

GE Water & Process Technologies



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GE Water & Process Technologies



imagination at work

GE's portfolio

- 4 businesses operating in more than 160 countries ... 125+ years
- Over 300,000 employees worldwide
- 2008 revenue \$183B

GE Capital



- Aviation Financial Services
- Commercial Finance
- Energy Financial Services
- GE Money
- Treasury

NBC Universal



- Cable
- Film
- International
- Network
- Sports & Olympics

Technology Infrastructure



- Aviation
- Enterprise Solutions
- Healthcare
- Transportation

Energy Infrastructure



- Oil & Gas
- Energy Services
- Power & Water

Becoming the global water leader

Glegg

BetzDearborn

Osmonics

Ionics

ZENON

✓ Pure Water Solutions

✓ Water & Process Specialty Chemicals

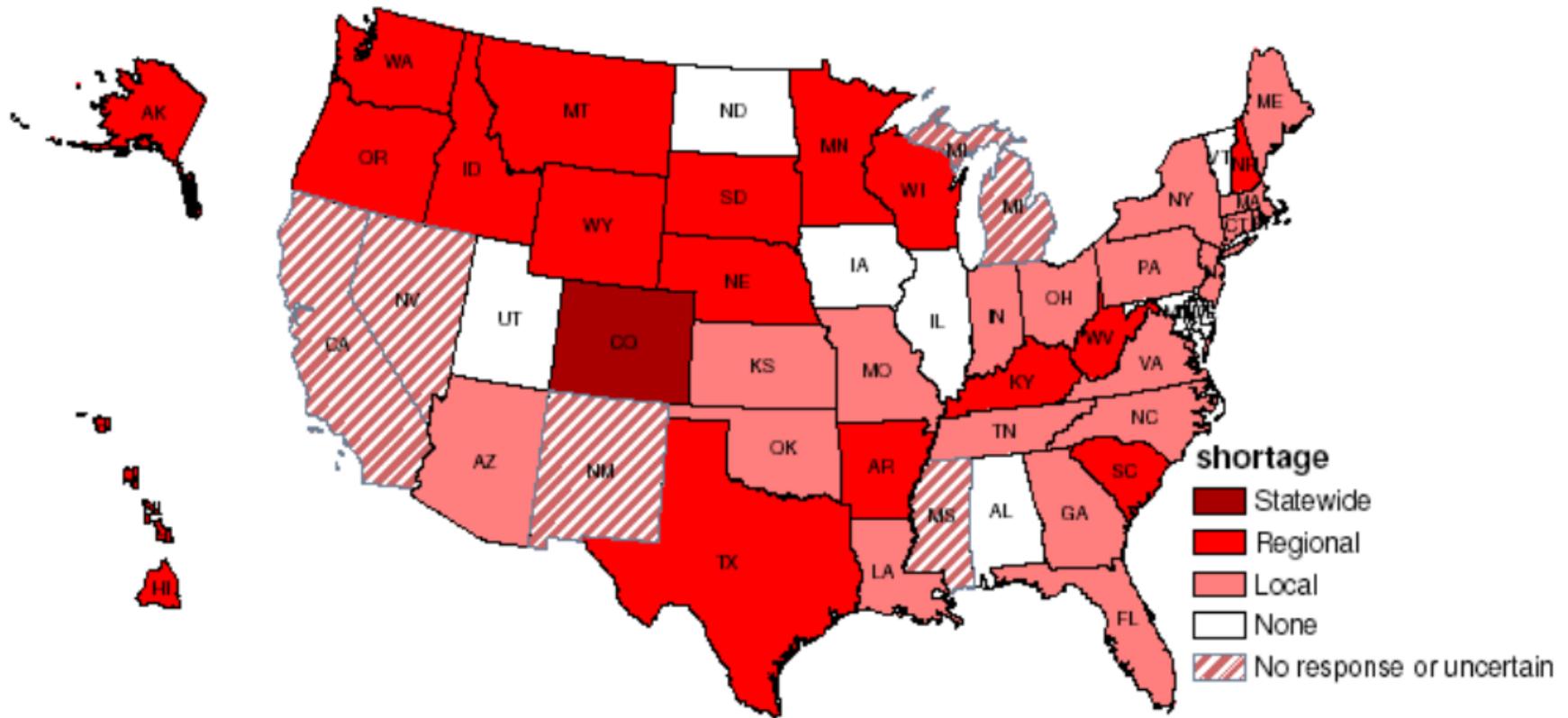
✓ Equipment & Membranes

✓ Desalination & Reuse
✓ Mobile Water

✓ Hollow Fiber Technology
✓ MBR Technology



Most States expect water shortages over the next decade under average conditions

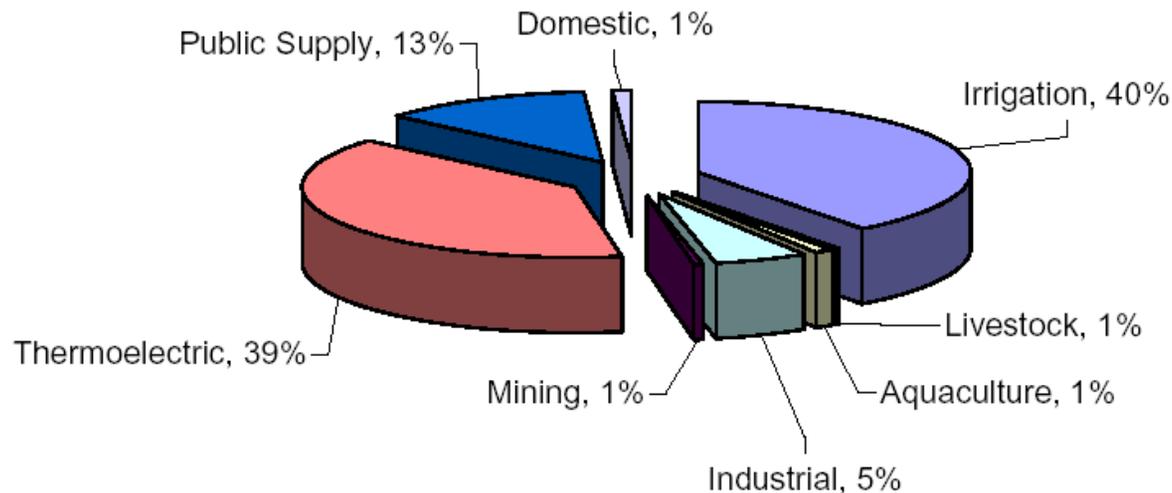


Source: GAO 2003

US freshwater *withdrawals*

- Industrial users consume 45% of all US freshwater withdrawals
- 39% of US freshwater withdrawals are used in thermoelectric (non-hydro) power generation

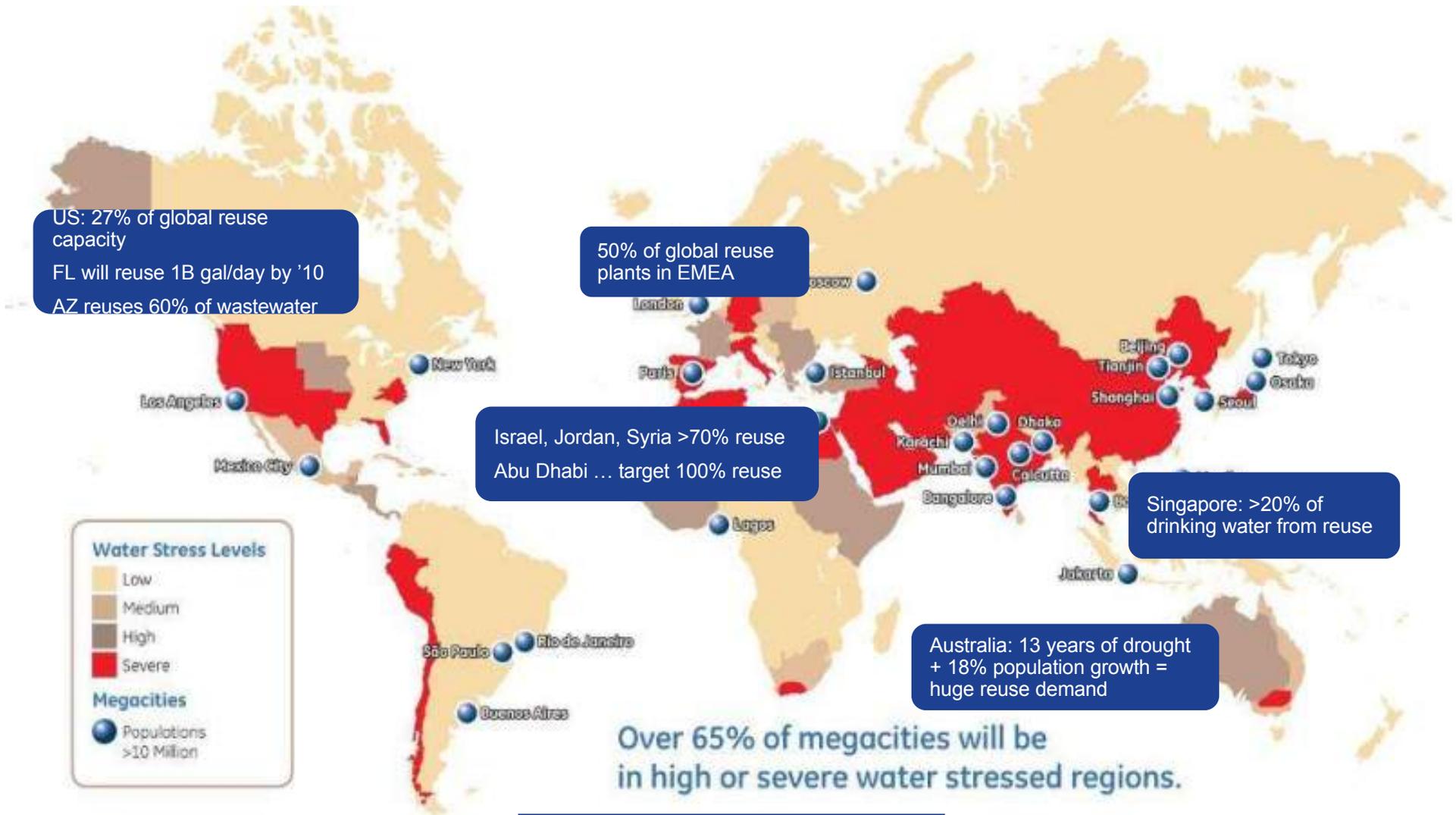
U.S. Freshwater Withdrawal (2000)



Sources: USGS, *Estimated Use of Water in the United States in 2000*, USGS Circular 1268, March 2004
USGS, *Estimated Use of Water in the United States in 1995*, USGS Circular 1200, 1998

Water scarcity 2025

Reuse increasing from ~4% of WW treated to 22%



Scarcity driving reuse

Solaire Apartments, Battery Park

Building Type: Multi-unit residential

Building Size: 357,000 sq. feet (33,160 sq. meters)

Occupancy Date: August 2003

Application: Wastewater reuse

Capacity: 25,000 gpd (95 m³/d)

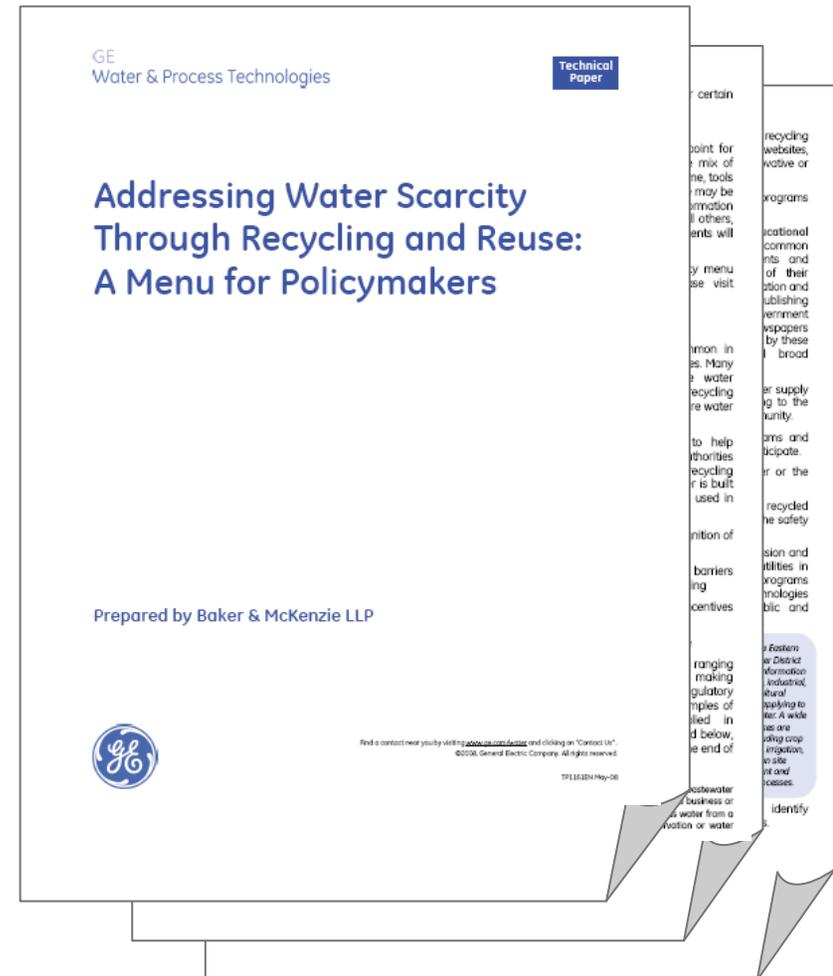
LEED Rating: U.S. Green Building Council LEED-NC Gold



Water Reuse White Paper

- GE releases global White Paper on how governments can promote greater reuse (May 2008)

- ✓ Education & Outreach
- ✓ Remove Barriers
- ✓ Stricter Regulations
- ✓ Incentives



Advocating Water Reuse Incentives

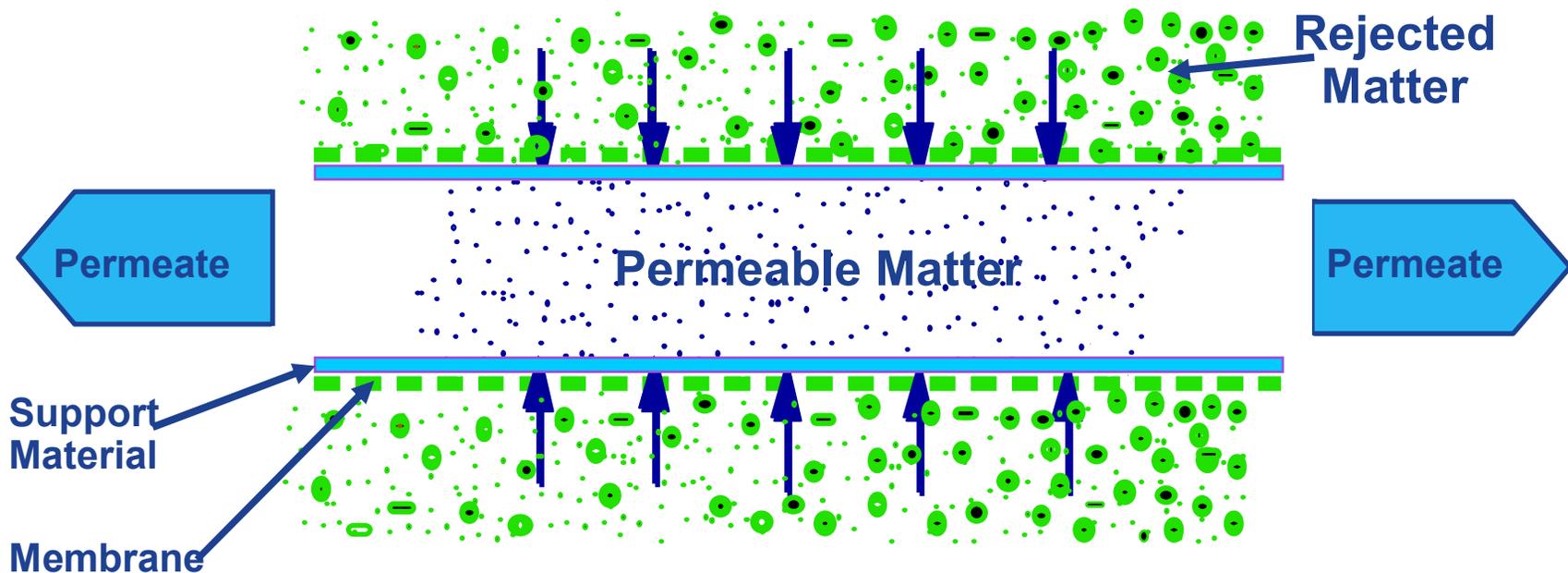
- US Stimulus grant funding for municipal reuse (25% to 50% grants) under Title XVI and SRFs
- March 10th Senate Hearing on 30% Investment Tax Credits for industrial reuse
- US/Texas . . . March 2009 Bill for 25% reuse incentives for frac water

Water Policy Trends Impacting Reuse

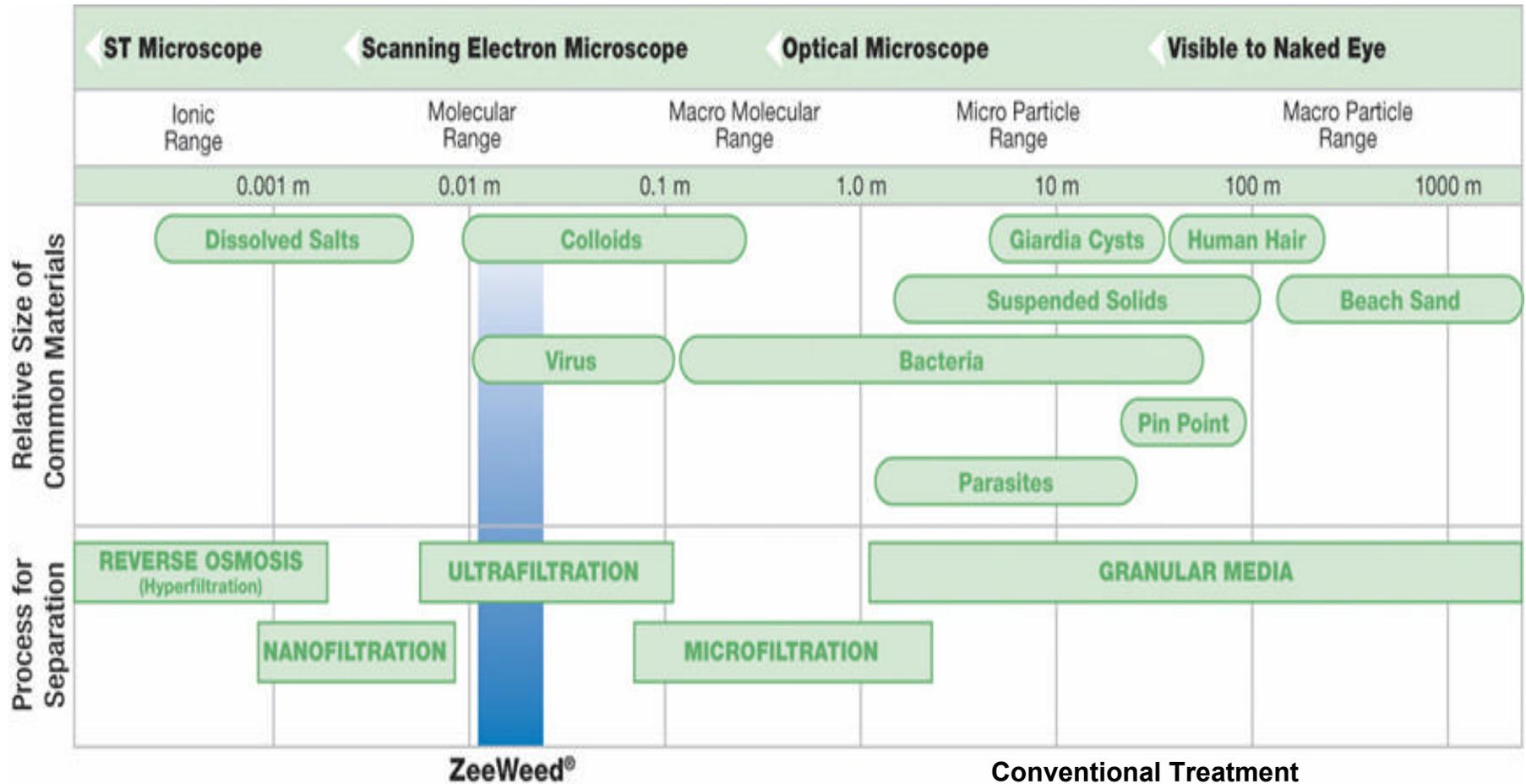
- New Administration focused on Climate Change
 - ✓ Increased focus on water scarcity
- Energy-Water Integration Act of 2009
 - ✓ NAS study of water consumption in energy production
 - ✓ Exploration of fuel sources & production of electricity
- SECURE Water Act of 2008
- Stricter Regulations
 - ✓ Alberta, Canada: Water Discharge & Reuse standards
 - ✓ US EPA Standards . . . Selenium, etc.
 - ✓ Pennsylvania . . . new discharge limits effective 2011
 - ✓ Louisiana . . . exploring new reuse policy

What is a Membrane?

Membranes are engineered thin barriers or films of material that allow certain substances to pass by a size exclusion mechanism related to the size of the pores on the membrane surface



Membrane Filtration



Building Block Design



◀ **Membrane Modules**
are simply inserted into
frames to form a
Membrane Cassette ▶

ZeeWeed Reinforced
Membrane modules and
cassettes are built tough to
provide a long and reliable
operating life in harsh MBR
conditions



Simple, Clean, Easy Access



Membranes are Rapidly Replacing Conventional Technology



Conventional Treatment

- 19th century technology
- Large land requirement
- Coarse filtration, no physical barrier
- Need multiple steps for coarse filtration
- Labor and chemical intensive
- Dependent on chlorine for disinfection



ZeeWeed Membrane Treatment

- Modern and continuously improving
- Compact footprint; allows for expansion
- Physical barrier means higher quality water at all times
- Single step provides simpler operation
- Fully automated with minimal chemicals

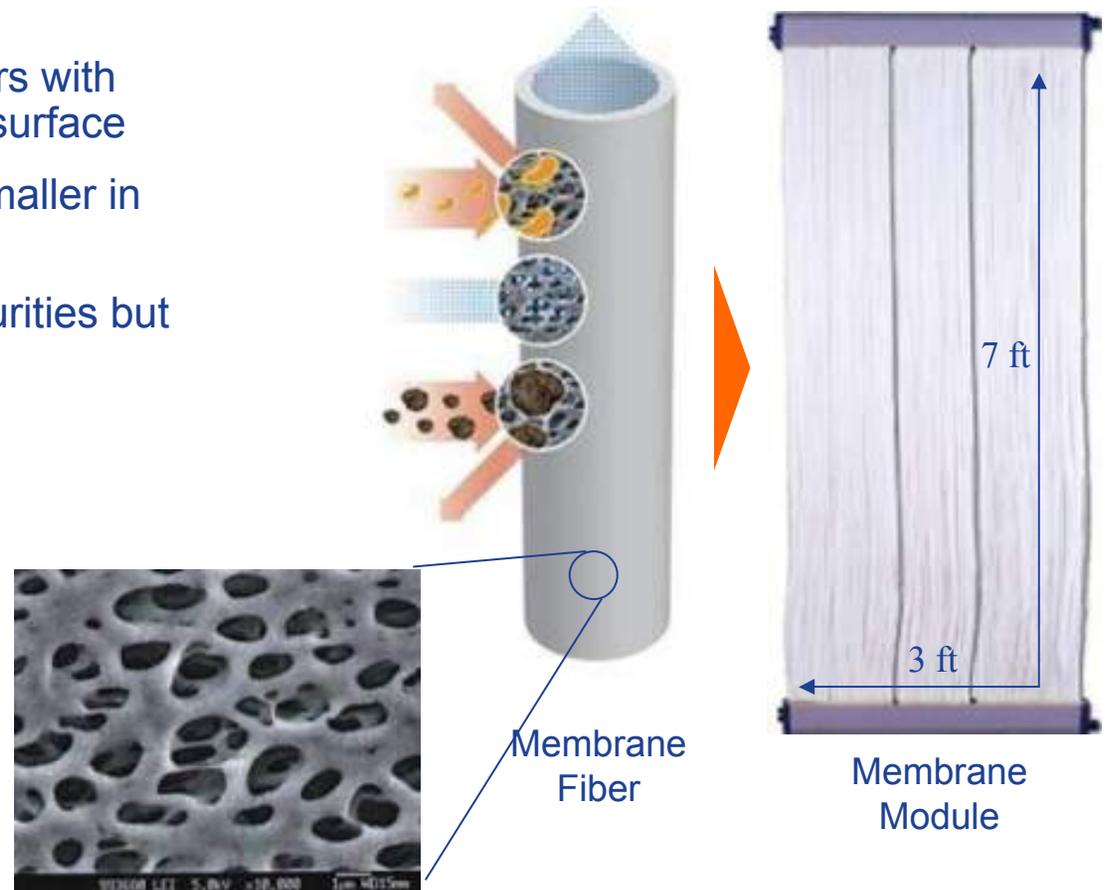
Membranes are the Key to Superior Effluent Quality

Hollow strands of porous plastic fibers with billions of microscopic pores on the surface

The pores are thousands of times smaller in diameter than a human hair

Pores form a physical barrier to impurities but allow pure water molecules to pass

Clean water is drawn to the inside of fiber by a gentle suction



Electron microscope view of membrane surface

GE Power & Water

Combining the best of GE to solve the world's biggest challenges

WATER

Water is needed to generate energy



The 'WATER' box features a green header with the word 'WATER' in white. Below the header, the text 'Water is needed to generate energy' is displayed in blue. To the right of the text is a small globe of the Earth. Below the globe is a large, clear blue water droplet that has just hit a surface, creating ripples.



POWER GENERATION

Energy is needed to generate water



The 'POWER GENERATION' box features a green header with the words 'POWER GENERATION' in white. Below the header, the text 'Energy is needed to generate water' is displayed in white. The background of the box is a photograph of an industrial power plant at night, with tall smokestacks and complex piping illuminated by lights.

Maximize our scale, operating discipline, and diversity

Enabling the future with portfolio solutions

Desalination Solutions:

Drawing on the ocean's virtually limitless water resources, GE's desalination technologies are helping water scarce regions to create new freshwater sources that can quench growing demand.

Municipal Solutions:

Facing unprecedented growth and water demand, cities are turning to GE's advanced membrane and water quality measurement technologies to tackle increasingly stringent water and wastewater regulations and the threat of new, virulent pathogens in our lakes and rivers.

Product Water:

Consumers use the products they trust – whether it is pharmaceuticals, food, or beverages. As brands expand globally, GE technologies ensure high quality ingredient water for manufacturing regardless of a plant's location or its water source.

Residential Products:

GE point-of-use and point-of-entry filtration systems are enabling homeowners to produce higher quality water from every tap in the home. This same technology is helping developing countries to leapfrog traditional, costly infrastructure and provide safe water to those who need it most.

Utility Solutions:

GE is optimizing system efficiency & increasing uptime in cooling towers and boilers by reducing energy usage and greenhouse gas emissions. Advanced monitoring systems reduce the risk of pathogen growth, such as Legionella, in cooling systems.

Process Chemicals & Separations:

Silently working in pipes, tanks and process fluids, GE's advanced chemicals protect valuable production assets from corrosion and fouling faced in day-to-day operations, while improving overall manufacturing efficiency and quality.

Industrial Wastewater:

Once considered a by-product, GE's water reuse technology is transforming industrial wastewater into a sustainable, new water source that can often be used many times over—dramatically reducing the strain on our precious water resources.

