

**DRINK WATER TREATMENT PLANT
DESALINATION of Mediterranean Sea**

Feed Water Analysis-Guaranteed Outcome

Main Parameters	Feed Water	Filtrate*	Unit
Calcium (Ca)	447	0,5-2,0	mg/l
Magnesium (Mg)	1 400	1-3	mg/l
Sodium (Na)	12 121	50-150	mg/l
Potassium (K)	431	3-7	mg/l
Sulfate (SO ₄)	2862	2-4	mg/l
Chloride (Cl)	21 740	80-220	mg/l
Boron (B)	4,6	<1,0	mg/l
Bicarbonate (HCO ₃)	172	2-4	mg/l
pH	8,3	6,5-7,5	
Temperature	12-29	12-29	°C
TDS	39 200	100-500	mg/l

*water quality must comply with EU Standard specification for drink water

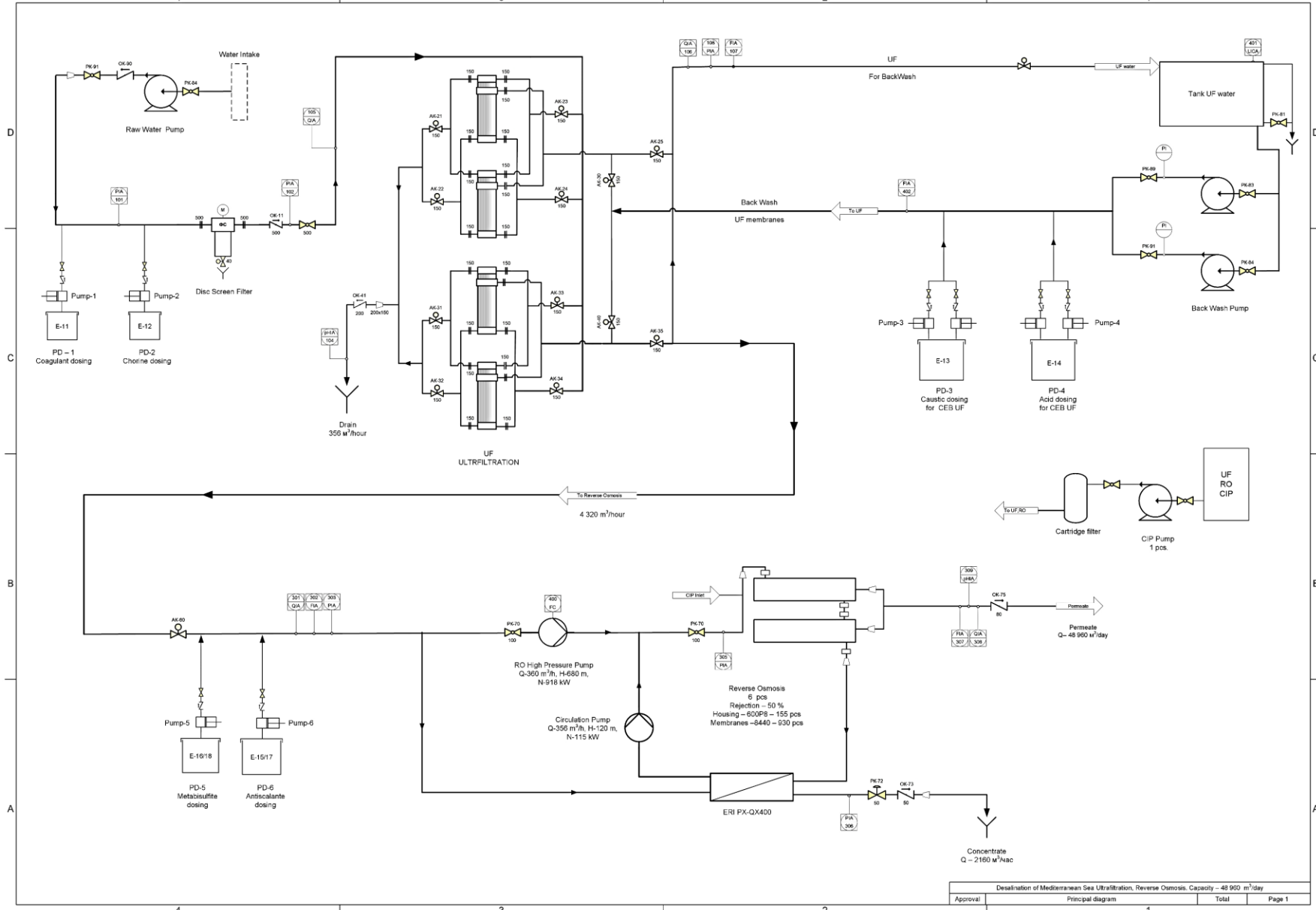
Capacity – 48 960 m³/day,

Recovery – 50%, Rejection – 50%.

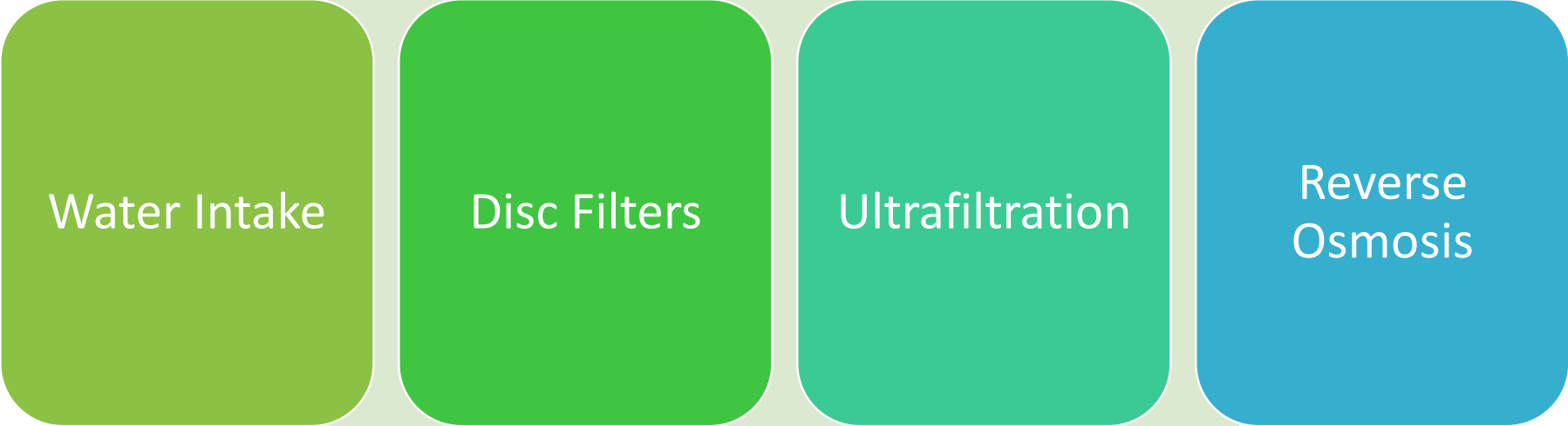
Main electricity consumers for source water temperature:

- minimum temperature of source water 12 °C – 2,9 kW/m³
- average temperature of source water 19 °C – 2,6 kW/m³

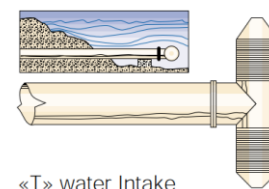
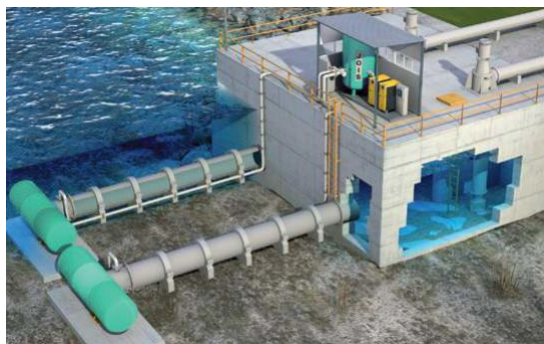
P&ID DIAGRAM



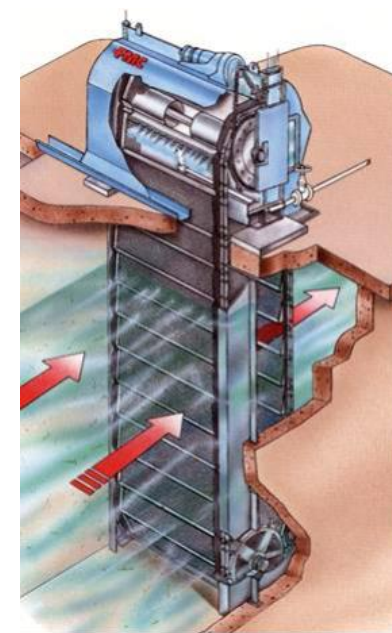
Stage of Process



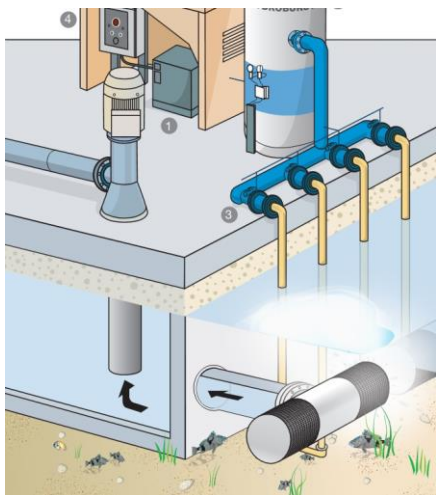
Water Intake



«T» water Intake



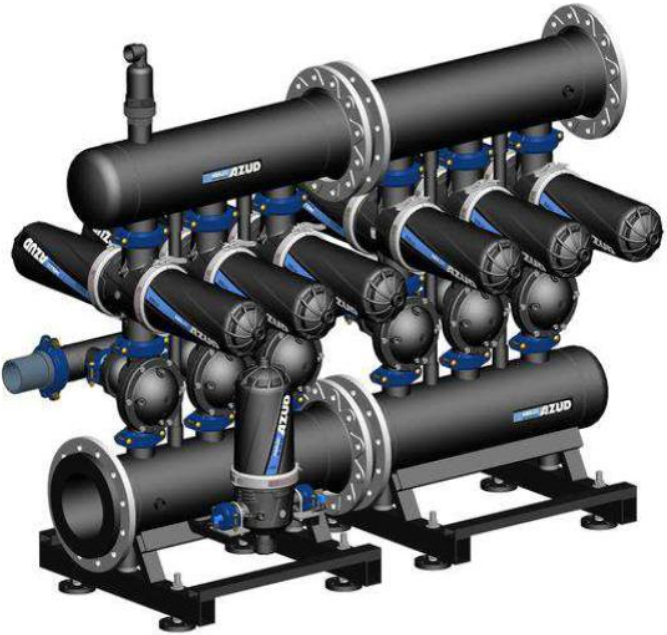
«S» water Intake



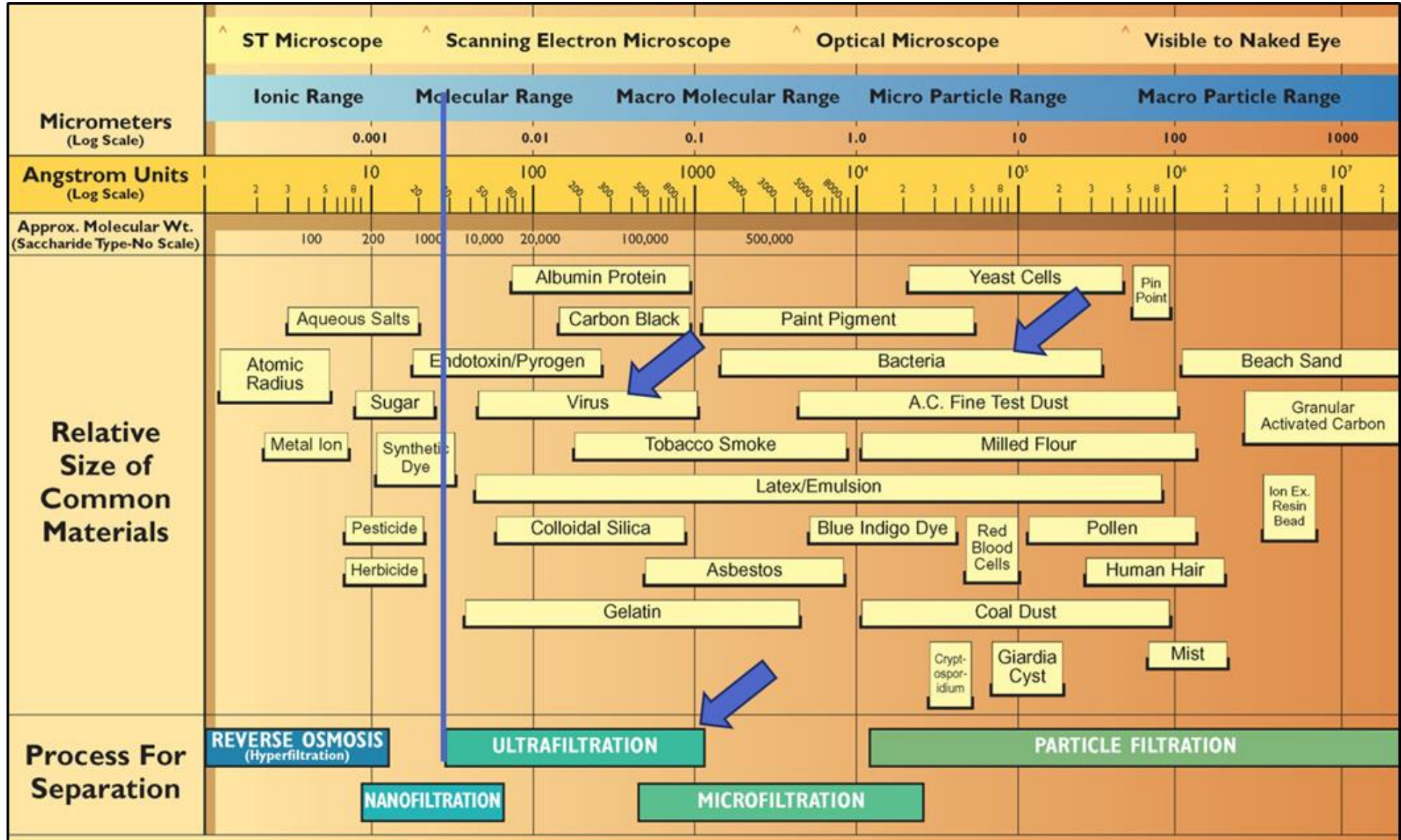
«S» water Intake



Disc Filters



Filtration Spectrum UF



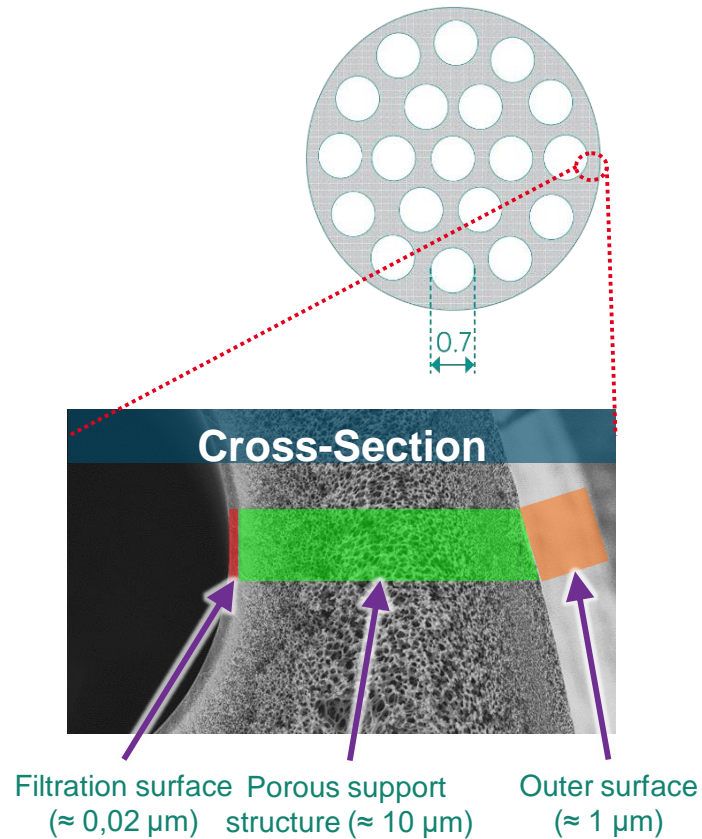
Ultrafiltration

Advantages:

- pore size approx. **10 – 25 nm**
- work pressure – 0,5-1,0 bar
- bruts pressure > **13 bar**
- high chemical and biological resistance
- removes particles, **bacteria**, germs and **viruses**
- pH resistance between **pH 1-13** (no risk of irreversible organic fouling)
- effective cleaning performance, less water for backwash water



Module UF

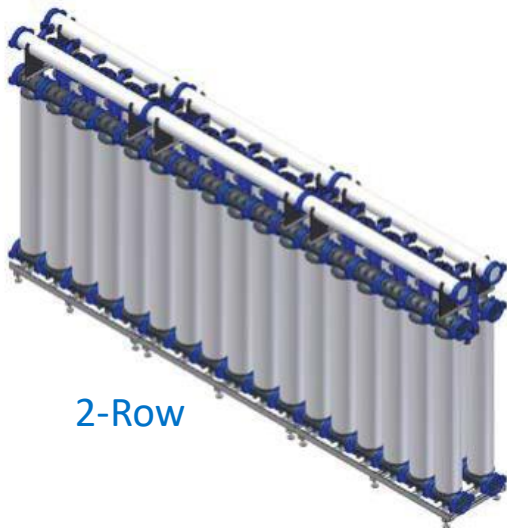


Membrane (capillary)



Membranes Skid T-Rack

Ultrafiltration



2-Row



4-Row



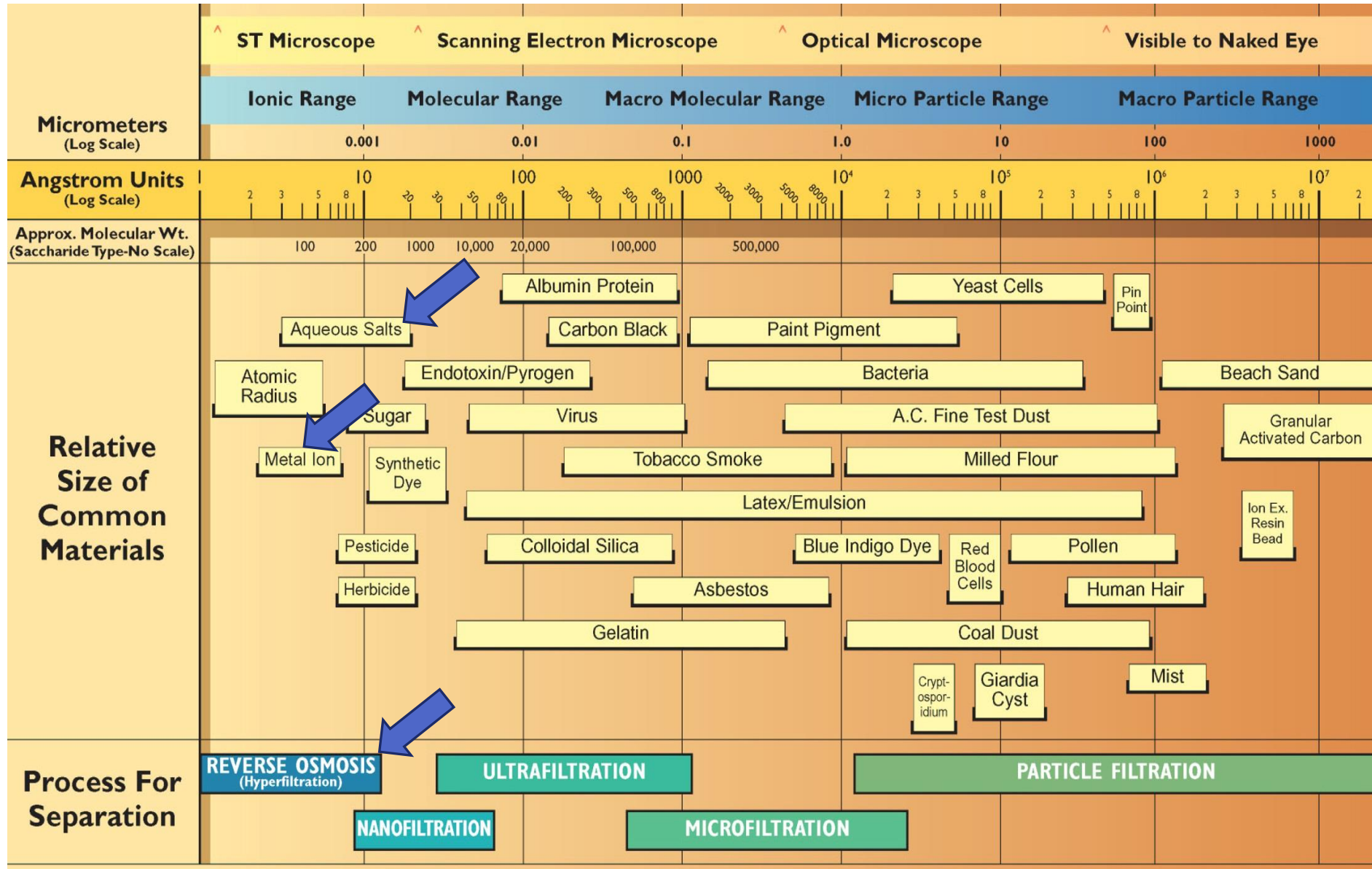
T-Rack



Ultrafiltration

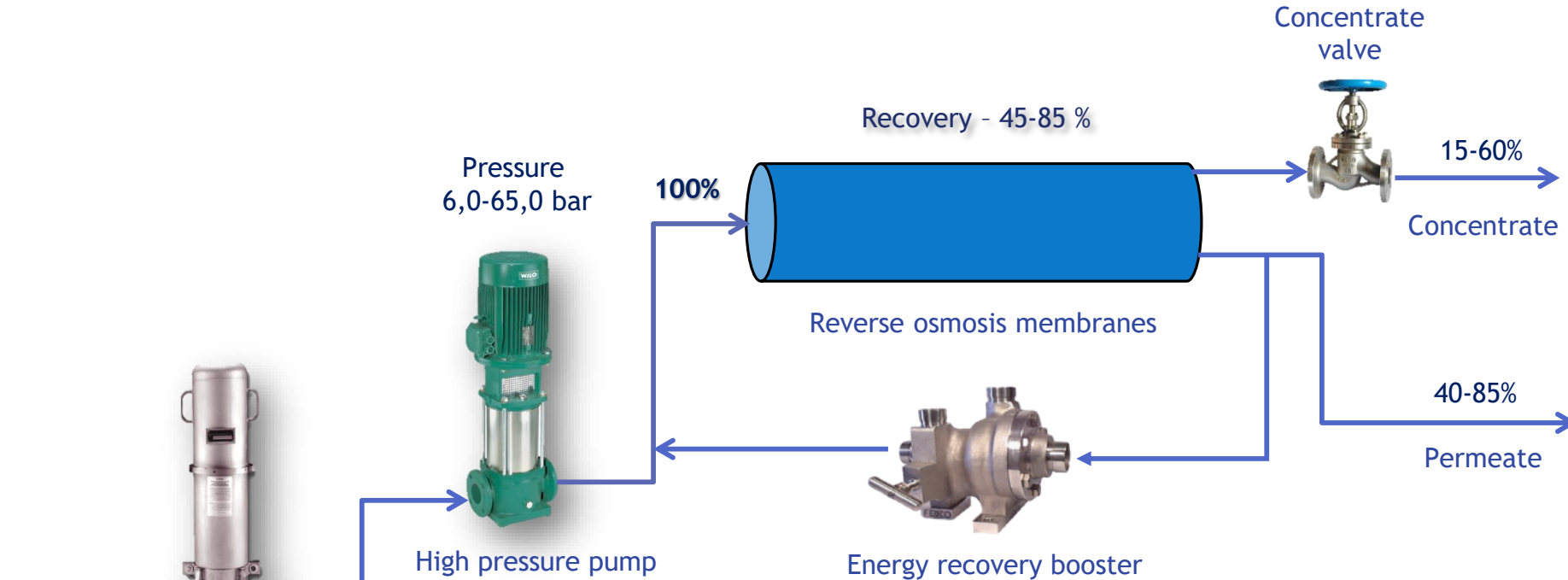


Filtration Spectrum RO



Reverse Osmosis

Reverse Osmosis system design



Cartridge filtration
1-5 micron

High pressure pump

Pressure
6,0-65,0 bar

100%

Recovery - 45-85 %

Reverse osmosis membranes

Energy recovery booster

Concentrate
valve

15-60%

Concentrate

40-85%

Permeate

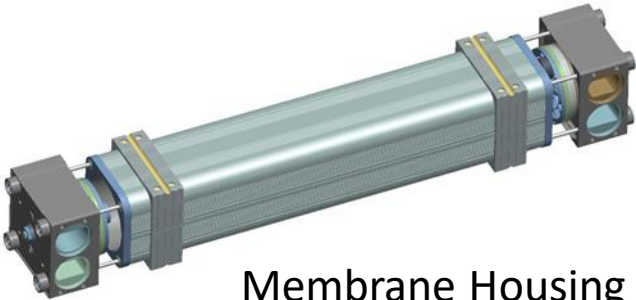
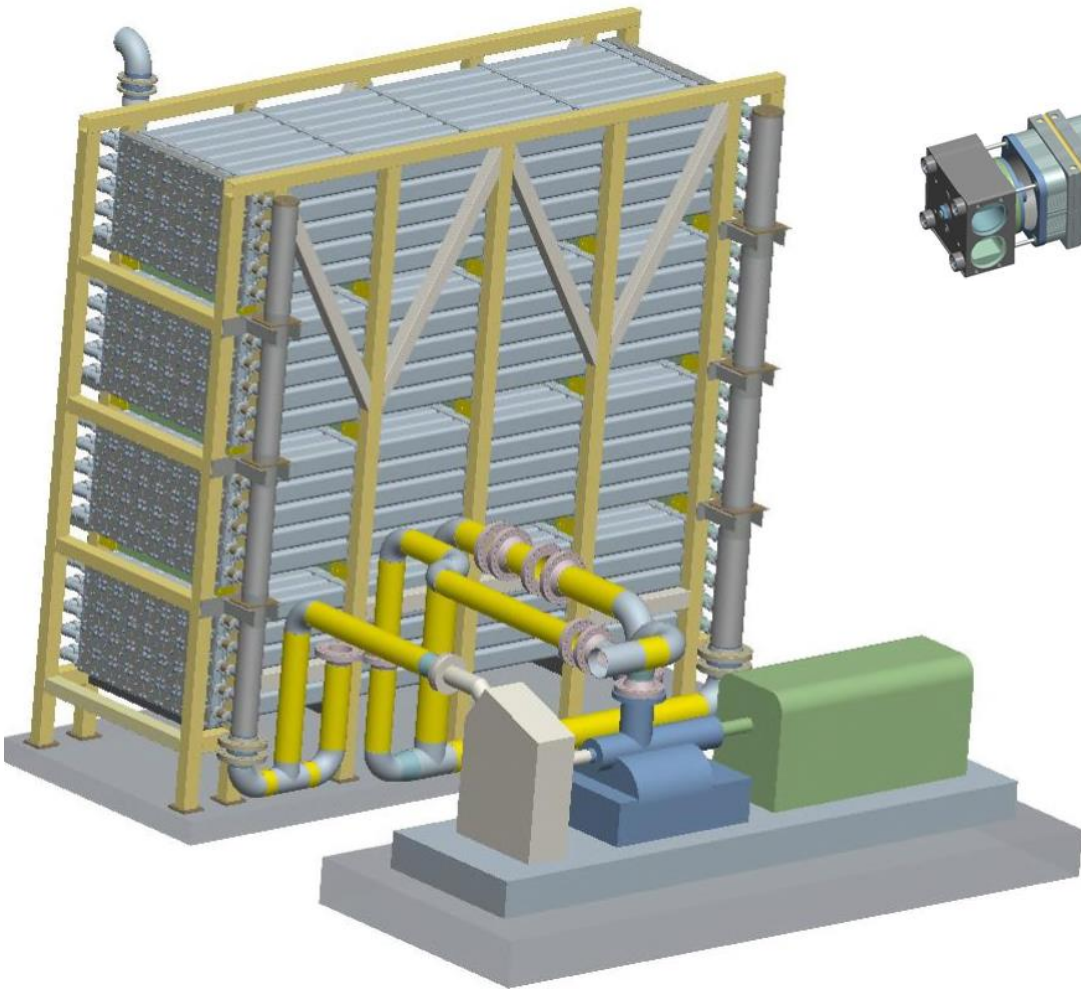
Product quality:

- TDS 150-750 mg/L
- Hardness 0,2-2,0 mg-eq/L

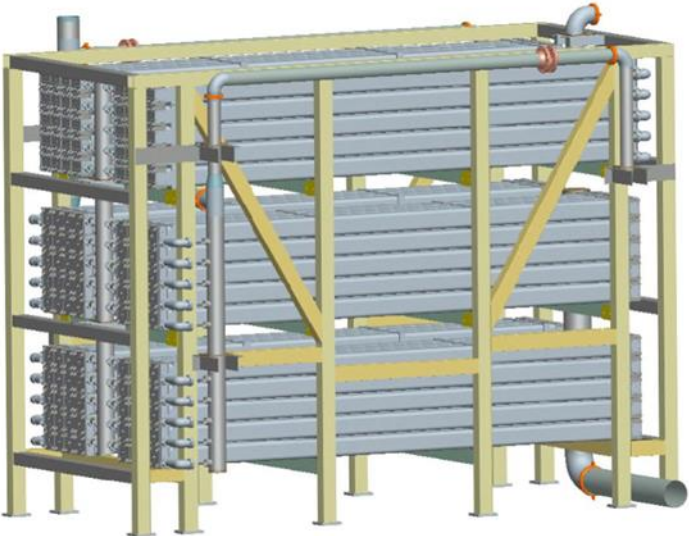
Feed water quality:

- Total dissolved solids (TDS) 500-45 000 mg/L
- Hardness up to 40,0 mg-eq/L

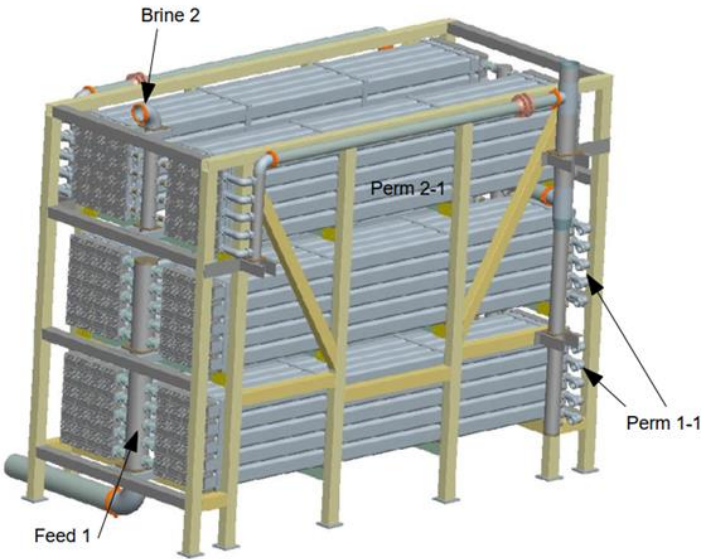
Reverse Osmosis



Membrane Housing



Skid with 120 housings in 2 stages (80 + 40pieces)



Reverse Osmosis



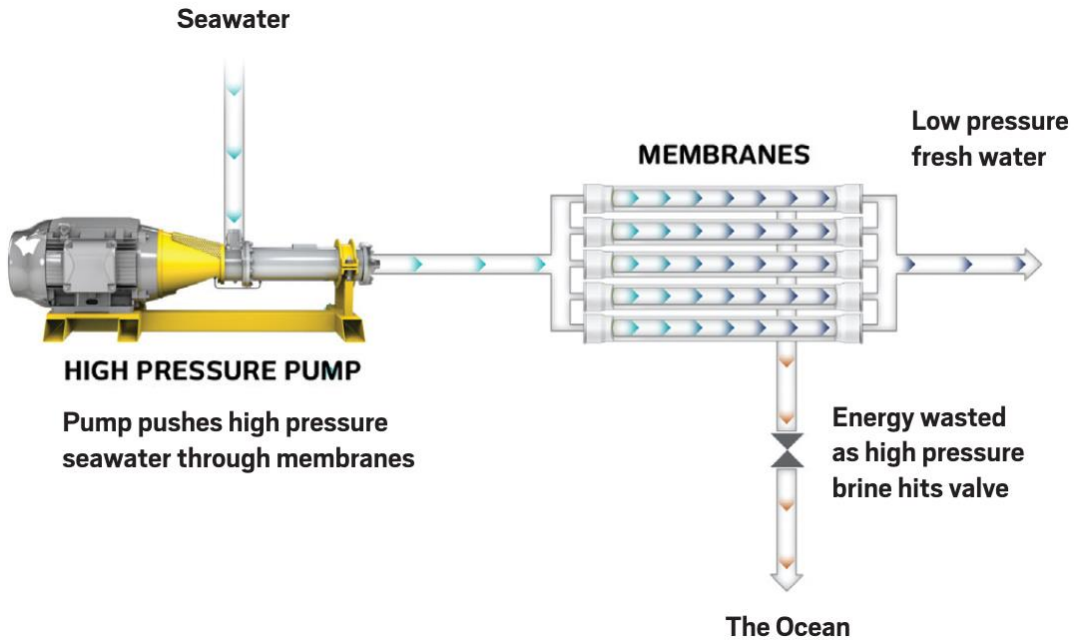
Pressure Exchanger

Historically, energy consumption and costs made SWRO uneconomical.

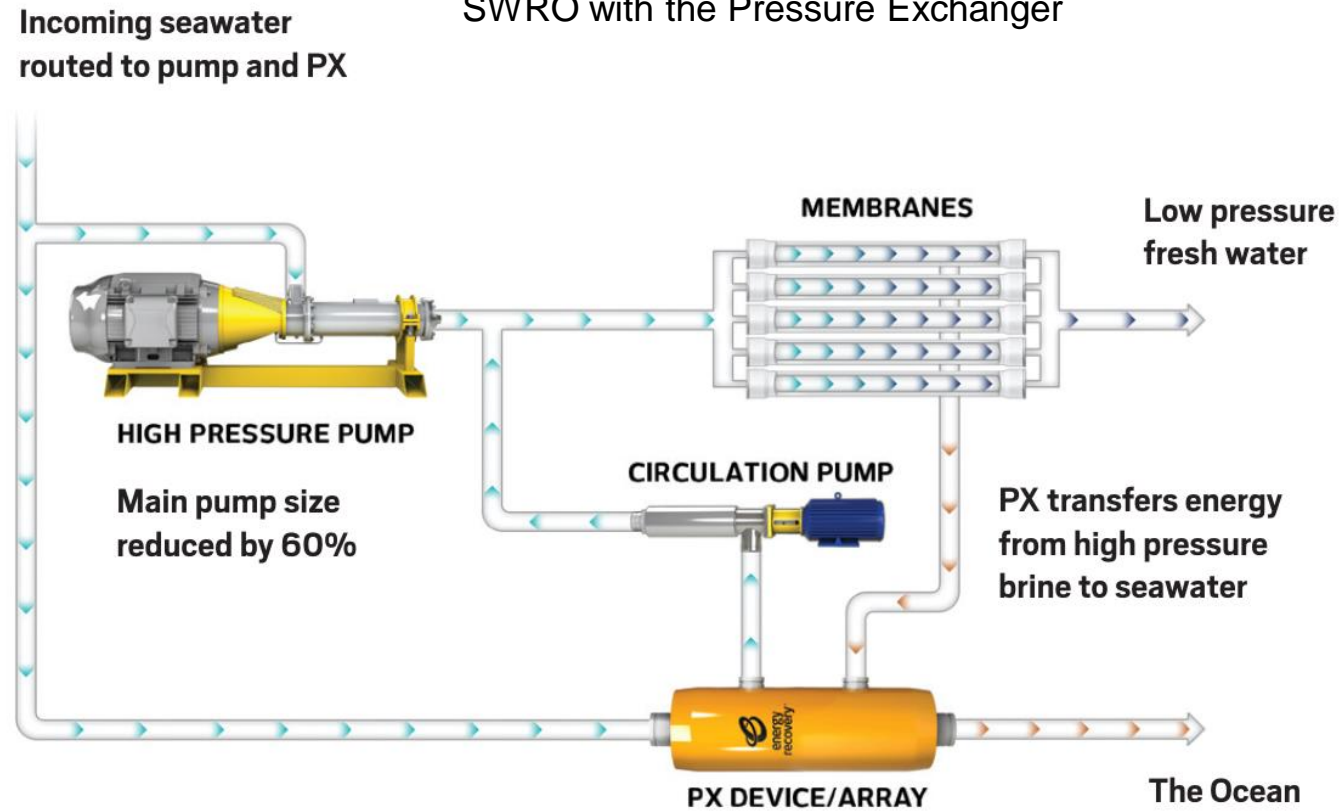
With the Pressure Exchanger, up to 60% of that wasted energy can be recycled

In addition, the site and/or number of high pressure pumps can be decreased.

SWRO without Energy Recovery Devices



SWRO with the Pressure Exchanger



Pressure Exchanger (PX)

Electricity Consumption (12 °C):

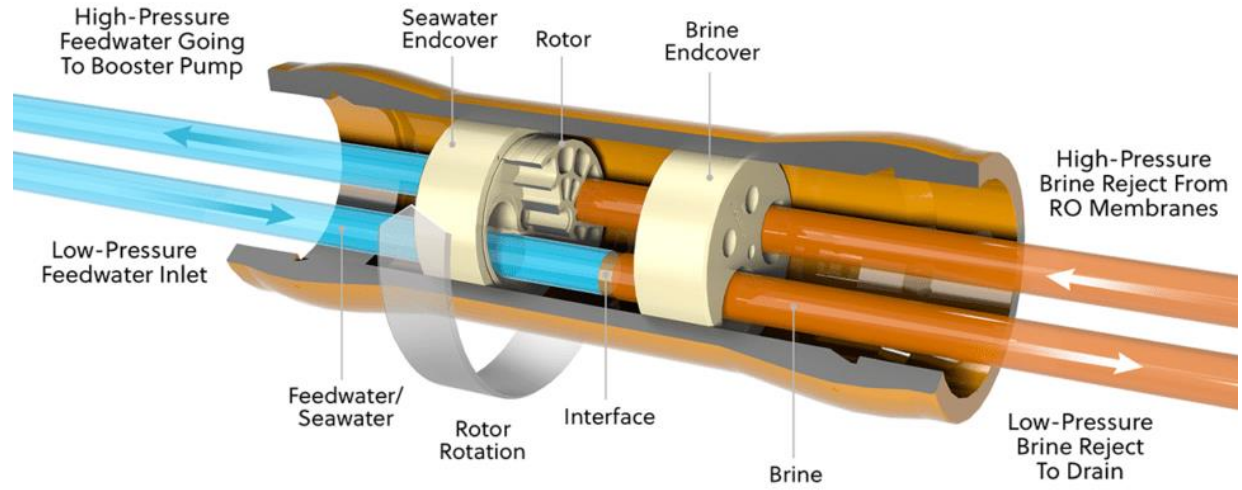
No PX – 4,9 kW/m³

With PX – 2,6 kW/m³

Economy – 2,3 kW/m³



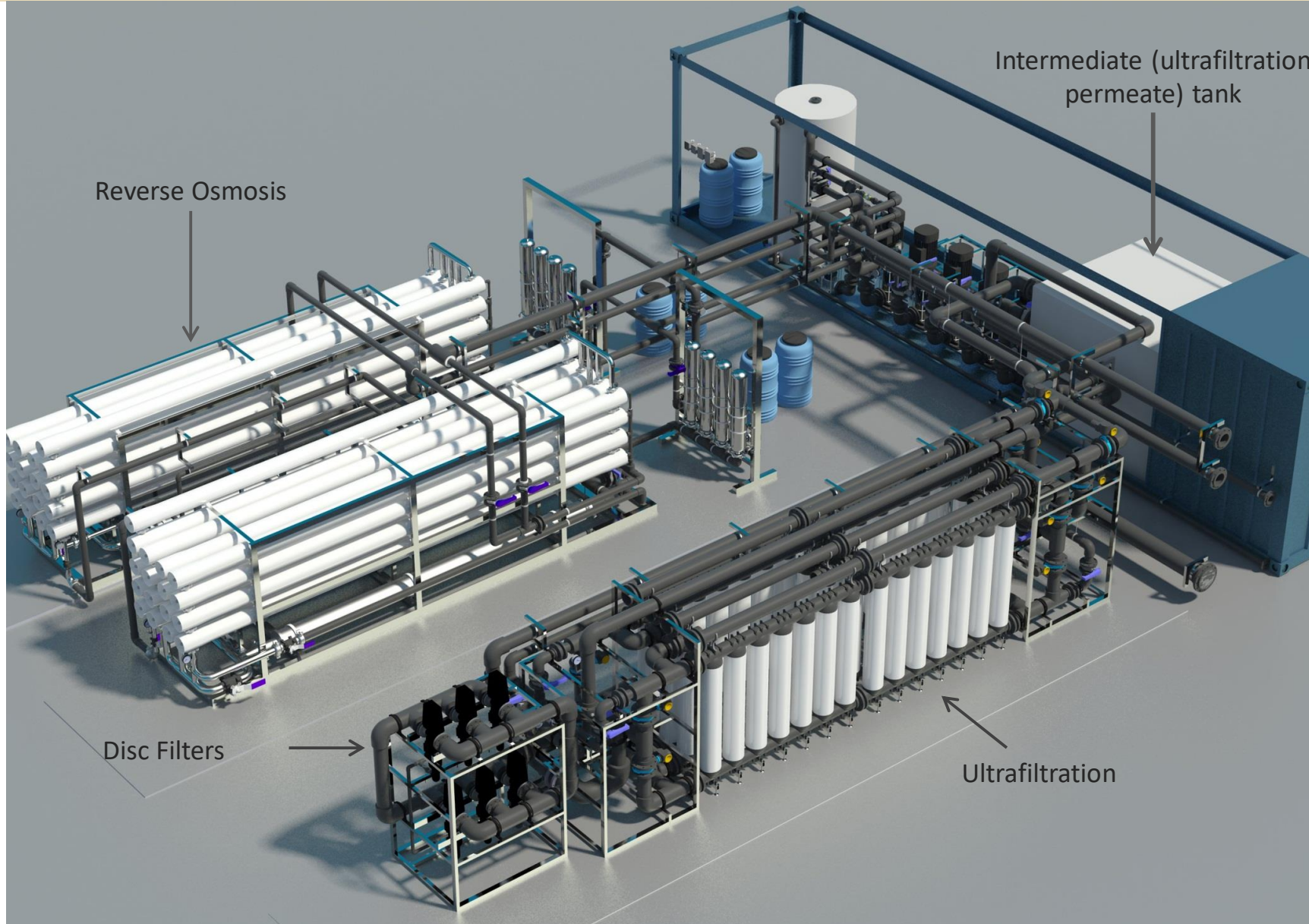
PX Power Train



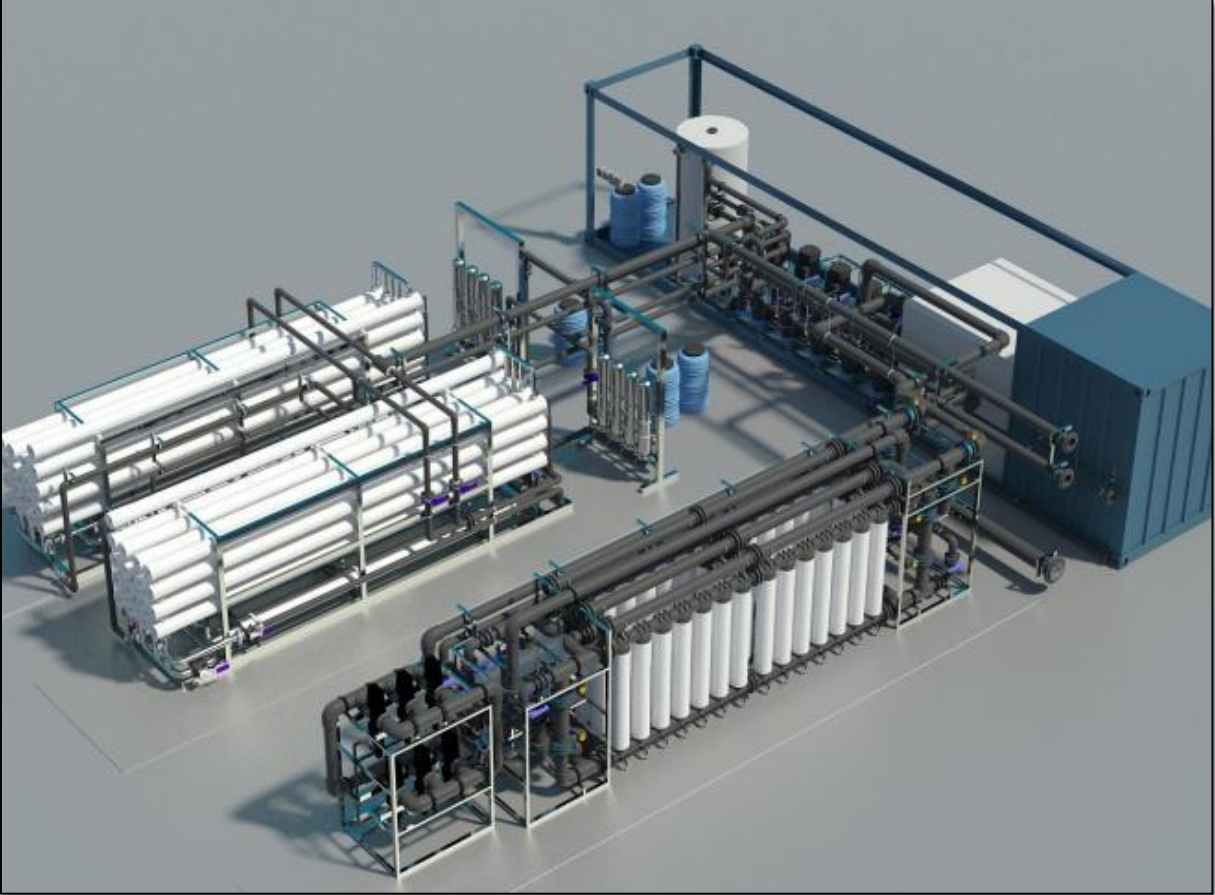
Reverse Osmosis



Containerized Desalination Plant



Containerized Desalination Plant



Containerized Desalination Plant

