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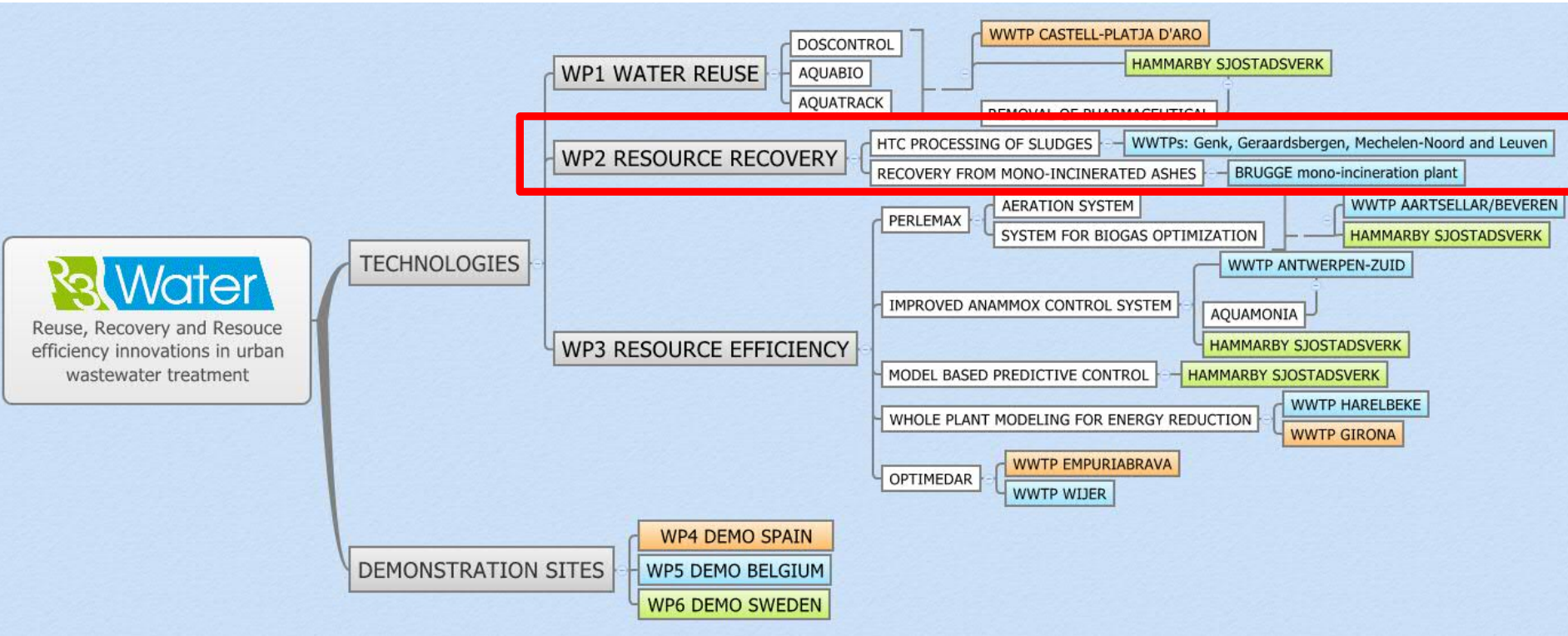
# WP2 Demonstration of innovative solutions for **Resource recovery** in urban wastewater treatment

R3Water

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# R3 Technology map



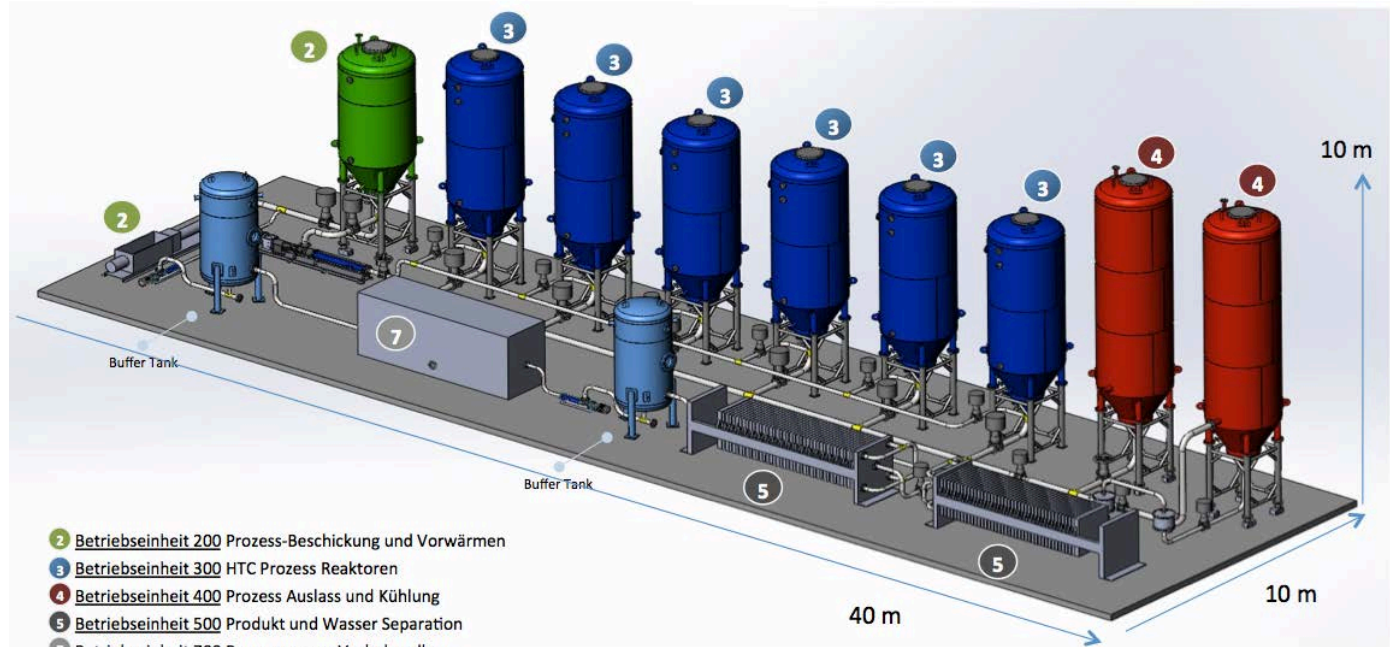
# HTC – hydrothermal carbonisation

## Description

Hydrothermal carbonisation transforms biomass into CO<sub>2</sub>-neutral biocoal in an anaerobic thermo-chemical process forming a multitude of different carbon compounds are formed

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

RESOURCE RECOVERY



# HTC – hydrothermal carbonisation

## Advantages

- CO<sub>2</sub>-neutral process
- Plug and play
- Highest CE value of all technology options (HTC = 95% / Biogas = 50%)
- Wet process – Biomass can be used without expensive pre-drying
- Can process numerous biomass types including 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.

## Demosites

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



# 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.

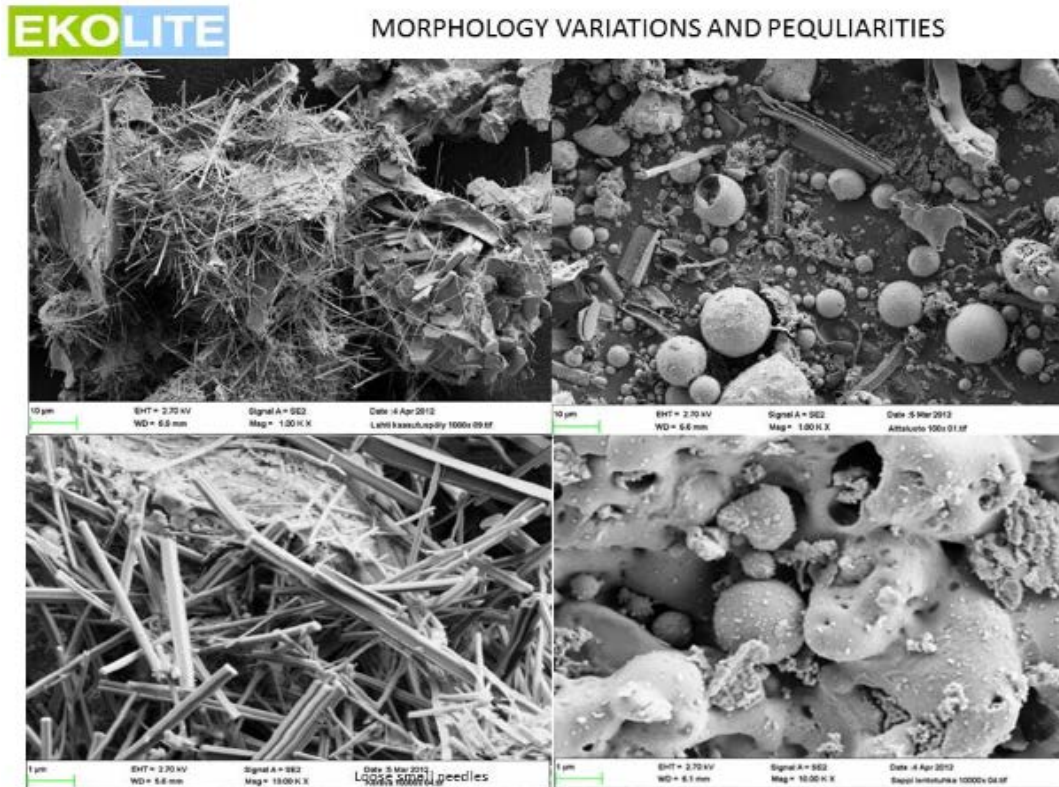


# Incinerated sludge to products

- Ca 26 % of all sludge produced in EU is incinerated
  - the amount is expected to increase steadily until 2020
  - Landfilling of generated ash costly, still major part goes to landfill
  - Ashes are commonly used as fillers in the cement industry; however, its compressive strengths and other physical properties have not been fully optimised for that purpose.
  - New solutions are needed for efficient utilisation of the minerals contained in the ashes.

- Ashes are a very heterogenous material with different types of particles

RECOURCE RECOVERY



1/29/2013

Bob Talling

# Ash products by milling

## Grinding :

- breaks the agglomerates and create fresh surfaces
- increases reactivity/Solubility substantially and
- allows to extract and recover more  
→ maximized material efficiency



## EkoliteMill Concept

- For super-fine grinding and particle surface activation
  - Proven & compact, dozens of references
    - Less energy, water & capital intensive
- Suitable to all kinds of biomass, ash and minerals
  - Up-scalable up to 100.000 tons/a plants



# Benefits

- Proper understanding and control of ash chemistry, mineralogy and morphology enhances the use of ashes in traditional application.
- Mechanical and chemical activation of the ash agglomerates followed by smart separation increases the window for production of higher value composites out of the sludge ash. For instance, refining technology for use of ash minerals as efficient high strength binders includes breaking the ash agglomerates for increased reactivity and pH value, controlling hydration kinetics by adding selected chemicals and other by-products in the grinding process.
- At site processing allows the instant utilisation of the mechanical-chemical activation energy introduced in the ashes in the application.
- End products: different cementing materials like geo-polymers and fillers for use in green buildings and infrastructure
- **Demosite:** Aquafin Brugge monoincineration