



Lowering Project Costs With AquaNereda® Aerobic Granular Sludge Technology

Source: Aqua-Aerobic Systems, Inc.

Increased construction costs, limited space, and rising influent volumes: This is the triple threat many engineers and utility managers face when modernizing or expanding wastewater treatment plants (WWTPs). While traditional activated sludge biological nutrient removal (BNR) has been the go-to technology for WWTPs for decades, the large footprint and volume of concrete and machinery required can make implementation impractical. Even when space is available, the high energy costs and mechanical complexity of traditional BNR can strain operating budgets.

These challenges can be overcome with [AquaNereda® aerobic granular sludge technology](#). AquaNereda technology provides a cost-effective solution for advanced biological treatment with nutrient removal. It fits into a very compact footprint, reducing the cost of building a new plant while minimizing mechanical and energy consumption

without the use of chemicals. Altogether, AquaNereda offers significantly lower total cost of ownership (TCO) than traditional activated sludge BNR.

Treatment Advantages

The AquaNereda process uses a carefully engineered feeding and sludge wasting system to create sludge granules between 200 microns and 4 mm in diameter without adding chemicals. Each granule contains layered aerobic, anoxic, and anaerobic zones that support simultaneous nitrification, denitrification, and enhanced biological phosphorus removal within a single reactor tank, significantly reducing or even eliminating the need for chemicals.

Because the larger granules settle faster than conventional sludge, the system can maintain much higher mixed liquor suspended solids (MLSS) concentrations, typically 8,000 mg/L or greater. The higher concentration of microorganisms

gives WWTPs more treatment capacity in a smaller volume of water. It also makes the biological process more resilient against potential upset conditions such as toxic shocks, chemical spikes, and pH change and load fluctuations.

Less Construction, Less Energy, More Savings

AquaNereda technology can cut down on total project costs by significantly lowering both initial capital expenditures (CAPEX) and long-term operating expenses (OPEX). While the specialized equipment may have a higher price tag than some conventional options, the total plant cost is often less expensive thanks to vastly reduced infrastructure and mechanical requirements.

For example, AquaNereda systems are extremely compact, typically requiring only 25% of the footprint of conventional activated sludge systems and roughly half the space of sequencing

batch reactors (SBRs). This translates to substantial savings on concrete and other construction requirements. In addition, all biological treatment, including nutrient removal, occurs in a single aeration step. As such, the process does not require secondary clarifiers, return activated sludge (RAS) pumping stations, or separate selector compartments. Moreover, the technology does not utilize mechanical mixers, as the aeration process provides sufficient mixing.

It also requires fewer blowers and smaller aeration systems, which leads to:

- Smaller blower buildings and electrical substation facilities
- Reduced electrical wiring and field piping
- Lower total installed electrical loads

Another advantage is that AquaNereda can be retrofitted into existing tanks, potentially doubling the treatment

capacity of existing tankage depending on the technology being retrofit. This represents substantial savings over other expansion options.

From an OPEX standpoint, the system offers many ways that WWTPs can save money in the short and long run. With fewer blowers and pumps, WWTPs can achieve [energy savings of 40% to 50%](#) compared to conventional activated sludge processes. Fewer mechanical components also means there are lower long-term maintenance costs.

Finally, the fully automated controls of this system are able to handle many critical decisions, including reactor scheduling, aeration set points, and more. This reduces labor demands, freeing operators to tackle more urgent tasks.

A Trusted Technology

Granular activated sludge systems have been around for more than 20 years. There are 131 such systems operating worldwide, 12 of which are located in

North America with another 18 under construction. While it is a proprietary technology, AquaNereda does not require ongoing license fees, subscription costs, or recurring royalties. Once up and running, the plant is issued a perpetual license to operate the system. Plant owners are also given full access to their control system without restrictions.

The combination of rising costs, limited space, and increasing volumes challenges traditional wastewater solutions. AquaNereda is a cost-effective alternative to conventional activated sludge, proving that higher treatment capacity doesn't require a larger footprint or a massive construction budget. By consolidating complex nutrient removal into a single compact reactor, this technology reduces infrastructure needs and energy consumption without dependence on proprietary chemicals or ongoing licensing fees. For modern utility managers, the shift to granular sludge is more than an upgrade — it is a strategic investment in long-term fiscal and operational resilience. ■