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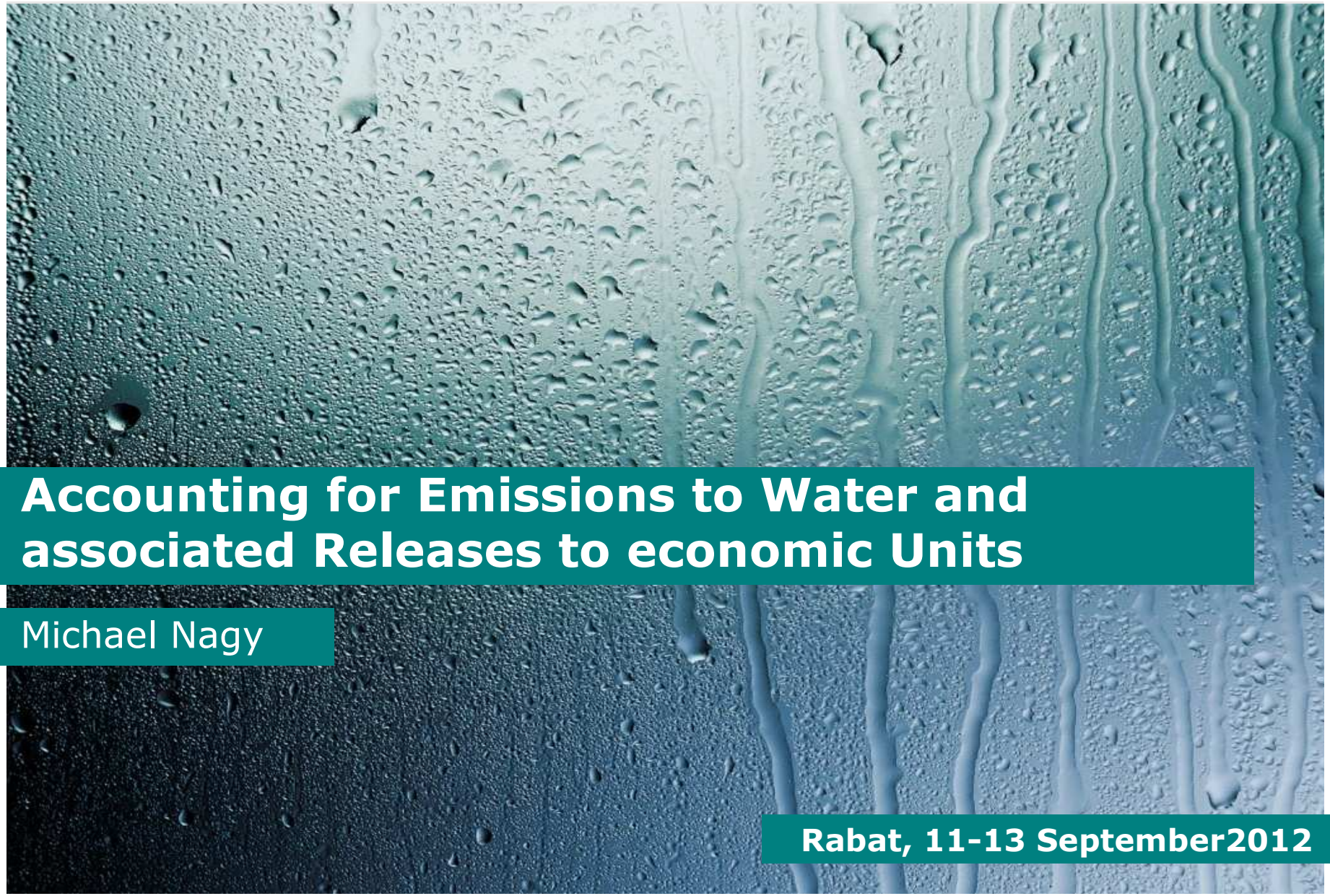

Accounting for Emissions to Water and associated Releases to economic Units

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Rabat, 11-13 September2012

Outline

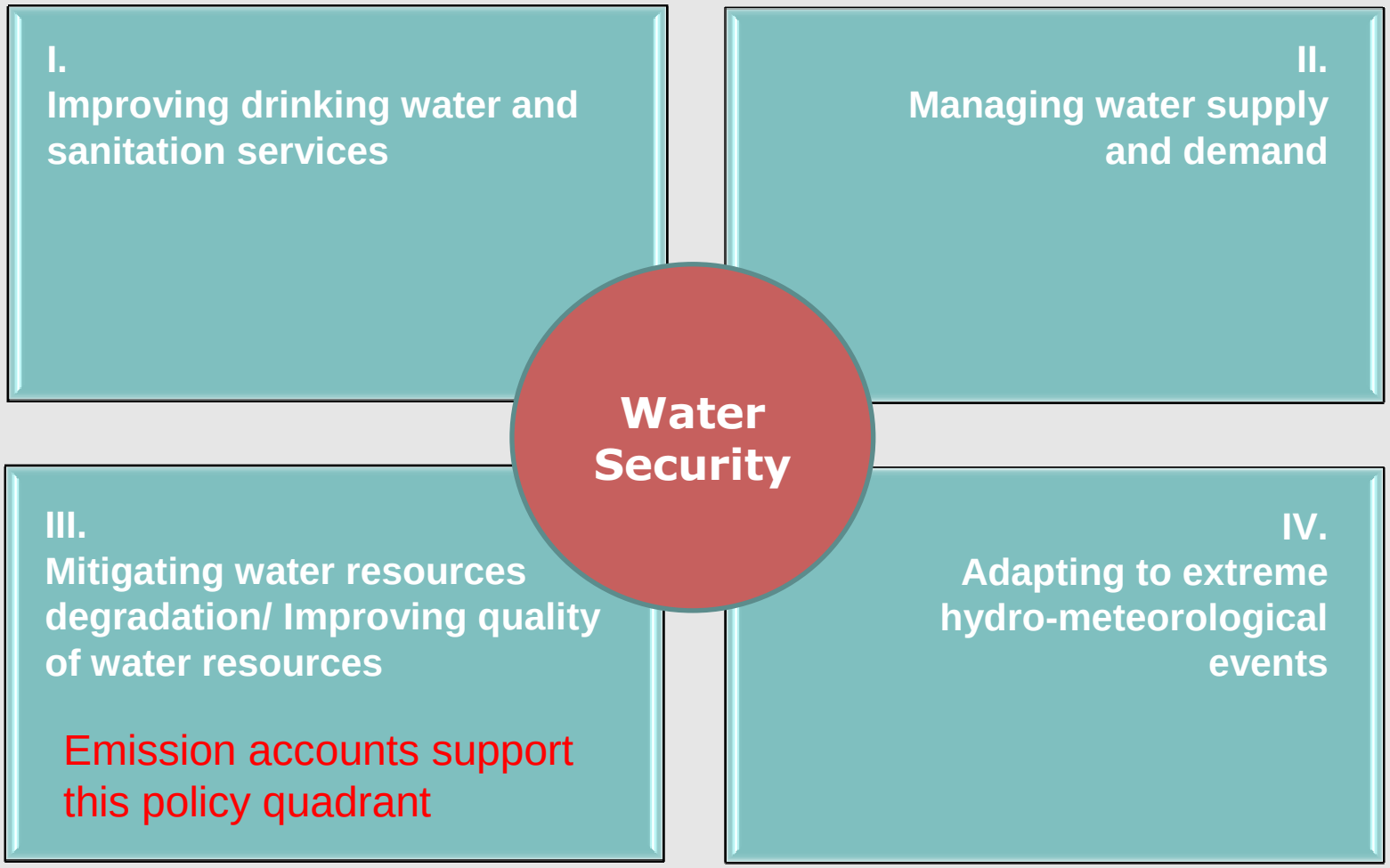
- Why compiling water emission accounts?
- Which water policy objectives are supported?
- Basic concepts and definitions
- Physical Supply and Use Tables
- Examples:
  - Indicators
  - Reallocation of emissions
- How to get the data?

Why compiling emission accounts?

- Emission accounts provide information on
  - Which activities are responsible for the emission
  - How much is being emitted
  - Where is being emitted

- They are useful for designing policies aimed at reducing pressure on the environment
- In combination with economic accounts they allow for
  - the formulation of cost-effective policies aiming at reducing emissions
  - the evaluation of the economic impacts of policies aiming at reducing emissions

The four quadrants of water policy objectives



Source: United Nations Statistics Division

Quadrant	**Mexico** (2030 Water Agenda) 	**Austria** (NGP 2009) 
I. Improving drinking water and sanitation services	• Suburbs connected to supply networks • Rural communities with drinking water • Efficient water utilities	• Maintenance of existing water supply and sanitation infrastructure
II. Managing water supply and demand	• All irrigation surfaces with appropriate technology • Self-managed basins • Reuse of all treated wastewater • Aquifers in equilibrium	• Sustainable protection of all water resources by regulating and balancing public interests and all kind of water use demands
III. Mitigating water resources degradation/ Improving quality of water resources	• All municipal wastewater treated • Trash-free rivers and lakes • Non-point sources of pollution under control • All industrial wastewater treated	• Good ecologic status, including improvement of river morphology (e.g. river continuity) • Reduction of diffuse pollution from agriculture • Prevention of pollution from point sources (e.g. from contaminated sites) • Application of best available techniques for wastewater treatment
IV. Adapting to extreme hydro-meteorological events	• Efficient land use planning • Flood zones free from human settlements • Warning and prevention systems with state-of-the-art technology	• Protection of all settlements and important infrastructure from HQ100 floods • Awareness raising about the importance of self-protection and the limits of possible protection.

Basic Concepts and Definitions

- **Emissions to water** are substances released to water resources by establishments and households as a result of production, consumption and accumulation processes.
- It is relevant to account for both **emissions of substances to water resources and releases of the same substances to the sewerage system** by establishments and households.
- Water emission accounts record **the quantity of substances added** to water by establishments and households during an accounting period in terms of mass (e.g. kg or tones).

Basic Concepts and Definitions

- Water emission accounts cover
  - Substances added to wastewater and collected in the sewerage system
  - Substances added to wastewater discharged directly to water bodies
  - Substances from non-point sources, for example, emissions and releases from urban runoff and emissions from agriculture.

- Direct dumping of waste into water bodies is not covered in water emission accounts but in solid waste accounts

Basic Concepts and Definitions

- **Point sources** are sources for which the geographical location of the discharge is clearly identified, e.g. releases from
  - Sewerage facilities
  - Power plants
  - Industrial establishments
- **Non-point (or diffuse) sources** are sources without a single point of origin or a specific outlet into a receiving water resource, e.g.
  - Urban runoff
  - Collection of of wastewater of individual and small scale activities which, for practical reasons, cannot be treated as point sources

Basic Concepts and Definitions

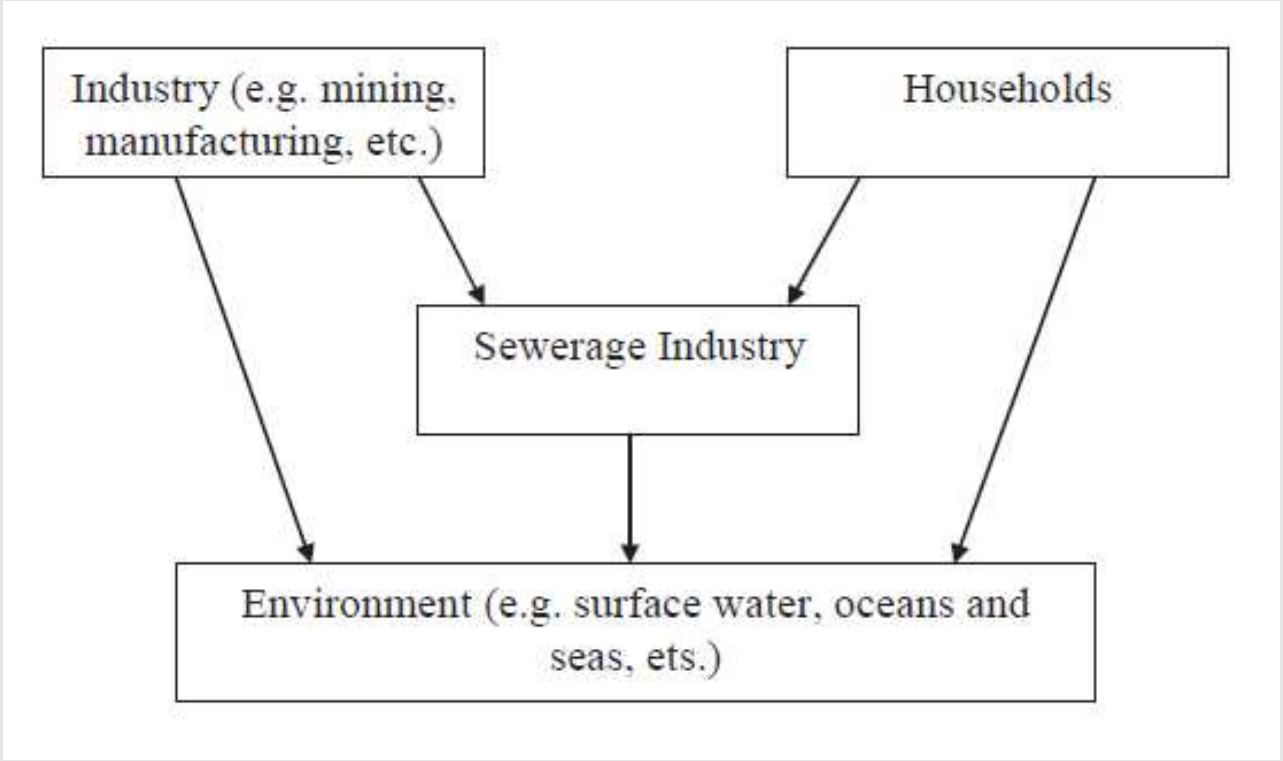
- **Urban runoff:** By convention emissions and releases associated with urban runoff that pass through sewerage facilities are attributed to the sewerage industry
- **Emissions relating to returns of irrigation water and rainfed agriculture** are described in terms of the substances that are added to the return flows of water from agricultural land, primarily fertilizer and pesticide residues in the soil that infiltrate into groundwater or run-off to surface water.

Basic Concepts and Definitions

- **Imports and exports** of wastewater:
  - Release of wastewater from one economy to a sewerage facility in another economy.
  - 'imports' and 'exports' of substances through natural flows of water resources are not included.
- Included in the accounts are emissions of relevant substances **from fixed assets**, such as from vessels operating within a country's water resources (for example, due to corrosion or fuel leaks).
- Emissions due to **activities undertaken in water resources or seas** (e.g. dredging of waterways and ports) are included and recorded against the relevant industry.

Basic Concepts and Definitions

Flows in water emission accounts



Water Emission Standard Tables
Physical Supply Table

Physical supply table for gross releases of substances to water

	Generation of gross releases to water			Accumulation	Flows with the rest of the world	Flows from the environment	Total supply
	Sewerage industry	Other industries	Households	Emissions from fixed assets			
Emissions by type of substance							
BOD / COD *	5 594	11 998	2 712				20 304
Suspended solids							
Heavy metals							
Phosphorous	836	1 587	533				2 956
Nitrogen	10 033	47 258	1 908				59 199
Releases to other economic units							
BOD / COD *		7 927	8 950				16 877
Suspended solids							
Heavy metals							
Phosphorous		814	6 786				7 600
Nitrogen		15 139	30 463				45 602

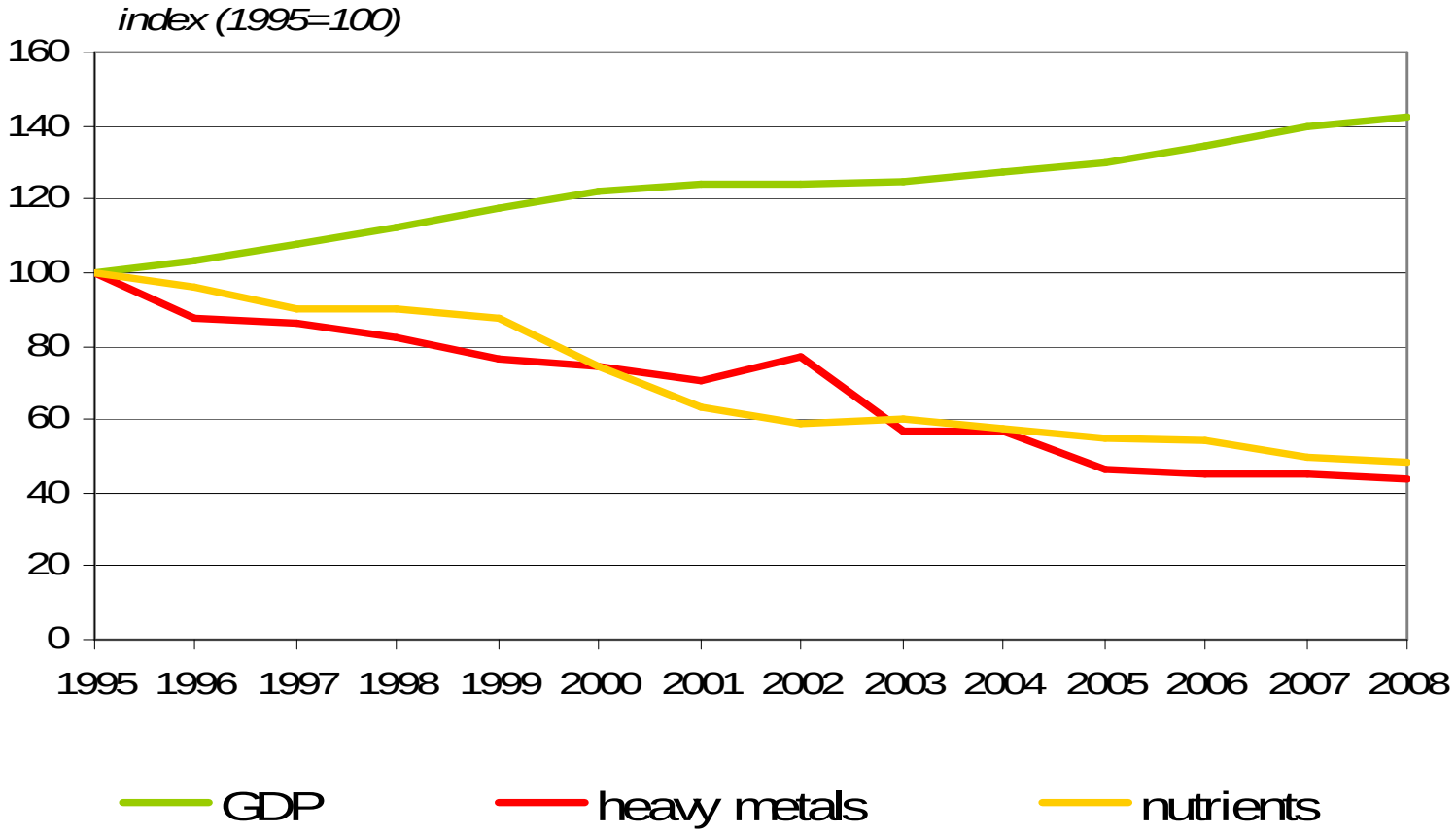
Physical use table for gross releases of substances to water

Water Emission Standard Tables
Physical Use Table

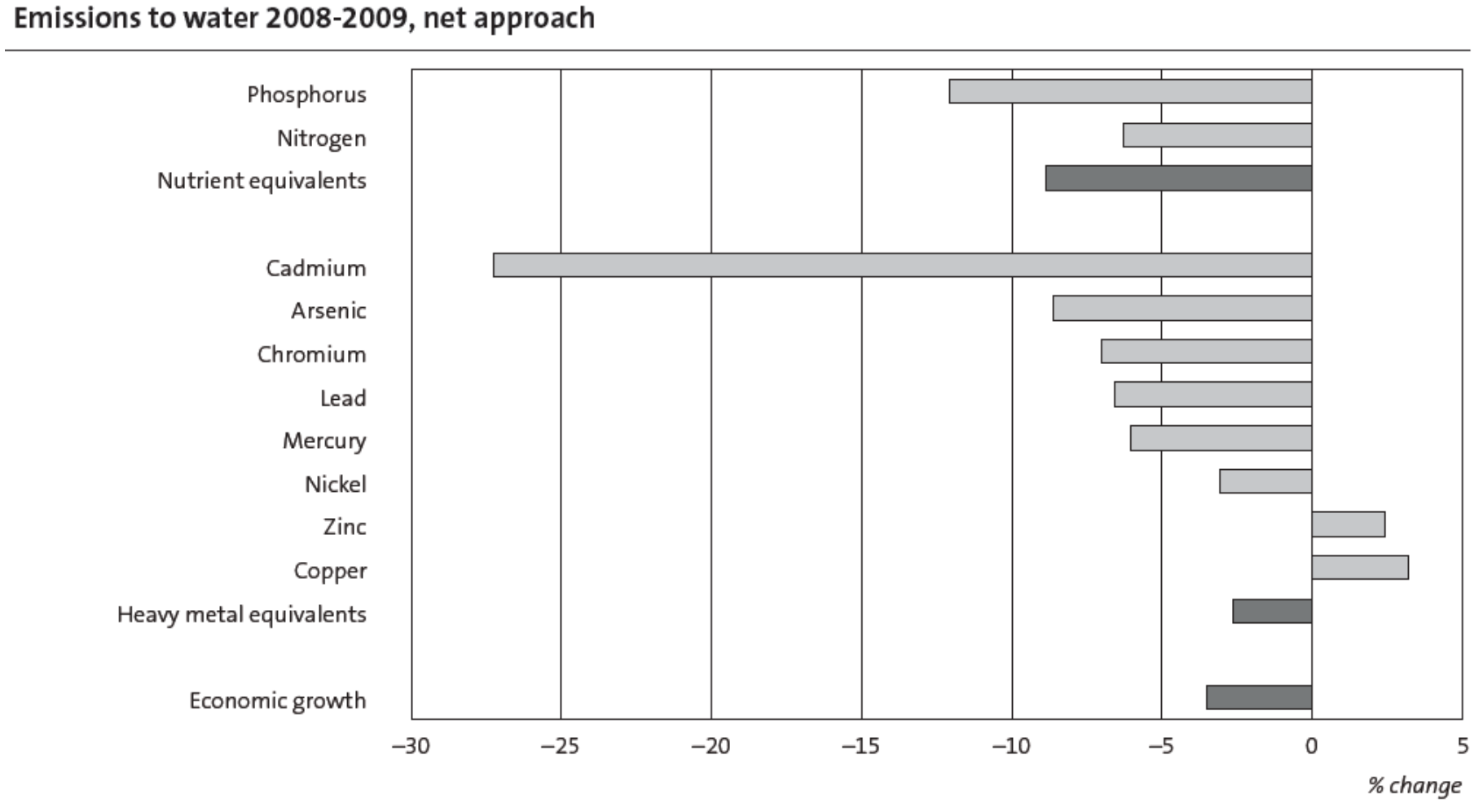
Physical use table for gross releases of substances to water

	Collection of gross releases to water			Flows with the rest of the world	Flows to the environment	Total use
	Sewerage industry	Other industries	Households			
Emissions received by the environment						
BOD / COD *					20 304	20 304
Suspended solids						
Heavy metals						
Phosphorous					2 956	2 956
Nitrogen					59 199	59 199
Collection by other economic units						
BOD / COD *	16 877					16 877
Suspended solids						
Heavy metals						
Phosphorous	7 600					7 600
Nitrogen	45 602					45 602

Example: Economic growth and contribution of Dutch economy to water emissions

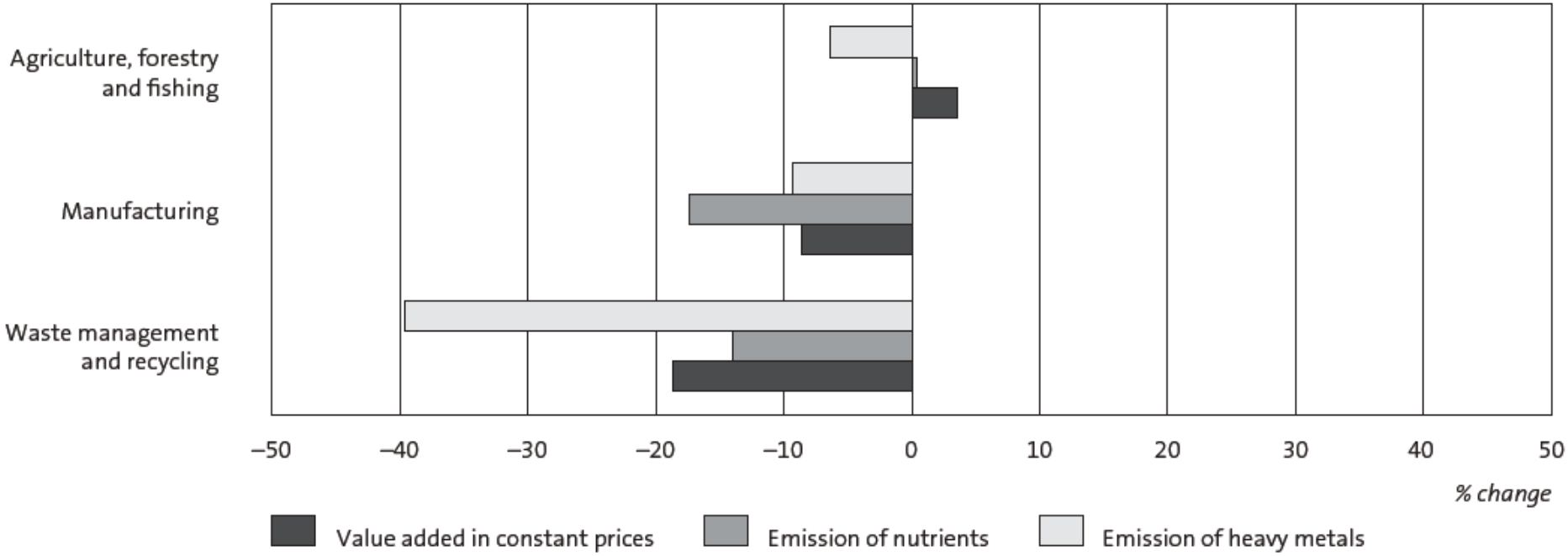


Example: Dutch Emissions to Water, Net Approach

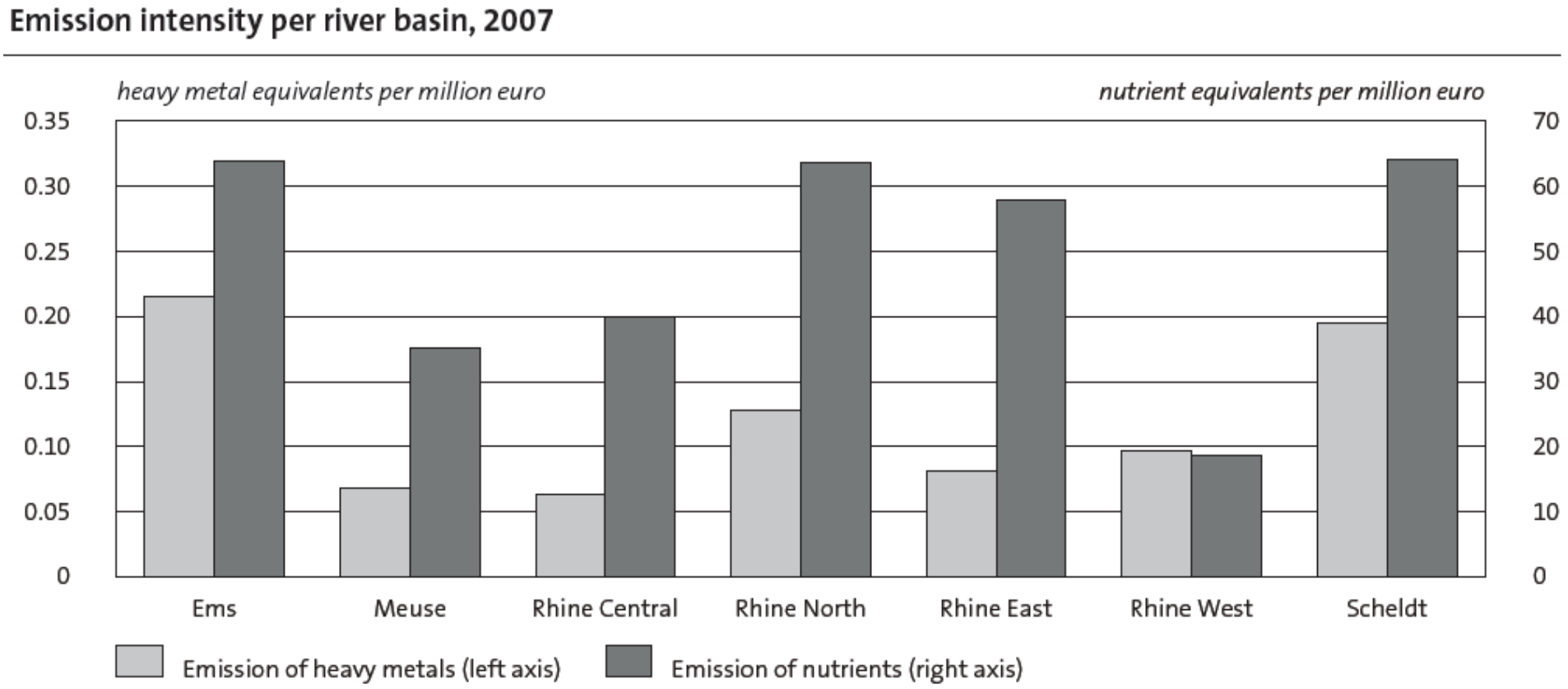


Example: NL: Change in Water Pollution and Value Added

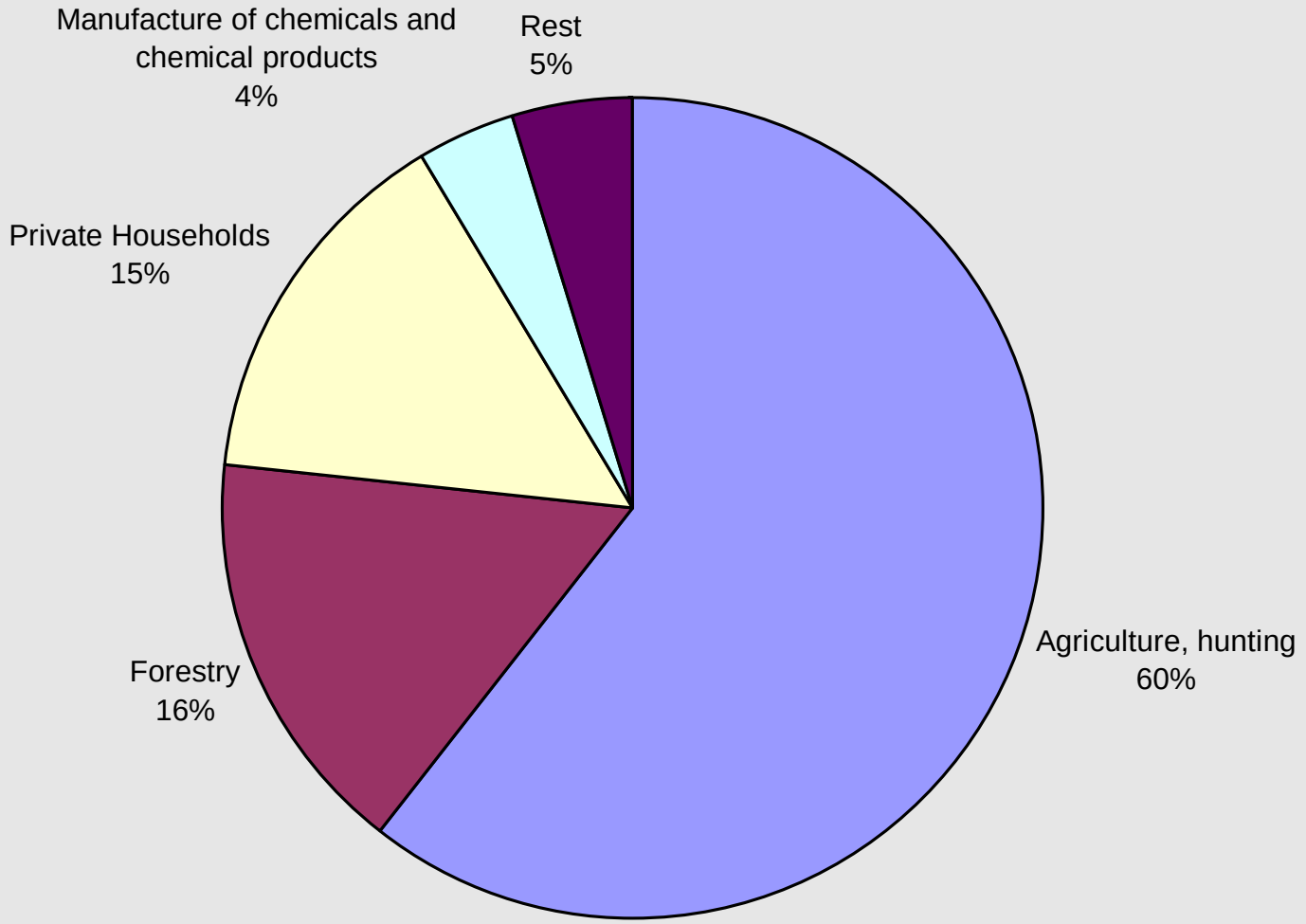
3.2.3 Change in water pollution and value added, 2008–2009



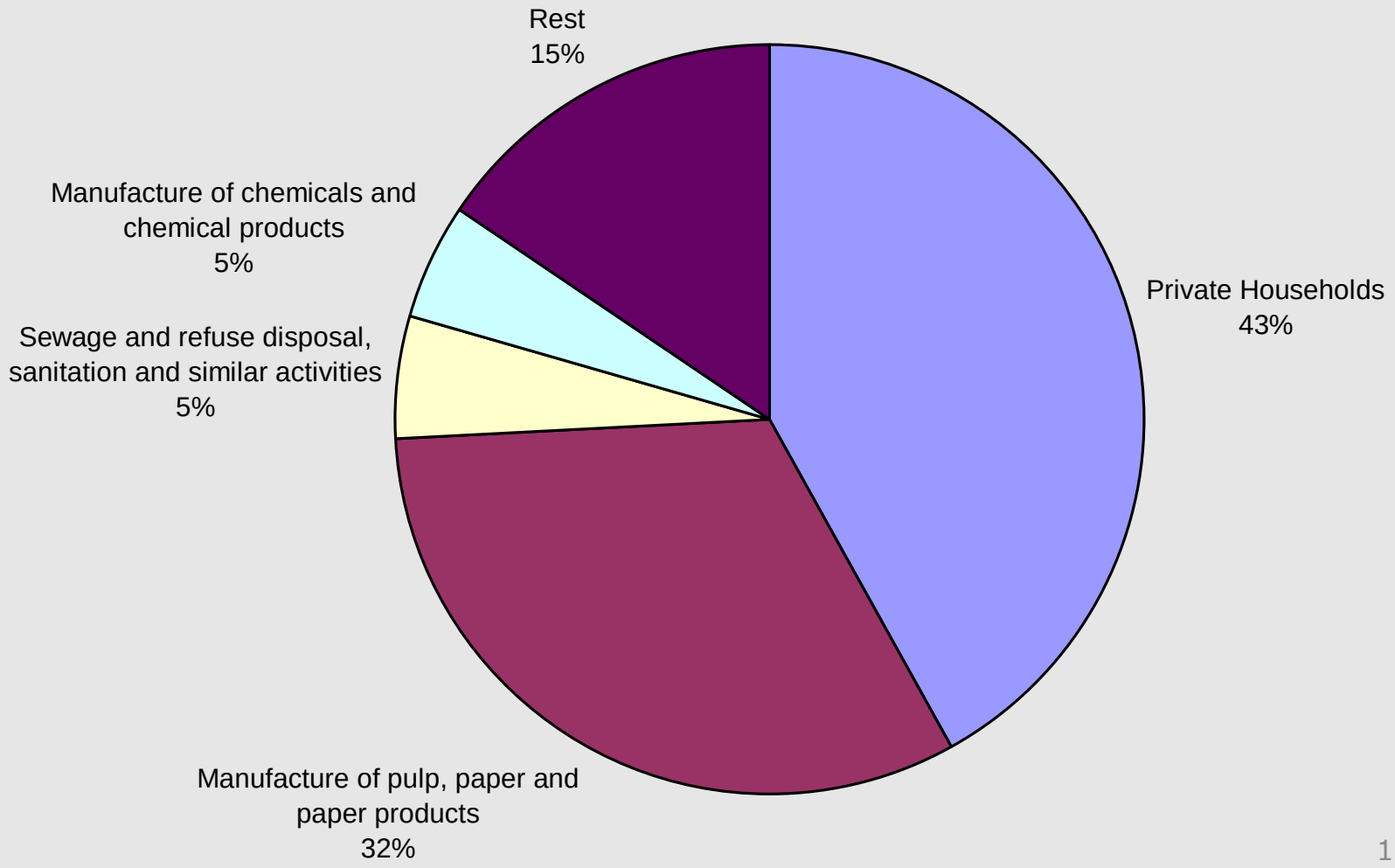
Example: NL: Emission Intensity per River Basin



Example: AT: Net Emissions of Nitrogen

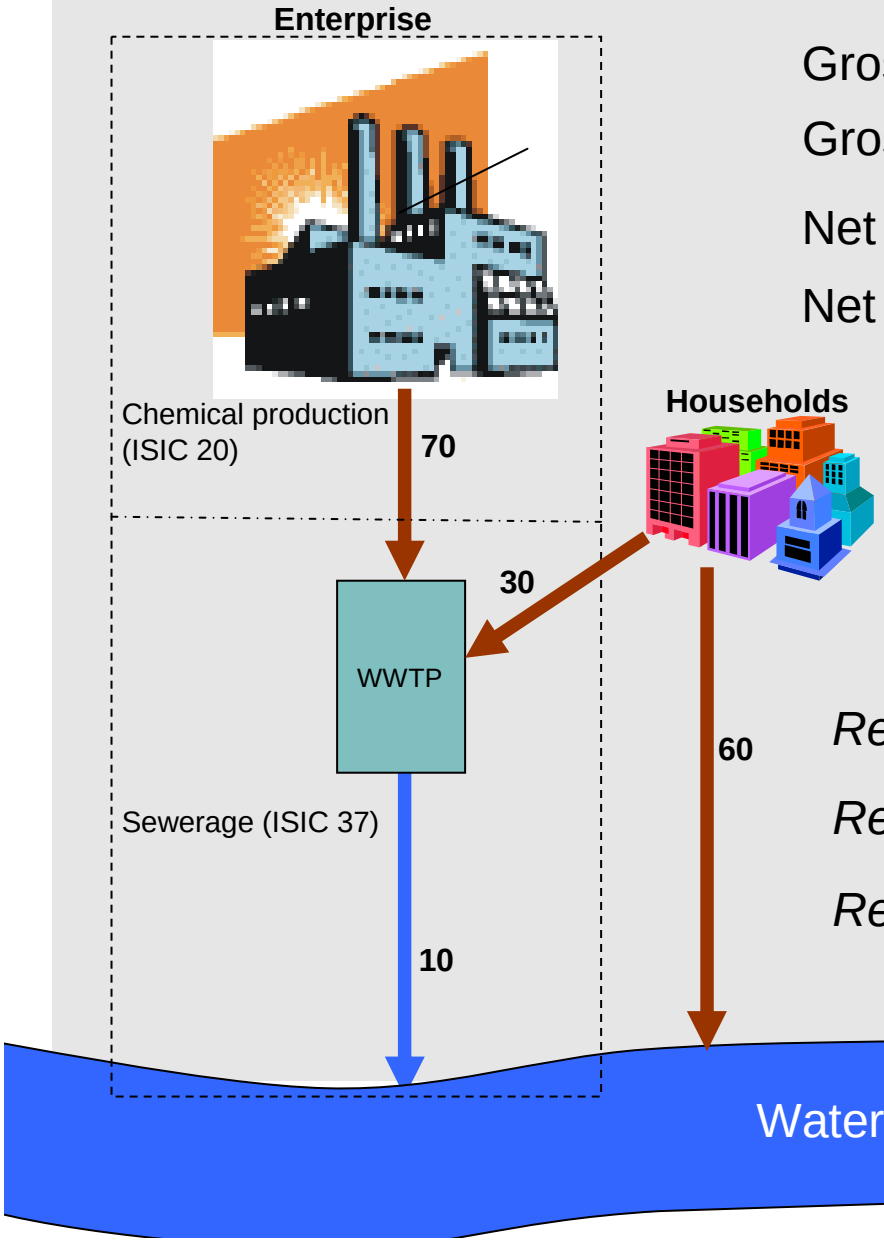


Example: AT: Net Emissions of COD



How to calculate net emissions?

- Net (or final) emissions correspond to the pollutants discharged into water resources after treatment.
- Net emissions = gross releases (emissions) if there is no treatment of wastewater



Gross emission ISIC 20: **70**

Gross emission Households: 30 + 60 = **90**

Net emissions ISIC 20: **7**

Net emissions Households: 3 + 60 = **63**

Calculation steps

*Removal rate WWTP: 1 - 10/(70+30) = **90%***

*Reallocated load ISIC 20: 70 * (1 – 0.90) = **7***

*Reallocated load Househ.: 30 * (1 – 0.90) = **3***

How to get the data?

- Quantities are expressed in terms of mass (kg or tonnes, depending on substance under consideration)
  - Data from administrative sources is often available in form of concentration (e.g. mg/l).

  → Concentrations need to be multiplied with the corresponding volume of wastewater to receive the annual load
  - → this is not a trivial task, as the exact calculation method is dependent from the number of samples taken and the underlying measurement concept (e.g. often samples are not representative, because they are taken only at high production periods)
  - → Request the data from the primary source in form of annual load (t/y or kg/y)

How to get the data?

- Industrial emissions:
  - Registers of Ministries of Environment (results of inspections and regular monitoring as required by law or the individual permits); e.g. Pollution Release and Transfer Register (PRTR)
  - Industry surveys
  - Application of emission factors
- Agricultural emissions:
  - Are mainly diffuse emissions – model calculations are needed; data sources can be MoE, MoA or research institutions
- Household emissions:
  - Calculation via emission factors
- Emissions of the sewerage industry
  - Registers of MoE
  - Calculation with reduction rates
- Service industries‘ emissions:
  - Re-calculation
  - Application of emission factors (emission rate per economic output or employee)

Thank you very much for your attention!

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