Fraunhofer ISI

FRAUNHOFER INSTITUTE FOR SYSTEMS AND INNOVATION RESERACH ISI

ANTHROPOGENIC MICROPOLLUTANTS

The Fraunhofer ISI explores material flows of relevant substances and investigates the suitability and cost-effectiveness of substance-specific measures at source as well as of downstream measures with a large broadband effect in order to reduce pollutant emissions into the aquatic environment.

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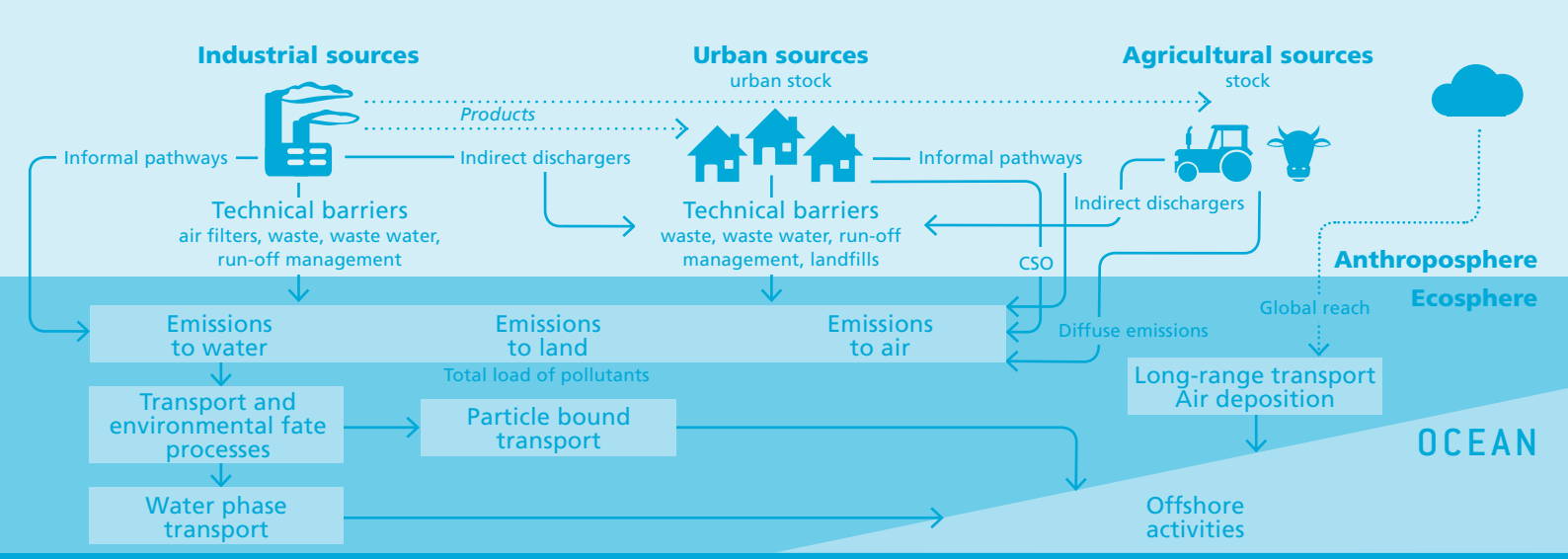
BACKGROUND

The emission of anthropogenic micropollutants into the aquatic environment via releases from industrial, agricultural and urban activities is one of today's major challenges. The number of micropollutants is large: more than 100,000 substances are available on the EU market, about one-third in quantities greater than one tonne. At the same time for most substances the data base for understanding and controlling emission patterns is insufficient, while the chronic effects of the emitted “chemical cocktails” are difficult to predict.

Anthropogenic micropollutants can cause direct effects, such as the death of biota, but can also have subtle effects, such as impairing the reproductive, endocrine and immune systems or indirect effects by accumulation along the food chain.

Each substance has its own pattern of sources and emission pathways, forming in total a complex network of emissions. For many anthropogenic micropollutants a change in the emission pattern has been observed in the past few decades. Especially due to regulations and subsequent substitutions the network of emissions is therefore dynamic. While regulations and the following technical measures have reduced emissions from industrial



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sources, non-industrial sources with a more diffuse character are becoming more important, such as the emissions through the use of household products or pharmaceuticals.

To reduce the emissions of the various micropollutants technological and non-technological measures are available, including both substance-specific measures (e.g. substitutions) and downstream measures with a large broadband effect (e.g. the advanced treatment of urban waste water). The effectiveness, the required extent of implementation and the associated costs as well as additional secondary effects are each to be differentiated.

RECENT PROJECTS

In the context of different research projects substance characteristics, specific emission pathways and patterns are investigated for selected micropollutants. In addition, the cost-effectiveness of interlinked source-related and downstream measures (e.g. municipal sewage treatment, improve stormwater and water treatment) as well as others are examined. The aim is to obtain suitable combinations of measures and their boundary conditions, characterized by high cost-efficiency. The combination of measures should be integrated into an impact assessment which allows the integration into the planning processes within the Water Framework Directive.

For practical recommendations within the regional planning processes the baseline of a model-based economic evaluation of measures is developed.

RESULTS

The reduction of emissions at source seems always to be particularly useful and effective as a first step (implementation of the polluter pays principle – pollutants cannot be released into the environment, therefore negative long term effects will not occur). At the same time the extent to which emissions are thereby sufficiently reduced has to be verified in each case: Sometimes, sufficient efficient intervention options are not available, or the release into the environment cannot be limited directly due to applications in the past which have emitted pollutants over a long period of time (e.g. in the application of various biocides in building constructions). In some cases there are high loads in other environmental media, which are responsible for further entries into the water bodies. In particular, additional effects can be expected with end-of-pipe measures, for example, by simultaneously reducing emissions of additional nutrients or pollutants, which would be the case with advanced treatment in municipal wastewater treatment plants.

CLIENT

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