Introducció

Innovation Demonstration for a Competitive and Innovative European Water Reuse Sector

DEMOWARE
(FP7-ENV-2013-WATER-INNO-DEMO)

Keywords:
Water reuse, innovation, demonstration, urban side, barriers to implementation, technology, monitoring, environmental and human health risk, access to financing, public and political engagement
Europe has plenty of water resources compared to other regions of the world, and as a whole it has not been traditionally considered as exposed to scarcity... this position has been changed in the last years by growing water stress (water scarcity and quality deterioration).

Half of the European countries representing almost 70% of the population are facing stress issues.

However, no uniform guidelines, regulations or management practices yet exist at the European level to define the term “appropriateness” considering criteria such as human health and environmental risk as well as public acceptance and financial viability.

![Water exploitation index (%)](image)

Source: European Environment Agency

![Graph showing water usage and potential](image)
Contexte del Projecte

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FP7 2013 Inno-Demo call (€50M)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Number of proposals submitted</td>
<td>133</td>
</tr>
<tr>
<td>Proposals funded</td>
<td>11</td>
</tr>
</tbody>
</table>

“15/15”
Partners: 27  
Demo-sites: 10  
Budget: 10.504.470 €  
Requested UE contribution: 5.999.566 €  
Duration: 3 years

Country  | No. Partners  
--- | ---  
Spain  | 8  
France  | 3  
Israel  | 3  
Italy  | 3  
United Kingdom  | 3  
Belgium  | 2  
Germany  | 2  
Czech Republic  | 1  
Switzerland  | 1  
Netherlands  | 1

Country  | No. Demo Sites  
--- | ---  
Spain  | 4  
France  | 1  
Israel  | 1  
Italy  | 1  
United Kingdom  | 1  
Belgium  | 1  
Germany  | 1

Work Packages: 9  
Person-months: 961.8  
Deliverables: 42  
Milestones: 28  
External Stakeholders: 12
Objectius

- Demonstrate the technical feasibility of innovative technologies for wastewater reclamation and reuse
- Demonstrate advanced monitoring and control of water constituents (pathogens, contaminants and nutrients) in various water recycling schemes.
- Demonstrate how through the assessment and management of risks the socio-economic and environmental benefits of water reuse can be maximized, while negative impacts are kept to a minimum.
- Increase and promote the marketability of water reuse schemes.
- Improve the ability of reuse scheme operators to deliver socially acceptable projects within collaborative and effective governance regimes.
- Promote a wider understanding and awareness of water reuse practices among public administrations and end-users.
- To create and nurture an identity and knowledge base for the nascent European water reuse sector.

Resultats
Site 1: Torre Marimon - Catalonia, Spain

- **AGR**
  - Secondary treated effluent from the WWTP Caldes de Montbui plus different low cost disinfection treatments (1 m³/d) for several uses in farms.
  - AnMBR for unrestricted irrigation applications (50 dm³/d).

- **Unrestricted irrigation Farm applications**
  - WP: 1,2,3,5,7,8,9

- Feasibility of AnMBR for integrated water reuse and waste management in rural zones.
- Explore water reuse in farms.
- Feasibility of innovative clogging reduction methodologies in agricultural irrigation networks.
- Public perception and acceptability and governance issues.

Site 2: Braunschweig - Lower Saxony, Germany

- **AGR**
  - Reuse of Steinhof WWTP effluent for agricultural restricted irrigation: fodder and industrial crops.
  - Primary sedimentation, activated sludge and biological treatment for the removal of organic carbon and nutrients respectively.
  - The sludge from primary sedimentation and the activated sludge process is digested in an anaerobic treatment. In summer the digested is mixed with the effluent and used for irrigation in agriculture. In winter the sludge is dewatered and used as fertilizer on agricultural areas.

- **Restricted irrigation**
  - WP: 1,2,3,4,8,9

- Provide new technologies and concepts for nutrient recovery and serve as a demonstration site of decoupling nutrients water management.
- Demonstrate of partial disinfection strategies in the framework of risk assessment.
Site 3: Capitana – Puglia Region, Italy

**AGR**

- Wastewater of Fiordelisi: a certified organic producer, growing and processing mainly tomato for the international market.
- Treatment system for wastewater from vegetables processing (300 m$^3$/d) and has a conventional activated sludge system, tertiary membrane filtration, and on-line UV treatment. Effluents from the tertiary can be stored in reservoirs and used for irrigation at test fields, with an additional on-line UV disinfection.

**Feasibility of reusing agroindustrial wastewater for food crop irrigation and to determine its advantages in terms of nutrient recovery.**

Site 4: Shafdan – Israel

**AGR**

- The Shafdan WWTP produces 130 hm$^3$/yr secondary effluent of which 125 hm$^3$/yr are further treated by Soil Aquifer Treatment (SAT). The groundwater infiltration ponds have a capacity of 342000 m$^3$/d.

**Unrestricted irrigation**

WP: 1, 2, 3, 5, 8, 9

- Optimised pre-treatment before soil infiltration using AOP.
- Configuring alternative treatment to SAT based on Integrated Membrane System (IMS) consisting of UF and RO. This technology will enable to treat the excess secondary effluents of the Shafdan WWTP.
Site 5: Tarragona – Catalonia, Spain

IND
- Fully integrated Water Reclamation Unit (WRU) utilising the secondary effluent from 2 municipal wastewater plants (Vila-Seca and Tarragona), including its treatment and distribution to the end-user.
- The supply will eventually rely on RO plant with a treatment capacity of 30,000 m³/d.

Industry reuse
WP: 1, 2, 4, 7, 8, 9

- Water reuse in the petrochemical complex, will free up existing raw water rights to meet future local (municipal and tourism) demand.
- Optimisation of pre-treatment and membrane performance to reduce chemicals and energy use.
- Failure Mode and Effect Analysis in RO.

Site 6: Old Ford Water Recycling Plant (OFWRP) – United Kingdom

URB
- The scheme provides water for urban non-potable applications. A network connects to the Olympic Park for toilet flushing, landscape irrigation and topping up on-site rainwater harvesting systems.
- The plant has capacity to treat 574 m³/d (0.21 hm³/yr) of raw sewage in a MBR with UF, GAC filtration and disinfection (NaOCl).

Urban reuse
WP: 2, 3, 4, 5, 8, 9

- Technology resilience: contaminants removal, with special focus on microbiological pathogens.
- Public perception and acceptability.
- Customers education toward reclaimed water.
Site 7: Sabadell – Catalonia, Spain

URB
- The reuse scheme is to serve urban uses, commercial areas and golf courses. Authorization for private garden irrigation is under review by the Catalan Water Agency.
- Separate distribution network has already been constructed.
- Tertiary treatment plant has a design capacity of 2500 m³/h and features flat-sheet MBR and a disinfection post-step based on UV irradiation and hypochlorite dosing.

Urban reuse
WP: 2,3,4,7,8,9

- Human health risk management
- Network maintenance
- Environmental sustainability
- Public perception and governance issues.

Site 8: Toreele, Flanders – Belgium

IPR
- The effluent of the Wulpen WWTP is reclaimed for indirect potable reuse after artificial recharge of the dune aquifer of St-André, used for groundwater extraction to produce potable water. The artificial recharge, was implemented to prevent saline intrusion, increase the groundwater table, enhance natural values and obtain sustainable groundwater management.
- The plant (6.850 m³/d) applies a double membrane process: UF and RO.

Indirect potable reuse
Saline intrusion barrier
WP: 1,2,3,5,8,9

- Test two technologies to reduce the nutrient content; demonstrate the long-term performance of a subsurface flow constructed wetlands with willows to reduce nutrients from the concentrate and produce biomass by short rotation coppice (SRC) for energy production; fixed-bed post-denitrification.
Site 9: El Port de la Selva – Catalonia, Spain

**IPR**
The tertiary treatment (25 m³/day) consists of pre-coagulation, double filtration (sand/anthracite filters), UV disinfection and residual chlorination. The site will be the first demonstration in Europe targeting indirect potable reuse and aquifer recharge without double membrane systems. Instead a hybrid and low cost & energy filtration/disinfection reuse scheme for aquifer recharge will be established and thoroughly tested.

- Technical performance.
- Public acceptance.
- Cost benefit estimation.

**Indirect potable reuse**
**Saline intrusion barrier**
WP: 1,2,3,4,8,9

Site 10: Vendée – France

**IPR**
The reuse facility would be used to supply the Jaunay reservoir which is a source for drinking water production (50,000 m³/d water treatment plant). Treated wastewater coming from a wastewater treatment plant that currently discharges into the sea would be the primary source. Recommendations on the most appropriate treatment train for the scheme will be elaborated during the course of the project.

- Overcome concern human health safety and public acceptance, to demonstrate that the reuse scheme is not a threat to public health and does not have a significant detrimental impact on water bodies.
- Vendée site represents a global demonstration site with the necessity to integrate all aspects of reuse with the concrete target of delivering the first scheme in France for planned indirect potable reuse.

**Greenfield site**
**Indirect potable reuse**
WP: 6,8, 9
- Nous esquemes i Tecnologies per a la reutilització
- Noves opcions per al monitoratge i control d’esquemes de reutilització
- Quantificació del benefici ambiental i el risc per a la salut
- Identificació d'oportunitats i nous models de negoci
- Eines per a la governança i la involucració de stakeholders
- Creació de Water Reuse Europe
- Disseminació dels resultats
- Implementació de resultats en un Greenfield

Preguntes?

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