

Pollutants in the Urban Environment (PurE)



The mission of the PurE project is 'to enable valid and transparent assessments of sustainable development scenarios by providing an improved scientific understanding of the behaviour and impacts of pollutants in the urban environment'.

This mission has been set in motion through the PurE Scoping Study (2003 to 2004) conducted to develop an initial conceptual basis and define a decision-support framework capable of integrating the three critical steps defined by the consortium partners (see figure):

1. mapping the sources and flows of pollutants associated with human activities in the urban environment;
2. modelling the fate and transport of pollutants in the environment; and
3. understanding (identifying and quantifying) the impacts of pollutants on human and ecological health in the urban environment.

This vision will extend into the Main Study, proposed for 2005 to 2009.

Stage 1 - Stakeholder Consultation

The Research End-users workshop in October 2003 identified numerous research actions (26 in total), which are prioritised as follows:

- o Develop integrated models of urban pollution, health, environmental quality, and ecological health;
- o Improve knowledge of chemical (pollutant) interactions;
- o Utilise Life Cycle Assessment (LCA) and whole life costing;
- o Define end-users as part of a gap analysis;
- o Review integrated and holistic approaches taken by stakeholder organisations; plus many others...(see SNIFFER 2004).

Several of the research actions have been explored in four (six-month) scoping study research projects, carried out by the academic partners (see list of reports). These actions and additional needs identified by the PurE researchers will be addressed in the Main Study (see below).

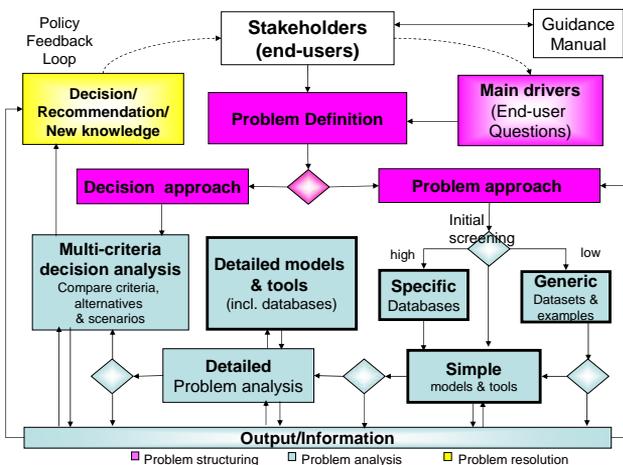
The Signpost Document presents the findings of the survey of available models and tools for urban pollution. Examples of tools for inclusion in the PurE framework include LCA, substance flow analysis (SFA), air and water pollution dispersion, health impacts models, whole life costing and sustainability indicators.

Stage 2 - Framework Development

The main aim is to develop an integrated decision-support framework comprising a suite of appropriate models and tools that can be selected by different stakeholders or end-users (policy-makers/implementers, local authorities, industry, researchers, NGOs) to conduct simple screening studies and/or detailed modelling assessments of options for a more sustainable management of urban pollution.

The conceptual framework consists of several stages (see flowchart): **problem structuring** where the end-users identify their main drivers and key questions; **problem analysis** using either a problem- or decision-oriented approach (and corresponding tools); and, **problem resolution** (assessing the sustainability of urban scenarios/options).

The scoping research has explored different parts of the overall framework. More detailed research and demonstration of applications is planned for the Main Study (see below).



Stage 3 - Work Programme for the PurE Main Study

The main deliverables for the PurE Main Study will be a decision-support methodology, modelling platform (software) incorporating a suite of models and tools, and the end-users guidance manual.

The stages include: **stakeholder engagement** through interviews, tools workshop, and communications (e.g. newsletter); **framework development** (methodology covering eight research themes); **building and testing** the modelling platform (technical tools review, software); and **synthesis and dissemination** of the findings (framework launch). There could also be several special projects (if funding permits) to examine: mixtures of pollutants; detailed models; comparison of UK and EU case studies; pollutants & tradeoffs in alternative energy systems & biomass; environmental forensics; and risk & uncertainty.

Case for Support: Pollutants in the Urban Environment (PurE) Scoping Study (UniS *et al.* 2002).

SNIFFER: Research End-Users Workshop. Report for the PurE Scoping Study, Stage I, October 2003 (SNIFFER 2004).

University of Surrey, Centre for Environmental Strategy (UniS-CES): Signpost Document of Models and Tools for Urban Pollution Studies (Pettit 2004).

UniS-CES: A Life Cycle Approach to Mapping the Flow of Pollutants in the Urban Environment. (Azapagic & Sinclair 2004).

UniS-CES: PurE Framework Development. Report for the PurE Scoping Study, Stage II. Draft in preparation. (Pettit and Azapagic 2004).

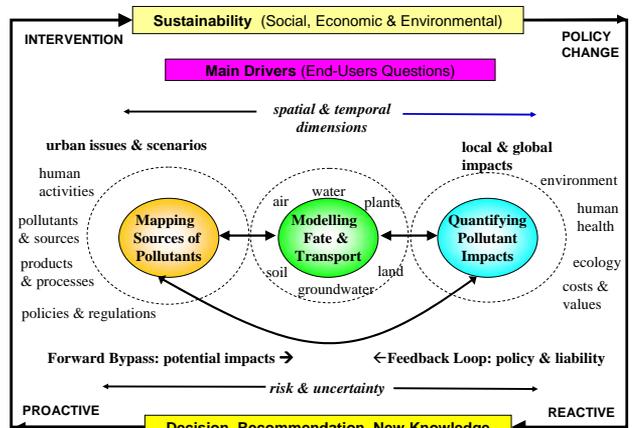
UniS-CES: Development of a Framework for Integrated Assessment of Pollutants in the Urban Environment (PurE). *Proc. International Sustainable Development Research Conference*, Manchester, March 2004. (Pettit, Azapagic and Jefferis 2004).

Sheffield University Waste Incineration Centre (SUWIC): Review of Pollutants (Gas, Liquid, Solid) Released to the Urban Environment from Combustion Systems and Quantification through Predictive Modelling (Al-Rahbi *et al.* 2004).

Cardiff University & London School of Hygiene & Tropical Medicine (LSHTM): Integration of the Engineering Source Terms for Pollutant Release, Fate and Transport Modelling, and Health Impact Analysis of Urban Pollution (Seetharam *et al.* 2004).

Queens University Belfast (QUB): Integrated Use of Large Scale Index Methods and Site Scale Pollutant Transport Models for Assessing Urban Groundwater and Surface Water Pollution Potential (McKinley and Yang 2004).

PurE Proposal: Case for Support to EPSRC for the PurE Main Study, 2005 to 2009 (UniS *et al.* 2004).



Some of the main drivers for application of the PurE integrated decision-support framework are:

- EU Directives and UK Legislation including Water Framework (WFD); Environmental Liability; Strategic Environmental Assessment (SEA); Integrated Pollution Prevention & Control (IPPC); Registration, Evaluation & Authorisation of Chemicals (REACH); Chemicals Strategy (Defra & EA); Control of Major Accident Hazards (COMAH); Environmental Statements for major urban renewal, planning issues, etc.

The types of questions that end-users may want to explore are illustrated by the following examples:

- What are the major sources of **pollutants X** in my urban area?
- How would changes to a **process X** affect the local environment and population?
- How could **product X** affect the urban environment and urban society?
- Would **activity X** have any negative effects on the health of urban dwellers?
- What are the implications of **policy X**? etc.

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