

## Water-Energy Nexus

Water managers and energy utilities alike are paying more and more attention to what is being termed the water-energy nexus. This term refers to the idea that water is required to generate energy and that energy is required to treat and deliver water. With hotter and drier weather projected for the Southwest due to climate change, this nexus between water and energy could make providing both more difficult in several ways. Higher temperatures will increase energy demands for cooling in the residential and commercial sectors. As groundwater supplies decrease, more energy will be required to pump water from greater depths. Warmer intake water (from rivers and lakes) will make it more difficult to cool process water used in power plants. Some power plants, such as the Palo Verde Nuclear Generating Station near Phoenix, AZ, use reclaimed water for cooling. However, as water resources become scarcer, competition for even reclaimed water supplies may become more and more fierce.

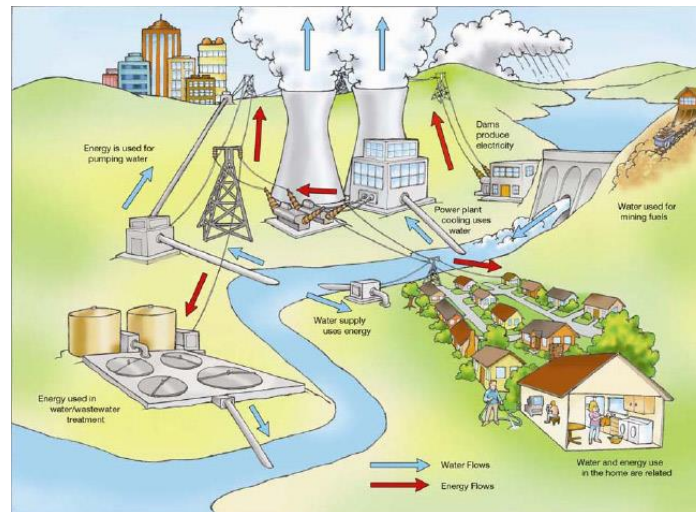


Figure 1: Graphic depiction of the water-energy nexus ([www.ncsl.org](http://www.ncsl.org))

One very clear example of the water-energy nexus involves the production of hydroelectricity. Hydroelectric dams require large volumes of water in the reservoirs behind them to generate pressure, and therefore, electricity. Higher temperatures mean higher rates of evaporation from reservoirs, as well as potential reduction of precipitation amounts and longer periods of drought that could further reduce supplies. Lake Mead, which generates electricity and supplies water for Arizona, Nevada, California, and Mexico, and Lake Powell, which further stores water for these Lower Basin states, both have “bathtub rings” showing how much capacity has been lost from a decade of drought.

Water harvesting can help ameliorate the impact of climate change on the water-energy nexus in several ways. Residents and businesses that use harvested water to irrigate outdoor vegetation reduce their demand for potable water—water which requires energy to both treat and deliver. Further, harvested water used to grow vegetation, and especially trees, along streets and homes can help cool the urban environment, both by shading homes and businesses and by increasing the cooling effects of evapotranspiration.



# Quick Resource

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## Further reading and resources:

- <http://www.ncsl.org/issues-research/env-res/overviewofthewaterenergy nexusintheus.aspx>
- [http://www.gao.gov/key\\_issues/energy\\_water\\_nexus/issue\\_summary#t=0](http://www.gao.gov/key_issues/energy_water_nexus/issue_summary#t=0)
- <http://www.southwestclimatechange.org/blog/13929>



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