

California looking to recycled water to ease drought concerns

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SACRAMENTO — Transforming sewage into clean water will be the wave of the future for many Californians, experts say.

At two treatment plants in El Dorado Hills, millions of gallons of brown wastewater pour in every week, and millions of gallons of clean water pour out through purple pipes that irrigate the lawns of 4,000 homes.

Proponents call it water recycling. Critics call it "toilet-to-tap." But as the drought has taken hold in California, opposition to the idea has been drying up, and recycled water is winning acceptance. It's expected to be a significant source of landscaping and drinking water for many Californians in years to come.

Today, taxpayer money is flowing toward recycled water programs. As part of recent drought relief measures, the state allocated \$200 million in grants to jump-start those efforts and slashed interest rates on \$800 million more in loans.

"There's a billion dollars for recycling we did not have available to us as an industry six weeks ago," said Dave Smith, the managing director of WateReuse California, part of a nationwide group that advocates water recycling.

More than a billion gallons of treated wastewater are pumped into the Pacific Ocean each year, Smith said. The state wants to dramatically reduce that amount, and increased water recycling is seen as the way to do it, he said.

There will be more communities investing in systems that recycle water for use on lawns and crops, but much of the growth, especially in Southern California, will be in turning human wastewater into drinking water, Smith said.

In October, Gov. Jerry Brown signed a bill that requires state health and water officials to report by September 2016 on the feasibility of developing uniform standards for recycling wastewater for "direct potable reuse." That means purified wastewater would flow straight to household faucets.

"California needs more high-quality water, and recycling is key to getting there," Brown said in his signing message for SB 322, authored by Sen. Ben Hueso, D-San Diego.

Smith said one key will be educating the public about safety. He contends that highly purified wastewater will be cleaner than the water currently pumped and treated from some of the state's major surface-water sources.

"We can produce from sewage much higher quality water than comes from the Colorado River or the Sacramento-San Joaquin Delta," Smith said. "We're going to see more projects as time goes forward and communities pursuing a full range of options."

Reusing wastewater is nothing new. Starting in the late 1800s, farmers used wastewater to irrigate crops, and Golden Gate Park in San Francisco, once sand dunes, was famously watered with untreated waste until complaints about the smell put an end to the practice, said Richard Mills, chief of the recycling and desalination section at the state Department of Water Resources. Treated water was used at the park starting in the 1930s, he said.

In the 1960s, water agencies in coastal areas began using highly treated urban wastewater to replenish groundwater basins to stop seawater from intruding into underground aquifers, Mills said.

A survey in the late 1970s showed that California was using about 175,000 acre-feet of reclaimed wastewater annually, primarily in agriculture, he said. The most recent survey, in 2009, showed a jump to 669,000 acre-feet per year. (An acre-foot is the amount it takes to cover an acre 1 foot deep – about 326,000 gallons, or the quantity of water two average households use in a year.)

These days, recycled urban wastewater is "being looked at more as a new water supply," Mills said. That's especially true in Southern California, where investing in recycled water is relatively cost-effective given that the area pays to import almost all its fresh water from the Sierra Nevada and other distant regions.

Earlier this month, the Escondido City Council, in northern San Diego County, approved a \$285 million plan to turn all the city's sewage into irrigation water. Orange County, a leader in recycling efforts, injects highly treated water into underground aquifers and withdraws it again for drinking water — a system known as indirect potable reuse.

The process involves pushing the wastewater through ultra-fine filters that can strain out bacteria, then using reverse osmosis to remove almost all molecules that are not H₂O. What's left is chemically disinfected and exposed to ultraviolet light, producing a substance on par with distilled water.

The next step would be direct potable reuse — sending the purified wastewater straight to the tap rather than into underground aquifers. The process would be similar, Mills said, but would require overcoming consumers' safety and "psychological concerns," generally called the yuck factor.

"That's the coming frontier, but we're not quite there yet," Mills said.

For now, the main focus in many communities is on increasing the amount of recycled water used for landscaping instead of spraying drinking water on lawns.

"As a region we're using maybe 1 or 2 percent recycled water," said John Woodling, executive director of the Sacramento-area Regional Water Authority, which consists of 25 water providers and affiliated agencies in Sacramento, Placer, Yolo and El Dorado counties.

That relatively small percentage amounts to fewer than 10,000 acre-feet a year. A regional water plan calls for upping the amount to 55,000 acre-feet by 2030, as population grows and more homes are built.

El Dorado Hills has emerged as a model for water recycling in both the region and the state. The city of 42,000 was one of the state's earliest converts to recycled water and remains a leader.

"We've been doing it aggressively for 20 years now," said Kirk Bone, government relations director with Parker Development, the company behind the upscale, gated Serrano subdivision in El Dorado Hills.

In the late 1970s, the El Dorado County Irrigation District started recycling water as a way to help meet new discharge requirements, said Vickie Caulfield, the district's division manager for wastewater operations. The recycled water initially was used only by a golf course and a local wood products plant.

But then the developers of Serrano came calling. They saw recycled wastewater as a means to building thousands of homes across parched ridges where cattle grazed and rattlesnakes basked.

"Water was always a problem," Bone said. "Early on, we realized we couldn't rely on potable water."

The developers spent \$10 million to help upgrade treatment plants and install pipelines, he said. Initially it was only used on the community's golf course, but in the early 2000s Serrano moved to landscape the front and backyards of new homes with recycled water.

Now, weather stations with satellite links and soil monitors determine the precise amount of water needed, and the Serrano homeowners' association controls most front-yard irrigation to conserve water, maintenance manager David Sanders said.

That water comes from the city's two wastewater plants, which treat the sewage flowing in using an elaborate process that includes filtering through sand, coal and plastic beads.

At the end, the water is run through blindingly bright banks of ultraviolet lights to disinfect it.

Some of the water is discharged to a creek flowing by, but much of it is sent by purple pumps through purple pipes to holding tanks.

The color purple is commonly used to differentiate pipes carrying recycled water in systems dual-plumbed with drinking water.

"It's called reclaimed water once it hits the purple pipe, and out it goes," said Alan Planje, supervisor of operations and maintenance at the El Dorado Hills Wastewater Treatment Plant.

"The drought has given new impetus to recycling," Mills said.

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