

# From digesters to the fuel tank

Orange County, Calif., WWTP tests feasibility of converting methane into fuel for hydrogen-powered vehicles

**W**ill the local wastewater treatment plant (WWTP) become the place to go to fill up your car's tank? If one day the tank takes hydrogen instead of gasoline, the answer could be "yes." With this possibility in mind, a pilot project at a Southern California WWTP is testing the feasibility of converting methane into fuel for hydrogen-powered vehicles.

In a first-of-its-kind application, the 772,000-m<sup>3</sup>/d (204-mgd) Reclamation Plant No. 1, which is owned by the Orange County Sanitation District (OCSD; Fountain Valley, Calif.), has been outfitted with fuel-cell technology capable of converting methane from the plant's mesophilic anaerobic digesters into hydrogen. Although much of the hydrogen is consumed by the fuel cell as it produces electricity, the excess hydrogen that remains is collected, purified, and made available for use by vehicles powered by fuel cells. Funding for the \$8 million pilot project came from public and private sources, including OCSD, the U.S. Department of Energy, the California Air Resources Board, the South Coast Air Quality Management District, and Air Products and Chemicals (Air Products; Allentown, Pa.). FuelCell Energy (Danbury, Conn.) supplied the fuel-cell technology.

The fuel cell installed at the OCSD plant is designed to generate nominally 300 kW of electricity and approximately 50 kg/d



Ed Heydorn fuels a hydrogen fuel cell vehicle at the Orange County Sanitation District WWTP. Air Products/Mike Danese

(110 lb/d) of hydrogen, said Ed Heydorn, business development manager for hydrogen energy systems at Air Products, a hydrogen provider and developer of hydrogen fueling stations. "That's enough to support 100 to 150 vehicles," he said.

Automakers currently lease, rather than sell, hydrogen-fueled vehicles to the general public. However, automakers have indicated that they intend to launch commercial sales of such vehicles in 2015, Heydorn said.

In August, Air Products opened a fueling station at OCSD's Reclamation Plant No. 1, the company's 11th such installation in California.

"The fueling station is located on our property just outside the front gate of our facility," said Jeff Brown, senior engineer and project manager at OCSD.

Although OCSD is able to use the electricity generated by the fuel cell, the amount is relatively minor, Brown noted. Therefore, the "main benefit to OCSD is the opportunity to evaluate the real-world

performance of an environmentally benign power-generating technology using our renewable biogas as its fuel source," he said.

As a potential feedstock for renewable energy, biogas from wastewater has the benefit of being continuously available in large, concentrated volumes, Heydorn noted. Meanwhile, wastewater treatment facilities tend to be located near urban populations, the most likely candidates for hydrogen-fueled vehicles. Currently, the fuel cell at the OCSD facility is harnessing only about 5% of the methane generated by the treatment plant. However, Air Products is keen to test whether the technology can be operated on a grander scale. "You can see how this would move to large-scale fuel cells in the megawatt size and then large-scale hydrogen production," Heydorn said. To this end, Air Products is planning to deploy a 1-MW fuel cell at a European WWTP in the future.

— Jay Landers, WE&T