



Promoting Clean Energy and Economic
Opportunity for All Texans

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Report: Water Among Nation's Largest Energy Users

*Energy Needed to Capture, Move, Treat and Prepare Water in 2010
Equaled 12.6 Percent of Annual U.S. Energy Consumption*

AUSTIN – A new [report](#) by a team of University of Texas at Austin researchers shows that the energy needed to capture, move, treat and prepare water in 2010 required 12.6 percent of nation's total annual energy consumption, which is equivalent to the annual energy consumption of roughly 40 million Americans.

[“Evaluating the Energy Consumed for Water Use in the United States”](#) is the first report of its kind to quantify baseline water-related energy consumption across the U.S. water system.

The report, published in the September issue of the peer reviewed scientific journal “Environmental Research Letters,” gives industry leaders, investors, analysts, policy makers and planners the information they need to make informed decisions, and could help the nation achieve its water and energy security goals.

“Energy and water security are achievable, and with careful planning, we can greatly reduce the amount of water used to produce energy, and the amount of energy used to provide and use water,” said Dr. Michael E. Webber, associate professor of mechanical engineering at the University of Texas at Austin, who directed the research project. “In particular, our report shows that because there is so much energy embedded in water, saving water might be a cost-effective way to save energy.”

The report used data from the U.S. Energy Information Agency, the U.S. Department of Energy, EPRI and private sources to examine water-related energy in the residential, commercial, industrial and power sectors, which represent just over 70 percent of America's total energy consumption.

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Moreover, the report differentiated between primary and secondary uses of energy-for-water, incorporates the relative efficiencies for power plants and direct use, integrates the most recent primary data and statistics collected by relevant agencies, and allocates embedded energy from a broad range of relevant appliances and functions

All told, researchers found that energy embedded in the U.S. water system represented 12.3 quads (12.6 percent) of national primary energy consumption in 2010.

Of that 12.3 quads, the report also estimated that 5.4 quads (611 billion kWh) was used to generate electricity for pumping, treating, heating, cooling and pressurizing water in the U.S., which is approximately 25 percent more energy than is used for lighting in the residential and commercial sectors.

According to the U.S. Geological Survey, the U.S. withdrew approximately 410 billion gallons of water a day in 2005 to cool power plants, grow crops, manufacture goods, and serve public water supply customers, among other vital activities. Of this amount, 349 billion gallons per day was fresh water.

Providing water at high quality and at these volumes requires significant amounts of energy to pump, treat and distribute water to end-users, who are likely to heat, chill or pressurize this water to suit their needs on-site. After water is used, much of it is collected and sent to a wastewater treatment plant where it is reconditioned to an acceptable standard so that it can be released back into a water reservoir.

Kelly Twomey Sanders, graduate research assistant in the Department of Civil, Architectural and Environmental Engineering at the University of Texas at Austin, noted that water-stressed states like Texas, Florida, Arizona and California are shifting toward more energy-intensive technologies, such as desalination plants and interbasin water pipelines, to address current and future water-scarcity concerns.

“Although these shifts are likely to have an appreciable impact on future energy demand, very little analysis has been done to quantify water-related energy use at the national level. This analysis serves to fill that gap by quantifying a baseline estimate of 2010 water-related energy use,” she said. “Our results are surprising in that it wasn’t known before how much energy is embedded in water.”

Future analyses will assess the opportunities for carbon and energy reductions by water-conservation efforts, efficiency improvements, and new technologies. They will also include the increasing role of the bottled water industry, which has large energy and carbon implications that were not explored in this report.

In addition, future work will seek to identify a general framework for characterizing the energy and carbon intensities of water systems based on regional variability in geography, climate and policy frameworks.

“This will become increasingly significant as population growth, water-scarcity, and tougher drinking water-quality standards force local, state and federal policymakers to identify solutions that will offer a reliable way to achieve water and energy security in the future,” Sanders said.

To download a copy of the full report, please visit the TCEC website at www.texascleanenergy.org. The Texas Clean Energy Coalition is a nonpartisan alliance that seeks to speed Texas’ transition to a new energy economy. The study was funded with support from the Energy Foundation and the Cynthia and George Mitchell Foundation (<http://www.cgmf.org>).

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About the Texas Clean Energy Coalition

The Texas Clean Energy Coalition is an alliance of business and economic development groups, faith-based organizations, the Latino and African-American communities, labor, and academia dedicated to building a clean energy economy that creates jobs and economic growth in the Lone Star State. Its goal is to educate Texans and support state energy policies that promote clean energy markets, job growth, energy security and Texas’ energy leadership in the U.S. and around the world. For more information, visit the coalition Web site at www.texascleanenergy.org.