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Development of energy accounts in Finland

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Energy accounts in the EU

- Physical Energy Flow Accounts are one module of environmental accounting regulation of the EU
- The module came into force in 2014, and accounts on years 2014 and 2015 have to be reported to Eurostat in 2017

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Physical Energy Flow Accounts (PEFA) 1(2)

- Supply-use tables including all energy forms and fuels
- Basic structure adopted from the System of Environmental-Economic Accounting (SEEA)
  - Natural inputs, products, residuals; more than 100 items
  - All branches of industry (NACE A*64), households, accumulation, import and export, environment
- Unit: Terajoule

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Physical Energy Flow Accounts (PEFA) 2(2)

- Supply and use of energy are balanced
- The main differences with respect to energy statistics:
  - Branches of industry highly disaggregated, especially in manufacturing industries and services
  - Private transport is included in the household sector
  - Residence principle as in National Accounts
  - Environmental aspect

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Energy flows

- **NATURAL INPUTS (RESOURCE FLOWS, energy statistics classification)**
  - **Non Renewables**
    - Uranium and thorium ores
    - Hard coal
    - Lignite/Brown coal
    - Peat
    - Crude oil
    - Natural gas liquids
    - Other hydrocarbons
    - Natural gas
  - **Renewables**
    - Hydro power
    - Wind power
    - Solar thermal (resource: solar radiation)
    - Solar PV (resource: solar radiation)
    - Tide, Wave and Ocean
    - Geothermal energy
    - Biomass for energy use

- **PRODUCTS (PRODUCT FLOWS, CPA classification)**
  - Wood, wood waste and other solid biomass
  - Hard coal
  - Lignite, peat and derivatives
  - Crude oil
  - …
  - Coke
  - Motor spirit
  - Kerosenes and jet fuels
  - Gas/Diesel oil
  - Liquid biofuels
  - …
  - Electrical energy
  - Derived gases
  - Biogas
  - Derived heat
  - …
  - Municipal wastes (renewables, non-renewables)
  - Industrial wastes
- **RESIDUALS (RESIDUAL FLOWS)**
  - Waste
  - Losses during distribution/transport
  - Losses during transformation
  - Dissipative heat or end use losses
  - …

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Branches of industry (NACE rev.2)

NACE code	Branch of industry
A01	Crop and animal production, hunting and related service activities
A02	Forestry and logging
A03	Fishing and aquaculture
B05	Mining of coal and lignite
B06	Extraction of crude petroleum and natural gas
B07	Mining of metal ores
B08	Other mining and quarrying
B09	Mining support service activities
C10_C12	Manufacture of food products, beverages and tobacco products
C13-C15	Manufacture of textiles, wearing apparel and leather products
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
C17	Manufacture of paper and paper products
C18	Printing and reproduction of recorded media
C19	Manufacture of coke and refined petroleum products
C20	Manufacture of chemicals and chemical products
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
C22	Manufacture of rubber and plastic products
C23	Manufacture of other non-metallic mineral products
C24_FER	Manufacture of basic iron and steel and of ferro-alloys; of tubes, pipes, hollow profiles, related fittings and other products of first processing of steel; casting of iron and steel
C24_NFER	Manufacture of basic precious and other non-ferrous metals; casting of light metals and other non-ferrous metals
C25	Manufacture of fabricated metal products, except machinery and equipment
C26	Manufacture of computer, electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C29	Manufacture of motor vehicles, trailers and semi-trailers
C30	Manufacture of other transport equipment
C31_C32	Manufacture of furniture; other manufacturing
C33	Repair and installation of machinery and equipment
D	Electricity, gas, steam and air conditioning supply
E36	Water collection, treatment and supply
E37-E39	Sewerage, waste management, remediation activities
F	Construction
G45	Wholesale and retail trade and repair of motor vehicles and motorcycles
G46	Wholesale trade, except of motor vehicles and motorcycles
G47	Retail trade, except of motor vehicles and motorcycles
H49	Land transport and transport via pipelines
H501_H502	Sea and coastal water transport

NACE code	Branch of industry
H503_H504	Inland water transport
H51	Air transport
H52	Warehousing and support activities for transportation
H53	Postal and courier activities
I	Accommodation and food service activities
J58	Publishing activities
J59_J60	Motion picture, video, television programme production; programming and broadcasting activities
J61	Telecommunications
J62_J63	Computer programming, consultancy, and information service activities
K64	Financial service activities, except insurance and pension funding
K65	Insurance, reinsurance and pension funding, except compulsory social security
K66	Activities auxiliary to financial services and insurance activities
L	Real estate activities
M69_M70	Legal and accounting activities; activities of head offices; management consultancy
M71	Architectural and engineering activities; technical testing and analysis
M72	Scientific research and development
M73	Advertising and market research
M74_M75	Other professional, scientific and technical activities; veterinary activities
N77	Rental and leasing activities
N78	Employment activities
N79	Travel agency, tour operator reservation service and related activities
N80-N82	Security and investigation, service and landscape, office administrative and support
O	Public administration and defence; compulsory social security
P	Education
Q86	Human health activities
Q87_Q88	Residential care activities and social work activities without accommodation
R90-R92	Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities
R93	Sports activities and amusement and recreation activities
S94	Activities of membership organisations
S95	Repair of computers and personal and household goods
S96	Other personal service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organisations and bodies

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Energy accounts in Finland

- Energy accounts were the first application of Natural resource accounting compiled at Statistics Finland in late 1980s, on 1985 data
- The application was updated in 1995, on 1990 data
- Project on energy accounts in Finland started in spring 2012

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Project organisation

- Project group consists of experts on
  - environmental accounts
  - energy statistics
  - air emission statistics and accounts
  - monetary supply-use tables
- Units represented in the steering group
  - Environment and Energy Statistics
  - Greenhouse Gas Inventory
  - National Accounts

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Objectives

- Develop a methodology to compile energy accounts regularly
- Compatibility with other modules of physical and monetary environmental accounts (e.g. air emission accounts) and energy statistics (note: conceptual differences)
- Compilation system of physical supply and use tables for energy flows in Finland 2008-2011
- Identification of elements of energy accounting calculation system that could be integrated into planned production system of energy statistics

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Challenges

- Different approach than in energy statistics
  - residence principle, private transport, environment
- The availability and quality of the data at the detailed classification levels required for product flows and branches of industry (NACE A*64)
- Especially the energy use of the service sector is problematic to disaggregate into such detailed level

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The main steps 1(2)

- ***Identification of data sources***
  - *Energy statistics: e.g. statistics on energy use in manufacturing and production of electricity and heat*
  - *Monetary supply-use tables of National Accounts: intermediate consumption of energy products*
  - *Finnish Customs: imports and exports of energy*
  - *Air emission accounts: e.g. bridging items*
  - *Waste statistics: industrial waste generation by branches of industry, used for energy production*
  - *Other data sources*

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The main steps 2(2)

- ***Development of methodology and calculation system***
  - *Identification of links to air emission accounts, energy balance and new production system of energy statistics*
  - *Data modifying and aggregation, linking different classifications*
  - *Supply and use of energy by branches of industry and energy sources*
  - *Balancing the supply and use*
  - *Testing the system with 2011 data*
  - *Improvements to calculation system*
- ***Supply-use tables 2008-2011***

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Example of compiling methods: Energy use of the service sector

- Calculation model for space heating (Statistics Finland)
- Electricity consumption by sector (Finnish Energy Industries)

-> Allocated to branches of industry using monetary supply-use tables

- Air emission accounts

-> Shares of road transport by branches of industry

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Examples of compiling methods 2(2) Water transport

- MEERI - calculation system for waterborne traffic emissions and energy consumption (Technical Research Centre of Finland – VTT)

-> Allocated to sea/coastal and inland water transport using the Merchant Fleet statistics (Finnish Transport Safety Agency)