GLOBAL WATER SUMMIT 2025

ACCELERATING INVESTMENT

12 - 14 May 2025 | Paris, FR

Project 96: Brine Valorization

Zero Liquid Discharge of Desalination Brine & Industrial Chemical Production

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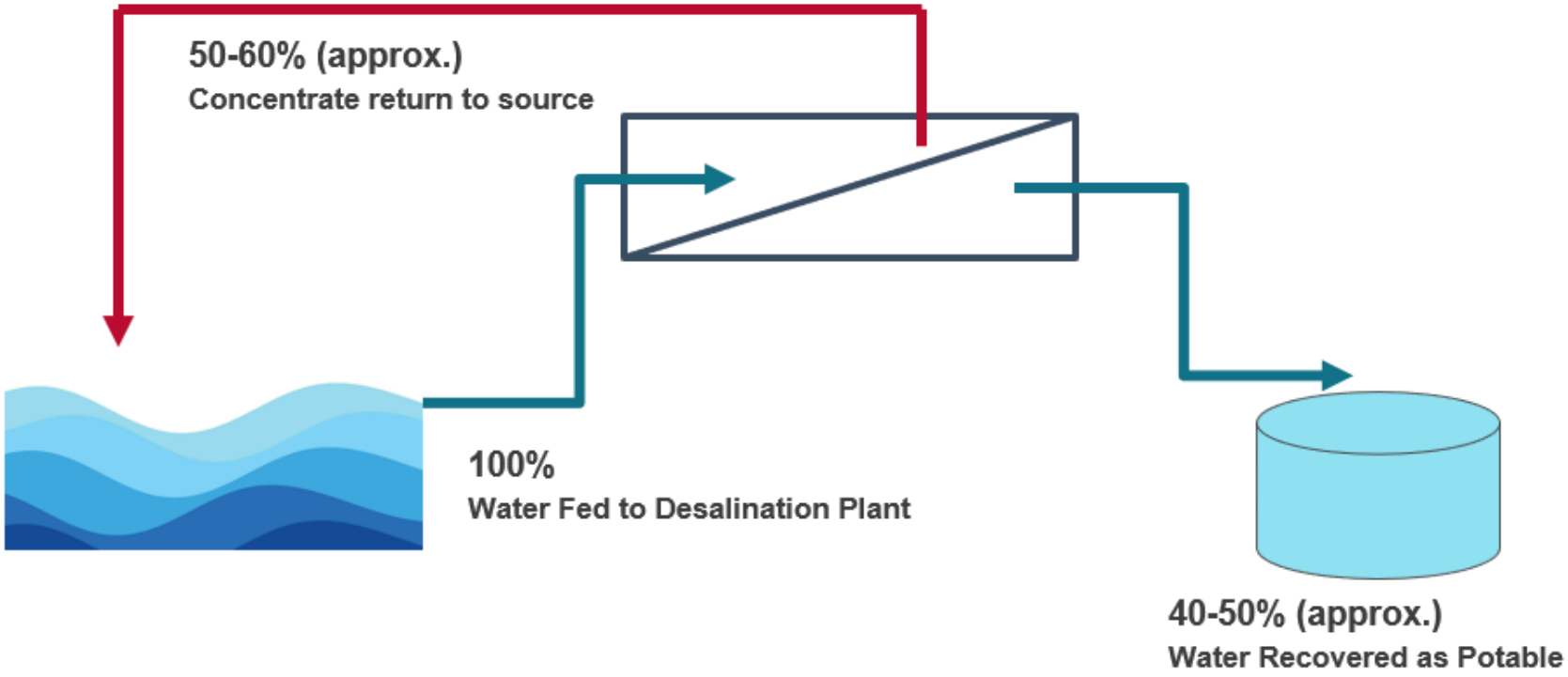
GWI GLOBAL WATER INTELLIGENCE

What if the waste brine happened to be worth **MORE** than the pure water being produced?

What if we could convert the efficiency of ANY desalination plant from **40-50% recovery to >96% recovery?**

Recovery/Efficiency of a Typical Desalination Plant

Only 40-50% of water entering a desalination plant becomes potable water. The rest is returned as a waste concentrate.



Seawater Constituents (Pacific)

Seawater Constituents	Concentration (mg/L)	Atomic Weight g/mol	Molar Concentration (moles/L)	Molar Concentration (moles/m3)	Molar Concentration (moles/1,000 m3)
Cations					
Calcium	403.00	40.078	0.0101	10.10	10,100.00
Magnesium	1,298.00	24.305	0.0534	53.40	53,400.00
Sodium	10,693.00	22.9897	0.4649	464.90	464,900.00
Potassium	387.00	39.0983	0.0099	9.90	9,900.00
Boron	4.60	10.811	0.0004	0.40	400.00
Bromide	7.40	79.0945	0.0009	0.90	900.00
Hydrogen		1.008	55.5000	55,500.00	55,500,000.00
Total Cations	**12,859.60**		**56.0396**	**539.60**	**56,039,600.00**
Anions					
Bicarbonate	142.00	61.0169	0.0023	2.30	2,300.00
Sulfate	2,710.00	96.0626	0.0392	39.20	39,200.00
Chloride	19,284.00	35.45	0.5432	543.20	543,200.00
Fluoride	1.30		-	-	-
Nitrate	-		-	-	-
Total Anions	**22,137.30**		**0.5847**	**584.70**	**584,700.00**
Total	**34,996.90**		**56.6243**	**1,124.30**	**56,624,300.00**

Process and Industrial Chemical Outputs

Transfer the brine to the Blue Brine facility

Reorganize the ions and molecules into useful chemicals

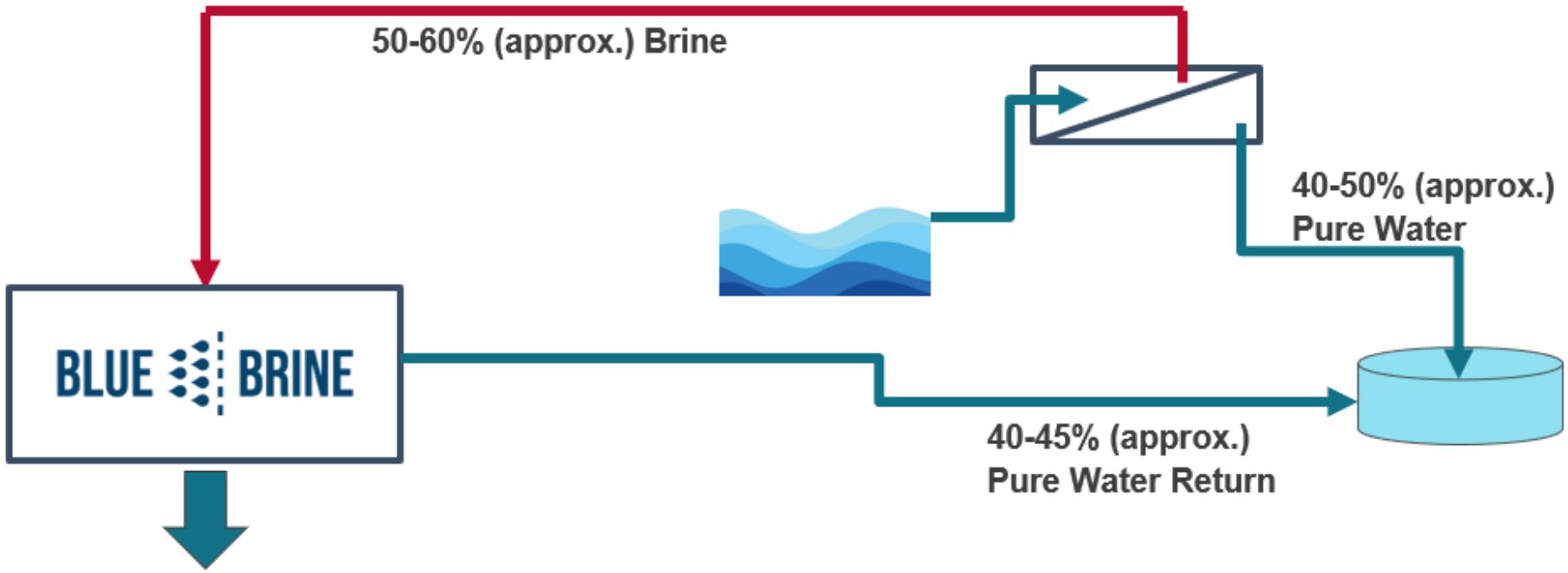
Fractionate out the chemicals for commercial offtake

Return the potable water

Product	Product Formula	Final Product Per 1,000 m3/Seawater Concentrate (Metric)	Final Product Per 1 MGD Seawater Concentrate (USA)
Magnesium	Mg	1.82 Tons	6.9 Tons
Calcium Sulfate (Gypsum)	CaSO4	1,9 Tons	7.2 Tons
Hydrochloric Acid	HCl	78.50 Tons, 35.2% HCl	297 Tons, 35.2% HCl
Caustic Soda	NaOH	52.06 Tons, 50% NaOH	197 Tons, 50% NaOH
Recovered Water	H2O	>99.7% Potable+Solutions	>99.7% Potable+Solutions

Recovery/Efficiency by Adding Blue Brine Technology

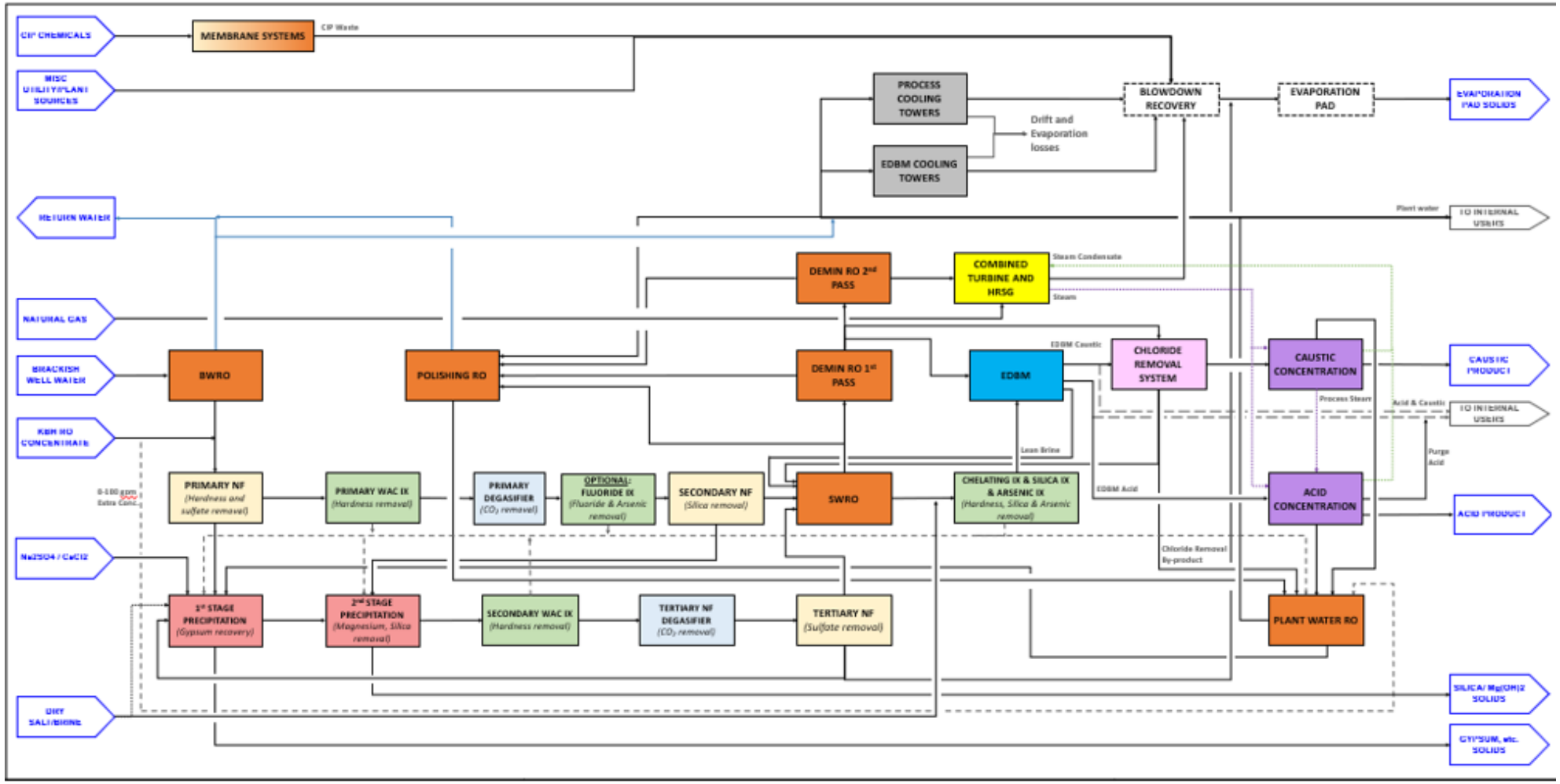
The Blue Brine facility converts the brine into useful industrial chemicals and returns potable water to the desalination plant.



Industrial Products:
- -Magnesium (Mg)
- -Gypsum ($CaSO_4$)
- -Caustic Soda (NaOH)
- -Hydrochloric Acid (HCl)

Simple Concept: Numerous Integrated Processes

Engineering Challenges: ZLD, NSF Compliance, Process Design, Scaling from Pilots



PROCESS STAGES

- Gypsum precipitation using nanofiltration, hydrocyclones and dewatering.
- Magnesium Hydroxide precipitation using nanofiltration and vibratory shear membrane concentration.
- Salt concentration using SWRO's
- Ion exchange and chelating to remove divalent & trivalent ions
- Electrodialysis for production of HCl and NaOH
- Distillation of HCl and NaOH
- Storage & Offtaking

El Paso, Texas Project: 10,000m3/day

UW CMC LLC
ZLD/Chemical Plant

Kay Bailey Hutchison Desalination Plant (EPWU)
Water Treatment Plant

Industrial Chemicals:

- Caustic Soda (NaOH)
- Hydrochloric Acid (HCl)
- Gypsum (CaSO4)
- Magnesium Hydroxide (MgOH)
- Rare Earth Metals
- Etc.

Industrial Chemicals

Water

Brine

Water

Project Efforts to Date

Project touched by over 200 engineers

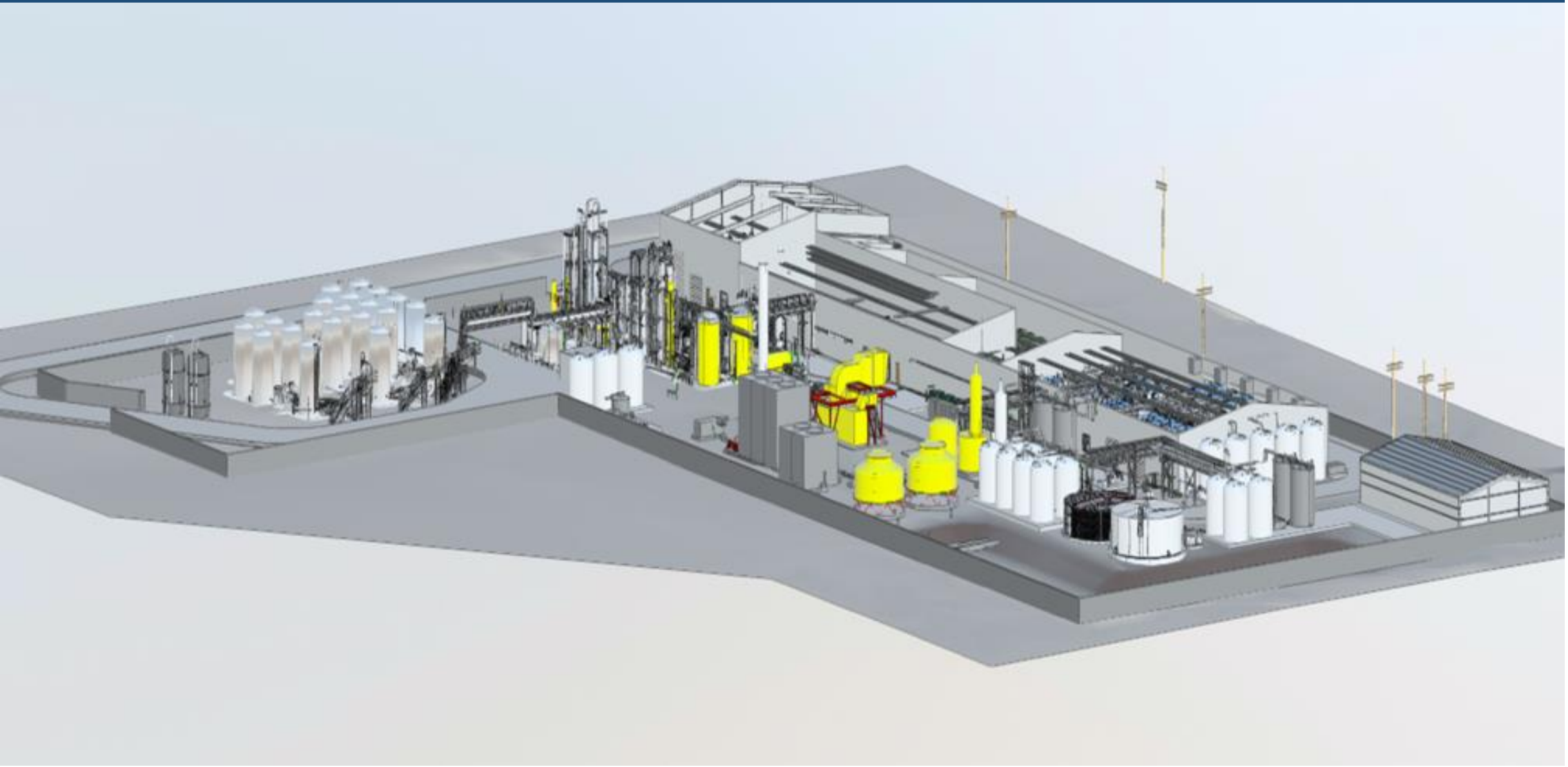
Core team of 20 Engineers and Technicians

3 Years of Design, Engineering, Piloting and Testing

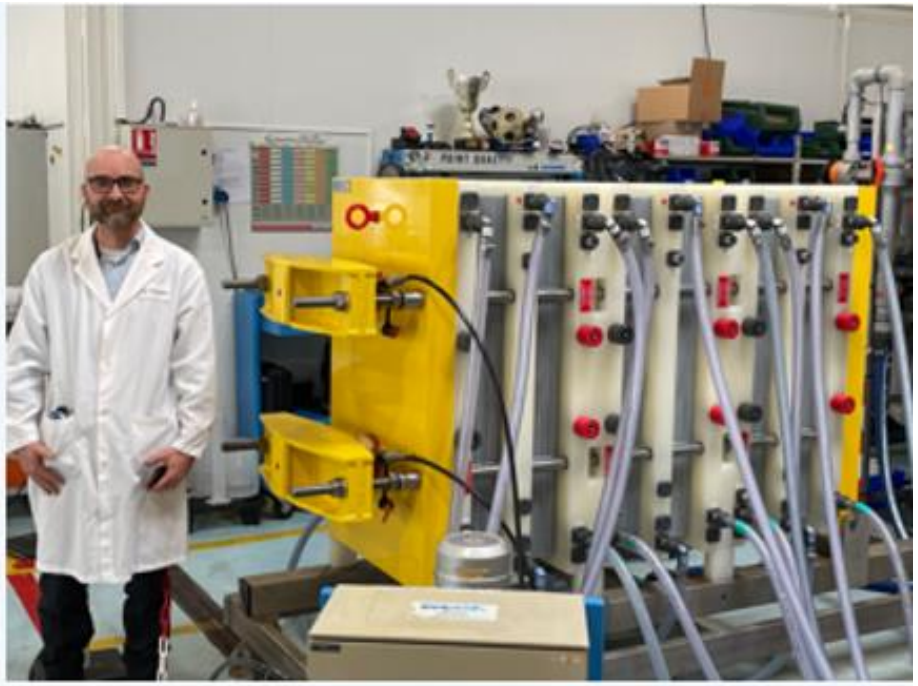
$USD 75 Million invested to date. $85M remaining

Construction completion December 2026

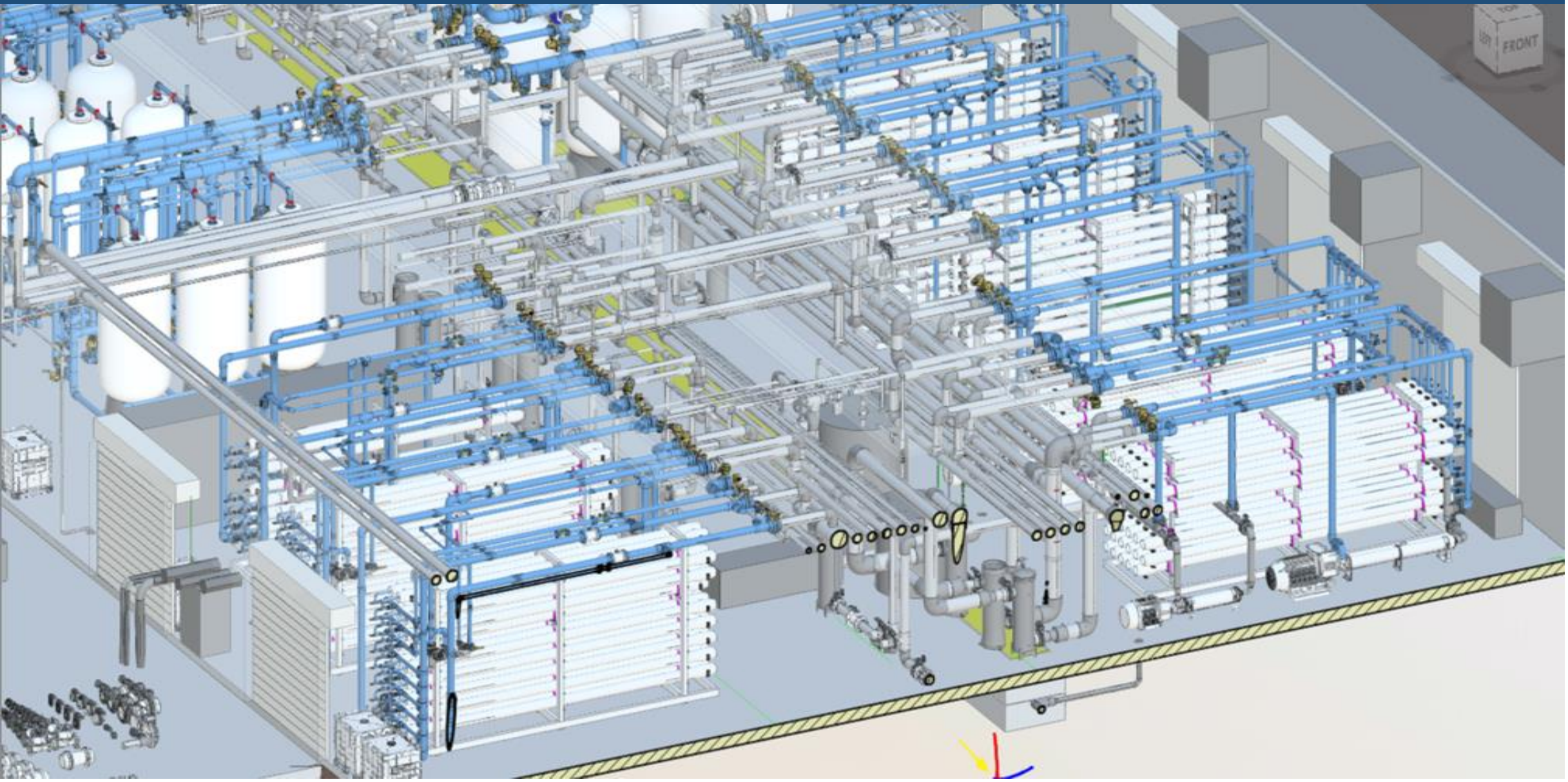
7 Hectare Site: End-to-End Treatment & Distribution

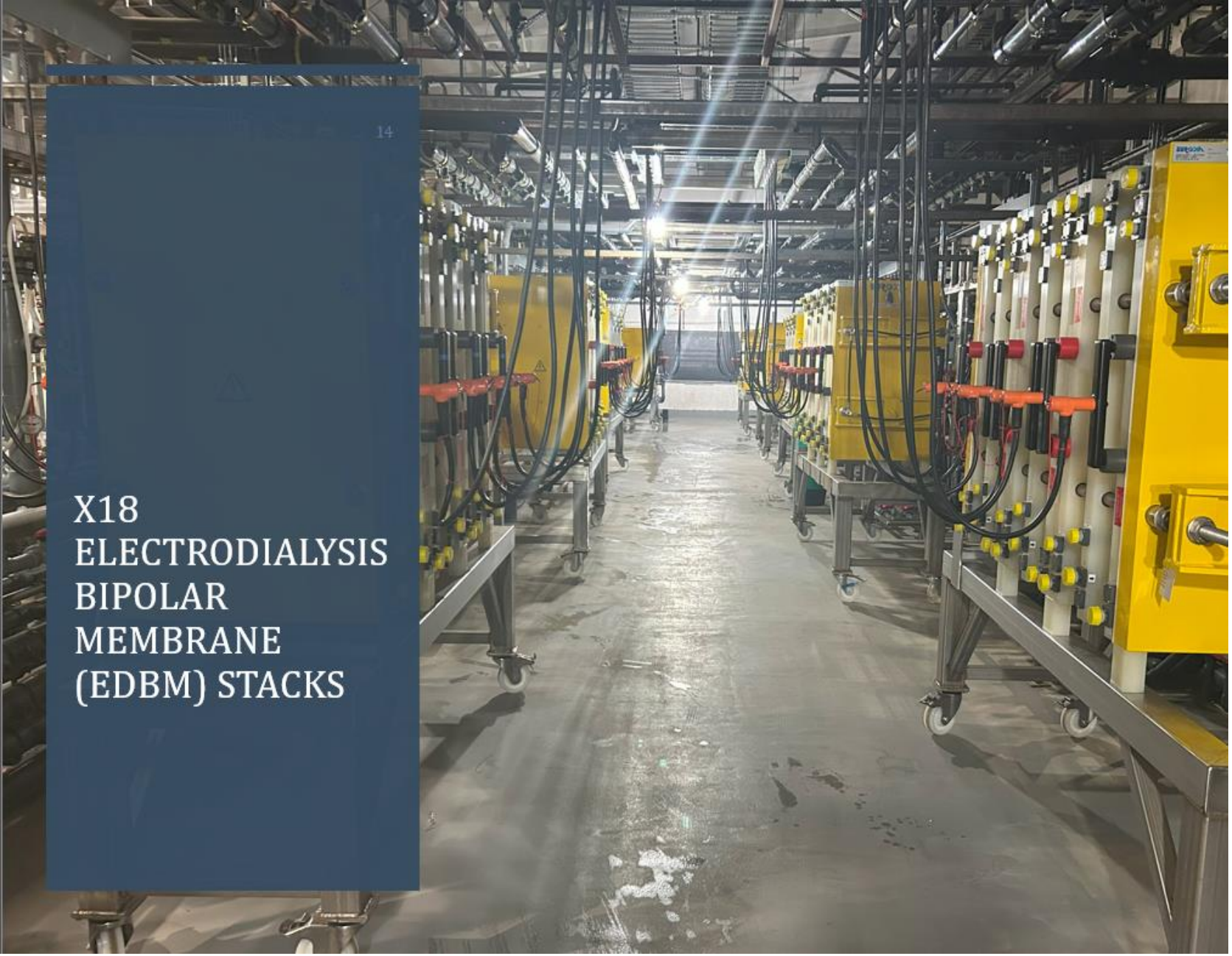


EDBM Piloting & Testing



22 Membrane Skids: NANO, BWRO, SWRO





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X18 ELECTRODIALYSIS BIPOLAR MEMBRANE (EDBM) STACKS

KEY TAKEAWAYS

- Surface and sub-surface discharge of brine represents a lost opportunity.
- The production of industrial chemicals from salt brines is technically and commercially feasible.
- Production of industrial chemicals from salt brines is profitable
- Salt brines can be selectively engineered to obtain specific elements or chemical compounds.
- Seawater Desalination Plants can almost double their capacity with this technology.

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