



Industrial Revolution 4.0

***Bioscience Innovation in Urban
Wastewater Treatment***



Circular Economy & Water
Company Overview
Technology Overview
Circular Economy Case Study
Questions



What is a Circular Economy?

Circular Economy:

Systems that are restorative or regenerative by intention and design. The primary objective is to design out waste.

The Problem:

Current day systems are “disposal-based linear systems.” We make, we use and we dispose.

The Opportunity:

Innovate sustainable, non-chemical, clean energy based systems that are modular, scalable and leverage existing infrastructureoh and make these systems economically competitive.

CLEARAS Solution:

Leverages information systems to manage the relationship between mechanical process and biology which unlocks and recovers the value of otherwise wasted resources within wastewater infrastructure.

**WATER IS THE
DRIVING FORCE
OF ALL NATURE.**

Leonardo da Vinci

PICTUREQUOTES.COM



- Founded in 2008, HQ Missoula, Montana
- Ranked #791 on the 2017 Inc. 5000 fastest growing companies in U.S.
- Recently listed in Water Environment Federation Nutrient Roadmap publication.
- Biomimicry-inspired approach to wastewater treatment.
- Differentiated and disruptive value proposition
- Experienced team: power generation, civil infrastructure & engineering, information systems, renewable energy and financial services.
- Integration of world class supply chain partners.

Industry mega-trend moving towards sustainable, chemical free wastewater treatment solution with an economic advantage.

MIX



RECOVER



SEPARATE



The *Problem* is the Solution!

Existing Technology



CAPITAL INTENSE



ENERGY INTENSE



CHEMICAL INTENSE



TOXIC BI-PRODUCTS

CHALLENGES

TECHNOLOGY

CLEARAS RESPONSE

Capital Competitive

- Competitive CAPEX
- Total Cost of Ownership Advantage
- Price elasticity

Operationally Efficient

- Reduced OPEX
- Valued (\$) Co-products
- No haul away costs
- Limited consumable costs

Non-Chemical

- Biological / natural process
- Renewable solution
- Sustainable approach

Valuable Co-Product

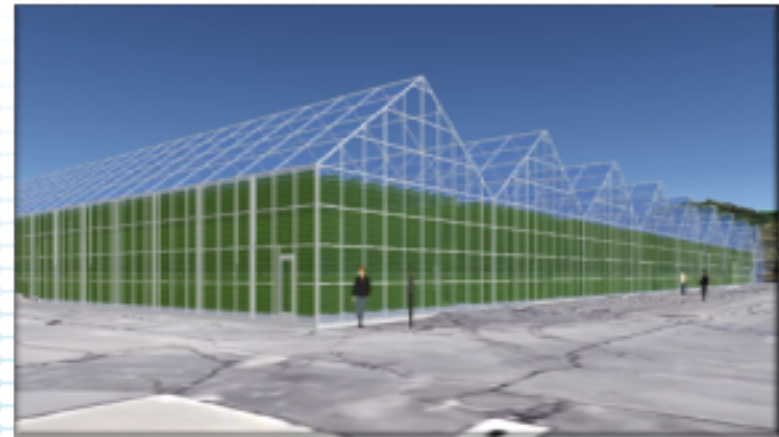
- Carbon recycling of plant emissions
- Co-product value: O₂, Biomass
 - Secondary income stream

ABNR Enables Circular Economy Projects



South Davis Sewer District

- ✓ Announced May of 2017 with a commission date of September 2018.
- ✓ Prime example of the circular economy at work – ABNR is transforming waste to value
- ✓ Extends the life of existing / aging wastewater infrastructure
- ✓ Co-construction of food waste to energy (2,500 dekatherms per day) along with ABNR at SDSD creates an economic system to support the circular economy.
- ✓ ABNR results in:
 - ✓ 4 MGD of the highest quality reuse water
 - ✓ 18,000 lbs of carbon dioxide recycled daily
 - ✓ 8,000 lbs of algal biomass being sold as a feedstock for bioplastics



“ABNR has the potential to change the way we think about wastewater treatment...”
Dal Wayment, South Davis General Manager

Environmentally Friendly

- Sustainable approach
- Lower energy requirement
- Optimizing natural processes
- Minimizes chemical sludge
- Chemical Free

Modular and Scalable

- Ease of expansion as regulations tighten or volume increases
- Tight footprint, vertical arrangement

Economic Advantage

Valuable Co-Products

- Biomass
- Carbon Dioxide (CO₂) Recycling
- Pure Oxygen

High Water Quality

- Meets severe water quality standards
- Multi-contaminant removal
 - TP, TN, TSS, BOD and etc.

“An invasion of armies can be resisted but not an idea whose time has come.”

- Victor Hugo