



Center of Advanced Materials for
the Purification of Water *with* Systems

Testimony on Water Use Efficiency and Conservation Research

Mark A. Shannon
Director *WaterCAMPWS*
University of Illinois
Founder US Strategic Water Initiative



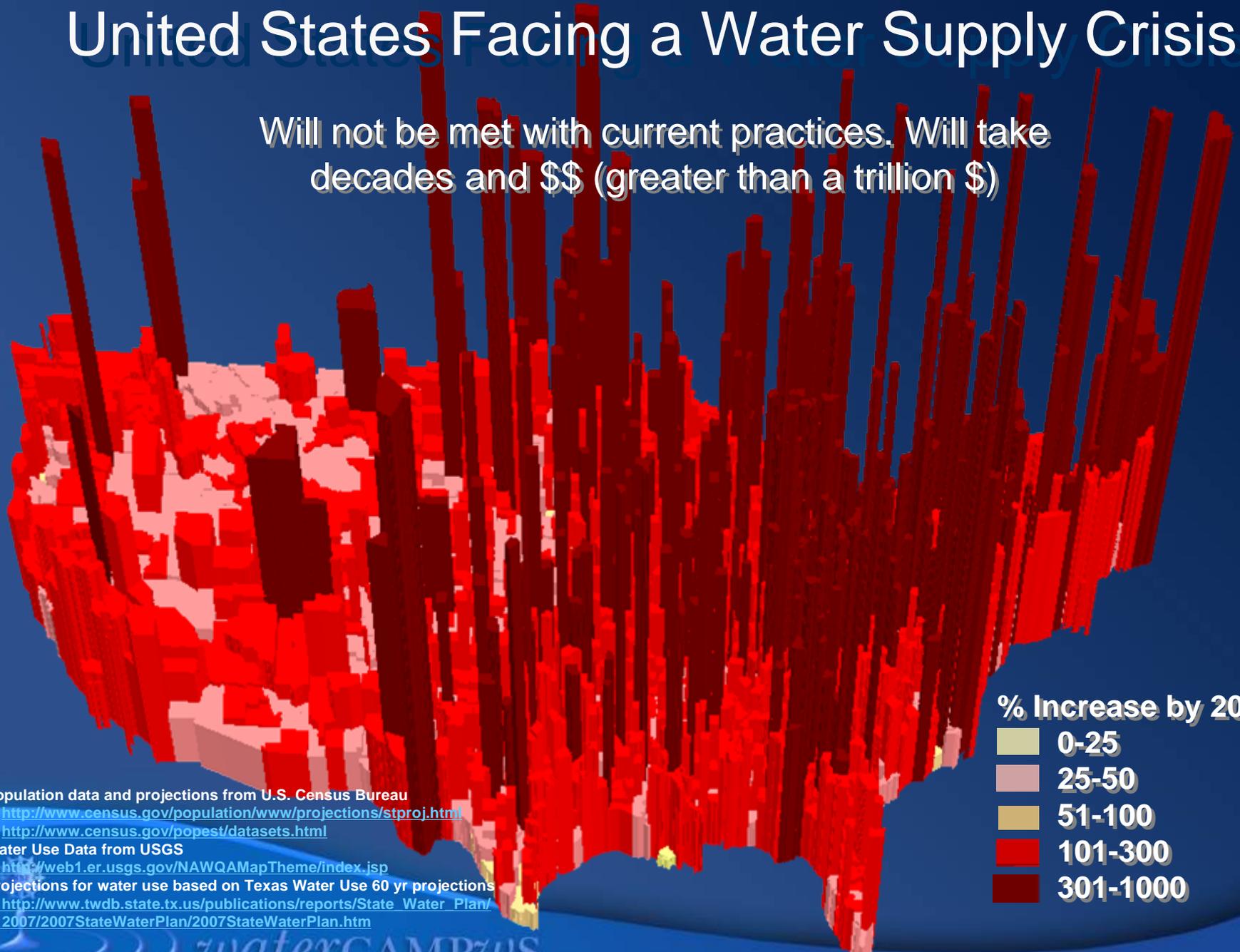
USSWI



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United States Facing a Water Supply Crisis

Will not be met with current practices. Will take decades and \$\$ (greater than a trillion \$)



Population data and projections from U.S. Census Bureau

<http://www.census.gov/population/www/projections/stproj.html>

<http://www.census.gov/popest/datasets.html>

Water Use Data from USGS

<http://web1.er.usgs.gov/NAWQAMapTheme/index.jsp>

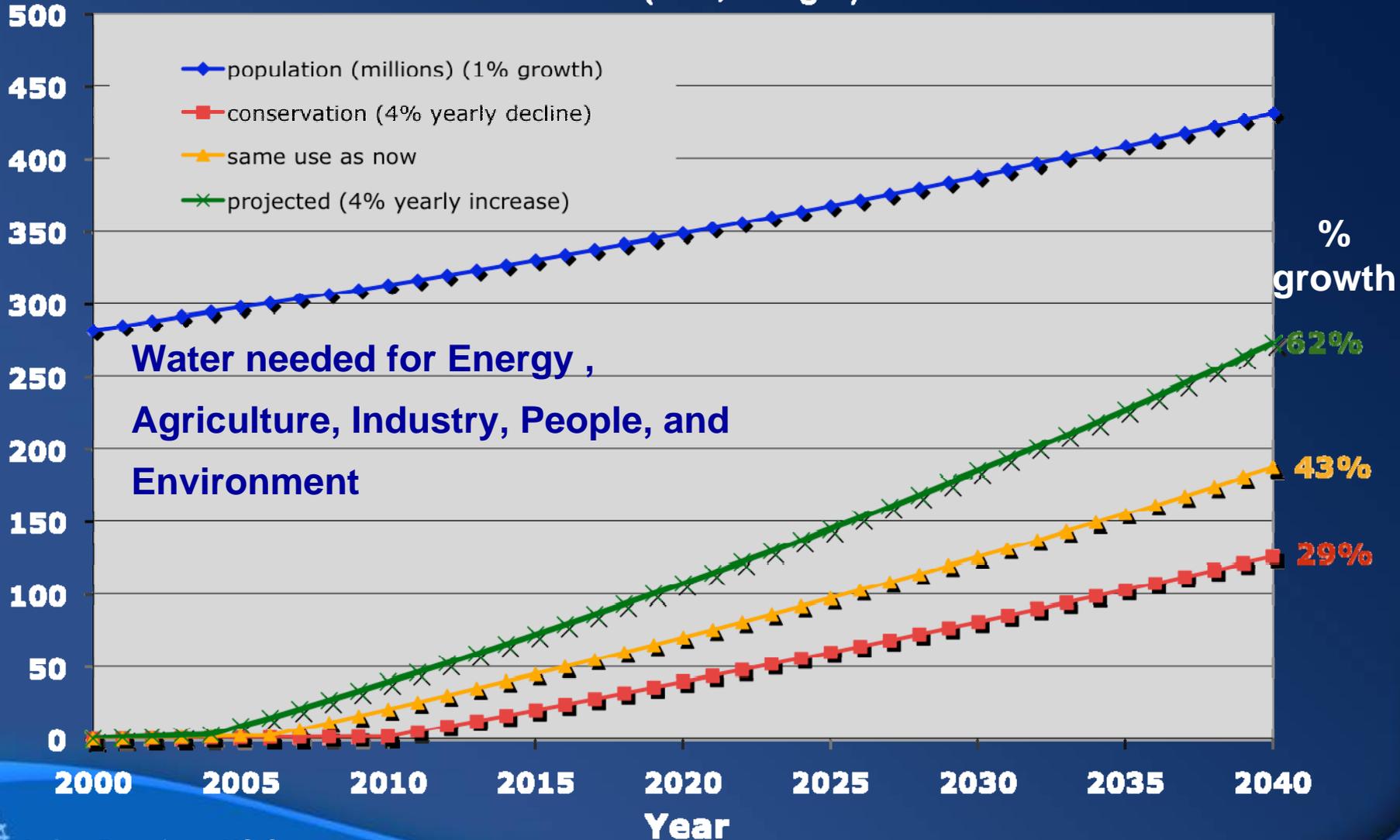
Projections for water use based on Texas Water Use 60 yr projections

http://www.twdb.state.tx.us/publications/reports/State_Water_Plan/

2007/2007StateWaterPlan/2007StateWaterPlan.htm

Water Use Growth With Population

Increase in Million Acre Feet (325,500 gal) of Water Withdrawn

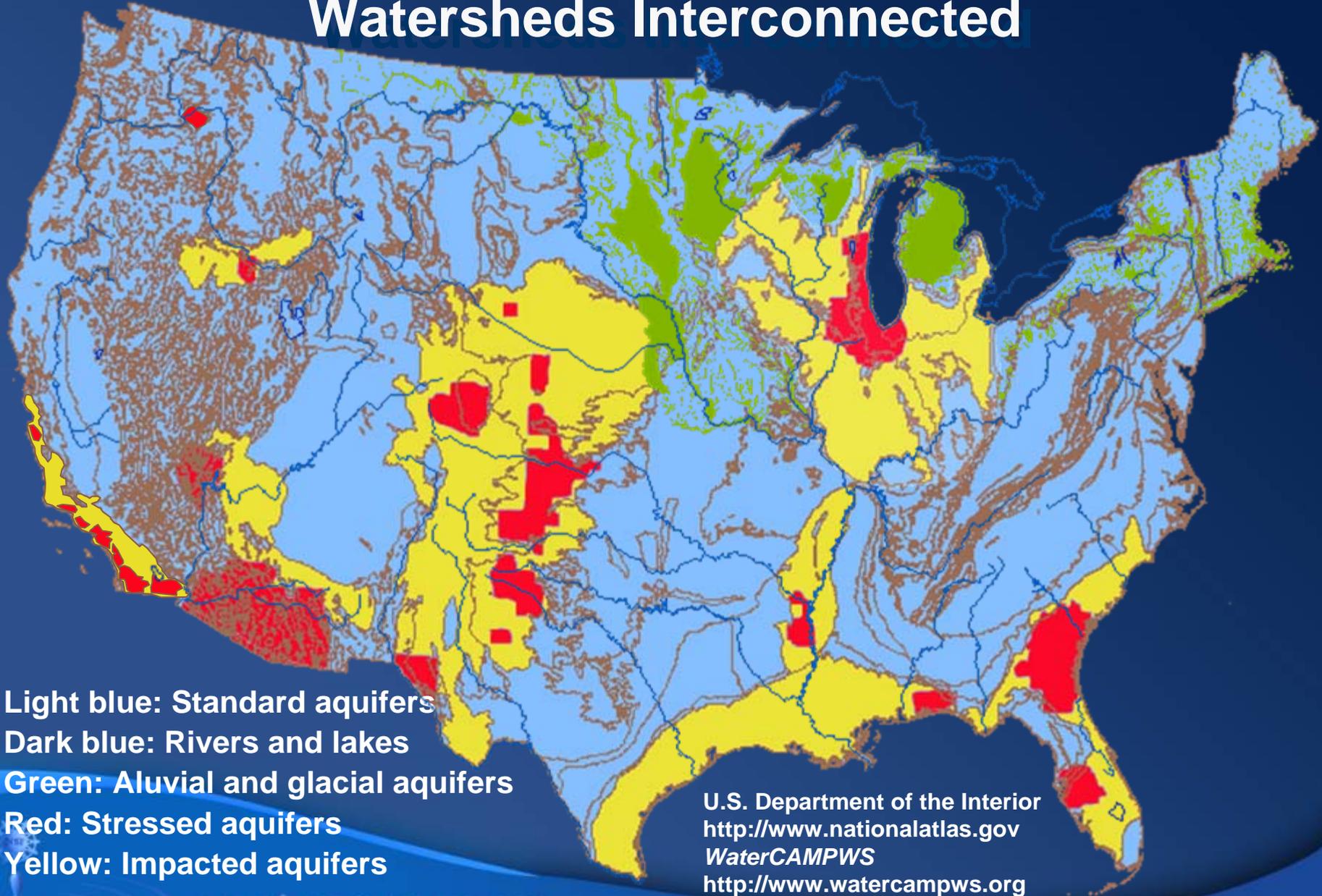


Population Data form US Census Bureau

The Blueprint 2030 forecast share of the revised United States population growth forecast from 2000 to 2030 was 1.14%

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Lakes, Rivers, Aquifers (Standard and Fossil) Watersheds Interconnected



Light blue: Standard aquifers
Dark blue: Rivers and lakes
Green: Aluvial and glacial aquifers
Red: Stressed aquifers
Yellow: Impacted aquifers

U.S. Department of the Interior
<http://www.nationalatlas.gov>
WaterCAMPWS
<http://www.watercampws.org>

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EPA Critical Drinking Water Contaminants in Surface and Groundwaters

**Water Treatment:
Repeated treatments
increases salting and
purification costs**

Micrograms per Liter



Brown: Excess salting

**Contaminants
impacting water
supplies**



There Are Many Opportunities

- 💧 We are far from the natural law limits for separating contaminants from water: Lots of room to improve!
- 💧 Traditional methods in developed world are capital, energy, chemical, and water intensive.
- 💧 New technologies can dramatically save and create new waters, and aid the energy/water nexus.
- 💧 Innovation from our universities, national, state, and industrial laboratories need to be accelerated into practice and into the marketplace.

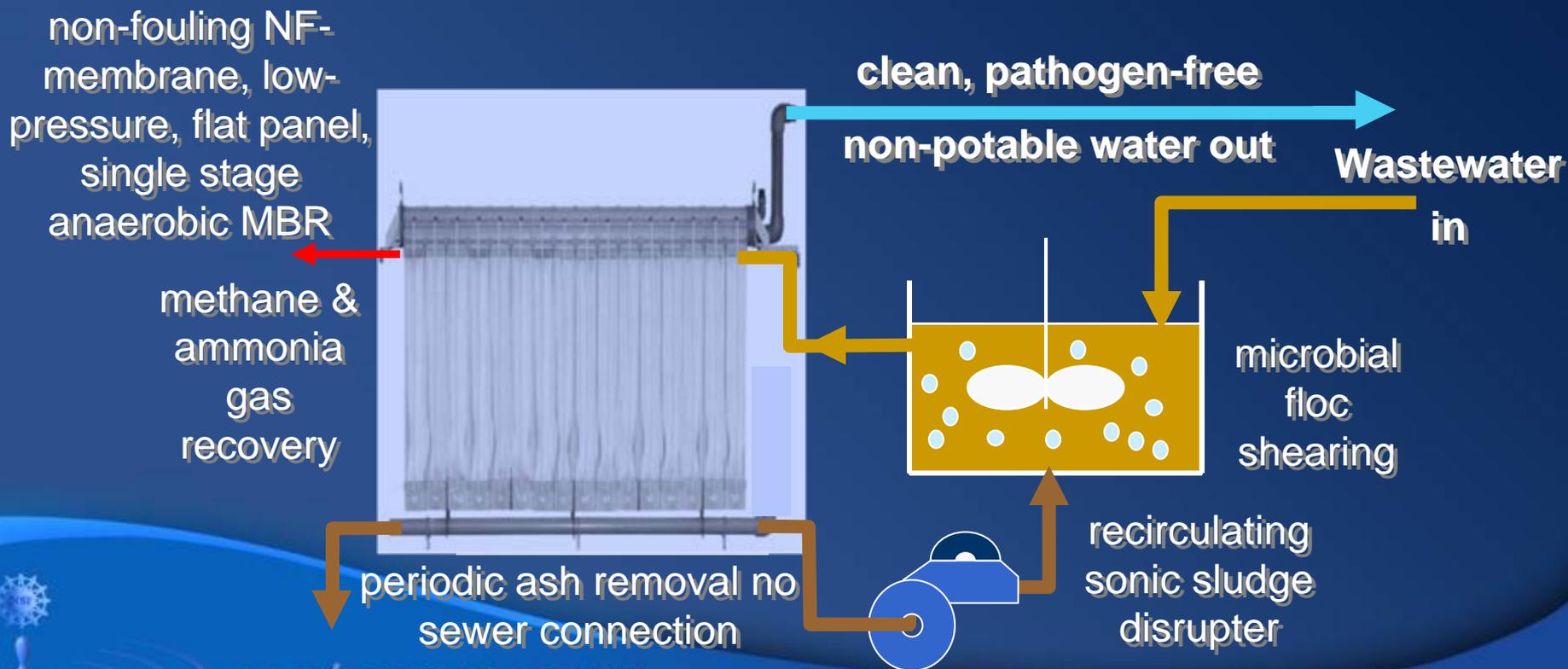


Siemens SkyHydrant



Recovery & Reuse of Water Creates a Resource

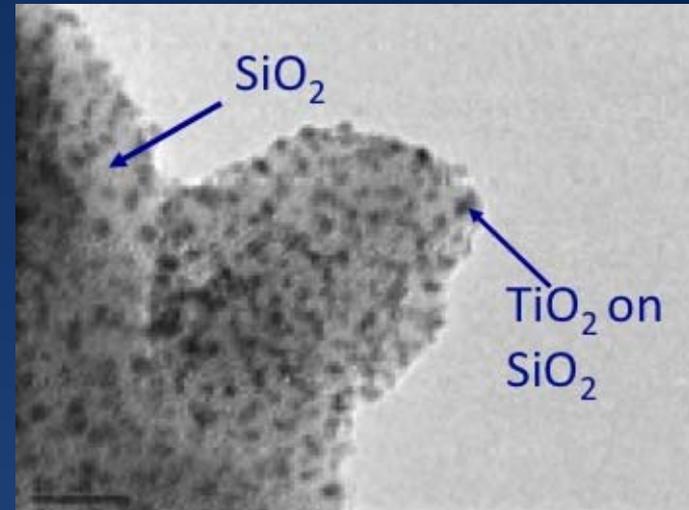
- Can be used for Point-of-Discharge to recharge aquifers or use locally in non-potable uses. Saves \$\$, energy, & chemicals.
- New technologies can generate energy when cleaning water, rather than consuming energy
- Membranes can ensure high quality and safety



Cleansing Water of Toxins with Sunlight



Ndiege, Chandrasekharan, Masel,
and Shannon, UIUC



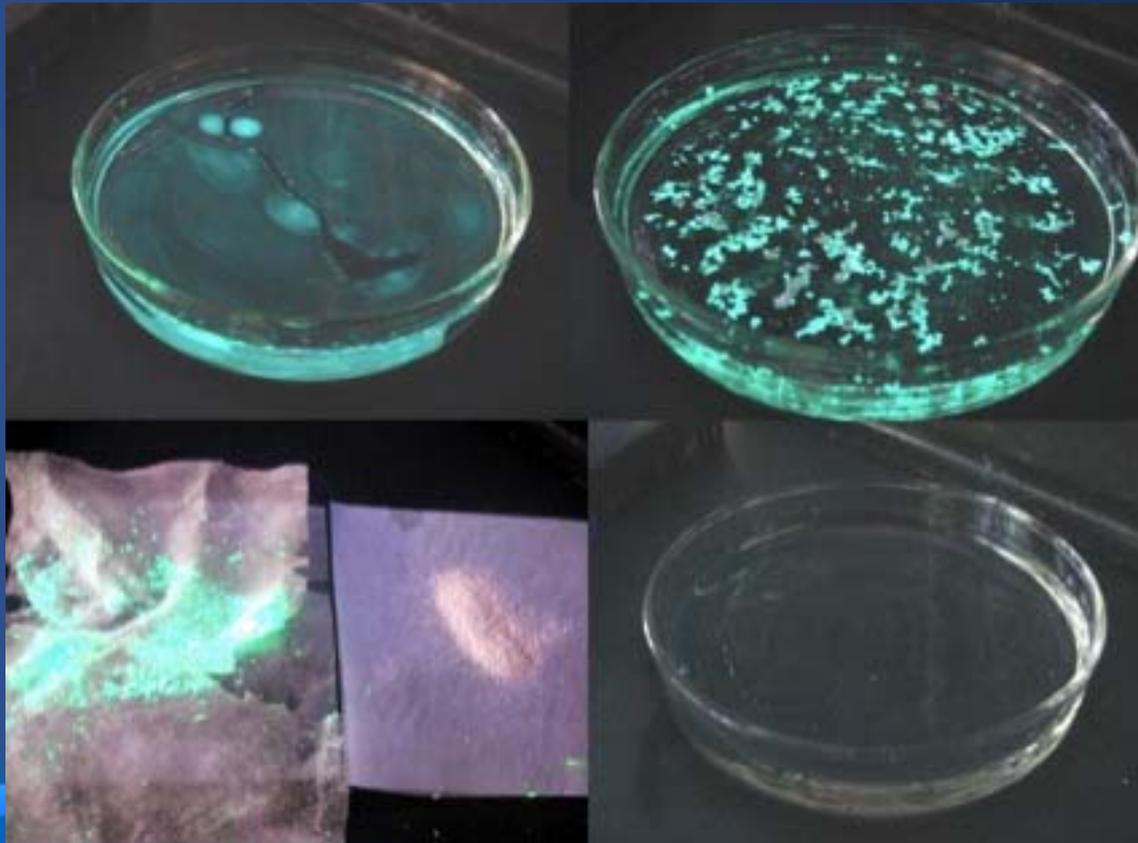
TEM micrograph of 2 nm diameter
 TiO_2 on 20 nm diameter SiO_2 particles

Can use low-cost specially treated silica (sand) to remove all organic compounds from water at high rates using free sunlight. Can remove carcinogens, toxic compounds, Pharma-products, endocrine disrupters, and pathogens too, all without using chlorine.



Removing Petroleum Byproducts and Minerals from Water

“Organic–Inorganic Hybrid Materials that Rapidly Swell in Non-Polar Liquids: Nanoscale Morphology and Swelling Mechanism,” Burkett, Underwood, Volzer, Baughman, and Edmiston, Chemical Materials 2008. Absorbent Materials, Inc.



New low-cost absorbable glass can remove virtually all petroleum byproducts like benzene, MTBE, distillates, and oil from water. Can be used over and over again.

Energy and minerals in water have economic value. Lithium for car batteries alone can help pay for water needed.



The Innovation Imperative For Water

- 💧 Need to increase water use efficiency and conserve supplies, while protecting public health and the environment. Need to recovery energy and minerals from waste and saltwaters, while increasing available water
- 💧 There are many key questions that can be answered by U.S. scientists. Companies can generate lots of good jobs by providing solutions. Else we will import from overseas.
- 💧 Global innovation is occuring in water technologies. The U.S. needs to lead this Innovation Imperative.
- 💧 The Federal Government can reinvigorate water sectors if R&D can be funded AND research moved quickly out of the lab into practice with U.S. companies.

