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## World Water Day: Powerful Water, Thirsty Energy

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### Author(s)

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It's [World Water Day](http://www.unwater.org/worldwaterday/about/en/). Designated in 1993 by the United Nations General Assembly, March 22 now represents a day to celebrate water. A day to make a difference for the members of the global population who suffer from water-related problems. And a day to prepare for how we manage water in the future.

To me, references to global water stress typically only conjured up platitudes such as “Every Drop Counts” and “Conserve Water, Save the Planet.” That's how it was until I started working at the Department of Energy.

As a member of the nascent DOE crosscutting [Water Energy Tech Team](http://www.energy.gov/water-energy-tech-team), I've come to recognize the significance of the energy-water nexus. The energy-water nexus describes the interdependency between energy and water, broken down simply as “energy for water” and “water for energy.” Energy is required to transport, heat, treat, and desalinate water. Water is used to cool thermoelectric (coal, gas, nuclear) power plants, utilized in the production of fossil fuels, and is crucial for geothermal energy, irrigating bioenergy feedstocks, and hydropower.

This interdependency is not insignificant. To provide some perspective on the “energy for water” half of the nexus, note that approximately [13% of U.S. energy consumption in 2010](http://fas.org/sgp/crs/misc/R43200.pdf) was water-related.

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Energy-water analysts will tell you this is good news for your conservation efforts. Now you understand that saving a drop of water actually saves energy as well. Organizations such as the U.S. Environmental Protection Agency (EPA), the American Council for an Energy Efficiency Economy (ACEEE), and the California Public Utilities Commission (CPUC) are educating the public on the fact that “saving water saves energy.”

But I want to take it one step further.

Let’s revisit the “water for energy” half of the nexus. In 2011, [almost 50% of the 405 billion gallons](http://www.energy.gov/downloads/water-energy-nexus-challenges-and-opportunities) (<http://www.energy.gov/downloads/water-energy-nexus-challenges-and-opportunities>) withdrawn in the United States each day went to cooling thermoelectric power plants (coal, natural gas, and nuclear). This doesn’t even include the water required for other parts of the energy lifecycle (think fracking, enhanced oil recovery, coal washing, etc.). So. Remember the energy required to get that drop of water to your tap? *It turns out that embedded in that energy itself is a significant amount of water.* And it doesn’t end there. In actuality, conserving a drop of water saves energy, which saves water, which saves energy, which saves water...and on and on in a cascading fashion.

Utilizing the extreme simplification that ***Ew*** units of energy are directly embedded in ***W*** units of useful water, and ***We*** units of water are directly embedded in ***E*** units of useful energy, this can actually be written out exactly as the sum of an infinite geometric series: if you conserve an amount of water, ***X***, the total water savings is

But back to the big picture. Right now, [2.8 billion people](http://www.worldbank.org/en/topic/sustainabledevelopment/brief/water-energy-nexus) (<http://www.worldbank.org/en/topic/sustainabledevelopment/brief/water-energy-nexus>) live in areas of high water stress (and 2.5 billion have unreliable or no access to electricity). In addition, estimates show that by 2035, global energy consumption will increase by 35%, which will [increase water consumption by 85%](http://www.worldbank.org/en/topic/sustainabledevelopment/brief/water-energy-nexus) (<http://www.worldbank.org/en/topic/sustainabledevelopment/brief/water-energy-nexus>). So every drop does count.

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If nothing else, remember that energy is thirsty, and water is powerful. Happy Water Day, world.

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