

# Welcome to the webinar!

Sponsored by Veolia





# **ZeeWeed\* MBR with memDENSE\* for Resilient Wastewater Treatment**

*2 years of successful operation at the City of Detroit Lakes WWTP*



\*Trademark of Veolia; may be registered in one or more countries.



# ZeeWeed MBR with memDENSE for Resilient Wastewater Treatment

| Today's Presenter



**Matt Reeve**  
Process Engineer



# ZeeWeed MBR with memDENSE for Resilient Wastewater Treatment

## | Agenda

### What we will cover today:

- Technology Introduction
- Experience
- Results and Benefits
- Implementation
- Q & A



**ZeeWeed Membrane Bioreactor (MBR) with memDENSE optimizes membrane and biological performance, reducing operating costs, boosting resilience, and giving operators peace of mind.**

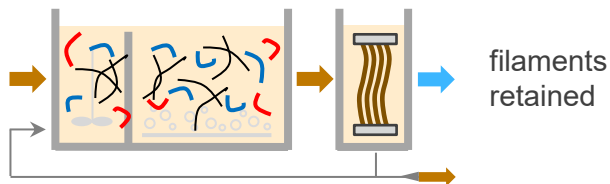


# ZeeWeed MBR with memDENSE

## MBR plus Densification

### CONVENTIONAL MBR

Uncontrolled MLSS characteristics limit MBR performance

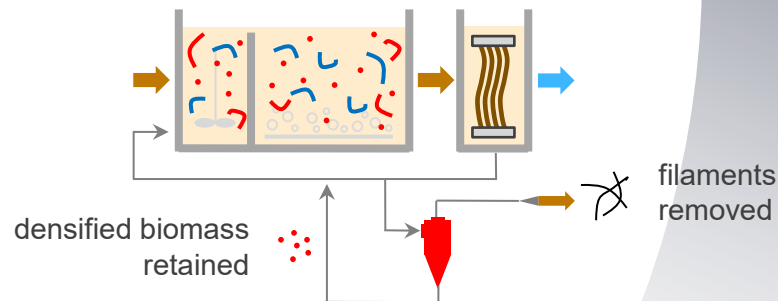


 filaments

 flocs

### ZeeWeed MBR with memDENSE

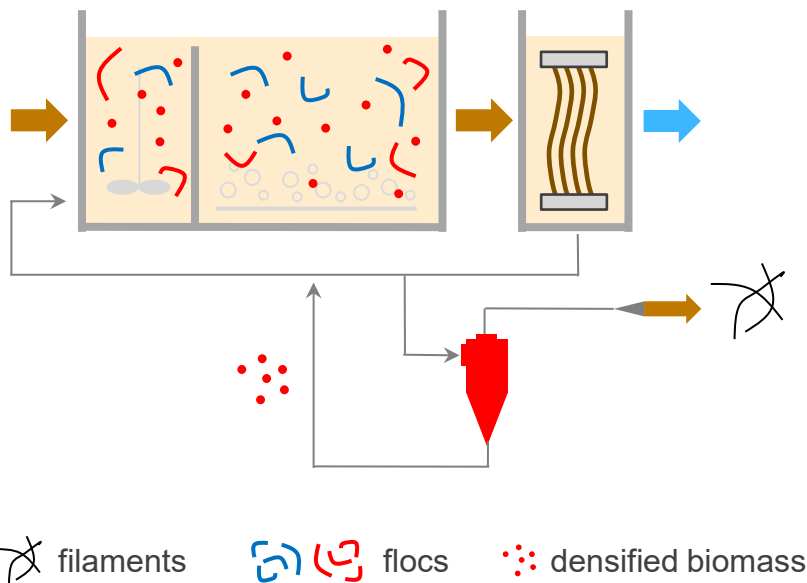
Tailored MLSS characteristics unlock MBR potential



 densified biomass

# ZeeWeed MBR with memDENSE

## How it Works



### SELECTIVE WASTING

#### Removal of light biomass fraction

- foulants, colloids, pin floc
- nuisance bacteria, filaments

### DENSIFICATION

#### Retention of dense biomass fraction from plants with an anaerobic zone

- improved filterability
- nutrient removal specialists

# ZeeWeed MBR with memDENSE

## Optimizes Membrane & Biological Performance

### MEMBRANE PERFORMANCE

- Permeability increase
- Fouling reduction
- Cleaning optimization

### BIOLOGICAL PERFORMANCE

- Biological P removal enhancement
- Process aeration energy reduction
- Nuisance foam control



# ZeeWeed MBR with memDENSE

## Experience

Plant	Size	Configuration	Commissioned
Detroit Lakes, MN, USA	1.2 MGD // 4.5 MLD	A2O MBR	2023
Watercare, New Zealand	0.3 MGD // 1.1 MLD	MLE MABR-MBR	2024
PUB, Singapore	2.64 MGD // 10 MLD	Step-feed MABR-MBR	2024
Ile Arrault, France	4 MGD // 15.1 MLD	MLE MBR	2024
Gwinnett County, GA, USA	19 MGD // 72 MLD	A2O MBR	2025
Jordanelle, UT, USA	1.2 MGD // 4.5 MLD	A2O MBR	2025

A2O - Anaerobic-anoxic-oxic  
MLE - Modified-Ludzack Ettinger  
MABR - Membrane Aerated Biofilm Reactor

# DETROIT LAKES MINNESOTA, USA

- 1.2 MGD MBR
- A2O configuration
- Total Nitrogen (TN) 7 mg/L
- Total Phosphorus (TP) 0.07 mg/L
- MBR + membrane sludge thickener commissioned 2019
- memDENSE commissioned 2023



# memDENSE INCREASES FLOC SIZE

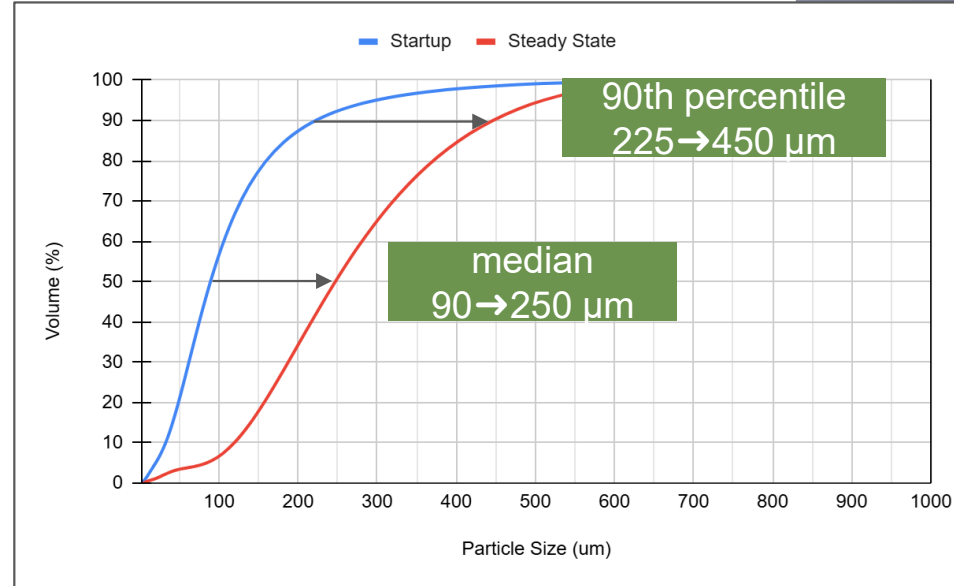
Easier to filter, Less fouling, Better biological P removal



**before**  
memDENSE

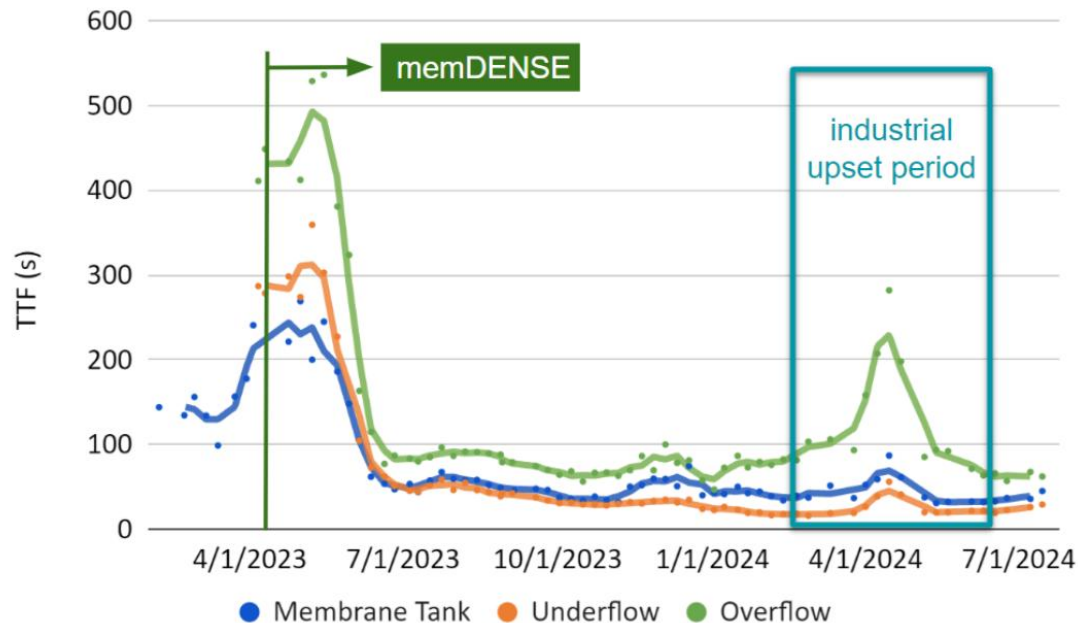
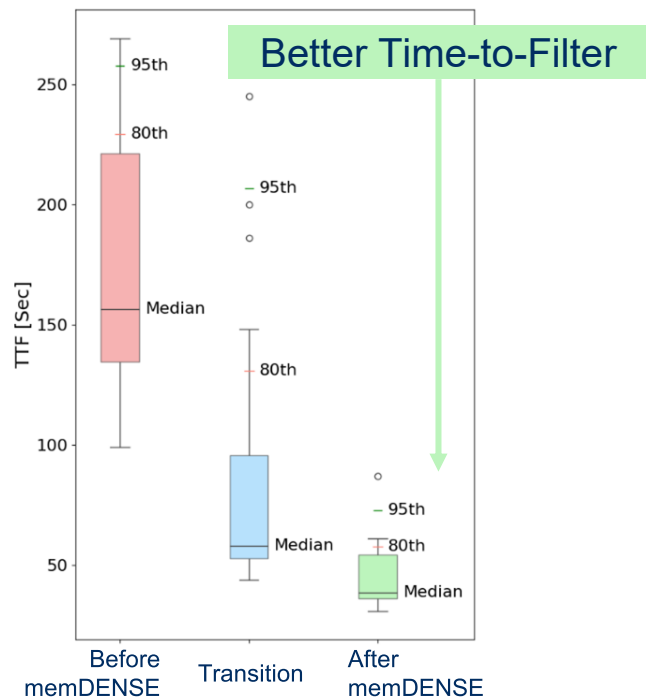


**after**  
memDENSE



# MORE RESILIENT BIOLOGY

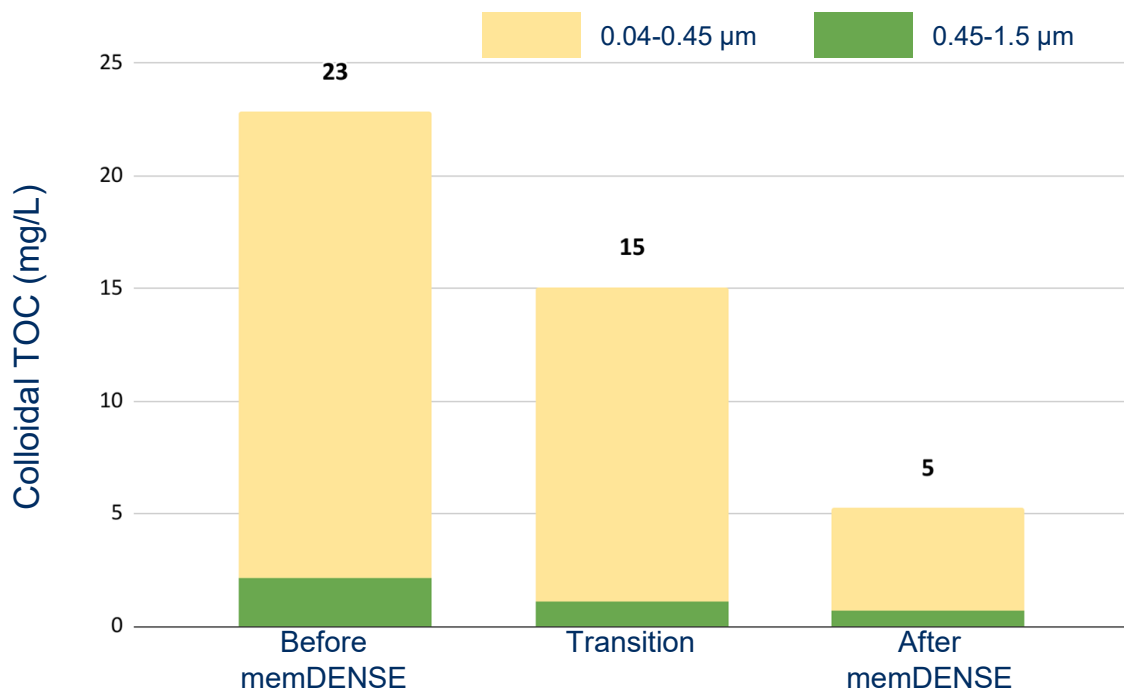
With easier to filter Mixed Liquor



and mitigation of biological upsets

# REDUCED MEMBRANE FOULING

Removal of organics that require cleaning

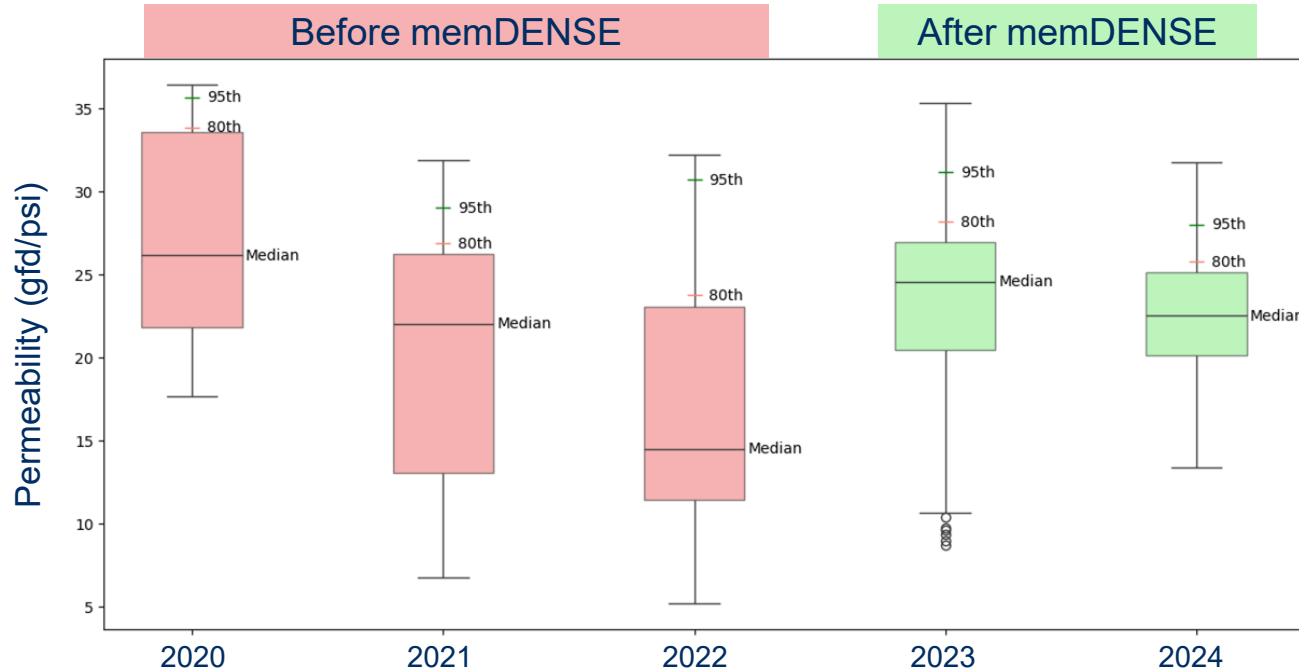


memDENSE removes colloidal material that causes fouling

- reduces fouling
- reduces cleaning

# MEMBRANE PERMEABILITY INCREASE

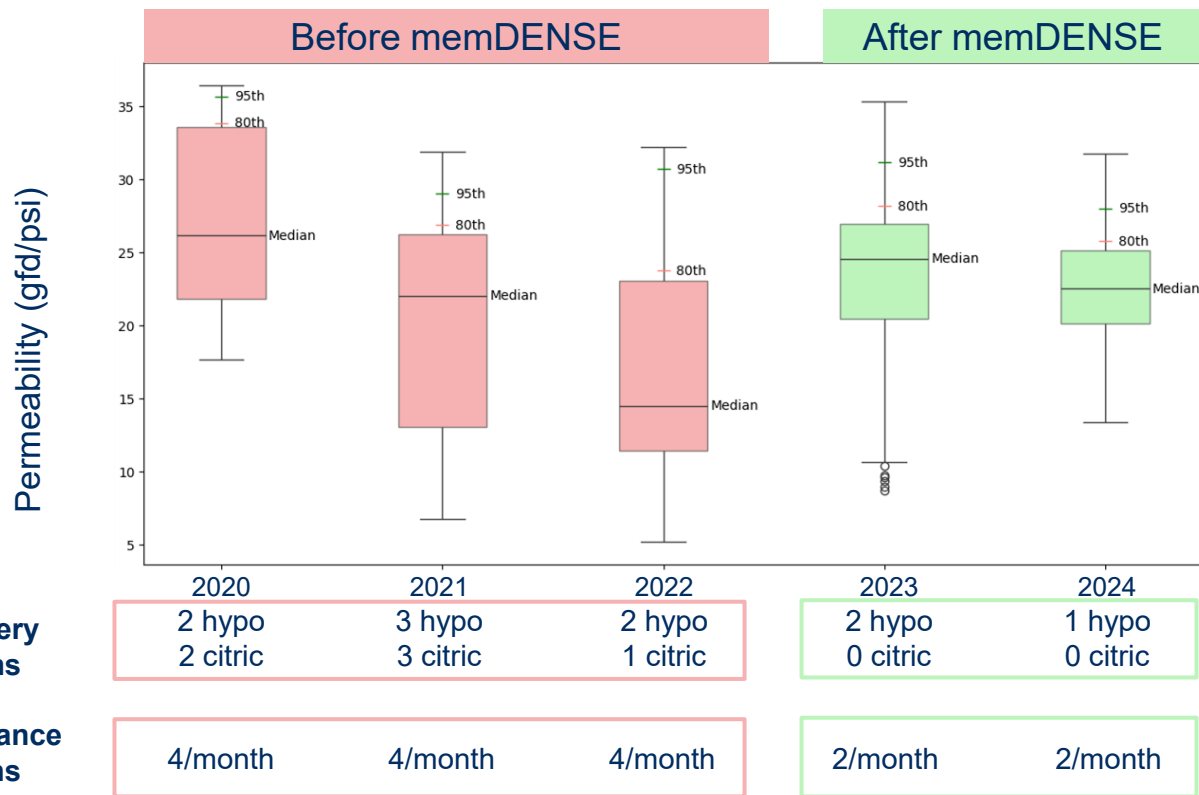
Capacity to handle the unexpected



Increased permeability to withstand seasonal variability



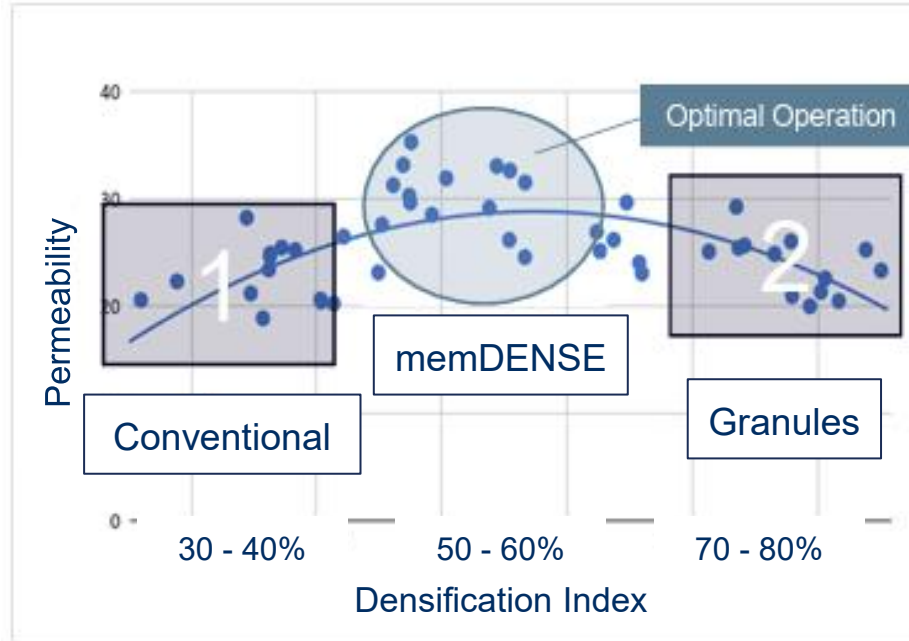
# CLEANING CHEMICAL SAVINGS



50% reduction  
in maintenance  
& recovery  
cleans

# OPTIMIZING PERMEABILITY

memDENSE is best for MBR



memDENSE mixed liquor optimizes permeability

Densification Index (DI): fraction of sludge that's densified

# NUISANCE FOAM CONTROL

memDENSE Removes Foam Causing Filaments



Before memDENSE

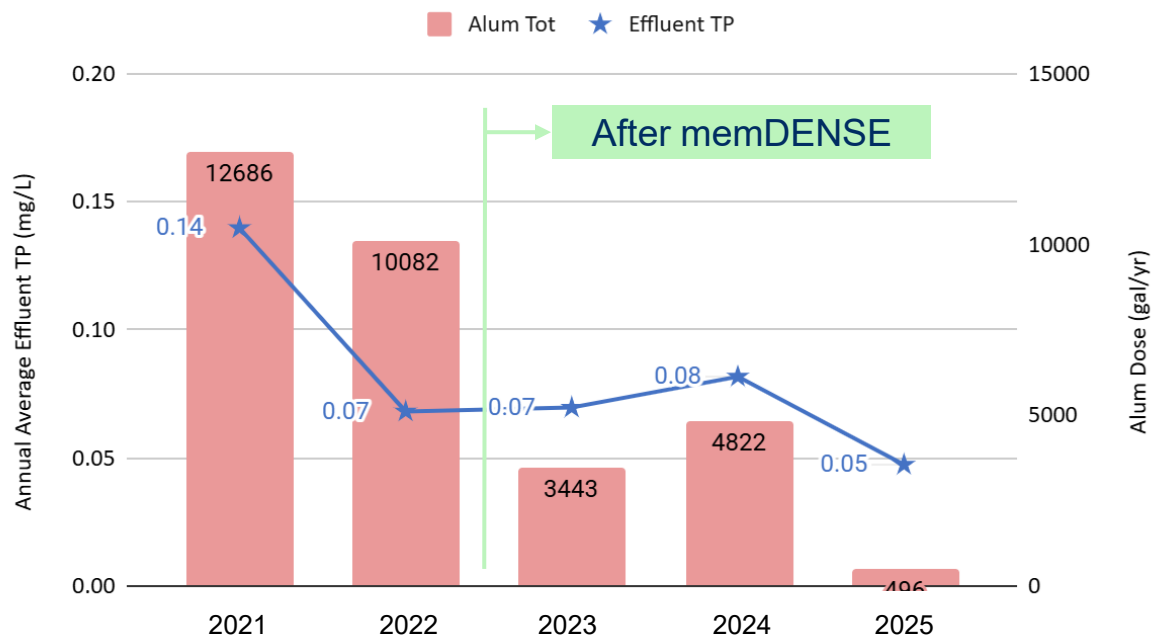


After memDENSE

# BETTER BIOLOGICAL P REMOVAL

## Chemical savings

### Alum Requirement for P removal



memDENSE retains phosphorus accumulating organisms and improves biological phosphorus removal

70% alum savings with same or greater phosphorus loading

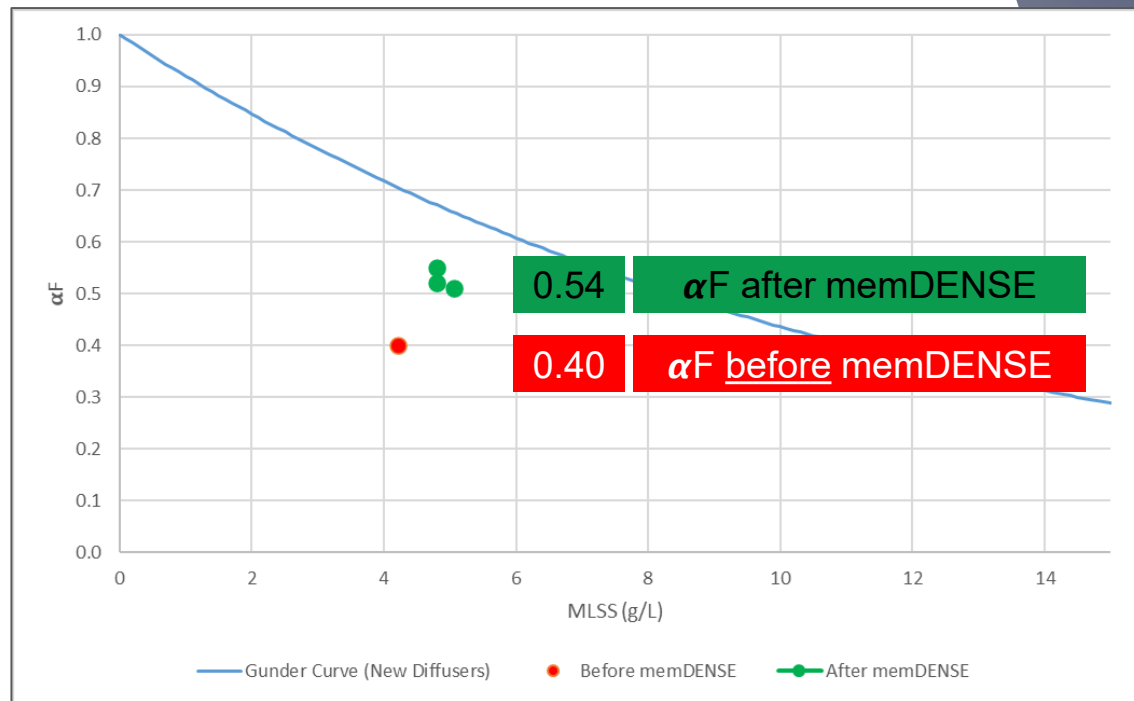
# PROCESS AERATION ENERGY REDUCTION

## Up to 30% Energy Savings

memDENSE increases oxygen transfer efficiency by up to 30%

Evidence shows less resistance to diffusion of O<sub>2</sub> from bubbles to biology

~\$30,000 savings on process aeration for a 5 MGD MBR



$\alpha F$  is the relative O<sub>2</sub> transfer rate in dirty water vs clean water, including diffuser membrane fouling

# ZeeWeed MBR with memDENSE

Optimizes Membrane & Biological Performance

<b>MEMBRANE Performance</b>	<b>Result</b>	<b>BIOLOGICAL Performance</b>	<b>Result</b>
Permeability Increase	Restored to year 1	Bio-P Enhancement	70% reduction in coagulant
Fouling Reduction	80% reduction of cTOC	Process aeration	30% reduction
Cleaning Optimization	50% reduction in RC/MC	Nuisance foam control	Foam eliminated



# memDENSE IMPLEMENTATIONS

Ile Arrault, France



# memDENSE IMPLEMENTATIONS

Gwinnett County, Georgia, USA





# ZeeWeed MBR with memDENSE for Resilient Wastewater Treatment

| Questions

We are actively seeking your feedback on using  
ZeeWeed MBR with memDENSE.

Take our quick survey to share your thoughts  
for a chance to win a **free year of memDENSE**



Scan QR Code

or

[Click Here for Survey](#)