"EPD requires specific data - and relies on generic databases"

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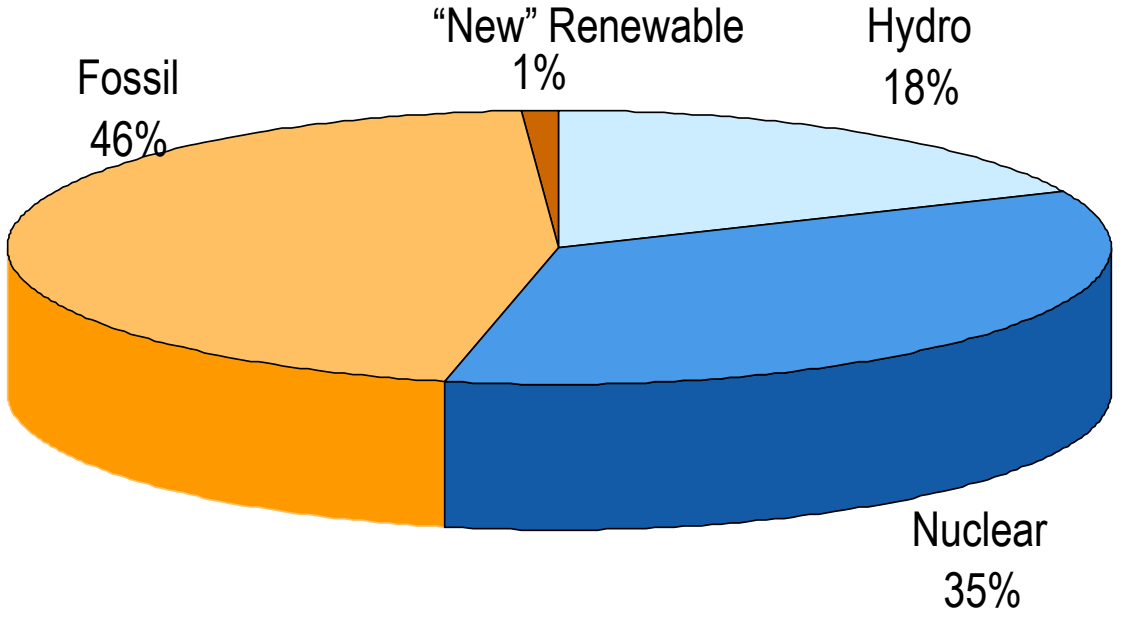
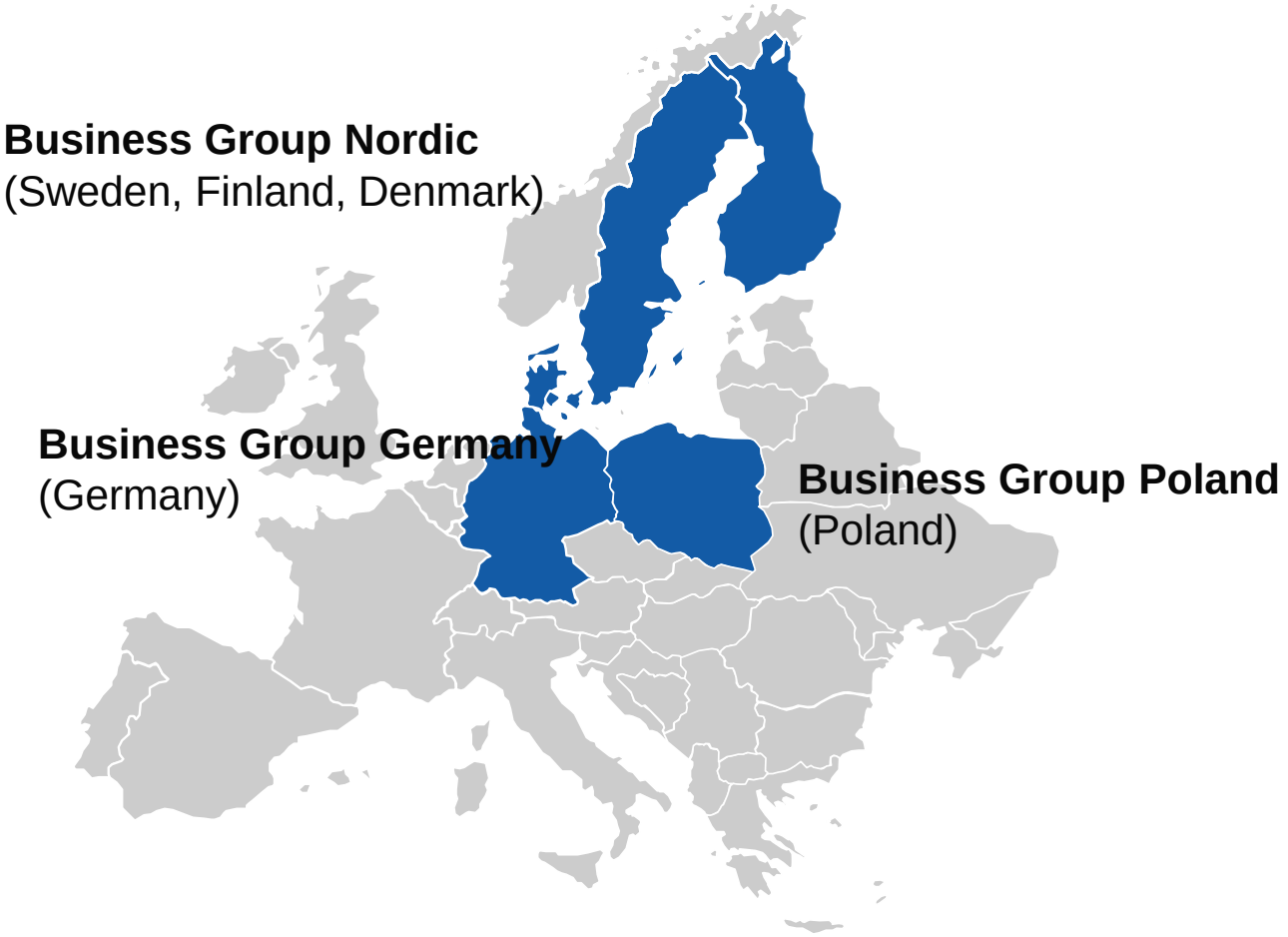
Vattenfall Group (2006)

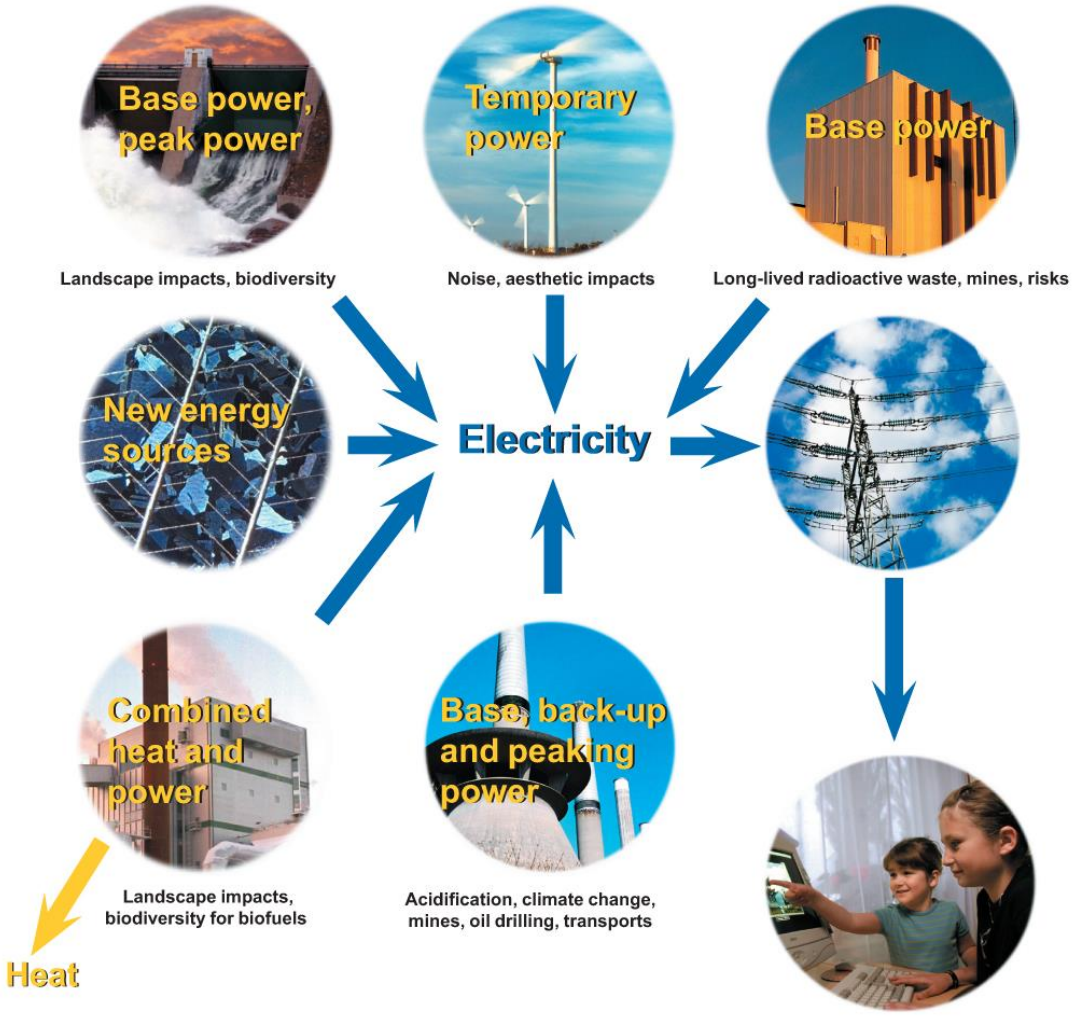
- Europe's fourth largest electricity producer and the largest heat producer
- Net sales: 16 billion EUR
- Operations in Sweden, Finland, Germany, Poland and Denmark
- Operates the complete value chain: production → distribution → sales
- Vattenfall Group electricity generation: ~186 TWh
- ~ 32 000 employees



Three Business Groups



Electricity generation systems



The LCA work

- Started 1993 – reason to understand the electricity production chain
- Then methods under development
  - Difficult to get data
  - Resistance from suppliers
- Very early we understood the value of the ETH data-bas
- The situation is improving
- More databases and specific data
- Now ISO and more for methods
- EPD are emerging
  - Specific/companies-products
  - Generic/sectors

It is possible to “lie”, manipulate, and misuse LCA

Differences in the following will give differences in the results

- **System boundaries**
- **System expansion or not**
- **Cut offs**
- **Data and data quality**
- **Differences in tools**

But ambiguity can be avoided

- **Transparency in description of scope, goal and calculations**
- **Agreement between operators and stakeholders on the market**

Environmental assessment tools - Nordic Generation

Life-Cycle Assessment (LCA) according to the international EPD®system

- Cradle-to-grave assessment of resource use and emissions (book-keeping approach)
- ISO-standard 14025, Product Category Rules (PCR)
- Identifies weak-spots, keeps track on up- and downstream suppliers

Environmental Risk Assessment (ERA)

- Based on PSA-methodology from nuclear
- Likelihood x consequence of mishaps, failures, accidents
- Quantitative results (in form of environmental impact and costs)

Biodiversity impact assessment

- Biotope method
- A before-after methodology
- Quantitative results

Environmental strategy – Nordic Generation

Environmental Management System

- Laws & permits
- Continuous improvement
- Environmental aspects
- Targets & programmes

Accountability

Assessment tools – LCA, ERA & Biotope method

- Assess environmental performance
- Identify ”weak spots”
- Prioritise business risks
- Cost-effective solutions

Effectiveness

EPD

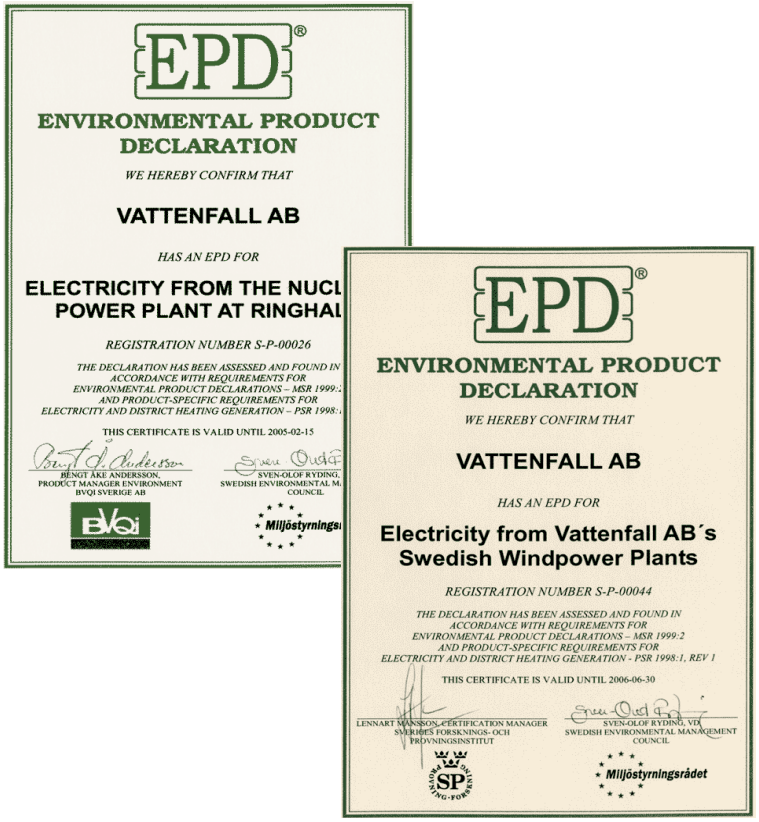
- Environmental Product Declaration, based on LCA
- Third-party certified performance report
- Open, comparable & transparent

Openness

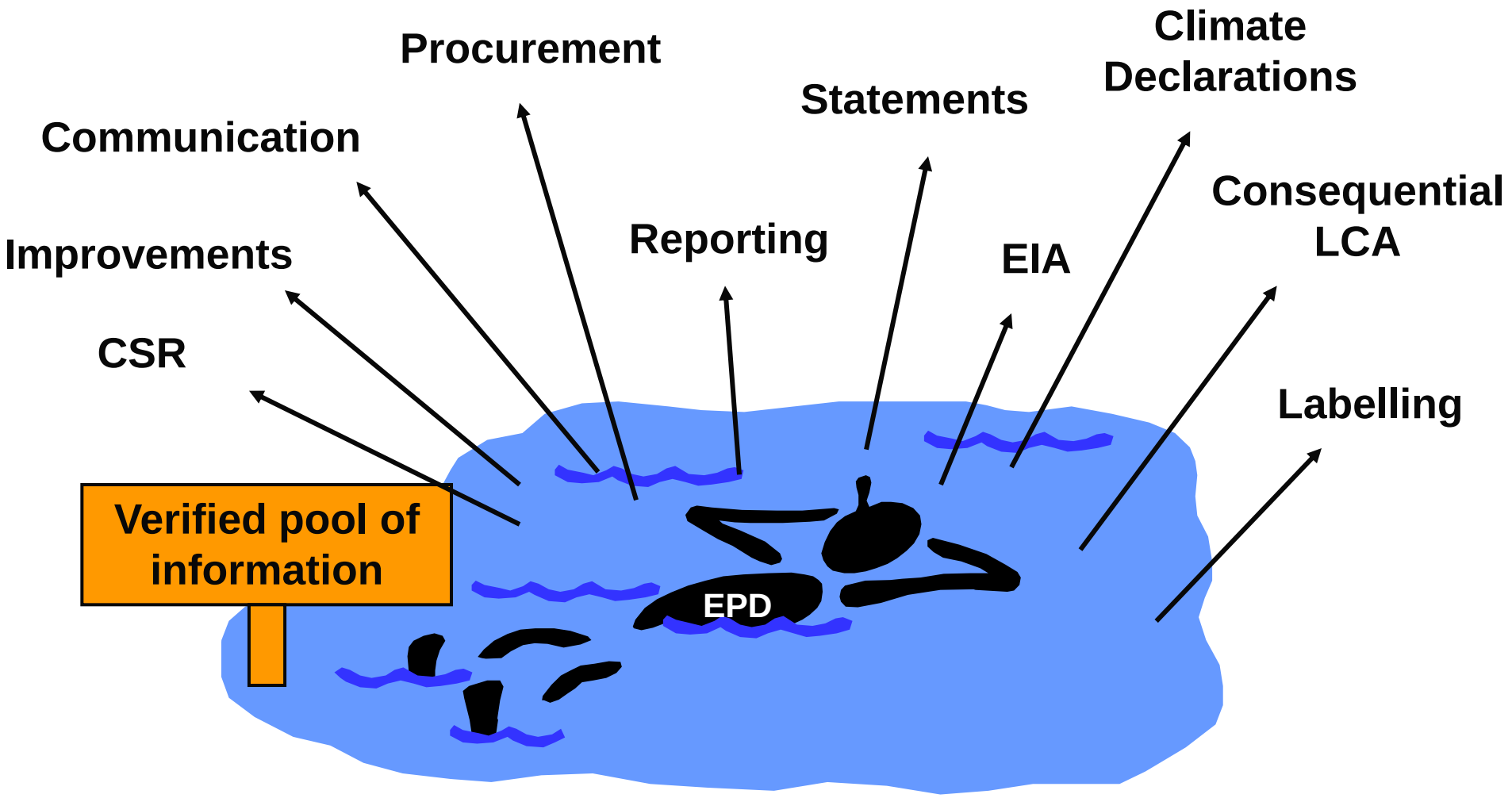
Certified Environmental Product Declaration EPD® catches more than LCA

EPD®
THE GREEN YARDSTICK

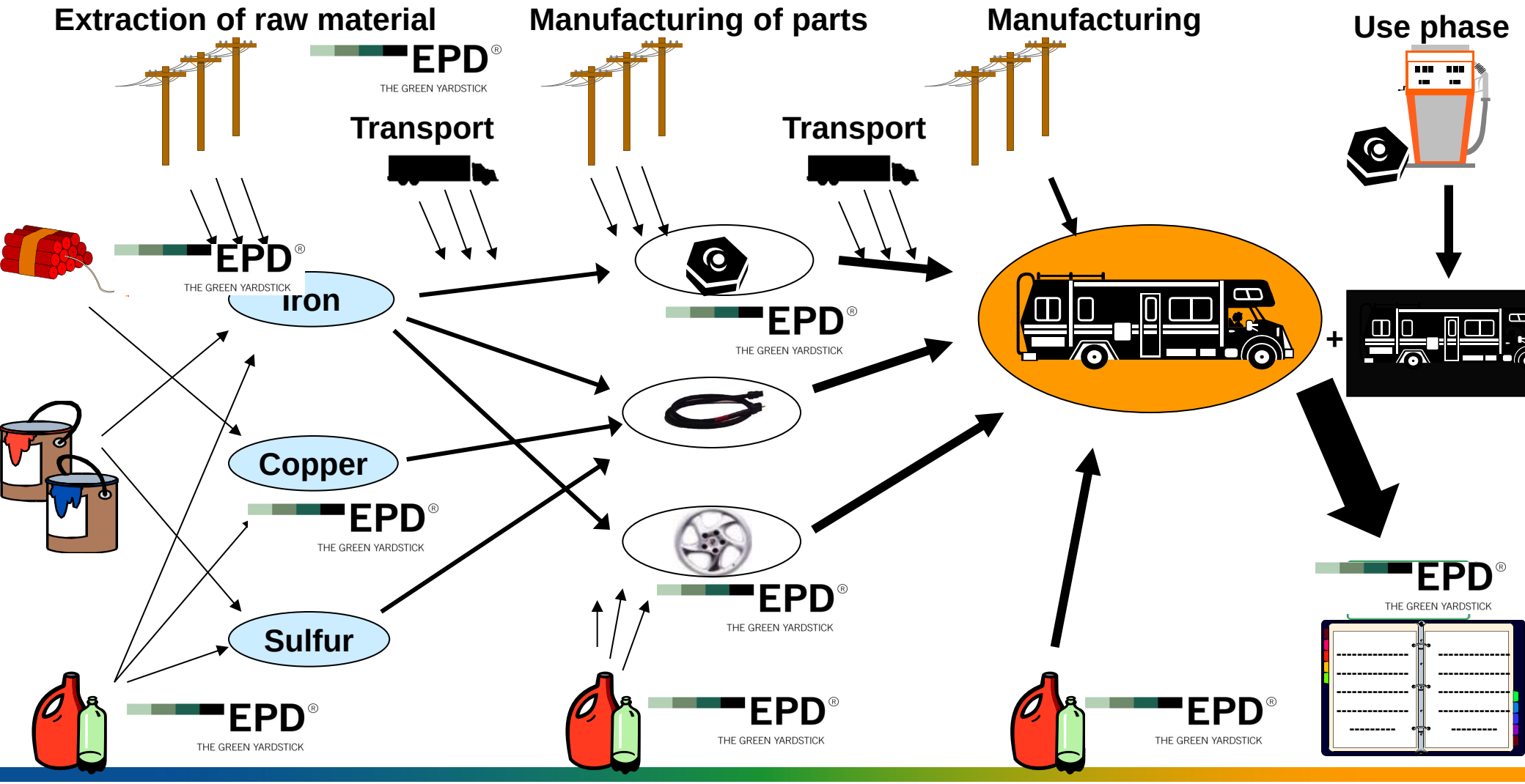
- **EPD® – Environmental Product Declaration – an information system to describe environmental properties of products and services based on facts**
- **Open for all products and services**
- **Based on ISO 14025**
- **Third party verified and certified**
- **An EPD® for electricity and district heat contains**
  - Life Cycle Assessment (LCA)
  - Land-use
  - Study of impacts on biodiversity
  - Environmental Risk Assessment (ERA)
  - Radiology
  - Proliferation



Use for EPDs and underlying studies



Added information throughout the supply chain



Product category
Example: Electricity Steam and hot (cold) water

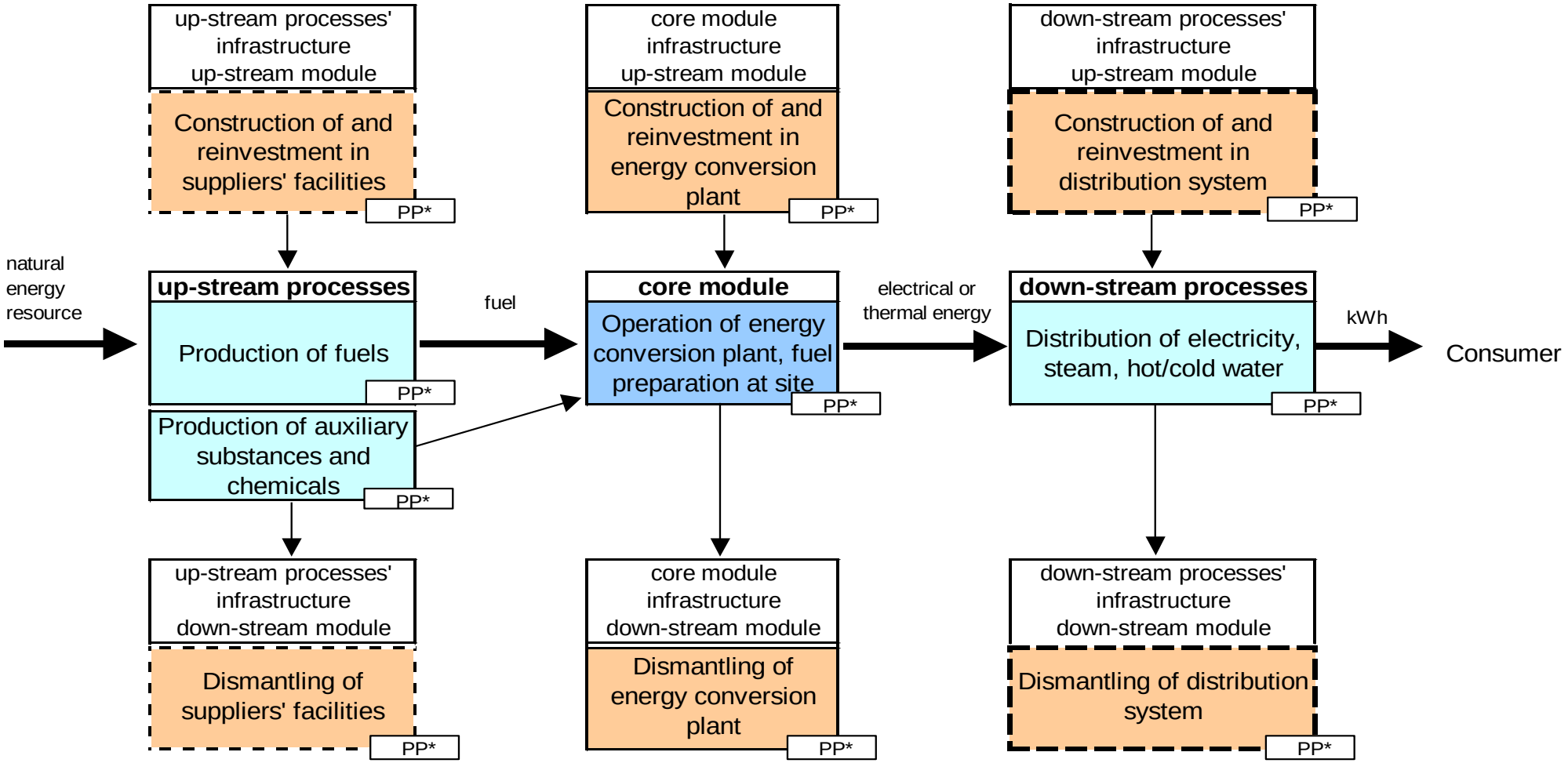
Code according to UNCPC (United Nation Central Product Classification)

- **Section: 1- Ores and minerals; electricity, gas and water**
  - Division: 17 – Electricity, steam, and hot (cold) water
    - Groups:
      - 171 – Electrical energy
      - 172 – Steam and hot (cold) water

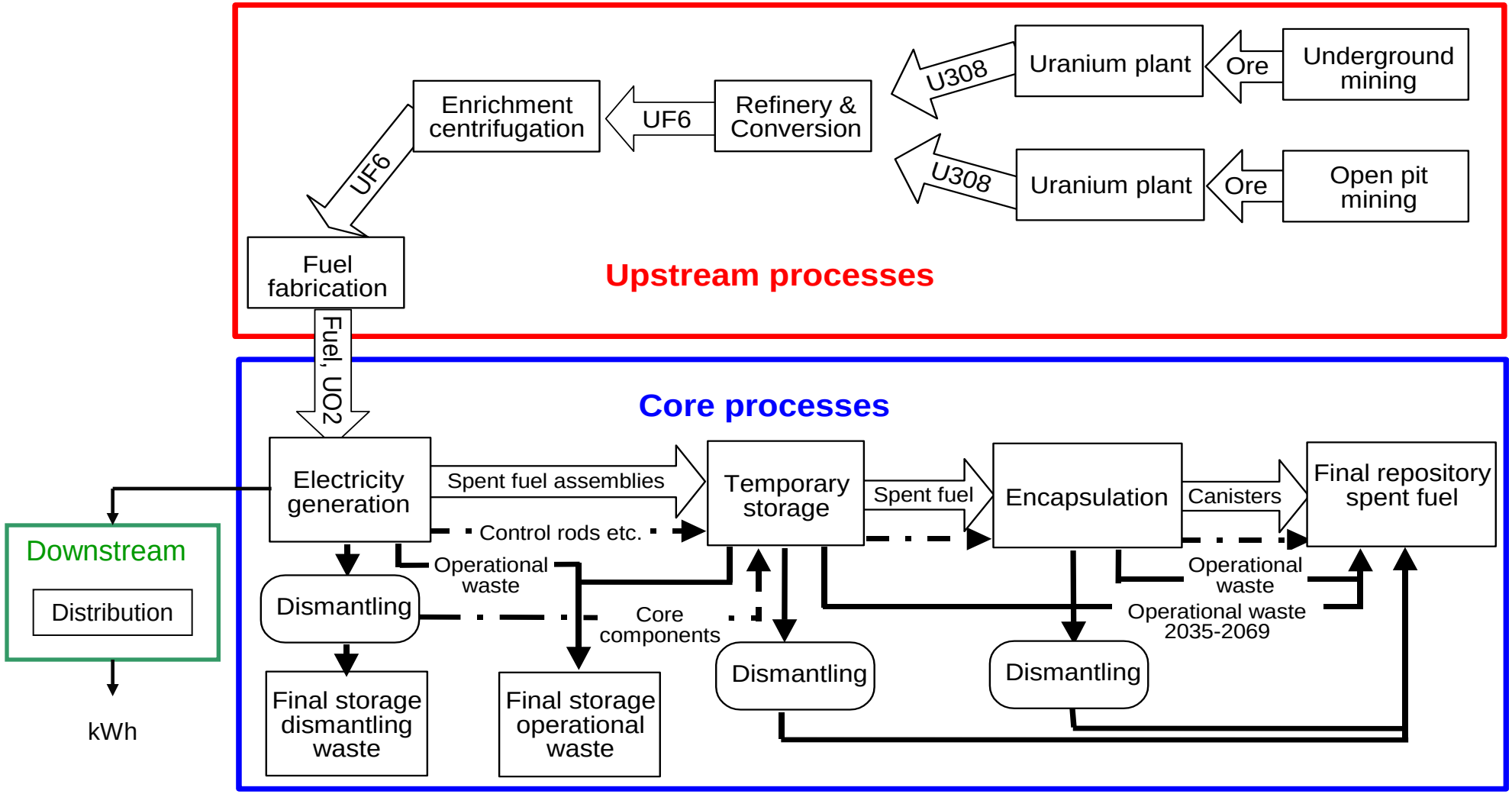
The product category includes the generation and distribution of electricity, steam, hot and cold water

- Generation: from cradle to power plant transformer inclusive or to heat delivery point to the distribution system
- Distribution: processes after transforming to customer or from heat delivery point to the customer central unit
- The use of electricity, steam, hot and cold water is not included

Information modules (* Polluter Pays allocation method)



Ringhals' nuclear fuel cycle



Rules for the core module, data requirement

- Specific data shall be used for the amounts of inputs and outputs in following activities
  - operation of energy conversion plant
  - fuel preparation processes at energy conversion site e.g. drying and grinding
  - maintenance activities e.g. lubrication
  - operation (also test operation) of backup power and heat
  - distances for the transportation wastes and type of vehicles and thus emissions
  - handling/treatment/storage waste

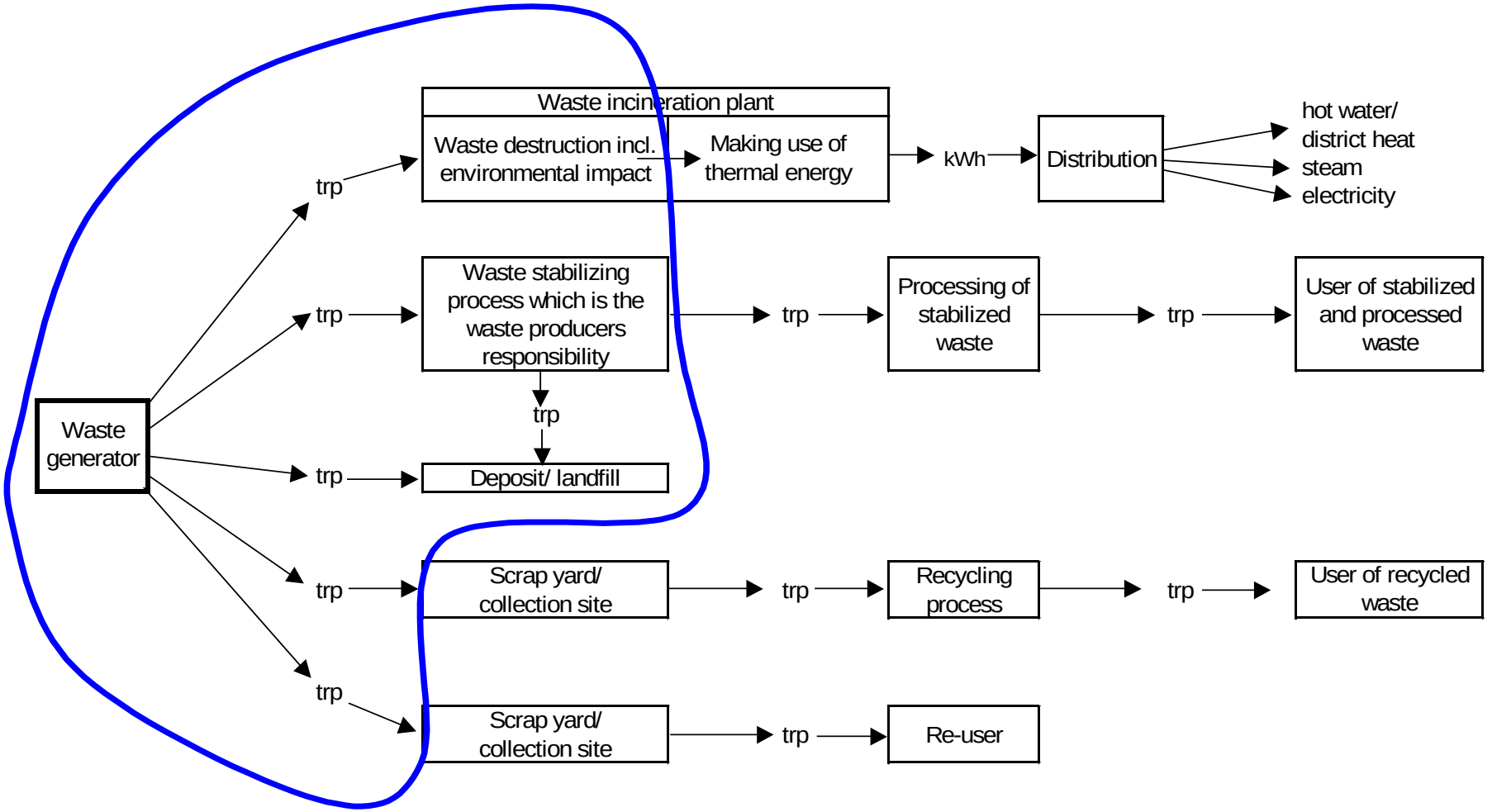
Rules for upstream processes (1)

- **Fuel production**
  - Extraction of natural energy resources
  - Processing of fuel
  - Preparation of fuel
  - Fuel storage operation
  - Transports: extraction/farming-> refinery->conversion plant
- **Production of auxiliary inputs to the core module**
  - Extraction of natural resources for auxiliary inputs (fuels and electricity used by suppliers, materials, chemicals)
  - Production of fuels and electricity used by suppliers and auxiliary materials and chemicals
  - Storage of auxiliary materials and chemicals at energy conversion site
  - Transports: extraction -> processing -> conversion plant

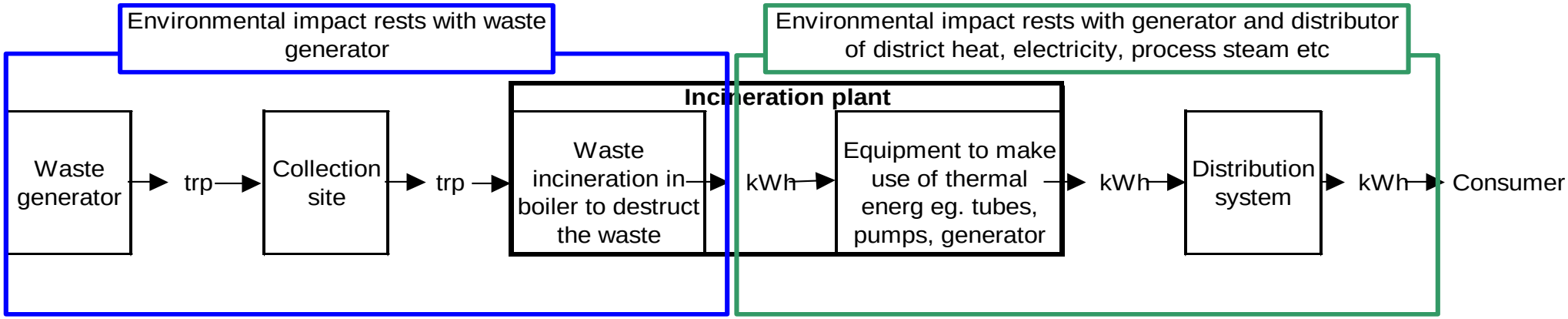
Rules for upstream processes (2)

- **Production of fuel for the energy conversion plant**
- **Specific data** should be used for
  - **production of main fuels**
  - **distances** for the transportation within the fuel production chain and to the energy conversion plant and type of vehicles and the emissions
- **Generic data** may be used for
  - production of fuels **bought on the spot market**
  - **transportation** services (fuel use and emissions in conjunction with transportation)
  - resource use and emissions in conjunction with electricity, auxiliary materials and chemicals used in **fuel suppliers'** processes
  - national or regional **mixes for electricity** generation
  - resource use and emissions in conjunction with treatment of operational waste from fuel suppliers' processes

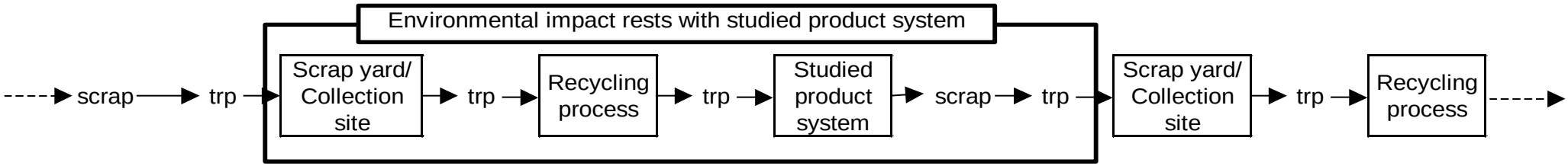
Polluter Pays allocation method



Shared burdens



No double counting



Data sources for Europe

MATERIAL	DATABASE
Steel	IISI (International Iron and Steel Institute)
Primary copper Copper products	ICA (International Copper Association) European Copper Institut (Deutsches Kupferinstitut – Life Cycle Center)
Electricity	ecoinvent Data combined with IEA (International Energy Agency) statistics on electricity generation mixes for nations, regions etc.
Fuels	ecoinvent
Aluminium	EAA (European Aluminium Association)
Plastics Chemicals Electronic components	PE Plastics Europe (former APME Association of Plastics Manufacturers in Europe) PE Plastics Europe (former APME Association of Plastics Manufacturers in Europe), ecoinvent EIME (Environmental Information and Management Explorer) EcoBilan
Transports	NTM or regional alternatives[1]
Waste management, other construction material	ecoinvent

Warning allocation!!!

Credible and high quality data are key in the LCA

Differences in the following will give differences in the results

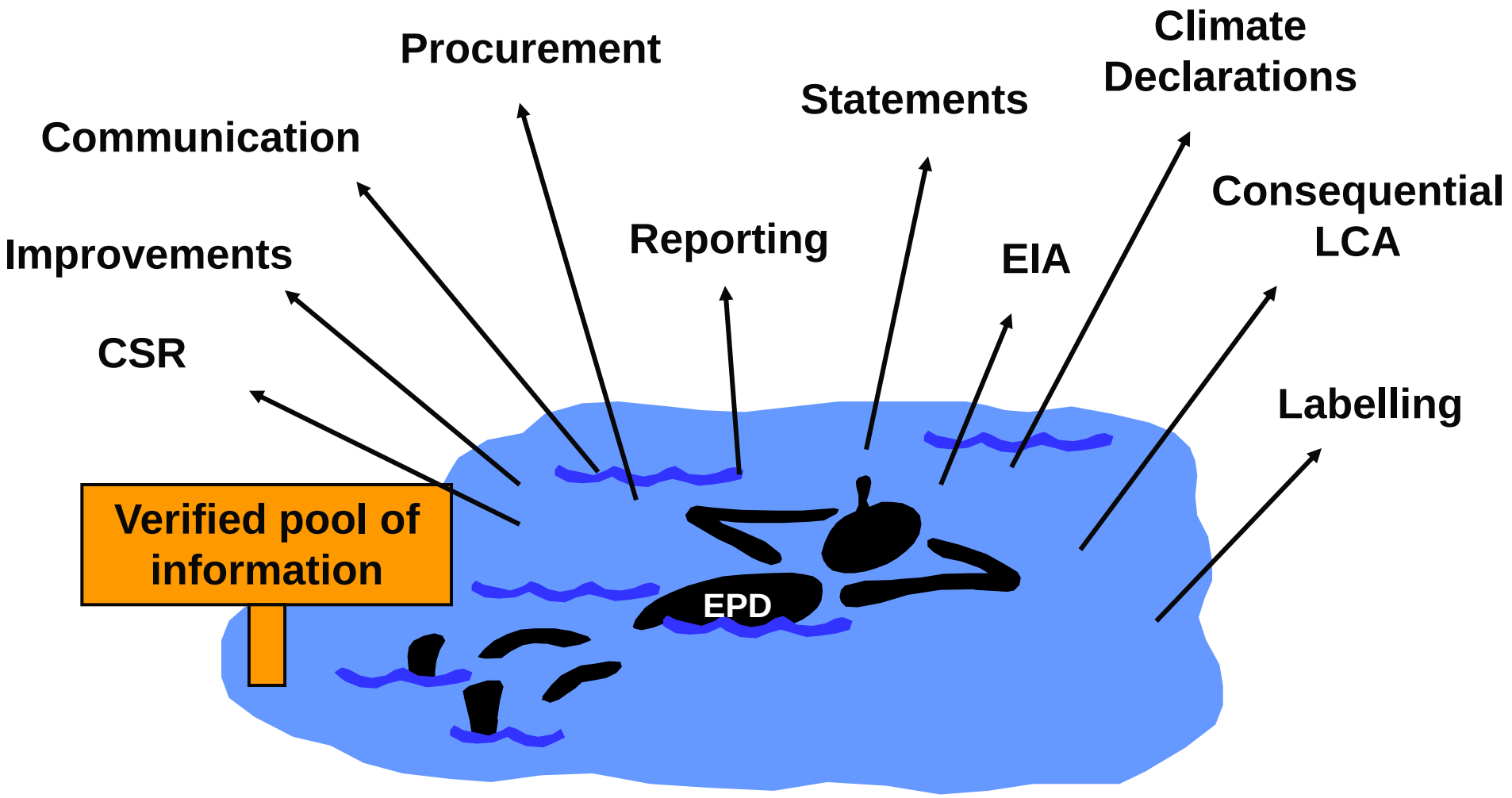
- **System boundaries**
- **System expansion or not**
- **Cut offs**

We also need / want

- **Information about the data - “meta data”**
- **The data are given in modules**

Thus we have requirements on generic data concerning those key issues and that will help to avoid ambiguity

Use for EPDs and underlying studies



Thank you

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- www.vattenfall.com
- www.vattenfall.se (in Swedish)

- www.environdec.com