

G20
**DATA GAPS
INITIATIVE 3**

Recommendation 2: Energy Accounts

G20 DGI-3 GLOBAL CONFERENCE: 13 JUNE 2023 – SESSION II

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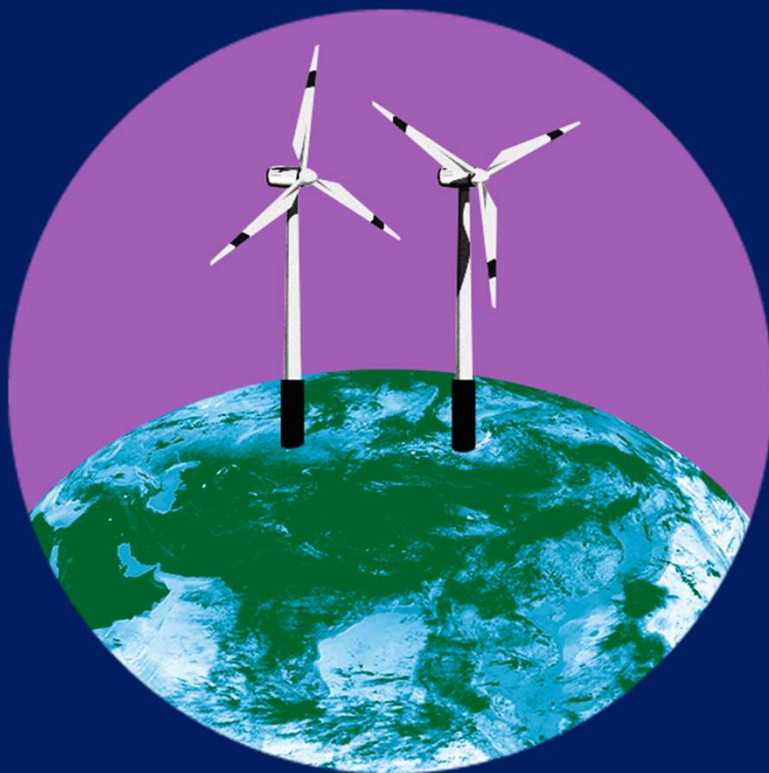
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- Statistical framework underlying Recommendation 2
- The SEEA Central Framework: SEEA - Energy
- Final thoughts



Recommendation 2 - Energy Accounts

Recommendation 2: Energy Accounts

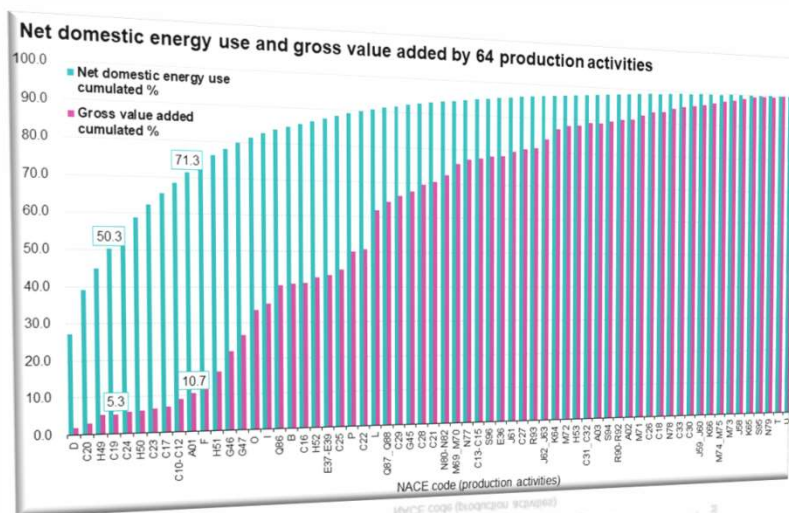


- Transformation of the energy sector is key to addressing climate change.
- To achieve Nationally Determined Contributions (NDCs) defined under the Paris Agreement, policymakers will need to employ policies to facilitate the energy transition towards a low carbon economy.
- **Energy accounts** can be used to monitor the energy mix (including the share of renewable energy sources) used by economic activities in production, energy transformation and final consumption.
- Energy accounts allow for the calculation of energy intensities (by economic activities), calculating multipliers, energy footprints, or performing structural decomposition analysis.

Targets and Requirements for Recommendation 2

Develop and disseminate annual **SEEA-CF based energy accounts** for **2015 to YTD – 2**, expressed in terajoules which include:

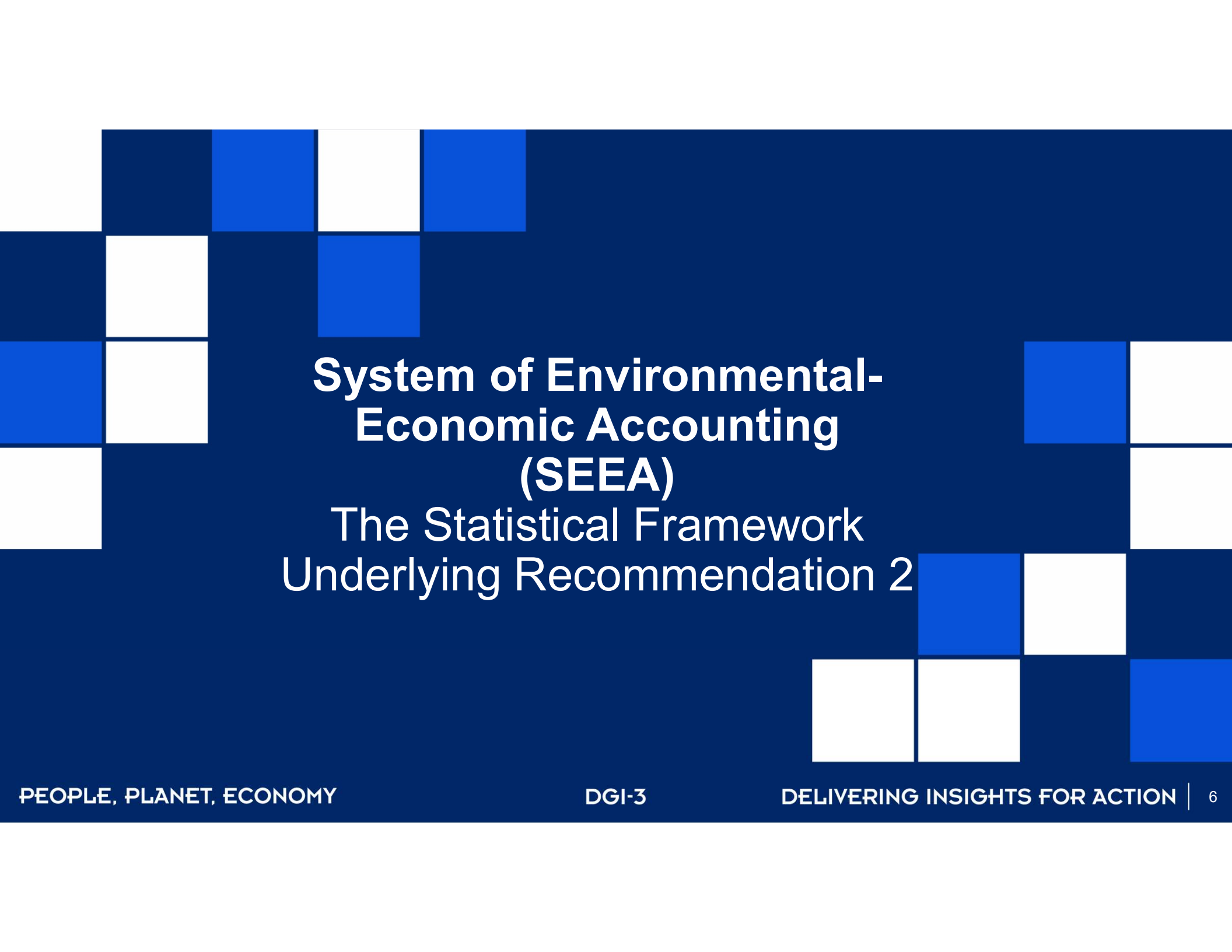
- **Natural energy inputs** (e.g., fossil energy production and renewable production).
- **Energy products** (e.g., hard coal; brown coal and peat; crude oil; natural gas, etc.).
- **Residuals** (e.g., losses during extraction, distribution, storage and transformation).



Source: Eurostat

Key indicators derived from energy accounts:

- Extraction of natural inputs by economic activities
- Domestic production of energy products
- Intermediate consumption of energy products
- Use of waste for energy purposes
- Net domestic energy use
- Share of renewable energy over total energy consumption

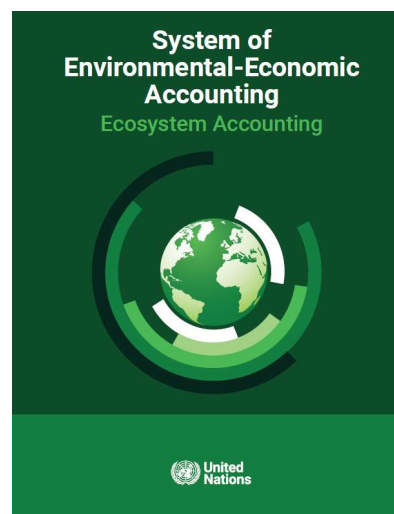
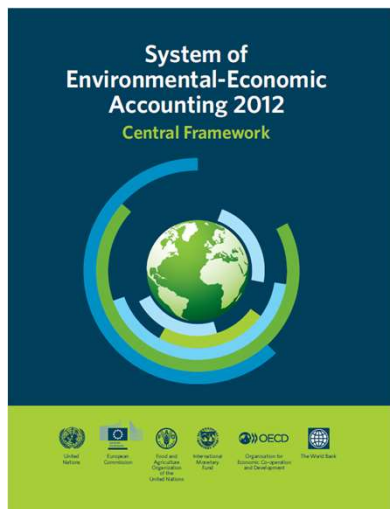


System of Environmental- Economic Accounting (SEEA)

The Statistical Framework Underlying Recommendation 2

Why SEEA?

The SEEA is a statistical standard adopted by the UN Statistical Commission



Brings together environmental and economic data using the same accounting principles of the SNA



Credibility, reliability, replicability of data



Consistency over time and space

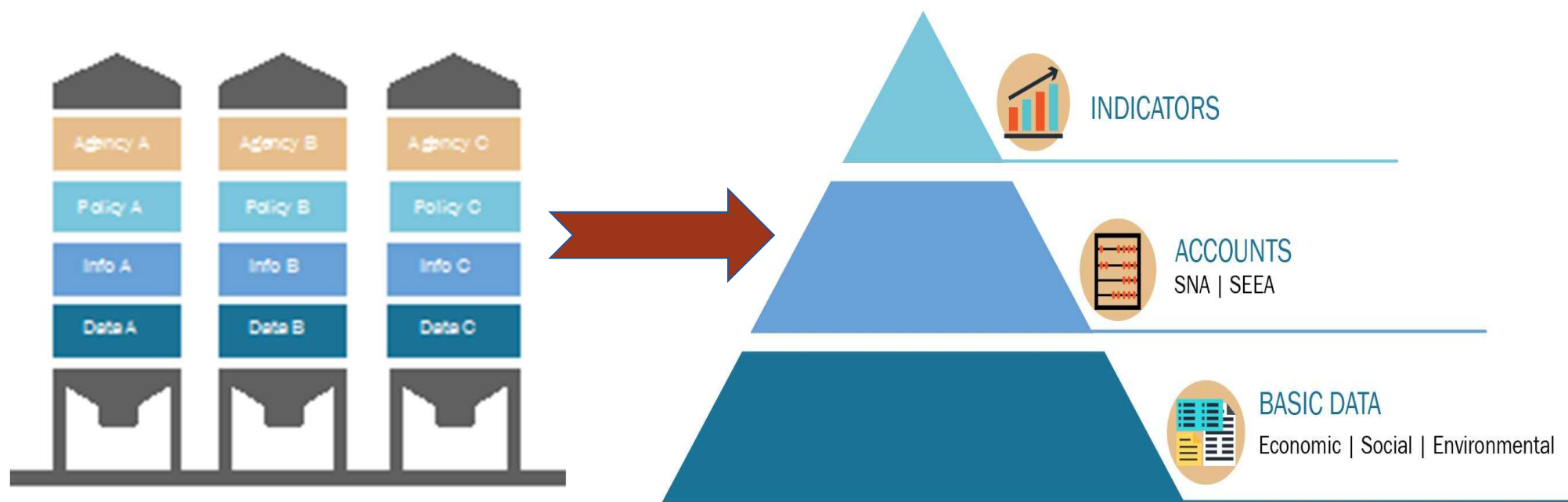


Common language between different communities



Breaks down silos and fosters collaboration

From Silos to Integrated Information



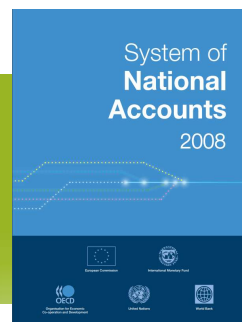
SEEA - Integrating Many Data Sets Using an Accounting Approach

- SEEA accounts can rely up to numerous data sources, covering for energy accounts, such areas as
 - economy
 - energy
 - transport (i.e., air, water, etc.)
 - tourism
- These data sources are combined to produce an integrated set of accounts and develop policy relevant indicators

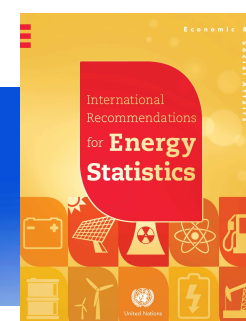
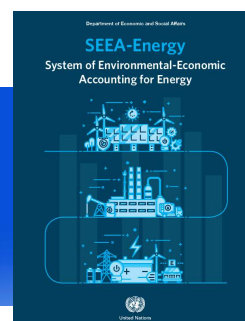


Publications and Resources

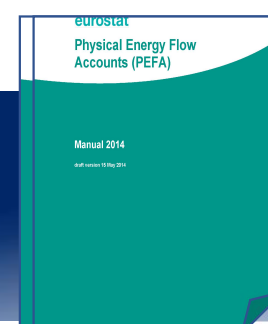
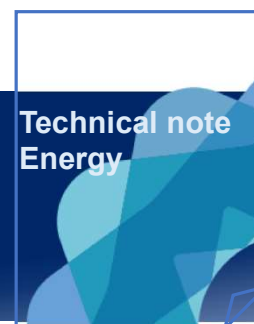
International Statistical Standards and Recommendations



International Energy Standards and Recommendations



Manuals Guidelines Technical notes Compilation resources



Important Concepts - Classifications

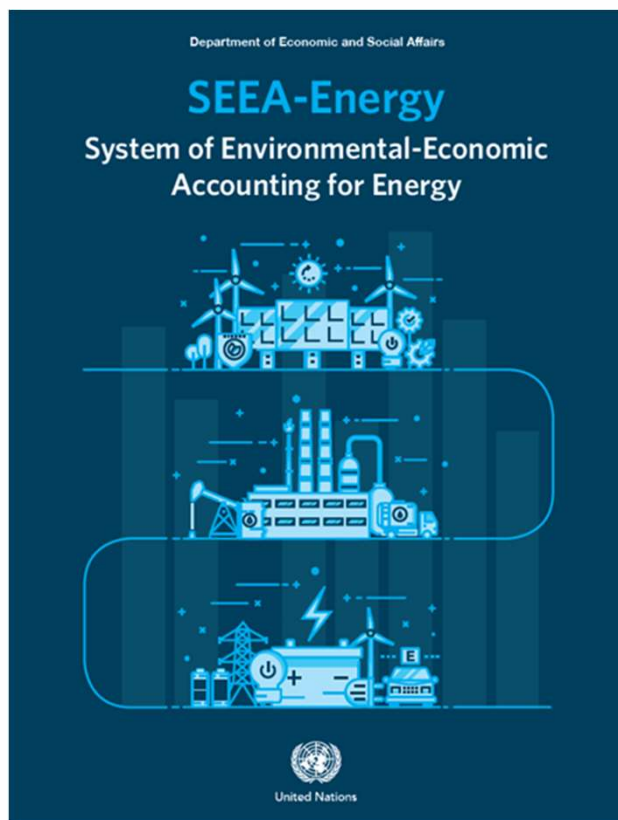
- The International Standard Industrial Classification of All Economic Activities (ISIC)
- Central Product Classification (CPC) - currently under revision]
- Standard International Energy Classification (SIEC) - currently under revision
- Classification of Environmental Function (being finalized)
- Classification of physical flows
- Classification of assets





SEEA- Energy

The SEEA-Energy Accounts



▪ **Flow accounts:** supply and use tables for products, natural inputs and residuals (e.g., dissipative heat, flaring, venting) generated by economic activities.

- Physical (e.g., terajoules)
- Monetary values (e.g., permits, final consumption expenditures of households on energy, etc.)

▪ **Activity / purpose accounts** that explicitly identify environmental transactions already existing in the SNA

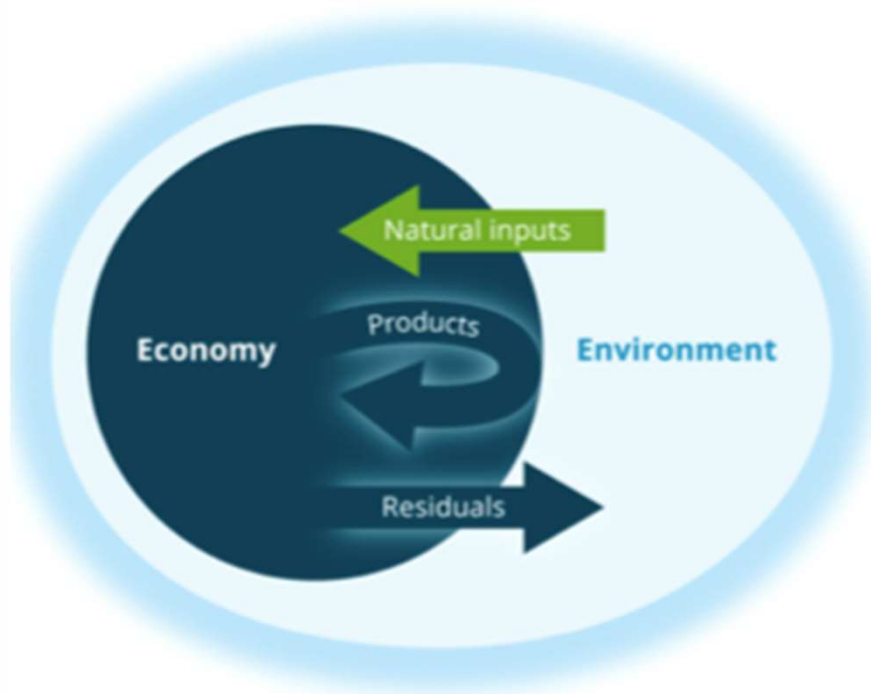
- Expenditures for environmental protection and management
- Environmental taxes (energy taxes)
- Environmental subsidies for renewable energy
- Environmental Goods and Services Sector

▪ **Stock accounts** for environmental assets:

- Physical (e.g., mineral and energy stocks and changes in stocks)
- Monetary values (e.g., value of energy resources, depletion)

Flows of Energy in Physical Energy Flow Accounts (PEFA)

Recommendation 2



- **Natural inputs**
 - Energy resources in the environment which can be extracted/captured
- **Energy products**
 - Products exclusively or mainly used as a source of energy
 - Include fuels produced/generated, electricity and heat
- **Energy residuals**
 - Flows of energy that are discarded, discharged or emitted by establishments and households

Scope of the Economy in SEEA-Energy and PEFA

	Residents	Non-residents	
National territory	Sold on territory to resident units	Sold on territory to non-residents (foreign tourists, transport companies, embassies)	Energy statistics and balances
Rest of the world	Sold to residents operating abroad (tourists, transport companies, etc.)		
	SEEA-Energy		

- In accordance with the System of National Accounts and SEEA-Central Framework, the scope of SEEA-Energy covers the economic activity of resident units
- Resident of a country = institutional unit with centre of economic interest in the economic territory of a country
- Resident units can operate inside or outside of the national territory
- Use of residence principle is in contrast to energy statistics and balances

Flow Accounts: Monetary Supply and Use Table - SNA

Supply table							
	Industries	Households	Government	Accumulation	Rest of the world	Environment	Total
Products	Output				Imports		Total supply of products
Use table							
	Industries	Households	Government	Accumulation	Rest of the world	Environment	Total
Products	Intermediate consumption	Household final consumption expenditure	Govt. final consumption expenditure	Gross capital formation (incl. changes in inventories)	Exports		Total use of products
Value added							

Flow Accounts: Monetary Supply and Use Table - SNA

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SEEA Flow Accounts

Supply table							
	Industries	Households	Government	Accumulation	Rest of the world	Environment	Total
Products	Output				Imports		Total supply of products
Use table							
	Industries	Households	Government	Accumulation	Rest of the world	Environment	Total
Products	Intermediate consumption	Household final consumption expenditure	Govt. final consumption expenditure	Gross capital formation (incl. changes in inventories)	Exports		Total use of products
Value added							

Flow Accounts: Physical Supply and Use Table

Supply table						
	Industries	Households	Accumulation	Rest of the world	Environment	Total supply
Natural Inputs					Flows from the environment	Total supply of natural inputs
Products	Output			Imports		Total supply of products
Residuals	Residuals generated by industry	Residuals generated by final household consumption	Residuals from accumulation	Residuals from the rest of the world	Residuals from the environment	Total supply of residuals

Use table (Transformation and End-use)						
	Industries	Households	Accumulation	Rest of the World	Environment	Total Use
Natural Inputs	Extraction from natural inputs					Total use from natural inputs
Products	Intermediate consumption	Household final consumption	Changes in inventories	Exports		Total end use of products
Residuals	Collection and treatment of residuals		Accumulation of residuals	Residuals sent to the rest of the world	Residuals flows direct to the environment	Total use of residuals

Flow Accounts: Transformation and End-Use of Energy

Transformation use table							End-use table							
	Industries	Households	Accumulation	Rest of the world	Environment	Total		Industries	Households	Accumulation	Rest of the world	Environment	Total	
Natural Inputs	Extraction natural inputs	Records transformation of energy products into other energy products					Natural Inputs		Records the use of energy products to produce goods and services that are not energy products and the final consumption					Total use from natural inputs
Products	Intermediate consumption					Total transformation use	Products	Industry consumption	Household consumption	Changes in inventories	Exports		Total end use of products	
Residuals	Waste use				Transformation losses	Total transformation residuals	Residuals	End-use of residuals	End-use of individuals	End-use of institutions	End-use of the env.	Residuals to the env.	Total end use or residuals	

Use table (Transformation and End-use)						
	Industries	Households	Accumulation	Rest of the World	Environment	Total Use
Natural Inputs	Extraction from natural inputs					Total use from natural inputs
Products	Intermediate consumption	Household final consumption	Changes in inventories	Exports		Total end use of products
Residuals	Collection and treatment of residuals		Accumulation of residuals	Residuals sent to the rest of the world	Residuals flows direct to the environment	Total use of residuals

Flow Accounts: Physical Supply and Use Table

Supply table						
	Industries	Households	Accumulation	Rest of the world	Environment	Total
Natural Inputs					Flows from the environment	Total supply
Products	Output			Imports		Total supply of products
Residuals	Residuals generated by industry	Residuals generated by household consumption	Residuals from accumulation	Residuals received from the rest of the world	Residuals recovered from the environment	Total supply of residuals

Use table (Transformation and End-use)						
	Industries	Households	Accumulation	Rest of the World	Environment	Total Use
Natural Inputs	Extraction from natural inputs					Total use from natural inputs
Products	Intermediate consumption	Household final consumption	Changes in inventories	Exports		Total end use of products
Residuals	Collection and treatment of residuals		Accumulation of residuals	Residuals sent to the rest of the world	Residuals flows direct to the environment	Total use of residuals



Examples

Energy Accounts in Denmark

- Yearly physical (PJ) and monetary (DKK) supply and use tables
- Analytical tables
 - Energy multipliers (domestic energy footprint)
 - Renewable energy share of energy consumption
- The monetary accounts are fed directly into the *national accounts supply and use tables*
- The physical energy accounts are used for estimation of air emissions accounts and material flow accounts
- SDG indicators are derived from the energy accounts (e.g. SDG 7.2.1 Renewable energy share in total final energy consumption)
- Energy accounts are based on energy statistics, but parts of the accounts are also used for the yearly energy statistics

- Environmental-economic accounts
 - Natural resource accounts
 - Green economy
 - Energy and air emission accounts

www.statbank.dk/20293

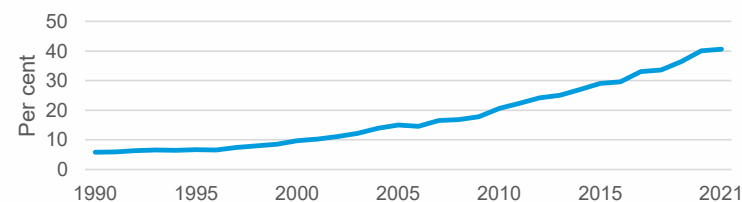
Energy accounts

ENE3H	Gross energy consumption in GJ by industry and type of energy (1966-2021)
ENE1HO	Energy Account in specific units (summary table) by supply and use and type of energy (1966-2021)
ENE1HT	Energy Account in specific units (detailed table) by supply and type of energy (1966-2021)
ENE1HA	Energy Account in specific units (detailed table) by use and type of energy (1966-2021)
ENE2HO	Energy Account in GJ (summary table) by supply and use and type of energy (1966-2021)
ENE2HT	Energy Account in GJ (detailed table) by supply and type of energy (1966-2021)
ENE2HA	Energy Account in GJ (detailed table) by use and type of energy (1966-2021)
SDG07021	Renewable energy's share of total gross energy consumption (1990-2021)

Energy multipliers

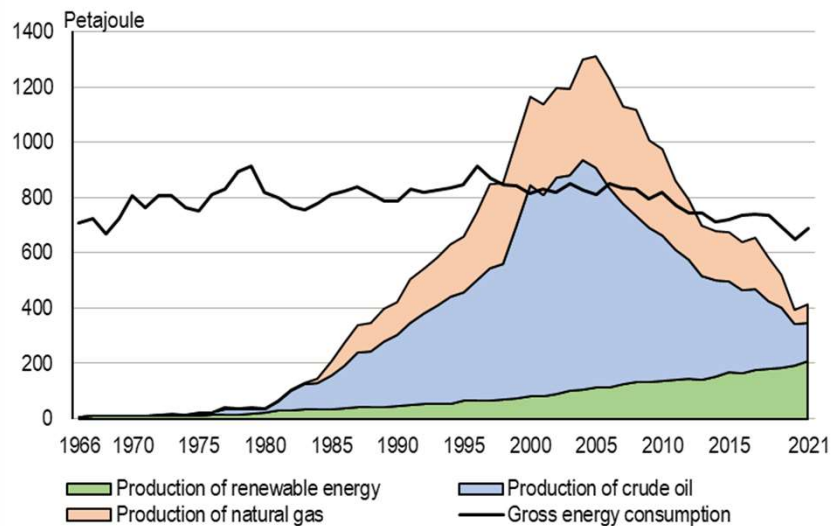
ENE2MU1	Direct and indirect use of energy by industry and type of energy (1990-2021)
ENE2MU2	Direct and indirect use of energy by final demand and type of energy (1990-2021)
ENE2MU3	Use of energy caused by final demand, by industry and type of energy (1990-2021)

SDG 7.2.1 Renewable energy share in the total final energy consumption

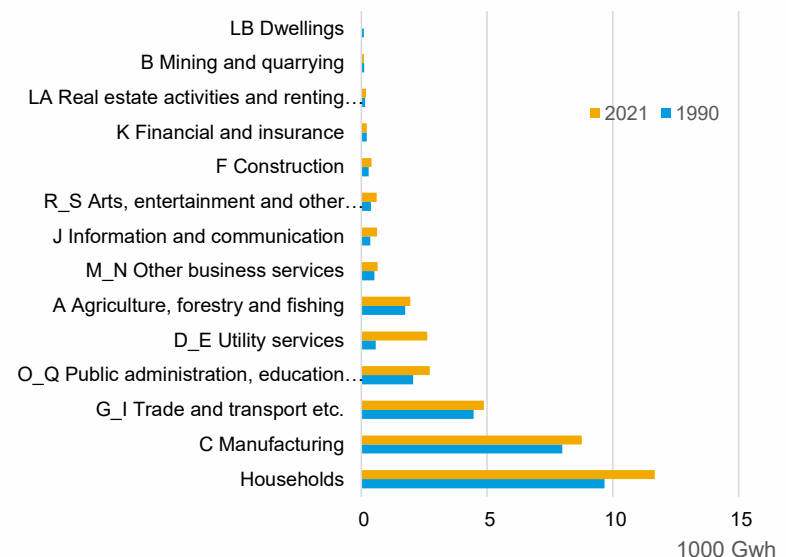


Danish energy accounts with long time series and industrial breakdown provide users with an excellent overview of the development and structure of energy production and consumption

Danish energy production and consumption 1966-2021



Electricity consumption 1990 and 2021



Source: Energy accounts, Statistics Denmark

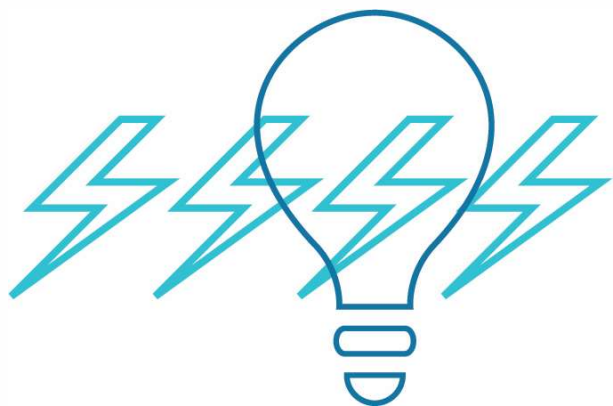
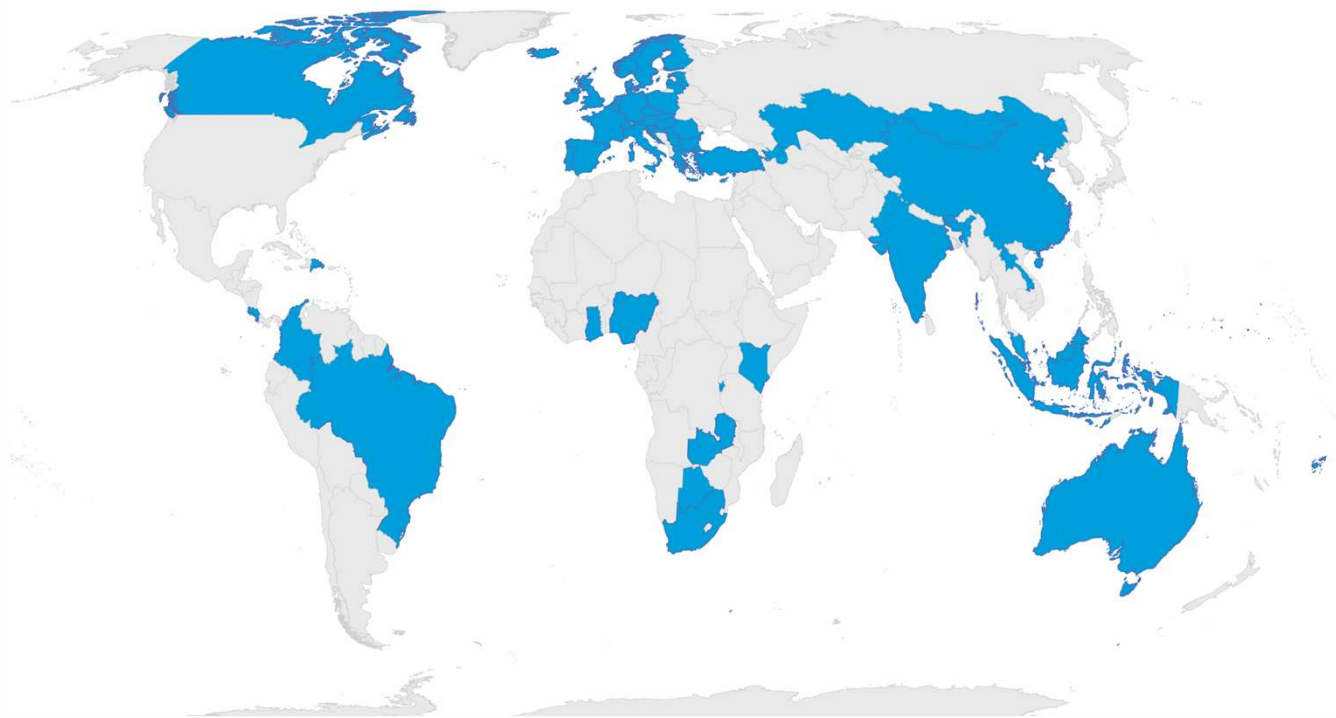


Final Thoughts

Countries Compiling Energy Accounts

2022 Global Assessment on Environmental-Economic Accounts (UNSD, 2023)

60 countries
compile energy
accounts around
the world



Global Data Collection

- Development of global SEEA databases is a priority for the UN Committee of Experts on Environmental-Economic Accounting (UNCEEAA)
- Joint exercise between UNSD and OECD, in collaboration with the wider UNCEEAA Working Group on Global Databases
- **Physical energy flow accounts (PEFA)** identified as one of the priority areas for global data collection, given its broad policy relevance, including for the Sustainable Development Goals (SDGs). Other priorities are **air emissions accounts (AEA)**, land, water, material flows.
- UNSD launched data collection of PEFA and AEA in the Q1-2023 and OECD will launch in Q3-2023.
 - Global questionnaires developed using Eurostat's as a starting point.
 - Questionnaires have three tiers.
- Current focus on collecting data from countries which already have national PEFA accounts but do not yet report data to an international organization

Challenges

Technical challenges

- Issue of consistency
 - Classifications (CPC, HS, SIEC)
 - Estimation models
 - Use of different units (joules, tonnes, GwH) / issues in conversion
- Data adjustments
 - Territory to residence principle
 - Difficulty of determining the energy use by resident units abroad and by non-resident units in the territory
 - Transport
 - Allocation of energy use to certain sectors
- Difficulty calculating the energy use by households not connected to the grid.

Strategic challenges

- Absence of energy data in statistical plans and national statistical strategies
- General data governance issues (e.g. lack of institutional arrangements, data exchange, and legal framework)
- Lack of skilled human resources (or turnover)
- General lack of digitalization:
 - Large amount of energy data may be collected using paper forms
 - Obsolete IT systems combined with lack of skilled staff hinder adoption of new technologies
 - Lack of standard approaches to integrate information from microdata and emerging technologies

Thank you!

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