

Turbo purification in Havelland

Roskow wastewater treatment plant: 70% lower energy costs thanks to conversion to a new treatment process

When it comes to reliability, energy efficiency, service-friendliness and low life cycle costs, turbo blowers are simply unbeatable. The Roskow wastewater treatment plant in Havelland has carried out the practical test - and is completely satisfied. By switching to AERZEN's highly efficient turbo technology and state-of-the-art aeration technology, it will reduce energy consumption in the aeration by 330,000 kWh per year and thus significantly reduce wastewater cleaning costs.

To the west of Berlin stretches the Havelland - an idyllic landscape that Theodor Fontane once memorialised in his "Wanderungen durch die Mark Brandenburg". Today, the area on the outskirts of the capital is a popular excursion and holiday region and the declared destination of many city escapees. The public drinking water supply and wastewater disposal is the responsibility of the [Havelland Water and Wastewater Association \(WAH\)](#) which operates eight waterworks and three wastewater treatment plants (Roskow, Nauen, Ribbeck) in its catchment area. The largest wastewater treatment plant is located in Roskow. It was built in 1994 and is now rated for 49,000 population equivalents (PE). Every day, 4,000 cubic metres of wastewater from Wustermark, Brieselang, Ketzin and Beetzseeheide are treated. Calculated over the year, this amounts to 1.45 million cubic metres.

The target: reducing energy demand and lowering CO₂ emissions

In order to reduce energy demand and CO₂ emissions, the Roskow wastewater treatment plant carried out extensive construction work between 2021 and 2023. "A lot has changed structurally in these three years," says Thomas Hantke, Technical Director of the WAH: "We have completely modernised the machine technology, the construction technology and the E/I&C and process control technology. The plant is now up to date in terms of energy efficiency. This results in a number of positive effects regarding energy consumption, CO₂ emissions and costs."

Energy optimisation of aeration technology is the key to higher energy efficiency

A central component of this was the energy optimisation of the aeration technology in two aeration tanks. By switching to AERZEN's highly efficient turbo technology and new aerators, the Roskow wastewater treatment plant was able to reduce its energy demand in 2023 by around 330,000 kWh compared to 2022, saving 177 tonnes of CO₂. In addition, a digestion plant including an associated CHP plant and upstream pre-treatment was installed in a separate construction phase, which has an annual output of 660,000 kWh. This will save a further 354 tonnes of CO₂ per year.

Turbo blowers replace old compressor station

Biological treatment is at the heart of every wastewater treatment plant, but it is also the biggest consumer of electricity and therefore costs. Previously, rotary lobe compressors and positive displacement blowers of the Delta Blower type (two GM 25 S) supplied the microorganisms in aeration tanks 1 and 2 with oxygen. These have now been replaced with five turbo blowers: one AT 50 and one AT 100 per basin and one AT 150 as a central reserve. "The Havelland Water and Wastewater Association has always used AERZEN technology on

its wastewater treatment plants. We are well looked after there and feel that we are in good hands. The machines are reliable and the services are outstanding," says Thomas Hantke, who is delighted with the excellent cooperation. With regard to the turbos, he adds: "We are very happy that the Turbos are so compact. This is very beneficial for our limited installation capacities. They are also service-friendly. An oil change is not necessary. This makes work easier for our operating staff. The brand loyalty also has advantages in terms of spare parts stocks, standardisation, control technology, operation and maintenance."

AERZEN is the market leader in the field of water treatment

For over 150 years, AERZEN has been supporting operators of wastewater treatment plants on their way to maximum resource efficiency and has long been recognised as the [market leader in the field of water treatment](#). The range of services covers all aspects - from bespoke machine and technology design to smart, needs-based control systems, customised ROI calculations and flexible rental solutions (Aerzen Rental) through to support with funding applications.

The Aerzen Turbo is unbeatable in terms of energy

The [Turbo blowers of the G5^{plus} series](#) which are now in operation at the Roskow wastewater treatment plant, are among the most compact and efficient turbos in their class and are currently unbeatable in terms of energy efficiency: Compared to conventional turbo technology, their energy efficiency is up to 10% higher. Compared to displacement machines such as positive displacement blowers, savings of up to 30% can even be achieved. This can be accomplished by highly efficient individual components, such as the extremely powerful and energy-saving permanent magnet motor, which meets the future requirements of the IE5 classification (Ultra Premium Efficiency) thanks to the particularly aerodynamic design with turbo impeller and spiral casing and the innovative multilevel VFD technology with up to 90% less power loss in the motor compared to conventional converter technology. "Aerzen turbos stand for maximum energy efficiency, absolute reliability, reduced maintenance costs and low life cycle costs, making them an ideal solution for supplying oxygen of the aeration," emphasises Christian Meyer from AERZEN.

Minimum machine footprint

Thanks to the air foil bearing with double coating, Aerzen turbos offer an extended bearing service life of up to 80,000 operating hours regardless of start-stop cycles and are virtually maintenance free. The only thing that needs to be done is to change the filter regularly. The reduced dimensions warrant a minimum machine footprint - ideal when space is limited. AERZEN manufactures and develops all of its products via in-house production. This means that all components can be perfectly matched with each other and ideally adapted to the operating process. This guarantees maximum reliability, operational reliability and cost-effectiveness.

50 % higher oxygen input thanks to state-of-the-art aeration

The aeration elements were also modernised as part of the renewal of the blowers. Instead of candle diffusers, [large-format aerators](#) ensure that the air provided by the AERZEN packages reaches the pool. At the same time, the configuration was optimised and the area increased from 60 m² to 160 m². With the same amount of air, 50% more oxygen can now be entered. This enables enormous energy savings. Thanks to the new technologies - blowers

and aeration elements - as well as the construction of a pre-treatment and digested sludge plant, the tank volume could be reduced: Instead of three, only two aeration tanks are needed. The third basin, which had its own compressor station with a further three machines, was taken out of permanent operation and serves as a buffer tank.

Extensive construction measures

The primary clarifier and digestion tower reduce the COD freight for biology by a third, as the primary sludge from the primary clarifier is fed to the digester (capacity approx. 2,500 m³) together with the excess sludge. This results in an increase in capacity from 36,000 to 49,000 PE of the wastewater treatment plant. A gas storage facility (capacity approx. 500 m³), a gas flare with condensate water shaft and two block-type thermal power stations with a total output of 160 kW were also installed. In addition, the construction of a rake and grit trap, the switch from a belt press to a modern centrifuge for sewage sludge dewatering and the complete renewal of the EMSR technology and the associated process control technology (including visualisation system and remote maintenance option). To ensure sufficient performance, the capacity of the transformer station had already been doubled a few years earlier.

Subsidies secured the financing

The conversion of the Roskow wastewater treatment plant cost a total of 19.5 million euros - a sum that the Havelland Water and Wastewater Association could not afford on its own. The energy efficiency measures could only be financed thanks to subsidies. For the energy optimisation of the aeration technology, the WAH generated 200,000 euros as a grant via the municipal guideline, a funding programme of the Federal Republic of Germany. Support was provided by e.qua. [e.qua is a network of municipal water management companies](#) and focusses on the topics of energy efficiency, energy (recovery) and resource management. Together, AERZEN and e.qua offer time-saving [help with applying for government subsidies](#). "We provide information about the available subsidies, offer advice, prepare the potential study and, on request, take care of the total subsidies management," says Philip-Leander Rausch, outlining e.qua's range of services. The association received EUR 4.88 million from the state of Brandenburg and the European Union via the "RENplus 2014-2020" programme for the separate project "Construction of a sludge digestion plant with downstream block-type thermal power stations" (without e.qua's participation).

Massive cost reduction thanks to lower energy consumption and a higher proportion of self-generated electricity

In 2022, the Roskow wastewater treatment plant drew around 1.4 million kWh from the public electricity grid. The conversion to the new treatment process drastically reduces this value. In 2023, the plant only needed 410,000 kWh of public electricity. That is a reduction of 70%. 330,000 kWh are saved by renewing the aeration technology and 660,000 kWh are produced thanks to sewage sludge digestion.

Broken down to the aeration, the following image emerges: Before the optimisation measures, four packages were in use for aeration tanks 1 and 2 and two packages for aeration tank 3, i.e. a total of six machines (not including the redundant machines). Following the switch to turbo technology and the [new aerators](#), only two machines will be in operation

on average - namely one AT 50 each for aeration tanks 1 and 2. That is an annual saving of 330,000 kWh - and that with a 36% increase in capacity from 36,000 to 49,000 PE.

AERZEN technology at all wastewater treatment plants in the association's area

In connection with the construction measures at the Roskow wastewater treatment plant, the energy optimisation of the Nauen wastewater treatment plant will follow. AERZEN turbo blowers will also be installed there - two AT 50 and one AT 100. AERZEN technology is also in use at the small wastewater treatment plant in Ribbeck (350 PE). "AERZEN is a competent, reliable partner and we are very satisfied," emphasises Thomas Hantke.

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Company information AERZEN (box)

Industrial plants all over the world are provided with gaseous media using AERZEN blowers and compressors. AERZEN's innovative machine technology incorporates the experience gained from over 150 years of company history. The AERZEN product portfolio includes rotary lobe compressors, positive displacement blowers, turbo blowers and screw compressors and, in addition to standard products, also provides customised special solutions. Digital services can be used to increase efficiency, availability and productivity in a sustainable and future-oriented manner. In addition, AERZEN After Sales Service offers the whole range of services - from full maintenance contracts to repairs and modernisations of existing plants.

www.aerzen.com

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Image overview:



01-AERZEN-WWTP-Roskow.jpg

A bird's eye view of the Roskow wastewater treatment plant

Image: AERZEN



02-AERZEN-Turbo blowers.jpg

Five turbo blowers from AERZEN ensure the oxygen supply in the aeration tanks

Image: AERZEN



03-AERZEN-Turbo.jpg

The turbo blowers in the G5^{plus} series are among the most compact and efficient turbos in their class

Image: AERZEN



04-AERZEN-Aeration.jpg: Biological treatment is at the heart of every wastewater treatment plant, but it is also the biggest consumer of electricity and therefore costs.

Image: AERZEN



06-AERZEN-Aerator?-Oxygen-Entry.jpg

As a result, the oxygen input is 50% higher than with the old candle aerators. New aerators ensure that the air provided by the AERZEN packages reaches the pool.

Image: AERZEN



07-AERZEN-Digestion Tower.jpg

The primary sludge from the primary clarifier is fed into the digester (capacity approx. 2,500 m³) together with the excess sludge

Image: AERZEN



08-AERZEN-Gas-Storage.jpg

The gas storage tank has a capacity of approx. 500 m³.

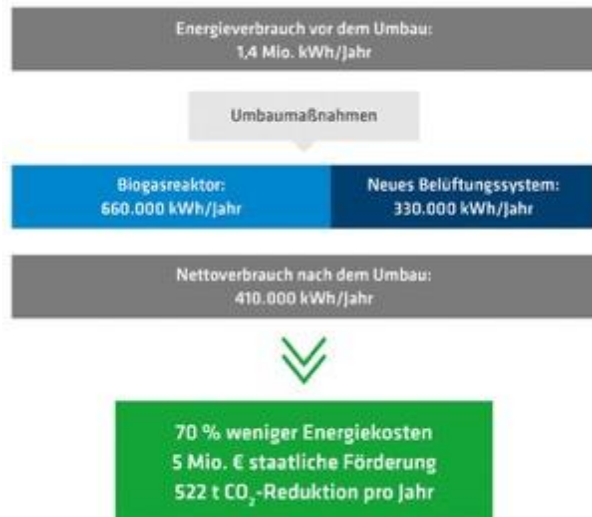
Image: AERZEN



09-AERZEN-WWTP-Roskow-Energy Efficiency.jpg

The Roskow wastewater treatment plant is now up to date in terms of energy efficiency and has been able to significantly reduce its energy consumption, CO₂ emissions and costs as a result

Image: AERZEN



10-AERZEN-Overview-Benefits.jpg

Overview of the benefits achieved by converting to the new treatment process.

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Deeplinks:

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