

TRANSITIONS TO
THE URBAN
WATER SERVICES
OF TOMORROW

07

trust

MAGAZINE

Reading about
change in the
water services
of tomorrow

E-book for
policy makers

Adaptive urban water systems

Sustainable intervention options.

6

Adaptive urban water systems - Sustainable intervention options



What is resilience in terms of Urban Water Systems?

Resilience indicates durability or continuity. Its achievement is primarily through enhancing both the potential for change (flexibility), and the ability to adapt (adaptivity).

The decision issues faced by water professionals and policy makers concern the selection of appropriate technology options and network configurations that cope with uncertainties and that can meet system design criteria such as cost and use.

A handbook for policy makers - Transition to Sustainable Urban Water Services of Tomorrow

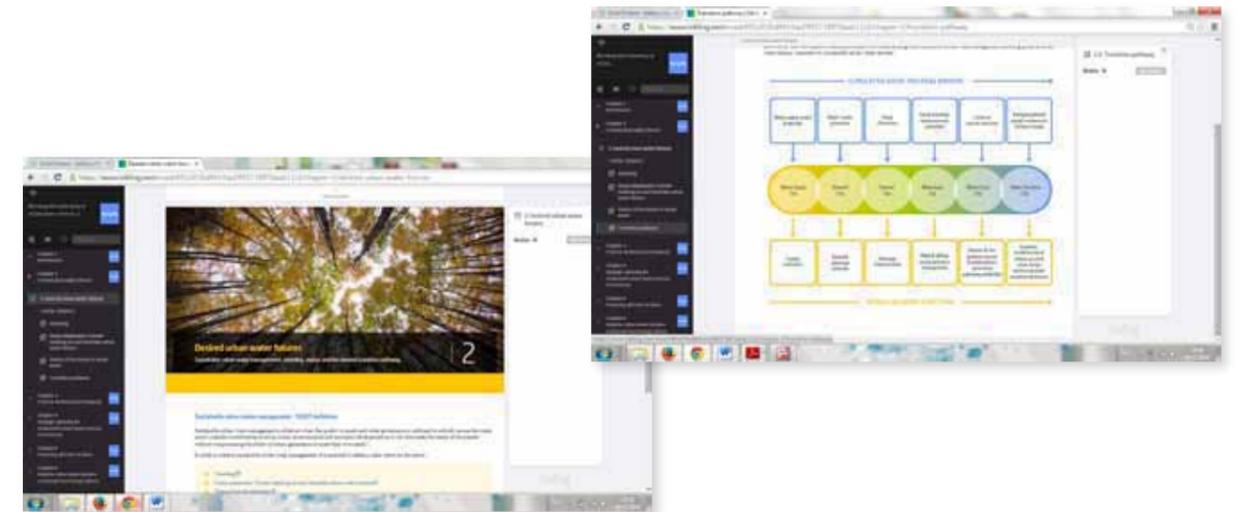
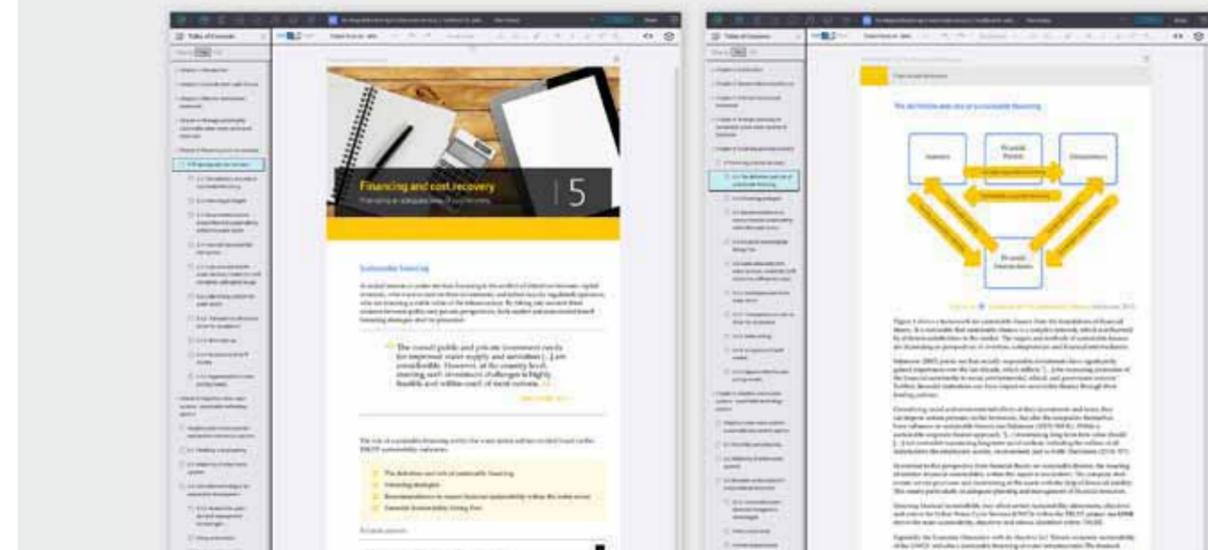
Policy makers are challenged with rising and emerging change pressures on traditional urban water management practices and infrastructures. Changing social, economic and environmental patterns will affect the urban water services of tomorrow - the backbone of our society.

Contemporary thinking about the behaviour of highly complex urban water systems has significant influence on the debate about the future of urban water systems. Despite of innovative integrated urban water management approaches and the availability of appropriate tools and technologies contributing to sustainable urban water services, the progress of implementation is slow and major barriers remain. Transition processes to sustainable urban management are adaptive measures beyond the daily operating decisions. Coping with future uncertainties and increasing challenges requires sustainable urban water governance practices facilitating the ability to change.

The main questions are: Where to be in 2050? How to facilitate change towards sustainable urban water services?

The Policy Guidance Material (PGM) of TRUST provides information and assistance for shaping the transition towards sustainable urban water services of tomorrow for policy makers and public decision makers, addressing the following issues:

- Desired urban water futures
- Effective institutional frameworks
- Strategic planning for sustainable urban water services of tomorrow
- Financing and cost recovery
- Adaptive urban water systems



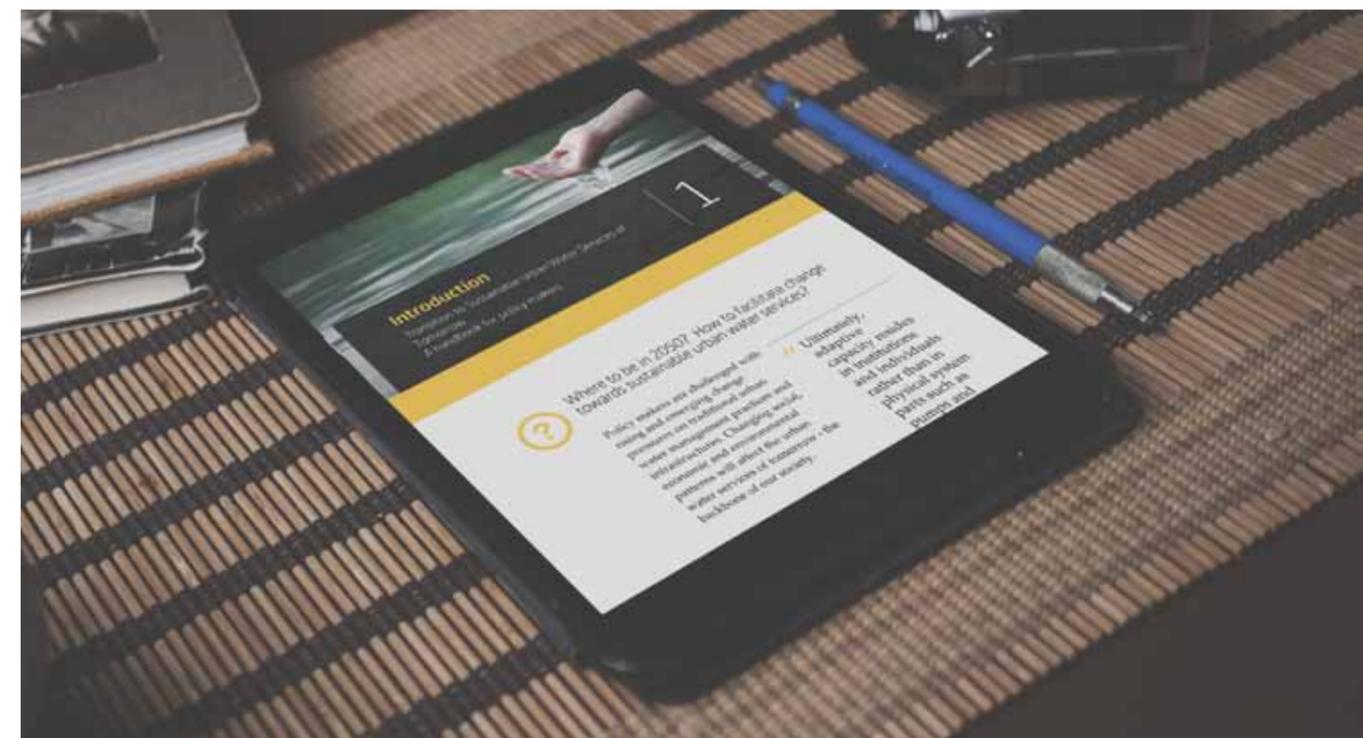
Policy makers are typically in the position to influence specific development pathways by their decisions. What they need for their informed decision making is a broad overview on possible pathways for a sustainable development of urban water cycle services (UWCS), an access to multi-disciplinary material on technical, hydrological, socio-economic, legal, administrative issues, and a broad understanding of interdependencies between water infrastructure decisions and external drivers. Specific viewpoints are on overall visions, competent institutional frameworks, capacities and the financial impact of their decisions.

The Policy Guidance Material gives answers to those questions and provides access to relevant findings and results from the TRUST project (such as different self-assessment tools, metabolism tool, decision support system (DSS), collaborative decision theatre, city blueprint, roadmap guideline and many others), but also allows identifying contributions from outside TRUST by following the provided external links. In this context, there is no single answer to a given set of conditions.

The aim is to lay out available alternatives being clearly but thoroughly characterised, in an easily understandable and useable form, explaining their main features, advantages, and disadvantages.

What additionally makes the Policy Guidance Material outstanding is the fact that it addresses topics which are commonly not accounted by existing water policies or strategic plans, e.g. a vision describing the desired state of the urban water future, tools to measure the current state of sustainability, principles of resilience, flexibility and adaptivity in terms of urban water systems and the five dimensions of UWCS sustainability regarding future pressures and trends about, among others, climate change, population growth and changing water demand.

The Policy Guidance Material is a self-explaining document comparable to an animated website. It will be available for free on the TRUST website under downloads soon.



“Urban water use and water services must be different in 50 years”

The objective of TRUST’s work area 5 “Future policies & integrated tools” is to develop general-use integrated approaches and planning support tools aimed at the transition from current status to the desired sustainable urban water cycle services of tomorrow. The integrated approaches, developed both at the regional/national level and at the utility level, will seek a balanced long-term asset management view between performance, risk and cost, and will take into account social and political acceptance. The life cycle assessment paradigm will be incorporated whenever appropriate and feasible. The proposed development work aims at empowering policy makers and water utilities. Dr. Helena Alegre is the leader of this work area.



Helena Alegre. WA5 leader.

Helena, what is the purpose of your work area within the TRUST project?

The main purpose of “Future water policies & integrated tools” is to produce guidance materials and software that can guide policy makers, managers and water professionals in the transition for more sustainable urban water services. It builds from previous knowledge, from the work developed in the other work areas of TRUST and from the “ecosystem” of related projects that partners developed parallel to TRUST.

In your opinion, what are the biggest challenges and problems at the moment? What kind of change is needed urgently and where?

Nowadays, many urban water services are not sustainable, meaning they are not prepared to cope with climate change, have a high carbon footprint, and they are aging at a considerable pace. This situation must change. Even when sustainability drivers are recognised and corresponding strategic objectives are stated by policy makers and CEOs, it is frequent that daily lives of the organizations responsible for managing the urban water cycle services do not reflect these high level statements. In general terms, investments in renovation of the existing aging systems are insufficient to prevent aging and do not correspond to a well-defined transition path for more sustainable urban water services.

This was actually one of the motivations to start TRUST. During the course of the project, a lot has been developed and made available for the water community at broad already. The last months of the project now will allow finalizing some practical tools that will provide more coherence to the whole package of TRUST products.

As you said, the TRUST project is slowly coming to an end. What do you consider as the most important achievements of your work area?

Most products are being finalised at a professional grade, with

a very practice-oriented focus, all of them grounded on the 5-dimension TRUST definition of sustainability (economic, environmental, social, governance and assets). The products include (i) a web-based software tool to assist in roadmapping, which provides guidance on how to build a roadmap and concrete information on existing TRUST products for each roadmapping stage and each TRUST sustainability objective and criteria, (ii) a set of guidance manuals on infrastructure asset management, targeting at water professionals and (iii) a web-based software platform that contains a coherent set of tools to assist strategic and tactical planning. Those are only a few of the work area 5 products and you can find more on the TRUST website.

To add to this, a metabolism-based decision support tool and a leading-edge decision theatre tool, designed to build consensus among stakeholders about a common set of objectives, assessment criteria and metrics, were developed at a prototype level.

Are the products verified and applied already?

The guidance manuals and the professional software of TRUST/AWARE-P were developed together with utilities and decision makers and they have been broadly tested and used as part of their infrastructure planning processes by many utilities in many countries, particularly in Portugal, Spain, USA, Australia and Brazil.

The guidelines and other products that are currently being finalised have not been tested as such, but all their content directly reflects joint work between researchers, water utility professionals and policy makers. They summarise the learnings from several years of application of a well-structured approach to infrastructure asset management, while embodying key learnings from the other TRUST work areas.

This ‘real life’ impact of the TRUST/AWARE-P approach and tools was recently recognised with two prestigious European awards: The 2014 Project Innovation Award/Planning (Europe and West Asia region) and the Mülheim Water Award 2014.

How might urban water use and water services be different in 50 years and what would be your ideal?

Urban water use and water services MUST be different in 50 years. A status quo situation is simply not feasible. Nowadays, there is a trend to promote decentralised systems, benefiting from more effective and easier to use on-site technologies. However, this is by no means a “one size fits all” solution. My personal view is that centralised systems will continue to prevail in urbanised areas, with hybrid solutions being progressively implemented. However, the major changes are cultural, in governance and in organisational management processes. There is a huge room for improvement in these areas. I believe that TRUST’s legacy is a very important step into this direction.

Read more about TRUST and the results of the project on the TRUST website under <http://www.trust-i.net/>

Upcoming deliverables in Trust

D41.2

Optimisation procedures and benefits for sustainable water supply systems of tomorrow

This report introduces a framework and a number of diagnostic tools to help water utilities for the optimization of water supply systems with respect to safety, environmental impacts and cost. It is mainly directed at the scientific community and water professionals (technical staff and decision makers).

Most existing water supply systems are and will be in operation for decades to come and therefore optimization of operation performance should be carried out regularly. These days, the efforts are often restricted to water treatment plants, and are mainly motivated from water quality and cost issues. However, the remaining optimization challenges and unexploited optimization benefits still seem significant and should include more criteria to achieve a more sustainable operation with respect to safety, environmental impacts and cost-efficiency. Optimization of water treatment plants and distribution systems also has to rely on selected optimization criteria that are site and system specific. Comprehensive knowledge of the specific characteristics, limitations and challenges of a water supply system is required in order to define available alternatives and to design and perform full-scale optimization studies and trials.

Three test sites in non-organic matters (NOM) laden regions in the United Kingdom, The Netherlands and Norway are chosen on the basis of common drivers and challenges with respect to drinking water safety and sustainability issues. This report provides first examples on the application of the optimization framework and a number of diagnostic tools that enable assessment of water quality, NOM nature and properties, including biodegradability, water treatability, treatment technology, and operation performance. Differences in applied technologies and operations are also an important aspect to consider and contribute to applicability of the optimization framework to attain sustainable and safe water services as proposed in this report.

D53.2

Infrastructure Asset Management (IAM) planning software application

The PLAN tool is a decision-support environment, designed to be used as an organized assessment and comparison for any number of competing projects, solutions or alternative designs, which can be assessed and pitched against each other numerically, as well as visually. PLAN was designed as the central planning framework of the AWARE-P infrastructure asset management methodology, where planning alternatives or competing projects are measured up and compared through selected performance, risk and cost metrics, through interactive numerical and 2D/3D graphical information display. It may also be used to compare different systems or sub-systems for diagnosis and prioritization. It was created as a technical tool, but just as importantly as a negotiation and communication vehicle.

As in the AWARE-P asset management approach, emphasis is placed on evaluating impacts over the long term and in multiple dimensions (service, economics, social), and on quantifying the impact of those interventions in a defensible, repeatable and transparent way.

PLAN is based on the three main axes that characterize the assessment and comparison process: a time frame, a set of alternatives under comparison, and a number of standardized metrics that reflect the impact of those alternatives on the set objectives in performance, risk or economics terms.

D54.2

DSS strategic planning software application

A proof-of-concept decision support system was developed within TRUST. It is integrated with the WaterMet2 city-level metabolism model, the University of Exeter’s applied approach to decision support, and TRUST’s WA3 risk methods applied to the problem of deciding between competing alternatives from a long-term sustainability viewpoint.

Decision support is performed, using a four-stepped approach: (1) problem definition, which entails specification of the data describing the problem analysed, scenarios, intervention strategies (aka alternatives) and metrics; (2) decision matrix population, which is achieved by running a predefined metabolism model, designed using WaterMet2 software, and collecting the relevant output metrics/indicators; (3) ranking and result viewing that is carried out by the Compromise Programming method and the results are visualized on alternative vs. metrics or alternatives vs. scenarios, integrating a risk-based approach to cross-scenario ranking and (4) modification and re-evaluation.

Register for the Cities of the Future Conference about leading-edge developments in the area of urban water services today!

The Cities of the Future – Transitions to the Urban Water Services of Tomorrow (TRUST) conference from 28-30.5.2015 in Mülheim an der Ruhr/Germany, organised by the IWA Cities of the future programme and the TRUST project, will provide an opportunity to present and discuss leading-edge developments in the area of urban water services with an international audience of water utility personnel, researchers, engineers, technology providers, city planners, consultants, regulators and policy makers. It will be focused on the techniques, technologies and management approaches aiming at enabling and supporting the transition towards more sustainable urban water futures, but also zoom-in on the socio-economic requirements and aspects of this transition.

Growing cities around the world are subject to a number of challenges such as demographic change, globalizing economies, social inequalities, technological innovation, growing resource-demand and environmental changes. The challenges are all expected to impose significant strains on urban water systems (UWS) over the coming decades. Some consequences could be increasingly frequent shortfalls in the supply / demand balance. More intense rainfall events will lead to local flooding of properties and transport systems and to pollution of receiving waters. Sustainable solutions to these challenges need to be sensitive to long-term investment needs, but also to increasing energy prices, demands for low carbon

intensity solutions, and the need to reduce gas emissions from urban activities.

Water is vital for any human society, and therefore the urban water cycle services (particularly water supply and sanitation) are key factors for stable and healthy cities of the future. Within the context of a growing world population, continuing urbanization and the general pursuit of better living standards, there is an urgent need for really sustainable solutions for urban water services: solutions that meet the needs of the present without compromising the ability of future generations to meet their own needs.

Conference Programme

	TUE 28 APRIL	WED 29 APRIL	THUR 30 APRIL
09:00	Session 0 (not public) TRUST Project meeting	Session 4 Governing and Financing Keynote: Xavier Le Flaive - OECD (tbc)	Session 8 Territorial & Urban Planning Keynote: Mark Fletcher - Arup
10:30	Registration / Coffee	Coffee & Poster	
11:00	Session 1 TRUST - Results - Part 1	Session 5 Planning Future UWS Strategies & Tools - Part 1	Session 9 Engineering Future UWS
12:30	Lunch & Poster		
14:00	Session 2 TRUST - Results - Part 2	Session 6 INIS A research cluster on water infrastructure	Excursion / Technical Tour "Emscher Conversion"
15:30	Coffee & Poster		
16:00	Session 3 Workshop Resource/Energy Efficiency Keynote: Willy Verstraete	Session 7 Planning Future UWS Strategies & Tools - Part 2	
17:30	Break		
19:30	Dinner		

Conference Venue

The conference venue "Mülheim an der Ruhr" is situated in the metropolitan Ruhr area, which is populated by around 5 million people, providing an excellent example of an extended infrastructure for water and wastewater services in a very active transition process. The urban water systems and services have been continuously expanding from the end of the 19th century, driven by heavy industry demands (mining and steel) and are now changing again due to economic transformation and demographic change of population. A complex system of regulated rivers, reservoirs, impounded lakes, groundwater recharge areas, open sewer channels and artificial waterways for transport within a densely populated area is now in a transition to meet the expectations of today's and future generations in terms of environmental quality and living standards, as well as to better comply with current and future regulations.

The region provides numerous examples of complex and innovative experiences in urban water service management, such as integrated management of rivers, watersheds incl. reservoirs, treatment plants, no-dig renewal strategies and application of information systems.

Therefore, the area provides ample opportunities for technical tours and excursions back-to-back with the conference.

Poster Submissions

Up until the end of February 2015, applicants are invited to submit a poster featuring contributions to knowledge or case studies with value for practitioners. All posters submitted will be peer-reviewed by the program committee. You can download the template for submissions using the following link: <https://conference.trust-i.net/uploadabs/>

Register Now!

<https://conference.trust-i.net/>

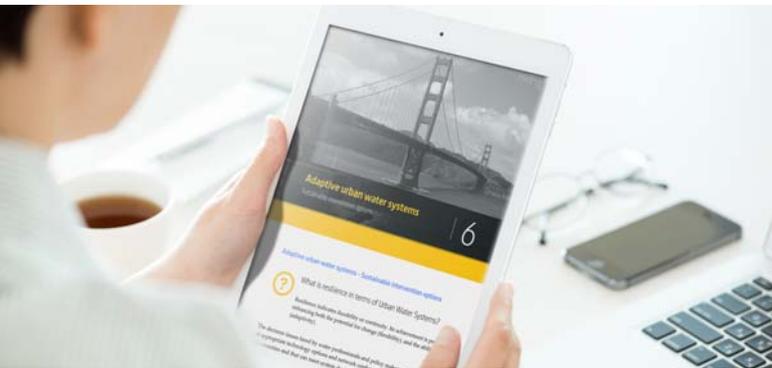


Conference subjects and topics

- **Planning for Future Urban Water Services**
 - > Strategies for Sustainable UWS
 - > Territorial and Urban Planning
 - > Diagnosis Tools
 - > Management Tools
- **Engineering Future Urban Water Services**
 - > Water Security in Cities
 - > Healthy and Liveable Cities
 - > Resource/Energy-Efficient Cities
 - > Climate-Resilient Urban Water Services
 - > Smart Networks – Smart Water Services
- **Governing and Financing Future Urban Water Services**
 - > Water Governance in Transition
 - > Financial Sustainability of UWS
 - > Affordable Water Services

Within the conference, there will be a special session dedicated to the core outcomes of the TRUST project, covering in particular the following aspects of a successful transition to more sustainable urban water services:

- > Diagnosis and Vision
- > Policy, Financing and Society
- > Analysis Tools
- > Technologies & Operational Options
- > Future Water Policies & Integrated Tools
- > TRUST@Work: solutions demonstrated in Green Cities, Water-Scarcity Cities and Urban / Peri-Urban Settings
- > Train4TRUST: trainable TRUST outputs, training opportunities



Train4TRUST

In order to ensure a verification of the TRUST tools, methods and models and in order to achieve a maximum imprint of the project in the practice of water utilities and water authorities, the training of users on TRUST tools and outputs is one implementation route of the TRUST outreach strategy. After advertising the main project outcomes to water utilities participating in TRUST and beyond, there have been requests for training on the following topics.

- Oslo, Norway: evaluation of the applicability of all TRUST deliverables (event is in planning stage)
- Hamburg, Germany: training on asset management software Aware-P (event is in planning stage)
- Madrid, Spain: training on tools for demand, energy and storm water management (events has taken place already)
- Reggio Emilia, Italy: training on urban water metabolism model (event will take place in January 2015)
- Bucharest, Romania: training on new concepts and practices for network design and sustainable operation (event has taken place already)

All TRUST utilities will have the possibility to be trained on project outcomes at a dedicated event linked to the final project conference at 28.-30. April 2015 in Muelheim an der Ruhr (Germany).



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This publication reflects only the author's views and the European Union is not liable for any use that may be made of the information contained therein.

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