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.

Urban NEXUS Case Story 2014 - 24 **August 2014**

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.

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Date	2005-2016
NEXUS Sectors	Water-Energy-Waste
NEXUS Innovations	Design + Technology, Delivery Models
Scale	District Wide (2,000 residents)
Budget	620 million EUR

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.

Urban NEXUS Definition

The Urban NEXUS is an approach to the design of sustainable urban development solutions. The approach guides stakeholders to identify and pursue possible synergies between sectors, jurisdictions, and technical domains, so as to increase institutional performance, optimize resource management, and service quality.

It counters traditional sectoral thinking, trade-offs, and divided responsibilities that often result in poorly coordinated investments, increased costs, and underutilized infrastructures and facilities. The ultimate goal of the Urban NEXUS approach is to accelerate access to services, and to increase service quality and the quality of life within our planetary boundaries.

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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

Authors: Angèle Cauchois, Martin Abbot, Chaitanya Kanury, Louise Cousyn, and Victoria Vital Estrada (Master GLM, Sciences Po - ICLEI Capstone Project)

Editors: Lucy Price, Louisa Weiss (ICLEI World Secretariat)

Further Reading

EnEff:Stadt official website, Energy-based optimisation of the Hamburg Water Cycle in the Jenfelder Au urban neighbourhood: http://www.eneff-stadt.info/en/pilot-projects/project/details/energy-based-optimisation-of-the-hamburg-water-cycle-in-the-jenfelder-au-urban-neighbourhood/ (20 Aug 2014)

Hamburg Water Cycle official website: http://www.hamburgwatercycle.de/index.php/english.html

GIZ and ICLEI, 2014, Operationalizing the Urban NEXUS: towards resource efficient and integrated cities and metropolitan regions, GIZ Study: www.iclei.org/urbannexus

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ICLEI World Secretariat, Kaiser-Friedrich-Straße 7, 53113 Bonn, Email: urban.research@iclei.org

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