

# THE TREATMENT ROOM



Water treatment specialist Judith Herschell provides insight on how water treatment companies can benefit from the growing interplay between water and energy.

## The key to the energy market

As my colleague Amanda Brock stated in her column (*see opposite*), global energy production is consuming ever more water as time goes on. The interdependency of water and energy is becoming abundantly clear, and water treatment companies stand to benefit by helping energy producers improve their water efficiency.

In the energy arena, water is used in energy capture, refining, processing, power plant exhaust cleaning, steam generation, cooling, and a number of other applications. Conversely, it takes massive amounts of energy to access, treat and transport water and wastewater. It has been estimated that nearly 20 percent of California's electricity is used for water-related applications. A similar figure for the U.S. is about 6 percent. There has been great concern over exhausting fossil fuel sources, but comparatively little concern with regard to depleting freshwater resources. Due to the interrelation of the two, an urgent situation is looming as limited water will eventually curtail energy production and/or increase the price of both resources.

Projections are for the annual water usage for energy production in the U.S. to increase from 66 billion cubic meters (bcm) to 135 bcm. This is largely due to soaring coal-fired electricity and the ramping up of biofuel production. The chart (*bottom right*) shows the approximate volumes of water used to extract and process various fuel types.

Myriad factors contribute to the interplay of water and energy demands in the U.S.:

- Population growth of 12 percent is expected between 2012 and 2035
- Areas of population growth and energy usage don't align with water availability
- Per capita water use is increasing
- Energy production and associated water use are increasing
- Water production and associated energy use for treatment and delivery are on the rise
- Agriculture and industry are competing for limited water resources
- The volume of accessible water supplies is unchanging
- Once-through cooling systems are being upgraded with closed-loop cooling systems, which have substantially higher net water usage

The volumes of water used in energy extraction, processing and conversion are likely to rise with an increased reliance on water-intensive fuels. Excluding renewable sources such as wind and solar power, shale gas will have the largest impact

on decreasing water usage. It is being produced in much larger volumes and as has lower water usage than other fossil fuels, both in production and in fueling power plants.

### Win-win situation

The win-win of the interplay between water and energy is that reducing energy consumption saves water, and reducing water consumption saves energy.

The key to meteoric success for water treatment companies supplying to the energy industry is innovative technologies that reduce the amount of water used to produce energy. The key to competitiveness for energy companies is the reduction of energy required to treat, pump and distribute water, including improvements in energy usage for wastewater treatment processes and irrigation technologies. There are a number of technologies that can conserve valuable resources and contribute to the competitiveness of energy players. The High-Efficiency Reverse Osmosis (HERO) process, for instance, uses gray water in power production. Membrane distillation unlocks currently unusable water sources. Dry cooling systems reduce water losses, and integrated gasification combined cycle technology reduces water use in power generation.

These technologies will likely demand a higher cost and/or have lower efficiency or reduced reliability. Nevertheless, the lifecycle costs of trimming water usage will in many cases far outweigh the costs of using additional water.

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### WATER USAGE FOR EXTRACTION AND PROCESSING OF FUEL

Fuel – extraction and processing	Water usage (gal/MBtu)
Natural gas & transportation	4.0
Coal mining & washing	6.8
Coal & slurry pipeline	8.5
Uranium mining & enrichment	10
Oil: primary-secondary	93
Oil: enhanced oil recovery	91
Oil sands	50
Natural gas & GTL	74
Coal & CTL	70
Corn ethanol	83
Cellulosic ethanol	90

Source: Energy Technology Innovation Policy Research Group