Low-Income Community Solar Demonstration Project Case Study: San Miguel Power Association

OCTOBER 2017

COLORADO
Energy Office

Project Details

San Miguel Power Association's Demonstration Project Highlights

- SMPA integrated its low-income community solar garden with its income-qualified weatherization program.
- A portion of SMPA's low-income community solar garden was funded by SMPA's Green Fund -- a fund supported by Renewable Energy Credit (REC) purchases.
- SMPA's low-income community solar garden was constructed on an old landfill, transforming a brownfield to a "brightfield".
- On average, subscribers will realize annual cost savings of $134, and when combined with average cost savings of $200 from CEO's WAP, subscribers could see annual savings of $334.

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 (WAP) is committed to improving energy affordability for low-income households. Guided by this commitment and in response to a gap in electricity cost reduction programs, the CEO launched the Low-Income Community Solar Demonstration Project (Demonstration Project) in 2015. The Demonstration Project is a 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 San Miguel Power Association (SMPA), a rural electric co-operative utility with 13,400 meters serving Ouray, San Juan, San Miguel, Montrose, Mesa, Hinsdale, and Dolores Counties. This case study describes SMPA's income-qualified community solar project and seeks to inform utilities, local governments, and policymakers on the ways in which community solar projects can impact low-income communities.

PROJECT PARTNER ROLES

SMPA partnered with the CEO and GRID Alternatives (GRID) to develop a 125 kilowatt (kW) community solar array for up to 60 low-income co-operative members. In the event that there is additional demand, SMPA built an additional 72 kW array. If there is not enough demand to subscribe additional income-qualified households, SMPA will open the array up to all members.

The Telluride Foundation and its affiliates -- Johnson Family Fund, McManemin Family Fund, Hermitage Fund, and Paradox Community Trust Fund -- also partnered with SMPA to provide funding assistance.

The primary goal of the low-income project was to provide an accessible renewable energy source for income-qualified members.

Each partner played a key role:

- CEO provided project evaluation and funding support.
- GRID provided the design and implementation framework, designed and lead the installation of a new 197 kW system, provided workforce integration, helped with permitting, provided outreach, and managed subscriptions. Moving forward, GRID will conduct primary operation and maintenance (O&M) activities and maintain equipment warranties.
- SMPA provided funding support, lead fundraising efforts, provided the land and interconnection, and conducted outreach. In addition, SMPA will provide bill credits and billing support, maintain full ownership, and support O&M.

PROJECT IMPLEMENTATION

The project was first introduced to SMPA's Board of Directors in late fall of 2015 and was not approved until the spring of 2016. It was approved because of its benefit to low-income members, its synergy with member values, including support for renewable energy, and the ability to repurpose a brownfield.

"Our position as a non-profit organization is essential to our perspective as a utility. We are tasked with serving all members of our community. The best ways to do this, and to bring electricity to the end user, is to develop programs that serve low-income households and support local economic development." – Wiley Freeman, SMPA's Manager of Member Services

The area had a strong history of NIMBYISM ("not-in-my-backyard" philosophy) and SMPA had difficulty getting approval for large-scale solar photovoltaic projects in the past. This time, SMPA approached its Board and other community leaders from a different angle. They knew that many of the region's residents wanted more renewable energy in the Valley and they asked various community leaders where the community solar garden should be located. The community leaders responded positively to this approach and SMPA, along with the County staff and commissioners, chose to construct the community solar garden on a former landfill owned by San Miguel County about 45 minutes away from SMPA's headquarters in the small town of Norwood, Colorado. This solution not only brought more renewable energy to the Valley, but made use of an otherwise unused parcel of land without obstructing existing mountain views.

Though the placement was ideal for the community, re-purposing an old landfill had numerous challenges including state permitting, water quality compliance, grading, and land management. The post-closure actions significantly delayed construction.

"Building on a retired landfill was the number one factor that influenced the timeline of our construction." – Wiley Freeman, SMPA's Manager of Member Services

Fortunately, both the state and the San Miguel County were big champions of the project and helped SMPA streamline the landfill closure procedures. SMPA leased the land from San Miguel County for a negligible annual fee, and the land was eventually transitioned from a brownfield to a "brightfield."

SMPA and their stakeholders found that capping a landfill with a community solar project actually improves the land. Solar systems require specific grading, which leads to less erosion and better vegetation coverage with native grasses and plants. Numerous prairie dog issues existed when the site was a landfill, but during the solar garden process, the team was able to improve the prairie dog habitat. The existing fence was in poor condition, and with construction of the solar garden, a newer and more robust fence was built.

"Since we will monitor the site for 20 years, we no longer have a neglected piece of land." – Wiley Freeman, SMPA's Manager of Member Services

With the exception of the meter, the garden was completed in March 2017. The solar garden was interconnected with SMPA's grid in June 2017. The first subscriber signed up June 2017, and as of July 2017, the community solar garden was nearly 45% subscribed. Subscribers will begin to realize cost savings approximately one month after they are signed up.

To qualify, subscribers must earn less than 80% of HUD's area median income (AMI). SMPA may refer subscribers and deny subscriptions due to poor credit history, history of unpaid bills, and/or illegal activity. SMPA has committed to providing program subscriptions for 20 years, with individual subscriptions lasting 5 years. All subscribers were required to have either received home improvements through SMPA's income-qualified (IQ) Weatherization Program or through CEO's weatherization program.

The project was implemented using a turn-key installation in a "barn-raising" community development model, where volunteers donated sweat equity and worked alongside GRID and SMPA. Typically, GRID encourages utilities to enlist the help of subscribers. However, because SMPA found that many potential subscribers were elderly, on disability, or even connected to oxygen tanks, SMPA did not require volunteer time from subscribers and rather opened volunteer opportunities to the community at large.

Though the solar garden was installed nearly 40 miles away from SMPA's headquarters, the community solar production meter was interconnected directly to SMPA's electric grid. The array was inspected by the state electrical inspector, and was exempt from state electric board regulations.

SMPA and GRID were able to construct the solar garden using mostly local contractors who possessed complementary skillsets. When equipment that may have been more

accessible in urban areas was not available, many members of the local community pitched in and provided assistance to the project.

"Local folks helped out logistically. In one instance, we found a local farmer and were able to call upon him for trenching equipment. In another case, we employed a neighbor's relatives to help with concrete work. Part of the success of this project was due to the fortitude of the locals." – Kam Jaspal, GRID Alternative's Land and Project Development Manager

ENERGY GENERATION

SMPA entered a contractual relationship with SMPA's wholesale electricity provider, Tri-State Generation and Transmission Association, Inc. (Tri-State). Tri-State's Board of Directors' Renewable Energy Policy 115 governs the terms under which SMPA can "self-generate" and lists the bill credit rates paid by Tri-State to SMPA for the electricity generated by the community solar array. Tri-State will provide bill credits to SMPA for the life of the 20-year Policy 115 and then will bill SMPA for the electricity produced by the community solar array. SMPA's wholesale electric service contract also limits co-operative owned electricity generation system sizes to no more than 5% of the co-operative's total load.

Tri-State also offers Renewable Energy Policy 117 that governs the renewable energy credit (REC) transaction with member co-operatives. However, Policy 117 does not apply to SMPA's low-income community solar project since SMPA choose to retain ownership of the RECs. SMPA will sell the RECs at a premium to local organizations and invest the money into their Green Fund, which is an escrow account that is used to fund energy efficiency and renewable energy projects and programs. SMPA has used the Green Fund to pay for qualifying projects for the last nine years and continually replenishes the fund using money received from the sale of projects' RECs.

"Our community has a big appetite for RECs. We have used them to create a positive feedback loop over the last nine years." – Wiley Freeman, SMPA's Manager of Member Services

PROJECT COSTS

The low-income community solar project cost $456,000, with $135,000 covered by CEO's grant and $330,000 contributed by SMPA, of which the Telluride Foundation and its affiliates granted $50,000 and $30,000 was provided in-kind by SMPA. 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. SMPA provided in-kind support including billing software, ongoing program administration, and leasing of the land.

Tri-State's Renewable Energy Policy 115 requires SMPA to pay Tri-State for electricity consumed by its members even though that consumption is offset by the community solar project. SMPA must also pay GRID an annual operation and maintenance fee. Even with the O&M fee, SMPA expects the project to be budget neutral every year of the contract term.

SMPA used money from its Green Fund to help pay for the low-income community solar project.

"We created a "solar endowment" to help improve the quality of life for those folks who need help paying for their utilities. We could have invested this money in the stock market, but we used it to create a solar project." – Wiley Freeman, SMPA's Manager of Member Services

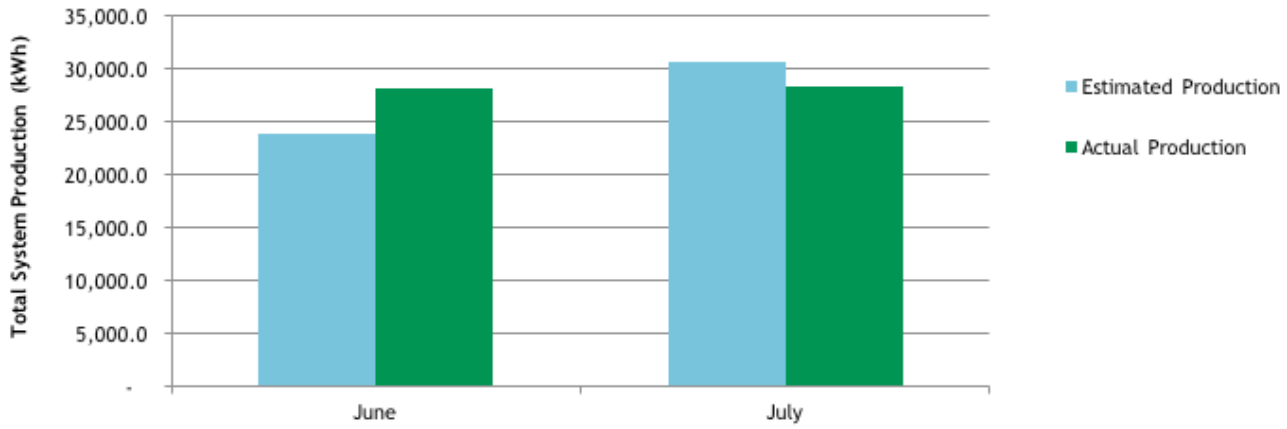
PROJECT PRODUCTION

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 315,735 kWh. Actual production data from June 2017 through July 2017 shows that the system produced 56,484 kWh, while estimated production during that same period was 54,497 kWh. During this timeframe, the system produced 3.6% more electricity than expected.

PROJECT OUTREACH

SMPA developed a targeted marketing campaign, in which it called over 70 previously weatherized households who received services through SMPA's IQ Weatherization Program.

FIGURE 1: ESTIMATED VERSUS ACTUAL SYSTEM PRODUCTION



Based on previous marketing efforts, SMPA leveraged existing relationships and continued conversations with the clients they knew would be eligible and would benefit from additional energy assistance. GRID also assisted with outreach by sending out postcards and emails and conducting a call campaign.

Subscribers were excited to get signed up to both programs; yet, there was a significant delay in enrollment between the two programs. Initial marketing for the community solar garden began with the development of SMPA's IQ weatherization program in the summer of 2016 and community solar garden subscribers were not enrolled until early summer of 2017.

"Folks were very excited about the IQ weatherization program and community solar. They patiently waited to get signed up!" – Wiley Freeman, SMPA's Manager of Member Services

Though SMPA never completed any in-person outreach, its targeted marketing via phone calls proved valuable. SMPA noted that the biggest outreach hurdle was ensuring that all potential subscribers completed the program application.

SUBSCRIBER STATISTICS

The 125 kW solar garden is designed to serve approximately 60 subscribers, with each utilizing varying amounts of solar energy from the garden. System sizes are limited to 2 kW. Subscribers have a 5-year contract with SMPA, and subscription contracts can be renewed. Subscribers are expected to save approximately 50% of their usage based on a demand of 2 kW. Additional capacity of 72 kW is available to income-households as needed.

COST STRUCTURE

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

The 2017 residential retail rate is $0.135/kWh. The fixed monthly access charge is approximately $18. The bill credit is currently equal to $0.0527/kWh and will increase at varying amounts between 1 and 3% until 2027, at which point the credit will remain constant at $0.067/kWh. SMPA set the solar credit equal to what they receive as a bill credit from Tri-State. The difference between the retail rate and the bill credit is the solar payment. In 2017, it is set at $0.082/kWh and will vary as the retail rate and solar credit rate varies.

By setting the customer's solar credit equal to Tri-State's solar credit, SMPA provides a pass-through credit to its customers. This ensures that the project is budget neutral and helped sell the project to SMPA's member base.

On average, SMPA's project is expected to save each subscriber approximately $134 in the first year. Assuming average annual electric utility costs of $1,250 based on SMPA's historic data, the community solar garden, when combined with potential cost reductions of $200 achieved through CEO's WAP, could reduce low-income subscribers' annual energy costs by approximately 27%.

SMPA'S NEXT STEPS

In light of Tri-State's 5% self-generation cap, SMPA still sees room for renewable energy growth. SMPA is working with Tri-State and other member co-operatives to develop more community solar and provide as many energy efficiency and renewable energy options to its members as possible.

Subscriber Spotlight: Evelyn Nelson

Evelyn Nelson and her husband are two professionals with a large family trying to make ends meet. They signed up for SMPA's program July 2017 and expect to save 5% to 7% on their electricity costs each year.

"This is a good program for family that do not qualify for [other] help, but still need some assistance."
– Evelyn Nelson, subscriber

Evelyn had a contractor perform an energy assessment on their house through SMPA's IQ Weatherization Program. The contractor left a card about SMPA's new IQ community solar program. At first, Evelyn was hesitant to sign up; she didn't understand how a community solar program could work for her and her family. She reached out to GRID and SMPA for more information. They were very helpful, and worked closely with her to answer questions and make sure that she felt comfortable about the process. Signing for the program was easy and her application was quickly approved.

Her family had always been interested in renewable energy and the fact that this project would result in cost savings was an obvious win.

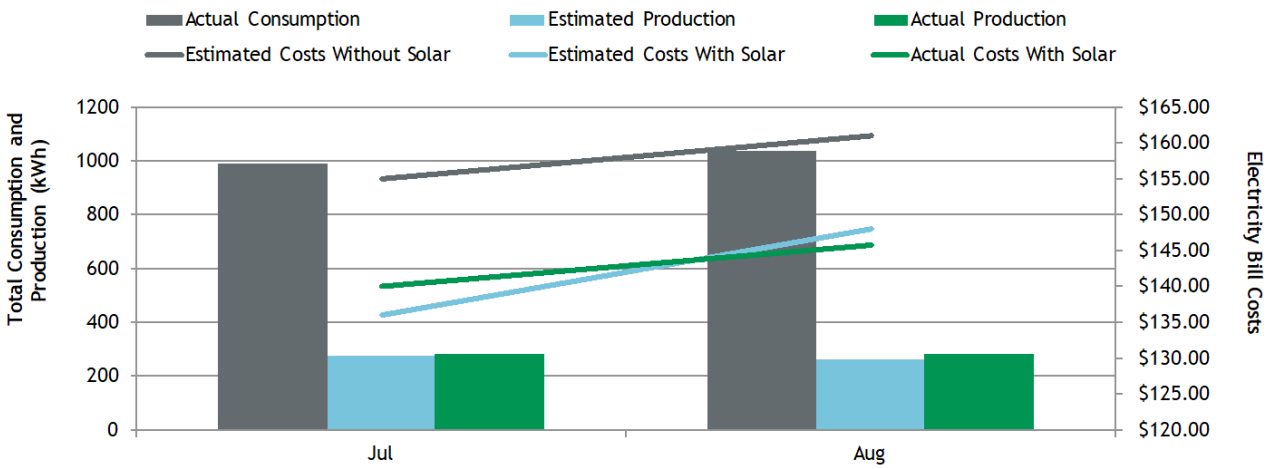
"I am grateful to be part of a program that helps the environment, while helping community members."
– Evelyn Nelson, subscriber

Estimated Versus Actual Performance

In the past 12 months, the Nelson household used 15,536 kWh and spent $2,310 on electric bills. To offset usage, the Nelson's household was allocated 2.0 kW of solar energy. The solar system was expected to offset 20% of their usage and save 7% of their costs annually.

During the first two months of the array being online, the Nelson's solar system offset usage by 28% and saved 10% on their electricity costs. To date the system has produced 5% more electricity than estimated.

FIGURE 2: ESTIMATED VERSUS ACTUAL PRODUCTION FOR THE NELSON HOUSEHOLD



Lessons Learned

SUCCESSES

- SMPA used money from its revolving Green Fund to help pay for the initial community solar costs.
- The community solar garden transformed a brownfield to a "brighfield" by making use of an old landfill site.
- SMPA enlisted participation from its existing IQ weatherization program, increasing the savings potential for income-qualified households and streamlining outreach and marketing.
- The project has low operating costs and minimal O&M.
- The project aligned with SMPA's core values and member's values: serving income-qualified households and bringing more renewable energy to the Valley.
- Subscriber electricity costs were reduced.
- Lower electricity costs will help reduce the number of non-payments that SMPA will receive.
- A majority of the project construction was executed by local contractors.
- When coupled with WAP savings, this project has the potential to reduce energy costs by approximately 25% to 30%.

CHALLENGES

- The project had a high capital cost.
- As a Tri-State member, SMPA was required to pay wholesale electricity costs for electricity consumption that was offset by the community solar garden.
- Even with the CEO grant and GRID's support, it was difficult for SMPA to provide maximum benefit to subscribers while balancing utility costs.
- The site was remote and was difficult to quickly access.
- Local expertise in solar was limited.
- Closing the landfill and getting a special use permit was difficult and time-consuming, taking between eight to nine months to complete.

Lessons Learned

BEST PRACTICES

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

Install array on land that is otherwise unused. Although installing the solar garden on an old landfill site proved to be somewhat challenging, it did provide significant benefits. This not only helped build support throughout the community, but also lowered project costs, avoided NIMBYISM issues, and will actually improve the land over time.

Consider a pass-through bill credit structure. It is difficult for utilities to design solar projects that are budget neutral. If a utility is receiving a bill credit from their wholesale provider, considering passing along the exact same credit to the subscriber to avoid an annual deficient. It should be noted that though this approach provides a balanced financial return, it does limit the ability of the utility to increase cost savings to its members.

Consider pairing a low-moderate income community solar garden with other IQ energy efficiency programs. By improving efficiency first, a smaller renewable energy system is required to offset electric consumption. Plus, the same participants can be part of both programs, which simplifies outreach and marketing.

When NIMBYISM issues are at play, work with the community to develop the community solar garden. Getting early buy-in on site placement, using local contractors, and touting the benefits of clean energy can help overcome legacy biases against renewable energy systems.

POLICY CONSIDERATIONS

Lessons learned from the SMPA community solar garden present the following policy considerations.

Wholesale power purchase agreements affect a co-operative utility's ability to offer community solar. Where and how a co-operative utility purchases its power can greatly affect its ability to provide community solar. SMPA was limited in its ability to offer more community solar and to manage operating costs because of Tri-State's Board of Directors' Renewable Energy Policy 115, which limit self-generation to 5% of total consumption and require that SMPA pay for the electricity consumed by its members that is offset by solar. In addition, Tri-State's renewable energy policies prohibit the community solar array from offsetting peak demand charges. If Tri-State had accepted peak demand offsets from SMPA, SMPA could have realized an additional few thousand dollars of savings each year.

The bill credit 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. SMPA's bill credits will not escalate after the year 2027 even though electricity costs will. Therefore, solar payments will grow over time and the subscriber's savings will stay relatively the same or slightly decrease.

Limiting the size of a household's system reaches more households but reduces an individual's potential for cost savings. SMPA limited each household's system size to 2 kW, even when consumption exceeds 2 kW. This allowed SMPA to make a broader impact on its member base, but reduced a household's potential savings to 5% to 10% of total costs (based on an estimate of 50% savings from a 2 kW system).

Project Snapshot

QUICK STATISTICS

- 125 kW to 197 kW solar garden
- Maximum 60 subscribers for the 125 kW array
- 45% subscribed
- Converted a brownfield to a "brightfield"
- Partially funded by SMPA's Green Fund
- Paired with SMPA's IQ Weatherization Program
- 100% of current subscribers have received or signed up to receive either CEO's weatherization services or SMPA's IQ weatherization services
- Uses Tri-State Board of Director's Renewable Energy Policy 115

UTILITY TYPE

- Rural electric co-operative
- Serves 13,400 meters in Ouray, San Juan, San Miguel, Montrose, Mesa, Hinsdale, and Dolores Counties
- Receives wholesale electricity from Tri-State Generation and Transmission, Inc.

ENERGY BURDEN

- Approximately 9% of Ouray County, 16% of San Juan County, 11% of San Miguel County, 18% of Montrose County, 14% of Mesa County, 11% of Hinsdale County, and 15% of Dolores County residents live below the poverty line, compared to a statewide average of 12%.
- For those living at 50% of the poverty line, Ouray County residents have an energy burden of 28%, San Juan County residents have an energy burden of 36%, San Miguel County residents have an energy burden of 26%, Montrose County residents have an energy burden of 23%, Mesa County residents have an energy burden of 21%, Hinsdale County residents have an energy burden of 36%, and Dolores County residents have an energy burden of 27%.

PROJECT GOALS

1. Serve income-qualified households
2. Provide renewable energy and diversify energy supply
3. Repurpose a brownfield

PROJECT PERFORMANCE

- Project target is approximately 50% usage savings based on a system size of 2 kW
- Expected to produce 315,735 kWh annually
- Within 2 months, the system has produced 3.6% more electricity than expected

PROJECT COSTS

- Total project cost $465,000
- CEO grant $135,000
- SMPA contribution $330,000, including $30,000 in kind and a $50,000 grant from the Telluride Foundation

SUBSCRIBER PAYMENT STRUCTURE

- Costs and credits for 2017:
  - Retail rate $0.135/kWh
  - Monthly fixed charges ~$18
  - Solar credit rate $0.053/kWh (with approximately a 3% escalator)
  - Subscriber solar payment $0.01/kWh (no escalator)

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