Community Solar Model for Water Utilities

APPENDIX B

Examples – Water Utility Solar Investments

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During research to support our paper on community solar for waste utilities we came across a number of press reports that describe actions by local authorities to invest in solar to support water services. This is not a comprehensive list and none of these projects involve a community solar structure.

We include this appendix as a way for readers to become aware of the experience of other water utility managers in their regions. Most of the material below are excerpts from new stories on the projects.

Ventura County CA, Public Works Agency

Microgrids Protect Essential Water Services for California Residents During Outages

July 23, 2021 By Lisa Cohn

Ventura County Public Works Agency's water and sanitation department in California is planning a microgrid at its Moorpark Water Reclamation Facility, which serves low-income residents.

Microgrid provider PowerFlex is financing and installing the microgrid, due to be installed during the second quarter of 2022. It also has plans for ensuring a different microgrid keeps water flowing to residents in a nearby community. That microgrid will be installed in Thousand Oaks, California, said Michael Robinson, associate director of microgrids and new markets at PowerFlex, an EDF Renewables company.

The water facilities are subject to public safety power shutoffs (PSPS) from utility Southern California Edison (SCE), which means they must rely on polluting and expensive diesel backup generators during outages.

In Ventura County in 2020, SCE held PSPS 11 times in portions of Moorpark, Santa Susana and the Simi Valley, said a spokesman for Ventura County Public Works.

Right now, Ventura County's Moorpark facility has about 1 MW of solar — plus a diesel generator that's used during outages, said Robinson. Without a microgrid, when there's an outage, the solar goes offline. With the microgrid, the solar will continue to operate, and for a longer time period during outages, thanks in part to the 750-KW, 3,000-KWh battery that's part of the microgrid.

The Thousand Oaks project faces the same challenges, and PowerFlex plans a similar solution.

Both microgrids will receive funding from the equity resilience budget of California's Self-Generation Incentive Program (SGIP), which is available to low-income and disadvantaged communities that need energy resilience.

In the Ventura County case, the microgrid project is eligible for a $1,000/kWh incentive because it's located in a high fire threat district, provides critical facilities infrastructure — sewage treatment — and serves a community that includes low-income residents. The total payment from SGIP will be $1,992,050, said Homer Arredondo, an engineer for Ventura County Public Works' water and sanitation department.

Under a financing arrangement from PowerFlex, the Ventura County and Thousand Oaks projects require no upfront payments. PowerFlex collects the SGIP incentives from the state, leases the microgrid equipment to its customers and is paid back through monthly payments.

"You could call it an energy-as-a-service contract," said Robinson. "We finance it, we are responsible for operations during both grid-connected times and power outages. We generate savings so the savings cover the cost of the customer's lease payments."

The state of California provides 50% of the SGIP payment upfront, and the other 50% is paid out over a 5-year period, based on the number of battery cycles, said Robinson. A battery has completed one cycle when it fully charges and discharges. Generally, a battery cycles about 300 times a year, he said.

The microgrid at the Ventura County Public Works Agency is expected to save the district and its customers $355,400 over the 15-year life of the battery by reducing demand charges as well as energy charges during on-peak, time-of-use tariff periods, said Arredondo.

First, the microgrid will allow the company to use the solar and battery to reduce demand charges. Second, the microgrid will reduce the agency's energy costs by taking advantage of SCE's time-of-use tariff (TOU-PA3E tariff). The solar will charge the battery during less expensive off-peak hours, and the battery will be discharged during expensive peak rate times, which occur between 4 p.m. and 9 p.m., said Arredondo.

Lake Michigan Filtration Plant (LMFP), City of Grand Rapids

- 1 MW ground mounted solar;
- $1.2 million savings over 24 years ($50,000/year);
- 700-1000 metric tons CO2 avoided;
- City goal to supply muni operations with 10% RE by 2025;
- LMFP used 17,236,501 kilowatt-hours of electricity in 2020, which was 23% of all electricity used by city of Grand Rapids municipal operations;
- 67 Acre site;
- Zoning variance granted by Grand Haven zoning Board of Appeals at request of City of Grand Rapids;
- Requires approval from Grans Haven Planning Commission for site pan building and electrical permits

Reference:
Grand Rapids receives approval for filtration plant solar project, Grand Rapids Business Journal
By Ehren Wynder -March 16, 2021https://grbj.com/news/energy/grand-rapids-receives-approval-for-filtration-plant-solar-project/

Narragansett Bay Commission

The Narragansett Bay Commission operates the two largest wastewater treatment facilities (WWTF) in Rhode Island. Its annual energy use is 36,312,890 kilowatt-hours/year. In response to statewide goals for renewable energy, the Narragansett Bay Commission completed several renewable energy projects. In 2012, it installed three 1.5 MW wind turbines at the Field Point WWTF. At Bucklin Point WWTF, there are three anaerobic digesters. The commission has been using about half of the biogas to heat the digesters. In 2018, it built a new combined heat and power (CHP) system to burn the remaining biogas in reciprocating engines to produce power. In addition to these projects, the commission receives net metering allowances for its offsite wind turbines and solar photovoltaic energy farms. The Narragansett Bay Commission now utilizes renewable energy for more than 90 percent of its annual energy demands.

Atlantic County Utilities Authority

The Atlantic County Utilities Authority (ACUA) serves 14 municipalities in Atlantic County, New Jersey and a population of over 230,000 residents. Its wastewater treatment plant has a capacity of 40 million gallons per day (MGD) and currently treats about 26 MGD. The treatment plant has an energy demand of approximately 2.5 MW. The 7.5 MW Jersey Atlantic Windfarm provides about 60 percent of the utility's electricity through a fixed purchase agreement. ACUA also has 500 kW of solar onsite, including ground mount, canopy and rooftop systems. ACUA has a land lease agreement with Viridity Energy, who installed, owns and operates a 1 MW battery energy storage at ACUA. Viridity uses the frequency regulation market to get a return on its investment

and shares in the savings ACUA sees from a reduction in peak load charges on its electric bills. The 1 MW battery storage could provide 15 minutes of back-up power to the entire treatment plant. During a longer power outage, the utility would switch from battery storage to back-up generators. ACUA plans to obtain additional batteries so it can operate as an island, independent of the grid.

Santa Clara County Valley Water

In the event of an extended outage, how many days can Valley Water continue water delivery service using back-up power resources?
Several factors are involved in determining how long Valley Water can continue treated water delivery service, including time of year and water demand. In the event of the unlikely possibility of a total power loss throughout Santa Clara County, we have enough fuel on-site to run the generators for approximately four to six days. We also have contracts with fuel suppliers that could supplement our needs if necessary to extend our operations using backup power.
https://www.valleywater.org/flooding-safety/preparation-extended-power-outages

Ullrich Water Treatment Plant, Austin Texas

NPR Story: https://www.npr.org/2021/03/08/973512033/how-giant-batteries-are-protecting-the-most-vulnerable-in-blackouts
Like falling dominos, infrastructure around Texas, dependent on electricity, began failing in the extreme cold. In Austin, the Ullrich Water Treatment Plant shut down due to an electrical failure. That, combined with low water pressure from broken pipes, meant residents had to boil their water. …So, some communities are looking for new ways to ensure that vulnerable people and infrastructure can withstand power outages. They're installing solar panels and large batteries to create tiny "microgrids" that continue working when the larger grid goes dark. Some are being sited at crucial facilities, like water treatment plants, hospitals and emergency response centers…….

Waste Water Treatment Plant, Caldwell NJ

PSE&G installed solar panels at a wastewater treatment plant in Caldwell, New Jersey, as well as a very large battery. The solar panels generate electricity for the local grid, but in the event of a storm, they help keep the plant running by supplying the plant during the day and helping to charge large batteries that can provide electricity when the sun goes down.

Between the battery and the backup generator, the wastewater plant can run for several weeks on its own,

> "It took several weeks for the state to really come back," Powers says. "Generators were destroyed, and they weren't able to get diesel fuel to their generators."

Billions of gallons of raw sewage were released into waterways in New York and New Jersey as a result of the power loss and flooding. In the wake of the storm, the state of New Jersey began looking at how to create a more resilient system.

In the course of rebuilding the grid after Sandy, New Jersey spent $200 million on installing energy systems at critical facilities and looked at how microgrids can play a larger role.

75th Street Wastewater Treatment Facility, City of Boulder, Colorado – Biomethane and SolarPV System

This case study examines the development and operation of biomethane and solar resources for the 75th Street Wastewater Treatment Facility (WWTF) in Boulder, Colorado. The study showcases the collaboration between public and private entities to deploy solar PV (photovoltaic) resources without passing the cost of PV onto municipal customers. Since the start of operation in 2010, the installed PV system has saved customers over $200,000 and reduced carbon dioxide (CO2) emissions by 10 million pounds of CO2 (City of Boulder 2018).
The one MW PV system was installed on land owned by the utility in 2010. The developer, EyeOn Energy, leased five acres of city owned land at the treatment facility to install the project (Day 2011).

The PV project was financed through a no-upfront cost PPA. During project approval, the City of Boulder identified the lack of capital available for the project

The WWTF signed a PPA with the EyeOn Energy to purchase electricity from the solar site at an average price of $0.032/kWh in 2010 (a savings compared to the average bundled cost of electricity from the grid at $0.065/kWh) (Douville and Macknick 2011). In the agreement, the electricity price increases by 2.75% per year for the first ten years to $0.0417/kWh for the remainder of the agreement (Day 2011). Excess power is sent back into the electrical grid and is under a net-metering agreement with Xcel Energy, the local electrical utility. Power exported to the grid is currently small and only occurs during times of high solar and biogas production coupled with low demand. Excess power is slight enough that the WWTF does not need to schedule exports with Xcel Energy. After installation, SOLON Corporation sold the PV asset to SunEdison Corporation, and then it was sold again to Longroad Energy, who currently operates and maintains the installation.

Blue Plains Advanced Wastewater Treatment Plant, Washington DC

DC Water has recently installed solar panels across its open and flat 153-acre Blue Plains Advanced Wastewater Treatment Plant site: the largest advanced wastewater treatment plant in the world and the largest consumer of electricity in the District.
Deemed Phase 1, solar panels were installed over parking lots, on rooftops, and in-ground mounts as well as a canopy structure on the DC Water pier that sits on the Potomac.
Deemed Phase 1 of the project, the installation began in spring 2020 and by the end of

FY 2020 was generating 5.2 MW of electricity. In total, over 12,000 solar panels were installed, covering around 264,000 square feet.

East Lansing Power and Light Community Solar

https://www.lansingstatejournal.com/story/news/local/2019/01/23/new-community-solar-park-east-lansing-goes-line-clean-energy/2659818002/
https://micommunitysolar.org/new-solar-park-in-east-lansing-goes-on-line/

Fayetteville AR

https://www.nwaonline.com/news/2019/sep/06/fayetteville-flips-on-solar-panels-at-w/
Fayetteville Arkansas. September 2019
Representatives with the city, Ozarks Electric Cooperative and Today's Power Inc. flipped the switch Friday in a showing of the city's solar power system. Three farms and two battery storage facilities cover 87 acres between the city's two wastewater treatment plants.

• The city will lease 87 acres at the wastewater treatment plants
• TPI will build for a capacity of 5 megawatts of solar panels and 12 megawatt hours of battery storage at each wastewater facility and will assume the costs of operating and maintaining the facilities.
• The city will purchase electricity generated by the arrays at a rate that will be $0.0033 less per kilowatt hours.
• The city will own 1% of the solar array, and TPI will own the remaining 99%.
• The city will assume the cost of making electric improvements to both sites to connect the arrays to the power grid. This cost will be paid from the city's water and sewer reserve fund.
• Ozarks Electric will pay the city to manage backup generators at both plants, as well as for HVAC, lighting and storage losses associated with the battery storage.
Read more about the solar array project at bit.ly/faysolararray.

The entire system of 10 megawatts of solar power generation and 24 megawatt hours of storage will save the city about $180,000 annually, said Peter Nierengarten, the city's sustainability director. Work on the $23 million system started in March.
Today's Power put up most of the money for the project. The company is a subsidiary of the Arkansas Electric Cooperatives in Little Rock and offers solar array and energy storage systems, electric cars and charging stations to nonprofit groups, governments and private companies.
The wastewater treatment plants will use the energy generated from the solar panels, and the unused energy will go into storage, Nierengarten said. The plants will be able to draw from the storage units when sunlight is low, he said.
The rate the city will pay to Today's Power is slightly lower than what it paid to Ozarks Electric, and it will make a difference, Nierengarten said.

Today's Power owns 99% of the solar energy systems while the city owns 1% and the land. Construction crews from TPI and Ozarks Electric built the systems.
The city spent $700,000 for site preparation from its water and sewer fund. The city will make back that investment in a few years because of the savings in energy cost, Nierengarten said.
The project will pay for itself in 20 years with the money the city will pay Today's Power, said Michael Henderson, president. The project finished on time and about $3 million under budget, he said.
Ozarks Electric also will be able to draw from the solar energy systems, lessening the cooperative's cost to buy electricity.
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Peterborough NH

With overwhelming support and enthusiasm from the public, the Town of Peterborough has built the largest solar array in the state (944 kW DC). The project was funded by a $1.22 million PUC grant, with the remaining $1.4 million in total project costs being covered through a long-term power-purchase agreement (PPA) with Borrego Solar. The array powers the Town's newly constructed wastewater treatment plant located off of Rt. 202 and helps to offset energy costs for other municipal buildings through a GNM agreement (Group Net Metering).

The project is anticipated the save the town an estimated $250,000.00 to $500,000.00 over the next two decades. This savings will be achieved through a long-term power-purchase

agreement with Borrego Solar that enables the town to purchase power at a discounted rate (8 cents/kWh versus 14 cents/kWh) and new state rules regarding “virtual” net metering. "Virtual” net metering allows for the benefits of energy captured at one site (in this case the Peterborough WWTF) to be shared among other buildings not directly attached to the energy capturing site. This model enables a large-scale solar project to help offset the cost of purchasing energy elsewhere, as excess energy is captured and sold back to the larger energy grid.

- Phase 1 of the project, filling of the former lagoon, was completed in the fall of 2014
- Phase 2 construction of the solar array began in mid-November 2014
- The solar array went online in the fall of 2015

The following files may be of assistance as you plan your own sustainable initiative:

- Town of Peterborough/Borrego Solar Power Purchase Agreement
- Town of Peterborough/Borrego Solar Option and Lease Agreement
- NH PUC Grant Application
- Borrego 20-year Cash Flow Analysis
- Information on RECs
- RECs Explained in Simple Terms - Video
- Information on "Net Metering" and "Virtual Net Metering"
- Peterborough Solar Array - General Information Handout

  http://www.peterboroughprojects.info/

Solar Power System at WRCRWA

The Western Riverside County Regional Wastewater Authority (WRCRWA), which is governed via a Joint Powers Authority and managed by Western, has more than 5,000 solar panels at the authority’s wastewater treatment plant that will provide up to one megawatt of energy during peak energy use hours. WRCRWA is committed to utilizing renewable energy sources to help lower the amount of greenhouse gases released into the atmosphere.

- The system provides one megawatt of energy, which is enough to power more than 200 homes per year.
- There are more than 5,000 solar panels covering nine acres.
- Solar panels track the sun, increasing sunlight capture by up to 30 percent more than conventional fixed-tilt systems.
- At its peak, the solar panels will provide 25 percent of the power needed to operate the wastewater treatment plant.

Benefits

- Helps reduce the authority's energy costs as the price of electricity increases in the years to come
- Increases the reliability of the plant and protects the region against power outages by relieving the
  burden on the California electrical grid during peak demand
- Lowers the amount of greenhouse gases released in the atmosphere by utilizing a renewable energy source

Greater Bayfield Waste Water Treatment Plant, Wisconsin

Array Size: 124.5 kW DC Date Installed: 2019
https://eaglepointsolar.com/portfolio/greater-bayfield-waste-water-treatment-plant/

Seneca Wastewater Treatment Plant in Germantown, Md

Two large fields of several solar panels were unveiled at the., and the Seneca Wastewater Treatment Plant in Germantown, Md., by the Washington Suburban Sanitary Commission (WSSC).The two 2-megawatt (MW) ground-mounted installations, each with nearly 8,500 solar panels spanning several acres, will power the two facilities -- both a result of a public-private partnership (PPP) with Washington Gas Energy Systems and Standard Solar, Inc. Washington Gas Energy Systems will own and operate the solar installations under a 20-year power purchasing agreement.
https://metrocouncil.org/Wastewater-Water/Projects/Sewer-Planning-Construction-Updates/Projects/SenecaWWTP-807520.aspx

Iowa Great Lakes Sanitary District

Solar Project At Waste Water Treatment Plant, September 10, 2020

https://www.iowagreatlakessanitarydistrict.com/2020/09/solar-project-at-waste-water-treatment-plant/

Solar Project will provide up to 0.5 megawatt of power to off set cost power cost for the Wastewater Treatment Plant. The pay back is estimated to be about 7 years. … The plant treats about 2.5 million gallons of wastewater a day the discharges the treated water to Milford Creek.

City of San Juan, Puerto Rico

The solar panel array, which is a 100 kW (DC) Solar Photovoltaic System, is located on a quarter acre of Town property behind the Wastewater Treatment Plant. The project is guaranteed to produce 95,000-plus kW hours of electricity per year using solar panels and electrical inverters made in Washington State. Apollo Solution Group, through a Washington State Department of Commerce grant, installed the array.

https://www.sanjuanjournal.com/news/friday-harbor-wastewater-treatment-plant-solar-project/