



Energy & Water Solutions

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Dow's business is about addressing World Challenges



RESOURCE SCARCITY

By 2030, water needs are expected to grow **50%**

35% Of the world's population will live in water scarce regions by 2020



POPULATION GROWTH

There will be **1 billion** more mouths to feed by 2025

Global food demand will increase **70%** between 2000 and 2050



ENERGY CONSUMPTION

GDP growth will continue to drive energy consumption

Demand should increase by **30%** in the next 15 years

Linear economy model: "take, make and dispose" of raw materials.

RESOURCE EXTRACTION PRODUCTION DISTRIBUTION CONSUMPTION WASTE

to



Circular economy model: "reduced, reused and reclaimed" raw materials.

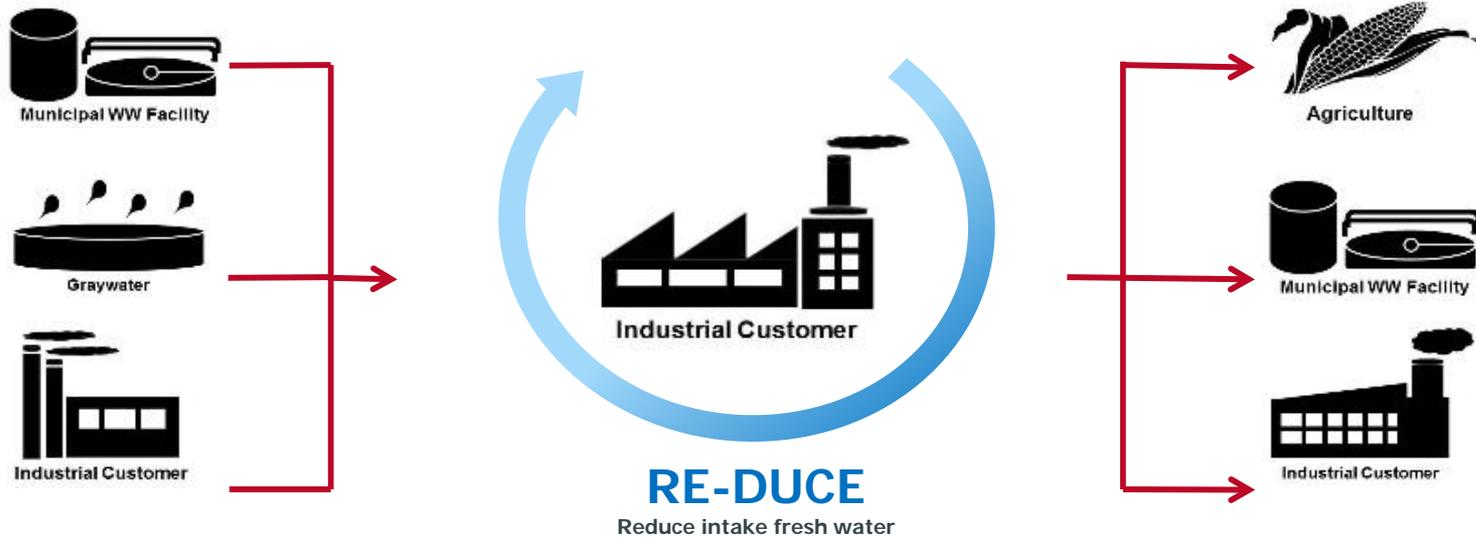


More from Every Drop: reduce energy and increase value

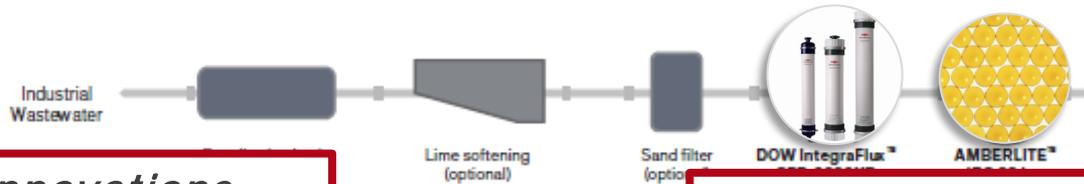
point-of-source
RE-CLAIM
Source reclaimed water

on-site
RE-CYCLE
Increase number of cycles

discharge
RE-NEW
Upgrade for alternate use

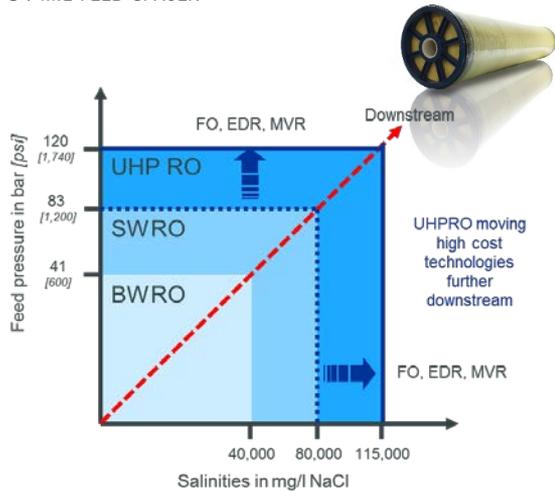


Dow Solutions for Industrial Water Reuse – Reducing Energy Cost Minimal Liquid Discharge (MLD)



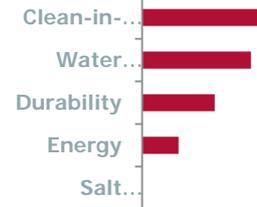
UHP RO Innovations

- PRESSURE RATING UP TO 120 BAR / 1740 PSI
- SPACE SAVING SPIRAL WOUND DESIGN
- MEMBRANE AREA (8") : 285 SQFT / 27M2
- 34 MIL FEED SPACER

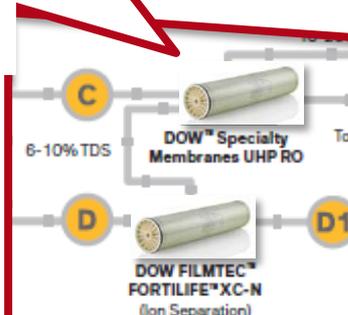
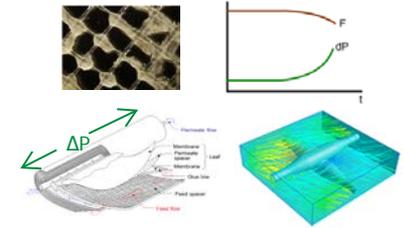


RO Module design Innovations

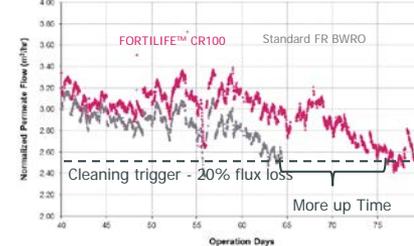
Wastewater Reuse Needs



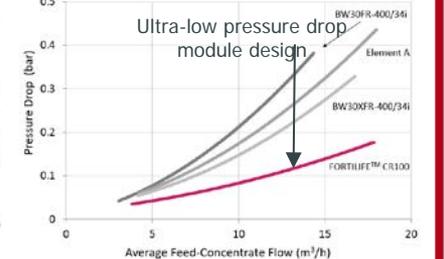
Biological Fouling ($\uparrow \Delta P$)



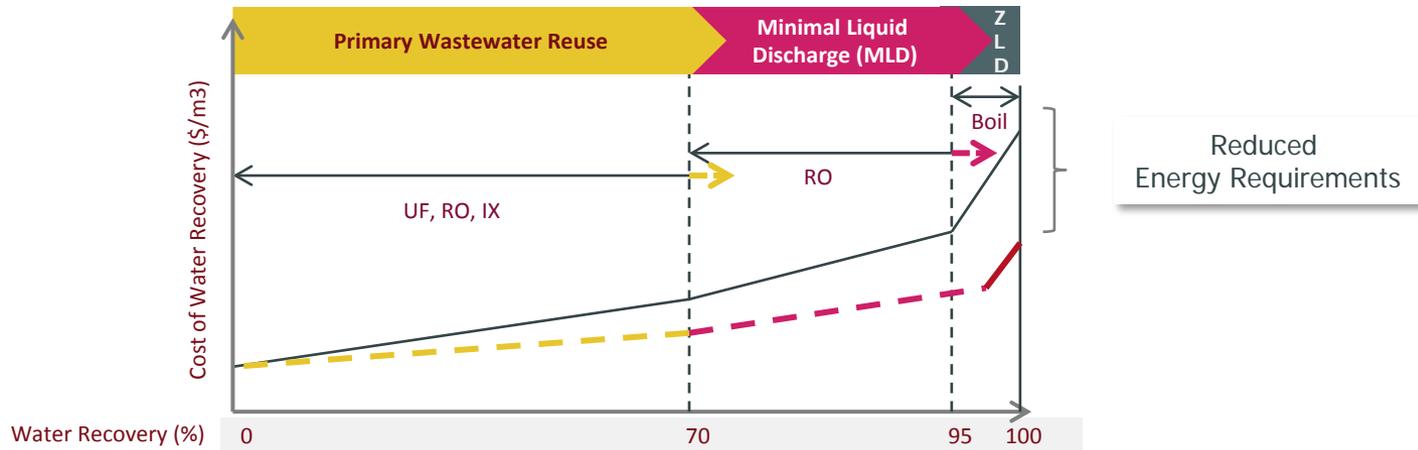
Steel and Iron Industrial Wastewater



8-inch Module Differential Pressure



MLD Changes Operational Discussions – Reducing Energy Requirements



Change focus from...

- How much money can I save by cleaning less frequently?
- How much water can I recover?

To...

- How can I lower my overall cost of water?
- How much additional water can I recover?

Dow Terneuzen Netherlands

Advancing a water circular economy to enable growth in the region

Circular Economy solutions for a scarce fresh water region

Meet Dow's demand:
22 Mm³/yr of fresh water

Breakthrough Public-Private Partnership established to accept Municipal Wastewater

- Water re-used first to generate high pressure steam for site
- Reused again for Cooling Towers
- Finally evaporated

Municipal Wastewater reused 3X

The problem

Terneuzen, Netherlands

FRESHWATER
scarce
REGION

- ↑ Horticulture
- ↑ Agriculture
- ↑ Risk of Salinization



TRANSPORT WATER OVER
120 km
(approximately the distance
between New York City
and Philadelphia)

Benefits

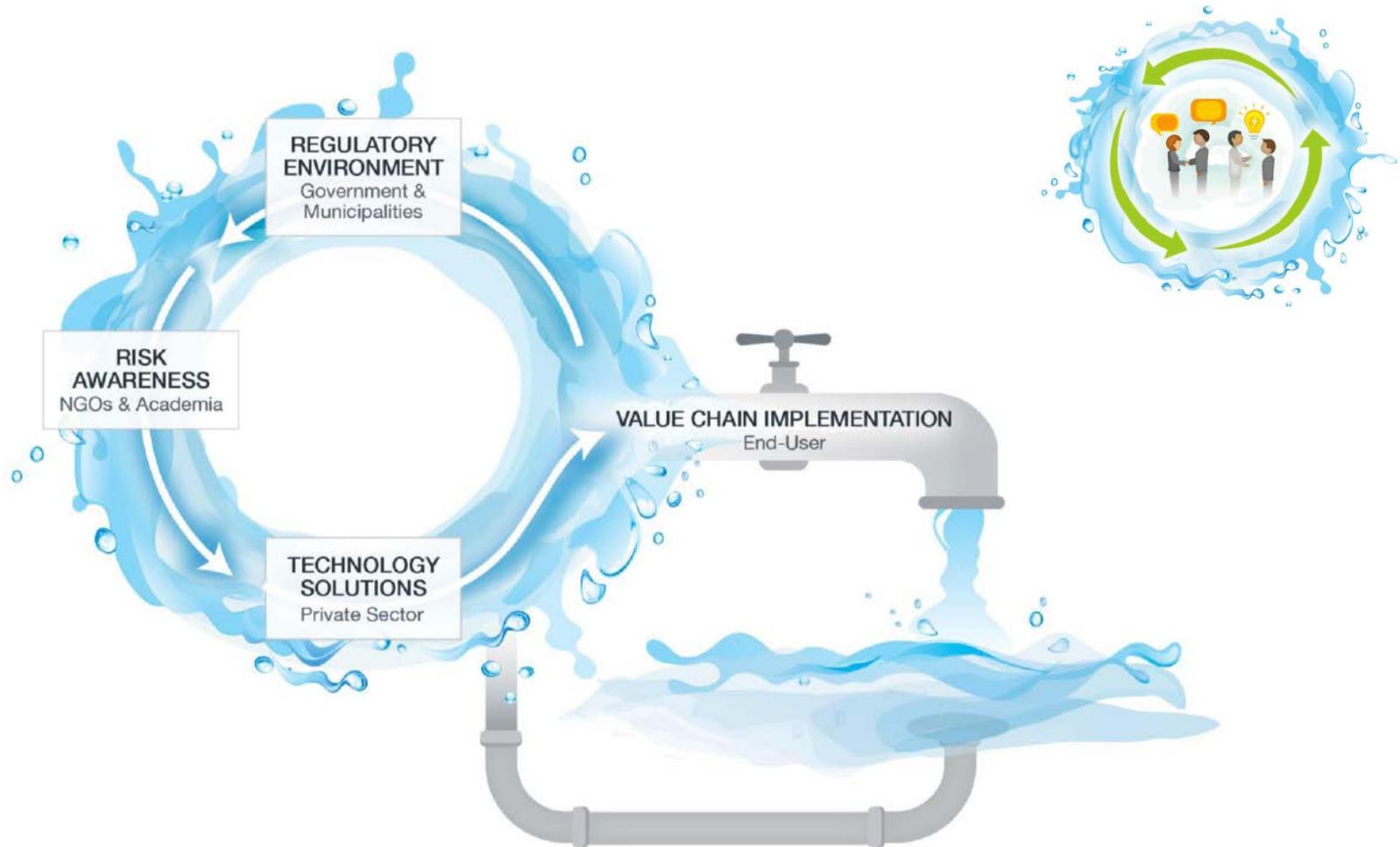


↓ CO₂ emissions
60,000 tons/year



↓ Cost
↓ Energy
95% reduction

Partnering to Address Water Challenges



Thank You.
Let's *discuss.*

