

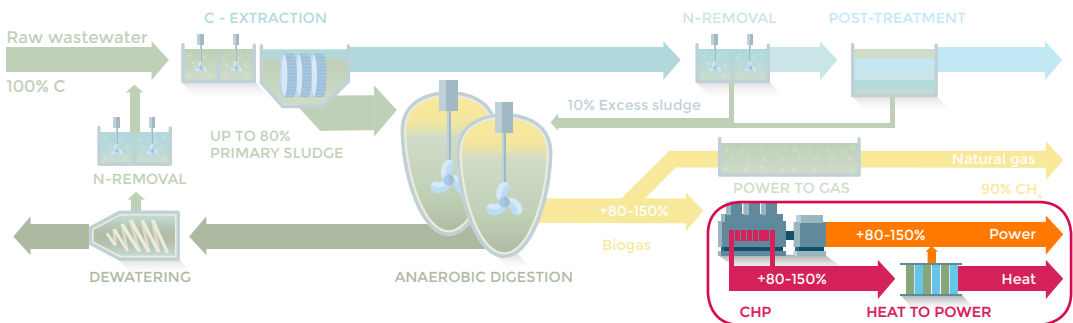


BRAUNSCHWEIG

INNOVATIVE MANAGEMENT STRATEGIES TO INCREASE ENERGY AUTONOMY

Modern waste water treatment plants (WWTPs) produce their own electricity and useful heat from biogas. One of the main challenges is the management of the heat and electrical power demand and ensuring its production throughout seasonal changes. POWERSTEP aims to increase the energy autonomy of WWTPs through innovative energy and heat management strategies. This requires new heat-to-power technologies for improved heat utilisation and the application of smart grid strategies for energy management.

WHAT IS THE INNOVATION?



Combined heat and power (CHP) uses a heat engine to produce electrical power and useful heat at the same time. The installation of the heat-to-power thermoelectrics technology demonstrates a way to increase the electrical efficiency of the CHP. Dynamic heat management, with

heat storage systems and the optimisation of the plant operation against energy markets, energy consumption, production and storage, is achieved by utilising innovative smart grid strategies for energy management, which increases the self-sufficiency of the plant.

○ WHAT IS THE ADDED VALUE?

Today, the seasonal variation and the dynamic nature of energy demand prevents the full energy autonomy of the Braunschweig WWTP. The integration of thermoelectric modules into the exhaust gas heat exchanger can improve the overall efficiency of the production of high grade electricity, while reducing the excess production of heat. This will allow for more flexibility in CHP operation. In addition, by applying sophisticated management strategies derived from the smart grid concept, excessive heat will be stored using dynamic heat management.

○ WHAT ARE THE TECHNOLOGIES AT STAKE?

- ▣ Thermoelectrics utilises the physical Seebeck effect in semiconducting materials. With no movable parts, a thermoelectric generator will convert heat directly into electricity.
- ▣ Smart grid technology refers to the effective management of energy in a distributed network. Decentralised energy sources are effectively combined in order to raise synergies.
- ▣ Thermal energy storage is a means to store large amounts of heat. It helps to decouple the production of heat from the consumption of heat.

○ WHAT ARE THE EXPECTED OUTCOMES?

- ▣ Large-scale application and demonstration of the viability of a thermoelectric generator (TEG).
- ▣ Comparative assessment of TEG and Steam Rankine Cycle (SRC).
- ▣ Dynamic heat management with storage systems and optimisation of plant operation using smart grid strategies.

○ PARTNERS



More information:

Christoph Siemers
christoph.siemers@veolia.com
www.powerstep.eu

Christian Loderer
Project coordinator
christian.loderer@kompetenz-wasser.de

