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RESEARCH NEWS

IFAT 2016: Sustainable water infrastructure concept

Rigid water pipes, fit for the future

- **Our water infrastructure needs an update**
- **Fraunhofer and partners provide a modern, intelligent approach for urban areas**
- **Implementation within the next three years in Lünen, Westphalia**
- **Flexible integration in the existing water infrastructure systems**

At IFAT 2016 Fraunhofer presents a modern, intelligent and sustainable water energy transition concept for urban areas. It will be implemented during the next three years in the city of Lünen, Westphalia. Visitors of the booth will be able to experience the project results via a digital game platform. At May 31 and June 2, 2016 the presentation of the results and the serious game will take place at 4.00 p.m. at the booth (hall A5, booth 217/316).

Water infrastructures – such as pipes, sewers or water storages – are rigid systems. They are renewed according to certain renovation cycles. This can take up to 70 years for municipal sewage systems and up to 30 years for baths in rental apartments. "That has to be considered when creating concepts for the future of the water infrastructure," says Dr.-Ing. Thomas Hillenbrand, scientist at the Fraunhofer Institute for Systems and Innovation Research ISI in Karlsruhe.

Modernise exisiting water infrastructures

In the joint project "Paths Of Transition For Water Infrastructure Systems TWIST ++" the institute developed the integrated water energy transition concept i.WET. By means of real scenarios, the concept shows how a modern and intelligent water supply and watewater management can be implemented step by step in urban areas. It takes the renovation cycles of existing systems into account, can be flexibly implemented in modular form, and combines new water and wastewater technologies intelligently. i.WET includes solutions for three major challenges of water infrastructure in Germany: demographic change, climate change and energy policy. In Lünen, a city of 90,000 people in Westphalia, the results of i.WET are to be implemented in a pilot project over the next few years. The scientists are presenting the concept at IFAT, the International Trade Fair for Environmental Technologies, from May 30th to June 03rd in Munich (Hall A5, Booth 217/316).

Editorial Notes
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i.WET envisages specific measures for buildings, sewer systems and wastewater treatment plants. The decisive point is the separation of less and more heavily contaminated wastewater already in the household (gray/black water). In buildings, the researchers want to install separate pipes for water from showers, wash basins, sinks on the one hand, and the rest of the waste water from toilets, washing machines and dishwashers on the other hand. Approximately 110 liters of water per day are consumed in households in Germany. "Up to 50 percent of this water is required for showers and baths. This water is good for reuse – such as for flushing the toilet," Hillenbrand explains.

Energy alley as green water treatment

The water, which is not recycled in the household, flows into the "energy alley"– a green strip with plants that thrive on moisture. They stand with their roots in the water, absorb the remaining nutrients and have ideal growing conditions. "The result is biomass, the cities are greener and the threat of flooding is reduced – due to the water tank under the plants. One square meter per inhabitant is sufficient. In the long term, such a system can be operated more favorably than the current standard sewer system," Hillenbrand says. The scientists want to initially keep the sewers operable through regular surge irrigation with recycled water from households and, in the long term, replace them with vacuum dewatering.

Then, only highly-concentrated wastewater will reach the wastewater treatment plant. It can be routed directly into the biogas plant, in order to recover methane, thus reducing the energy demand for wastewater treatment. "The energy gain is significant. We can also recover nitrogen and phosphorus," says Hillenbrand.

Pilot project in Westphalia

In Lünen, it is intended for a housing association to incorporate the separate pipes for gray and black water in the buildings of the model district. The wastewater disposal rehabilitates the sewage system. "Time is on our side. The respective renovation cycles are expiring," Hillenbrand reports. The measures should be implemented within the next three years.

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Project TWIST++

- Funding: German Federal Ministry of Education and Research BMBF
- 16 Partners from science, industry and administration: http://www.twistplusplus.de/twist-de/inhalte/partner.php
- Project Management: Fraunhofer Institute for Systems and Innovation Research ISI, Karlsruhe
- Duration: three years (until the end of September 2016)
- Implementation: in the next three years in the three model regions in North Rhine-Westphalia and Thuringia

Water infrastructure Germany

Wastewater can be separated into highly-organically polluted black water (toilet) and lightly polluted gray water (bathroom, kitchen, laundry). One household in Germany consumes approximately 110 liters per person per day: approximately one third of which is for the shower, toilet and sink, washing machine and dishwasher. A small portion is consumed for watering the garden. About 80 percent of the costs of the municipal sewage system results from the canals and about 20 percent from the sewage treatment plants.

IFAT trade fair profile

- Who? Fraunhofer Institute for Systems and Innovation Research ISI
- When? May 30 to June 03, 2016, starting at 9:00 a.m.
- Where? IFAT, Munich Trade Fair, Hall A5, Booth 217/316
- Interactive game: Visitors can experience project results playfully via a digital platform
- Presentation of results: May 31 and June 02, 2016 starting at 4:00 p.m. at the trade fair booth

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Rain and gray water, which is not recycled by the household, flows into the "energy alley" – a green strip with plants that thrive on moisture. They stand with their roots in the water, absorb the remaining nutrients and even have ideal growing conditions. © Fraunhofer ISI | Picture in color and printing quality: www.fraunhofer.de/en/press