REFERENCE PROJECT

AACHEN-SOERS WASTEWATER TREATMENT PLANT

Energetic optimisation of aeration
May 2018

German Water Partnership
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25 JAHRE WVER WASSERVERBAND EIFEL-RUR
WASSER VERANTWORTUNG ERFOLG FÜR UNSERE REGION

KEY DATA

Wastewater treatment plant

Equivalent population figure:
458,300 equivalent population

Maximum feed load:
Approx. 3,000 l/s

Tank capacity per row: 10,587 m³

Tank capacity all rows: 74,110 m³

Objective:
Holistic, energetic optimisation of aeration

Result:
Energy savings of over 50% in relation to the biology

BACKGROUND

What can be done when physical capacity limits have been reached?

Aachen Soers wastewater treatment plant had reached the maximum capacity limit. In addition, the aeration consumed an enormous amount of energy, accounting for about 60% of the treatment plant‘s energy costs. To ensure the oxygen input could continue to operate economically and in line with increased feed loads in the future, a decision was made to holistically optimise the aeration stage (ventilation systems, agitator technology, process air generation and control system). To carry out this measure, a holistic optimisation concept based on a two-year large-scale test was initially worked out, and then the entire design was awarded to a system manufacturer during a request for proposals / quotations.

IMPLEMENTATION OF THE MEASURES

Achieve sustainable efficiency with coordinated engineering and optimal solutions

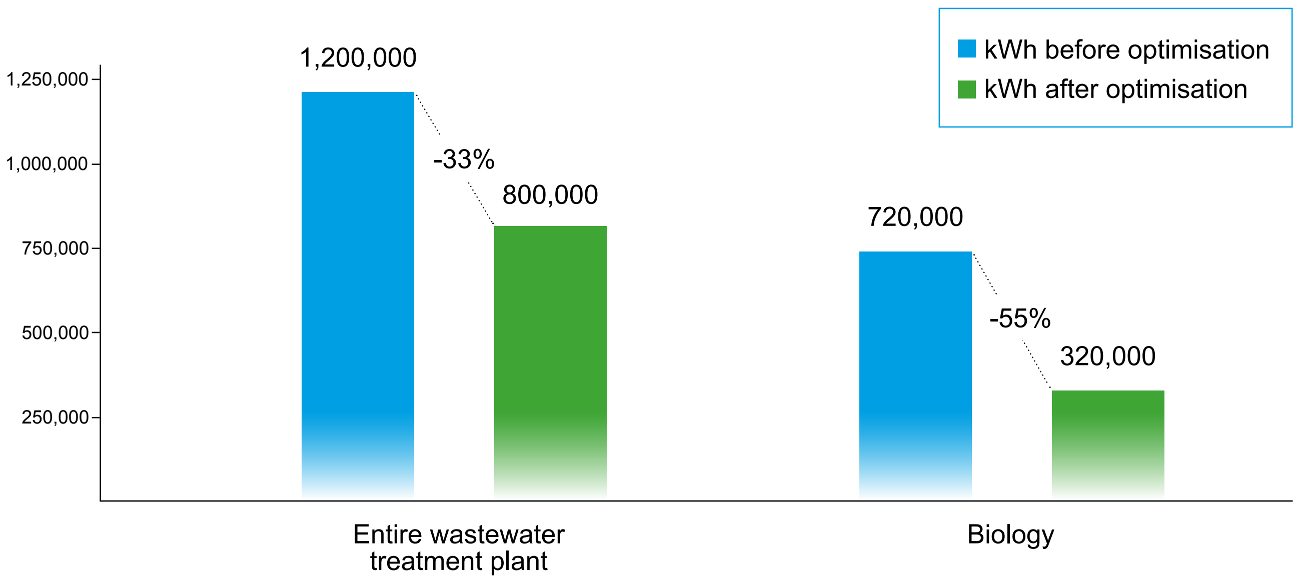
Consistent engineering as well as optimal coordination and dimensioning of the individual components into an harmonious overall system were decisive for success. The high efficiency of the ventilation system, which consists of large-format plate aerators and an individual higher-level control concept, ensures optimal oxygen supply to the aeration tanks. By switching to an alternating and intermittent mode of operation, the required oxygen can now be fed via the newly installed 164 plate aerators per row in a much more targeted and energy-efficient manner, which, of course, also benefits the improved process values. With the help of a previously developed CFD simulation, the agitators and the ventilation system were optimally aligned with each other. The innovative agitator technology with three-blade propeller and IE 4 motors ensure the best possible thrust performance, which enables additional energy savings to be achieved. The profitability analysis was based on the continuous operation of the 12 agitators in the denitrification zone. The other 12 agitators are only in use about 50% of the time in the transition zones. In the new mode of operation, the 10 turbo compressors were replaced by 17 energy-efficient rotary lobe compressor. Their large control range also enabled an optimised design for the newly installed ventilation system. All machines are installed in a decentralised manner at the aeration tank. This avoids unnecessary pipe losses, and the outdoor installation ensures that the coldest air with the maximum oxygen content is always supplied to the ventilation process. Decentralisation was consistently continued with the EMSR technology and a control logic based on the approaches of Water 4.0 was established. This ensures that purification or transfer of the wastewater is implemented in accordance with the measuring and procedural specifications. This means that individual plant areas can be operated autonomously and monitored via a central process control system. In future, Water 4.0 will continue to offer considerable opportunities with the possibility to further integrate individual process steps over the entire plant cycle: from engineering and operation to ongoing optimisation.

CONCLUSION

The result: a high level of operational safety and long-term energy savings

The symbiosis of process engineering and system manufacture as well as the use of perfectly coordinated system components create a high level of operational reliability, permanently low discharge values and the following energy savings:

Electrical output of the biology



German Water Partnership

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With its strong network of companies, professional associations and science and research institutions from the water industry, the German Water Partnership e.V. (GWP) drives innovation and bundles information. This commitment shows how breaks in the engineering disciplines and hurdles in the various disciplines can be overcome via cooperation and the implementation of WATER 4.0.

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