



WATER SMART INDUSTRIAL SYMBIOSIS

CS2 – Nutrient Recovery

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ULTIMATE Project



REUSE WATER

Recover, refine & reuse wastewater from industries & municipalities



EXPLOIT ENERGY

Extract & exploit energy, combined water-energy management, water-enabled heat transfer, storage & recovery



RECOVER MATERIALS

Nutrient mining & reuse, extraction & reuse of high-added value exploitable compounds

“Water Smart Industrial Symbiosis”

9 DEMOSITES

ULTIMATE will implement Water Smart Industrial Symbiosis in nine large-scale business cases from the international agro-food, petrochemical and biotech sector.

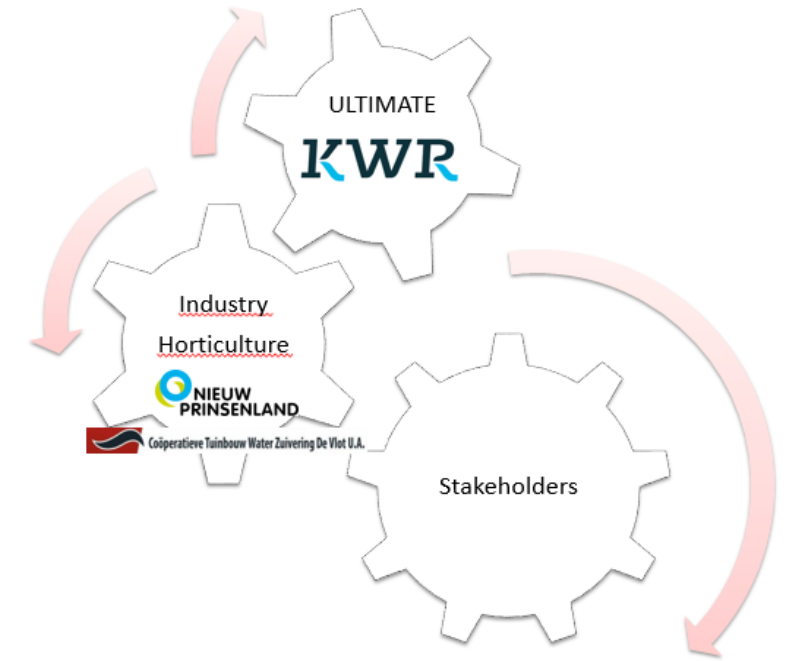
- Ⓞ 1- Tarragona (ES)
- Ⓞ 2- Nieuw Prinsenland (NL)
- Ⓞ 3- Rosignano (IT)
- Ⓞ 4- Nafplio (EL)
- Ⓞ 5- Lleida (ES), Ostrava (CZ)
- Ⓞ 6- Karmiel, Shafdan (IL)
- Ⓞ 7- Tain (UK)
- Ⓞ 8- Saint-Maurice l'Exil (FR)
- Ⓞ 9- Kalundborg (DK)





Horticulture – Industry symbiosis

- Greenhouse development in the Netherlands
- Builds upon existing symbiosis and collaborations
- Project partners involved



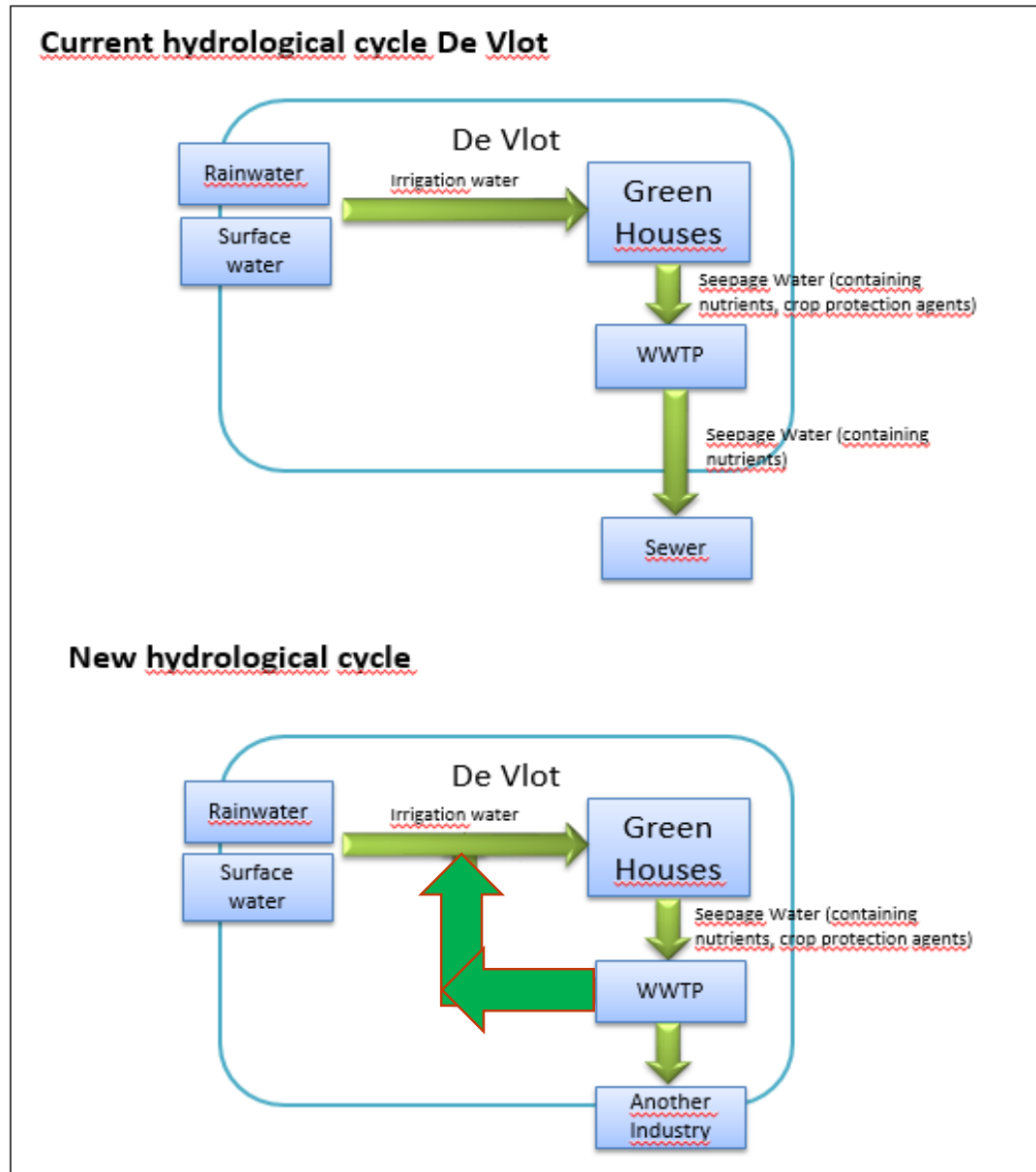


Fate of Nutrients

- Pesticides and pathogens removed with advanced treatment
- reclaimed greenhouse wastewater will contain valuable nutrients
- Effects of nutrient composition in the reused water on plant growth and health (e.g. Na/K ratio) will be assessed in the demo-greenhouse.
- Optimum nutrient balance and prevent the accumulation of specific minerals (B, Cu, etc.)
- Economic analysis of potential cost savings by using recovered nutrients



The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318





KWR and Nutrient Recovery

- Nutrient recovery as part of resource recovery
- Resource recovery from **drinking water production**
- In cooperation with Aqua Minerals → company that sells resources from water and wastewater
- Calcite in face scrub
- Ferric (hydr)oxide pellets for removal of sulphur from (bio)gas, phosphorus from (surface) water and arsenic from (ground)water



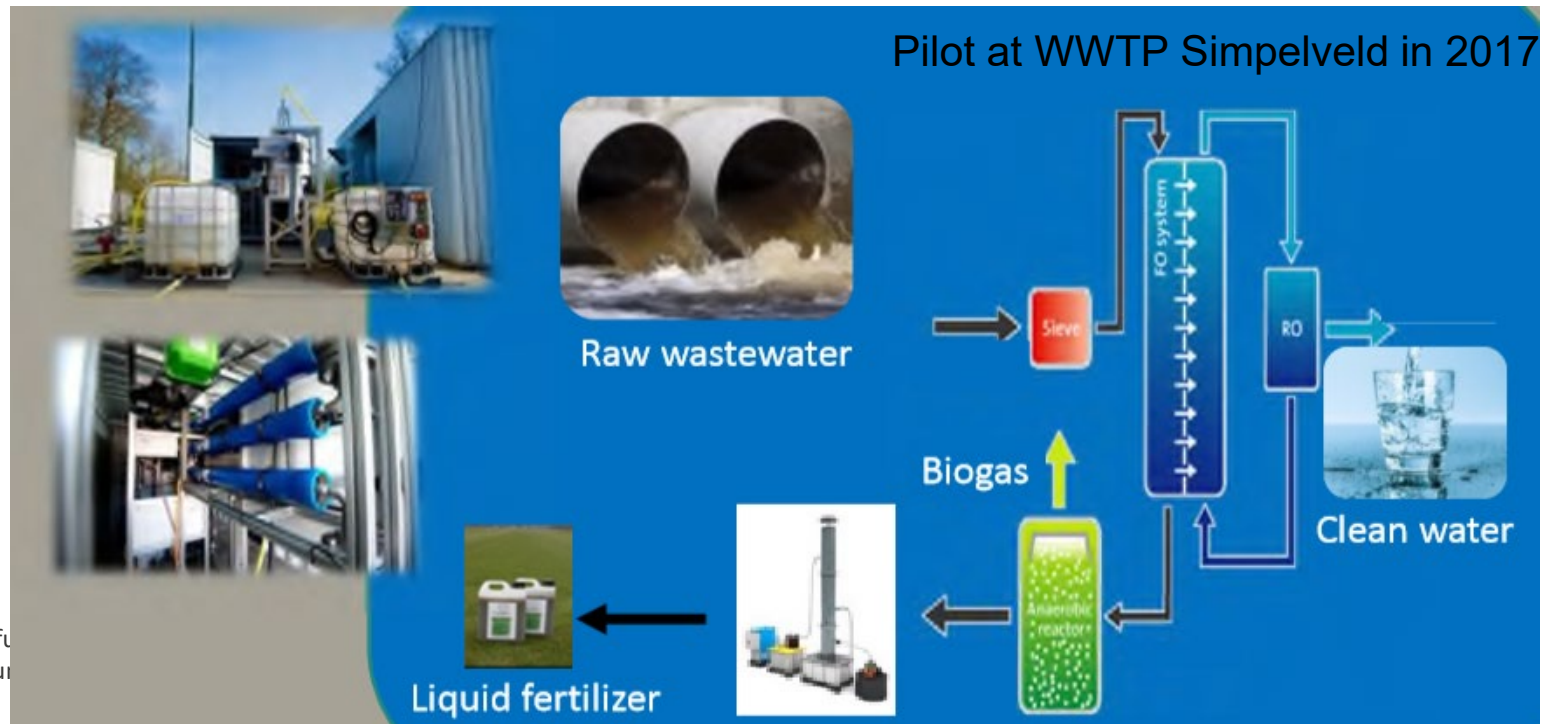


KWR and Nutrient Recovery

- Nutrients from wastewater
- Metals: heavy metals and rare earth metals from fly ash
- Biogas from slaughterhouse wastewater

- Core project:

Liquid fertilizer production



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KWR and Nutrient Recovery

Resources from drinking water production and industry for application in wastewater treatment

- Spent powdered activated carbon from industrial use for OMP removal from WWTP effluent

Reuse of greenhouse drain in greenhouses: project in Nieuw Prinsenland to determine theoretical safety of reuse: microbiological and pesticides

Reuse of municipal effluent for greenhouses: treatment for upcycling, regulations, risk analysis and monitoring throughout the whole chain for responsible reuse: from WWTP to greenhouse to table





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Thank You!

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