Energy & Water Solutions

George Barclay
Global R&D Director, DW&PS
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.

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

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

- Municipal WW Facility
- Graywater

**Industrial Customer**

**RE-DUCE**
Reduce intake fresh water

- Agriculture
- Municipal WW Facility
- Industrial Customer
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
- Clean-in...
- Water...
- Durability
- Energy
- Salt...

Biological Fouling ($\Delta P$)

Steel and Iron Industrial Wastewater

Ultra-low pressure drop module design

Cleaning trigger - 20% flux loss

More up Time

DOW RESTRICTED
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

Benefits
↓ CO₂ emissions 60,000 tons/year
↓ Cost
↓ Energy 95% reduction

TRANSPORT WATER OVER 120 km (approximately the distance between New York City and Philadelphia)
Partnering to Address Water Challenges
Thank You.
Let’s discuss.