



ACCOUNTING FOR CARBON EMISSIONS: THE CASE FOR ALIGNMENT

WORKSHOP ON CARBON CONTENT

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Outline

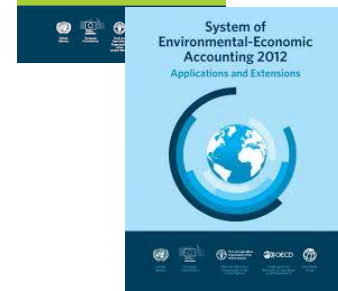
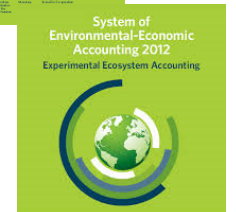
- International statistical approach
 - Measurement frameworks
 - Concept and definitions
 - Compilation practices
- What statisticians offer
 - National level
 - Global level
- Business accounting approaches
- What statisticians need
- Conclusions



Statistical Measurement Frameworks (1)

Different measurement frameworks serving different policy needs

- Emission inventories: **anthropogenic** emissions from sectors / sources
 - Based on IPCC Guidelines, in support of UNFCCC
 - Part of environment statistics
- Air Emissions Accounts (AEAs): emissions due to **economic activities / production**
 - Based on SEEA, aligned with SNA principles
 - Part of the environmental-economic accounts / national accounts
- Carbon account: measure stocks and flows of the **carbon cycle**
 - Capture all factual **emissions** include “natural” emissions (e.g. forest fires)
 - Part of ecosystem accounts
- Carbon footprints: measure emissions embodied in **final demand**
 - Application of AEAs using Multi Regional Input-Output Tables (MRIOs)



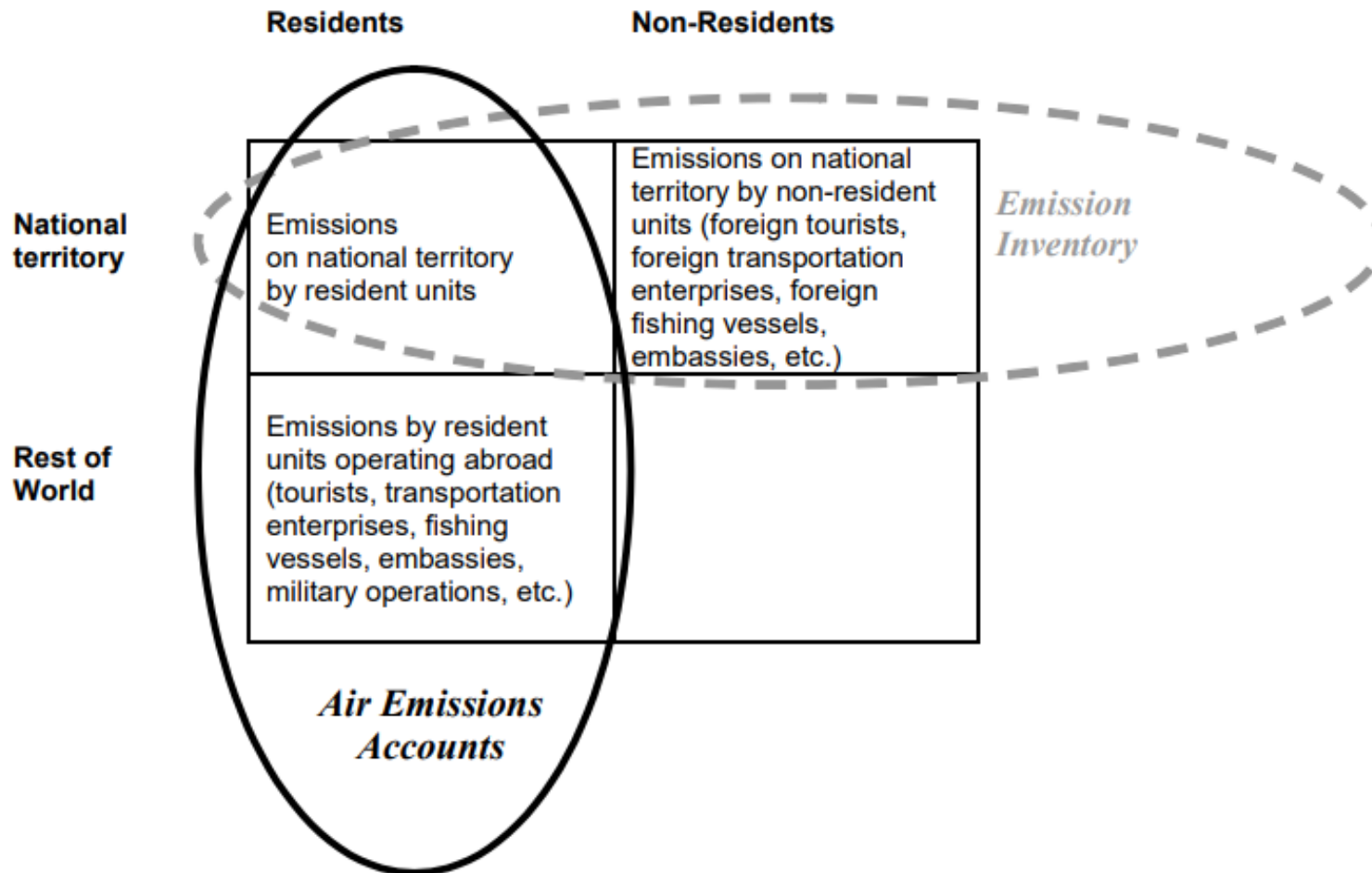


Statistical Measurement frameworks (2)

- Different concepts
 - Territory (inventories) vs. residence (SEEA)
 - Differences due to international transport and international tourism
- Different classifications
 - IPCC Sectors (CRF categories)
 - Economic activities (ISIC / NACE)
 - Difference treatment for instance of transport-based emissions (functional vs activity allocation)
- Different scope / treatment for:
 - Land Use Land Use Change and Forestry (LULUCF)
 - Included in inventories; excluded in AEA
 - Carbon sequestration: included in inventories, excluded in AEA, included in carbon accounts
 - Short-cyclic carbon excluded from inventories, included in factual emissions
 - Biofuels (combustion):
 - Included in AEA but recorded separately, excluded from IPCC totals



Residence vs territory



AEAs:

- Emissions by units are allocated based on the residence of the economic unit regardless of where emissions actually occur

An example:

- Airline resident in country A, may fuel in country B, flying to C. Emissions attributed to A
- Private car used for holidays operated / owned by family resident in A

Why?

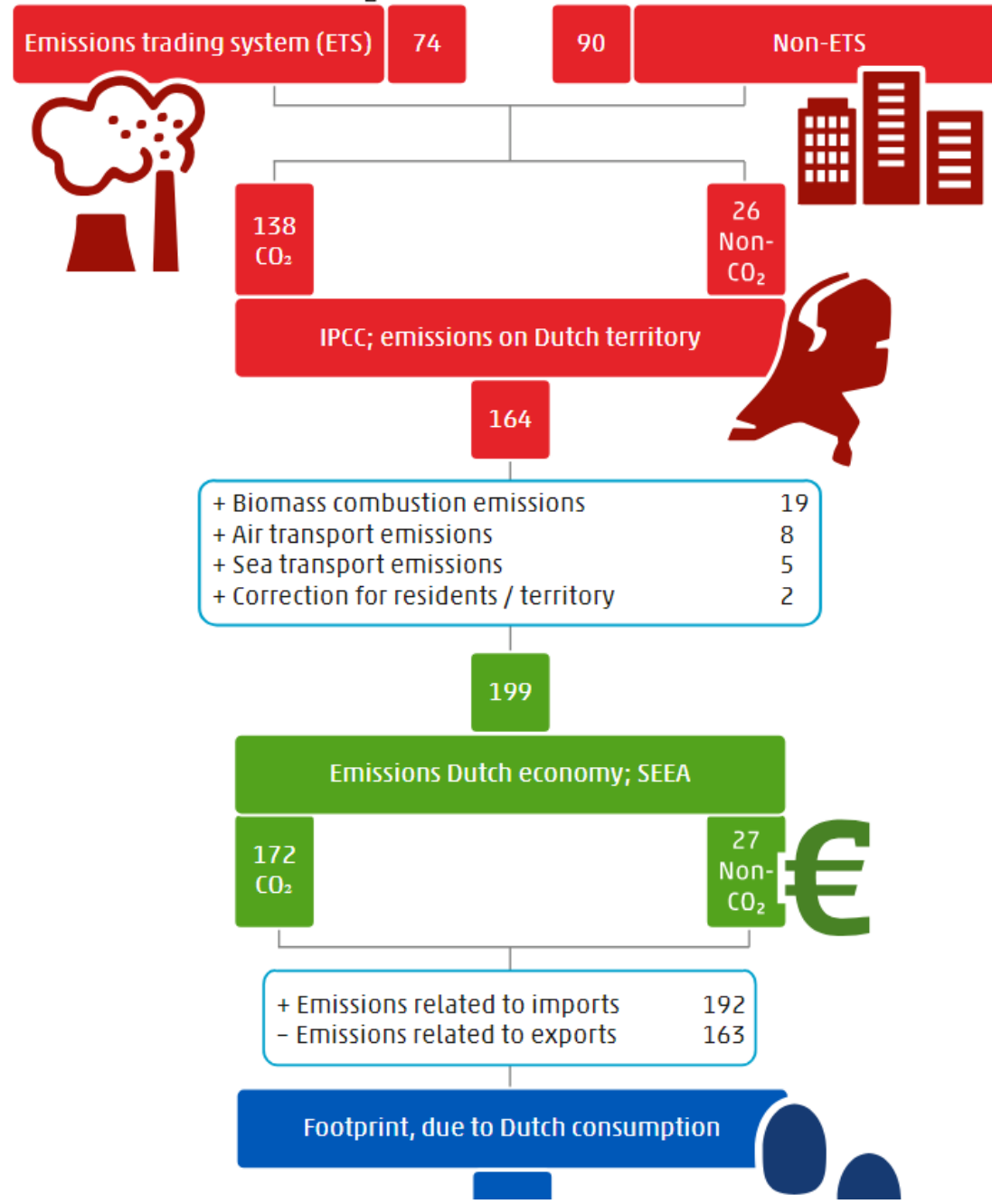
- Valued added is attributed to country A



Bridge table

- Different measurement frameworks confusing for users
- Best practice: Developed bridge tables to explain these differences
- Differences can be significant for some countries

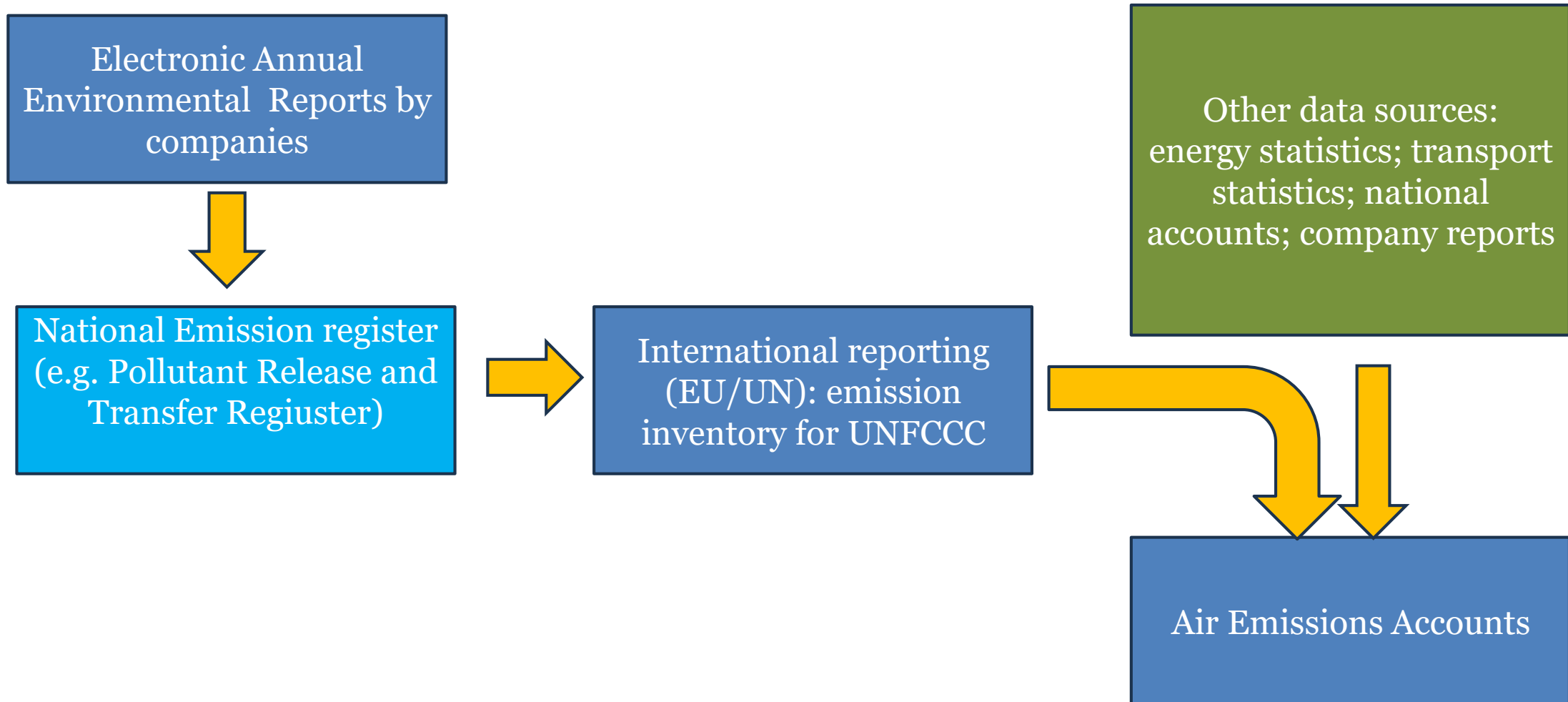
Greenhouse gas emissions according to different frameworks, 2020 (megatonnes of CO₂ equivalents)



Source:
<https://www.cbs.nl/en-gb/news/2022/06/urgenda-reduction-target-for-ghg-emissions-achieved-in-2020>



Compilation: Typical Data Flow





What statisticians offer – national level

- Official statistics based on statistical standards
 - Clear principles + concepts -> **no double counting**
 - Based on clear statistical units / business register
- Comprehensive, also include other environmental themes
 - Such as: fine dust / ozone / nitrification
- Improvements made last couple of years in timeliness:
 - Currently also producing Q-AEAs
- Remains a macro-approach:
 - Good for national + activity level
 - Insufficient for product level accounting



What statisticians offer – international level

- Multi-Regional Input-Output databases
 - Various MRIOs exist (ICIO at OECD; FIGARO at Eurostat)
 - Different footprints -> GIANT initiative
 - Harmonize input data used
 - Perhaps (in later stage) harmonize further
- Working towards global databases
 - GHG emissions by source (based on inventories)
 - In 2023 started global data collection of AEAs and PEFA
- Analytical global databases (OECD)
 - Maritime emissions
 - Aviation emissions



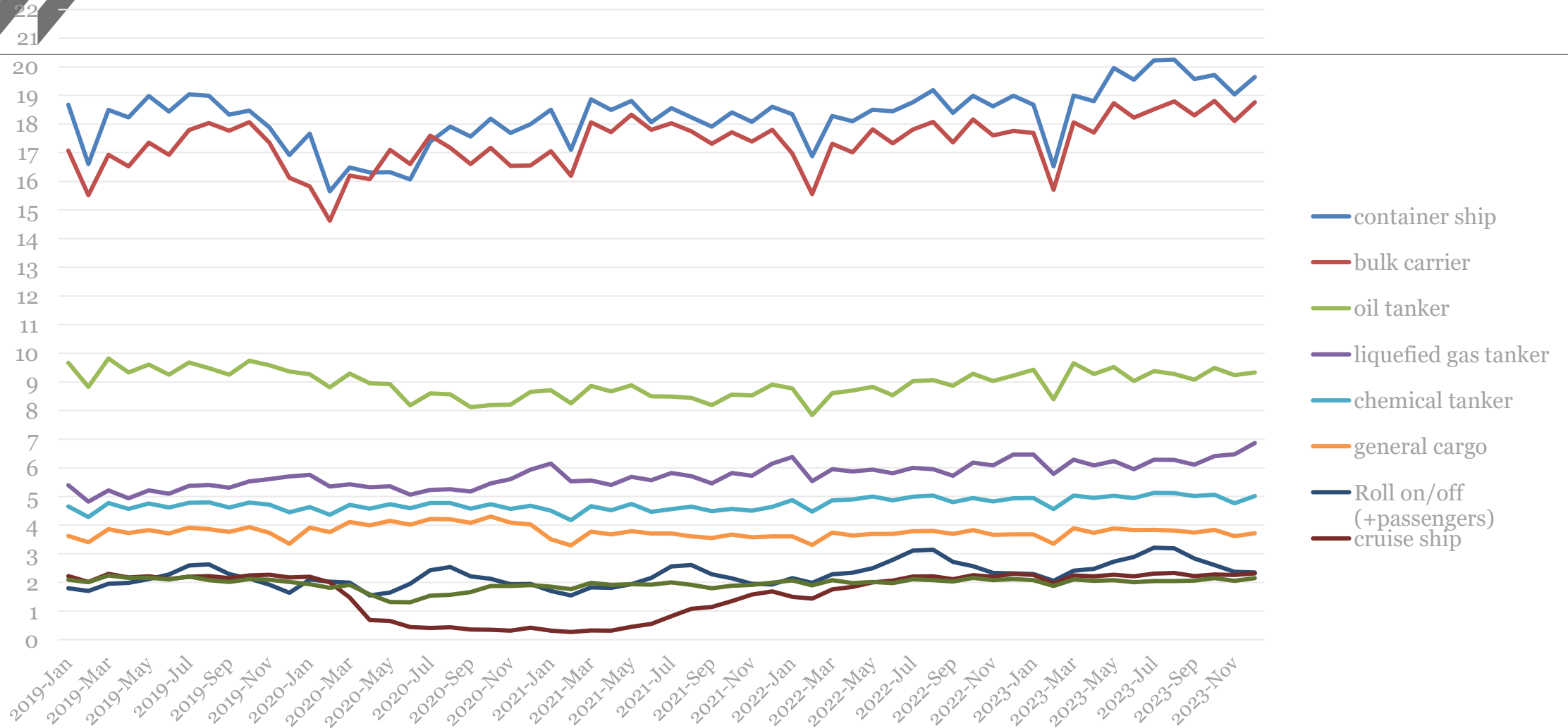
Global database on maritime emissions (experimental)

- Total CO₂ emissions = **distance** * **emissions per nautical mile**
 - For each country + OECD + World (published)
 - For each vessel type at global level (published)
 - For each shipping operator (**not published**)
 - For vessel types by country (**not published**)
- This requires two types of information...
 - **Distance** comes from AIS (Automated Identification System)
 - Access to the AIS is via the UN Global Platform
 - **Emissions per nautical mile** comes from EU-MRV dataset for EEA ships; for other ships, modelled using AIS and other datasets
 - Random forest regression model; accuracy about 85 %
- Emission allocated based on residence of the operator
- Monthly disaggregation (updated quarterly)





CO2 emissions from global shipping by vessel type Jan 2019 to Dec 2023 (million tonnes CO2)



Source: OECD Maritime transport CO2 emissions (experimental)

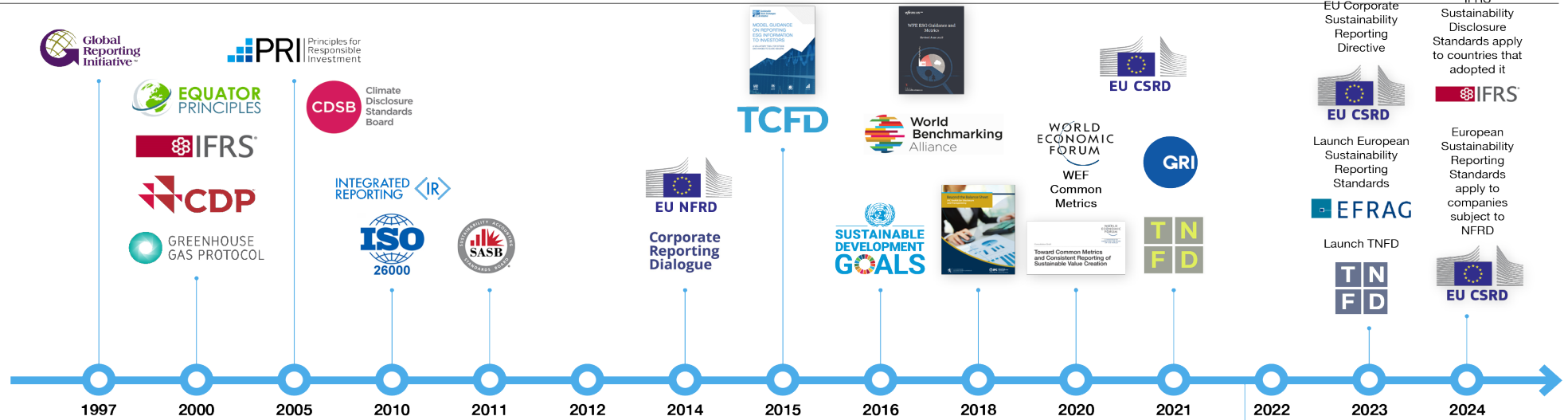


Business accounting (ESG) approaches

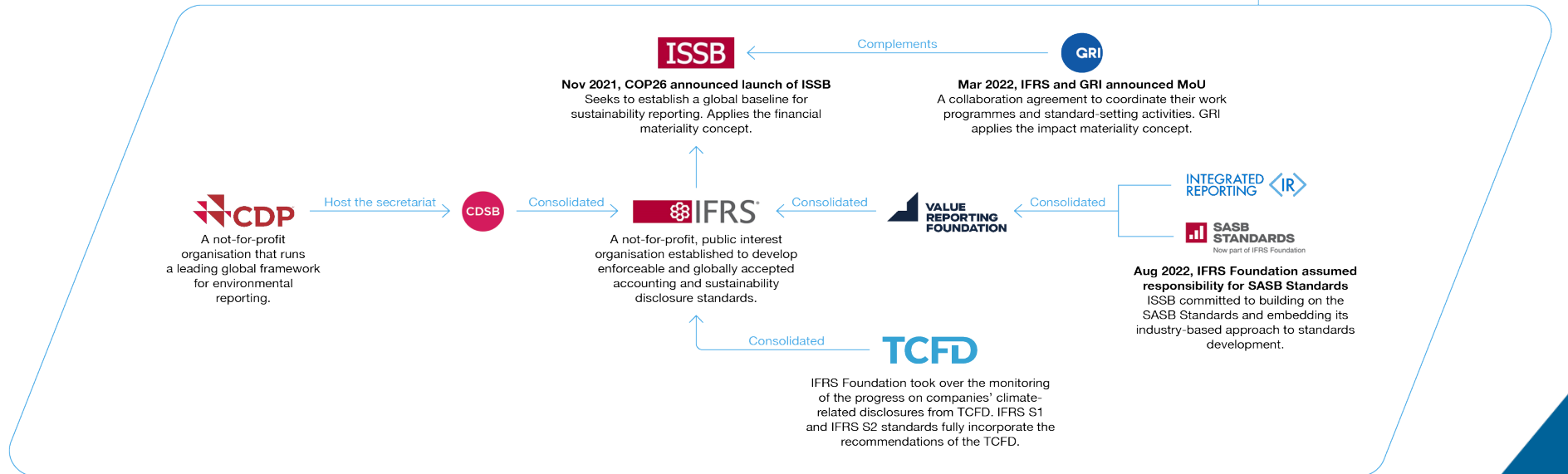
- Complex (and evolving) landscape
 - GHG protocol
 - Global Reporting Initiative standards (specifically GRI 305)
 - ISO standards
 - Task Force on Climate Related Financial Disclosures (TCFD)
 - IFRS standards (specifically IFRS S2)
 - Regulatory frameworks (e.g. EU CSRD)
- Different views what “standard” means
 - Statistical community: single standard
 - ESG community -> multiple standards (and standard setters), external disclosure is highest category



Pathway to ESG disclosure going mainstream



Source:
[Understanding the Global Reporting Frameworks | IFC Beyond the Balance Sheet](#)





Needs from a statistical perspective?

- Additional data sources are very welcome!
- Statistics needs data sources that are **stable** / **comparable** over time
- Clear on definition of **reporting units** / what do we mean with company reporting?
 - Establishment, enterprise, enterprise group
 - Data needs to be linkable to the business register
- **Scope**
 - Common in ESG reporting to distinguish
 - Scope 1: direct
 - Scope 2: indirect emissions associated with production of electricity / heat
 - Scope 3: supply chain (downstream/upstream)
 - But Scope 2 and scope 3 lead to double counting, need separate reporting of scope 1.
- Principles for disclosure
 - ESG uses **materiality** whereas statisticians use **thresholds**;
 - Latter are absolute and provide easier indication of what we need to impute



Conclusions

- Different measurement frameworks exist
 - Bridge tables to explain differences to users
 - Emission statistics / accounts suitable for country + activity level, less so for product level
- Statistical community
 - Highly developed statistical standards
 - Complementarity between national + global level
- Standardisation of business reporting
 - Opportunities for new data sources
 - However, alignment with statistical concepts, units, measurement principles is important