

# Membrane Distillation(MD) solves the problem of seawater desalination and wastewater purification of RO

## [POINT]

The Reverse Osmosis(RO) system has the issues of high initial investment costs and high operating expenses.

## [DATA comparison]

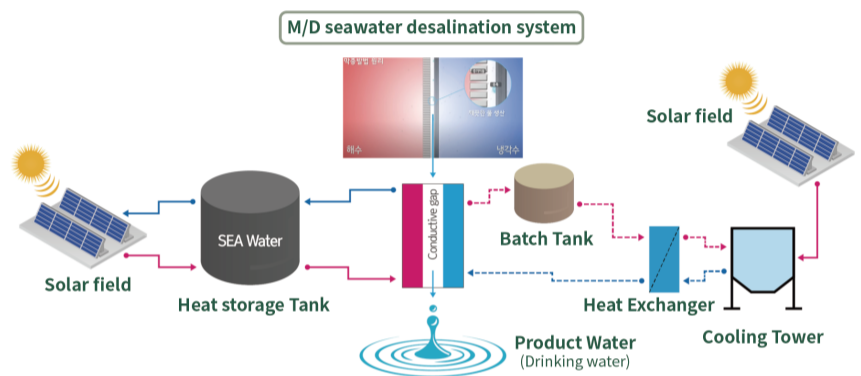
Desalination DATA			
No.	Category	RO	M/D (2N TEST - Standard)
1	Principle of operation	Solute filtration using pressure difference	Water vapor diffusion using temperature difference
2	Power consumption [kw h/m <sup>3</sup> ]	4.260 (normal operating value)	1.163 (our testing standards)
3	an output	30 ~ 50	About 40L/m <sup>2</sup> hr (our testing standards)
4	Pressure	20 ~ 100 bar	normal pressure
5	Water desalination commercialization proportion	80%	under development
6	incoming water concentration (Na standard)	10~ 500 mg/L	105.45 g/L
7	ionic concentration in freshwater(Na Standard)	93.9ppm	< 0.003 g/L
8	Membrane contamination	35 g/kg Less than	Less than 105 g/kg
9	concentrated water recovery rate	30 ~ 50%	Less than 95%

## [2N - TEST]

MD TEST Result (conductivity test)			
Category	FEEDWATER	PERMATE	Processing speed (10hr Post-operational measurement)
BR	240mS/cm	447.7 μS/cm	About 40L/m <sup>2</sup> hr
NS	50.66mS/cm	335.4 μS/cm	39.68L/m <sup>2</sup> hr

Reference Data  
Tap water: 200uS/cm  
Drinking water reference limit: 105uS/cm

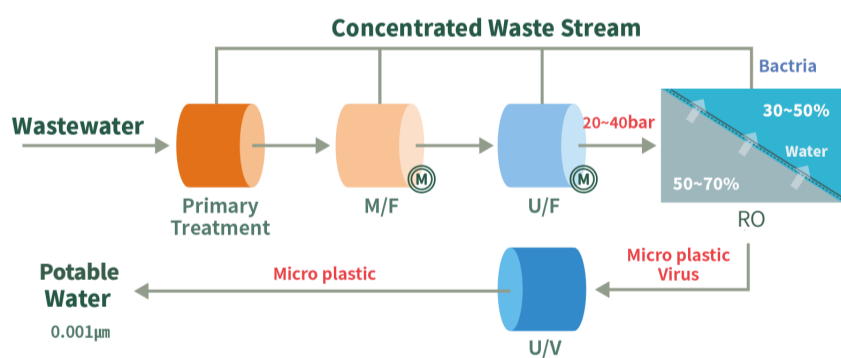
Category	Sample name	S	NA	Remark
The Case of Brine	BR	3.912	105.45	-
	AF	< 0.003	< 0.003	-
The Case of NS Soln	NSR	13.77	19.46	-
	NSAF	< .0003	< .0003	-



2N Manufacturing equipment that 50L/Day of Water using only solar Power (Feb . 2024 year)

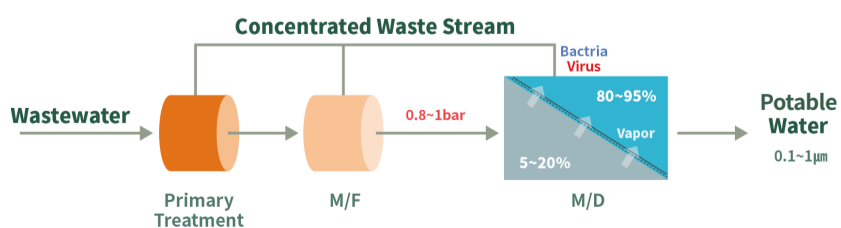
## [RO System]

- High Energy Consumption
- High Operating Cost
- High Maintenance Cost
- Concentrated water, Not OK

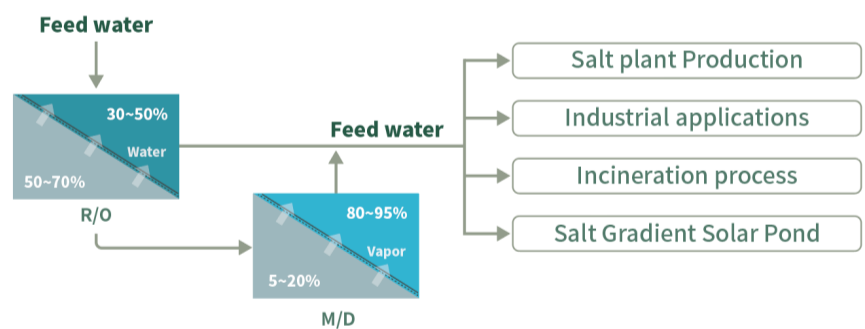


## [M/D System]

- Low Energy Consumption
- Low Operating Cost
- Low Maintenance Cost
- Concentrated water, OK



## [Hybrid System R/O + M/D]



1 Billion PILOT PLANT IN DECEMBER 2023 - 2N

We are currently progressing with the Deep Tech TIPS program (a national R&D project in Korea) for seawater desalination.

We are conducting test beds for Wastewater Treatment for secondary battery sector.

# Oil-Water Separation

## with NO Energy, High Performance



### [Issue]

Currently, a large amount of energy is being used to remove fine moisture and inorganic Cl from oil.

Key Performance Indicator	Unit	Target	Evaluation Institution	Measurement (Evaluation) Method
1. Moisture measurement in oil	ppm	> 300	Authorized Certification Agency	ASTM D 6304-20 measurement method
2. Inorganic Cl (Inorganic chloride) * Special specification standard	mg/kg	> 10 (70% reduction compared to crude oil)	Authorized Certification Agency	UOP 588-12 measurement method

**A large amount of energy is being used to remove fine moisture and inorganic Cl from oil.**

(There were no alternatives other than using a centrifuge or evaporation method)

### [Technical Field]

- Completion of filtration filter technology development using superhydrophobic material
- Capable of oil-water separation with zero energy (Moisture content in oil: below 300 ppm)

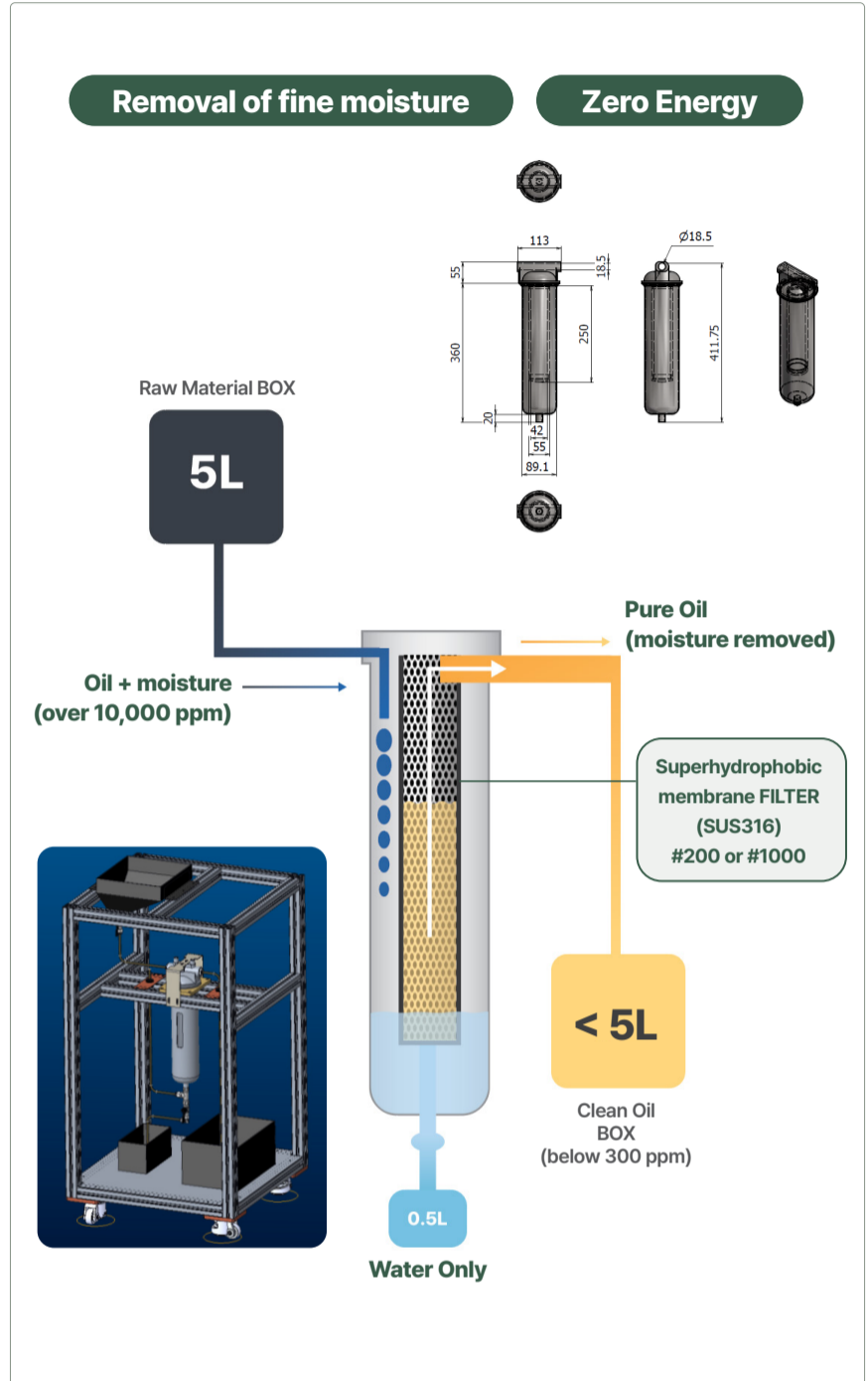
### [Commercialization]

In progress through large-scale facility investments

**26,600ppm**

**327ppm**

**Capacity : 100L/hr**



### Two-N's Composition Report (Oil Separation)

Test Item (Test Methods)	UNIT	Before	After
1. Water (ASTM D 6304-20)	MASS %	0.024 (100%)	0.017 (-29%)
2. Inorganic chloride (UOP 588-12)	Mg/kg	4 (100%)	1 (-75%)

**REPORT OF ANALYSIS**

REPORT NO. : 80200-002000-10 DATE: Jul. 31, 2023

CLIENT : TWO-N CO., LTD.

TEST ITEM	UNIT	TEST RESULT	TEST METHOD
Water	mass %	0.024	ASTM D 6304-20
Organic chloride	mg/kg	78	ASTM D 5188-20 Mod
Inorganic chloride	mg/kg	4	UOP 588-12

**REPORT OF ANALYSIS**

REPORT NO. : 80200-002000-14 DATE: Jul. 27, 2023

CLIENT : TWO-N CO., LTD.

TEST ITEM	UNIT	TEST RESULT	TEST METHOD
Water	mass %	0.017	ASTM D 6304-20
Organic chloride	mg/kg	38	ASTM D 5188-20 Mod
Inorganic chloride	mg/kg	1	UOP 588-12