

Saving energy in

# wastewater treatment

Each year HSY Water's wastewater unit processes 130 million cubic meters of wastewater. The treatment process is energy intensive, with the pumps that convey wastewater to the treatment plants being particularly heavy energy users. ABB's energy management system provides reliable data on the process – data that can be used to improve energy efficiency.

**T**his year HSY, the Helsinki Region Environmental Services Authority, has implemented ABB's Energy Manager (EM) system at its Viikinmäki wastewater treatment plant. EM can help to save energy in the wastewater treatment process when used as part of an energy efficiency program. According to Panu Karhu, lead engineer at ABB, Energy Manager is a scalable system designed for managing energy consumption and production as well as purchases and sales of electricity. It can be easily connected to external systems via OPC or other interfaces.

The system at the Viikinmäki plant is currently in its pilot phase. "At the moment the plant is using the energy management system's monitoring function with OPC connections to data sources. This general-purpose system can be easily configured to suit each customer's individual needs," Panu Karhu says.

He explains that the EM system can be used in many different types of situation: in industrial processes, buildings and premises, on board ships – in fact any application where process data is available and there is a need to monitor energy consumption.

"The system supports programs to boost the energy efficiency of plants and facilities. It offers a means to visualize and analyze process data, and utilize the results of this analysis to identify concrete opportunities to improve energy efficiency."

At the Viikinmäki plant the system is being piloted in the discharge water pumping station. Energy consumption is being monitored and the results analyzed to identify areas for improvement. At the same time the potential for expanding the system to other areas is being considered.

#### Savings represent main incentive

In some cases major energy users have reported a payback time of just a few months for the system. According to Panu Karhu, the main incentive for implementing the system is the possibility of saving energy. In general, plants have the potential for saving energy, but they do not know how much they could save. "Processes can

be extremely complicated. Without an energy management system it's difficult to get an overall picture of what is happening. It's important to get reliable process data, because this provides the basis for efficiency improvements."

He points out that in wastewater treatment – as in other processes - reliability is the primary consideration. "Reliability should not be compromised. But it is possible, within limits, to boost energy efficiency – perhaps by optimizing operating procedures."

Panu Karhu says that in Finland progress is being made in the area of energy management. "A lot of work has already been started in this field, but there's still plenty to be done. In many cases the need to improve energy efficiency is being tackled through individual projects. Without continuous follow-up it's not possible to say how much improvement has been achieved and whether the improvement is permanent. Operating in real-time also offers the capability to adjust the process quickly."

#### Wastewater treatment is energy intensive

Kari Reinikainen, maintenance manager at HSY Water's wastewater unit, says that HSY Water intends to use the EM system to get an overall view of energy use at the Viikinmäki plant. "The system will give us more information about how we use energy. We can identify what needs to be repaired or replaced simply by looking at the machines and equipment we have; upgrading the motors or drives and other control equipment could deliver improvements."

He explains that over the years the wastewater unit has implemented several projects to save energy. "As a result we've changed the type of pumps we use and acquired

new equipment that uses significantly less energy than before. We've regularly monitored the energy consumption of the process."

HSY Water's wastewater treatment activities use a lot of energy. According to Kari Reinikainen, there are several areas - process stages and individual items of equipment - where it makes sense to monitor energy consumption. The pumping operations, in particular, provide scope for improvement. "Pumping the wastewater to the treatment plant is energy intensive. We also want to analyze the air supply for the aeration process and the compressors we use. In future we'll be bringing the wastewater pumping stations into the project."

Producing energy from sludge  
HSY Water has two wastewater treatment plants, Viikinmäki and Suomenoja. The Viikinmäki plant has an annual energy of around 38 GWh; the figure for Suomenoja is approximately 15 GWh, and for the wastewater pumping stations around 10GWh.

Both the Viikinmäki and Suomenoja plants have been producing their own electricity



since 1994. Electricity is generated using biogas that is produced by digesting sludge which is separated out from the wastewater. At Viikinmäki this biofuel produces over half of the energy required by the plant, and at Suomenoja it covers around 40% of the plant's energy requirements.

Kari Reinikainen believes that in future the wastewater treatment plants may be energy self-sufficient, or even produce electricity and heat for use in the surrounding areas. Wastewater contains a lot of heat energy which could be re-used. Heat contained in the wastewater leaving the Viikinmäki plant is already being recovered at the Katri Vala heat pumping station operated by Helsingin Energia, the energy company in Helsinki.

Project started with discharge water pumping station  
At the Viikinmäki plant the energy management system was first implemented in the discharge water pumping station in order to provide process data and monitoring. Kari Reinikainen says that the system is being used to analyze analyze different operating procedures. "We believe that EM will enable us to find an effective way of running the

process."

The energy management system will be used to examine the process one stage at a time to determine the energy consumption and efficiency of the individual stages. The pilot project will be progressively expanded.

HSY has also begun planning work to construct a new wastewater treatment plant at Blomminmäki, with the objective of getting the new plant into operation by 2020. The aim is to incorporate energy efficiency into the design of the new plant.

HSY began operating at beginning of 2010  
HSY, the Helsinki Region Environmental Services Authority, started operating on January 1, 2010. It provides waste management and water supply services for residents of the Helsinki Metropolitan Area. In addition HSY produces regional information, including air quality assessments. HSY has almost 800 employees.

HSY wastewater treatment is a unit within HSY Water. Its treatment plants at Viikinmäki and Suomenoja process an annual total of 130 million cubic meters of wastewater from an areawith a population of 1.1 million people. The wastewater unit has 110 employees. The wastewater unit is also responsible for the almost 500 wastewater pumping stations located in HSY's operating region, which comprises the cities of Espoo, Helsinki, Kauniainen and Vantaa.



Fakta

### Energy Manager in a nutshell

ABB's cpmPlus Energy Manager enables users to

- monitor and report on energy use and efficiency
- predict consumption and production and monitor to ensure that commitments are complied with
- optimize energy production and procurement

System benefits

- savings of up to 15-25% in energy consumption can be achieved when the system is used as part of an energy efficiency program
- 2-5% savings in unit price of energy