SOLUTION OVERVIEW
In 2008, Victor Valley Wastewater Reclamation Authority (VVWRA) began planning plant upgrades to comply with new nitrogen permit limitations and an expected capacity increase. VVWRA also evaluated incorporating a waste-to-energy project to reduce future energy costs and eliminate natural gas purchases with the ultimate goal of becoming energy neutral.

VVWRA estimated the financing required for the waste-to-energy project represented $15-20 million in capital costs. The Authority was already using California’s State Revolving Fund, a U.S. Environmental Protection Agency (EPA) loan program that provides low-cost financing for projects in water and wastewater treatment plants. However, much of California’s Revolving Fund resources were obligated to major projects in other parts of the state. Hoping to avoid significant ratepayer impacts by funding the project itself, VVWRA decided to seek a private technology provider capable of financing the waste-to-energy project. The success of the third party funding arrangement led to a public-private partnership with funding from the State of California. As a result, VVWRA has been able to pursue additional opportunities to enhance its energy infrastructure, furthering its energy neutrality goal.

BARRIER
Limited internal and state funding resources to finance energy efficiency/recovery projects

SOLUTION
Using a special lease and power purchase agreement (PPA) to finance plant energy improvements

OUTCOME
Secured funding and implemented a waste-to-energy process (biogas from wastewater), reducing energy costs

POLICIES
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For a number of years, VVWRA experienced difficulties with limited resources for traditional Operations & Maintenance (O&M) and Replacement and Renovation (R&R) projects. As a result the long-term goal of energy neutrality was initially met with skepticism from operating staff. VVWRA leaders gained staff support by sharing the immediate benefits of individual projects and demonstrating how each project builds towards broader energy goals. Ongoing education about energy efficiency accomplishments in the treatment processes, for example operating five of eight secondary clarifiers while still meeting permit requirements, helped staff understand their roles in reducing the facility’s energy consumption.

**PROCESS**

In 2012, VVWRA developed a “Request For Proposals” (RFP) for the waste-to-energy project. A key element of the RFP was a stipulation that the contractor enters into a power purchase agreement (PPA)/lease. Under which, the selected contractor would develop and own the energy infrastructure and recover their investment via energy sales to VVWRA. The RFP required capital upgrades to be built into the monthly electrical payments VVWRA makes under the PPA. These upgrades covered installation of a second high-efficiency aeration blower, two combined heat and power (CHP) units, and other infrastructure improvements.

Before developing the PPA and RFP, the Authority reached out to other public water/wastewater treatment agencies that were pursuing similar endeavors to learn what worked and what did not work. In particular, Chuck Rogers at the City of Thousand Oaks, California, wastewater treatment facility provided background on his facility’s RFP and guidance on potential pitfalls. This significantly helped the VVWRA staff develop their own RFP and PPA. A key element of the RFP was that whoever provided the technology also had to self-fund the improvements. Since the RFP is long-term and the project is based on the cost per kilowatt hour, fractions of a penny can undermine the entire agreement.

The other critical element in the RFP was that the electric utility required an independent third party energy audit to be eligible for Self-Generation Incentive Program (SGIP) funds. The State intended the energy audits for traditional projects such as upgrading lighting, HVAC systems, and some motor-driven equipment; Complex waste-to-energy projects were not typically approved... In addition, the state of California requires participants in the rebate programs to have the energy audit completed by a third party selected from a list created by the utility. The energy audit contractors perform the assessment initially at no cost to the end user. However, the contractors can recuperate a portion of the annual energy cost savings from completed projects. In this case an energy audit was projected to cost between $80,000 and $100,000 annually based on the energy savings for 20 years. VVWRA was fortunate to participate in an EPA grant program through which the University of California San Diego performed the third party, independent energy audit, which VVWRA’s energy utility accepted for the rebate program.

By using the PPA and the EPA grant program, VVWRA realized two key goals of this project: First, not relying on outside financing for the installation; the equipment manufacturer had to provide it. Second, being able to obtain independent, third party energy audit, that had no strings attached.
OUTREACH
As a joint power authority of four different agencies, VVWRA must have support from all its members before executing a capital project. From the start, VVWRA leaders met with stakeholders including community groups, elected officials, and facility staff to share the utility’s long-term vision of energy neutrality. Consistent outreach over two years, through meetings and presentations helped convey to all of these stakeholders how wastewater could be a resource. Additionally, VVWRA exhibited how leveraging existing facility infrastructure provided a cost-effective platform to use ratepayers’ past investments to increase energy recovery. As a result, all stakeholders became supportive, not only because the energy efficiency improvements extended beyond VVWRA’s primary focus on water quality, but also because they were cost-effective.

FINANCING
The project was funded entirely through the PPA without bond or loan financing. The PPA allowed the Authority to reduce power costs over a fixed term of 20 years, with energy costs consistently lower than the local electric utility rate. This was done in cooperation and partnership with the local electrical utility. As part of the PPA, VVWRA received over $3.2 million in SGIP funds toward the project’s implementation, further reducing up-front costs to the technology provider.

As a result of the PPA, VVWRA entered into a Public-Private Partnership (PPP) using funding from the State of California. This PPP was able to obtain a $2 million Innovative Technology Grant from the California Energy Commission and $600,000 in private capital investment to upgrade an idle anaerobic digester with the Omnivore process. The Omnivore is a recuperative thickening and mixing system that enables the same amount of biogas production in one third the volume, thus saving significant capital expense.

PARTNERSHIPS
Laying the foundation to greatly increase onsite energy production represented a significant time commitment—nearly 8 years to plan, fund, and implement infrastructure needed to achieve energy neutrality. It was essential that VVWRA had long-term organizational stability and focus to stay the course and achieve project goals through the numerous stages.

Coordination with the electric utility was essential to obtain SGIP funding and also to approve of the interconnection of the CHP units with the grid. The electrical utility required a minimum grid purchase of 80 kW at all times to avoid potential to back feed the grid, which provided a barrier to achieving energy neutrality in the near term. In addition, newer engines are sensitive to power quality, and the VVWRA engines have experienced outages due to inconsistent grid power voltage. Through ongoing discussions with their utility VVWRA resolved the power quality issue and planned for new energy storage infrastructure that will enable VVWRA to minimize purchases of grid-supplied electricity.

MEASURING SUCCESS
VVWRA’s goal successfully implement its waste-to-energy project without having to borrow or use internal funds. This goal was met by maximizing 3rd party funding and entering into a public-private partnership that enabled a one-time grant to be obtained. In addition, VVWRA sought to achieve energy neutrality by 2015. However, the interconnection agreement with Southern California Edison required a minimum import of 80 KW to ensure that there is no back feeding on to the main electric

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grid. This requirement sought to undermine VVWRA’s ability to be energy neutral.

To overcome this situation, the agency decided to install a battery storage system and a microgrid. As part of a separate project, VVWRA received a 1.7 million dollar grant from the California Energy Commission for a battery storage and microgrid project. Once the infrastructure is installed, VVWRA will be able to depend on the battery system to smooth the electric power fluctuations that it experiences both in received and generated electricity. The battery system and microgrid will enable agency’s operations and maintenance staff to activate various types of equipment without impacting its power generation and consumption profile.

The interconnection agreement specified that once VVWRA demonstrates reliable energy generation it could sell up to 25% of its installed capacity onto the grid. With 1.6 megawatts worth of installed capacity, VVWRA can send approximately 400 KW on to the grid. Once this condition is met the agency plans to pursue a revision to the interconnection agreement allowing them to export that 25%. Because the amount of power VVWRA will be able to export is 320 KW greater than the amount of electricity they are required to import (80KW), they will not only meet their energy neutrality goal, but they will also become a net energy exporter.

OUTCOMES
With the energy generation improvements undergoing final troubleshooting, VVWRA’s wastewater recovery facility is on track to use 90% less energy and save at least $200,000 annually in electricity and natural gas costs. The facility is on its way to being one of the nation’s first completely energy-neutral wastewater treatment facilities. With the waste-to-energy infrastructure now installed, VVWRA has largely eliminated its dependency on outside power sources. Additionally, facility leadership continues to pursue improvements to energy efficient infrastructure as well as expand opportunities for future public-private partnerships.

Energy improvements have also allowed VVWRA to invest savings from the operating budget into additional projects. Over time, these efforts have increased the staff’s interest in the facility’s performance. Today, they take pride in continually identifying new ways to increase operational efficiencies.

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