

## Energy for Water

by Sarah Kozicki

### Energy for Water

Have you had a glass of water to drink today? How much energy do you think went into treating and transporting that water from its source – probably a lake or aquifer – to your kitchen faucet?

In the United States, 13 percent of the total energy produced each year is used to treat, transport and heat our water.<sup>i</sup> While that sounds like a lot of energy, getting clean water in the U.S. is as easy as turning on the tap. In some places around the globe it is not that simple.

### Carrying Water

In the United States and other developed countries, cleaned and treated fresh water is piped directly into our homes – we can turn on the tap for drinkable water any time. However in less developed countries, human energy is a necessary part of daily water use. About two thirds of the world's families do not have a water supply in their homes and must fetch water in jugs and buckets from wells, rivers, hand pumps and other public sources. This water is usually collected and carried by women and children. In



Many African women must travel miles by foot each day to fetch enough water for their families

Photo Credit: WaterAid/Layton Thompson

Asia and Africa, the average woman walks a total of 3.7 miles to collect and carry fresh water home each day.<sup>ii</sup> The average weight of water that a woman in Africa and Asia will carry is about 40 pounds!<sup>iii</sup> Water is usually carried on the head, back or hips, which can cause severe health problems. On average, a person living in sub-Saharan Africa uses four gallons of water a day, while someone in the United States uses *82 gallons of water a day or more*.<sup>iv</sup> How many trips would you have to make if you had to carry all the water your family uses in a day?



In some parts of the world, water is pumped by hand to fill buckets that are carried by women and children from a public source to their homes

Photo Credit: WaterAid/Layton Thompson

### Melting Snow

On the frozen snow and icescapes of Antarctica, scientists are hard at work monitoring ozone and greenhouse gas levels in the atmosphere and studying the biology of the unique ecosystems on the southernmost continent. Scientists living in Antarctica have the same basic needs as people everywhere do, including access to fresh water. But in Antarctica, turning on the tap isn't always an option. People living in research camps have to collect and melt snow to use for drinking, cooking and cleaning.

Melting snow for water isn't easy. First, scientists and support staff living in research camps have to gear up for extreme cold and shovel the snow, either by hand or using heavy machinery. They fill a snow melter with snow and then let it go to work, melting down enough snow for the entire camp to meet its basic water needs. That's a lot of snow—and energy!

The energy required to get fresh water in Antarctica – human energy to shovel snow and electrical energy to power the snow melter – limits the amount each person can use, so water conservation is an important part of daily life in a research camp. The snow melters at the West Antarctic Ice Sheet (WAIS) Divide use 4,000-watt electric immersion heaters—energy that comes from fuel-powered generators.<sup>v</sup> Fuel is precious on



A snow melter is used to obtain fresh water at some Antarctic research stations

Photo by Gary Wesche (PolarTREC 2009),  
Courtesy of ARCUS

### Water in the Wild West

In the arid west of the United States, many cities are finding it more and more difficult to supply fresh water to their growing populations. The search for sufficient sources of water is sending them deeper underground and farther from the populations the water is ultimately meant to serve. Some of the proposed water projects in Colorado, Nevada, Utah and Wyoming include pumping water anywhere from 62 to 300 miles, sometimes up and over mountains. The estimated net energy use of these projects can reach up to 600,000 megawatt-hours per year.<sup>vii</sup>



Imagine shoveling snow – by hand – into a snow melter to get the fresh water you need for daily use

Photo by Heidi Roop (PolarTREC 2009),  
Courtesy of ARCUS

Antarctica, as it has to be flown in. Because of limited fuel supply, people at WAIS Divide are limited to one 2-minute shower a week, after which they must shovel snow into a 45-gallon barrel and dump it into the snow melter so it's ready for the next person. It takes three 45-gallon barrels of snow just to do one load of laundry, which is done once every two weeks. The water conservation efforts of those living at WAIS Divide have resulted in an average use of just 5 gallons of water per person per day.<sup>vi</sup> How many barrels of snow would you need to meet your daily water needs?



In the western United States, water is often piped many hundreds of miles where it is needed

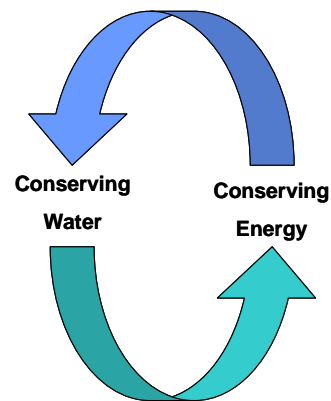
Photo Credit: U.S. Department of  
the Interior, Bureau of Reclamation

Many water projects already in existence move water very far distances. The Central Arizona Project (CAP) brings Colorado River water 336 miles, from Lake Havasu to counties in the southern part of Arizona. CAP is the biggest user of electricity in the state of Arizona. Last year, CAP needed 2.8 million megawatt hours in order to deliver over 500 billion gallons of fresh water to 80% of the state's population.<sup>viii</sup> That's a lot of water traveling a long way. But as demand for water increases and sources become scarcer, energy use will increase as well.

### **Water Conservation = Energy Conservation**

Energy consumption is an integral part of water use. Energy is used at every step of the process – to treat, transport and heat our water. When we conserve water, we conserve energy. Increasing water conservation efforts in many parts of the U.S. and around the world could delay or eliminate the need for new, energy-intensive water development projects.

Try to imagine carrying, pumping, shoveling and melting enough water or snow to meet your daily water demands, and you might find the motivation to reduce the size of your water-energy footprint.



<sup>i</sup> River Network. (2008). "Saving Water, Saving Energy." Retrieved February 2, 2010 from <http://www.rivernetwork.org/programs/saving-water-saving-energy>

<sup>ii</sup> University of Iowa Center for Human Rights. (2005) "UICHR Human Rights Index #14—Water." Retrieved March 23, 2010 from <http://international.uiowa.edu/centers/human-rights/projects/human-rights-index/14-2005.asp>

<sup>iii</sup> WaterAid America. (n.d.) "Statistics—Key facts and statistics." Retrieved March 23, 2010 from [http://www.wateraidamerica.org/what\\_we\\_do/statistics.aspx](http://www.wateraidamerica.org/what_we_do/statistics.aspx)

<sup>iv</sup> WGBH Educational Foundation & Vulcan Productions, Inc. (2005). "Rx for Child Survival—A Global Health Challenge: How Hard Can It Be to Carry Water?" Retrieved February 2, 2010 from [http://www.pbs.org/wgbh/rxforsurvival/campaign/givetime/pdf/Rx\\_Carry\\_Water.pdf](http://www.pbs.org/wgbh/rxforsurvival/campaign/givetime/pdf/Rx_Carry_Water.pdf)

<sup>v</sup> Roop, Heidi. (2010). "Water: a key element to survival." Retrieved March 24, 2010 from <http://www.polartrec.com/node/11304>

<sup>vi</sup> Banks, Maria. (2009). "Water, Water Everywhere but not a drop to drink!" Retrieved March 24, 2010 from <http://www.adventures-in-climate-change.com/drillingintothepast/>

<sup>vii</sup> Tellinghuisen, Stacy. (n.d.) "Pipelines and Power Plants: The Energy Needs of the West's Future Water Supplies." Retrieved March 19, 2010 from <http://www.westernresourceadvocates.org/water/energy.php>

<sup>viii</sup> Central Arizona Project Smart Energy. (2010) About Us. Retrieved March 23, 2010 from <http://www.capsmartenergy.com/aboutus.html>