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The Energy-Water Nexus: Exploring the Stream of Opportunities

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American Council for an Energy-Efficient Economy (ACEEE)

- 35 year old, nonprofit 501(c)(3) dedicated to advancing energy efficiency in the United States through research, policy, and technical assistance.
- Focus on end-use efficiency in Industry, Buildings and Equipment, Utilities & Transportation; Economic Analysis; Behavior; Finance.
- Policy Program working at National, State, and Local levels, some international work
- Local Policy work focused on:
 - Technical assistance to local governments and community organizations
 - Local Policy Toolkit, policy calculator, best practice research
 - Project on energy efficiency programs for multifamily housing
 - *City Energy Efficiency Scorecard* & related *Self-Scoring Tool*
 - Energy-Water Nexus



Introduction

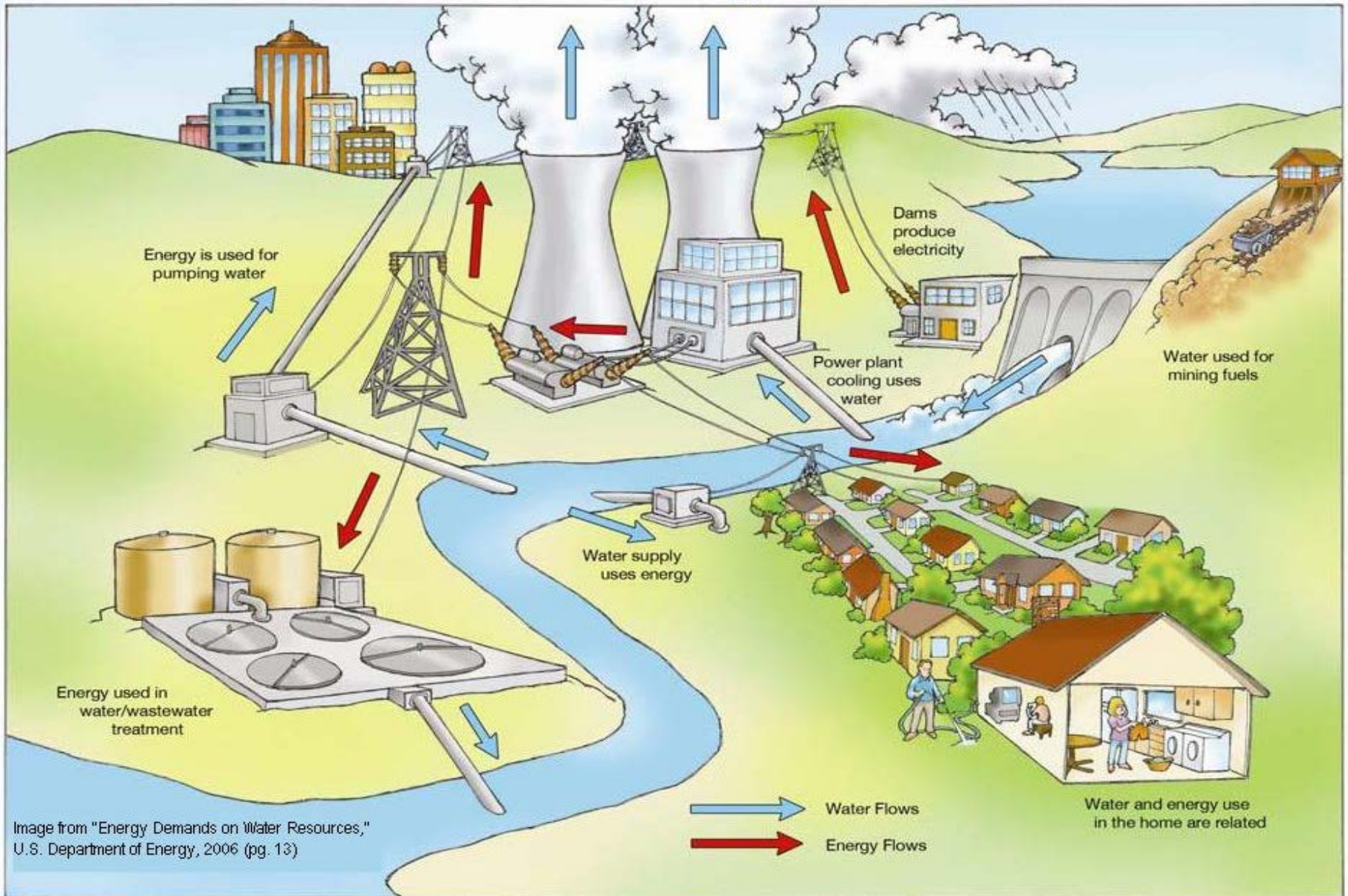
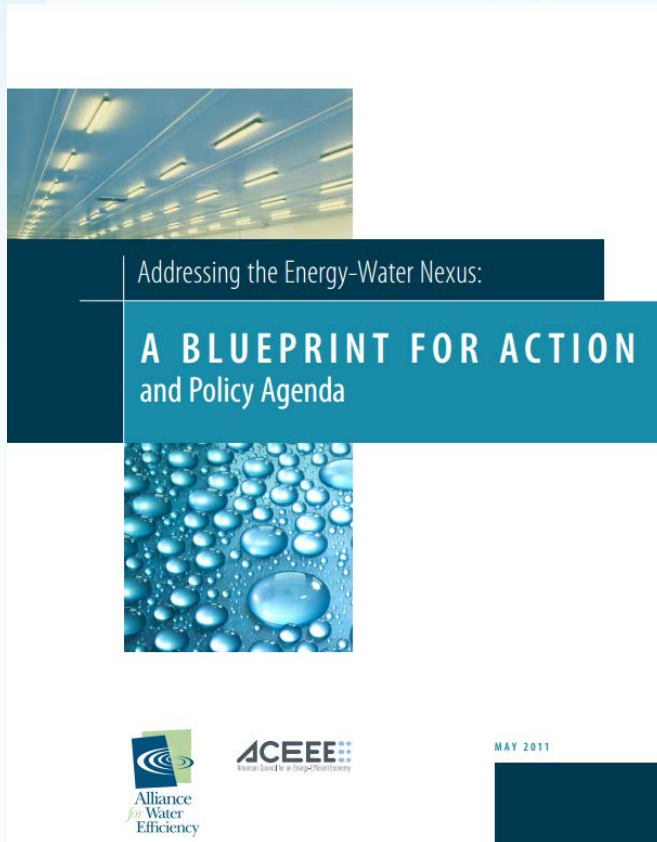


Image from "Energy Demands on Water Resources,"
U.S. Department of Energy, 2006 (pg. 13)

How has ACEEE contributed? Advancing the conversation



THE BLUEPRINT: WAYS TO INCREASE WATER EFFICIENCY

1. Increase collaboration between the water and energy communities in planning and implementing programs.
2. Better understand how energy is embedded in water and water is embedded in energy.
3. Learn from and replicate the best practices of successful energy-water efficiency programs.
4. Integrate water in energy research efforts.
5. Decouple water utility revenues from sales.
6. Leverage existing voluntary standards that address the energy-water nexus.
7. Implement codes and mandatory standards.
8. Create education and awareness opportunities for various audiences and stakeholders.

Key points

- There are many opportunities and benefits for joint programs to save energy and water despite limited efforts
- Better data on the energy embedded in water is needed to inform policies and programs
- There are many opportunities for further research on the energy-water nexus

Benefits of saving energy and water together

- Programs learn from one another
- Document savings
- Share costs
- Achieve deeper savings
- Leverage relationships



Multifamily Energy and Water Efficiency Program – City of Austin

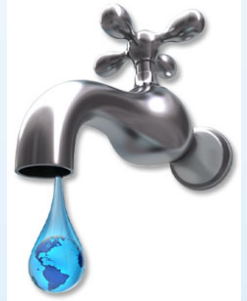
- Holistic water and energy efficiency evaluations, rebates and other incentives
- Collaboration between Austin Water Utility, Austin Energy and Texas Gas Service
- Saved 1.2 million gallons of water; 6200 kWh of electricity in the first year
- One-stop shop model



San Diego Gas & Electric and San Diego County Water Authority joint programs

Home energy and water savings kits

- SDG&E provides free energy and water savings kit. Water authority distributes



Water energy-pilot program

- Evaluated embedded energy use in three programs

Leak loss detection program

- Provides top-down water audits of retail water agency distribution system



Opportunities for joint programs

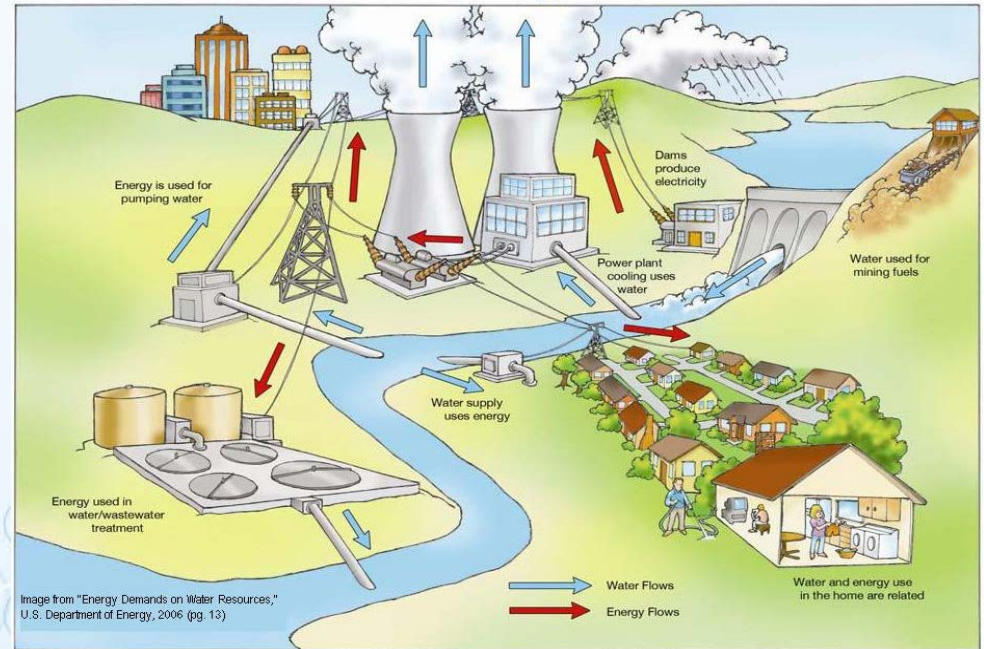


Challenges and solutions to joint programs

Challenges	Solutions
Commitment	Clearly delineate roles for stakeholders and ensure that benefits are well understood
Communication	Establish a decision-making process and rules of operations, and draft legal documents to ensure collaboration
Resources	Collaborate with multiple organizations and/or apply for federal grant money
Data	Include embedded use in savings calculations (resources permitting)

Better understanding the energy-water nexus

- Energy embedded in water
 - Conveyance
 - Treatment
 - Distribution
 - Heating
- Better data = better policies and programs

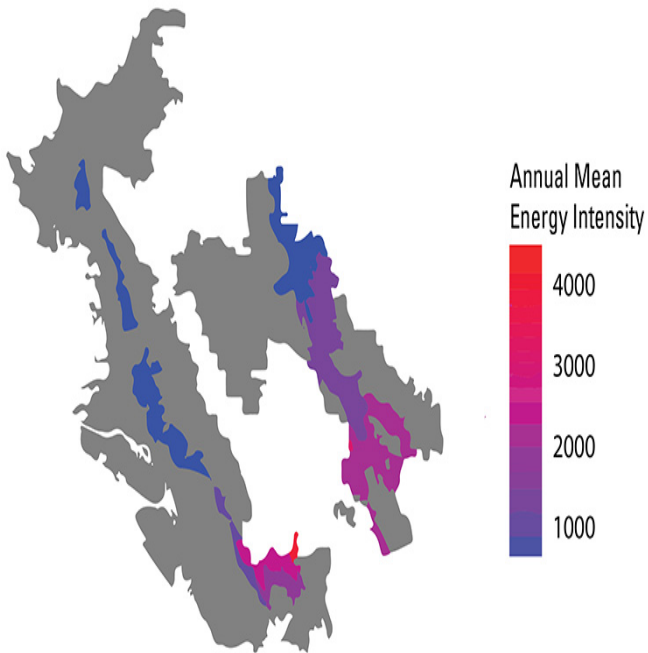


Collecting better data

- Assessments on the energy embedded in water systems are limited
- Existing reports attempt to establish baselines

Source	State	Year	Water services (kWh/million gallons)		
			Source and conveyance	Treatment	Distribution
CEC	CA	2005	0-14,000	100-16,000	100-1,200
EPRI	USA	2002	300-1,824		NA
ISAWWA	IL	2012	218- 12,890 (range for all utility sizes) 1,560- 2,912 (range of group means)		
	IN	2012	1,981-2,198 (range for 3 utilities)		

Efforts to collect embedded energy data



East Bay Municipal Utility District (UC Davis)

California Public Utilities Commission

NAVIGANT

GEI
Consulting Engineers and Scientists

Water-Energy Calculator
DRAFT: Version 1.05

Tool Overview

This tool was developed for the California Public Utilities Commission by Navigant. It is meant to help users estimate the avoided cost of the embedded energy associated with the water savings of various water efficiency/conservation measures. The tool allows users to define up to twenty water efficiency measures according to the water demand profile, water sector, water use, and other parameters. Additional information regarding methodology and data sources can be found in the accompanying report.

Uses and Limitations

Outputs are estimates based on regional data for California. This tool will not be representative for other states.

Embedded energy and avoided cost results are approximate; actual result can vary based on site-specific conditions.

Instructions

1. Proceed to the "Inputs" tab.
2. Fill in measure information.
3. Click "Run" button on "Inputs" tab to see results.

Information | Inputs | Water IOU Data | Glossary | Summary Outputs | Avg Embedded Electric

CA-PUC Energy-Water Nexus Calculator

Next steps for ACEEE's energy-water nexus research

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Conclusions

- More water and electric utilities need to form **joint programs** to tap into the benefits
- There is progress on understanding the energy embedded in water, but **more data is needed**
- Further research is needed! New areas of research:
 - Community resilience
 - Climate change
 - New water service technologies

Thank you!

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ACEEE's energy-water nexus publications

- N. Elliot. 2005. *Roadmap to Energy in the Water and Wastewater Industry*. <http://aceee.org/research-report/ie054>.
- ACEEE and Alliance for Water Efficiency. 2011. *Addressing the Energy–Water Nexus: A Blueprint for Action and Policy Agenda*. aceee.org/white-paper/addressing-the-energy-water-nexus.
- R. Cluett, J. Amman, B. Chou, and E. Osann. 2013. *Saving Energy and Water through State Programs for Clothes Washer Replacement in the Great Lakes Region*. aceee.org/white-paper/great-lakes-clothes-washers.
- R. Young and E. Mackres. 2013. *Tackling the Nexus: Exemplary Programs that Save Both Energy and Water*. aceee.org/research-report/e131.
- R. Young. 2013. *Saving Water and Energy Together: Helping Utilities Build Better Programs*. aceee.org/research-report/e13h.
- R. Young. 2014. *Watts in a Drop of Water: Savings at the Water–Energy Nexus*. aceee.org/white-paper/watts-in-drop-water.
- R. Young. 2015. *A Survey of Energy Use in Water Companies*. aceee.org/survey-energy-use-water-companies.