

Emission reduction strategy of priority substances in European waters

The general aim of SOCOPSE is to provide support to the implementation of the European Water Framework Directive (WFD) including measures to abate priority substances. Water managers are required to establish a multi-pollutant emission reduction strategy. There is, however, often a significant lack of data on emission control options. A methodology to build an Emission Reduction Strategy (ERS) on is suggested as a way to handle the limited data availability. The developed tools can be applied to steps 4, 5 and 6 in the SOCOPSE Decision Support System. These tools can also be used independently by water agencies to develop emission abatement strategies.

Below follows three useful tools:

TOOL 1: INVENTORY OF ABATEMENT MEASURES	
An inventory of possible abatement and substitution measures was developed by substance and by sector in Europe. The results are available in a database of "triplets" [measure-substance-emission source]	
TOOL 2: ASSESSMENTS OF ABATEMENT MEASURES	
<p>Qualitative assessment by substance: This assessment is based on outcomes from the literature, a survey and workshops. Each measure is assessed with the following criteria:</p>	<ul style="list-style-type: none"> • Technical feasibility: type of pollution, complexity of implementation, impact on the process of the factory, limits and restrictions of implementation • Environmental efficiency: abatement rate, reduction of other pollutants, consumption of energy, production of waste, cross-effects • Costs: investments and operational costs • State of the art: BAT or not, number of applications
<p>Quantitative assessment by triplet: This assessment is based on expert judgments. Each measure total cost is assessed with the following criteria:</p>	<ul style="list-style-type: none"> • "Costs": Investment, operational costs, maintenance costs and benefit foregone • "Availability": Level of availability of a measure in a given sector • "Co-benefits": number of priority substances the same measure can deal with • "Economies of scale": number of factories the same measure can deal with <p>The overall performance of each measure in terms of total environmental benefit is assessed with the following criteria:</p> <ul style="list-style-type: none"> • "Share": share of a substance emission from a given factory of this substances total emissions • "Efficiency": abatement rate, reduction of other pollutants, consumption of energy, production of waste, cross-effects
TOOL 3: EMISSION REDUCTION STRATEGY WITH MCA	
A multipollutant Emission Reduction Strategy, or ERS, is defined as the combination of measures which give the best overall results per substance. In order to get a ranking of measures, we performed an outranking multicriteria analysis methodology called ELECTRE with the quantitative database. The highest ranked measures by substance are presented in the table below (Table 1).	

Ranking	Trip-let_nb	Source	Measures	Sub-stance	Share	Efficiency	Costs	Avail-ability	Co-benefit	Scale
11	245	Surface water treatment	Activated carbon adsorption	Atrazine	50	8	8	9	1	4
1	78	Non-ferrous metals industry	Recycling and reuse	Cd	26.5	10	7	10	4	8
34	213	Uses of (non) polymers	Legislation on disposals	DEHP	90	5	10	6	1	1
36	223	Rural run-off	Grass strips, hedges	HCB	32	7	6	10	4	1
8	229	Farm point-source	Sharing equipment or spraying by contractors	Isoprot	35	9	8	9	1	1
5	120	Battery and cell production	Mercury substitution	Hg	16	10	8	8	10	1
21	160	Waste water treatment plants	Oxidative techniques: chemical	NPE	80	9	3	8	1	1
3	206	Domestic coal combustion	Combustion control and optimization	PAH	25	9	9	10	1	1
29	30	Production of polymers/plastics	Improving raw material handling	PBDE	18	7	9	9	1	1
4	102	Chemical industry	Substitution of TBT in fungicides	TBT	25	9	9	9	10	1

Table 1. The highest ranked measures by substance.

MAIN CONCLUSIONS

- A database on control measures and expected outcomes is available at the European scale. Local ERS can also be prepared by integrating local data in the database. If local data are missing, European data can be used as default.
- The quality of the database is very dependent on the quality of the inventory and qualitative assessment of measures. This highlights the need for more available data on costs and emission factors.
- Criteria used in the MCA describe costs and benefits related to the factory itself but do not consider interactions with ecological and socio-economic systems. Social costs and benefits or impacts of the measure on the local ecosystem are not taken into account.
- Concerning the MCA, the criteria weight allocation should be validated with a quantitative weight allocation methodology.

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