

# Southwest HYDROLOGY

The Resource for Semi-Arid Hydrology

Volume 6/Number 5

September/October 2007



Water-Energy  
Nexus

Southwest Hydrology  
University of Arizona - SAHRA  
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A bimonthly trade magazine for hydrologists, water managers, and other professionals working with water issues.

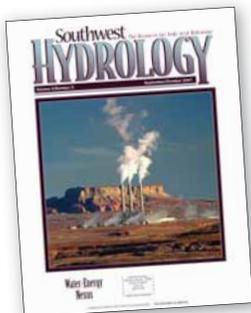


From the  
Publisher

*To really understand the nexus between water and energy, carry a five-gallon bucket of water up two flights of stairs. The stuff is heavy and can't be moved around without considerable effort. Yet without much hesitation, we pump huge quantities from great depths, pipe it around our states, treat it, deliver it to its point of use, collect it again, re-treat it, and dispense with it. And energy production itself requires water. We just spent another long, hot summer grateful for central air conditioning powered by electricity. But whether it was generated by hydropower, nuclear power, or thermoelectric power, a good amount of water was consumed in its production. Water and energy are intrinsically linked; we can't have one without the other. This issue takes a close look at how much of one is needed to produce the other.*

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Betsy Woodhouse, Publisher



*Navajo Generating Station near Page, Arizona. Photo donated and copyrighted (2004) by Bill Kutcher. Visit [www.pbase.com/ibill](http://www.pbase.com/ibill).*

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Printed in the USA by Spectrum Printing Company

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ISSN 1552-8383

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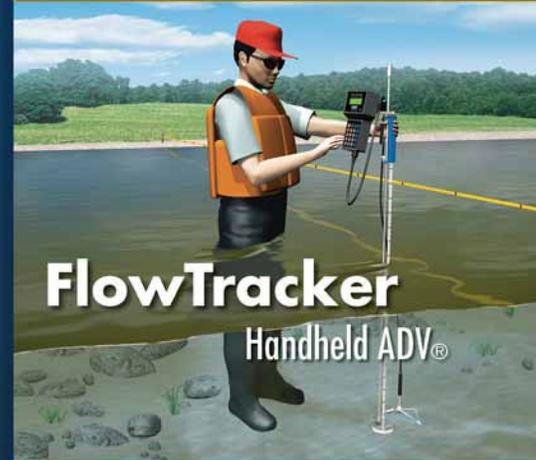
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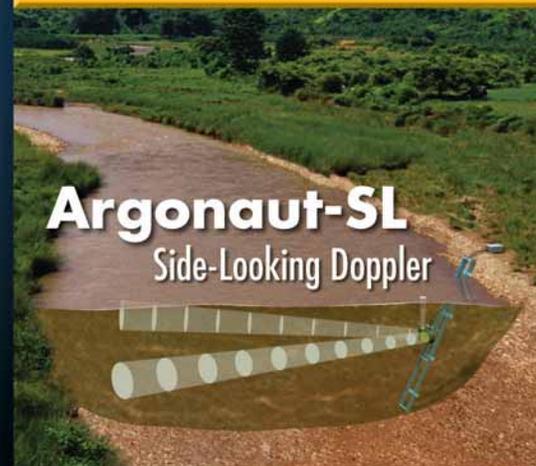
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## Water-Energy Nexus

Moving and treating water consumes energy, and producing energy nearly always consumes water: the two are tightly linked. The good news is that conserving one results in savings of the other as well. By understanding how much water is required to produce various kinds of energy, we can move toward more water-efficient energy production. In turn, recognizing how much energy is needed for various components of our water systems will help us identify opportunities for greater efficiency. This issue's articles look at both sides.

### 16 The Water-Energy Nexus

*Ronnie Cohen*

Enormous amounts of energy are required to move water from source to tap and beyond. Water conservation not only saves water, it saves the energy required to collect, pump, treat, deliver, heat, cool, and dispose of it. Turning off the tap can be as energy efficient as turning off the lights!

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*Betsy Woodhouse*

A recent Department of Energy report examines the interdependencies of energy and water in the United States.

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*Dana Larson, Cheryl Lee, Stacy Tellinghuisen, and Arturo Keller*

Researchers looked at total water requirements and water consumption for nine primary energy sources, and evaluated potential future energy scenarios for California in light of water use and the state's renewable portfolio standards.

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*Andy Aden*

New federal initiatives to increase use of renewable and alternative fuels have spurred massive growth in the ethanol industry. What are the true water and related energy demands for growing corn and other plants for ethanol production, and how could the process become more efficient?

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*Jeannine Larabee and Hossein Ashktorab*

The Santa Clara Valley Water District initiated several innovative water recycling and water conservation programs that have resulted in substantial energy savings and reduced emissions of carbon dioxide and other pollutants.

### 26 Linking Water and Energy along the Arizona-Sonora Border

*Christopher A. Scott, Robert G. Varady, Anne Browning-Aiken, and Terry W. Sprouse*

Water and energy don't stop flowing at the international border. Arizona and Mexico are coordinating their efforts along the border to improve both water and energy efficiencies, particularly in light of forecasted climate change.

### 28 Water-Energy Trade-Offs Between Swamp Coolers and Air Conditioners

*Arunima Chatterjee and Melanie Lenart*

In the dog days of summer, have you ever wondered about the overall water and energy tradeoffs of evaporative cooling versus air conditioning? This article examines the total energy and water consumed in each method, the climatic impacts of the way energy is converted, and ways to improve cooling efficiencies.

Publishing **Southwest Hydrology** furthers SAHRA's mission of promoting sustainable management of water resources in semi-arid regions.



This publication is supported by SAHRA (Sustainability of semi-Arid Hydrology and Riparian Areas) under the STC Program of the National Science Foundation, Agreement No. EAR-9876800. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of SAHRA or of the National Science Foundation.