



Reuse, **R**ecovery and **R**esource efficiency,
Innovations in urban wastewater treatment

Waste Water Treatment Plants (WWTP)

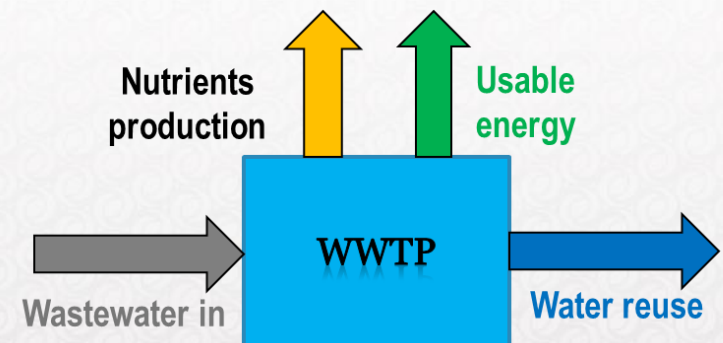
This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 619093.

→ WWTP today – meeting requirements

- A significant energy user
- Emissions of greenhouse gases
- Effluent might still contain viruses, pathogens and other unwanted contaminants
- Generated sludge is a problem

→ WWTP in the future – a production facility

- Net energy production
- Recovery of nutrients
- Resource efficient treatment
- Better treatment results
- Water reuse
- Generated sludge/waste is a resource

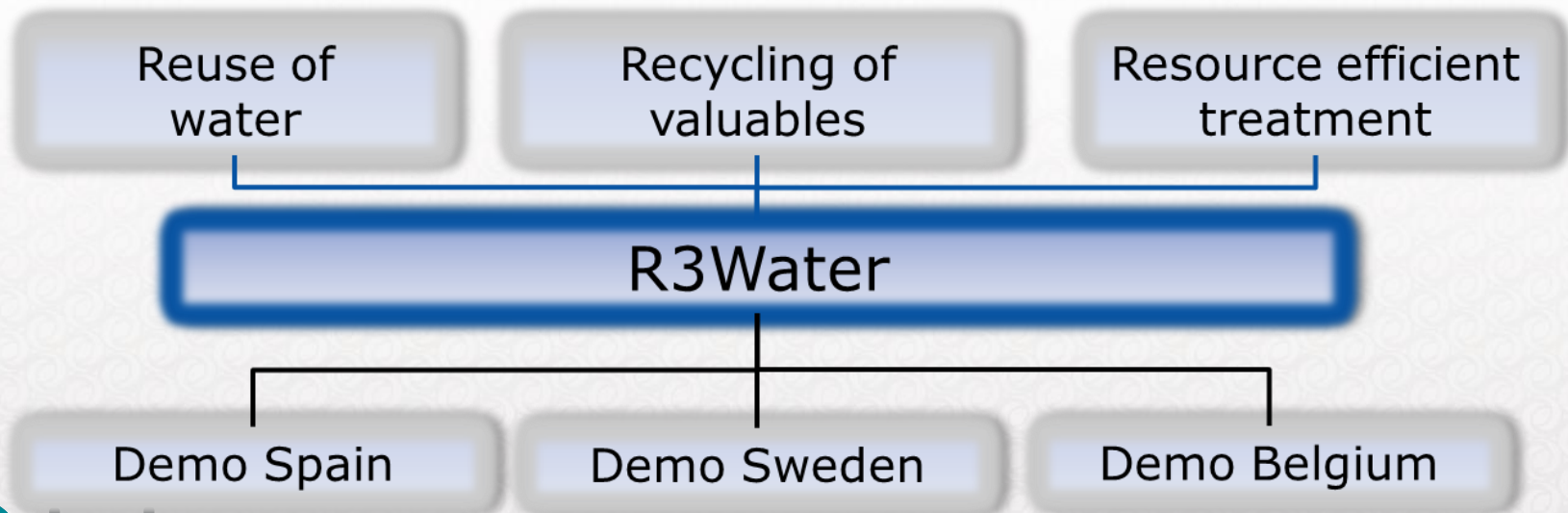




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Project objectives

- ➔ 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





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12 partners (6 SMEs)

- Belgium: *Aquafin*
- Finland: *VTT, Ekolite*
- Germany: *DECHEMA, AVA-CO2*
- Great Britain: *Perlemax*
- Norway: *Prediktor*
- Spain: *Adasa, Icra, Teqma*
- Sweden: *Aqua-Q, IVL*



Map adapted from <http://ppt-toolkit.com>



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Innovative areas covered

- ➔ Water reuse
 - Monitoring and control
 - Treatment of pharmaceuticals

- ➔ Recovery of valubles
 - Bio-char
 - Ash recovery
 - Phosphate Recovery

- ➔ Resource efficient treatment
 - Aeration
 - Process control
 - Anammox control



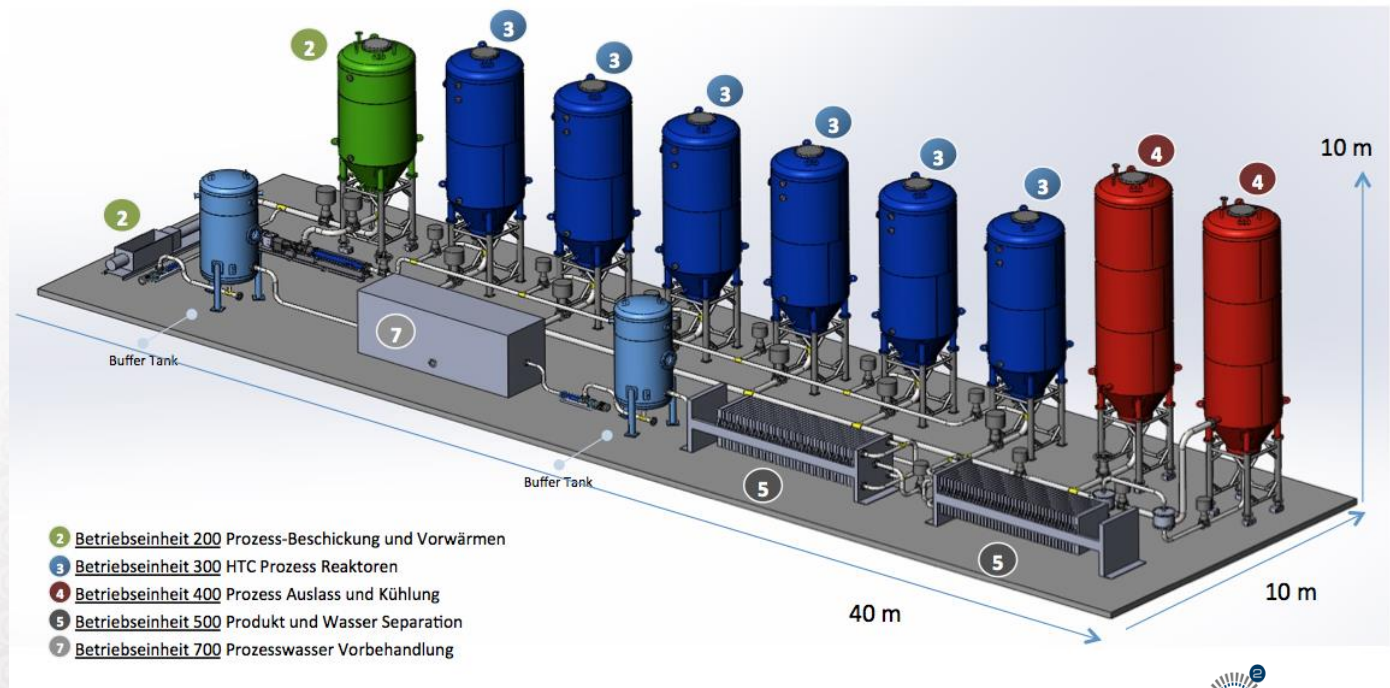
HTC – hydrothermal carbonisation

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Description

Hydrothermal carbonisation transforms biomass into CO₂-neutral biocoal in an anaerobic thermochemical process forming a multitude of different carbon compounds

HTC is the most efficient process to treat and de-water wet biomass.



WATER REUSE



HTC – hydrothermal carbonisation

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Some Advantages

- CO₂-neutral process
- Plug and play
- Wet process – Biomass can be used without expensive pre-drying
- Can process numerous biomass types e.g. sewage sludge that currently require expensive disposal
- Not in competition with foodstuff production, as biogenic waste can be used
- Simple, Proven and robust, multi-batch technology
- Low impact technology, very low odour or noise emissions
- Low maintenance costs
- proven, robust technical implementation
- Simple mechanical dewatering with filter presses to reach above 70% dry matter content
- Superior energy balance compared to thermal drying , Energy savings of up to 60%
- Organic micropollutant removal
- Allows for efficient phosphorous recovery.

Demosite

- Different Sludges from Aquafin Wwtp processed in
 - Karlsruhe, Germany





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HTC – Biochar a multifunctional product:

- Easily dried and pelletized
- Sterile and free from contaminants
- Low heavy metals content
- Valorisation e.g. as solid fuel with a high energy density, adsorbent for environmental remediation or water purification, or as soil amendment, enhancing soil fertility, water holding capacity and crop productivity.





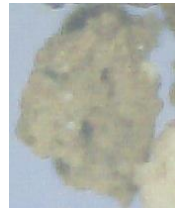
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Ash recovery

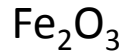
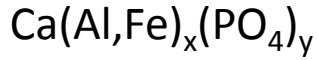
- ➔ Product processing concept for incinerated sludge ash valorization including its high value use as construction material and fertilisers
- ➔ Particle grinding and simultaneous mechanical activation by high speed impact milling.
- ➔ Technology to be tested in R3Water project with ash from Belgium
- ➔ Possible use for construction material



Liberation



Grinding ->



Agglomerate

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Liberated particles
Can be separated
Easier to leach

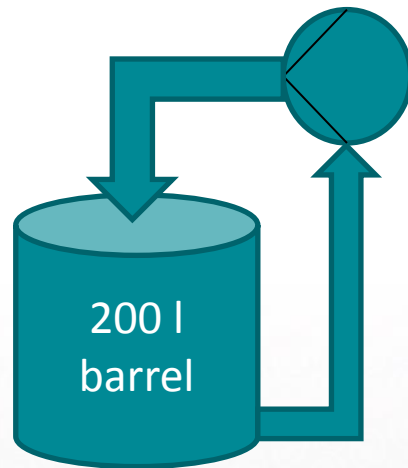
Magnetic separation

Flotation/reverse flotation



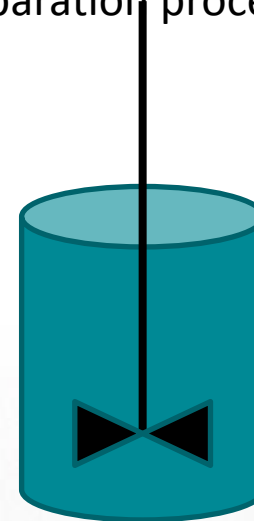
Process

Leaching



Heap leaching with 10% HCl
6 hours

Separation process



Liquid-liquid extraction
or other process

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Products for re-use:

- Metals for recycling in metal process
- Phosphorous for fertiliser
- Quartz particles as filler for concrete



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Project managers and contact

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