



How Israeli Technology Can Improve Wastewater Treatment



Agenda

- Introduction to Ohio Israel Initiative
- History of Israeli Water Ecosystem
- Review of Treatment Biology & Nutrient Removal
- Israeli Technology Companies Overview
 - Rotating Biological Contactor – EPC
 - Activated Lagoons – WFI
 - Membrane Aerated Biological Filter – Fluence
- Looking Forward
- Questions

Aryeh Canter

- 3 Years Engineering experience in California
 - Planning and Design for Wastewater
- 5 Years experience in Israeli Hi-Tech
 - IoT meets Wastewater
 - Improved Solar PV Trackers
- Masters in Environmental Engineering from New York University
- Bachelor in Sustainability, Science, and Society from McGill
- Father of 4 living in Cleveland Ohio

Ohio Israel Initiative

The Ohio-Israel Agricultural & CleanTech Initiative (OIACI) of The Negev Foundation focuses on promoting and enhancing trade opportunities, business attraction, technology transfer, and cooperation between Ohio and Israel in the agriculture, food and CleanTech industries

- Founded 25 years ago by Senator Voinovich
- \$99M+ in total trade between Ohio and Israel
- Focus on AgTech, Water, & Food Technology



Duckpond at Kingsfield Garden



Duck Pond at Kingsfield garden had gone into disarray, algae blooms and dirty water

In 2022 Ohio Israel Initiative brokered introduction to Odis Filter and financially supported the project

140 GPM system build by Odis Filters recirculates the entire pond creating a clear high water quality

All equipment fits in a 10x12 ft enclosure. Easy maintenance for staff

Glass-fronted control room and live dashboard turn the pond into a STEM exhibit, demonstrating practical water reuse to 100k+ annual visitors.

Reduce Algae Blooms at Chippewa Lake



From 2014–2019 Chippewa Lake was repeatedly closed each summer because of toxic cyanobacteria blooms that threatened public health and recreation

August 2019 enlisted Israel's BlueGreen Water Technologies

A two-person crew dispersed the product over the lake's ~330 acres in just 25 minutes, thanks to granules that float and drift to the densest parts of the bloom.

Lake remained HAB free for 3 consecutive summers

Plans for 2025 – Pilot Projects



Provide an opportunity to showcase Israeli Technology in Ohio

Funding available to help decrease risk for local stakeholders



Pair with workforce training

Providing hands on experience with the technologies of the 21st Century

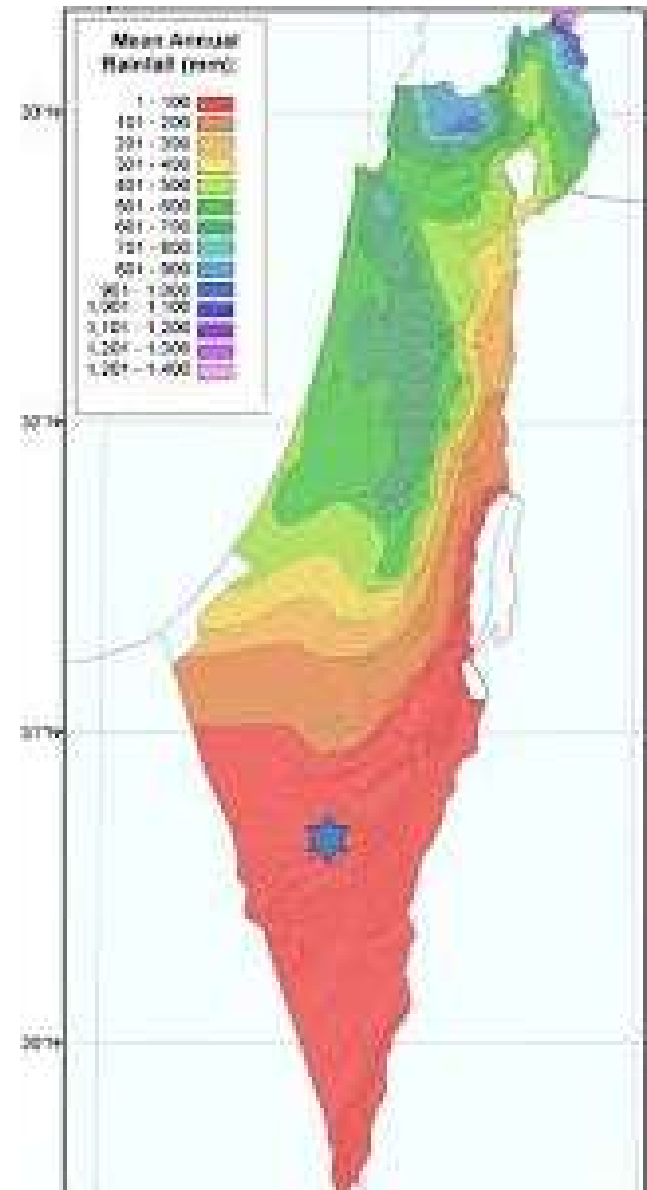


Document the success of the pilot

Provide White Paper (or similar) to showcase efficiencies and help propagate throughout the State

Water Challenges Build a Nation

- 60% of the Country is desert
- Severe Droughts in the 1950-60s
- Constant awareness of drinking water levels



Nationalized Water System

- Integrated National Planning
- Close Partnerships with Academia
- Funding R&D Projects
- Actively testing new technology

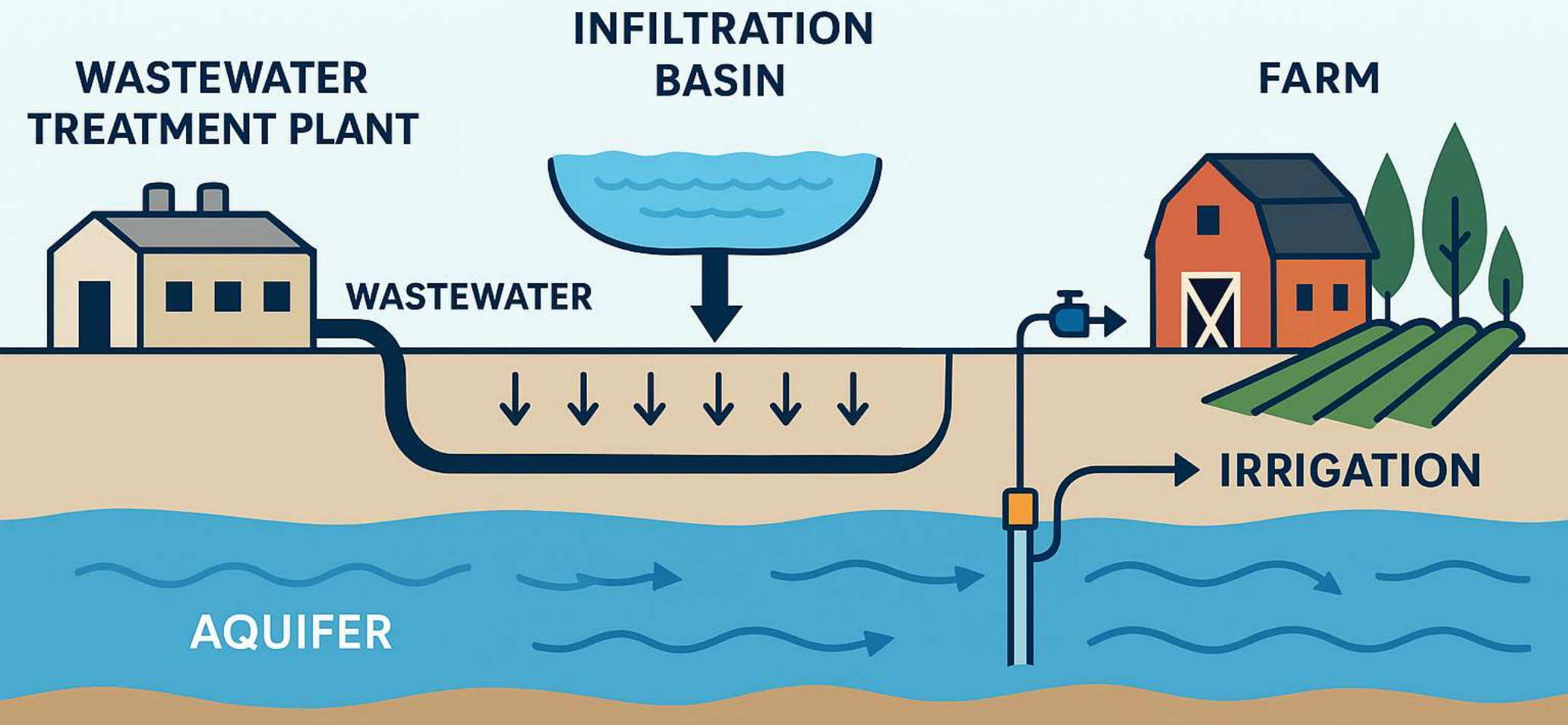




Shafdan Wastewater Treatment Plant

- Build in 1985
- Reuse with Soil Aquifer Treatment added in 1992
- Serves 3M people
- 100 MGD capacity
- Treated wastewater piped to Desert for agriculture

AQUIFER RECHARGE

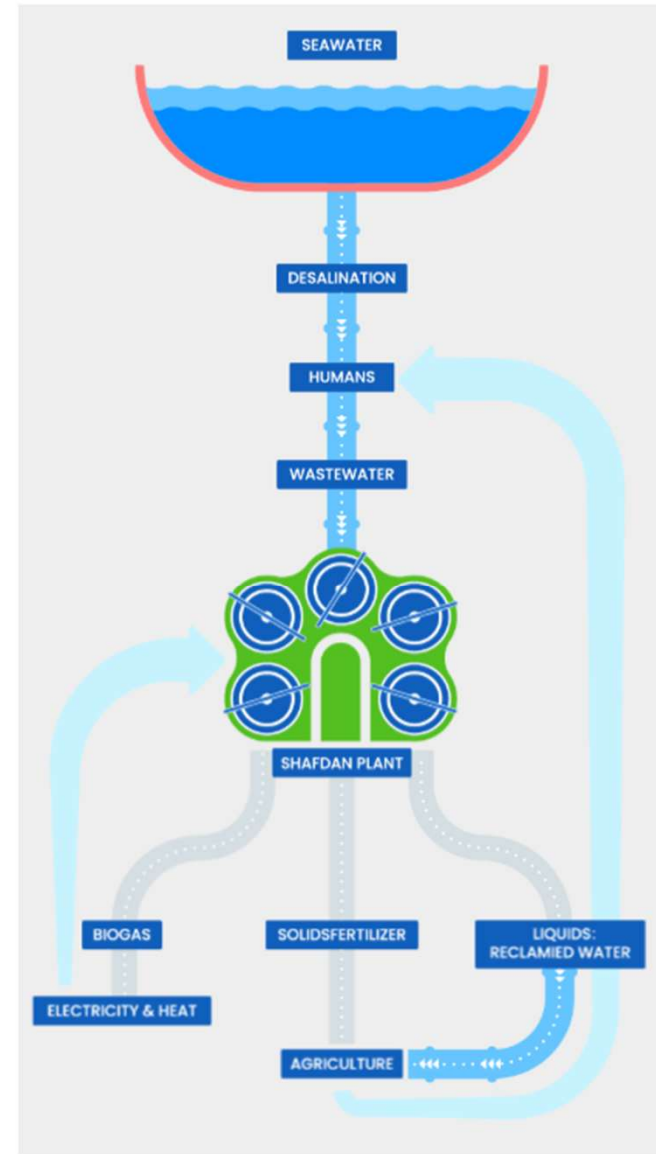


Desalination in Israel

- First Reverse Osmosis project started construction 1998
 - Commissioned in 2005
 - 100 MGD for first plant
- First Public-Private Desalination plant in the world
- Hybrid pre-treatments (coagulation + filtration) have variable Mediterranean Sea
- 6 total plants online total
 - 720 MGD of water produced
- Water becomes broker for peace

Fully Engineered Water System

- 90% of Wastewater is Reused
 - Spain next country at 20%
- 70% of Drinking water is from Desalination



Israeli Water Innovation leads to Business Innovation



300+ Companies

- Treatment Technologies
- Water Quality Monitoring
- Smart Water Networks

100+ Countries

- \$2 Billion in Annual Exports
- Every Continent has a project

EPA Approves Ohio TMDL Nutrients Plan

EPA Approves Ohio Nutrients Runoff Plan Nine Years After Lake Erie Algae Bloom

10/4/2023 | 9:21 AM CDT



By [Todd Neeley](#), DTN Environmental Editor

Connect with Todd:

[@DTNeeley](#)



Nine years after an algae bloom in Lake Erie forced residents of Toledo, Ohio, to boil drinking water, the EPA approved a state plan to reduce phosphorus runoff from farms. (Photo by NASA Earth Observatory)

Nutrient Removal In Ohio

- New focus from EPA and Ohio EPA on nutrient load reductions
- TMDLs now target Total Phosphorus and Total Nitrogen
- Many permits will require lower discharge limits for TP (e.g. 1 mg/L or less)
- Potential for new permit limits even at smaller WWTPs

A graphic featuring a large, dark grey circle with a white speech bubble in the center. The words "Quick Poll" are written inside the speech bubble, with "Quick" in black and "Poll" in blue. A hand is visible at the bottom of the speech bubble, as if holding it. The entire graphic is surrounded by four teal-colored curved lines.

Quick Poll

Quick Poll

Please raise your hand if –
You know of any utilities that
have their NPDS permit
adjusted for nutrient loading?

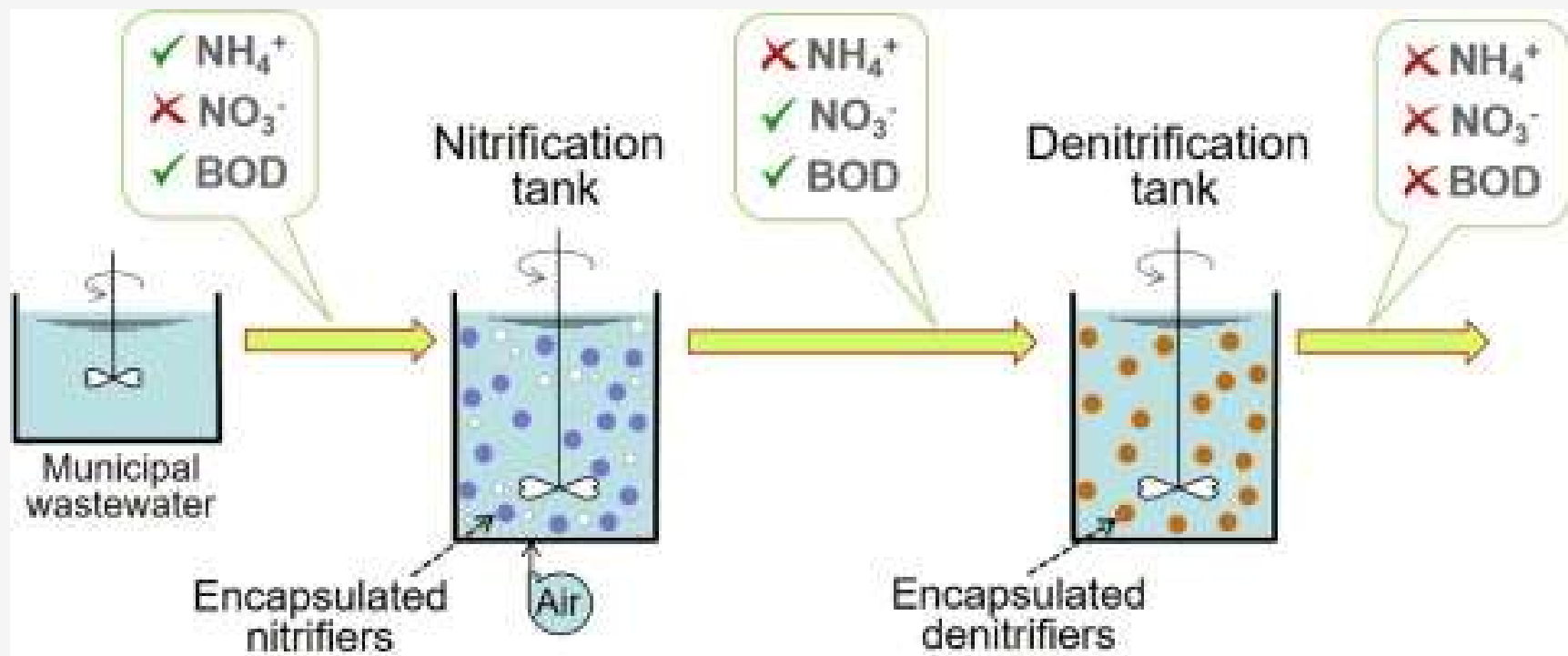
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Quick Poll

Quick Poll

Please raise your hand if –
You know of any utilities that
may need to upgrade their
plants to meet these
requirements

Treatment Biology Overview



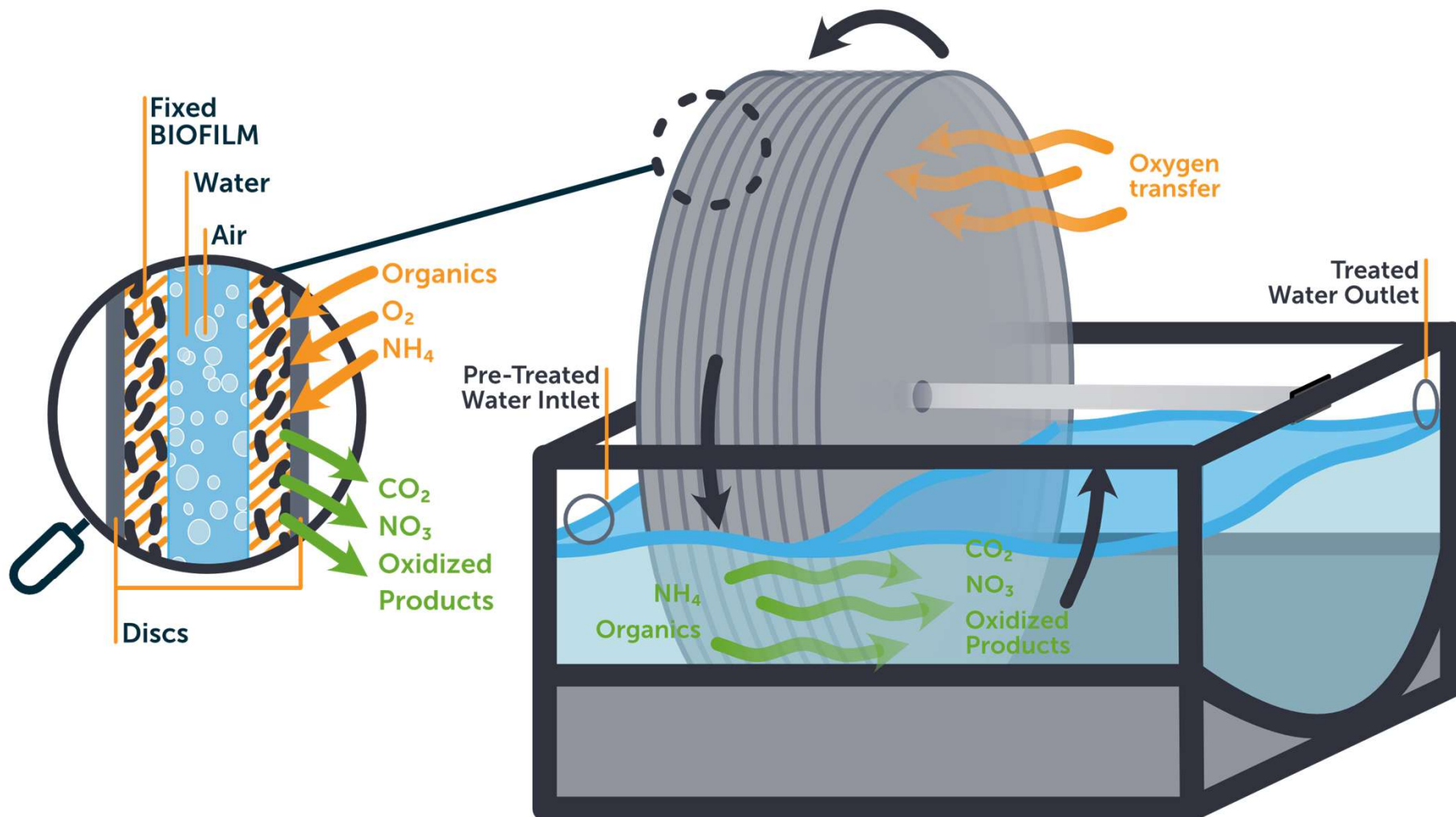
Treatment Biology Overview

- × Significant construction costs
- × Large footprint
- × High energy usage (blowers)
- × Not easy to upgrade
- × High Sludge production
- × Intensive O&M

Rotating Biological Contactors

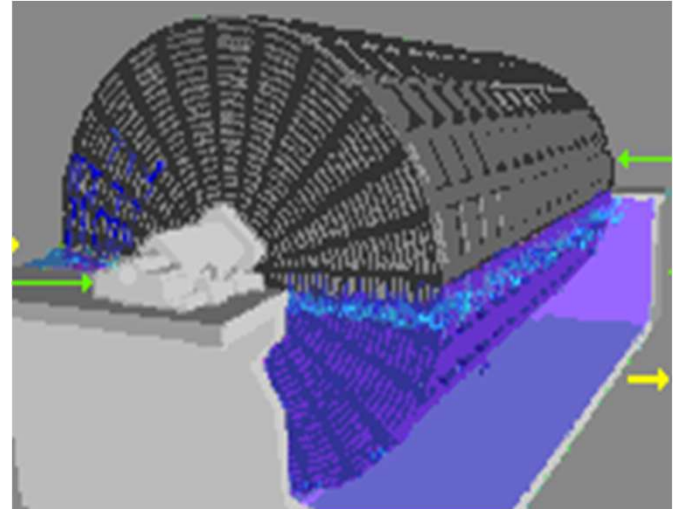


EPC Ltd
YOUR WATER GUARDIANS



BIO- DISK

- ✦ Mixing
- ✦ Slough off old sludge
- ✦ Aerating
- ✦ Elevate/Regulate flows



90%
Less Energy
than conventional technologies



CASE STUDY - STATE PARK, GRAFTON WV

- Serving 330k people annually
- Package plant built in the 1970s
- Exceeding permit limits
- Causing strong odors
- High maintenance requirement for park staff



CASE STUDY - STATE PARK, GRAFTON WV



Parameters	NPDES	SEP 21	DEC 21	May 22	SEP 22	MARCH 23	JUNE 23	DEC 23	AVE.
BOD5 (mg/L)	<30	8	5.4	4.7	4.7	<2	15.2	2.1	6
TSS (mg/L)	<30	3.4	9	4	24	9	28	U	11
F.Coli (MPN/100ml)	<200	33	-	222	U	<1	66.3	U	54
D.O. (mg/L)	>6	-	8.1	-	9.7	-	8.9	10.6	9.3
NH3-N (mg/L)	-	-	-	U	U	-	0.58	U	0.15

Activated Lagoon Treatment



TAYA Summary

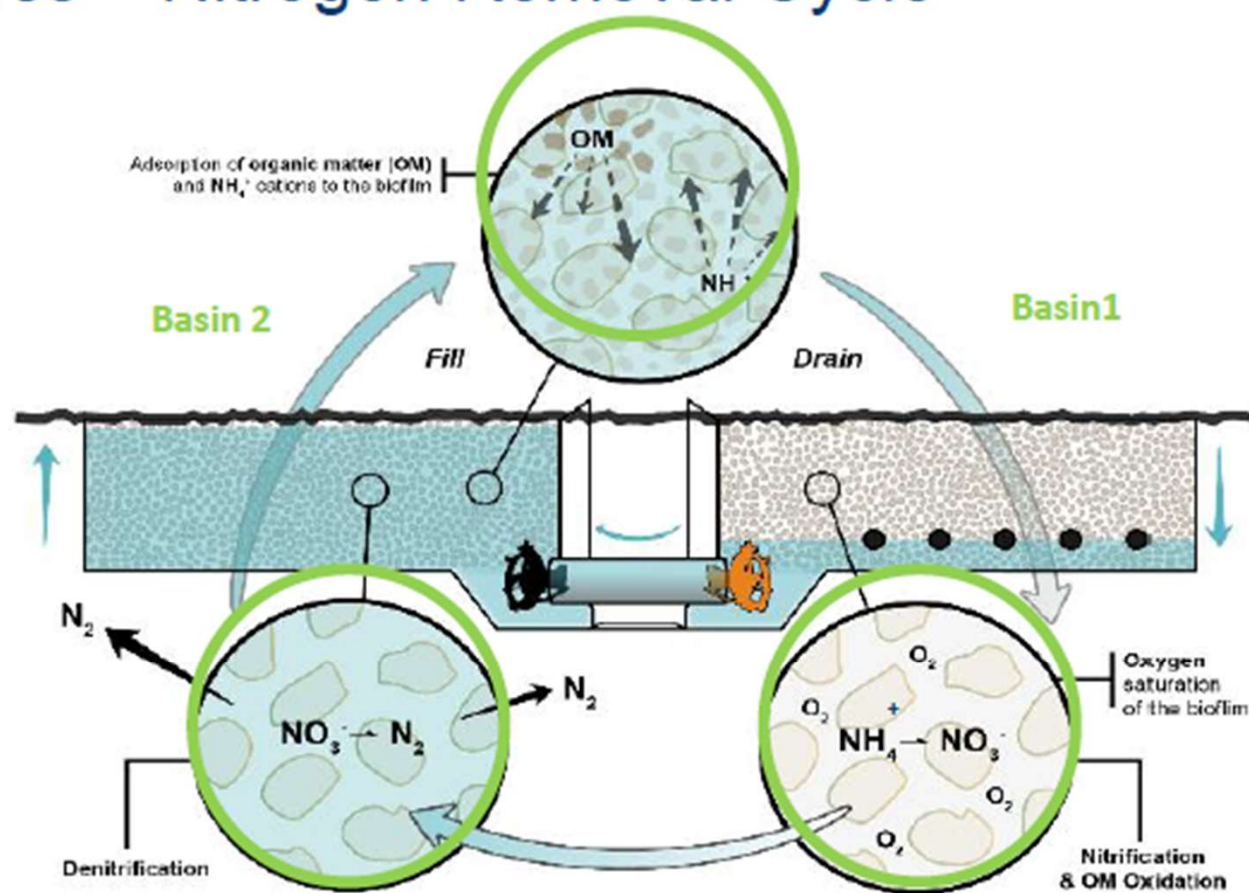
- A Wastewater Treatment Technology Developed for Decentralized Communities
- Minimizing Operational Needs while Delivering High Quality Effluent for Reuse
- Cost-Efficient
- No Daily Sludge Removal, No added Chemicals



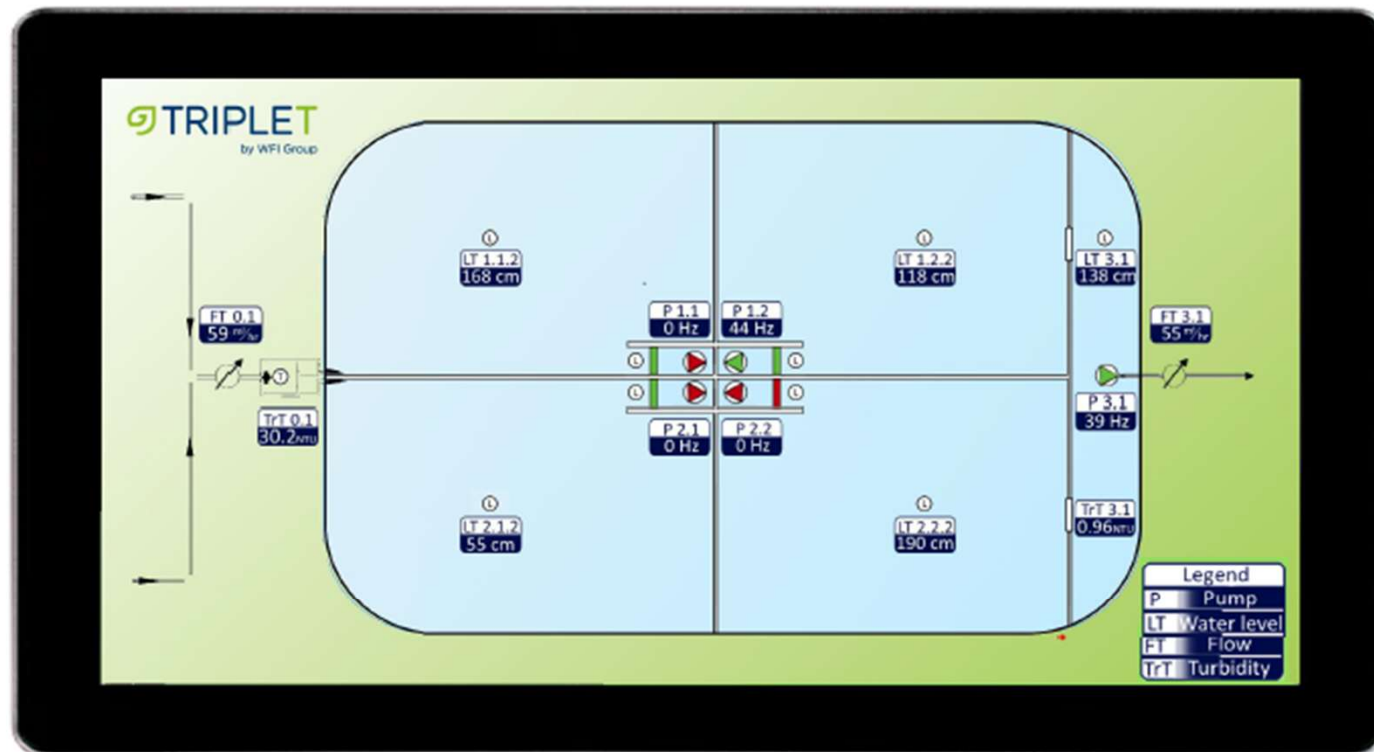
 **TRIPLET**
by WPI Group



TAYA Process – Nitrogen Removal Cycle



Remote Monitoring and Control



TAYA GO - Bennett, Colorado

Design Flow: 5,000 gpd (20m³/d)



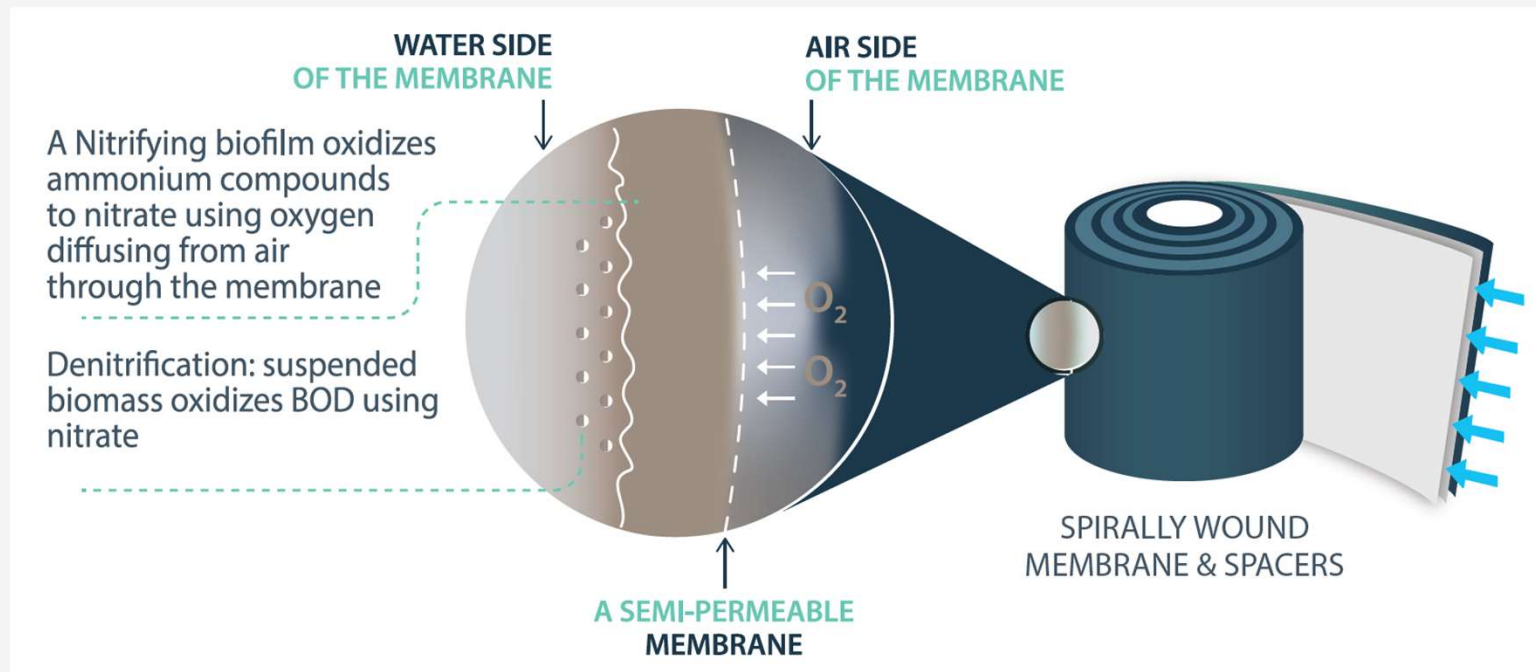
TAYA performance data- Bennett Colorado

Parameter	TAYA influent (mg/l)	TAYA effluent (mg/l)	Removal efficiency (%)	Effluent design limit (mg/l)
COD _t	648	51	92	100
BOD _t	305	10	97	30
TSS	93	9	91	30
TN	65	9	87	Not required
N-NH ₄	50	1.1	98	10

Membrane Aerated Biofilm Reactor

 The Fluence logo features the word "fluence" in a dark blue, lowercase, sans-serif font. A stylized graphic of three green bubbles of varying sizes is positioned above the letter "u".

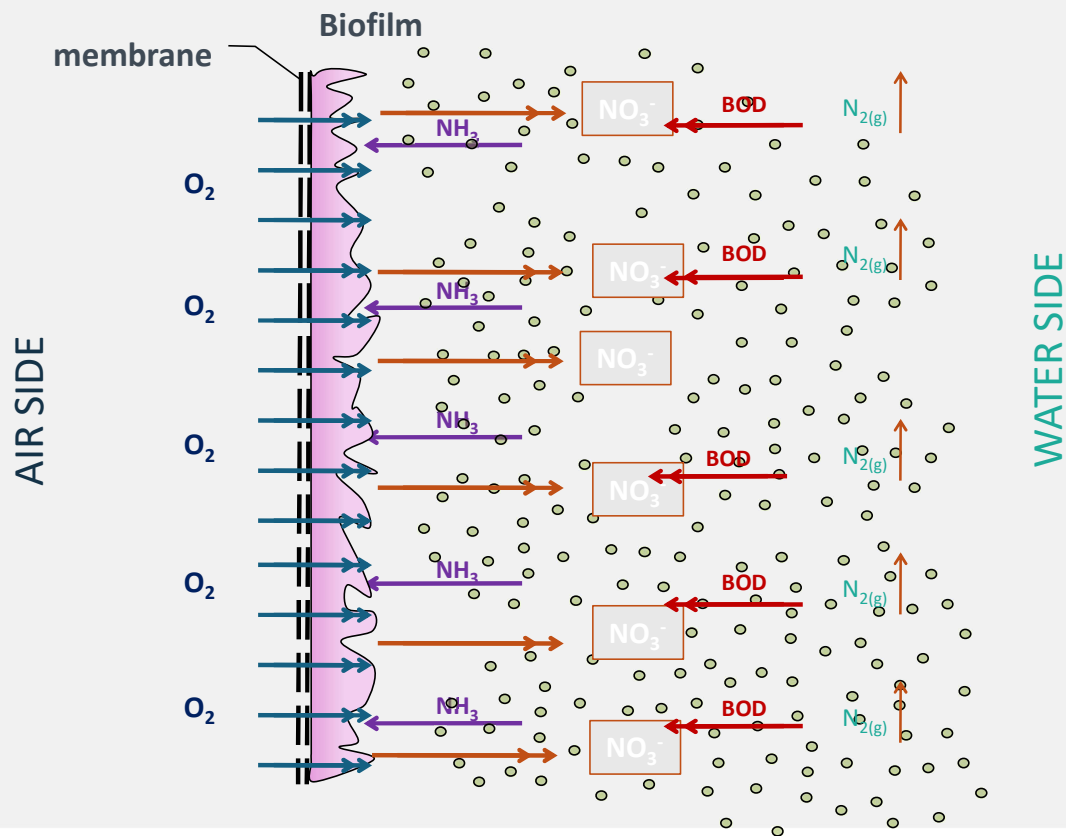
Membrane Aerated Biofilm Reactors (“MABR”) Technology



“MABRs are especially effective for total nitrogen (TN) removal, due to the counter-gradient diffusion of substrates”
(Essila, Semmens et al. 2000; Lee and Rittmann 2002).

A Unique Biofilm to support SND

Simultaneous Nitrification and Denitrification



Autotrophic biofilm develops at low BOD conditions, nitrifies ammonia using oxygen from the membrane

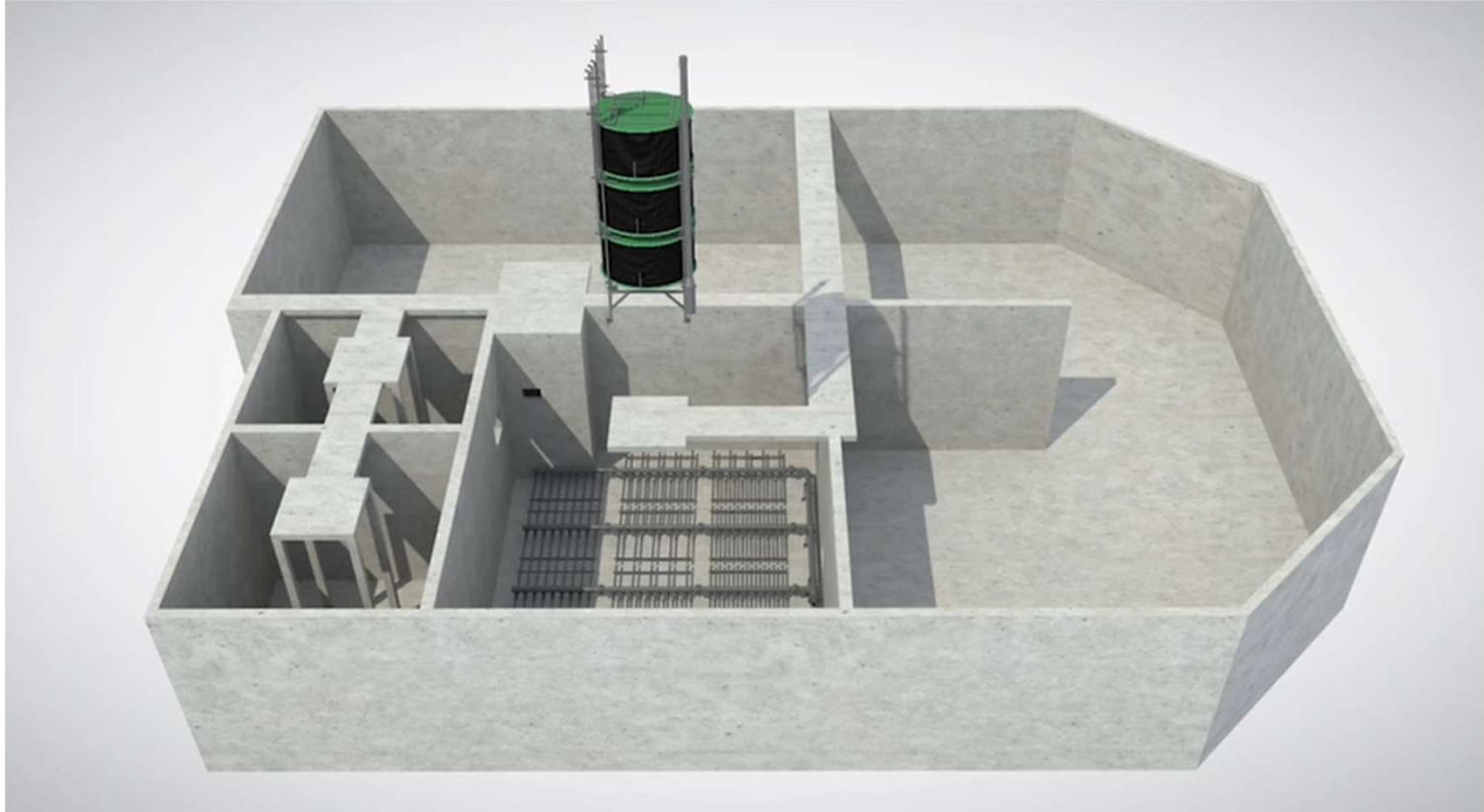
Heterotrophic suspended biomass denitrifies the nitrate at **anoxic** conditions

The SUBRE Tower Family

- 1-4 spiral membranes with a steel cage
- 5'-17' total height
- Adjustable base (10" - 31.5")



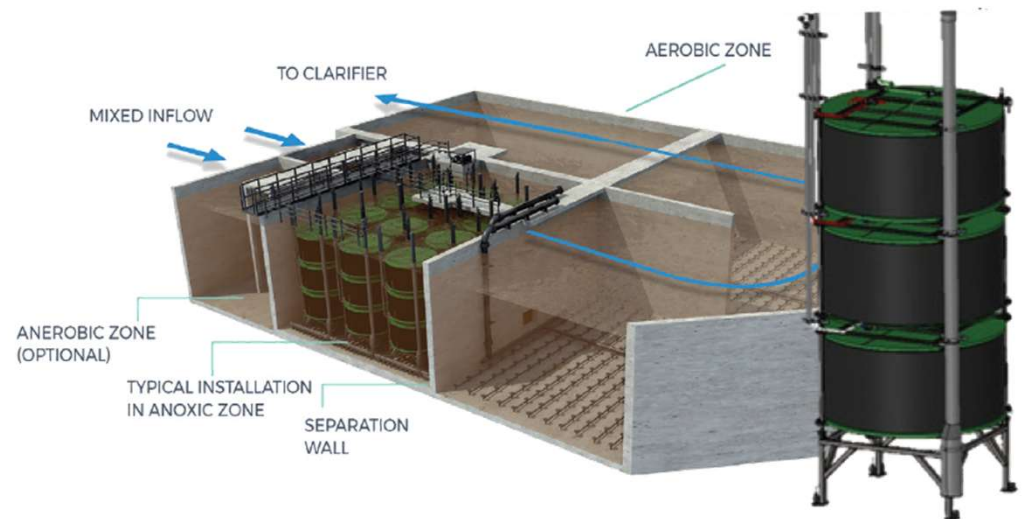
SUBRE Retrofit Design





Retrofit Results Summary

- Influent loading increase by 20%
- Specific Energy consumption reduced by 33%
- Exceeding required effluent quality
 - TSS – 2 mg/l
 - COD – 25 mg/l
 - BOD – 10 mg/l
 - TN - 10 mg/l
 - NH₄-N – 6.5 mg/l
 - TP – 0.3 mg/l

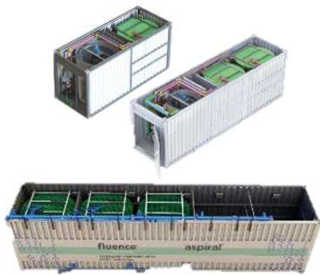


Fluence Projects in the United States



MABR Configurations

Aspiral Flex
Smart Packaged Plant



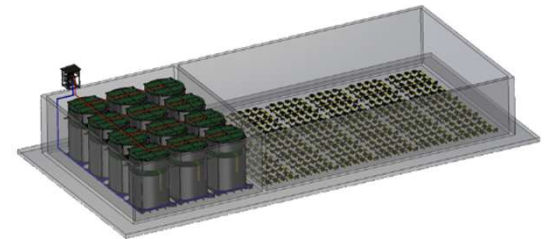
Aspiral plant
End-to-end wastewater solution



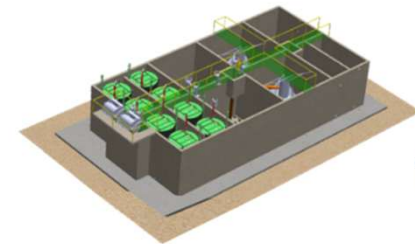
Modules
Integrate MABR in
existing solutions



SUBRE
Retrofit using MABR

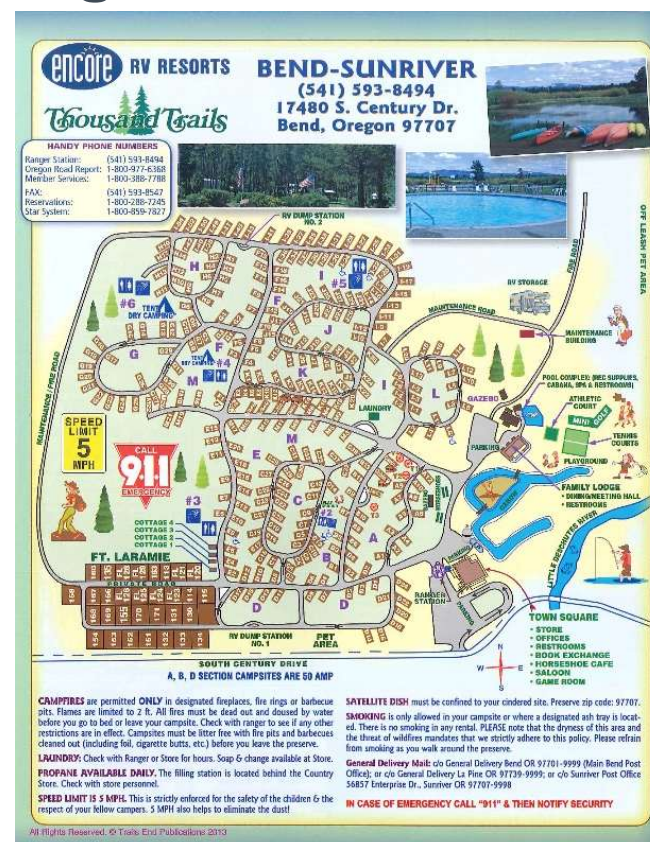


SUBRE greenfield
Concrete MABR plant



Thousands Trails RV Resort – La Pine, Oregon

Customer	Orenco (Equity Life Style)
Project	Integrate MABR modules into Orenco's FRP tanks in order to reduce the size of a I-fast based process and meet the stringent TN requirements at minimum energy and capital costs.
Capacity	18,000 GPD (Peak – 42,000 GPD)
Solution Overview	Install 4 x MABR, 2 Spiral modules into Orenco's FRP tanks and design the biological process as well as specify the auxiliary equipment supplied by Orenco and provide a PPG.
Results	• Integration of MABR modules took 2 days. • Installation time was reduced to less than a week • Results BOD < 10 mg/l TSS < 10 mg/l TN < 10 mg/l E. Coli - < 10 CFU





Looking Forward

- Pain points from clients that align with Israeli Technology
 - Nutrient Removal
 - Water Reuse
 - Smart Monitoring
 - And More!



Looking Forward

- Funded Pilot Projects
 - Interested in exploring new technology
- Lunch & Learns
- General Inquiry Meetings

Questions?



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Thank you

