Hamburg, Germany

Achieving energy-efficiency through the Hamburg Water Cycle in the Jenfelder Au eco-neighborhood

The Jenfelder Au eco-district is leading by example through its innovative Urban NEXUS approach to resource management. The housing district uses the energy-related potential of wastewater to achieve greater resource efficiency through the Hamburg Water Cycle.

The project in brief

The on-going innovative Jenfelder Au neighborhood project in Hamburg offers a holistic approach to wastewater and energy recycling through a new technology, the Hamburg Water Cycle, for all 770 accommodation units and 2,000 residents. With the new system, wastewater from toilets (black water) is diverted to a biogas plant to be converted into biogas. Biogas is then converted to electricity, used to heat the neighborhood. The process is completely CO2 -free. The combination of black water recycling, careful thermal insulation and photovoltaic installations are sufficient to cover the entire heating needs of the neighborhood, along with 50% of electricity needs. Simultaneously, grey water is separately treated for re-use for gardening or toilet flushing. Lastly, rainwater is also included in the system through decentralized rainwater management to be used for watering the lawns. The separation of grey and black water and promotion of onsite green area lessens the stress placed on stormwater infrastructure, in turn reducing the risk of flooding while increasing the neighborhood’s resilience to climate change.

What makes it "Urban NEXUS"?

Conventional drainage systems do not differentiate grey water and black water, thereby making suboptimal use of wastewater resources. Additionally, conventional wastewater treatment systems are relatively expensive and highly energy intensive. The Hamburg Water Cycle is a closed-loop system which optimizes the use of resources by integrating two systems, the energy production system and the waste water treatment system, for enhanced efficiency.

The project has been championed by the Hamburg municipality water company, Hamburg Wasser, which first demonstrated the system’s feasibility in the environmental theme park, Gut Karlshöhe. The system was initially operationalized in a nine acre park for educational purposes, before being adopted by the Wandsbek District Authority, who were responsible for building the Jenfelder's Au neighborhood.
Scope for improvement

The biogas plant's fermentation residues could be re-used in agriculture; however, this aspect has not been realized. In order to integrate agriculture into the closed-loop system, the City of Hamburg may consider broadening its institutional integration.

Replication

The initiative can be scaled up very easily. It can also be implemented elsewhere, where a more efficient and/or decentralized use of water, energy and resources is needed.

Acknowledgements

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