xylem
Treatment Solutions

Complete Aeration Systems for Biological Treatment

ENERGY SAVINGS ARE IN THE AIR

FLYGT®
SANITAIRE®
WTW®
YSI®

Achieve significant savings with efficient aeration.

Faced with increasingly strict environmental regulations and rising energy costs, wastewater treatment plants require both reliable biological treatment and efficient energy use.

Aeration systems play a critical role in nutrient removal. They can also represent anywhere from 50% to 80% of the total energy costs at a typical wastewater treatment plant.

Xylem can help design the most appropriate aeration system for your treatment needs and cut daily aeration energy consumption by up to 50%. This translates into improved plant performance, a smaller carbon footprint, lower total cost of ownership and, ultimately, a better bottom line.

Systems engineering for optimized performance

Proven reliable for more than 50 years, Xylem diffused aeration solutions are tailored to meet individual plant requirements and operating conditions. Whatever the tank geometry or process application, Xylem systems have proven effective for thousands of communities and customers worldwide.

Xylem partners with customers to not only meet their technical specifications, but also optimize the system to achieve their compliance, performance and efficiency goals. Our engineers understand how different operating strategies and equipment selection affect energy consumption and costs, so we can determine where additional power savings can be realized.

50%

An optimized aeration system design can cut your plant's daily aeration energy consumption by up to 50%.

30M

More than 30 million Sanitaire membrane and ceramic disc diffusers have been supplied worldwide.

Everything you need to optimize your aeration processes – from mixing and airflow specifications, to blower group design, to monitoring and control strategy – is available through a single, reliable partner.

Pressure control

Dissolved oxygen control

Airflow control

Blowers and controls

Mixers and controls

Online instrumentation

Diffusers

Grid configuration

Comprehensive aeration solutions from the industry leader

Xylem combines best-in-class technologies, deep know-how, and close customer relationships to identify the best aeration system solution for your treatment goals.

1 Diffusers

Sanitaire® fine bubble diffusers provide high oxygen transfer efficiency and long service life for biological aeration, pre-discharge aeration and sludge-holding odor control. With membrane diffusers for standard or low-pressure applications, and ceramic diffusers for corrosive environments, Sanitaire has a solution for any process.

For tougher applications such as sludge or industrial wastewater, Sanitaire wide-band coarse bubble diffusers supply continuous, uniform airflow.

Moreover, our engineers will optimize diffuser density, floor coverage, submergence, and airflow rate for the highest oxygen transfer efficiency (OTE).

2 Grids and piping

Every diffused aeration system needs a solid foundation. Sanitaire tailors its grid configurations and manifold sizing to meet your oxygen transfer requirements and supplies the highest quality framework, piping and supports. We can also offer condensate purge systems to remove water buildup in the manifold.

3 Mixers

With their ability to continuously adjust output to meet shifting process demands, Flygt submersible adaptive mixers optimize process efficiency and can reduce mixer energy costs by up to 50%. Automated mixer control allows the mixer to adapt to both unexpected events and planned changes with maintained efficiency and minimal wear and tear.

When designing aeration solutions, our engineers apply expert guidelines for determining the size, location, and speed of mixers to avoid dead zones, prevent excess turbulence, optimize aeration performance, and increase total energy efficiency for the system.

4 Blowers

We understand the parameters that influence blower selection – from energy efficiency to lifecycle cost, operational flexibility and installation footprint through to noise levels and maintenance requirements. Whatever your aeration needs, we help you select the right blower to meet maximum oxygen demands and required turndown ratios.

Direct-drive, high-speed Sanitaire TurboBLOWERS can reduce blower energy consumption by up to 40%. The blower's durable NSTB+ airfoil bearing, specifically designed for frequent on/off applications, delivers long blower life and minimal maintenance. Group control further optimizes efficiency and reliability.

5 Online instrumentation and monitoring

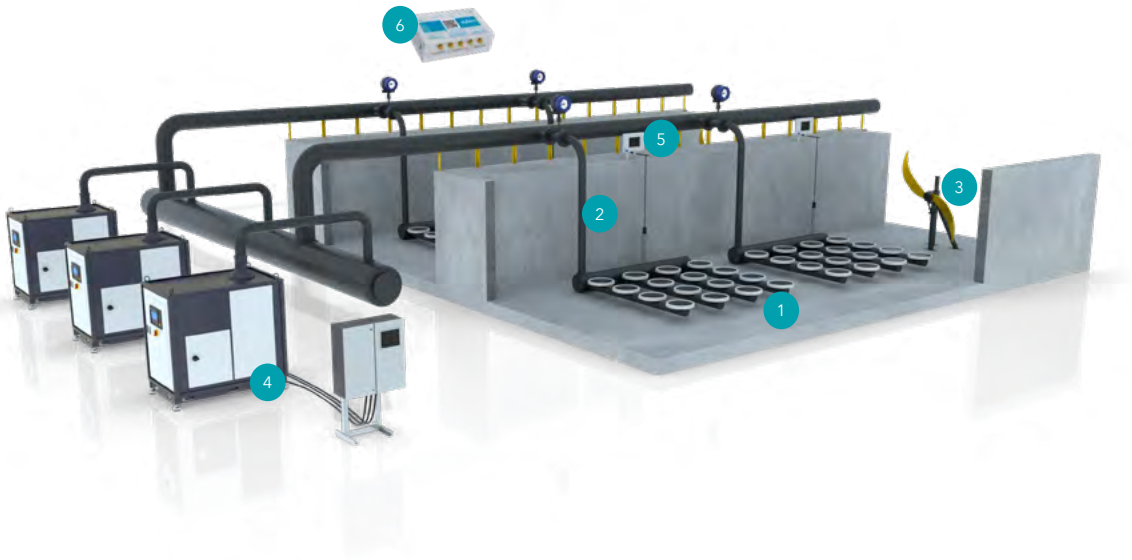
WTW's IQ SensorNet is a network of online controllers, sensors, and analyzers designed for process monitoring and control at wastewater treatment plants. IQ SensorNet continuously monitors water quality parameters throughout the wastewater treatment process, from the influent through the effluent, increasing operational efficiency, lowering operating costs and improving performance. IQ SensorNet helps ensure that your wastewater facility is within compliance and under budget.

The Sanitaire Digital Pressure Monitor (DPM) provides real-time, actionable data on diffuser health to help operators control capital and maintenance expenditures. Working with IQ SensorNet probes, the DPM system tracks pressure trends, issues diffuser cleaning recommendations, and indicates the potential energy savings and return on investment from diffuser replacement.

6 Process control and optimization

Xylem's proven control systems, integrated with our biological process expertise, help customers achieve their compliance targets and reduce operating costs.

For plants that experience underloaded conditions, Xylem Edge Control Pulsed Aeration ramps airflow up and down to provide efficient mixing and consistent, ideal dissolved oxygen (D.O.) concentrations. As a result, plants can achieve 25% to 75% energy savings, along with improved nutrient removal. Edge Control Ammonia Removal and Edge Control Ammonia + Nitrogen Removal solutions employ advanced algorithms to develop ideal biological conditions to accurately meet relevant permit limits at lowest possible energy costs.



Optimized system design for lowest total cost

When diffusers, grids, mixers, and blowers are specified independently, suppliers may also size their equipment independently, potentially leading to inaccurate equipment sizing, subpar product positioning, and lower overall efficiency.

Integrating aeration system design and supply can improve performance, reduce capital and operational costs, and lower the interface risk.

Experienced designers

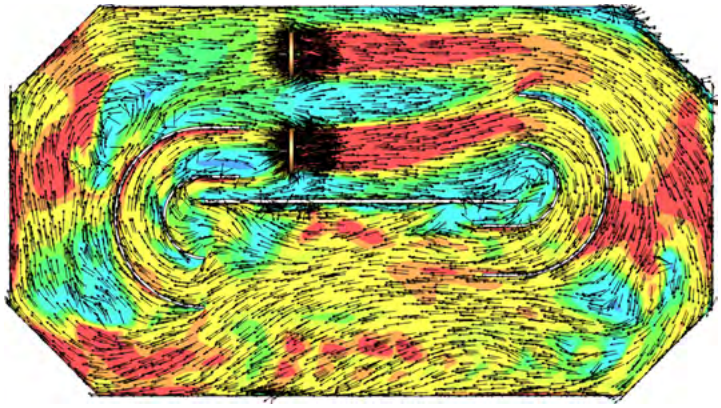
Xylem design and performance analysis is built on decades of experience and the largest performance databases in the industry.

Our engineers consider the impact that factors such as liquid depth, diffuser density, and the piping system have on energy consumption. We then use system temperature, pressure calculations, and water constituents, as well as computational fluid dynamics (CFD) as needed, to simulate operating conditions and confirm or improve mixing and airflow design. The result is a total system solution delivering the best standard aeration efficiency (SAE) and lowest total cost.

Standard oxygen transfer efficiency (SOTE) is the ratio between the amount of oxygen transferred and the amount actually delivered. Performance can reach up to 60% depending on the water depth and airflow rate. While commonly used to compare aeration systems, SOTE overlooks the energy required to achieve the oxygen transfer.

Standard aeration efficiency (SAE) is the ratio between the amount of oxygen transferred to the water and the amount of energy used. Typical values are 2–8 kgO_2/kWh for diffused aeration systems.

SAE reflects SOTE as well as blower efficiency and the system pressure loss. The higher the SAE, the higher the oxygen transfer and the higher the efficiency of your system – while using the lowest possible amount of energy.



Making the most of mixing

Optimal placement of mixers within an aeration system can deliver improvements in overall efficiency, optimizing bubble retention time, minimizing energy loss, and reducing blower demands.

Case study: CFD study helps reduce energy use

For the upgrade of the Bjergmarken (Denmark) Wastewater Treatment Plant, Xylem performed a full-scale aeration design analysis. Pairing Xylem design guidelines with CFD analysis, our engineers evaluated potential oxidation ditch designs under three air load conditions: no aeration, average aeration, and peak loads.

The analysis showed a risk of air entrainment and high turbulence around the mixers, so a variety of mixer positions and guide vanes were evaluated to find the best solution. The analysis also resulted in flow pattern improvements that reduced potential sediment spots and bubble-induced stress on equipment, while maintaining a high oxygen transfer rate.

The selection of high efficiency blowers in combination with the latest in mixer technology, advanced aeration design, and complete layout with the use of CFD analysis resulted in a truly optimized system – with more than 50% less energy use compared to the previous aeration system.

The impact of diffuser density

Standard oxygen requirement is a typical starting point for aeration system design. But when a supplier focuses solely on the lowest-cost diffuser grid to meet that demand, costs in other areas may rise. Low-density diffuser grids typically have lower oxygen transfer efficiency (OTE) and higher airflow requirements, requiring more energy to maintain D.O. levels. Meanwhile, high-density installations may look more expensive but deliver high efficiency at a lower capital cost.

Case study: System solution uncovers cost savings

For a municipal customer looking to meet an oxygen requirement of 927 kgO_2/hr, Xylem evaluated two diffuser layouts, along with their associated blower and power consumption requirements. The comparison showed significant savings with a high-density diffuser grid.

	Low-density grid	High-density grid
Diffuser count	6 396	15 768
Required airflow	70 420 Nm^3/hr	41 290 Nm^3/hr
Required pressure	592 mbar	411 mbar
Blowers required	6 blowers at 400 hp	4 blowers at 300 hp
Total power consumption	1 560 kW	708 kW

Xylem's holistic approach delivered lower investment costs and long-term energy savings.

23%

savings on investment with the high-density diffuser grid

55%

savings on energy

Lifetime system support

Customers worldwide have come to rely on Xylem for our comprehensive range of aeration system components, accessories, spare parts, and service. Whatever your requirements, we support you all the way – from design, delivery, and commissioning to optimization, control, and maintenance of your aeration systems.

Thanks to a large service footprint, non-disruptive service options, and intelligent use of remote connectivity and monitoring, Xylem can maximize system uptime and minimize unplanned expenses.

Talk to your representative about a preventative maintenance agreement (PMA) to protect your investment.

Realize transformational results

Accelerate your objectives with Xylem Treatment System Optimization. Leveraging real-time digital monitoring and modeling, Xylem can deliver optimized operational recommendations, predictive capabilities and decision-making support to help plants continuously optimize energy usage and ensure regulatory compliance at less cost.

- Accurately forecast influent characteristics
- Identify ideal aeration inputs to meet nutrient limits
- Reduce response times to issues in the plant
- Improve understanding of complex processes
- Increase transparency of performance metrics

Xylem Treatment System Optimization regularly achieves between 20% and 30% energy reduction in wastewater treatment plants. Learn more at **xylem.com/XylemVue**

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xylem.com

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xylem
Let's Solve Water

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