Low-Income Community Solar Demonstration Project Case Study:

Grand Valley Power

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COLORADO
Energy Office

Project Details

Grand Valley Power's Demonstration Project Highlights

- GVP built the first low-income community solar garden in the country in 2015.
- GVP's project was the fifth phase of a larger community solar array.
- GVP invited the local weatherization administrator to be part of the project and allowed their clients priority enrollment.
- On average, subscribers will realize annual cost savings of $590, and when combined with average cost savings of $200 from CEO's Weatherization Assistance Program, subscribers could see annual savings of $790.

INTRODUCTION

Approximately 30% of Colorado households pay more than 4% of their annual income on energy bills. Although several financial assistance programs exist to relieve high energy burden for low-income households, additional opportunities remain to achieve deeper cost savings by specifically targeting reductions in electricity costs.

The Colorado Energy Office's (CEO) Weatherization Assistance Program is dedicated to improving energy affordability for low-income households. Guided by this commitment and in response to a gap in electricity cost reduction programs, CEO launched the Low-Income Community Solar Demonstration Initiative in 2015 (Demonstration Project). The Grand Valley Power (GVP) solar installation is part of the statewide initiative that aims to reduce electricity costs for low-income households by offering community solar options to the same households that are eligible for weatherization services.

OBJECTIVE

The demonstration project has eight utility partners, including Grand Valley Power (GVP), an electric cooperative utility serving 18,000 meters in Mesa, Delta, and Garfield counties. This case study describes GVP's community solar project and informs utilities, governments, and policy makers how community solar projects can impact low-income communities.

PROJECT PARTNER ROLES

GVP partnered with CEO, GRID Alternatives (GRID), and Housing Resources of Western Colorado (HRWC) to develop a 36.54 kW (kilowatt) community solar array. The primary goals of the project were to grow existing low-income community solar offerings and to expand services to low-income cooperative members. This project was the fifth installment of a larger community solar array that was first implemented in 2011. Each installment or "phase" was so successful that GVP continued to build more capacity.

Each partner played a key role:

- CEO identified the solar installation opportunity and provided funding support and project evaluation.
- GRID developed the design and implementation framework, designed and led the installation of a new 36.54 kW system, provided workforce integration and outreach, managed subscriptions, and assisted with additional fundraising activities. In addition, GRID will conduct primary operation and maintenance (O&M) activities and maintain equipment warranties.
- HRWC administers CEO's weatherization program. They provided a NeighborWorks grant of $30,000 to support the project and, in exchange, their clients have priority enrollment.
- GVP provided funding support, the land and interconnection, and conducted outreach. Moving forward, GVP will provide bill credits and billing support, maintain full ownership, and support O&M.

PROJECT IMPLEMENTATION

GVP's total community array is 157.36 kW and consists of five phases. Phase 1 (20.68 kW) was built in 2011 and was available to all cooperative members. Phases 2 through 4 (100.14 kW total) were built in 2015 and are available to income qualifying members only. Phase 5 was the only portion supported by the CEO. It was built in 2017 and is only available to income qualifying members. GRID also partnered with GVP on Phases two through five.

The project (i.e., Phase 5) was first introduced to GVP's Board of Directors in January 2017. It was approved within one month because of its benefit to low-income members. The Board was also motivated to support this project because previous community solar phases were very successful and helped build a good working relationship between GVP and its members. Construction began in March 2017, and the solar garden was interconnected in April 2017. The first subscriber signed up in October 2017. They are expected to see savings within one month.

As a utility, GVP has always looked for ways to offer rebate programs for its members. Unfortunately, most low-income households are not typically able to take advantage of existing rebate programs because those programs frequently require upfront capital. GVP's Board was excited to grow a line of services that are specifically available to low-income households, closing the gap in electricity service offerings.

"This project was an easy sell to our Board. There is no magic pot of money for rebate programs; they are always supported by all of our rate payers. Low-income households get left behind because they can't pay out of pocket and, because many households rent, they may not benefit from rooftop solar. Here's a program that finally serves these members."
-Derek Elder, GVP's Member Service Manager

To qualify, subscribers must earn less than 80% of HUD's area median income (AMI). GVP may refer subscribers and deny subscriptions due to poor credit history, history of unpaid bills, and/or illegal activity. GVP has committed to providing subscriptions for 20 years, with individual subscriptions lasting four years. Subscribers can re-enroll if they still need financial assistance. GVP hopes that, over time, some subscribers' financial need will diminish and the array will become available to additional members.

The project was implemented using a turn-key installation in a "barn-raising" community development model, where volunteers donated 16 hours of sweat equity and worked alongside GRID and GVP. Typically, under GRID's implementation framework, utilities require that subscribers donate sweat equity to help construct the array. However, GVP's project was overwhelmed with volunteers from GVP's Board of Directors, GVP staff members, and students from the nearby Colorado Mountain College at Rifle; therefore, GVP waived the sweat equity requirement.

The panels were installed on land owned by GVP about 10 minutes away from GVP's headquarters. The community solar production meter was interconnected to GVP's electric grid. As an electric utility generation plant, GVP's income qualified community solar garden was exempt from the State Electrical Board's regulations on solar generation; therefore, no state electrical permit was required.

ENERGY GENERATION

Since the array is less than 80 mega-watts (MW) it is a qualifying facility under the Public Utilities Regulatory Act (PURPA). As a PURPA qualifying facility, GVP must adhere to PURPA rules and its wholesale contract with Xcel Energy (Xcel). Because of the small size, GVP stated that Xcel provided GVP full autonomy in the array's design and implementation.

GVP has three different oversized electricity transformers at the site. If the voltage gets too high, one or more of the inverters could be shut off. GVP has to carefully manage voltage of the arrays and this has proven to be challenging to GVP.

PROJECT COSTS

The project cost $55,250, with $21,250 covered by CEO's grant and $34,000 contributed by GVP of which $30,000 was provided by HRWC's NeighborWorks grant and the remaining $4,000 was provided by GRID. Direct project costs included operations (such as equipment, construction materials and GRID staff time), outreach, and administration. Operations accounted for approximately 96% of total project

costs, while outreach and administration accounted for approximately 1% and 3% of project costs, respectively. GVP provided in-kind support including billing software, ongoing program administration, and the donation of land. GVP is not tracking administration costs.

Additional project funding will be raised through fundraising activities. GVP's array was constructed adjacent to Highway I-70, a major expressway transecting Colorado from east to west. GRID and GVP worked with local companies to offer advertising space for signs installed on GVP owned land, adjacent to the array, that would be seen by motorists on Highway I-70. GVP paid for the signage, and the money used from advertising will help pay for GRID's expenses. GRID and GVP continue to look for additional advertising partners.

There was no financial transaction between GVP and Xcel; GVP's contract with Xcel allows for qualifying special projects to be constructed and not counted against the all-requirements power purchase agreements (PPA). GVP provided all bill credits to subscribers and does not get reimbursed from Xcel.

GVP retained its RECs, to help meet its 10% renewable energy goal by 2020. It should be noted that, as of 2017, GVP has exceeded this goal with a portfolio of 30% renewable energy.

PROJECT PRODUCTION

The estimated annual kilowatt hour (kWh) production of the solar garden was modeled using the National Renewable Energy Laboratory's System Advisor Model (SAM), and the system's long-term degradation was assumed to equal 0.7% per year. In Year 1, the system is expected to produce 56,336 kWh. Actual production data from May 2017 through September 2017 shows that the system produced 35,193 kWh, while estimated production during that same period was 28,352 kWh. During this timeframe, the system produced 24% more electricity than expected.

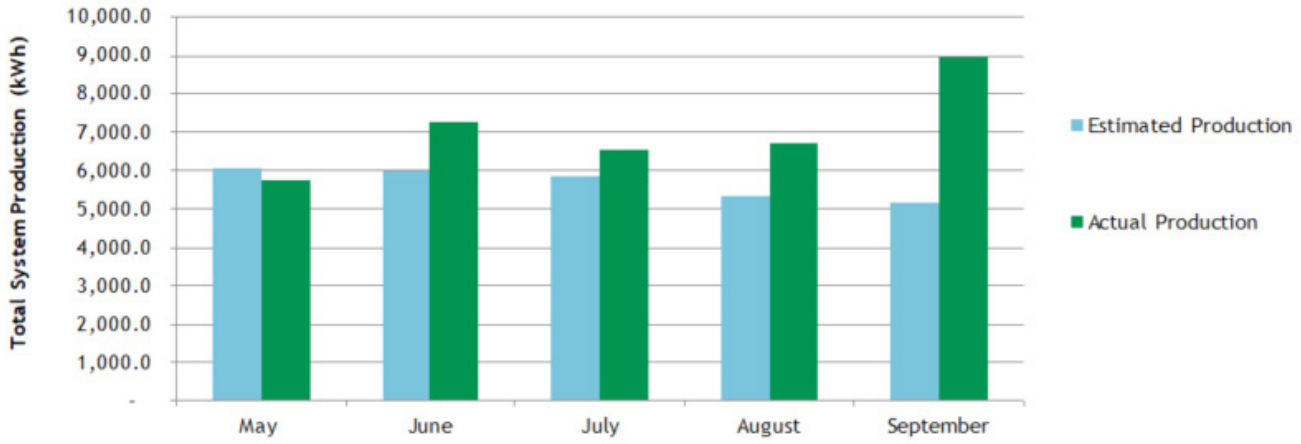
PROJECT OUTREACH

The success of GVP's previous community solar array phases helped build interest for new subscribers of Phase 5. Word of mouth within the community spread quickly, and many of GVP's members sought out subscriptions.

"A subscriber of Phases 2 through 4 was moving into a new home. She specifically looked for a home that was served by GVP so that she could re-enroll in the community solar project."
-Derek Elder, GVP's Member Service Manager

Since HRWC provided a NeighborWorks grant to support the project, they claimed priority enrollment for their clients. HRWC will refer all of their eligible clients to GVP and GRID for subscriptions.

FIGURE 1: ESTIMATED VERSUS ACTUAL SYSTEM PRODUCTION



GRID sent out mailers to households that had been previously weatherized, and they reached out to subscribers that were on the waitlist from previous phases.

GVP did note some outreach challenges with the initial phases. For example, subscribers were concerned that there could be a "catch" and that it was "too good to be true". As was done with previous phases, GVP worked to overcome initial skepticism by presenting a transparent outreach platform.

SUBSCRIBER STATISTICS

The 36.54 kW solar garden will serve up to 10 subscribers, with each utilizing varying amounts of solar energy from the garden. (GVP's Phases 2 through 5 will serve up to 40 subscribers.) System sizes range from 1.2 kW to 4.8 kW, with an average system size of 3.2 kW. Subscribers have a four-year contract with GVP, and subscription contracts can be renewed. Systems are sized to offset approximately 50% of subscribers' electricity costs and 90% of subscriber's electricity consumption, based on the subscribers' previous 12-month electricity consumption.

COST STRUCTURE

The subscriber pays GVP the retail rate for electricity consumed plus fixed monthly charges. In return, GVP provides a bill credit to subscribers for the electricity produced by their panels.

The 2017 residential retail rate is $0.102/kwh. Fixed charges include a grid connectivity charge that is equal to $30.

The bill credit is equal to $0.102/kwh and will increase or decrease as GVP's residential rates fluctuate based on fuel costs. GVP also established a solar payment of $0.02/kWh. This amount will remain fixed for the term of the contract. For subscribers, a constant and known solar payment provides insulation against rising electricity costs and helps subscribers budget for long-term energy costs.

"We can allocate the bill credits and continue doing so for 20 years so that we ensure that someone 'deserving' will benefit."
- Derek Elder, GVP's Member Service Manager

On average, GVP's project is expected to save each subscriber approximately $590 each year. Assuming average annual electric utility costs of $1,200, based on GVP's historic data, the community solar garden, when combined with potential cost reductions of $200 achieved through CEO's weatherization assistance program, could reduce low-income subscribers' annual energy costs by approximately 66%.

GVP'S NEXT STEPS

When GVP first built Phase 1, GVP did not know that within a few year's time they would have constructed their final array, Phase 5. The community solar site is now at capacity and; therefore, GVP has no plans to build additional community solar arrays. GVP continues to advocate for low-income community solar and recently met with policy makers at Washington D.C. to propose community solar funding support through the national Community Development Block Grants.

Subscriber Spotlight: Gloria Martinez

Gloria Martinez is a single parent and has always looked for opportunities to save on household expenses. Approximately one year ago, she received a letter in the mail from HRWC about GVP's upcoming income-qualified community solar array.

Her neighbor was already a subscriber in one of GVP's community solar arrays and had seen monthly electric savings of between $30 and $40. She liked the program, and Gloria was encouraged to join. At the time, Gloria was told that they did not have space for her household to join and she was put on a waitlist of approximately 8 to 12 months through HRWC's application process.

"I was looking for to it [joining the community solar array]. And I waited anxiously for the discount in my electric costs."
-Gloria Martinez, subscriber

Gloria is one of Phase 5's first subscribers. Her home was built through HRWC's Self-Help Build program, in which Gloria traded sweat equity for her home's down payment. Her home was built in accordance with good weatherization practices and will continue to benefit from reduced electricity costs associated with community solar. Even though GVP did not need additional volunteer support, based on her experience with HRWC's Self-Help Build program, Gloria would have gladly volunteered.

Estimated Versus Actual Performance

Due to the timing of this case study's release with GVP's subscription, it is unlikely that Gloria's household will have more than one month of solar production data to compare against estimated production. For a comparison of estimated to actual solar production data, please refer to the other Demonstration Project case studies.

Lessons Learned

SUCCESSES

- When it was built in 2015, Phases 2 through 4 was the first community solar garden completely dedicated to low-income households in the country.
- Phase 5 builds on four successful preceding community solar phases.
- The project has low operating costs and minimal O&M.
- The project aligned with GVP's core values and focused on services for low-income households.
- Board members, utility staff, and college students worked together to construct the array.
- GRID and GVP utilized innovative fundraising mechanisms.
- The project was the first of its kind to combine local weatherization service providers with low-income community solar.
- Subscriber electricity costs were reduced.
- When coupled with CEO's weatherization assistance program savings, this project has the potential to reduce energy costs by approximately 65%.

CHALLENGES

- The project had to use three different transformers, increasing the risk that an inverter could get shut off.
- GVP cannot build additional community solar arrays on the current site since it is at capacity.

BEST PRACTICES

GVP's case study provides insight on how to optimize future low-income community solar garden projects.

Install the array on utility-owned land. Installing the array on land owned by the utility and adjacent to utility headquarters can simplify interconnection and help to save costs. Land that allows for a three-phase system will add system flexibility and may result in fewer losses at higher voltage.

Focus on the benefits to an underserved market when introducing the project to the utility's Board of Directors. Most income-qualified homes pay into utility rebate programs, but frequently cannot take advantage of those programs. As a result, they are left out and, often, do not benefit from general utility energy efficiency and renewable energy programs as other members. A low-income community solar project is a great way to reach out to these members and provide a service that will meet their needs.

Consider a phased approach. GVP's entire community solar array included five phases built over six years. GVP, its Board, and the community were able to learn from earlier phases. With a proven track record, community solar's subsequent phases were an easy sell to both GVP's Board and to the public.

Combine weatherization enrollment with income-qualified community solar. By integrating weatherization services with the income-qualified community solar project, GVP received additional support from their local weatherization program administrator, HRWC. HRWC provided funding support and helped with outreach and marketing. This reduced some of the programmatic burden for GVP and helped streamline the enrollment process.

Construct the array next to a major thoroughfare or other well visited site. GVP's array was constructed alongside one of Colorado's most heavily traveled highways. This provided a great opportunity to take advantage of raising additional funds through advertising. The location also increased public awareness and reinforced the project as a local renewable energy source.

POLICY CONSIDERATIONS

Lessons learned from the GVP community solar garden present the following policy considerations:

The solar payment structure affects subscriber's total cost savings. The amount that each subscriber pays to participate in community solar and associated escalation rates affect the subscriber's total savings. GVP solar payments will remain constant, following fluctuations in GVP's retail residential rate. Therefore, solar credits will grow over time and the subscriber's savings will stay relatively the same or slightly increase.

Project Snapshot

QUICK STATISTICS

- 36.5 kW solar garden
- Maximum 10 subscribers
- Early phases of this project were the first LMI community solar garden project in the nation

UTILITY TYPE

- Electric cooperative
- Serves 18,000 meters in Mesa, Delta and Garfield counties
- Receives wholesale electricity from Xcel Energy (Public Service Company of Colorado)

ENERGY BURDEN

- Approximately 14% of Mesa County, 16% of Delta County, and 10% of Garfield County residents live below the poverty line, compared to a statewide average of 12%.
- For those living at 50% of the poverty line, Mesa County residents have an energy burden of 21%, Delta County residents have an energy burden of 23%, and Garfield County residents have an energy burden of 22%.

PROJECT GOALS

1. Reduce members' energy costs by approximately 50%
2. Provide a utility program for low-income members
3. Provide locked-in energy prices

PROJECT PERFORMANCE

- Project target is approximately 50% cost savings
- Expected to produce 56,336 kWh annually
- Within 5 months, the system has produced 24% more electricity than expected

PROJECT COSTS

- Total project cost $55,250
- CEO grant $21,250
- GVP contribution $34,000 plus in-kind support, of which $30,000 was provided by HRWC's NeighborWorks grant

SUBSCRIBER PAYMENT STRUCTURE

- Costs and credits for 2017:
  - Retail rate $0.101/kWh
  - Monthly fixed charges ~$30
  - Solar credit rate $0.101/kWh
  - Subscriber solar payment $0.02/kWh

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