

# Water Reuse and Resource Recovery potential application fields

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Escola Tècnica Superior d'Enginyers  
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# Water reuse point of view...

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- Water reuse is one of the earliest strategies for resources recovery
- That has evolved through:
  - Land disposal: water, nutrients and OM
  - Incidental reuse: stream dilution and new abstraction
  - Planned non-potable reuse for numerous uses
  - Indirect potable reuse, and more recently
  - Direct potable reuse

# Water reuse technologies...

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- are inspired in drinking water treatment processes...
- ... while using treated effluents as raw material
- are mostly influenced by the historical approach to sanitation in developed countries
- should be adapted to:
  - Social and economic conditions in developing countries
  - Industrial uses

# The technologies presented...

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- ... serve to improve water quality:
  - Water disinfection (chemical + UV light)
  - Online determination of *E. coli*
  - Online determination of pathogens
  - Model for predictive control
  - Online monitoring of treated effluents production
  - Models for energy management
- ... have all great potential in the 3 sectors:
  - drinking water, water sanitation, water reclamation

# They should be answers...

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- ... to clearly defined questions:
  - Regulations: limits, standards, requirements
  - Guidelines and recommendations
  - Concerns: institutional and public
- ... and able to provide:
  - A given performance
  - With a given reliability (variability)
  - Adaption to a multi-barrier treatment process
  - At a given cost
  - With a given energy consumption

# With potential barriers...

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- In four main current areas:
  - Their ability to perform: reliability and adaptation
  - Their energy consumption
  - Their O&M costs (under changing conditions)
  - Their public acceptance
- That can be overcome through:
  - Demonstration processes: open to the public
  - Critically reviewed documents, like Journals
  - Existing “certification” or “accreditation” programs

# The water reuse sector...

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- Is greatly affected by the lack of EU regulations...
- ...and a lack of collaboration between public health and water resources agencies
- It is more a cultural barrier than a technical limitation
- It is basically affected by:
  - National water quality regulations
  - Proven technical solutions
  - Economic and financial evaluation
  - Public acceptance
- An illustration: the case of the EU vs. the USA

# The EU case...

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- Few countries (France, Italy, Spain) have approved regulations, for different water uses
- There is no European regulatory framework, other than the WFD recommendations
- A frequent main goal: to establish EU regulations
- Existing regulations are considered inadequate, excessive and even ineffective
- Economic evaluation frequently ignores the potential of integrated management



# The USA case...

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- Water reclamation and reuse is a state responsibility: some have regulations
- The US EPA has provided “Guidelines” 2006, 2012
- Some states are more restrictive than others
- State leadership is recognized and followed
- State regulations deserve respect and promote collaboration among professional associations
- State regulations follow steady adaptation
- Integrated management is still a real challenge, but has been instrumental for success

# A success story...



The Camp de Tarragona water reuse project for industrial uses

Pictures courtesy of Enviro



# A new water source...

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- For industrial (petrochemical) use
- Satisfying common water quality limits
- Plus industry's specific requirements
- Treatment process development required a few months (2008-09)
- Permits and authorizations delayed construction and operation 3 years (2012)
- Has proven its performance and reliability
- The “demonstration” approach is raising interest among additional users

# A case of public acceptance



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## Orange County Water District and Orange County Sanitation District, USA

Pioneering work to develop the world's largest water purification plant for groundwater recharge earned the Orange County Water District and the Orange County Sanitation District, California, USA, the 2008 Stockholm Industry Water Award.

People expect water to be there when they turn on the faucet. But in growing arid regions like Orange County in Southern California, sufficient water is not naturally guaranteed. Fortunately for the 2.3 million residents living there, the Orange County Water District and the Orange County Sanitation District jointly developed the Groundwater Replenishment (GWR) system, a water purification system which will provide enough water to meet the needs of an additional 500 000 people without diminishing groundwater resources for current or future generations.

The GWR System diverts highly treated sewer water that is currently discharged into the ocean and purifies it through a series of advanced techniques: microfiltration, reverse osmosis, ultraviolet disinfection and hydrogen peroxide. The cleaned water is returned to the groundwater basin to increase both water supply and quality. The GWR system has established a blueprint for large-scale wastewater purification that is already being emulated in dry regions and nations, such as Singapore.



[Download the high-resolution picture from the award ceremony \(Photo Credit: SIWI\)](#)

# A case of water use efficiency



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## PepsiCo wins the 2012 Stockholm Industry Water Award

**The global food and beverage company PepsiCo has been named the recipient of the 2012 Stockholm Industry Water Award. PepsiCo has successfully reduced water consumption in its production, and extended its commitment beyond the company's own operations to help solve water challenges on a broad scale.**

The Stockholm Industry Water Award jury recognised PepsiCo's efforts to increase water efficiency. The company conserved nearly 16 billion litres of water in 2011, from a 2006 baseline, through the application of water saving equipment and technologies, creative recycling and re-use, and by deploying a water management system throughout its manufacturing facilities.

- PepsiCo has set and achieved a high standard for its own operations, and has demonstrated that responsible water use makes good business sense, the jury said.

PepsiCo's water commitment has not stopped at the factory walls. By assisting farmers in growing more water efficient crops, implementing better agricultural practices and irrigation techniques, and by supporting watershed management initiatives, PepsiCo has saved water all along its agricultural supply chain. In 2009, PepsiCo was among the first large companies in the world to recognise and to formally adopt the human right to water. The company has established numerous public-private partnerships and collaborations, which have increased access to safe water and sanitation services around the globe.

- PepsiCo is incredibly proud to win this prestigious award. As a global food and beverage company, we take a comprehensive approach to water stewardship throughout our supply chain and operations. Agricultural water conservation is a critical element in the water/food security nexus, and our stewardship efforts are crucial in securing a resilient supply chain for our business and helping the communities where we operate to thrive. We are proud to work with a variety of exceptional partners that help us reach aggressive water stewardship goals. We thank the Stockholm Industry Water Award jury for this recognition

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**Photos:** click the images to get the high-res file. Photo credit: PepsiCo



*At the Casa Grande, Arizona, Frito-Lay facility, a state-of-the-art water filtration and purification system recycles and reuses approximately 80 % of the process water used in production.*

# A case for corporate responsibility



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## Project Innovation Awards

Recognising excellence and innovation in water engineering projects throughout the world



IWA established the **Project Innovation Awards (PIA)** to recognise excellence and innovation in water engineering projects throughout the world, in keeping with IWA's mission of connecting water professionals worldwide to lead the development of effective and sustainable approaches to water management.

Established in 2006, the PIA runs on a two-year cycle, with entries competing first at the regional level in one of the regional bases - Asia Pacific, East East, Europe and West Asia and North America\*. Regional winners are then advanced into the global level competition for the Global Grand Awards which will be presented at IWA World Water Congress in Busan, Korea in September 2012.

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### **IWA Award: Coca-Cola wins for their water recovery system**

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# Lessons learned... we should...

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- Promote collaboration among professional sectors and with public health and environmental agencies
- Demonstrate the abilities of new technologies
- Evaluate their ability to comply with regulations
- Document their costs and energy requirements
- Promote studies and research in issues of concern
- Support further adaptations of regulations
- Promote public information and participation
- Use consistent and adequate terminology
- Expand international collaboration

Thank you  
for your attention !



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