

**Docket #:** S21-048

# **Energy Services through INtegrated FLexible Operation of Wastewater Systems (ENERGY-INFLOWS)**

Wastewater treatment is energy and cost intensive. Demand charges on electricity bills often account for a large share of electricity costs, creating strong incentives for shifting load peaks away from time-of-use periods. ENERGY-INFLOWS is a computational platform for integrated management of the energy flexibility upgrades available to wastewater treatment facilities including 1) biogas storage, 2) water storage, and 3) batteries. The tool uses facility-specific metering data and treatment characteristics to identify cost-optimal energy flexibility upgrades. Its runtime controller uses artificial intelligence and facility-specific load models to operationalize a facility's existing energy flexibility resources in real-time. Overall, the tool provides a scalable platform for facilities to lower electricity costs and earn revenues from the sale of demand response and other services to electricity grids.

Related Technology: [S21-074 Powernet: Behind-the-Meter Resource Management System for Farms](#)

## **Stage of Research**

- Prototype

## **Applications**

- Wastewater treatment plant management: coordinated operation of treatment and energy storage components
- Treatment facility optimization: calculate facility upgrade designs, reduce energy requirements, reduce operating emissions

## Advantages

- Flexible, cloud-based approach
- Integrated energy recovery and energy storage with wastewater treatment
- Recycled biogas production into energy generation

## Publications

- [Integrated Energy Flexibility Management at Wastewater Treatment Facilities.](#)  
*Environ. Sci. Technol.* 2023, 57, 46,. 18362-18371.

## Patents

- Published Application: [WO2022232603](#)

## Innovators

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