المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation

"DTRI Efforts in the Development of Innovative Desalination Technologies''

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DTRI

Overview

- Desalination Technologies Research Institute (**DTRI**) was established in 1987 in Al Jubail city.

- Its initial mission was to serve SWCC desalination plants by troubleshooting the operation and maintenance problems.

- For two decades, **DTRI** has made great progress in :
  - ✓ developing desalination technologies,
  - ✓ improving pretreatment technologies,
  - ✓ increasing the efficiency of the operation & maintenance sector,
  - ✓ lowering the capital costs of SWCC desalination plants.

Di-Hybrid System

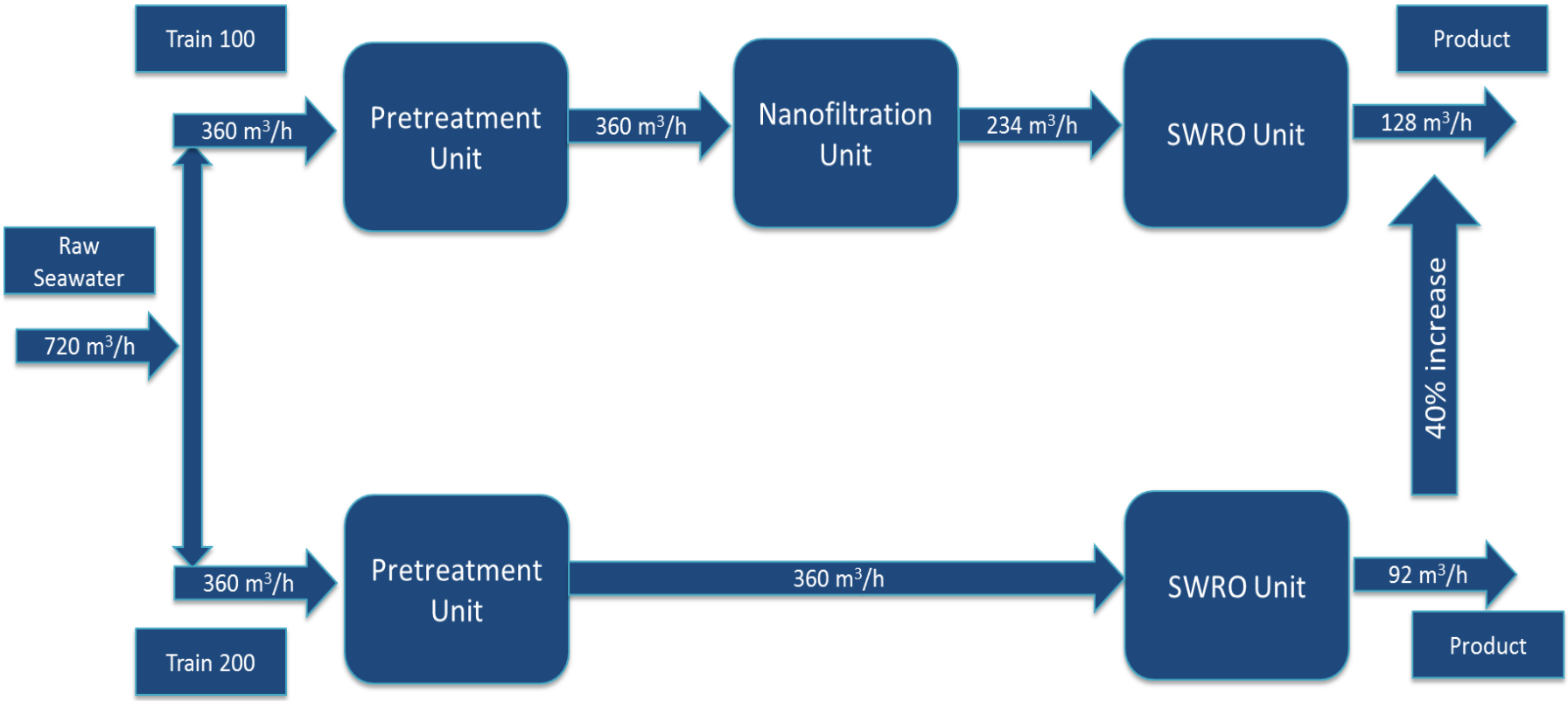
- **SWCC is the first to introduce this concept.**

  For the first time in desalination industry, a novel nanofiltration (NF) – seawater desalination process was developed in which the seawater feed prior to its entry to the desalination plants (membranes or thermal type) is first pretreated/partially predesalinated by the NF membrane process.

- **US Patent.**

  The NF membrane pretreatment overcomes the major problems encountered by the various conventional seawater desalination processes membrane or thermal and received several patents including US patent.

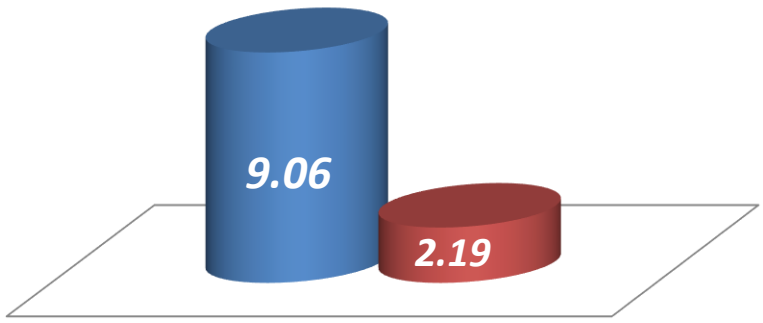
Di-Hybrid System



Di-Hybrid System

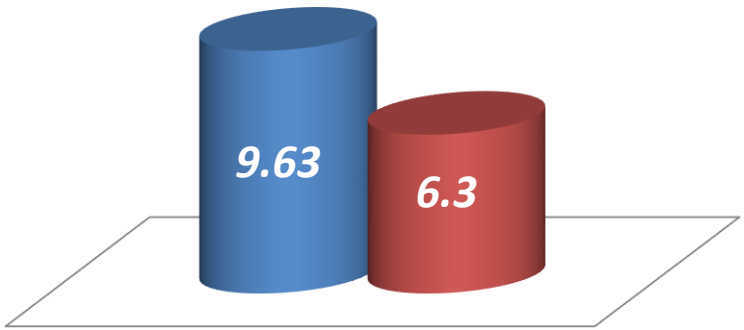
Unit Water Production Cost (SR/m^3)

- For Original Plant
- For Additional Production with NF

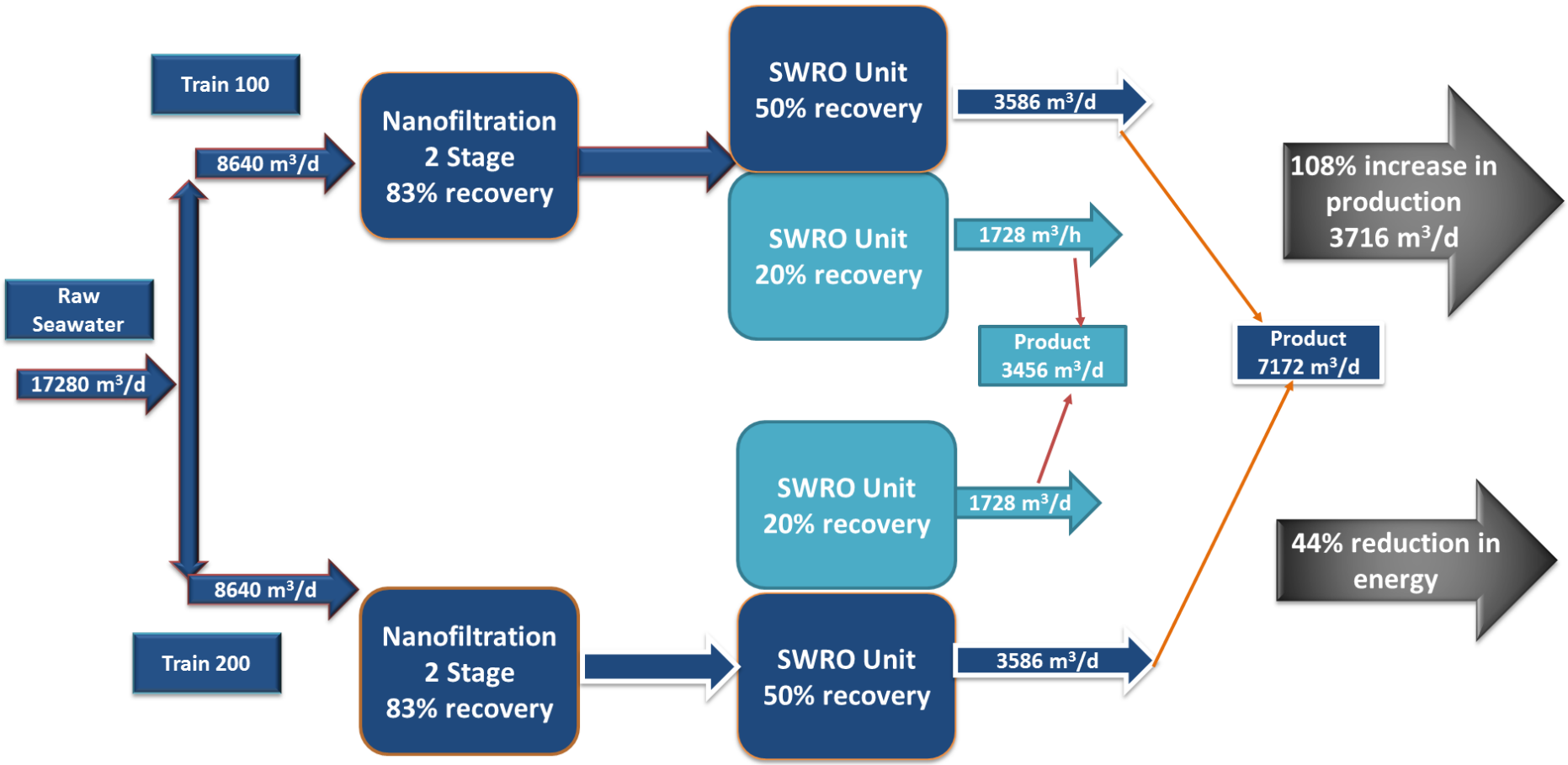


Energy Consumption (kWh/m^3)

- For Original Plant
- For Additional Production with NF



PROPOSED UMMLUJJ SWRO PLANT AFTER INRODUCTION OF 2 STAGE NF in BOTH TRAINS



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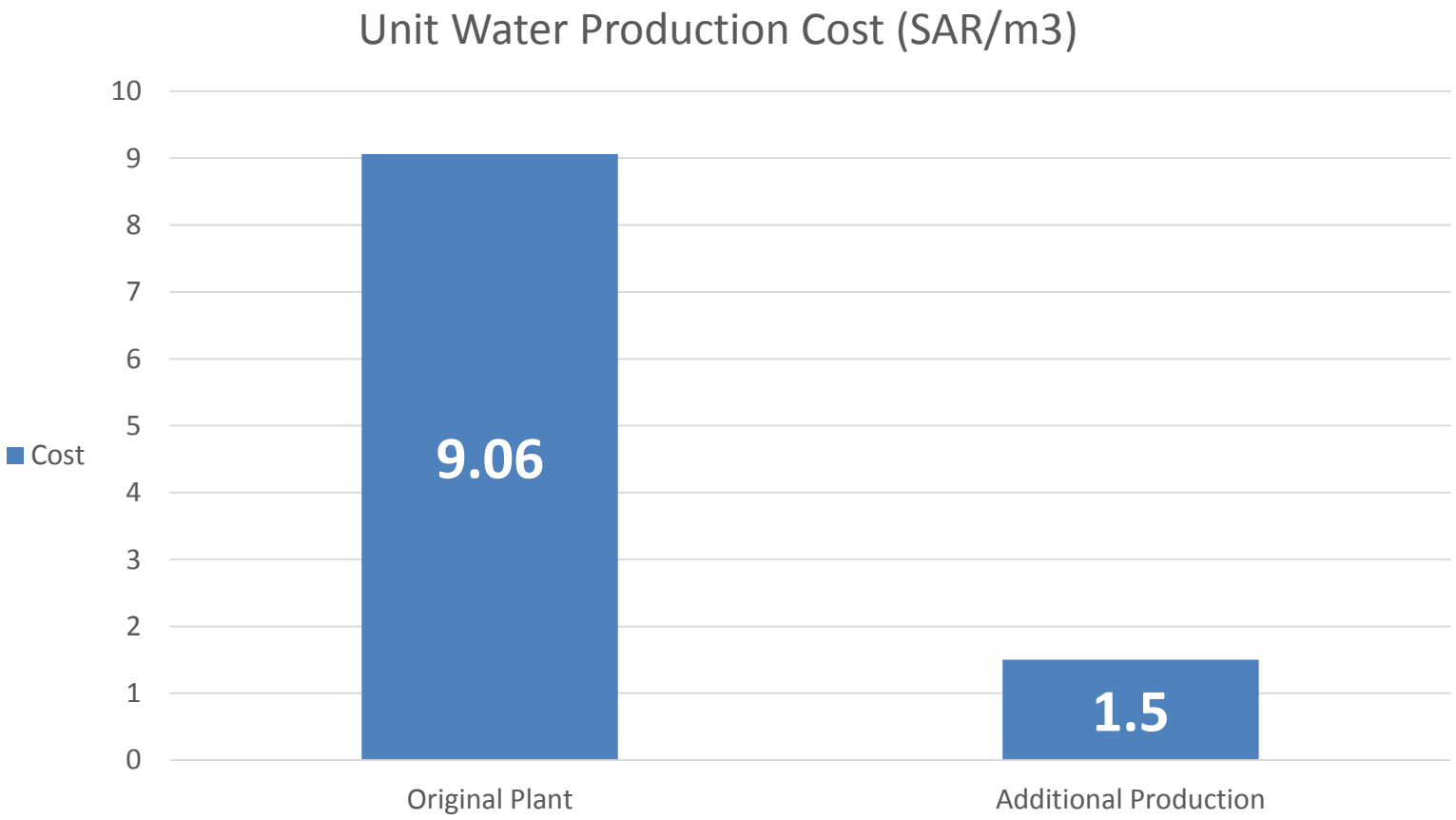


Green RO

- **Develop and evaluate a green SWRO desalination system.**

- Without or minimum use of chemicals.
- With lowest possible cost.
- With sustainable performance.

- **Actions:**

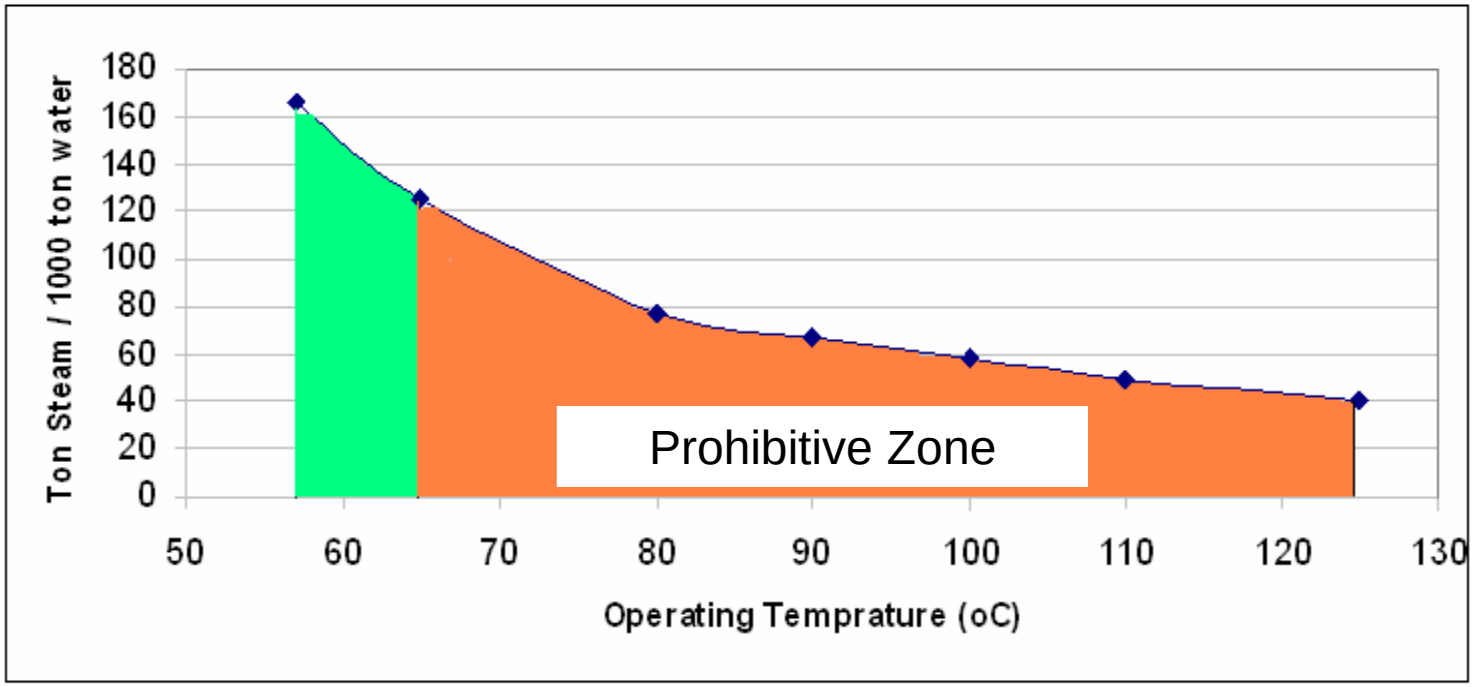
- Sodium Hextametaphsphate (SHMP): Completely Stopped.
- Sulfuric Acid: Completely Stopped.
- Copper Sulfate: dosing decreased from 5 ppm to 1 ppm (once a week).

- **Achievement:**

- Save more than 700,000 SAR annually.

Tri-hybird

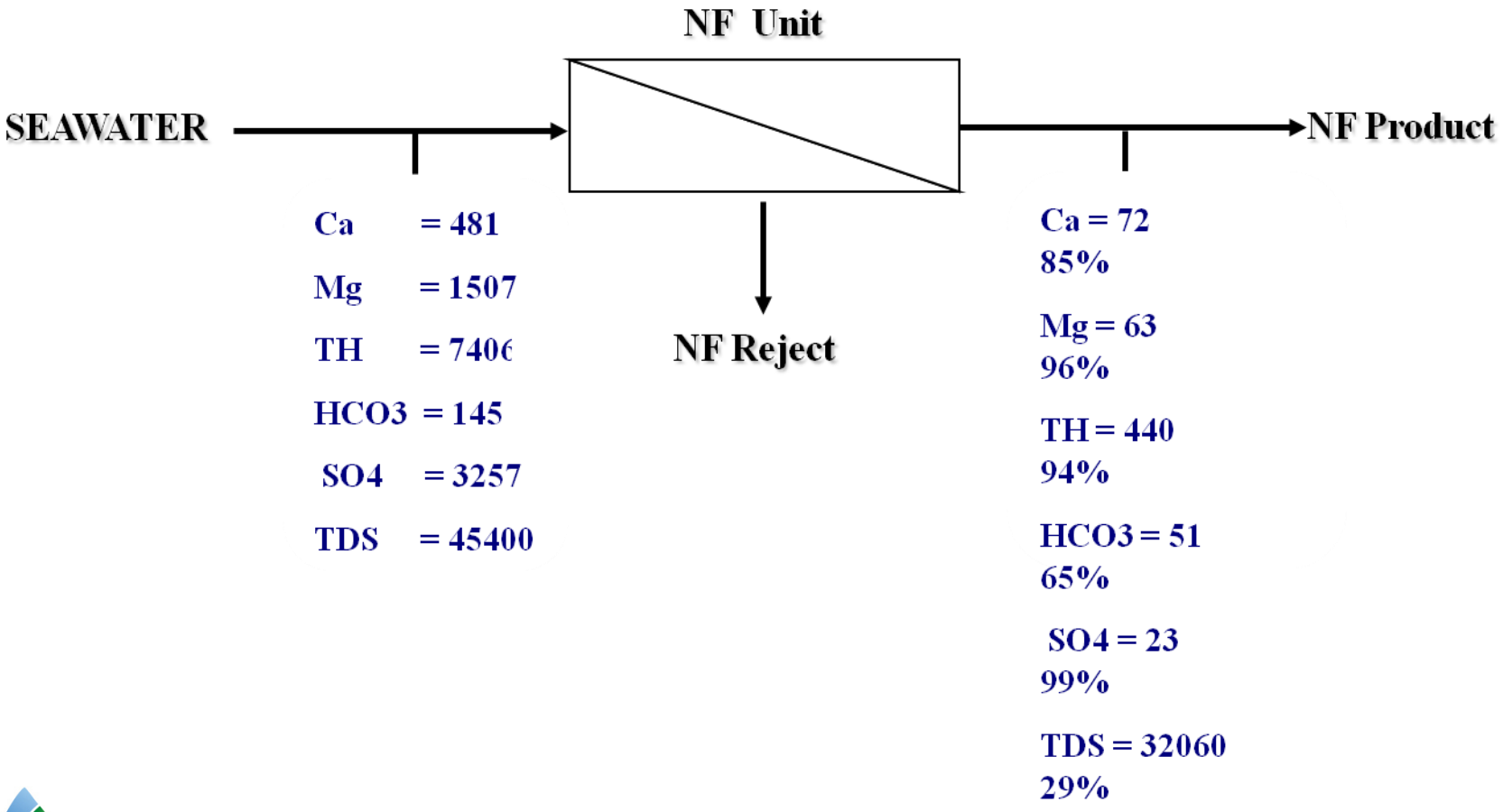
- **To eliminate the possibility of scale formation, commercial MED desalination plants are currently operating with TBT up to 65 ^{o}C**



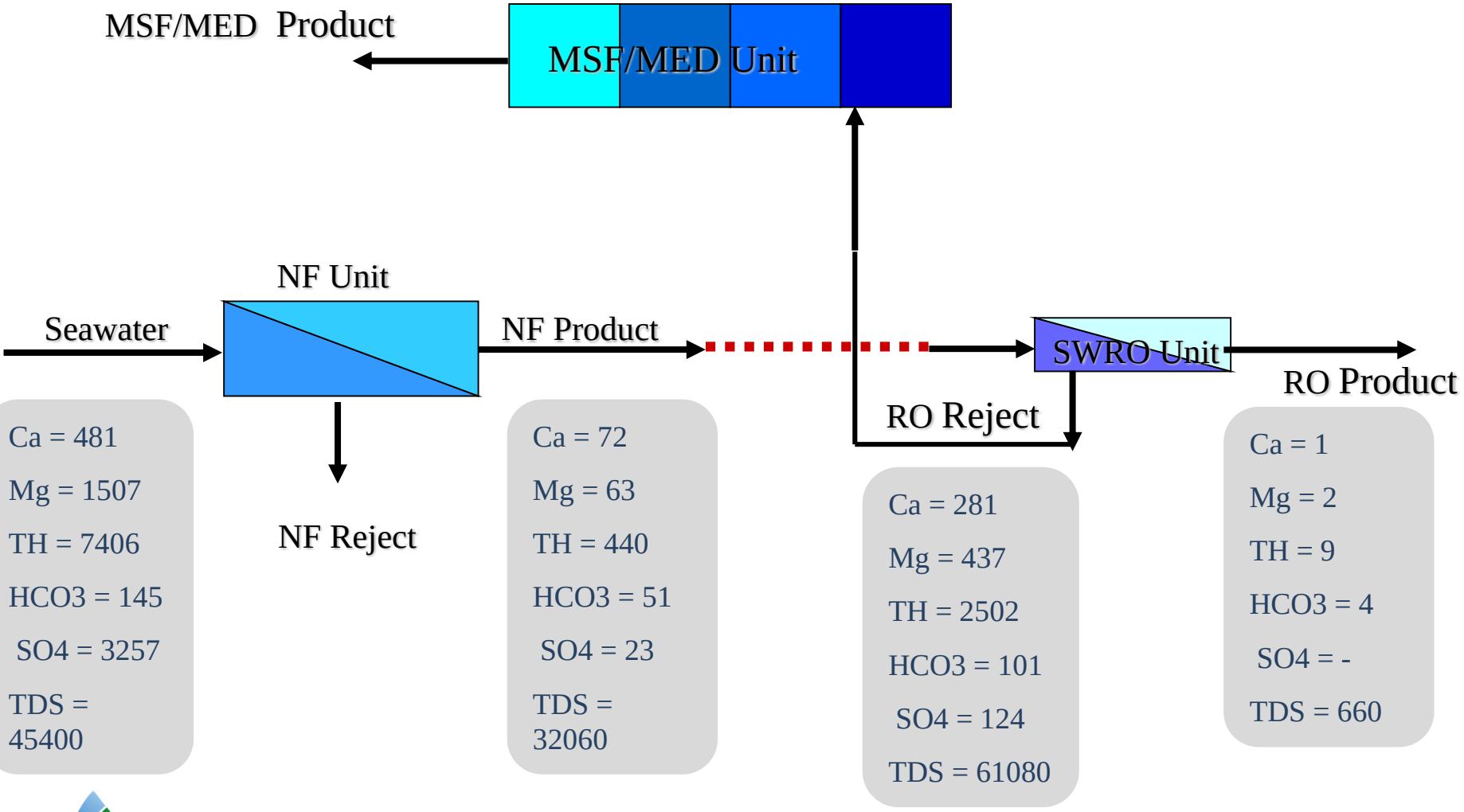
Impact of the variation of operating temperature on the energy consumption of the MED Process

Tri-hybird

- SWDRI introduced a promising and an innovative approach of pretreatment of seawater using Nano-filtration membrane (NF)

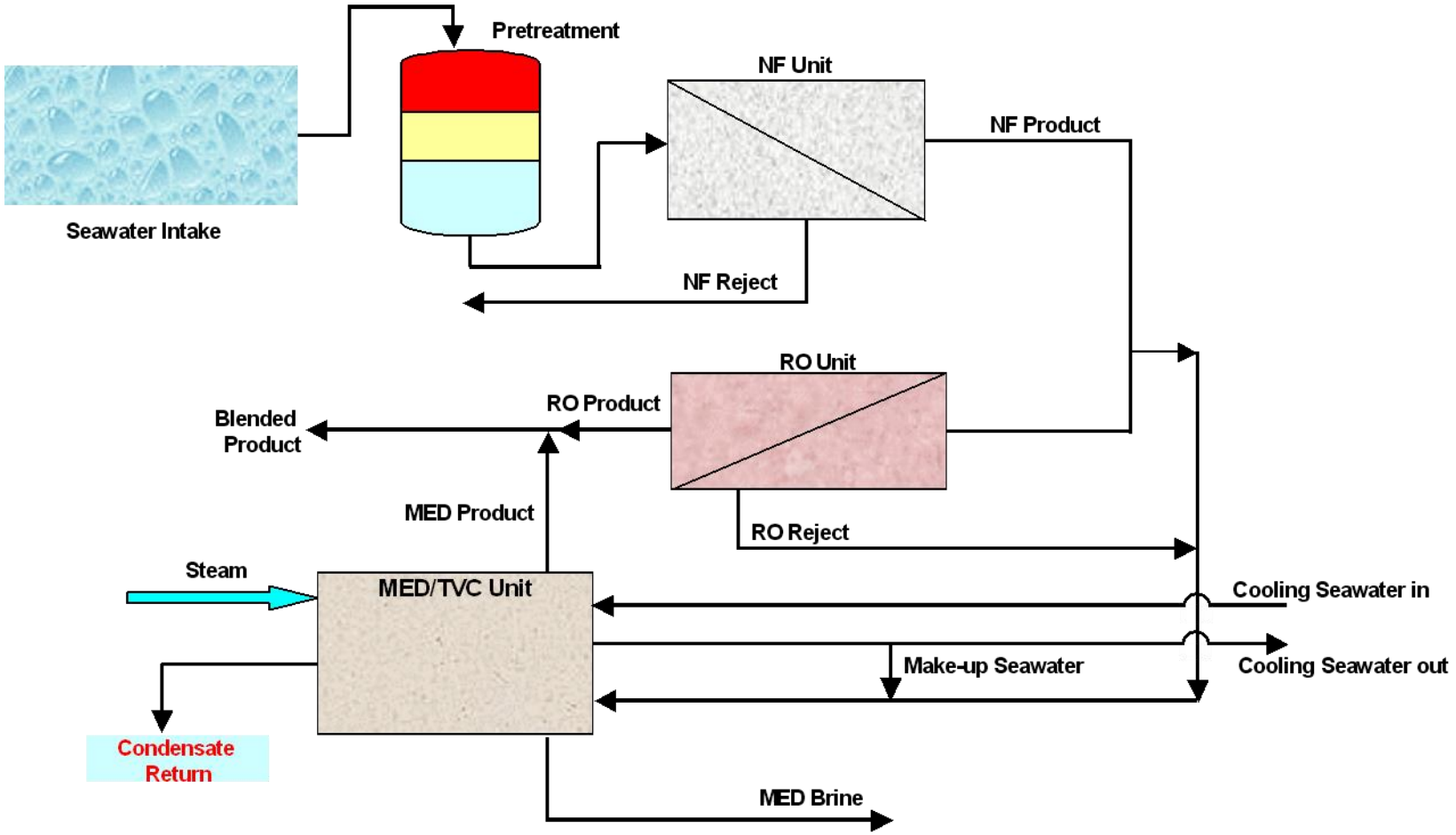


Tri-hybird


MSF/MED Product
MSF/MED Unit
NF Unit
Seawater
NF Product
SWRO Unit
RO Product
RO Reject
NF Reject
Ca = 481
Mg = 1507
TH = 7406
HCO3 = 145
SO4 = 3257
TDS = 45400
Ca = 72
Mg = 63
TH = 440
HCO3 = 51
SO4 = 23
TDS = 32060
Ca = 281
Mg = 437
TH = 2502
HCO3 = 101
SO4 = 124
TDS = 61080
Ca = 1
Mg = 2
TH = 9
HCO3 = 4
SO4 = -
TDS = 660

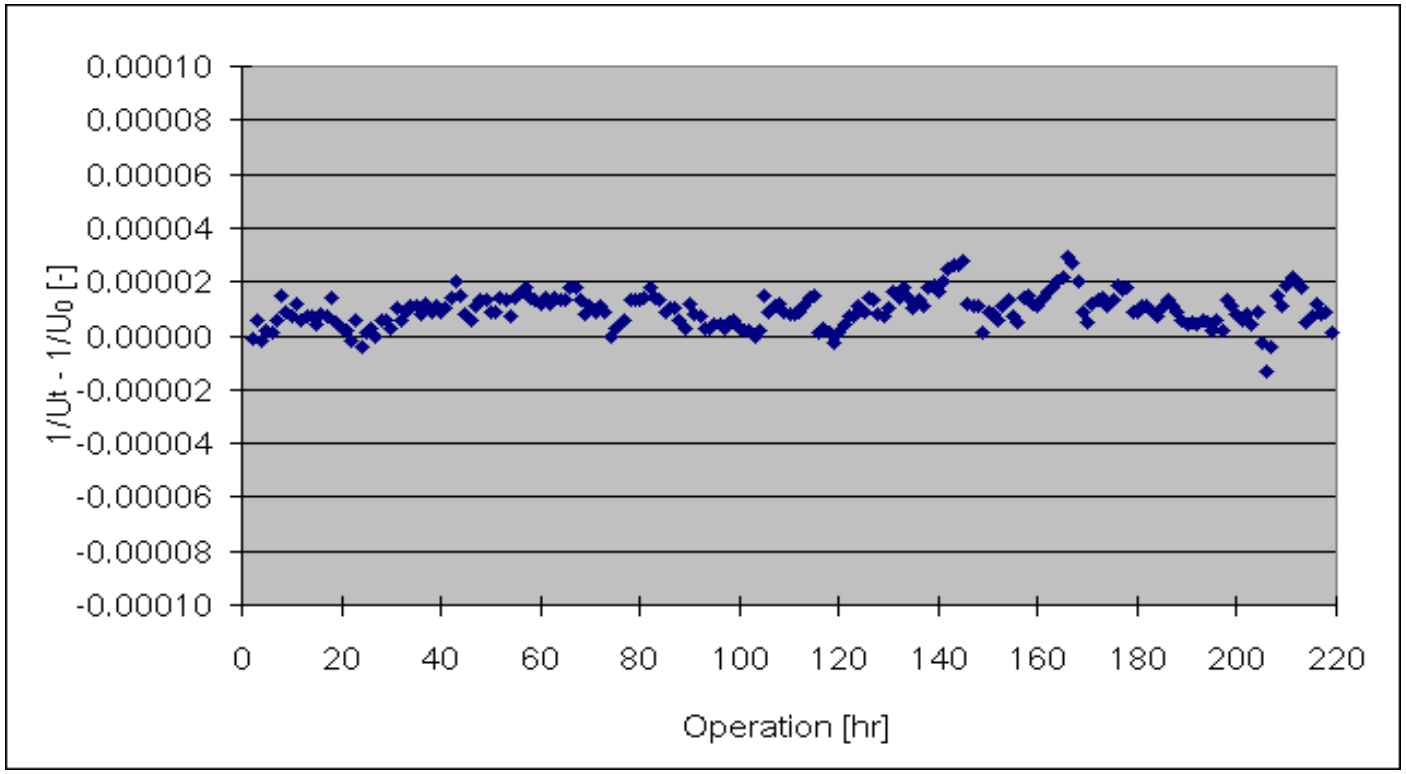
Tri-hybird

- Schematic flow diagram of Tri-hybrid NF/RO/MED desalination system



Tri-hybird

- **THERMAL PERFORMANCE AT 125°C**



The fouling factor of the high temperature (cell# l) when operated at a maximum temperature of 125°C, was virtually constant and there was no sign of deterioration.

Tri-hybird

Post-test visual inspection
Photo of the heat transfer tubes
TBT = 125°C





Thank you

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