

Material Flow Analysis for Selected Priority Substances in the European Union

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The EU SOCOPSE project

The SOCOPSE (Source control of priority substances in Europe) FP6 Research Programme focused on providing support- tools for implementing the European Water Framework Directive (WFD) with regard to the selected Priority Substances (PSs); PBDE, TBT, DEHP, Nonylphenol, Isoproturon, Atrazine, Hg, Cd, HCB, and PAHs. A Decision Support System (DSS) was developed to help water authorities identify current and future environmental problems and to reduce these problems by providing a holistic management approach. To provide the DSS the necessary

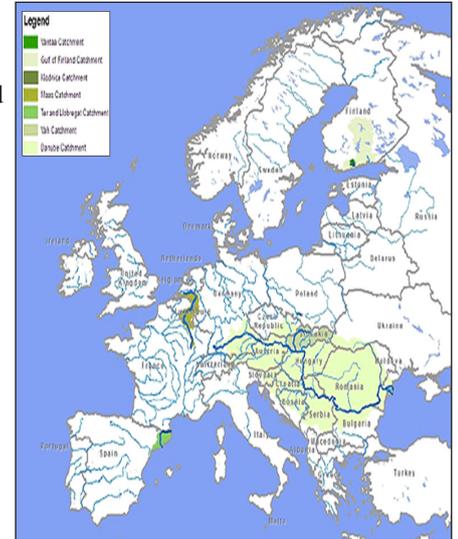
Simple MFA diagrams on the priority substances were either prepared from information on;

- 1) emissions to the atmosphere, releases to the aquatic ecosystems, and discharges to soil/land as available from national authorities, international organizations and programs, and national and international emission data collection sources, or;
- 2) on the basis of data on emission factors and release rates, and discharge rates available from national and international statistical yearbooks.

information on sources, flows, and environmental endpoints of the selected PSs in European waters, a Material- (and Substance) Flow Analysis (MFA) was used.

MFA results on mercury (Hg)

Through its mobilization from long- term geological storage into the biosphere, anthropogenic activities such as fossil fuel combustion, Hg mining, refining of metals, as well as use and disposal of Hg containing products has imposed significant alterations on the Hg cycles between water, air and soil. Based on the MFA findings, Hg concentrations in the aquatic environment are first and foremost linked to by-



The MFA results were applied for the DSS in five case studies in different geographical locations in Europe (Vantaa, FI; Meuse, NL; Danube, international with Vah tributary, SK; Ter-Llobregat, ES; and Klodnica, PL).

emissions from source categories emitting Hg as a product from their processes. The majority of direct discharges to water is usually related to effluents origin from power plant water usage in the cooling circuit systems, in the steam generating process, and in flue- gas cleaning systems. Less quantities of direct discharge to water can be traced to industrial wastewater effluents from non-ferrous metal smelters, iron and steel plants. Other direct releases are linked to waste disposal of Hg- containing consumer products, chlor- alkali production and amalgam used for dental purposes. Relatively large contributions to the balance were found to origin from atmospheric deposition.

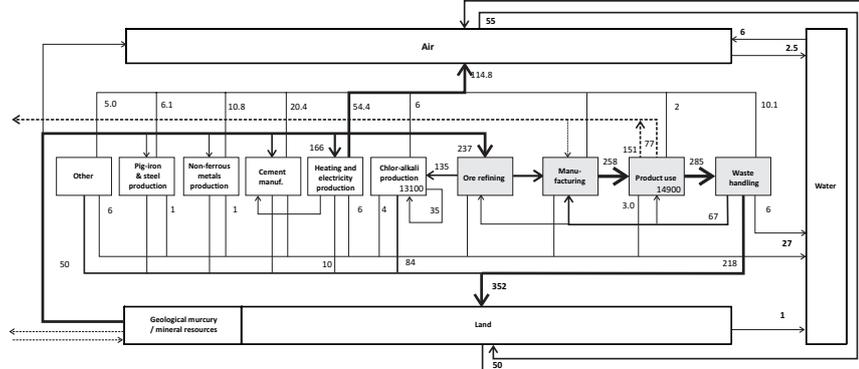
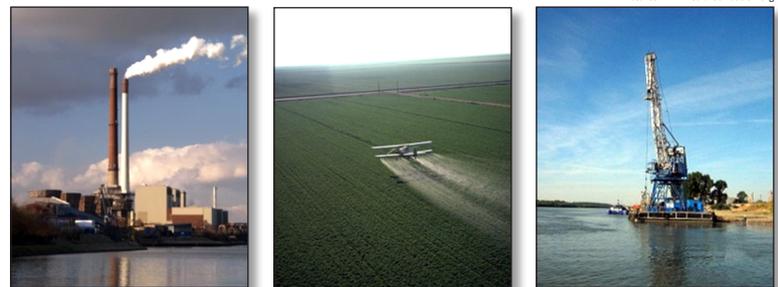
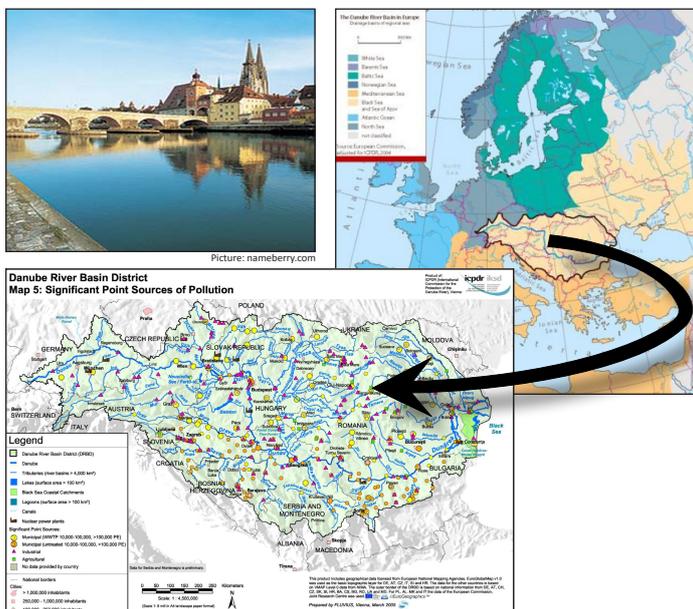


Figure (preliminary results). Simple MFA diagram for Hg in Europe in 2005 (tonnes/year)



Name	Major uses or emission sources
Polycyclic aromatic hydrocarbons, PAH, including Anthracene	Incomplete combustion
Brominated diphenyl ethers, PBDE	Flame retardant
Mercury, Hg	Chlor-alkali industry, coal combustion
Cadmium, Cd	Numerous
Tributyltin, TBT	Antifoulant, preservative, stabiliser in plastics
Nonylphenol	Industrial chemical
Hexachlorobenzene, HCB	Unintended formation, fungicide
Isoproturon	Pesticide
Atrazine	Pesticide
Di(2-ethylhexyl)-phthalate, DEHP	Plasticiser

See <http://www.scopse.eu>