



## LET US TAKE A QUICK LOOK AT YOUR WASTEWATER TREATMENT PLANT

Short-term measurements offer valuable insight to optimise your plant operation

Wastewater treatment plants (WWTPs) are key infrastructures for ensuring proper protection of our environment. As plants are expensive to build and operate, plant managers and operators need to pay close attention to their performance to ensure they are in optimal working condition. However, lack of reliable data for aeration and process efficiency makes this a difficult task. To help overcome this problem, we developed a comprehensive mobile monitoring unit for short-term measurements at WWTPs.

### WHY OFF-GAS MEASUREMENTS ARE IMPORTANT

For most WWTPs, aeration systems are the largest source of energy consumption but information about their efficiency is often lacking. Taking off-gas measurements can thus offer significant insight to improve plant operations. Our system provides a precise estimation of the Oxygen Transfer Rate (OTE) – the key parameter related to operating cost for aeration. Just one day of monitoring is sufficient to determine if it is time to replace the aeration system and at the same time, test the effectiveness of diffuser cleaning. This information helps to ensure minimal costs during the lifetime of the system. The nitrous oxide (N<sub>2</sub>O) measurements also enable a quantification of the plant's carbon footprint. This is especially important as N<sub>2</sub>O is 300 times more powerful than carbon dioxide (CO<sub>2</sub>).



A specially designed off-gas unit is an essential part of the DHI monitoring unit for waste water treatment plants. ©DHI /Stjernholm

### CLIENT

Wastewater utilities and operators

### CHALLENGE

Need to:

- get a comprehensive overview of the daily variations of key parameters to better understand treatment plant operations
- measure the efficiency of the aeration system to achieve optimal oxygen transfer for the plant using less energy
- gain knowledge about carbon footprint through accurate nitrous oxide measurements

### SOLUTION

To take short term measurements using our advanced transportable monitoring equipment, which provides:

- qualified estimation of the efficiency of the aeration system for various operations
- simultaneous wastewater and off-gas measurements from process tanks
- qualified estimation of nitrous oxide emissions, enabling you to prevent it by using intelligent online controls

### VALUE

- Reveal if your aeration system needs improvements and if the operation of the blowers should be changed as this may result in at least 10 – 20% energy savings
- Better understanding of the plant performance through online measurements
- Knowledge about the actual carbon footprint due to emission of climate gases and how it can be reduced through a change in plant operations

## THE WWTP MOBILE MONITORING UNIT BY DHI

At DHI, we have been developing and using online sensors for WWTPs for decades. Our extensive insight into sensor technology helps us gain reliable information about WWTP processes and facilitate this into process optimisation and energy savings.

We are no stranger to utilising off-gas measurements. With our new mobile WWTP monitoring unit, we check aeration efficiency and also monitor a range of other parameters in the process tank. The off-gas equipment is used for online measurements of  $N_2O$ , flow and oxygen emissions. In combination with simultaneous monitoring of ammonia, nitrate, oxygen, pH and suspended solids, it provides a precise overview of the ongoing biological processes. By analysing this data, we can suggest the actions to be taken to improve aeration efficiency and oxygen uptake rate. Furthermore, the large amount of additional parameters that are monitored allows us to provide suggestions for plant optimisation.



*During testing, the off-gas unit will be placed at the surface of the tank where the biological treatment process takes place. © DHI*

All data is logged, processed and easily accessible from our DIMS.CORE software. The mobile monitoring unit is a reliable and cost-effective tool for evaluating the performance of aeration systems. By monitoring the operation process, we can potentially reduce operating costs and increase plant capacity without or with minimum extension of the plant. For plants equipped with bottom aeration, the monitoring includes off-gas measurements that will provide information on the actual efficiency of the aeration system and the emissions of  $N_2O$ .

## A FAST AND FLEXIBLE SOLUTION

When off-gas measurements are used to check the aeration system, one day of measurements will often be enough. However, the system can also be used over a longer period to monitor daily and weekly variations. This can assess plant performance at various loads and can help determine alternative control strategies at various load conditions.

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The monitoring unit can be placed at various positions in the tank to monitor different concentration levels. This information derived from the unit helps to determine the right location for permanent online sensors. Many WWTPs are designed with several treatment lines but they seldom show the same results. Our monitoring unit can help investigate differences in performance, for example, due to uneven load or use of wrong set-points.

Based on your needs, we can install and manage the equipment and collect data for the pre-agreed period. The scope of work can either be customised or you may choose from one of our standard solutions:

- Monitoring aeration efficiency for bottom aeration systems, including evaluation of possibilities to improve the efficiency
- Monitoring aeration efficiency for surface aerators, including evaluation of possibilities to improve the efficiency through better submergence
- Plant evaluation including a full week monitoring at the plant to measure daily and weekly variations, where the collected data will be analysed and recommendations for optimisations will be drafted
- Full plant evaluation including a full week monitoring at the plant. This solution includes evaluation of each part of the WWTP, where the collected data will be analysed and proposals for improvements will be drafted. The result will be presented in an idea catalogue with estimated return of investment for suggested improvements or modifications.

## RESULTS JUSTIFIES THE COSTS FOR MEASUREMENTS

Measurements at more than 100 WWTPs have revealed potential cost savings or the need to change the aeration system. With a full plant evaluation, the cost savings will be even higher. Onsite measurements will help you pinpoint your challenges and potentially reduce your carbon footprint through better operation processes.