



Municipal Strategies for Energy Savings in Drinking Water & Wastewater Treatment

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The American Council for an Energy-Efficient Economy is a nonprofit 501(c)(3) founded in 1980. We act as a catalyst to advance energy efficiency policies, programs, technologies, investments, & behaviors.

Our research explores economic impacts, financing options, behavior changes, program design, and utility planning, as well as US national, state, & local policy.

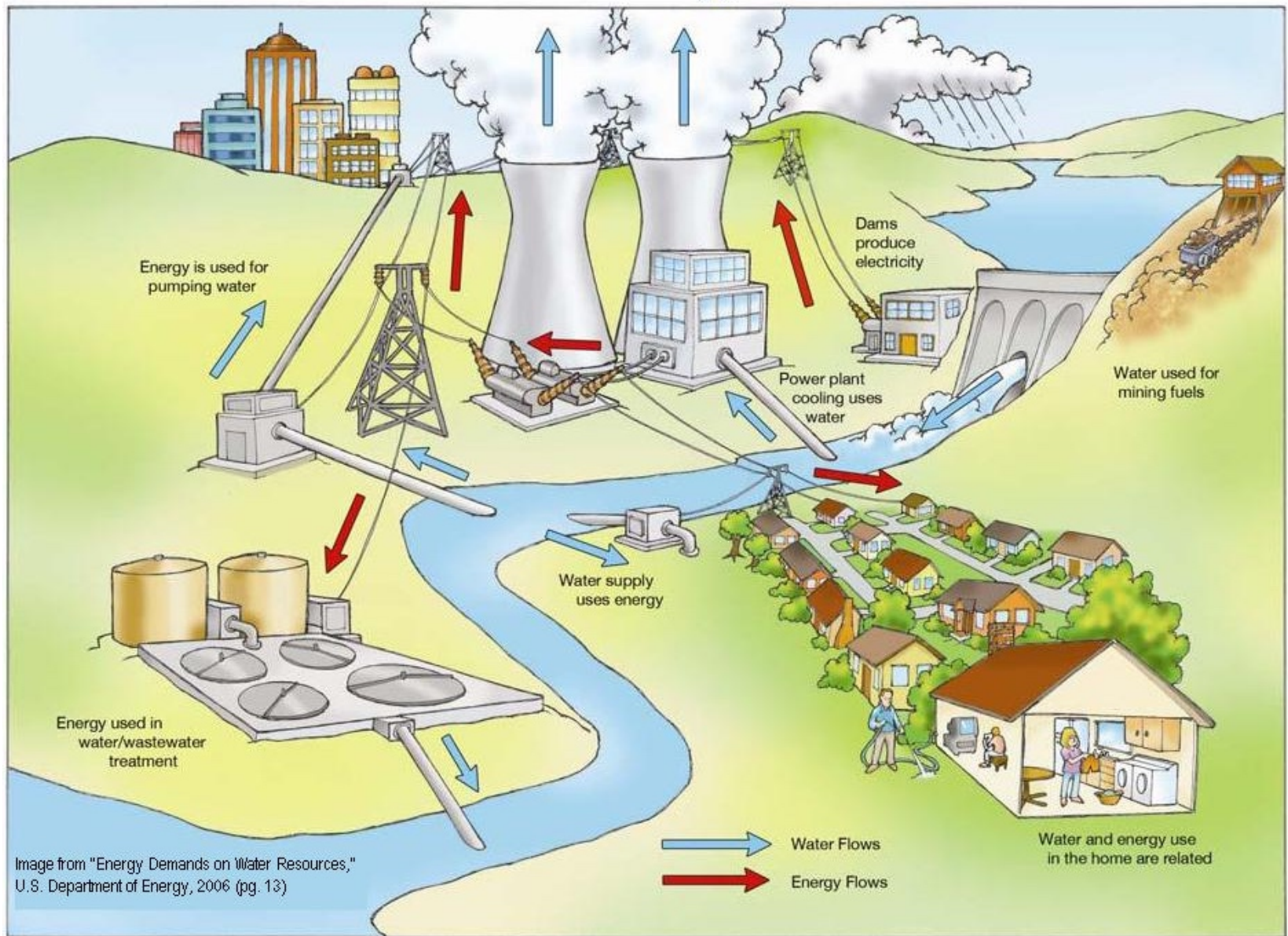
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Outline

- Overview and benefits of increasing energy efficiency in drinking water/wastewater treatment
- System strategies to achieve energy savings in treatment processes
- Navigating customer challenges
- Conclusions

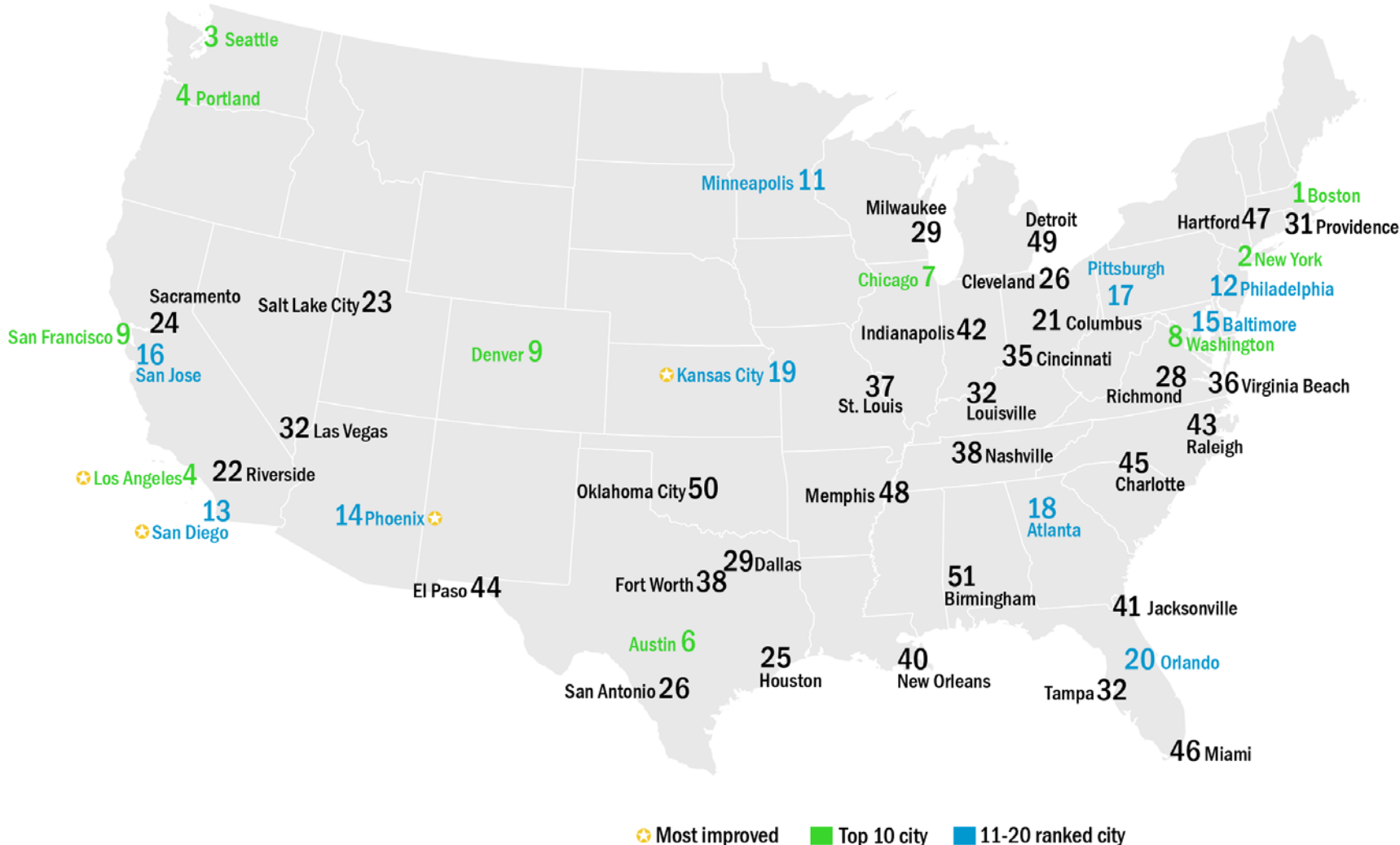




Why focus on energy efficiency in drinking water & wastewater treatment systems?

- **Free up financial resources.** Smaller municipal energy bills can free up financial resources that can be reallocated to other pressing local priorities.
- **Preserve vital resources.** Decreased energy use and water consumption preserves vital natural resources.
- **Defer plant expansions.** Improved operations can extend system's capacity, deferring need for expansion investments.
- **Alleviate climate change.** Energy efficiency can reduce greenhouse gas emissions stemming from water & wastewater treatment processes.

ACEEE scores cities based on EE efforts at drinking water & wastewater treatment plants



Strategies to achieve energy savings in drinking water & wastewater treatment systems

Developing local solutions to reduce energy use in municipal water/wastewater systems

- Each water system is unique—solutions are specific to the system
- Pumping the most significant energy consumer
- Most effective approach is to assess the system, gauging opportunities for savings using a systems approach



Sheboygan Regional Wastewater Treatment Facility; <http://www.sheboyganwwtp.com/>

Energy savings from water efficiency

- Reducing embedded energy reduces energy supply needed to serve customer needs
- Saving energy saves water—electric generation requires large quantities of water for cooling
- Examples
 - Leak detection in water system
 - Installing water saving technologies (water efficient appliances, fixtures, water systems)
 - Water conservation incentives



Systems approaches to saving energy in drinking water & wastewater treatment

Address unmetered water

Systems may experience water losses of 10% to 25%; implement meter maintenance and leak detection programs

Implement water efficiency measures

Water efficiency measures reduce both water & wastewater streams, reducing embedded energy in system

Right-size distribution pumping

Partially loaded pumps are inefficient; consider variable speed distribution or pony pumps

Manage wastewater concentrations & flows

Consider metered wastewater & pretreatment at customer facilities for large consumers

Upgrades at wastewater treatment plants

Opportunities vary depending on plant size and other local conditions (see following slide)

Wastewater treatment plant opportunities

- Optimize pumping systems & maintenance—consider variable speed drives
- Assess system performance working with energy performance professional
- Consider fine-bubble aeration for aerobic digestors
- Consider anaerobic digestion for sludge reduction with CHP for power & heat generation
- Consider alternative dewatering technologies to reduce sludge drying heat requirements

Examples of direct energy savings

- Efficient blowers for aeration in Green Bay MSD – 2,144,000 kWh/year savings
- Efficient distribution pumps in Trumbull water system – 31,900 kWh/year



Blue Plains wastewater treatment plant, Washington, DC

Navigating challenges

Meter maintenance programs can increase customer bills



Engage residents on bills vs. rates

Water efficiency sales reductions can create revenue challenges for the utility by reducing operating cost recovery



Consider restructuring rates

Conclusions

- Water/wastewater system represent important opportunity to reduce energy expenditures & achieve emissions reductions
- Need to take a holistic, systems approach to increasing energy efficiency
- Cities should evaluate energy savings opportunities & pursue those most relevant to their local context



ACEEE's energy-water nexus publications

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- 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.
- ACEEE. 2016. “The Energy-Water Nexus: Exploring the Streams of Opportunity.” Factsheet. <http://aceee.org/sites/default/files/pdf/energy-water-nexus.pdf>.
- W. Berg and D. Ribeiro. 2018. *Saving Watts to Save Drops: Inclusion of Water Efficiency in Energy Efficiency Programs*. <https://aceee.org/research-report/u1801>.

Thank You!

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Upcoming ACEEE Conferences

BECC	OCTOBER 7-10, 2018	WASHINGTON, DC
ACEEE RURAL CONFERENCE	OCTOBER 22, 2018	ATLANTA, GA
CONFERENCE ON HEALTH, ENVIRONMENT AND ENERGY	DECEMBER 3-5, 2018	NEW ORLEANS, LA

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