



Reuse, Recovery and Resource efficiency.
Innovations in urban wastewater treatment



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R3Water

Demonstration of innovative solutions for Reuse of water, Recovery of valuables and Resource efficiency in urban wastewater treatment



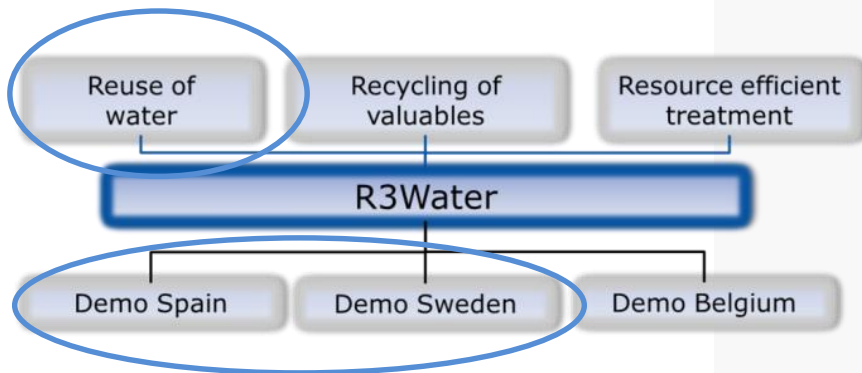
Water Reuse Conference

Innovation for a competitive water reuse sector

Barcelona, 13-14th of June 2016

Objectives and partnership

- To support the transition from an urban wastewater treatment plant to a production unit of different valuables by demonstrating new solutions to address main challenges
- To facilitate the market uptake of these innovative solutions

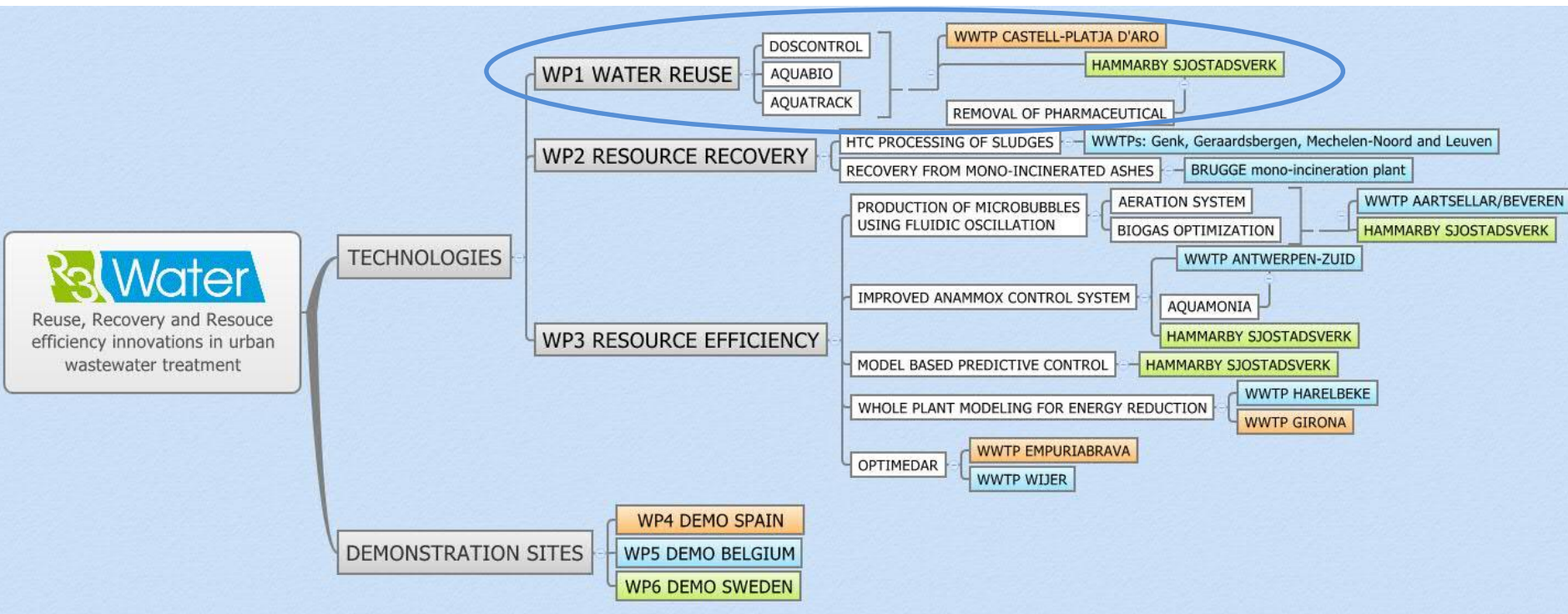


Coordination:



Technologies and demonstration

R3Water demonstration of different technologies on **Water Reuse, Resource Recovery** and **Resource Efficiency** in Girona / Costa Brava, Aquafin facilities in Flanders and IVL's pilot plant in Stockholm



Demo sites in Costa Brava and Stockholm



Castell – Platja d'Aro



Hammarby Sjöstadsværk

Aquatrack

Removal of
pharmaceuticals

AQUATRACK® online monitoring system of contaminants

AQUATRACK® is an online optical warning system with automatic water sampler for reclaimed and reuse of water

The system gives risk reduction of biological nature and high correlation between bacteria count and micro contaminants, >80%.

Gives quality information in real time to the management for reclaimed and reuse of water.



Patented

Automatic sampling when water quality deviates from set standard

Real time visualization of events and remote access of data

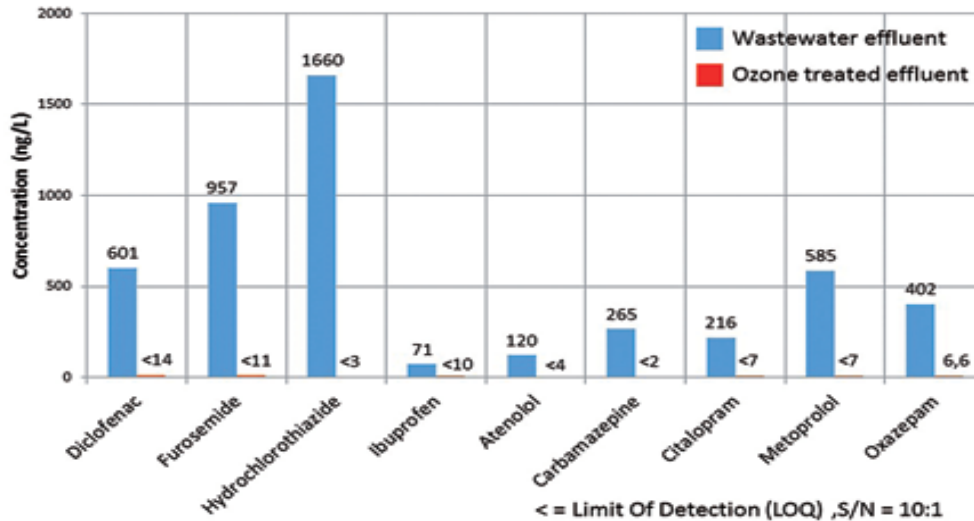
Why this technology is needed?

- To protect the environment
- Saves money, no need for periodic/collective sampling
- Quality control of aquifer recharge

Removal of drug residues in effluent/reclaimed water



Aqua-Q's ozone treatment efficiency on pharmaceutical elimination

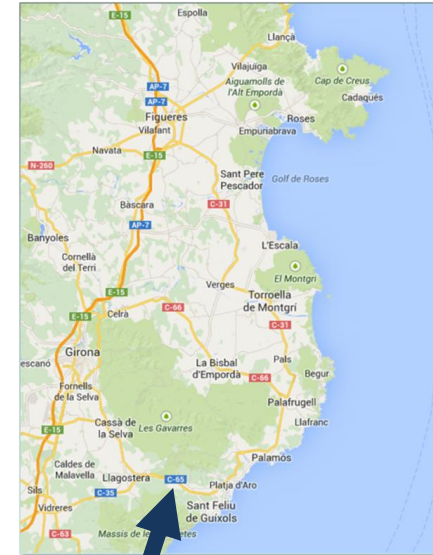


- Drug residues are emerging problems. After and before ozone polishing of effluent from MBR process.
- After ozone polishing there is no pathogens nor pharmaceutical residues.
- The water can be used to replenish aquifers or for artificial recharge.
- Water scarcity in the world can be overcome.

Castell – Platja d'Aro Case Study

WWTP

- Urban areas of Castell-Platja d'Aro, Platja d'Aro, Sant Feliu de Guixols and Santa Cristina d'Aro
- Design capacity of 35.000 m³/d, and 175.000 p.e. **with high seasonality**
- Conventional activated sludge **without nutrients removal**



Water Reclamation Plant (since 1989)

- Design capacity of 15.000 m³/day
- Gravity sand filtration + combined disinfection (UV + Sodium hypochlorite)
- Nutrient-rich reclaimed water for irrigation purposes



Continuous control of combined disinfection process in water reclamation.

- **Combination** of chemical + physical disinfection, generating positive synergies to **enhanced microbiology load reduction**.
- **Increased safety** of the reclaimed water produced (greater disinfection spectrum process)

Benefits

- Efficient safe water production, allowing fit-for-purpose production of reclaimed water, according to the intended water quality for the reuse (irrigation, environmental and industrial uses)
- Valuable real time information of the disinfection process
- Reduction in O&M associated costs



Preliminary results since summer 2015:

- Adaptability of the disinfection process to the changing inlet water quality (affected by upstream processes) → Reliability
- **-30% to -45%** Sodium hypochlorite consumption at the same sanitary level (dosage optimization) avoiding overdose – DBP formation
- Optimization of power consumption of UV system by controlling nº units ON, and power level.



Continuous measurement equipment for: *Escherichia coli* and total coliforms

- Used technique: Defined Substrate Technology® (DST®) and detection system by measuring fluorescence and absorbance.
- E. coli is a bacteria widely used as an **indicator of faecal contamination**, and also key indicators for determining the potential uses of reclaimed water from a WWTP tertiary treatment.

Benefits

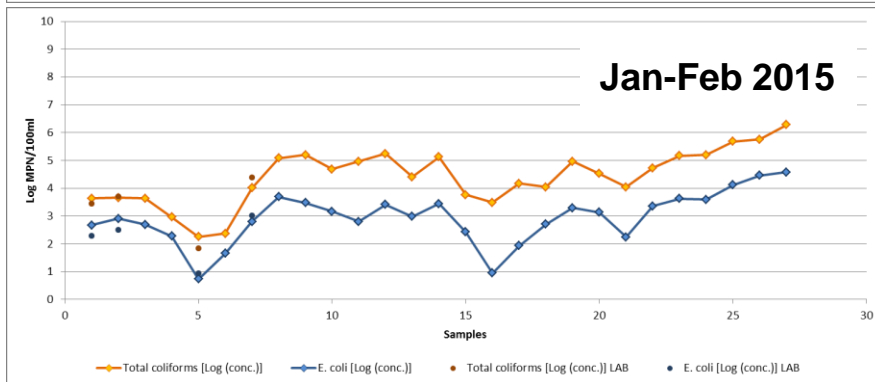
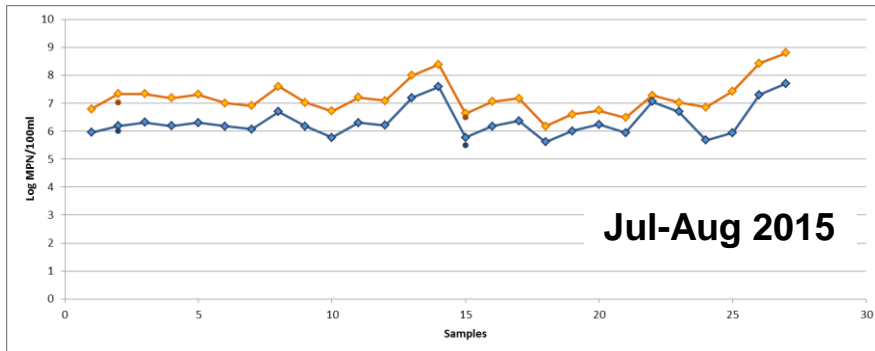
- Early warning in case of the water reclamation plant malfunctioning.
- Efficient production of reclaimed water, avoiding overdosing of disinfection chemicals and excess of UV power consumption.
- Allows the production of fit-for-purpose reclaimed water.



Preliminary results

aquaBio is monitoring the inlet of the WRP after the sand filtration

- Concentrations during the summertime are 2 order of magnitude greater than in wintertime, since the higher temperature increases the growing capacity of the microorganisms



- Good correlation with lab analysis (IDEXX method)

A second testing phase is planned for 2016, by monitoring the outlet of the WRP, thus, providing an early warning about the sanitary safety of the reclaimed water for the irrigation uses.

WRP Castell-Platja d'Aro

26 years of experience in Water reuse

Water reuse as a reliable local water source; introducing circular economy

Fertigation as efficient nutrient recovery reducing the environmental impacts of diffuse agriculture pollution

- Allows changing dry crops to irrigated crops. In the case of maize, doubles the atmospheric CO₂ uptake (*)
- Reclaimed water for irrigation has lower OPEX than extracting groundwater + purchasing fertilizers
- Better crop response and more valuable crops production, reducing fertilization costs

→ Decrease of the depletion of strategic groundwater resources

(*) J. Muñoz and L. Sala: Environmental criteria for alternative nutrient removal in treated wastewater. 6th Conference on Wastewater Reclamation and Reuse for Sustainability, October 9-12, 2007, Antwerp, Belgium http://ccbgi.org/docs/antwerp_2007/poster2007.pdf

Users and social acceptance aspects

- Opportunity for the generation of new economical activities and job creation in the WWTP Ecosystem. e.g Golf courses, agriculture..
- Continuity of economical activities and municipal services (gardens irrigation, cleaning of facilities) even during severe drought episodes (3 events between 1998 – 2008)
- End-users acceptance: the number of users has been increasing during the years and even farmers located relatively far away are interested in being connected to the water reuse network

Avoid reluctance from users and citizens

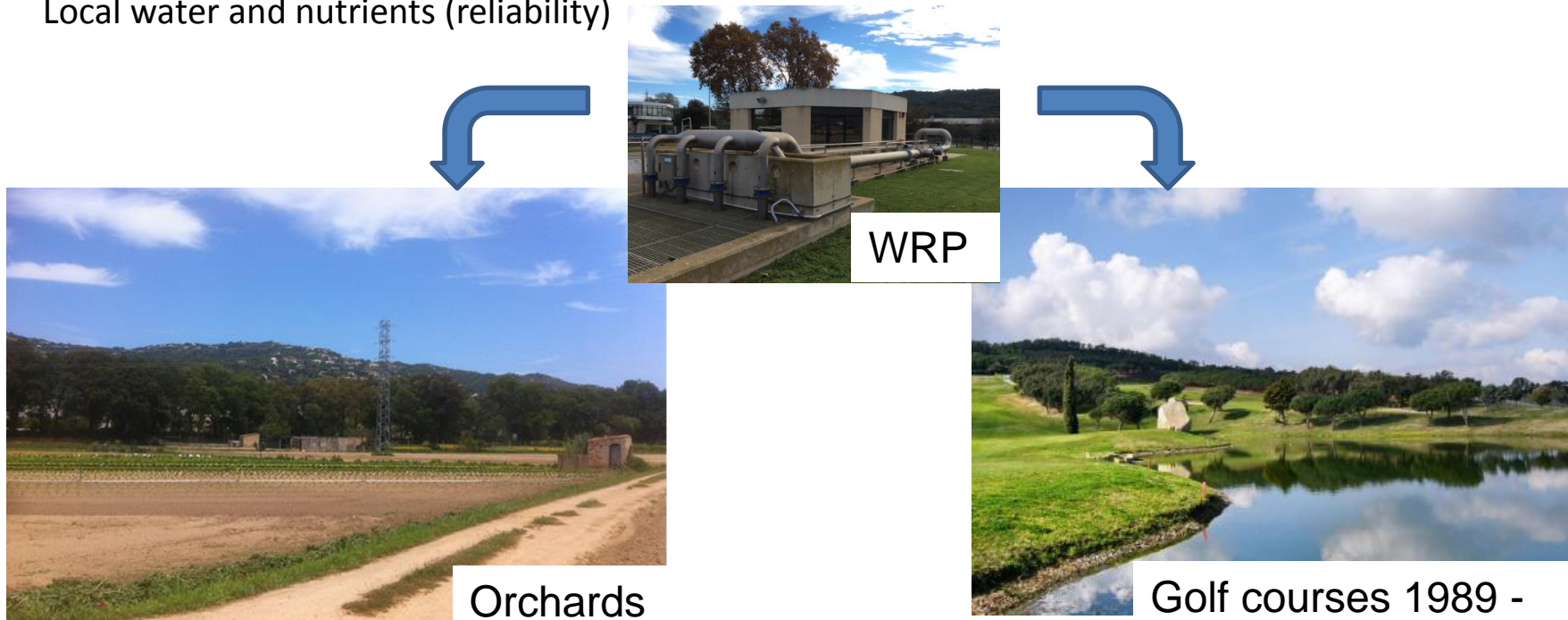
~~Reuse of Treated Waste Water or Waste Water Reuse~~

→ Reuse of Reclaimed Water

Castell experience

Main users/beneficiaries/customers

- High sanitary quality reclaimed water (increased with R3Water technologies) → safe water
- Production upon demand
- Local water and nutrients (reliability)



Water Reuse Regulatory Aspects

Regulatory framework:

- Specific regulation at national level (e.g. Spain, Portugal, France, Italy) with different regulatory relevance and criteria. Water reuse lacks of harmonization at EU level.
- Recently issued: ISO 16075 “Guidelines for treated wastewater use for irrigation projects”

R3Water and RTWQM AG are contributing actively in the EU initiative on water reuse (DOC WD/2015-1/5)

- ✓ Planning and management
- ✓ **Minimum quality requirements for water reuse and aquifer recharge**
- ✓ Support to research and innovation in water reuse
- ✓ EU funds for investments in water reuse

Specification of compulsory laboratory analysis methods

→ Barrier to innovative online monitoring

High frequency manual sampling (i.e 3/week) causes an increase of laboratory analysis costs and does not provide effective early warning

Water Reuse Market

For further discussion in Day 2

Workshop: “From Innovation to Market: The Second Valley of Death” (11th February 2016 in Leeuwarden, NL)

Market characteristics

- Mainly public owned, subjected to public procurement procedures
- Slow adoption of technology and risk aversion
- Subjected to strict environmental and sanitary regulations
- Public perception: water is for free

Water reuse market

- Water scarcity is the driver for the reuse
- Segmentation: countries/regions with existing water reclamation facilities/reuse distribution networks, and others with significant potential for further development of water reuse schemes

Water Reuse Market

For further discussion in Day 2

Actions to facilitate market uptake / tackle the barriers

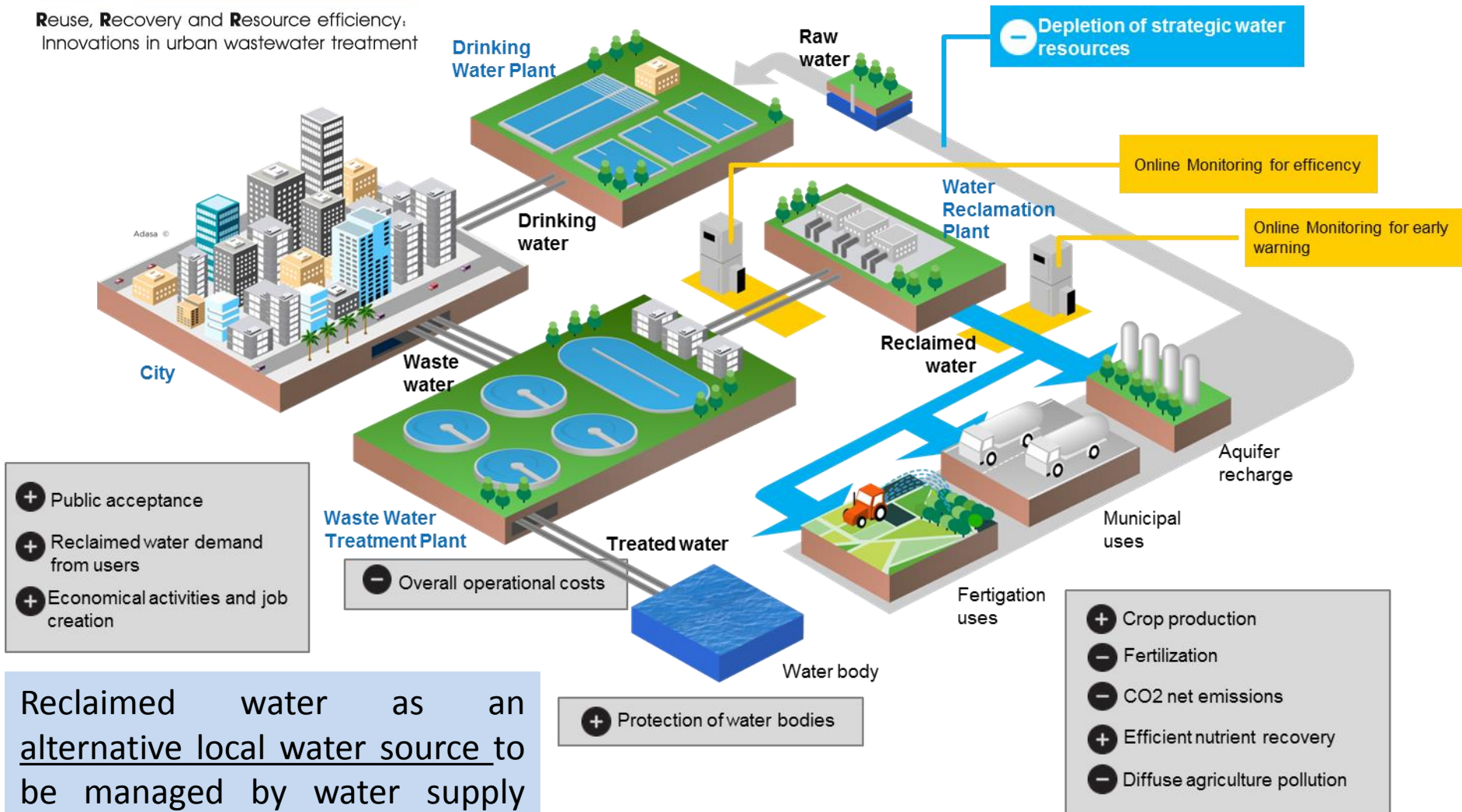
- Provide Success Cases from DEMOWARE, R3Water and other projects
- Participate in the revision of EU water directives
- The Water Safety Plans (WSP) approach
- The Environmental Technology Verification (ETV) approach

Building the market

- *“in spite of its numerous advantages and development potential, the reuse of reclaimed water is not widely implemented in many Member States” (*)*
- How to boost the development of new water reuse schemes ??

(*) Background document to the Public Consultation on Policy Options to optimise Water Reuse in the EU

Circular Economy approach



Reclaimed water as an alternative local water source to be managed by water supply utilities rather than an isolated service provided by the WRP



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THANKS FOR YOUR ATTENTION

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For more details and results, please visit www.R3water.eu

Download the 2nd project Newsletter [here](#)

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