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Recycled Wastewater—As Drinking Water

Recycled water will be an increasingly important component of sustainable development, and improved treatment methods and escalating costs for importing water are making attractive the use of recycled municipal wastewater for drinking water.

ALTHOUGH WATER HAS BEEN USED FOR decades in agriculture, industry, and commercial buildings, its growing shortage around the United States is expanding interest in recycled water for potable use. It has the potential to be a reliable source of potable water and can save energy and cost by decreasing the need for energy-intensive imported water. This is especially germane in areas of the country, such as the Southwest, where water is often pumped long distances.

Concerns about recycled water include its salt content and recent news reports of pharmaceutical and other chemicals detected in water supplies, not to mention public perception. Recent outbreaks of foodborne illnesses have also raised concerns about the possibility of pathogens in the water supply. Nonetheless, improved treatment methods and accelerating costs for importing water have led more communities to look to recycled municipal wastewater as potential drinking water.

greenhouse gases—a factor that we should expect to be increasingly scrutinized, regulated, and taxed—given current environmental policy trends.

Recycling municipal wastewater for potable use is relatively new. A significant issue is how clean to make the recycled water for its intended use. Regulatory programs allow lower levels of treatment for uses in which human contact is relatively low, such as landscape irrigation, and require higher levels of treatment for uses involving human contact, such as consumption.

All municipal wastewater is treated before being discharged to land or rivers or lakes. The treatment usually consists of sedimentation, filtration, disinfection, and aeration. Water that is intended for reuse is subject to further treatment consistent with its use.

Recent reports in news media on the presence of pharmaceuticals, veterinary drugs, and personal care products in drinking water have highlighted the issue for recycled water. The reality is, however, that many communities rely on lakes and rivers for their drinking water, and some of these communities are downstream of industrial and municipal wastewater dischargers.

Water reuse agencies are concerned that recycled water might be required to meet higher standards—requiring advanced treatment—than treatment required for discharged wastewater. The additional monitoring and treatment needed to meet these higher standards could be an economic disincentive to reusing wastewater.

The U.S. Environmental Protection Agency (EPA) reports that these chemicals can be removed through currently available treatment methods. Reverse osmosis can remove many of them, and residual organics can be destroyed by UV light and hydrogen peroxide.

There are numerous water recycling projects throughout the United States and, with the expected water shortages, recycled water will be an attractive future source of drinking water. Advances in treatment technology should bring down treatment costs, and new analytical methods will most likely be developed to provide better assurance of safety. **UL**



In California, demand for the state's limited water supply has resulted in a groundwater replenishment system (GWRS) for Orange County's Water District (above). The GWRS purification process includes reverse osmosis (above right) and ultraviolet light with hydrogen peroxide for advanced oxidation (above far right).

In California, demands for the state's limited water supply are intensifying due to population growth, decreased allotment of Colorado River water, and the impacts of global warming. Groundwater in San Bernardino's Rialto-Colton Basin, for example, has dropped 150 feet in the last century due to regional pumping. Rising temperatures from global warming are expected to exacerbate the water shortage.

Recycled water can result in substantial economic and energy savings. California's Orange County Water District estimates that the energy cost for its state-of-the-art recycling facility using microfiltration, reverse osmosis, and UV-peroxide treatment is about half the cost of pumping water across the Tehachapi Mountains. In addition, moving water consumes substantial energy resulting in the generation of significant

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