

Water Efficiency Key To Saving Energy

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By Ben Block

In regions where pumping and distributing water requires significant electricity use, policies that lead to reduced water consumption could address climate change more efficiently than requiring businesses and households to use less energy, according to water expert Peter Gleick.

"Some of the cheapest greenhouse gas emission reductions available seem to be not energy-efficiency programs, but water-efficiency programs," said Gleick, president of the California-based Pacific Institute, a global water research center.

Gleick notes, for example, that it may be cheaper for consumers to reduce the overall hot water usage in their homes than to replace their incandescent light bulbs with more energy-efficient alternatives.

The virtues of water efficiency can be found in California and China — regions where water shortages have become emergencies and droughts may worsen with climate change. Conditions may become more severe in the future as consumers turn to water solutions that often require even greater energy supplies.

In California, where drought is afflicting the land for the third year in a row, the state is reducing water deliveries by 20-30 percent this winter and warns of "the most significant water crisis in its history." The water shortages are forcing farmers to cut production and lay off employees in an already sour economy.

Meanwhile, water transportation, storage, and treatment account for about 19 percent of the state's electricity, according to a 2007 California Energy Commission report. To reach the rapidly expanding urban clusters in southern California, for instance, water is pumped 2,000 feet (610 meters) over the Tehachapi Mountains north of Los Angeles.

David Zoldoske, director of the Center for Irrigation Technology at California State University-Fresno, has led efforts to educate central California farmers about proper pump maintenance since 2001. With the help of utility company subsidies, the project has helped improve the efficiency of several irrigation pumps, saving 19.4 million kilowatt-hours of electricity annually between 2002 and 2005, he said.

But the recent drought may reduce many efficiency gains. Farmers are digging deeper water wells and several counties are exploring plans to build desalination plants. Both measures lead to significant increases in energy use.

"When you're running out of water, you don't care about what the energy bill is...and we're in dire straits here in California," Zoldoske said. "Where people can use water more efficiently, people will opt for that.... But the availability and reliability of water is more of a concern."

In China, drought now stretches across the northern wheat belt, and nearly 4 million people are without proper drinking water. After declaring an emergency "rarely seen in history" on Thursday, the government said it plans to send cloud-seeding rockets into the air to encourage rain, and to redirect portions of the Yangtze and Yellow rivers.

Many regions of China fit into Gleick's definition of "peak water" — a term used to describe situations when water is consumed from aquifers or the ground faster than it can be replaced, or when water-use patterns irreversibly damage the local ecology.

"China is an example where [water] problems come together in the worst ways on the planet," Gleick said during a presentation of his bi-annual report, *The World's Water*, at the Woodrow Wilson Center in Washington, D.C. last week. "Water resources are over-allocated, over-used, and grossly polluted by human and industrial waste."

To address the country's water deficiencies, the Chinese government began plans in 2001 for a South-North Water Diversion project. The \$62 billion project hopes to divert water from the Yangtze to the arid north along eastern, central, and western routes. If the project is completed (the western route has yet to begin), a significant amount of energy would be required to pump water across the country.

"It takes a lot of energy to move, treat, clean, and use water. A remarkable amount of water, it turns out," Gleick said. "So whatever we can do to reduce the energy required to meet our water needs reduces greenhouse gases."

The Chinese government in 2005 prioritized a 20-percent reduction in "energy intensity" — the amount of fuel needed to generate each dollar of national income — by 2010. Historically, water production and supply have consumed less energy over time. Energy intensity declined about 30 percent between 1997 and 2004, according to a 2008 study in the journal *Water Policy*.

But the study predicts that as China follows through on its promise to expand water treatment facilities across the country, energy consumption will rise.

"Reducing urban and other end-user water intensity could conserve both water and energy,...saving households money on water and energy and creating jobs elsewhere in the economy," said David Roland-Holst, an economist at the University of California at Berkeley who co-authored the study.

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