

This presentation premiered at WaterSmart Innovations

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American Council for an Energy-Efficient Economy



Alliance for Water Efficiency
American Council for an Energy-Efficient Economy

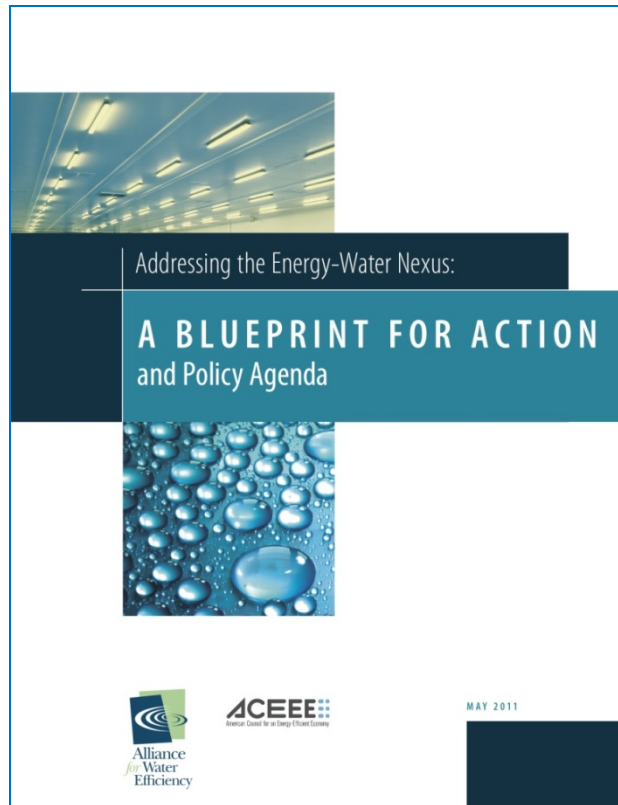
○ **MERGING WATER &
ENERGY EFFICIENCY:
A PROJECT OF
COLLABORATION**

**Part 2. Undertaking Joint
Research**

Background

- 30 years of energy conservation and increases in efficiency of energy use.
- 20 years of water conservation and increases in efficiency of water use.
- Saving a drop of water saves energy; saving a unit of energy saves water.
- Yet the two communities have historically not worked much together.
- It is time to change that!

The Project



- Joint effort of AWE and ACEEE.
- Supported by funding from the Turner Foundation.
- Purpose: to identify the major research, program, and policy needs of the water-energy nexus for decision-makers and funders.
- Establish the beginning of a national long term energy-water community.

<http://www.allianceforwaterefficiency.org/blueprint.aspx>

Moving Forward: 5 Key Priorities

1. Develop baseline of total energy use by water & wastewater utilities and water use by electric utilities.
2. Incorporate cost-effective energy/water measures into building codes, equipment standards, and tax credits.
3. Prepare a report for local and state policymakers addressing the rate-related barriers in water.
4. Survey existing programs for best practices.
5. Establish ongoing water and energy workgroups.

Baseline Estimates: Water Utilities

How much energy is used by water & wastewater utilities?

- California is only state with comprehensive data, gathered by California Energy Commission in 2005.
 - 19% of California's electric use related to water
 - 32% of California's gas load related to water heating
- What are the numbers for other regions of the country?
- Need to assemble data from utility electric bills and segregate by water source and treatment.

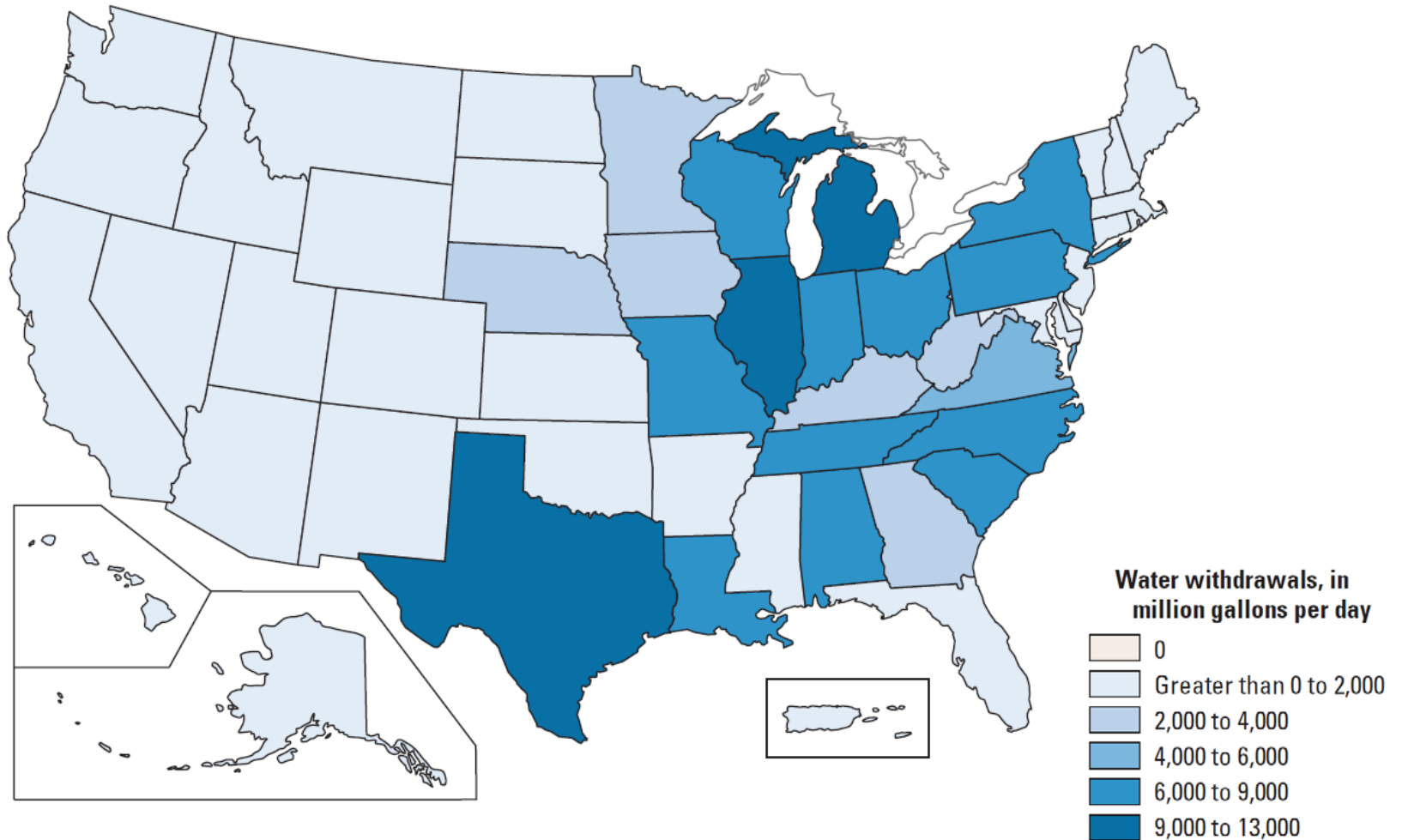
Baseline Estimates: Energy Utilities

How much water is used in generating electricity?

- Important issue in state and regional resource planning and power plant design & siting.
- USGS report every 5 years – most recently for 2005:
 - 49% of U.S. water withdrawals for thermoelectric power gen. (201 Bgal/day)
 - 41% of freshwater withdrawals (143 Bgal/day)
 - U.S. Average of 23 gallons per kWh
- Large variations by cooling type:
 - Open-loop (43% in U.S.) – high use (50-65 gal/kWh), low consumption (~1%)
 - Closed-loop w/ towers (42%) – low use (1-2 gal/kWh), high consump. (~70%)
 - Closed-loop w/ ponds (14%) – mid use (14-24 gal/kWh) & variable consump.

Regional Variations

2005 Freshwater withdrawals for thermoelectric power production

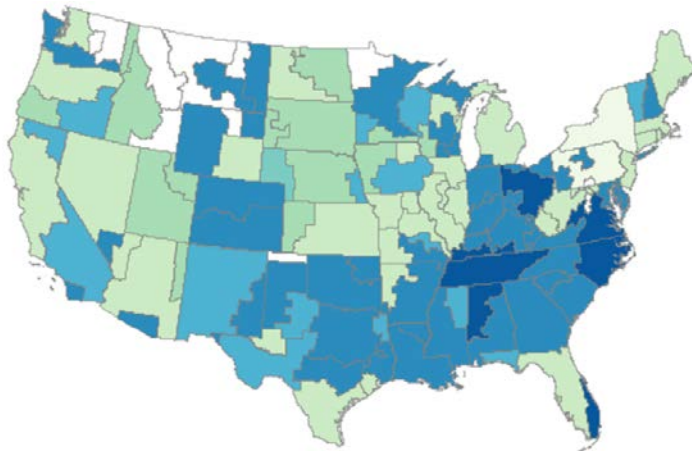


Source: USGS. 2009. "Estimated Use of Water in the United States in 2005"

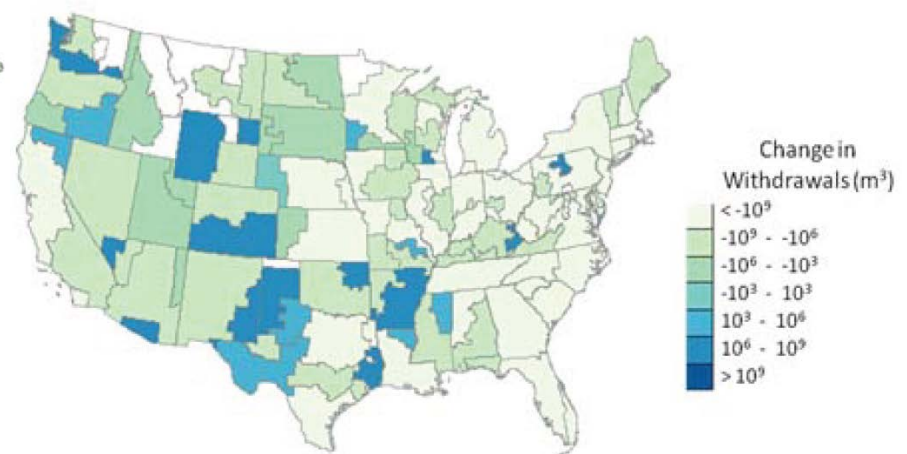
Need for Better Regional Data

- Policy and technology choices can result in divergent regional water impacts.
 - Ex. Macknick, et al. 2011 (NREL) – ReEDS modeling of water withdrawal and consumption impacts of 21% increase in generation from 2006 to 2030 using different technology mixes.

Base case (BAU)



All cooling towers scenario



Codes, Standards, and Tax Incentives

- Combined energy-water issues slip between the cracks.
- Energy can be better addressed in IAPMO code and water better integrated into IECC and ASHRAE 90.1.
- Opportunities for upcoming new/revised equipment efficiency standards include clothes washers, dishwashers, toilets and showerheads.
- Residential energy tax incentives expiring at end of 2011, for renewal investigate simple ways to include water efficiency in these programs (e.g. formula to convert water savings into energy savings).

Overcoming Utility Disincentives

Report for local and state policy makers and water utilities, covering:

1. problems with current water rates, particularly with regard to water efficiency programs which can lead to undercollection of fixed costs;
2. how some states address these issues for energy utilities with flat or increasing block rates, decoupling, lost base-revenue adjustments, and incentives;
3. recommendations on appropriate lessons and next steps for water utilities.

Joint Water-Energy Efficiency Programs

- Although some energy utilities have successfully promoted water efficiency programs, and vice versa, these programs have not yet been widely adopted.
- Programs focus on water and wastewater treatment as well as building end uses.
- We will highlight many of these programs and their lessons learned in a report aimed at utilities and regulators.



Embedded Energy in Water Pilots

- Nine joint pilot programs between California electric & water utilities in 2008-09 to test the embedded energy connection
- Purpose was to determine energy credit for “cold” water savings and potential for energy efficiency
- Pilots with highest energy savings: System Leak Detection, Low Income High Efficiency Toilets
- Other programs: Large Commercial, Recycled Water, Emerging Technologies for Water Pumping, Managed Landscapes

Source: http://www.energydataweb.com/cpucFiles/33/FinalEmbeddedEnergyPilotEMVReport_1.pdf

Embedded Energy in Water Pilots

- CPUC Calculator – identify programs made cost-effective through partnerships and spread costs across water and energy utilities:

Scenario 3--The program becomes cost-effective with 3 agencies sharing costs

Cost \$1,000,000

	Benefits	% of Benefits	Cost Allocation	Net Benefit
Agency 1	\$720,000	67%	\$666,667	\$53,333
Agency 2	\$240,000	22%	\$222,222	\$17,778
Agency 3	\$120,000	11%	\$111,111	\$8,889
total	\$1,080,000		\$1,000,000	\$80,000

Source: <http://www.aceee.org/proceedings-paper/ss08/panel11/paper12>

Joint Working Groups

Four working groups, following on the blueprint process, each based around one of our initial joint projects:

1. Codes, standards and tax incentives.
2. Water utility disincentives and ways to address them.
3. Joint energy and water-saving programs.
4. Research on energy-use connected to water and water use connected to energy.

Coordinated Research

- There is a lot of work to do on the Water-Energy nexus
- Coordination is needed to avoid duplication and maximize impact of all efforts
- Coordinated funding is needed on both sides



Download the Blueprint at:

<http://www.allianceforwaterefficiency.org/blueprint.aspx>

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Any Questions?

