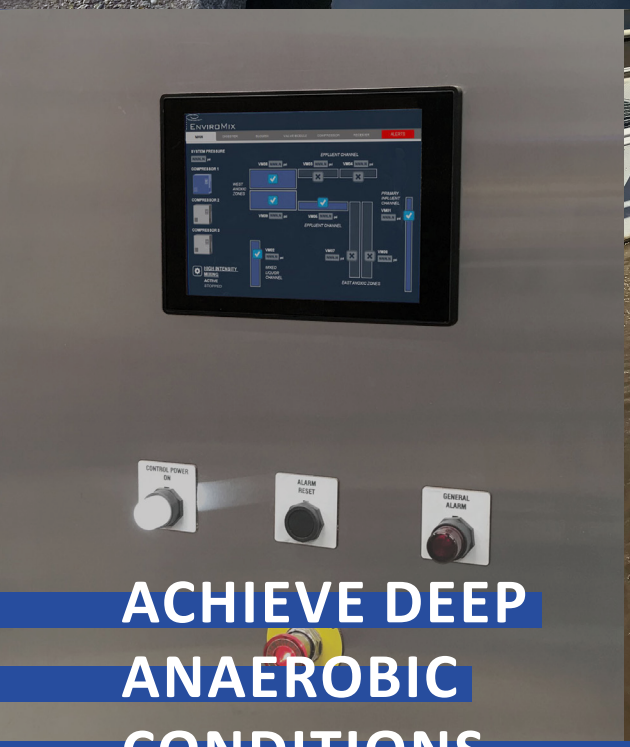
IMPROVED BIO-P · FLEXIBLE OPERATION

BioMix-DC Enhanced Anaerobic Mixing System

wef Innovative Technology Award 2022



ACHIEVE DEEP ANAEROBIC CONDITIONS

CONTACT SALES@ENVIRO-MIX.COM TO DISCUSS OPTIMIZING YOUR BIOLOGICAL PHOSPHORUS REMOVAL WITH BIOMIX-DC.

EnviroMix

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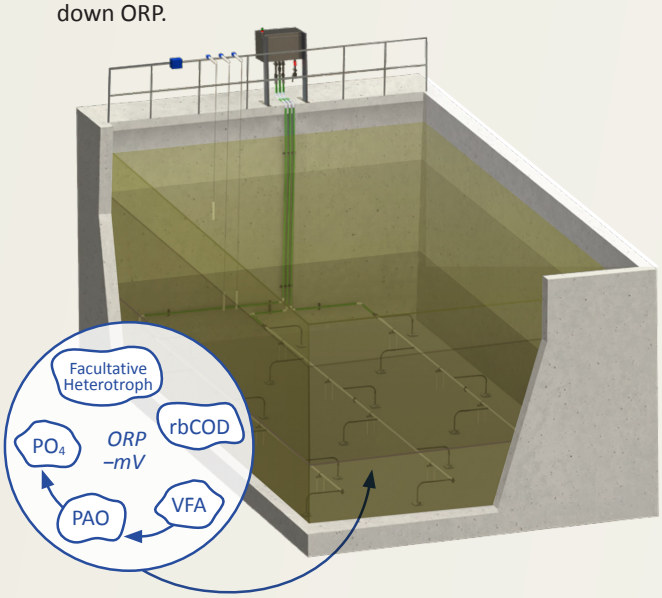
BIOMIX-DC ENHANCED ANAEROBIC MIXING SYSTEMS **optimize biological phosphorus removal by transforming a traditional anaerobic selector into an intensified fermentation tank by alternating a short mixing cycle with a long deep cycle.** The system is designed to adapt to changing process conditions to maximize volatile fatty acid (VFA) formation and biological phosphorus removal. The deep cycle stratifies the reactor in order to increase anaerobic solids retention time (SRT), minimize oxidation-reduction potential (ORP), and maximize VFA formation.

DEEP CYCLE

Long periods without mixing allow solids to accumulate, increasing anaerobic SRT and driving down ORP.

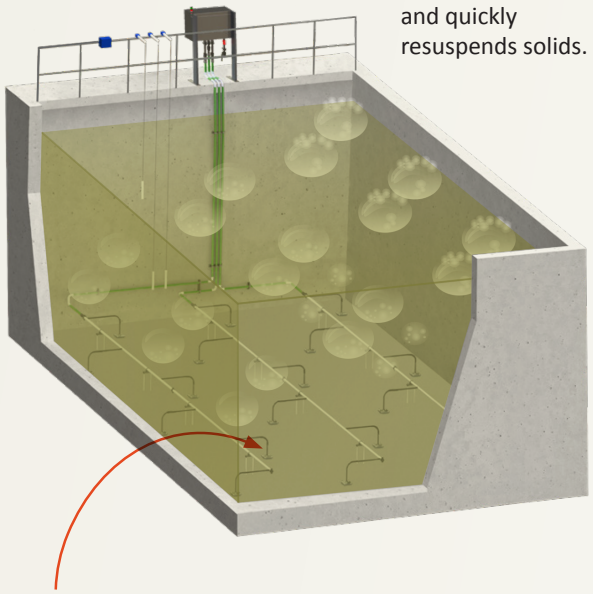


A longer anaerobic SRT combined with a lower ORP environment increases VFA production, enhancing biological phosphorus removal.

VFAs are transported throughout the reactor via intermittent pulses of mixing without disrupting the fermentation layer.

MIXING CYCLE

Mixing destratifies the selector and quickly resuspends solids.

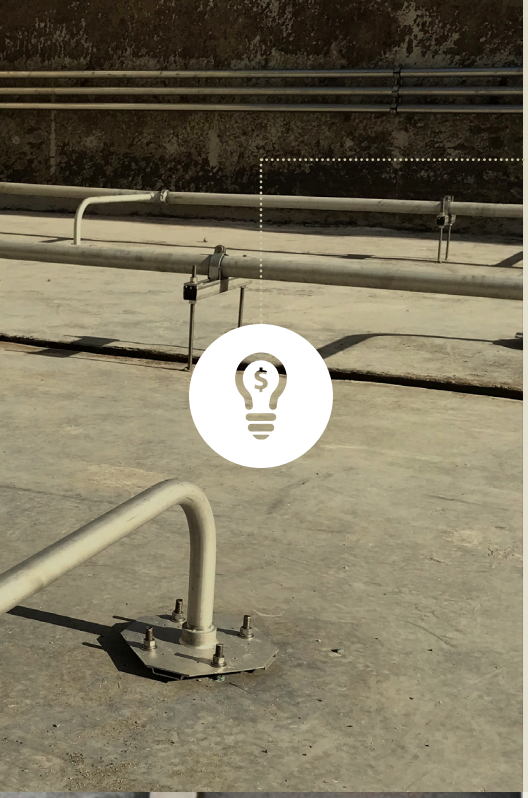


Nozzles near the floor of the tank release short bursts of compressed air, providing effective mixing.

Periods of mixing are important to homogenize the substrate and microorganisms.

STRAIGHTFORWARD OPERATION

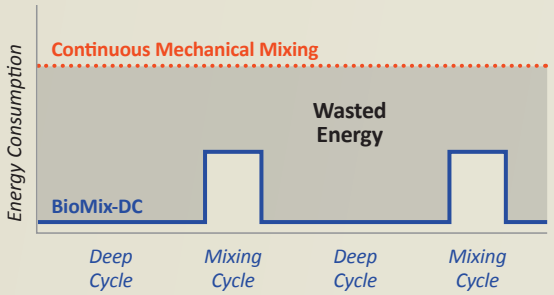
The low maintenance BioMix-DC system provides operators ease of mind. The cycle parameters may be adjusted to optimize mixing, power utilization, and VFA generation, manually or through automated process feedback. During the mixing cycle, high-pressure floor-mounted nozzle firing provides complete mixing with no in-tank maintenance. The operating regime of BioMix-DC is site dependent since each biological phosphorus removal treatment process operates differently based on the influent characteristics and facility design.



ENERGY EFFICIENCY

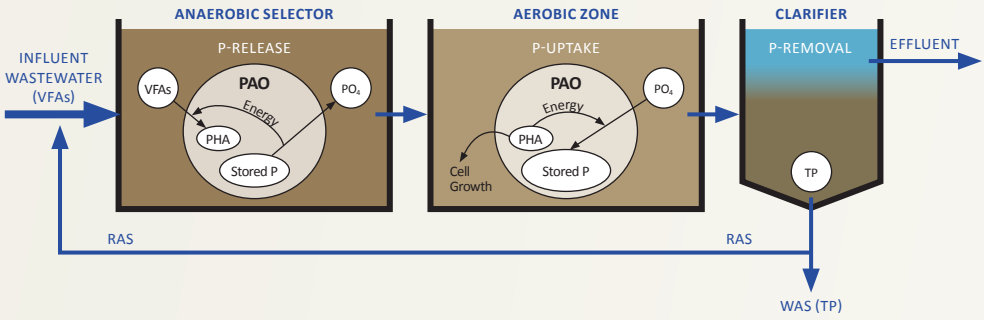
A combination of EnviroMix's efficient, patented technology and comprehensive understanding of anaerobic process requirements, BioMix-DC dramatically reduces mixing energy in anaerobic and fermentation zones. The core BioMix Compressed Gas Mixing technology uses 40-60% less energy than conventional mechanical mixers. This means that during the mixing cycle, BioMix-DC is actively using less energy.

Purposefully creating deep anaerobic states and conserving energy during the deep cycle, **BioMix-DC creates net energy savings of 90% or greater** compared to continuous mechanical mixing in anaerobic zones.



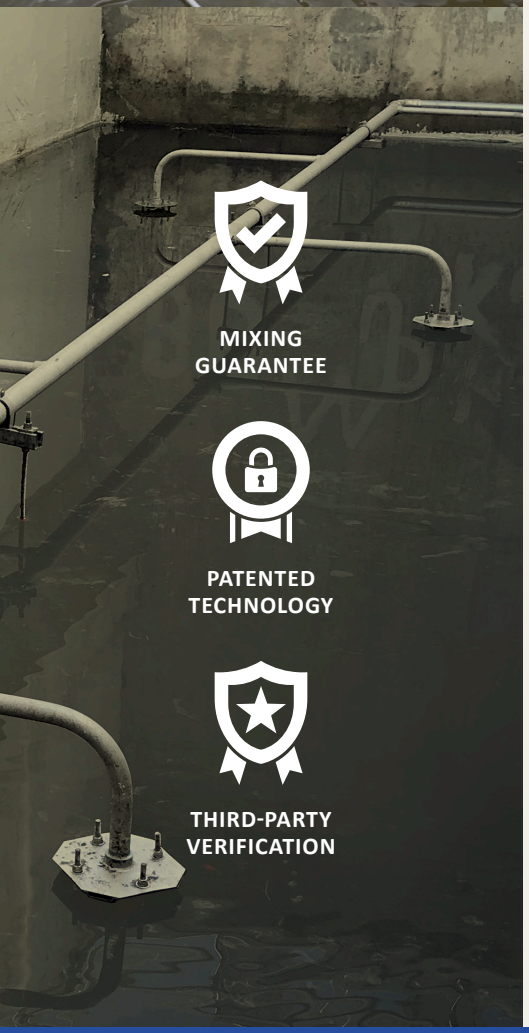
PROCESS OPTIMIZATION

Regulatory changes throughout the United States drive the need to implement biological phosphorus removal. Enhanced biological phosphorus removal (EBPR) is the biological uptake of phosphorus by selected microorganisms called phosphorus-accumulating organisms (PAOs). While the actual uptake of phosphorus occurs in an aerobic environment, PAOs must first be conditioned by exposure to VFAs in an anaerobic environment. PAOs store food under anaerobic conditions and then process the stored food once under aerobic conditions. The preferred food for PAOs are VFAs.



HOW CAN EBPR SYSTEMS CONSISTENTLY REMOVE PHOSPHORUS WITH A LOW OR VARIABLE SUPPLY OF INFLUENT VFAs?

To avoid costly carbon addition, facilities with insufficient influent VFAs needed for effective phosphorus removal can encourage additional VFA production through fermentation. An anaerobic selector provides the optimal environment for the uptake of VFAs by PAOs, but PAOs constitute a small subset of the bacterial population in the mixed liquor suspended solids (MLSS). The rest of the bacteria are switching gears to ferment organic compounds to obtain food and energy. These facultative bacteria do not consume VFAs; they break down complex soluble organic compounds to form VFAs, allowing the PAOs to take up additional VFAs and release phosphorus. Therefore, the anaerobic selector or fermentation tank in an EBPR facility simultaneously conditions PAOs and provides an environment for additional fermentation of soluble organics to VFAs.

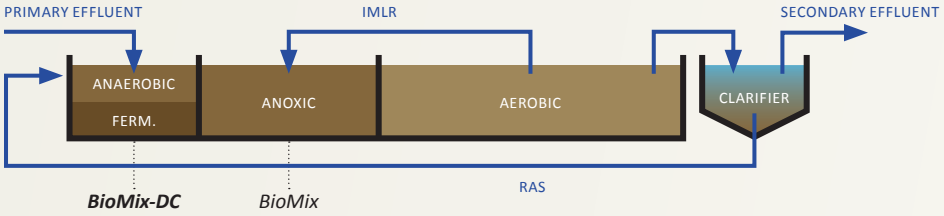


UNPARALLELED FLEXIBILITY

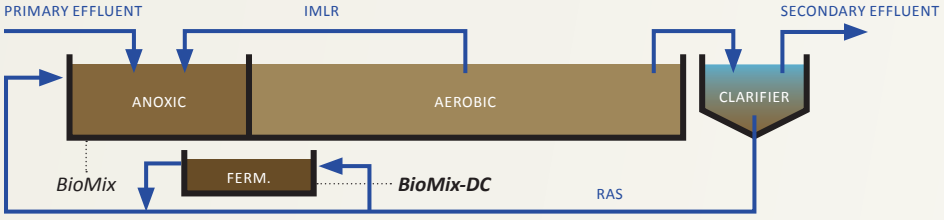
The fermentation process at an EBPR treatment facility can be accomplished multiple ways. Anaerobic fermentation is a common process for carbon augmentation and PAO conditioning. With BioMix-DC, turning mixing off during the deep cycle allows MLSS to settle, increasing the SRT in that zone and resulting in the formation of additional VFAs. If more soluble material is required, a separate return activated sludge (RAS) or sidestream MLSS fermenter will provide more efficient fermentation.

BioMix-DC can be applied in the anaerobic and fermentation tank(s) for any of the following processes, and it integrates seamlessly with BioMix systems used in anoxic, swing, or post-anoxic zones.

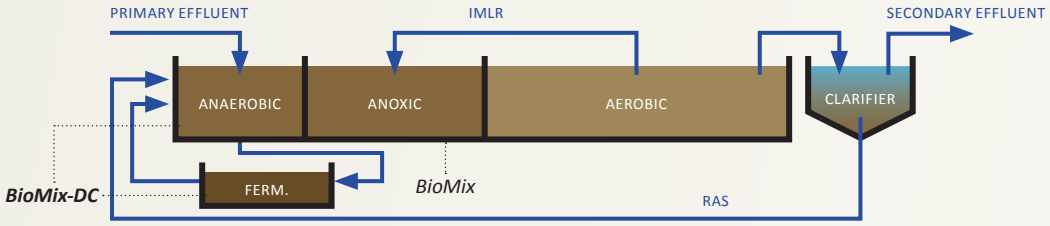
In-Line Mixed Liquor Fermentation



Sidestream RAS Fermentation



Sidestream Mixed Liquor Fermentation



EnviroMix, Inc. focuses on delivering solutions that reduce energy costs and enhance process performance in the water and wastewater industry. We design and manufacture performance-proven technologies that improve water quality and reduce energy consumption in critical areas of the treatment process. Utilizing patented and proprietary technology, we provide equipment and process control solutions to enhance plant performance for both the municipal and industrial markets.

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