

**More information**

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**Innovative high energy-efficient and cost-effective wastewater treatment concept**

Pilot testing at the WSCHÓD WWTP in Gdańsk



Wastewater Treatment Plant Wschód in Gdańsk

## Concept at a glance

Proposed innovative technology concept combines low energy consumption and cost-effective processes to achieve effective wastewater treatment and maximal recovery of chemical energy (organic compounds present in wastewater) for increased biogas production.

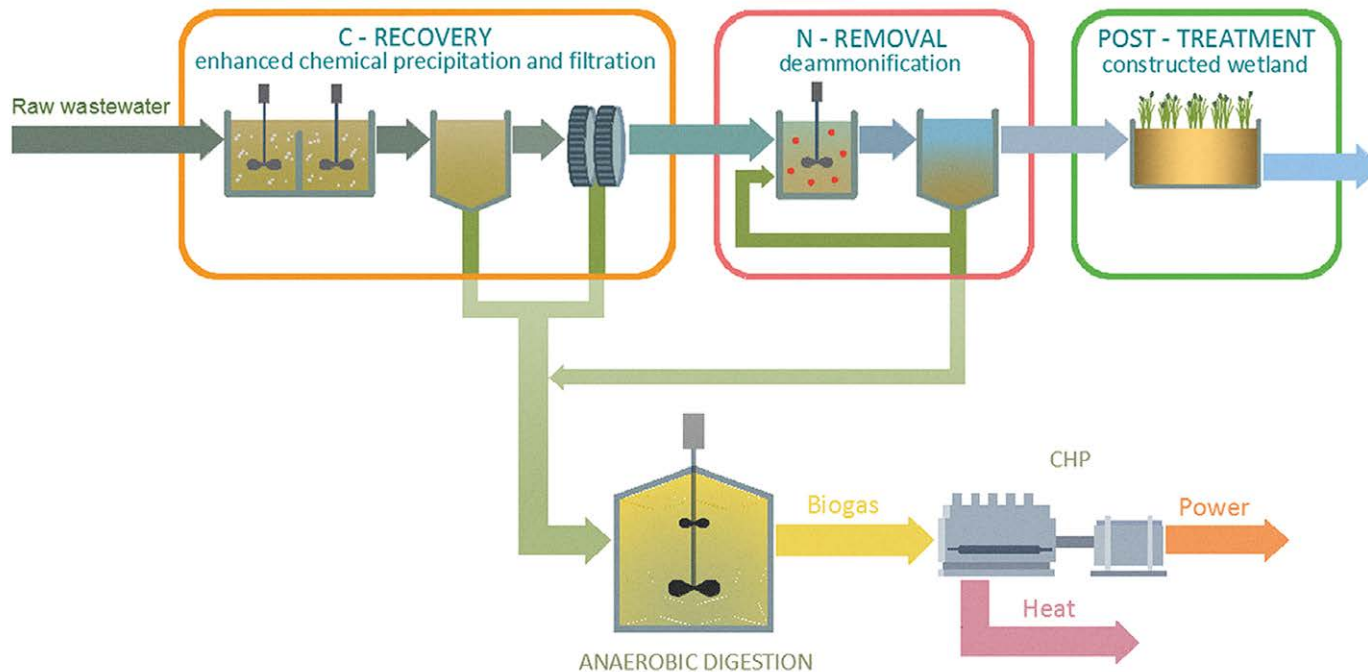
Primary treatment consists of coagulation-flocculation-sedimentation process, followed by filtration for enhanced carbon extraction and phosphorus removal.

Secondary treatment incorporates autotrophic deammonification by partial nitrification-anammox process in integrated fixed film activated sludge (IFAS) system

that features the benefits of both fixed film and conventional suspended growth activated sludge systems.

The final post-treatment is demonstrated by two stage constructed wetland that provides low cost removal of the remaining organics and nutrients.

Performance of the wastewater treatment is monitored with inline probes measuring solids, pH, oxygen, conductivity, ammonia, nitrite and nitrate. The IFAS bioreactor is equipped with automatic regulation of process temperature and oxygen concentration using PLC control system.



## Outcomes of the concept

The possibility of recovering a high fraction of organic carbon and removing nitrogen with nitrification-anammox process is seen as the key to achieve the ultimate in the energy balance positive wastewater treatment plant.

Increased carbon extraction improves energy balance of a plant due to higher production of biogas that can be utilised in a combined heat and power plant (CHP) to generate surplus renewable power. The anammox-based process allows for a shortcut in the nitrogen cycle since anammox bacteria convert ammonium and nitrite directly into nitrogen gas. This enables nitrogen removal at 60% lower oxygen consumption compared to conventional nitrification-denitrification systems. Besides, the process does not require a carbon source for denitrification that allows higher carbon extraction.

The innovative combined technology improves considerably energy balance and allows to make a plant cost-effective and energy-positive. Moreover, recovering energy from wastewater treatment brings many other environmental and health benefits.