



SHOWCASE PROJECT: VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY: OMNIVORE CO-DIGESTION AND RECUPERATIVE THICKENER

SOLUTION OVERVIEW

Beginning in 2008, Victor Valley Wastewater Reclamation Authority (VWRA) began planning plant optimization and expansion for its facility to comply with new regulatory limits and increase capacity. VWRA recognized that in complying with the new regulations they could incorporate project features to reduce future energy costs and eliminate natural gas purchases. The project thus involved re-commissioning a one-million gallon digester by installing a 330,000 gallon Omnivore Co-Digestion and Recuperative Thickener unit, with help from a \$2 million California Energy Commission innovative technology grant. This unit can produce 150% more biogas from the digestion process that can be re-used in-lieu of natural gas in two combined heat and power (CHP) units.

The expansion project initially included plans to decommission the facility's three smallest digesters. However, VWRA recognized that the digesters produce biogas, which can be used in place of purchased natural gas for internal energy consumption. The infrastructure could thus be made capable of producing enough biogas to meet the plant's energy demands if integrated with a program of imported organic feedstocks.

VWRA engaged Anaergia, which offered state-of-the-art recuperative thickening technology. The construction of the dome, installation of the hydraulic mixers and the installation of the Omnivore recuperative thickener all progressed without any significant hurdles. Construction started in 2013 and the system came on-line in February 2014. Once this infrastructure was in place VWRA began accepting fats, oils and greases (FOG) along with food and other feedstocks from local food processing facilities. By 2015 the co-digestion of the FOG, food wastes and conventional sludge enabled VWRA to generate up to 500,000 cubic feet of biogas per day (ft³/day), an increase of 300,000 ft³/day compared with its previous generation levels. This made it possible for VWRA to install two 800 KW CHP units in mid-2015 that could utilize all the biogas to produce heat for operations and electricity to displace grid-purchased electricity.

SECTOR TYPE

Industrial

LOCATION

Victorville, California

PROJECT SIZE

Plant takes up 446 acres of land, and also treats 10.5 million gallons per day

FINANCIAL OVERVIEW

\$2,600,000

SOLUTIONS

The entire Omnivore digester process is an innovation. The use of a recuperative thickener has been tried before; however, it is the mixing system that enables it to function as designed. Proprietary thickening technology and specialized hydraulic drive mixers are used to process the thicker sludge.

The Omnivore process thus dramatically increased digester capacity in existing tankage by maintaining the digester contents at 6% total solids—over twice as much as conventional digesters, which operate at around 2.5% solids. In addition, it allows VVWRA to reduce its footprint because it produces as much biogas as a digester three times its size.

The Omnivore process uses approximately \$78,000 per year of electricity, compared to approximately \$115,000 per year for the one-million gallon digester that it replaced. That represents a saving to the VVWRA of \$37,000 per year in electricity costs. By expanding biogas production, the unit also enables much greater energy cost savings with the implementation of CHP units which use the biogas to produce electricity and displace purchased electricity from the utility.

Since the Omnivore digester utilizes a polymer to achieve a higher solids concentration, there is an additional operating expense—the annual operating and maintenance cost of the Omnivore process is approximately \$22,000 more per year than a digester built to traditional performance metrics. However, the Omnivore digester's cost, \$2.6 million, is significantly lower than the legacy digester, which cost \$6 million at the time it was installed. When the capital cost savings are amortized over 30 years, this represents additional savings of \$113,000 per year.

OTHER BENEFITS

The Omnivore digester also cuts back on operation time and costs and improves worker safety. If a conventional digester had an operational issue with mixing internals, the site would need to completely drain the tank. This would involve entering into a permit-confined space with a crew of three people, spending as long as a month repairing, cleaning, and conducting other maintenance inside the digester. The digester would then need to be recommissioned, a process requiring between an additional three to six months to return it to its original operating performance level. However, with the Omnivore digester and the hydraulic mixers, the site is able to access the mixing system from outside the digester. This eliminates the need to send workers into a potentially dangerous space to drain the digester and saves time and money.

The new digester system also negates the need to process water and focuses solely on additional solids destruction, a result of an increased solids detention time. This leads to increased biogas production. With the CHP units installed and able to convert the biogas to electricity, the project is

generating over \$400,000 in annual electricity cost savings. And, when accounting for the receipt of fats, oils and greases (FOG) and anaerobically digestible material (ADM) for co-digestion in the digester, at a 20% feed rate and 4 cents/gallon in tipping fees from local waste haulers, it represents income in excess of \$80,000 on an annual basis.

Annual Energy Use

Baseline(2014)
98,000 MMBTU

Actual(2015)
47,000 MMBTU

Energy Savings

52%

Annual Energy Cost

Baseline(2014)
\$1,200,000

Actual(2015)
\$800,000

Cost Savings

33%



Digester tank and recuperative thickener



Recuperative thickener



Biogas storage vessel