

Recovery and utilisation of nutrients for low impact fertiliser



Demonstration site fact sheet - Ghent



Ghent: 'De Nieuwe Dokken'

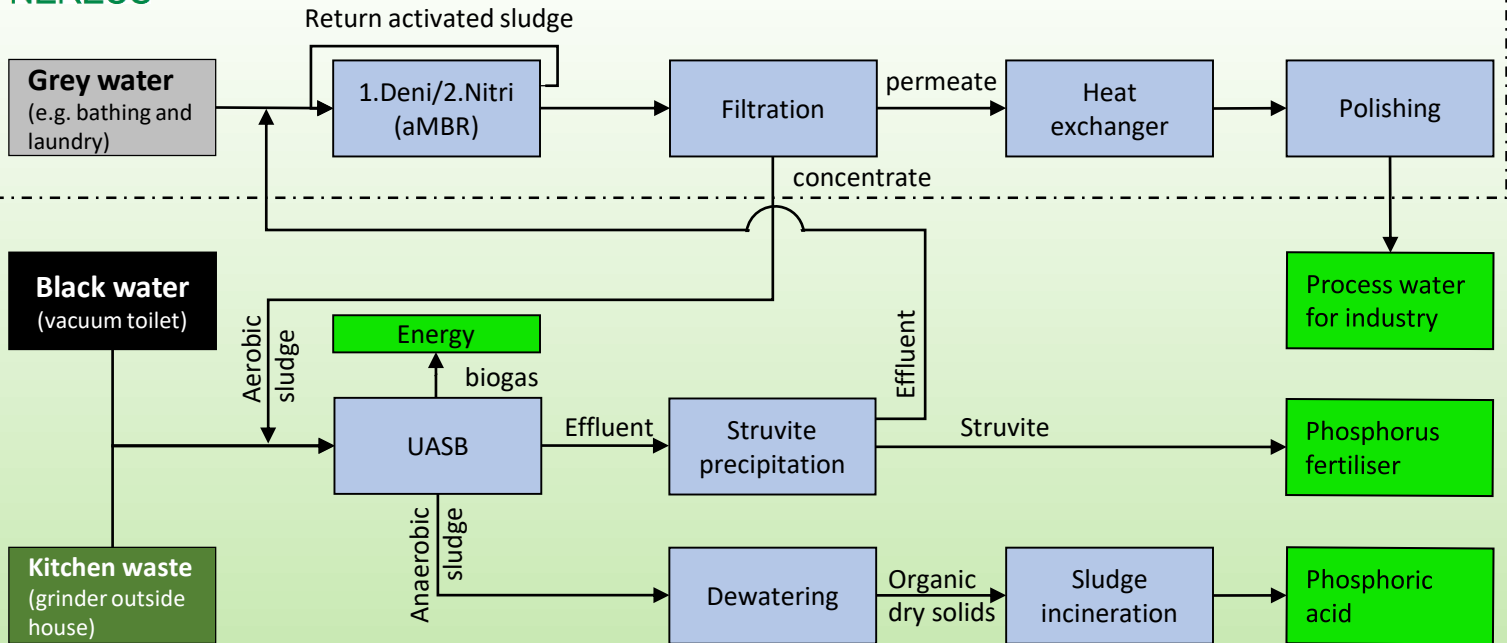
Wastewater reuse, nutrient recovery and energy recovery in a new city district

The 'Nieuwe Dokken' is a new residential district in Ghent, Belgium, in the city's harbour area. The demonstration site is implementing wastewater treatment and resource recovery technologies for 430 houses and a variety of other buildings, serving around 1200 people equivalents. Project partners CEIP and DuCoop manage this demo site within Run4Life. The goal is to have Zero Wastewater with Energy and Nutrient Recovery (ZWENuR) and thereby achieve closed loops for water, energy, and nutrients. To reach the goal, kitchen waste and separate domestic wastewaters from the demonstration site will be used to harvest struvite as a fertiliser for agriculture, process water for a neighbouring industry and biogas and residual effluent heat for the district heating network. At full deployment, the Nieuwe Dokken district will be a prime example of circular economy with synergies between water, nutrients and energy, as well as private households and industries. The annual expectation is a reuse of around 30.000 m³ of city water (>90% of the total water consumption), a production of more than 500 MWh of heat from wastewater and biogas, and a recycling of 1.500 kg of phosphate in the form of struvite. Residents are actively involved, as they are members of DuCoop - the cooperative that delivers their energy and harvests resources from their wastewaters.



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<https://run4life-project.eu>



Resource synergy between homes and industry

Segregated wastewater from toilets and organic kitchen waste is collected by a vacuum system. The kitchen waste is collected by means of shared grinders outside the homes. The mixed flow is stored in a vacuum collection tank and subsequently treated by anaerobic digestion in a so-called Up-flow Anaerobic Sludge Blanket (UASB) reactor. During this anaerobic process biogas is formed which is mainly composed of methane and carbon dioxide. Bioenergy as heat will be harvested from the biogas. Struvite, a slow-release phosphate fertiliser, is recovered from the UASB effluent. The anaerobic sludge is stored in a sludge tank, from there it is transported to the incineration plant where it first will be dewatered then incinerated. The option to recover phosphoric acid from the incineration ash of anaerobic sludge will be explored.

Wastewater from e.g. bathing and laundry is collected by a gravity sewer and treated in an aerobic membrane bioreactor (aMBR), together with the effluent from the struvite reactor. The produced aerobic sludge is sent to the UASB reactor as an additional carbon source for biogas production. The remaining heat present in the treated water is then recovered via a heat exchanger and heat pump in the district heating network. A nearby detergent industry is also integrated in the concept: The treated water is finally polished to meet process water quality for the detergent production. During the detergent production industrial heat is produced and recovered in the district heating network.

Key features of De Nieuwe Dokken demo-site:

- ✓ Water saving vacuum toilets
- ✓ Recovery of fertiliser from wastewater, e.g. struvite
- ✓ Treated water used in a nearby industry
- ✓ Biogas recovery from wastewater and food waste
- ✓ Use of heat from wastewater and industry

