



ScorePP is a Specific Targeted Research Project (STREP) funded by the European Commission under the Sixth Framework Programme

# ScorePP



## Summary of 1<sup>st</sup> annual Progress Report

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**Source Control Options for Reducing Emissions of Priority Pollutants (ScorePP)**

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### Abstract (max. 200 words)

The overall aim of the ScorePP project is to develop comprehensive and appropriate source control strategies that authorities, cities, water utilities and the chemical industry can employ to reduce emissions of priority pollutants (PPs) from urban areas into the receiving water environment. Focus is on the 33 priority and priority hazardous substances and substance groups identified in the European Water Framework Directive. However, this list may be expanded to include emerging pollutants or reduced if appropriate model compounds can be identified. The initial work focuses on 67 substances, including substances identified in the proposed European environmental quality standard (EQS) directive as well as the defined example compounds and several organometallic derivatives.

This report is a summary of the 1<sup>st</sup> annual Progress Report, describing the main scientific objectives of the ScorePP project and main results achieved within the first year of the project, which are (i) a database presenting basic information about the EU WFD Priority Substances (output from task 3.1), (ii) an assessment of the priority pollutant behaviour in stormwater best management practices (output from task 5.1) and (iii) an innovative approach to managing data about sources, their resulting PP loads and available mitigation options (output from task 9.3).

### Acknowledgement

The presented results have been obtained within the framework of the project ScorePP - “Source Control Options for Reducing Emissions of Priority Pollutants”, contract no. 037036, a project coordinated by Institute of Environment & Resources, Technical University of Denmark within the Energy, Environment and Sustainable Development section of the European Community’s Sixth Framework Programme for Research, Technological Development and Demonstration.

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## 1. Introduction

The European Commission (EC) has, in connection with the Water Framework Directive (WFD), identified a list of 33 priority substances (PSs) for which environmental quality standards and emission control measures have to be established (EC, 2001). The list was developed through a negotiation process and involved the use of scientific data on a range of properties of each substance including pollutant load, toxicity, persistence and liability to accumulate in the environment. Within this list a total of 11 substances have been identified as being particularly hazardous, and these priority hazardous substances (PHs) are subject to a complete cessation or phasing-out of discharges, emissions or losses within an appropriate time scale not exceeding 20 years. The overall list is under constant review and it is anticipated that certain of the 'possibly hazardous' substances will be "upgraded" to a PHS status and that several emerging pollutants will also be added to the list at a future date. As a first example, the EC has recently proposed a set of environmental quality standards (EQS) (EC, 2006), which in addition to the 33 PSs identified in the WFD includes 8 extra compounds and "upgrades" one chemical, anthracene, from PS to PHS status (i.e. there are now 41/12 PSs/PHSs to consider).

The complete cessation or significant reduction of PS/PHS emissions is a big challenge for the European Union (EU), and there are numerous scientific and practical questions remaining. For example: is it more feasible to control the substances via enhancing end-of-pipe treatment technologies or to control them at source via a combination of substitution, voluntary use reductions and/or legislation?

## 2. The scorePP idea

The ScorePP project (Source Control Options for Reducing Emissions of Priority Pollutants) is a recently started European 'Specific Targeted Research Project' that aims to develop comprehensive and appropriate source control strategies that authorities, cities, water utilities and the chemical industry can employ to reduce emissions of priority pollutants (PPs) from urban areas into the receiving water environment. PPs in this context refer specifically to the above mentioned PSs/PHSs; this list may however be expanded to include emerging pollutants or reduced if appropriate model compounds can be identified, depending on the local context (i.e. sources of pollution, existing monitoring activities and legislation).

A substantial proportion of the total load of PPs entering receiving waters is discharged from urban areas and this is therefore the primary focus of the ScorePP project. Agricultural, industrial and other potential sources (e.g. leachate from landfill sites) located outside urban areas will only be included if specifically required within the case studies investigated in the project. This does not imply that the project consortium considers urban pollution more important than rural; it merely reflects the focus of the project around which expertise is gathered and the work plan has been developed.

The Figure below illustrates the physical system considered in the ScorePP project, exemplified with a combined sewer system including both upstream (source control) and downstream (end-of-pipe treatment) mitigation options. In addition to the shown point discharges (treatment plants and combined sewer overflows) there are diffuse discharges from e.g. building drains and unknown pipe networks and overland flow (D: Detention, O: Overflow, T: Treatment).

**Limiting release through:**

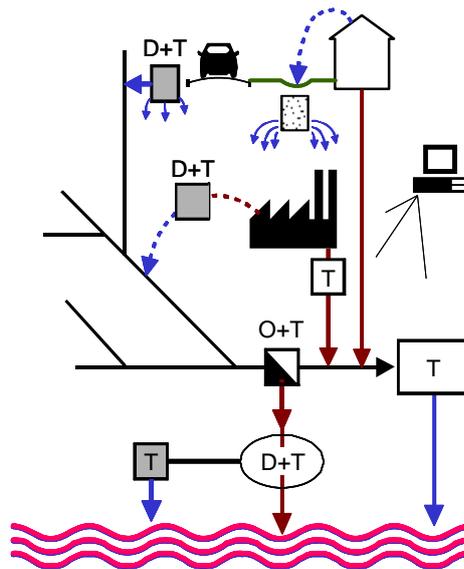
- Substitution
- Minimising release from products
- Legislation and regulations
- Voluntary use reductions

**Treatment options:**

- Stormwater BMPs
- Household treatment & reuse of WW
- On-site industrial treatment
- WWTPs
- Sludge disposal

**Sinks:**

- Primary: Surface water (WFD)
- Secondary: Sediments, soils/gr.water, humans, ...



### 3. Main scientific objectives

The overall work plan for the ScorePP project illustrating the 10 work packages, their temporal evolution and (in enlarged text bubbles) their grouping according to the nature of the work is illustrated in the next Figure. The project is divided into a number of work packages (WPs) that specifically address a range of identified objectives and follow in a logical sequence. The primary scientific objectives of the ScorePP project are, in brief, to identify the sources of PPs in urban areas (WP3), identify appropriate strategies for limiting the release of PPs from their sources (WP4) and for their removal via treatment (WP5), connect and visualise pollution sources, paths and loads using GIS technology (WP6), develop dynamic source-and-flux models for quantifying the fate of PPs within the urban drainage and wastewater system and optimising monitoring programmes (WP7), and benchmark the different emission control strategies and determine their socio-economic impacts on a societal scale (WP8).

Work Package	Month	1-12	13-24	25-36
WP1: User requirement analysis and dissemination to end-users	Advisory board, PPRIS	—	—	—
WP2: Analysis of case studies	Case studies	—	—	—
WP3: Source characterisation of priority pollutants	Establishing technical-scientific facts	—	—	—
WP4: Limiting release of priority pollutants		—	—	—
WP5: Treatment options		—	—	—
WP6: GIS-based identification of emission control measures	GIS, models, monitoring	—	—	—
WP7: Models and monitoring strategies		—	—	—
WP8: Socio-economic analysis of source control measures	Socio-economic and integrated analyses	—	—	—
WP9: Integration of knowledge and comparison of emission control strategies		—	—	—
WP10: Project management and coordination		—	—	—

It is appreciated that some of the emission control measures may be potentially controversial as they depend on the full participation of the chemical industry, water utilities and/or other stakeholders involved in urban spatial planning, with potential economic and social (as well as environmental) impacts and implications. Three further scientific objectives are therefore defined as follows: evaluate the usefulness of the developed approaches, technologies and emission control strategies in a number of case study cities (WP2), interact with the most important stakeholders and communicate the results of the project to a wide audience (WP1) and finally, integrate and condense the developed knowledge and experiences into appropriate and cost-efficient emission control strategies for semi-hypothetical case city archetypes representing PP emission states in different geographic and socio-economic contexts throughout Europe (WP9).

The WPs are connected group-wise according to the nature of the work, as shown by the text bubbles in the Figure. Case cities selected for detailed case study include Stockholm (Sweden), St. Malo (France), Prague (Czech Republic), Quebec (Canada) and St. Sebastian (Spain). The advantage of these 5 pre-selected case studies is that they represent a wide range of “states” with regard to monitoring and source control of priority pollutants.

#### **4. Main results achieved**

The main results achieved during the project’s first year are summarised in the outcome from the three project tasks mentioned below.

Database Presenting Basic Information about EU WFD Priority Substances (Task 3.1): The aim was to construct a database that is able to support the consortium in the other tasks and work packages with basic information regarding the priority pollutants. Basic information regarding inherent properties, environmental fate, risk classifications, observations in the environment and present legislation have been compiled for 67 chemicals and chemical groups. These 67 chemicals and chemical groups are included in the Water Framework Directive. The database is constructed in MS Access, and within the database there are several forms to handle chemicals, properties, data sources and data entries. In order to retrieve data from the database, an add-on program is used to generate a report in MS Excel based on the data in the database. Data on all properties for one chemical or data on all chemicals for one property are examples of the kind of reports that may be generated from the database.

Priority pollutant behaviour in stormwater Best Management Practices (Task 5.1): Limited, if any, field monitoring data exists on the behaviour of WFD priority pollutants (PPs) in stormwater Best Management Practices (BMPs). However, stormwater managers currently need to make decisions on the adoption of urban drainage schemes which can address both water quantity and water quality objectives, a need increasingly prioritised by the EU WFD. To address this identified knowledge gap, a theoretical approach to predicting the behaviour of PPs within BMPs, and hence the provision of an assessment of their removal potentials, has been developed. This methodology involves identifying the primary removal processes within 15 BMPs and categorising their relative importance. Physico-chemical data and, where this is missing, expert judgement are used to assess the potential for 52 WFD PPs (an extended list including a range of representative group members) to be removed by the identified processes. These two sets of information are then combined to generate a single overall unit value representing the potential for each BMP to remove a particular pollutant. Ranking these values in descending order enables a pollutant-specific BMP treatment ‘order of preference’ to be established. This report describes the methodology and presents the results of its application to the extended list of WFD PPs.

Data requirement analysis and definition of common data structures (Task 9.3): An innovative approach to managing data about sources, their resulting PP loads and the available mitigation options has been prepared by combining chemical identification (CAS#), NACE economic activity classifications and NOSE-P emission source classifications. Future challenges are to connect this data

management system with the detailed work on mitigation options (those mentioned in WP4-5), with the modelling efforts, and with the preparation of emission control strategies in the case city studies, as well as to establish a fruitful dialogue with important stakeholders in the area of emission control of PPs.

## 5. Contractors involved, Coordinator and public website

The project partners include Technical University of Denmark (Denmark), Middlesex University (UK), Ghent University (Belgium), Anjou Recherche (France), Envicat Consulting (Belgium), University of Ljubljana (Slovenia), Desenvolupament i Societat Estudis (Spain), City of Stockholm (Sweden) and Université Laval (Canada).

Further information may be found at the project's public website or by contacting the project Coordinator.



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