



CLEARAS
WATER RECOVERY

**SIMPLE, CHEMICAL-FREE
NUTRIENT RECOVERY.™**

clearaswater.com



A NEW VISION FOR NUTRIENT RECOVERY

CLEARAS Water Recovery originated from a desire to change the paradigm in wastewater treatment and design. The company was founded in 2008 with the foresight that water was a severely undervalued commodity and that wastewater treatment could be transformed from linear, disposal-based designs to more circular, resource recovery-based solutions.

Due to increasing water pollution (algae blooms and other forms of contamination) caused by excess nutrients, regulations governing nitrogen and phosphorus discharge continue to tighten. Wastewater dischargers everywhere face the same challenges of minimizing their environmental impact while simultaneously investing in plant efficiency and improved performance. CLEARAS Water Recovery recognized the problem (algae blooms) may also be the key to a more sustainable solution.

In 2010, CLEARAS Water Recovery delivered its first Advanced Biological Nutrient Recovery (ABNR™) system. ABNR is a leading-edge biological solution that **cost-effectively transforms waste to value** by leveraging natural processes, resulting in clean water for discharge or reuse, and a valuable algal biomass coproduct.

To address nutrient discharge standards, traditional treatment methods have included the use of conventional activated sludge, chemicals, filtration and other mechanical methods. These methods are costly to operate and maintain, and contribute to increased sludge-hauling demands.

In addition, many alternative solutions focus on a single pollutant and are aimed at meeting only the next permit requirement. This short-term emphasis is severely limiting and fails to address future contaminant regulation and infrastructure requirements. These factors reinforce the need for a more effective, sustainable and long-term focused solution.

OUR ADVANCED BIOLOGICAL NUTRIENT RECOVERY (ABNR™) SOLUTION

ACHIEVES ULTRA LOW-LEVEL NUTRIENT RESULTS FOR BEST-IN-CLASS WATER QUALITY... FOR THE LONG TERM.

The ABNR system is a chemical-free and biologically-based solution that leverages its zero-waste process to effectively achieve ultra low-level nutrient results for municipal and industrial point source dischargers.

FOUR PHASES OF THE ABNR SYSTEM:

1 MIX

Phosphorus and nitrogen loaded wastewater is mixed with a biodiverse blend of algae and other microorganisms to initiate nutrient recovery. This biodiverse blend is called the Mixture Flow.

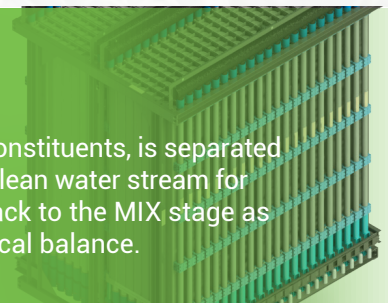


2 RECOVER

After the Mixture Flow enters the photobioreactor (PBR), biological activity is optimized and promotes photosynthesis where phosphorus, nitrogen and carbon dioxide are rapidly consumed.

3 SEPARATE

The wastewater, now significantly reduced of nutrients and other constituents, is separated from algae and other microorganisms, resulting in an oxygenated clean water stream for discharge or reuse. A portion of the biomass stream is returned back to the MIX stage as Returned Activated Algae (RAA) to sustain the appropriate biological balance.



4 HARVEST

At this stage, dewatering of the income-producing biomass byproduct is completed for delivery to a wide range of potential downstream markets.



RELIABLE AND PROVEN ACROSS THE U.S.

The ABNR system has been proven in over 45 pilot studies across the United States in a broad spectrum of wastewater applications, including municipal, pulp and paper, food and beverage, and aquaculture industries. The system's first full-scale commercial installation is underway at the 4 million gallon per day South Davis Sewer District located in West Bountiful, UT. The project is focused on meeting current and future nutrient discharge regulations.



THE CLEARAS SOLUTION

- **Performance:** Best-in-class phosphorus and nitrogen recovery
- **Sustainability:** Biological process, recycles greenhouse gases (CO₂ and NH₃)
- **Scalability:** Modular, flexible and bolts onto existing infrastructure
- **Multi-constituent:** Reduces contaminants beyond phosphorus and nitrogen
- **Chemical Free:** Natural and renewable solution
- **Coproduct:** Algae biomass as a sustainable feedstock

CLEARAS Mobile Demonstration Results

Washington Total Plants: 1
Avg Phosphorus Reduction: 97.6%

Idaho Total Plants: 3
Avg Phosphorus Reduction: 93.8%
Avg Ammonia Reduction: 85.2%

Minnesota Total Plants: 2
Avg Phosphorus Reduction: 98.3%
Avg Ammonia Reduction: 82.6%

Wisconsin Total Plants: 22
Avg Phosphorus Reduction: 98.1%
Avg Ammonia Reduction: 95.2%

Utah Total Plants: 9
Avg Phosphorus Reduction: 97.5%
Avg Ammonia Reduction: 91.3%

Kansas Total Plants: 2
Avg Phosphorus Reduction: 98.7%
Avg Ammonia Reduction: 94.5%

Michigan Total Plants: 1
Avg Phosphorus Reduction: 99.4%
Avg Ammonia Reduction: 94.9%

Massachusetts Total Plants: 1
Avg Phosphorus Reduction: 93.9%
Avg Ammonia Reduction: 84.4%

Ohio Total Plants: 1
Avg Phosphorus Reduction: 90.8%
Avg Ammonia Reduction: 87.0%

Illinois Total Plants: 2
Avg Phosphorus Reduction: 99.4%
Avg Ammonia Reduction: 94.1%

Alabama Total Plants: 1
Avg Phosphorus Reduction: 99.4%
Avg Ammonia Reduction: 90.0%