CASE STUDY:

Highland, Illinois Wastewater Reclamation Facility

EnviroMix

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Application:	Aerobic Sludge Digestion and Digested Sludge Holding
Design Flow (ADF):	2.0 MGD
Mixing Efficiency:	≈ 0.12 HP/1000 FT^3
Compressors:	Two (2) 25 hp rotary screw
Blowers:	Three (3) 60 hp hybrid positive displacement
Design Engineer:	Crawford, Murphy & Tilly, Inc.

The fine bubble aeration system provides process oxygen while BioMix provides independent mixing.

BioCycle-D Eases Maintenance Demands and Delivers Energy Savings for WRF Upgrade

Founded in 1831, Highland, Illinois, is one of the oldest Swiss settlements in the United States. Located 35 miles east of St. Louis, Highland is home to a population of about 10,000 residents.

In 2020, the City of Highland extensively upgraded their water reclamation facility (WRF), which had last been upgraded in 1997. The scope of the project consisted of new headworks, secondary clarification, aerobic digestion, sludge holding, and sludge dewatering. Replacing equipment that had reached the end of its operating life, **the upgrade was designed to ease operation and maintenance demands and improve energy efficiency**, allowing the plant to meet current and future permitted effluent limits for nitrogen and phosphorus.

Previously, the aerobic digester was aerated and mixed via inefficient coarse bubble diffused aeration with air lift pumps that transferred sludge between cells; the digested sludge holding tank was mixed with an inefficient pump mix system. **EnviroMix's energy-efficient BioCycle-D Optimized Aerobic Digestion Process was selected as a key treatment technology to replace the inefficient, conventional solutions in both applications.**

ENERGY EFFICIENCY

75% energy savings versus conventional diffused aeration

Annual O&M savings of over $200,000

STRAIGHTFORWARD OPERATION

Automatically adjusts operation based on loading conditions

Minimal, localized maintenance

PROCESS OPTIMIZATION

Precise process control improves volatile solids destruction and sludge dewaterability

UNPARALLELED FLEXIBILITY

Bottom-up, uniform mixing supplements aeration

Able to operate in parallel or series

EnviroMix

"What I like most about BioCycle-D is the functionality — the automatic operation of the decanting. It's very nice… everything just flows now and it's not so labor intensive."

Bill Zimmer,
Highland WRF Supervisor

Highland's staff were impressed after visiting other installations in Illinois and selected BioCycle-D due to the outstanding operation, performance, and energy savings they observed.

BioCycle-D is designed by right-sizing the diffused aeration system to satisfy process oxygen demand and applying energy efficient mixing through a BioMix™ Compressed Gas Mixing System. The process decouples aeration from mixing, facilitating independent control over oxygen delivery and mixing, thus preventing over-aeration and wasted energy.

Through aerobic and anoxic cycling, BioCycle-D maximizes volatile sludge destruction, minimizes energy consumption, recovers alkalinity, and provides denitrification, significantly reducing nutrient recycle to the main treatment process. The plant is able to operate the system as digesters in parallel or series depending on treatment demands.

Highland's supervisor Bill Zimmer commented, "Our old digester was labor intensive… we had to check it constantly, and we were wasting a lot of energy. [Since the upgrade], even though we've added three blowers and two compressors and doubled our capacity, in reality, we're using less energy than we were."

Decoupling aeration from mixing provides the Highland WRF with more than 75% energy savings at design loading and even greater savings at the reduced current sludge loading, resulting in annual operational savings of more than $200,000.

Hybrid blowers provide air to the fine bubble aeration system.

Rotary screw compressors provide high pressure mixing air to the BioMix system.

Contact sales@enviro-mix.com today to discuss the ways EnviroMix can optimize your mixing solutions.