



*Promoting Clean Energy and Economic
Opportunity for All Texans*

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Replacing Coal With Natural Gas Can Save Water

New study shows that replacing coal-fired power generation with natural gas could save Texas billions of gallons of water each year

AUSTIN – A new [report](#) prepared by a team of University of Texas at Austin researchers shows that the Lone Star State could save as much as 60 percent of the fresh water it consumes for coal-fired power generation if electric utility operators were to switch from pulverized coal to natural gas combined-cycle systems.

In 2007, these savings would have totaled 53 billion gallons – about 10 percent of the state’s 2011 water deficit or enough to provide water to 1 million citizens for a year.

“When used to generate electricity, natural gas consumes significantly less water than other options available to the power providers,” former state Sen. and TCEC Chairman Kip Averitt said. “With drought conditions occurring more frequently and with greater intensity, this water-saving strategy can be an excellent option for Texas electric utilities going forward.”

[“Can switching fuels save water? A life cycle quantification of freshwater consumption for Texas coal and natural gas-fired electricity”](#) spotlights in-state water consumption associated with Texas’ coal- and natural gas-fired electricity. The report also assesses the potential impacts of coal-to-natural gas fuel switching on Texas’ freshwater systems.

Published in the current issue of the peer reviewed journal “Environmental Research Letters,” the report uses resource basin- and power plant-level water intensity data to estimate the potential effects of coal to natural gas fuel switching in Texas’ power sector – a shift under consideration due to potential environmental benefits and very low natural gas prices.

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“We chose to study the water consumption associated with electricity production from coal and natural gas in Texas because energy and water are vital issues for the rapidly growing state,” said UT Austin’s Dr. Michael E. Webber, associate professor of mechanical engineering, who led the research project. “The population in Texas is expected to double by 2060, which means the state will need to provide significantly more electricity and water services in the coming decades.”

The research team’s approach was to consider three major elements of coal and natural gas fuel cycles, focusing on water consumed across the state.

Fuel extraction, power plant cooling and power plant emissions controls account for 95 percent of the water consumption associated with electricity production. Most of this consumption is for power plant cooling, but fuel extraction and emissions controls have also become increasingly important contributors as unconventional natural gas production requiring hydraulic fracturing and stricter sulfur dioxide control standards for power plants have become more common.

One of the major contributions of the study is a new set of specific comparisons for the water intensity of extracting conventional natural gas, unconventional natural gas, and Texas coal.

Based on the data collected, researchers concluded that unconventional natural gas extraction uses between 10 and 30 times as much water per unit of energy as conventional natural gas extraction. However, they also found that Texas coal extraction consumes about five times as much water per unit of energy as Texas natural gas extraction does on average.

“One of the biggest reasons for the lower water consumption for the natural gas fuel cycle is the much higher efficiency of natural gas combined cycle power plants versus Texas’ currently operating pulverized coal-fired power plants,” said Emily Grubert, graduate research assistant in the UT Austin Department of Environmental and Water Resources Engineering, and co-author of the study.

The research shows the coal to natural gas fuel switching is likely to reduce pressure on Texas’ water systems despite highly visible water consumption for hydraulic fracturing.

The research said such a switch could also reduce air pollution and the amount spent on imported energy resources, as Texas produces more natural gas than it uses but imports most of its coal.

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“Texas has unusually good data on water for resource extraction – we hope to do similar work for other coal and natural gas basins as data become available,” Grubert said.

The Texas Clean Energy Coalition (www.texascleanenergy.org) is a nonpartisan alliance that seeks to speed Texas’ transition to a new energy economy. The study was funded with support from the U.S. Department of Energy, the U.S. National Science Foundation’s Emerging Frontiers in Research and Innovation Resilient Infrastructures (EFRI-RESIN) program, and the Cynthia and George Mitchell Foundation (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.