

# SUSTAINABILITY

Process optimization turns wastewater plant from energy consumer to green energy producer

The Fritzens wastewater treatment plant (WWTP)  
in Tyrol – Austria.



The Fritzens wastewater treatment plant (WWTP) in Tyrol, Austria, serves 120,000 inhabitants and processes approximately 6.1M cubic metres of sewage per year, of which 80% is municipal and 20% is industrial wastewater.

The plant consists of a mechanical treatment, primary clarifier, a highly complex biological treatment, and the sludge treatment that includes two sludge digesters to produce biogas. After passing through the secondary clarifier, the purified water runs to the main river in Tyrol, taking it back into the river's natural cycle. As a result of the treatment process, the plant can generate energy. In fact, it generates so much energy that its entire electricity and heat demand is met, with an annual surplus of more than 6 Gigawatts of green power that can be incorporated back into the public grid.

### The challenge

After WWTP-Fritzens was commissioned, it was identified as a high energy consumer and the company set the objective of optimizing its energy usage. As the global specialist in energy management and a solution provider in terms of power and automation, Schneider Electric was the logical partner to adapt the plant's automation to all the necessary optimization measures.

### The solution

All the optimization projects were based on three pillars:

1. Process optimization; 2. Power generation; 3. Cultural shift for staff to focus on energy efficiency.

In addition, WWTP-Fritzens applied Schneider Electric's "energy efficiency loop," which is based on four pillars:

- Audit and measure energy flow: discover energy waste in the process; devise an action plan to deliver results
- Connect automation and control with energy monitoring systems to create an intelligent, energy-aware infrastructure
- Optimize: automate active energy management; gain insight into energy consumption in the context of the process, identifying more opportunities for savings
- Monitor, maintain, improve: manage energy as a production variable and reduce energy waste in the process through continuous improvement initiatives.

## Goal

Monitor, maintain, improve and manage energy as a production variable and reduce energy waste in the process through continuous improvement initiatives

## Story

Fritzens wastewater treatment plant needed to optimize its energy usage and adapt the plant's automation to all the necessary optimization measures

## Solution

- Optimization of processes and power generation
- Foster a cultural shift for staff to focus on energy efficiency
- Apply Schneider Electric's *Energy Efficiency Loop*, which
  - audits and measures energy flow
  - connects automation and control with energy monitoring systems
  - optimizes and automates active energy management

## Results

After continuing to implement and enhance the Schneider Electric energy efficiency loop, Fritzens' energy consumption dropped to 32kWh/EP/a, marking a 65% decrease in energy usage per person equivalent per year and achieved a 20% reduction in overall energy consumption

The largest and one of the first projects was the complete technological change of the aeration process, which resulted in significant energy savings (the plant's energy consumption has been reduced by 28%). WWTP-Fritzens replaced all mixers and aerators with the latest technology and increased the aerob-area to better meet their needs regarding the changing of sewage loads. In light of the success of the first cost-savings project, which resulted in an ROI of three years, further optimization measures were subsequently identified in various sections of the plant.

The power generation in the plant is based on biogas. With the depletion of traditional energy sources, biogas is in the race to become one of the major renewable energies of the future. Biogas makes use of the sludge from the wastewater treatment operations to generate energy. Subjecting the sludge to anaerobic bacteria in a closed vessel (digester) produces the biogas. To significantly improve this energy production, WWTP-Fritzens replaced the old gas engines with much more efficient new ones and built a second digester to double biogas production.

Fritzens also added a new process to treat over 2.200t/year of used cooking oil and fat. This additional organic waste is mixed with the sludge in the digester and increases the plant's biogas production.

The energy behaviour of the plant inspired the staff to start thinking in terms of energy efficiency: With every action they take, they now ask the question, "Could we improve something in terms of energy consumption?" With the availability of the main data inputs and an energy efficiency dashboard, the staff is now equipped to make better energy decisions. Enhancements offering a calculated promise of an ROI of 12 to 18 months are immediately implemented.

### The benefits

The plant turned from an energy consumer (3,6GWh/year) into an energy supplier (6GWh/year).

In terms of overall energy consumption, Fritzens achieved 20% reduction between 1996 and 2009. To fully appreciate this reduction, one has to keep in mind that the amount of wastewater Fritzens processes has actually increased by 55% during this same period.

In 1996, Fritzens used 90kWh/EP/a. In 2010, after continuing to implement and enhance the Schneider Electric energy efficiency loop, their energy consumption dropped to 32kWh/EP/a. This marks a 65% decrease in energy usage per person equivalent per year.

Schneider Electric's programming tools and libraries meant the time spent on engineering and commissioning this plant was reduced.

"It was extremely important for us to work with a partner who is familiar with the water segment and knows the water basics in order to engineer and commission such a plant."

— Christian Callegari,  
Managing Director,  
Fritzens WWTP

With the depletion of traditional energy sources, biogas is in the race to become one of the major renewable energies of the future.

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# EcoStruxure™

## Innovation At Every Level

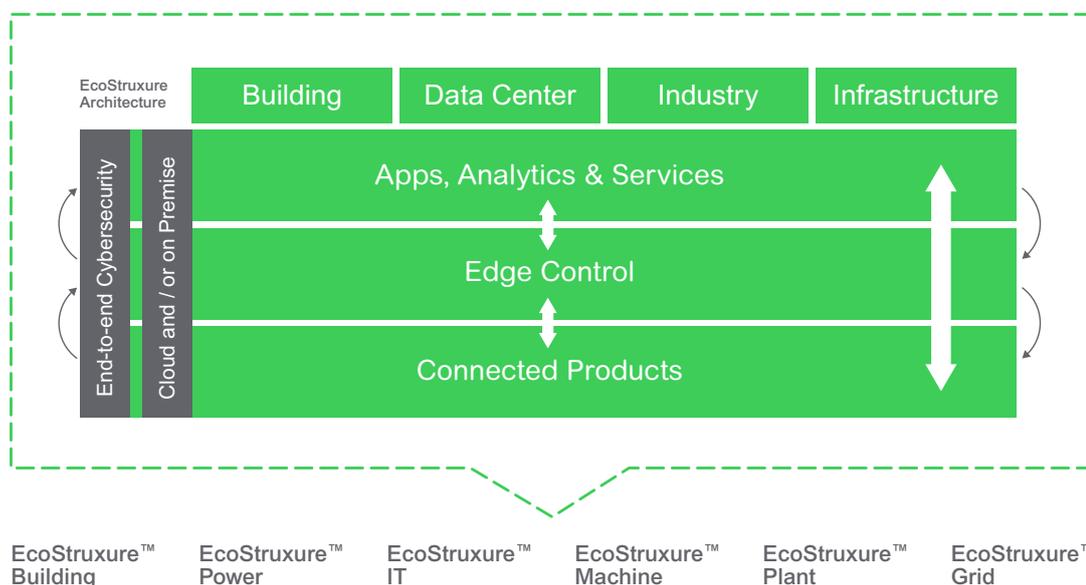
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