

Lübzin Waterworks: optimum value for specific energy expenditure



EURAWASSER Nord GmbH's partner is EURAWASSER Aufbereitungs- und Entsorgungs GmbH Berlin, a subsidiary of SUEZ ENVIRONNEMENT, France, active nationally since 1990. EURAWASSER's contracting companies are local authorities and public utility companies. EURAWASSER offers local authorities comprehensive long term collaborations for water and wastewater in the context of various models adapted to the specific context. These models range from management contracts to operational management, co-operation and operator models including holdings.

The collaboration model includes commissioning operations, maintenance, modernisation and the development of drinking water and wastewater facilities as well as other services. EURAWASSER implements new water resource management measures for efficiency, service and cost transparency. The 900 employees of the group are responsible for the drinking water supply and sewage disposal for around 750,000 people in cities, communities and rural areas and have an annual turnover of around 120 million Euros. SUEZ ENVIRONNEMENT is a market leader offering over 120 years of experience and know-how.

SUEZ ENVIRONNEMENT ensures the water supply for 68 million people and sewage disposal for over 44 million people as well as waste disposal for 46 million people. The company has 62,000 employees in over 100 countries and an annual turnover of around 12 billion Euros.

Waterworks foreman Michael Belosa (middle) and Ulf Lorenz (right), are very pleased with the LCC analysis by Grundfos; Reiner Baumann from Grundfos on the left.

The situation

"Water supply facilities have exceptionally high energy demands. In a time of ever increasing energy prices we have to optimise constantly and come up with new processes", this is Eurawasser's corporate philosophy as acknowledged by Ulf Lorenz from the technology department and groundwater development and detection specialist. Michael Belosa the waterworks foreman agrees. However, this is not merely a formality on paper: "our management gives us specific annual goals, and energy savings are always a top priority".

As a result the Grundfos service team was commissioned to perform the life cycle cost analysis at the Lübzin Waterworks. The purpose of this service is to identify the pump systems in the waterworks that could benefit from cost-effective energy reductions.

The solution

In May 2007, the Grundfos service specialist at

the Lübzin Waterworks investigated the situation and recorded the existing performance

data for the well and clean water pumps, their efficiency factors and their energy consumption.

Using specially developed evaluation software, they compared the values obtained with those of the potential new pump. The actual savings potential for identical operating points was under investigation. The investigating team soon reached a conclusion: the actual performance data of the old pump no longer corresponded to the parameters of the tool identification plate. Possible causes included wear and tear on the parts resulting in, for example, an increase in the impeller clearance, compromising overall efficiency.

The service team suggested three clean water high pressure pumps from the CR range and two well pumps from the SP range as replacements.

The outcome

After installing the new Grundfos pumps, the annual electrical energy saving for the same performance was 11,376 kWh. With electricity at 0.14 €/kWh, this corresponds to annual operating savings of €1,593/year and 60% for the CR pump and 56% for the SP pump.

The investment will be paid off after 4 and 2.6 years respectively. Diagrams 1 and 2 show the proportion of energy costs for the old pumps compared to the new ones and the savings potential (in green) for the next 10 years allowing for a 2.5% inflation rate, as well as the investment costs (in blue).

Ulf Lorenz: “Basically, we knew that the Lübz Waterworks was in need of refurbishment: if the pumps are only operational for two hours a day, then the installation is obviously oversized. Ideally, the pump run time should be from 10 to 12 hours a day”, says Lorenz. This also optimises the treatment process by reducing the load on the filter (a lower filter rate), better enabling the filter to reduce iron and manganese levels. The higher the filter rate caused by oversized pumps, the more iron and manganese remains in the clean water and the more residue collects in the pipes. “Properly designed pumps don’t just save energy, they also reduce flushing and cleaning work in the mains. The situation is similar for the well pump: if a lot of water is pumped in a short time, this will have a harmful effect on the well.”

Optimisation result: the overall energy consumption of the Lübz Waterworks dropped considerably, with the specific energy expenditure reduced from 0.57 to 0.38 kWh/m³.

A survey by the TUHH DVGW research centre at the Hamburg-Harburg Technical University produced interesting results on the project’s energy efficiency/savings in water treatment [1]. For the 422 participating utility companies, the average value of the specific energy expenditure (electricity consumption) per cubic metre of clean water is 0.58 kWh/m³ (diagram 3)

With a value of 0.38 kWh/m³, the newly installed pumps at Lübz are much more energy efficient. “For two-tier waterworks, energy expenditure must be our main priority” opines Michael Belosa.

“Eurawasser and Grundfos have agreed that Grundfos will perform a post-analysis after the proposed changes have been implemented. The measurements performed in July of this year showed almost exactly the predicted values”, said Ulf Lorenz.

Summary: the Lübz Waterworks example shows that even when the specific energy expenditure already presents a good average, there is still room for potentially huge savings.

Eurawasser Nord now aims to perform LCC analyses on more and more waterworks and rectify any problems.

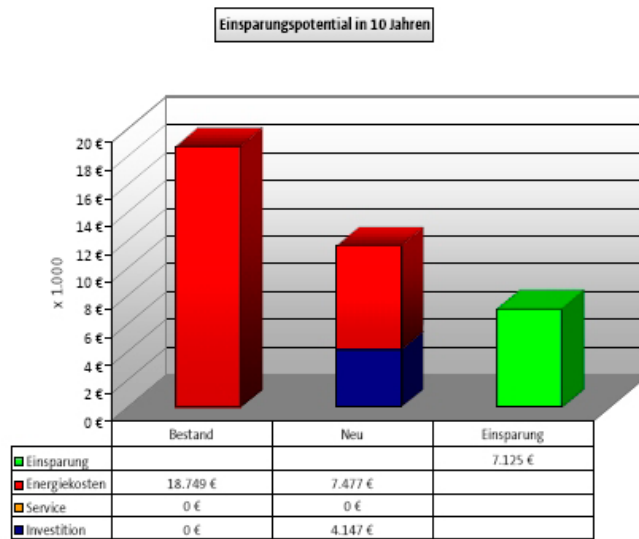


Diagram 1: Savings potential for the proposed clean water pump in 10 years.

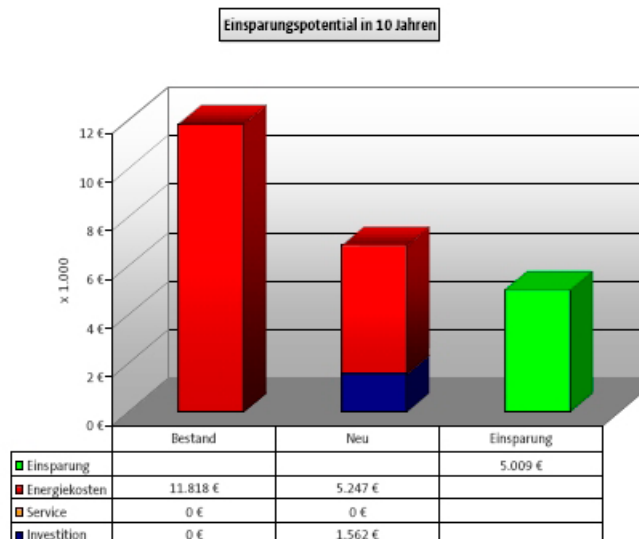


Diagram 2: Savings potential for the proposed well pump in 10 years.

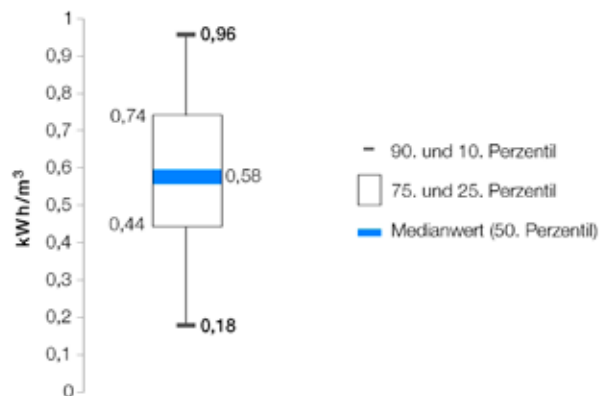


Diagram 3: Specific energy expenditure = electricity consumption per cubic metre of clean water flow. (Source: TUHH DVGW Research centre).