik School of Government

21-13 February 2024, Hamburg, Germany

[Link to conference website, incl presentations](https://www.bundesbank.de/de/service/termine/messung-des-carbon-content-auf-produkt-unternehmens-und-aggregierter-ebene-schaffung-einer-soliden-entscheidungsgrundlage-913006)¹⁾

¹⁾ <https://www.bundesbank.de/de/service/termine/messung-des-carbon-content-auf-produkt-unternehmens-und-aggregierter-ebene-schaffung-einer-soliden-entscheidungsgrundlage-913006>

Workshop participants

- In Hamburg more than 60 live representatives from
 - international organizations, central banks, ministries, ESG reporting standard setters, statistical offices, corporate accountants, data platform providers, satellite data providers, EU Commission, enterprises, universities
 - six continents (the Americas counting as two)
- More than 200 registered virtual participants worldwide

Consistent results and findings from all participants.

"Only what gets measured, gets managed" (Bo Li)

Use cases

Reliable and readily available measures of **carbon content** would enable

- **Companies** to align their production processes in a climate-friendly way,
- **Investors** to direct their capital towards climate-friendly investments if they wish,
- **Banks** to better assess the climate risks in their portfolios,
- **Governments and regulators** to intervene if needed, and
- **Consumers** to better understand the consequences for the environment of their decision to purchase a particular product or service.

Carbon content information is a **necessary condition for rational**, environmentally-oriented **decision making**.

"Only what gets measured, gets managed" (Bo Li)

Micro-macro consistency required

Carbon content information is produced on three levels:

- **Aggregate level -- country and sector** **statistics**
G 20 Data Gaps Initiative (DGI), ECB climate change related indicators
- **Company level** **non financial reporting**
IFRS Sustainability Disclosure Standards,
EU Legislation, specifically the Corporate Sustainability Reporting Directive (CSRD) and European Sustainability Reporting Standards (ESRS)
- **Product level** **carbon accounting**
industry initiatives (chemical industry, automobiles), accounting research

As yet, measurements and measurement concepts are mostly unrelated.
A joint perspective is needed.

Direct and indirect emissions

Terminology and concepts

In measurement of emissions by enterprises or enterprise groups, we distinguish:

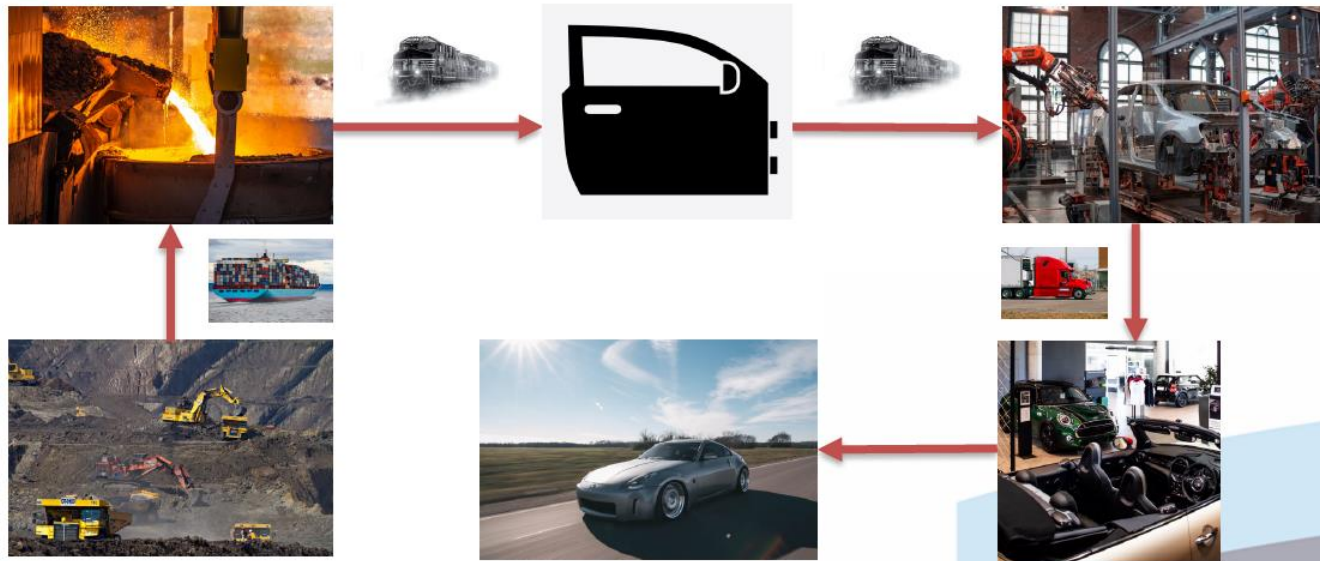
- **Direct emissions (Scope 1)**, generated in production itself,
- **Indirect emissions**, due to the use of **energy** and **heat (Scope 2)**,
- **All other** indirect emissions, upstream or downstream (**Scope 3**),
- **Carbon content** – sum of direct and upstream indirect emissions.

Carbon content is the **quantity of carbon emitted as a consequence of a production activity**.

Carbon content is **recursive** by nature, because **indirect emissions are the direct emissions of earlier stages**. We need to know the carbon content of our inputs

Indirect emissions and carbon content

E.g., how to calculate the specific carbon emissions in a car door?



All images © original owners via Unsplash and Creative Commons

Graph by courtesy of R. Kaplan and K. Ramanna

The hen and egg problem

What if we do not know the carbon content of our inputs?

Three types of answers:

- Try to understand your value chain and quantify direct emissions on each stage, then sum up

Drilling down the value chain: The tao of the GHG protocol

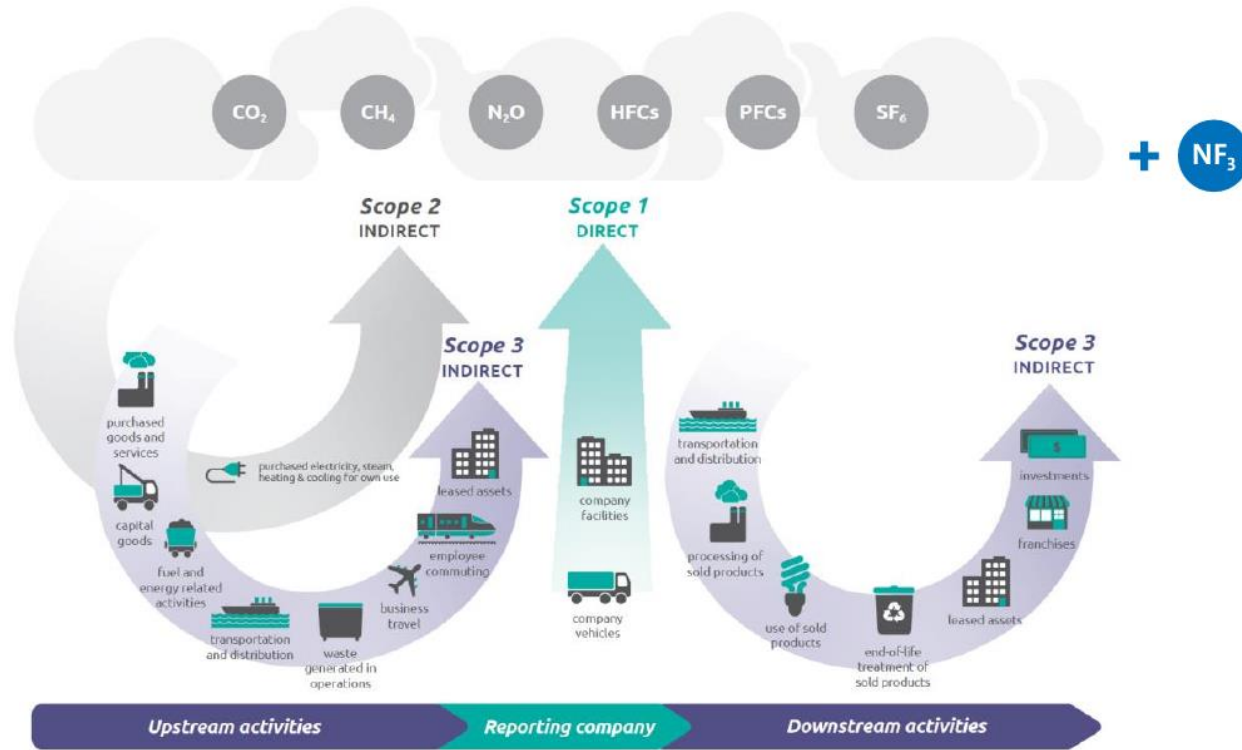
- Make your input provider give you the required information

Implicit knowledge: The tao of cumulative carbon accounting

- From knowledge of input requirements, solve for carbon content of all products in the system

Explicit knowledge: The tao of IO

The tao of GHG Protocol



Source: Greenhouse Gas Protocol (2011): *Corporate value chain (Scope 3) accounting and reporting standard*.



Taken from [Corporate Value Chain \(Scope 3\) Reporting Standard. Supplement to the GHG Protocol Corporate Accounting and Reporting Standard, WRI, 2011, p 5](#)

The tao of E-Liability -- cumulative carbon accounting

E-liability is the most prominent version of cumulative carbon accounting. Proposed and developed by **R. Kaplan (Harvard) and K. Ramanna (Oxford)** since 2021.

E-liability works straight from the definition of carbon content:

$$c_k = d_k + \sum_i c_i a_{ki} \quad (1)$$

Carbon content is cumulative, like VAT, thus carbon content information is passed through the system, from input provider to producer and further down the supply chain, to the end-user.

To allocate emissions to output, all standard methodology of cost accounting is used! Direct and indirect emissions are treated as an **accounting liability**.

Direct information from providers or own measurement have highest priority. Data gaps filled using estimates, eg from statistics.

The tao of Input-Output Analysis

If the c_i are unknown, equation (1) is **recursive**. It can actually be considered an **IO model**. On the level of large product groups, statisticians can solve for carbon contents simultaneously, taking into account all production interactions, both nationally and internationally.

IO tables for these interactions are provided by

- Eurostat (FIGARO)
- OECD (ICIO)
- IMF (MARIO, under development)
- As a result of academic endeavours

Main findings

- For **direct emissions, direct measurement** should have priority (incl. satellite recognition and measurement based on chemical composition)
- For **upstream indirect** emissions, priority should be with **communication by input providers**
- **Official Statistics can help to estimate Scope 2 and upstream Scope 3** data where no direct information from the supply chain is available
 - Emission data and Input-Output data within multi-regional Input-Output tables
 - Disaggregated information for industries where emission intensities are heterogeneous will enhance the quality of firm level estimates
 - Distinction between various modes of energy production needed
- **Official Statistics can set a good example for data compilation:**
 - Quality oriented accounting approach in macro statistics

Main findings

- **Official Statistics can benefit from disclosed micro data** (company or product level)
 - Limited availability of good and comparable micro data, as yet not fully used in statistics
 - Central Banks with their statistics machinery can play a pivotal role to improve the situation
 - Example from Europe: CSRD will make a wealth of company level data available. Joint initiative by Central Banks and Statistical Offices (common Task Force of the [Committee on Monetary, Financial and Balance of Payments statistics \(cmfb.org\)](#) and European Committee of Central Balance Sheet Data Offices ([ECCBSO](#))):
 - Keep track of regulatory and material developments; investigate use cases for official statistics
 - ECCBSO to collect company level CSRD data
- Using statistical data for filling data gaps on the micro level and using firm level information for official statistics generates an **interactive learning process** that converges to the true values, even if the starting values are poor (See [von Kalckreuth 2022](#) for a formal proof and [von Kalckreuth 2024](#) for a simulation based on US data).

Main findings

- ESG standard setters are willing to use statistical **classifications** (International Standard Industrial Classification of All Economic Activities (ISIC), Central Product Classification (CPC)) and the Harmonized Commodity Description and Coding System (Harmonized System, HS) for improved **consistency of micro and macro information**.
- **Quality of granular data** is crucial
Core principles for carbon accounting are under development (e.g. in the framework of the [E-liability approach](#)). Official statistics can provide input (e.g. bringing in dimensions of data quality, as expressed in the [Fundamental Principles of Official Statistics | UNECE](#)).

Statistics have a role to play!

New data needs and opportunities on several levels:

- **Industry level IO data on carbon contents** can be much better accessible and more granular than today
- Statistics can make available distributions on disclosed **company level data on emission intensities**, e.g. as a result of CSRD in Europe or the new IFRS reporting standards
- International data on **carbon contents of products** is needed as a **reference base for carbon accounting and CBAM**

Summary paper forthcoming, authored by Alessandra Alfieri (MF), Lauren Holloway (E-Liability Institute), Ulf von Kalckreuth (Deutsche Bundesbank), Stephan Moll, (formerly Eurostat), Christian Schmieder (BIS).

Statistics have a role to play!

Now is the time to get in contact with standard setters, firm level accountants and academia, at the

- international
- regional, and
- national level,

to prepare the production of reliable and micro / macro consistent data.