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Panel 1: Utility Overview

The Water-Energy Nexus: Capturing the Benefits of Integrated Resource Management for Water and Electricity Utilities and their Partners
University of California and the U.S. Department of Energy
Irvine, CA May 28-29, 2015



Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Panel Questions

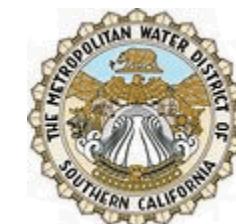
- What interfaces or interactions do you see between your utility and the other (water or energy) domain? How is this changing?
- What are the ideal circumstances—technical, regulatory, economic, organizational, cultural—that facilitate water and energy utilities working together?
- What obstacles or impediments do water and/or energy utilities run up against that make collaboration difficult?
- What are the key policy and legal barriers to developing an integrated approach?
- What types of water sector innovations or arrangements would be most helpful to energy utilities and vice versa?
- What changes do you envision in the next decade in your utility or industry that would impact achieving an integrated approach?

Panelist

- Vince Tidwell; Sandia National Labs
- Eric Schmitt, California ISO
- Ron Nichols, Southern California Edison
- Karen Zelmar; Pacific Gas & Electric Co.
- Warren Teitz, Metropolitan Water District of Southern California
- Mark Gabriel, Western Area Power Administration



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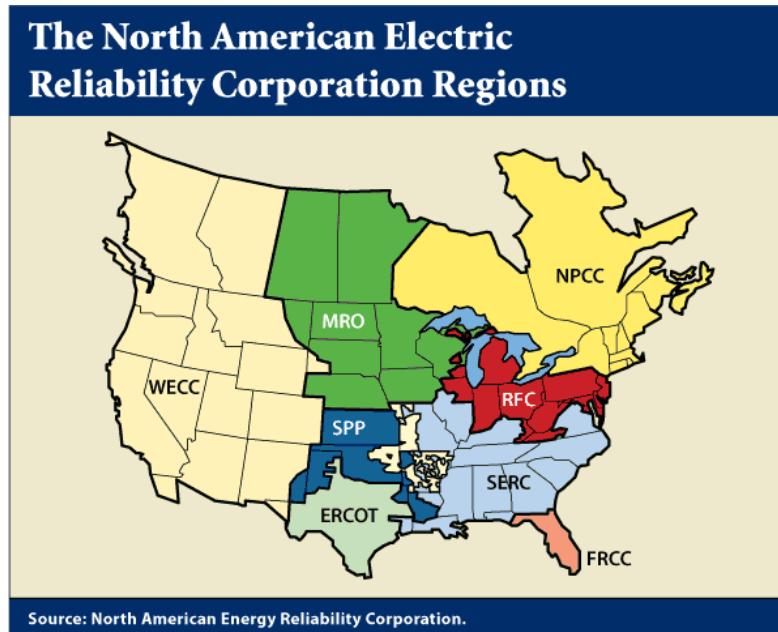


Integrated Planning



**WESTERN
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Serving the Governors of 19 States and 3 US-Flag Pacific Islands



WSWC
Western States Water Council

Climate Impacts on New Development

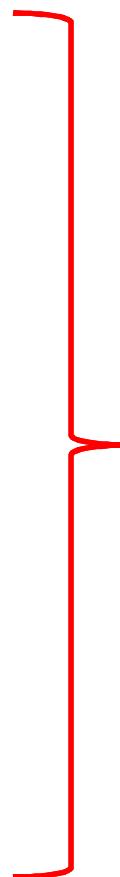
Characterizing Limitations on Available Water for New Development

- **Potable Water**

- Unappropriated surface water
- Unappropriated groundwater
- Appropriated water (rights transfers)

- **Non-Potable Water**

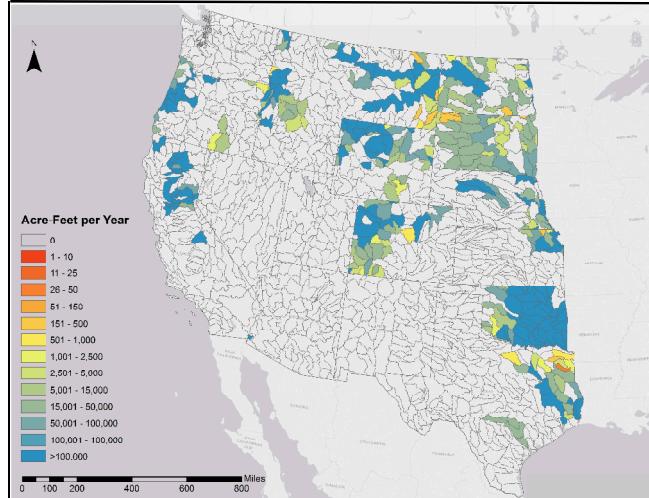
- Municipal/Industrial wastewater
- Shallow brackish water



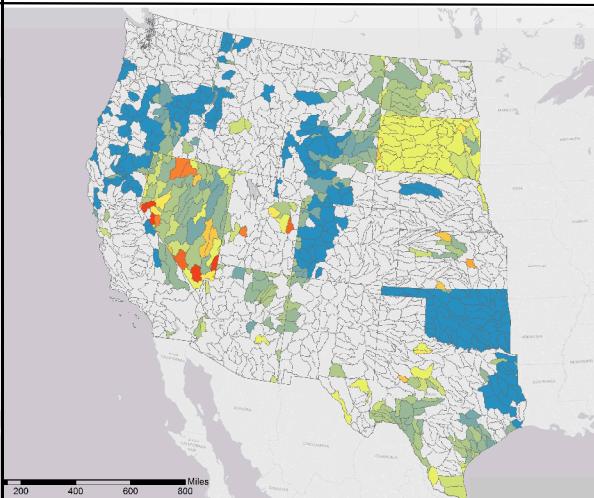
Relative Availability and Cost

Water Availability

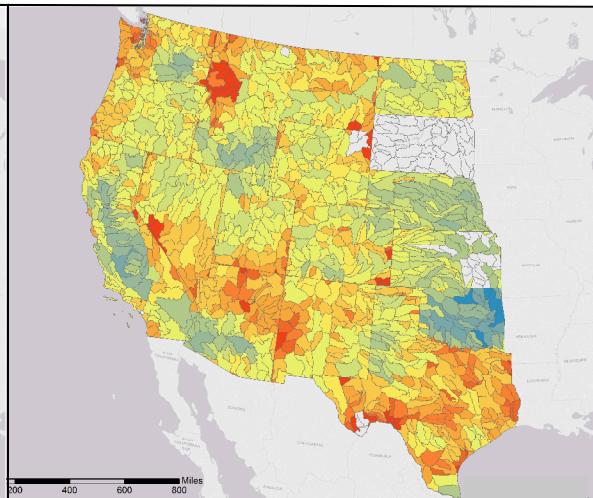
Unappropriated Surface Water



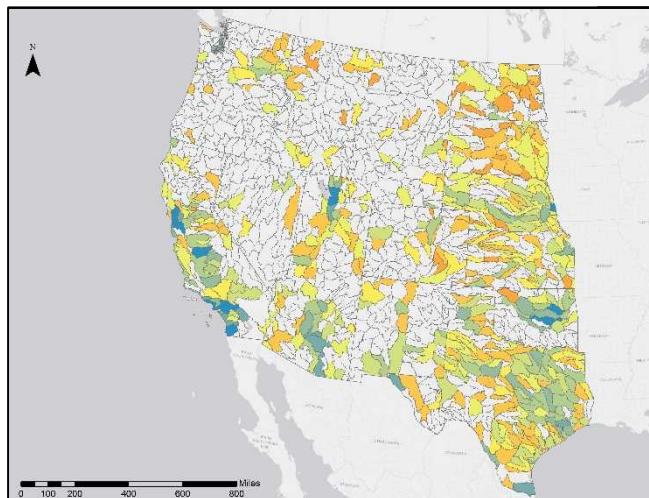
Unappropriated Groundwater



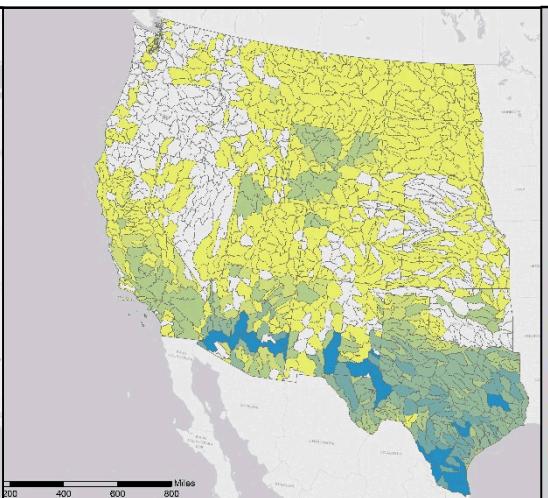
Appropriated Water



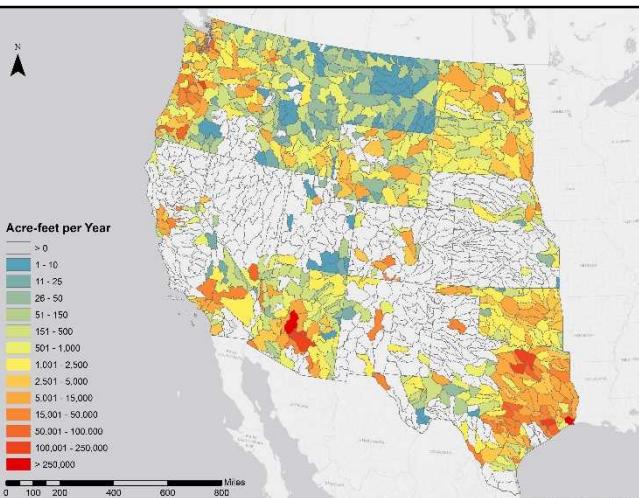
Municipal Wastewater



Brackish Groundwater

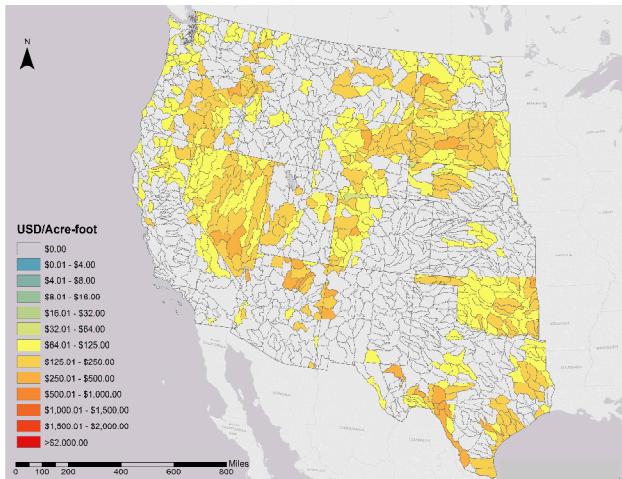


Consumptive Demand 2010-2030

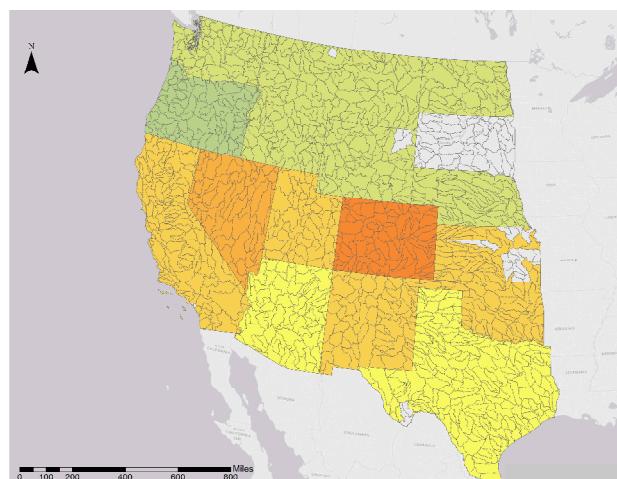


Relative Cost of Water

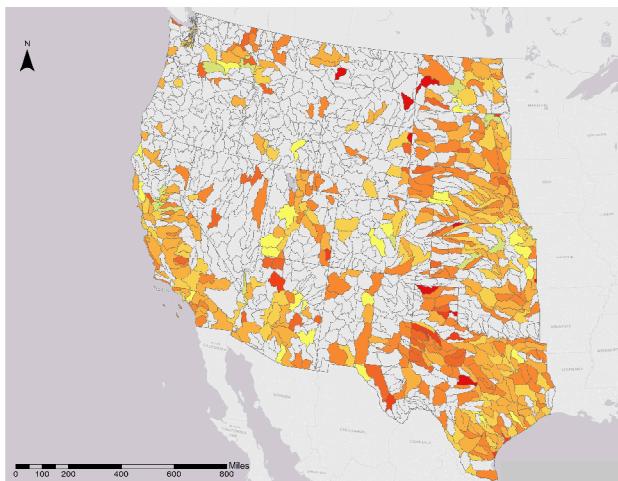
Unappropriated Groundwater



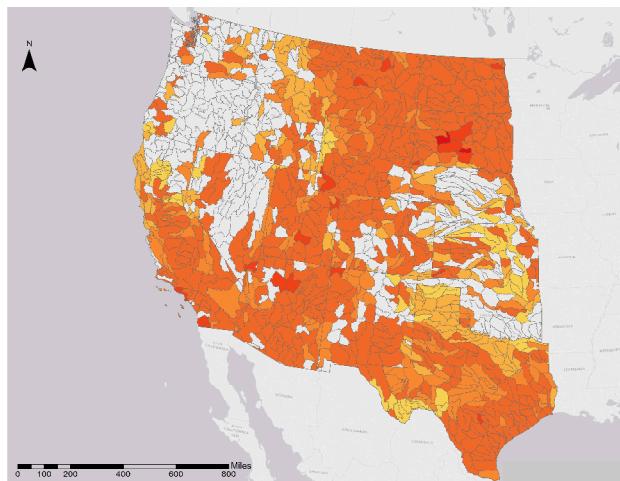
Appropriated Water



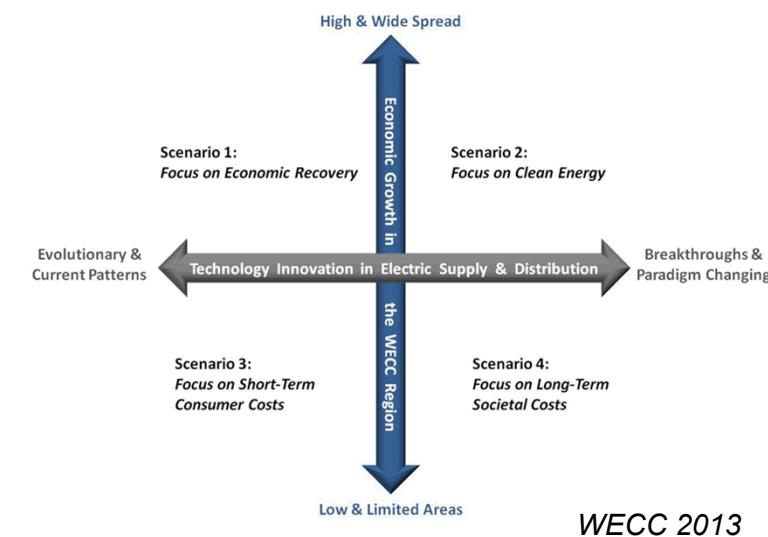
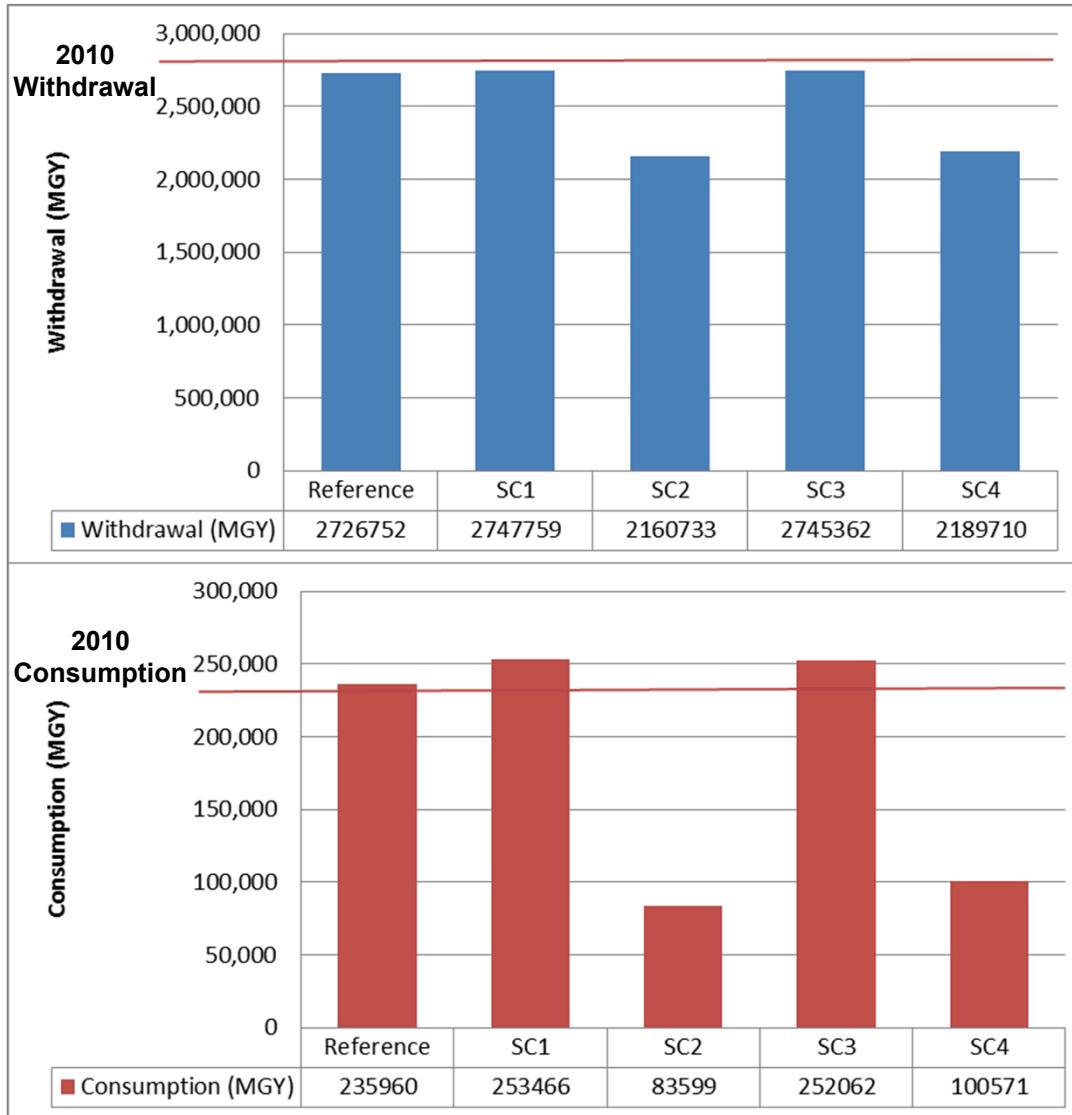
Municipal Wastewater



Brackish Groundwater



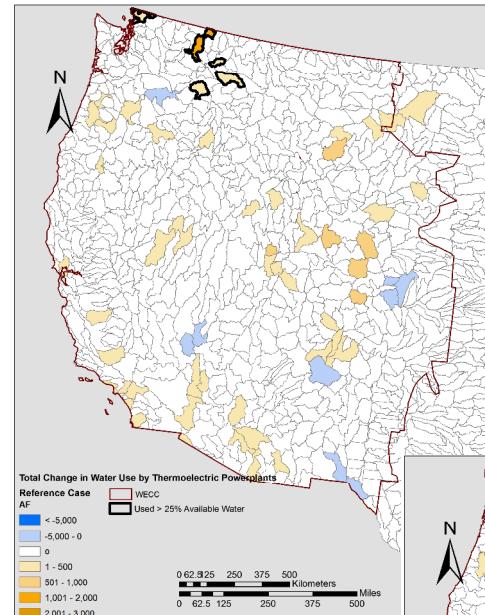
2013 Interconnection-Wide Transmission Planning



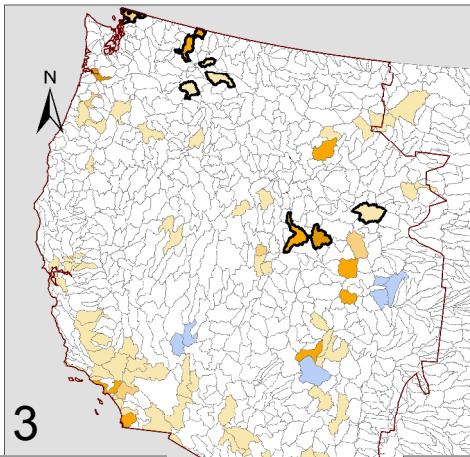
2013 Interconnection-Wide

Transmission Planning

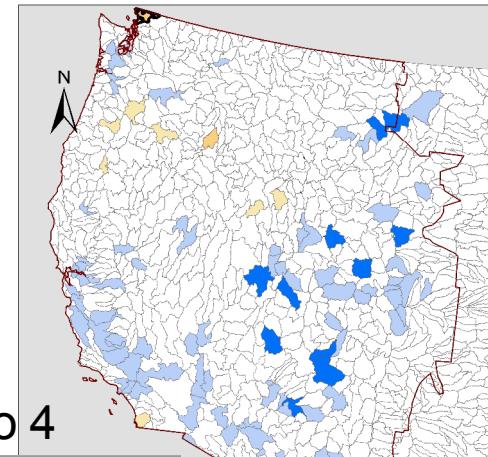
Reference Case



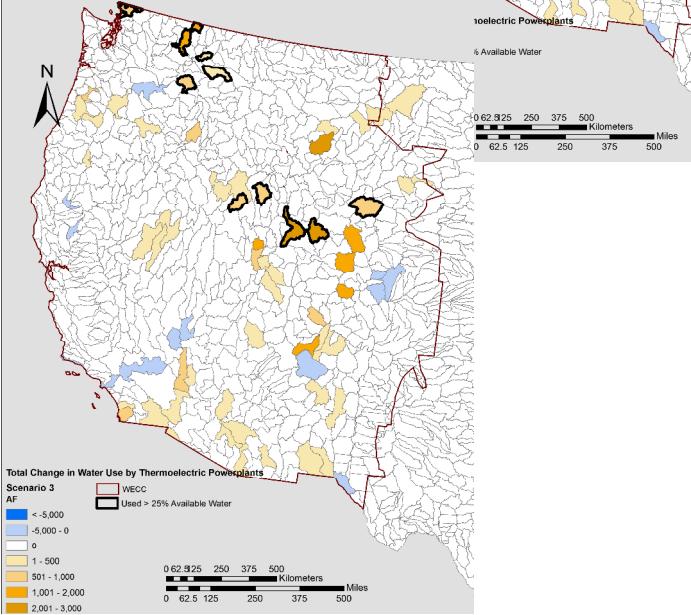
Scenario 1



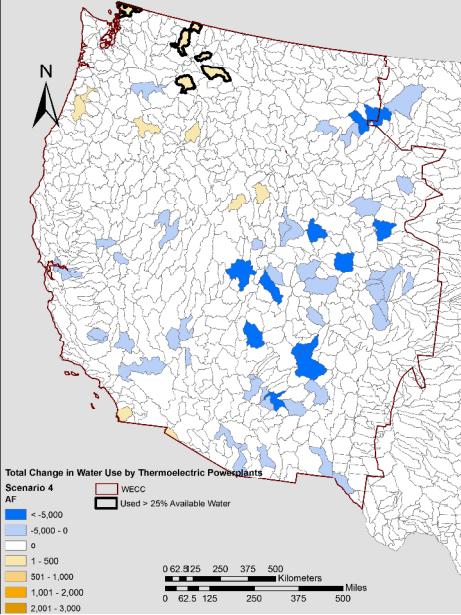
Scenario 2



Scenario 3

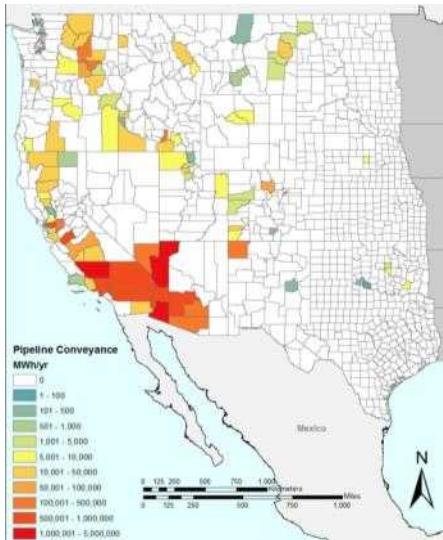


Scenario 4

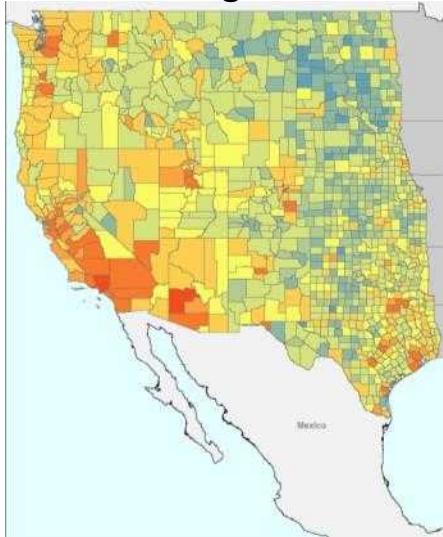


Energy for Water

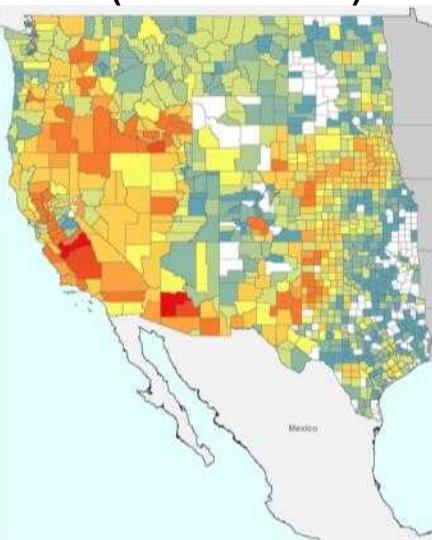
Large-Scale Conveyance



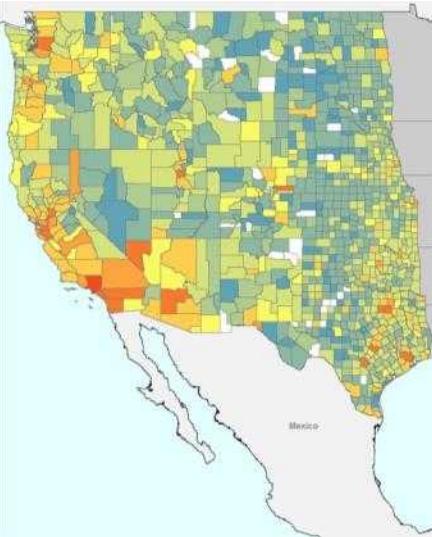
Drinking Water



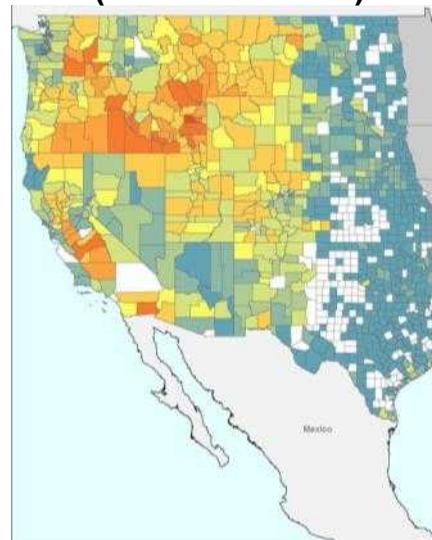
Agricultural Pumping (Groundwater)



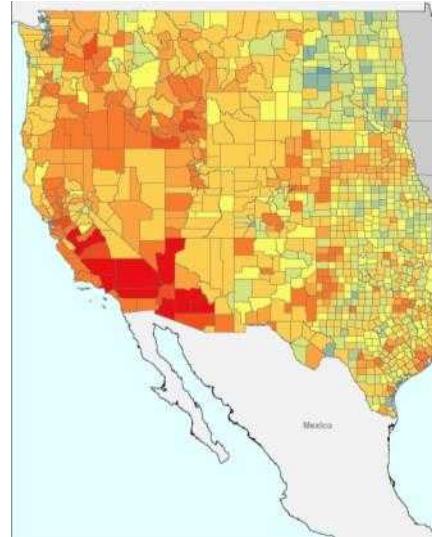
Municipal Wastewater



Agricultural Pumping (Surface Water)

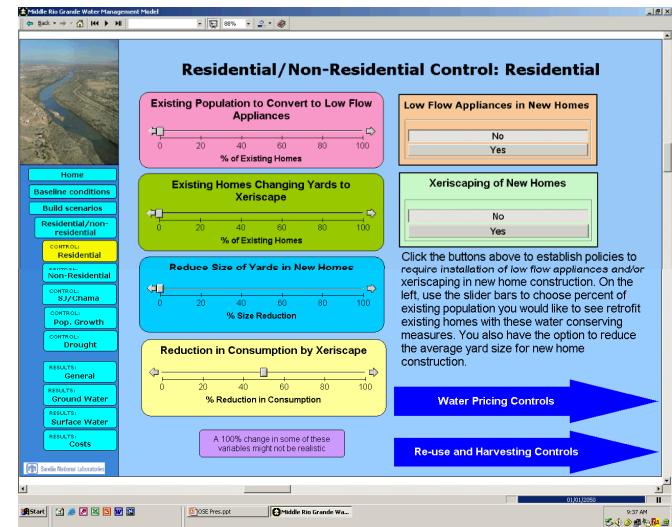
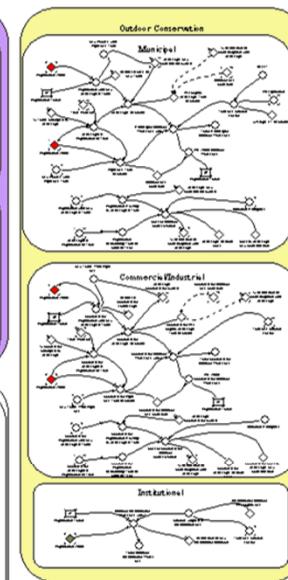
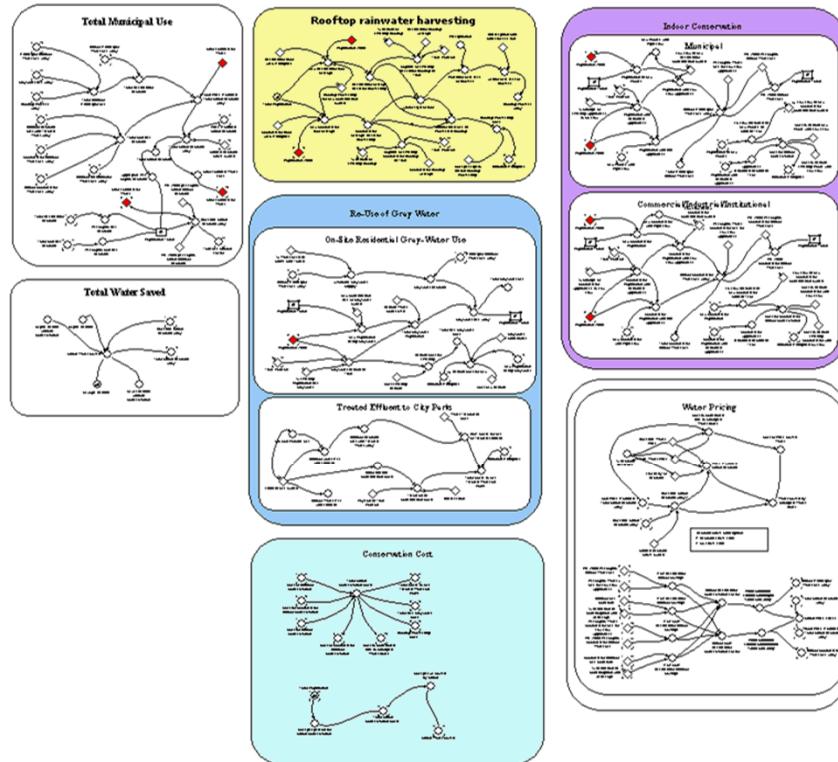


All Water Services



~6% of
electricity use
goes to
providing
water services.

Source: Tidwell et al. 2014



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