

Nitrous oxide monitoring puts VCS Denmark at the technological forefront

Nitrous oxide (N_2O), which is produced during wastewater treatment, is one of the industry's biggest environmental offenders with an eco footprint 300 times higher than that of CO_2 . To address this problem the water and wastewater company VCS Denmark has invested in measurement technology from Unisense Environment, enabling it to measure N_2O levels directly in the wastewater treatment units and to use measured data to calculate N_2O emission and reduce this by optimized process control

Wastewater treatment has previously been a very energy-intensive process, but in recent years the industry has focused on reducing CO_2 emissions. VCS Denmark, one of the largest and oldest water and wastewater companies in Denmark, is actively committed to resource optimisation. One of the major efforts has been on optimising its biggest treatment plant – Ejby Mølle Renseanlæg – so it produces significantly more energy that it consumes.

However, in its efforts to achieve its goal, VCS Denmark encountered a problem: When you reduce energy consumption in the complex microbiological treatment process, you also potentially increase N_2O emissions. N_2O is a potent, overlooked greenhouse gas which – when emitted – has an eco footprint 300 times that of CO_2 .

Measurement technology reads N_2O concentration

Increased levels of N_2O do not sit well with VCS Denmark's goal of reducing greenhouse gas emissions and becoming CO_2 neutral. The company therefore decided to invest in N_2O sensors from Unisense Environment.



Ejby Mølle WWTP, photo: VCS Denmark



Ejby Mølle WWTP, photo: VCS Denmark

"We wanted to measure N₂O levels in our wastewater treatment tanks, as these data enable us to optimise the operation of our treatment plants and reduce N₂O emissions. Unisense Environment had the technology we were looking for – and at a very affordable price," explains Per Henrik Nielsen, project manager at VCS Denmark.

Unisense Environment's measurement technology integrates with VCS Denmark's monitoring system, enabling the water company to monitor N₂O concentration along with ammonium, nitrate, oxygen and redox potential.

N₂O measurement – a giant leap forward

Up until now, N₂O concentration and emission data have been scarce and the wastewater treatment companies have therefore based their control efforts on guesswork and lab tests from the 1990s. Armed with the new technology, however, VCS Denmark can now measure N₂O concentration levels with a high degree of accuracy.



Ejby Mølle WWTP, photo: VCS Denmark

"There's a big difference between lab tests and the real world so it's a huge leap forward to be able to perform stable, full-scale, online N₂O measurements in an industrial context online 365 days a year using Unisense Environment's measurement technology," says Per Henrik Nielsen.

Deep background knowledge and respect for practice

The measurement technology was jointly developed by Unisense Environment and VCS Denmark with the help of DHI, and the project was funded by The Foundation for Development of Technology in the Danish Water Sector and Aarhus Water.

The development process has been so smooth that the measurement technology was developed and made implementable in record time. Per Henrik Nielsen believes this has a lot to do with Unisense Environment's attitude and business approach.

"Unisense Environment possesses extensive theoretical background knowledge and a deep understanding of the biological processes in wastewater treatment. They have also shown a great deal of respect for how things work in practice and understand our operational needs. That's a rare but highly desirable combination, which we value highly," he concludes.



N₂O Wastewater System