

## Overview

Colorado offers several energy efficiency and renewable energy programs for low-income households. Many of the renewable energy programs are prompted by the state's [Renewable Energy Standard](#), which requires 30% of the state's energy generation to be from renewable sources by 2020. With passage of the state's [Community Solar Gardens Act](#) in 2010, Colorado was one of the first states in the country to enable community solar projects, which provide renewable energy access to all energy consumers, including renters, low-income households, or homeowners without suitable roofs or adequate solar exposure. As part of this landmark effort, Colorado was the first state to mandate a low-income carve-out for community solar projects. The Colorado Energy Office and Energy Outreach Colorado (EOC) (both of which were partners in the U.S. Department of Energy [Clean Energy for Low Income Communities Accelerator](#)) in collaboration with utilities, developers, and contractors, have worked to improve existing energy programs and increase energy affordability for low-income Coloradans. In particular, the partners leverage the network of income-qualified and previously weatherized households to link them to community solar subscriptions. With a minimum of 5% and upwards of 15% of power provided by such projects for some utilities going to low-income subscribers, community solar developed in the state provides 60% to 70% in electricity cost savings to customers of the state's largest utility and 3-10 cents per kilowatt hour (kWh) savings for customers of participating electric utility co-operatives. Subscribers in the new community solar model for the state are households served by energy assistance and weatherization agencies. As a result, they are more likely to have had energy efficiency improvements made to their home and benefit from a more comprehensive set of energy savings opportunities.

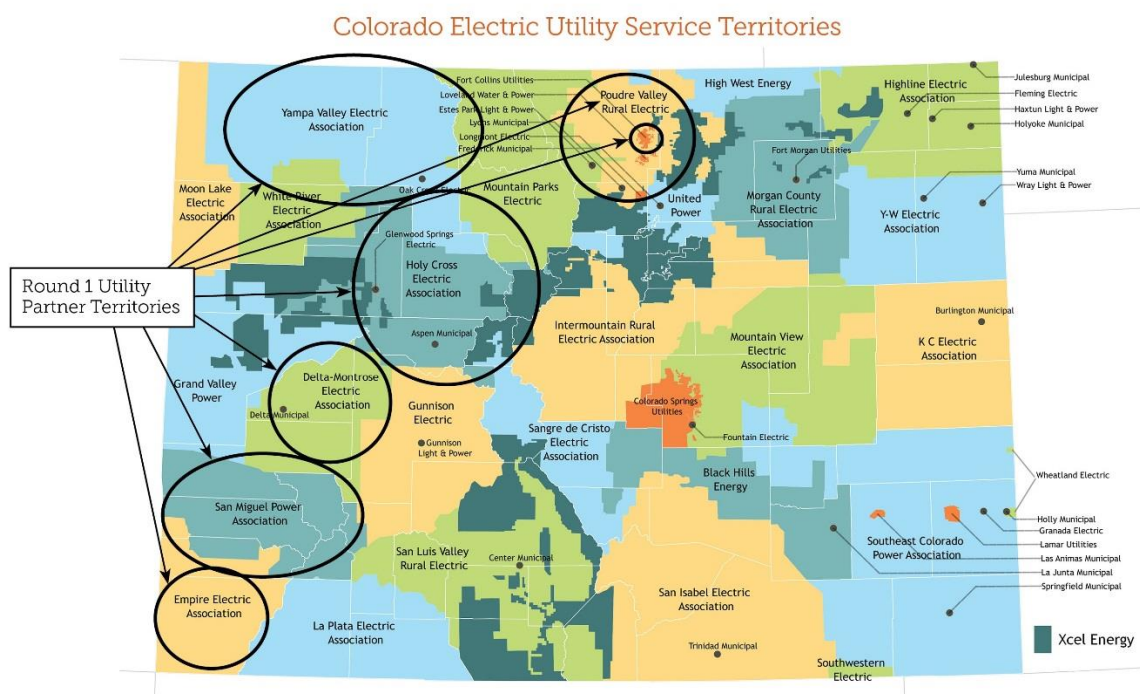
## Key Partnerships

The Colorado Energy Office (CEO) seeks to deliver cost-effective energy services and advance innovative energy solutions for the benefit of all Coloradans through technical guidance, policy research, and program management. As a Grantee of the U.S. Department of Energy Weatherization Assistance Program (WAP), CEO's approach includes linking low-income energy efficiency and renewable energy programs. Their Low-Income Community Solar Demonstration Project, which launched in 2015 in collaboration with several rural electric cooperatives, has provided 1.4 Megawatts (MW) of community solar generation to 380 households. According to CEO, all participating households either previously had their homes weatherized or received energy efficiency services and/or education as part of their participation in the community solar program (Dobos et al, 2017). The CEO approach, along with other community and rooftop solar programs for low-income Coloradans, is featured in a report, [Reducing Energy Burden with Solar: Colorado's Strategy and Roadmap for States](#), authored by the National Renewable Energy Laboratory (NREL).

The mission of EOC is to ensure that all Coloradans have access to affordable energy. EOC's programs include bill payment assistance, energy efficiency programs for residents of single-family, manufactured and multifamily homes, energy education, and advocacy. EOC's portfolio of programs serves over 25,000 families a year, of which approximately 17,000 receive bill assistance and 8,000 receive energy efficiency services. EOC's energy efficiency programs (e.g., Colorado Affordable Residential Energy) are funded primarily through utility ratepayer funds. They also receive funding from WAP (EOC is a WAP Subgrantee) and private donations. EOC funds emergency assistance organizations across Colorado, which provide energy bill assistance and other services directly to low-income, including behavior change information and referrals to energy efficiency programs. As much as feasible, families they subscribe to community solar

programs have been drawn from those that participated in energy efficiency and assistance programs to further reduce their energy burden, which is discussed later in this case study.

Xcel Energy is the largest electric and gas investor-owned utility (IOU) in Colorado. In 2017, its ratepayer-funded low-income energy efficiency programs had a total budget of more than \$5.8 million and included energy saving kits, single-family and multifamily weatherization, and a program for nonprofits. The utility’s rooftop solar and community solar programs include an elevated level of incentives for projects serving low-income households. Xcel Energy is required to meet the Colorado Public Utilities Commission (PUC) requirement of 5% low-income subscribers for community solar gardens (CSGs), defined as solar electric arrays with multiple subscribers that are connected to the utility grid. Xcel Energy anticipates that by the end of 2019, low-income subscribers will account for between 10% and 15% of overall CSG capacity.



Source: Colorado Energy Office. Map of CEO’s Low-Income Community Solar Demonstration Project Utility Partners and Colorado Utility Service Territory Map

### Spotlight: Low-Income Community Solar Subscription Model

Partners in Colorado are currently implementing a low-income community solar subscriber model that was launched in 2010 and subsequently revamped after six years of implementation. The carve-out model arose from the [Community Solar Gardens Act](#) of 2010 ([HB 10-1342](#)) and other policies that enabled community solar in the state and required the inclusion of low-income customers. However, these legislative solutions did not detail how to involve these constituents. During a roughly two-year rulemaking process, the PUC interpreted the legislative mandate for low-income participation to be a 5% low-income subscriber carve-out for the electric IOU’s community solar gardens. Initially, the parties responsible for achieving this were the community solar developers who responded to requests for proposals from the

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utility and subsequently were made responsible to meet the low-income carve-out during the project's pre-development phase. The approach was changed through utility rate cases and ultimately a settlement agreement meant to address the concerns of some state and community stakeholders, described in more detail below.

### Recruitment Challenges

In 2015, the CEO commissioned a study of the low-income community solar carve-out, which describes the challenges developers and other stakeholders had in recruiting subscribers and meeting the 5% requirement (Dobos et al, 2017). A key takeaway of the study was that when the project launched, Colorado lacked a functioning community solar market, but did have interested subscribers. There were indications of high demand, but the developers did not have the knowledge and resources needed to respond to market demand. Similarly, finance providers either were uncertain or lacked knowledge of how to locate and recruit low-income subscribers. In part, this was because none of the developers had low-income households as a primary target. Some developers approached EOC for assistance in identifying low-income households, but this approach was piecemeal and subject to its own challenges, including:

1. The income verification process was difficult. Participants had trouble locating required documentation and developers were not accustomed to the process of verifying customer income.
2. Subscription deals were inconsistent. There could be an 18-month lag from sign-up to interconnection, and a last-minute push to recruit subscribers meant that some households received free subscriptions while other households subscribed earlier in the process did not receive a free subscription.
3. There was a lack of trust. The developers were an unknown entity for low-income families. Some nonprofit partners provided energy assistance, and were therefore trusted by clients; however, they were unwilling to risk eroding the customer relationship via an unproven program, product, or partner.

### The Settlement Agreement

Due to the challenges noted above and outlined in more detail in the NREL report cited earlier, many stakeholders had ideas and suggestions for improving the low-income community solar carve-out model. An opportunity arose when Xcel Energy had several cases before the PUC. These were combined into one settlement, and 26 stakeholders, including the CEO and EOC, signed on to a settlement agreement with Xcel Energy in August of 2016. A focal point during the negotiations was the Renewable Energy Standard Adjustment (RESA) fund, which was created in 2010 to fund renewable energy projects, such as solar PV, via ratepayer contributions. At the time of the settlement agreement, RESA was being used to develop renewable energy that provided system-wide benefits to all customers regardless of income. However, low-income advocates argued that some of the RESA funds should be used to specifically serve low-income households. Thus, the settlement agreement more clearly defined the requirements for low-income participation in RESA-funded CSG projects.

### Program Adjustments and Achievements

Among many other changes related to the utility's solar offerings, the agreement led to changes in recruitment and enrollment of CSG subscribers to meet the mandated low-income subscriber carve-out. Whereas, previously, developers were required to meet the 5% low-income subscriber requirement for their

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projects, beginning in 2017 the utility assumed responsibility for that requirement. Two changes and the resulting positive impacts of these changes are particularly noteworthy. First, EOC is now the sole subscribing agency for most Xcel Energy CSGs. Second, they primarily recruit customers who have already qualified for and received energy efficiency upgrades. This centralizes the process and reduces administrative costs by identifying customers known to be income-qualified. It also addresses challenges associated with lack of trust as a result of the well-established relationships that EOC and its network have in low-income communities. Finally, it amplifies reductions in energy burden because previously weatherized customers, who are generally the most vulnerable of the low-income population, have further reduced their electricity costs. The integration of services also reinforces the value of energy efficiency as the first cost-effective step in helping a household reduce energy burden. Since the start of EOC's involvement with the low-income subscriber model in 2017, EOC reports that they have subscribed 638 low-income residences, five homeless shelters, and two affordable housing communities.

Since its inception in 2010, the aforementioned low-income community solar carve-out model has provided benefits to over 400 low-income households, including \$120,000 in bill credits and 1.5 million kWh. A total of 404 subscriptions belong to single-family home customers, who received approximately \$102,000 in bill credits in 2017. An additional 13 subscriptions are for multifamily buildings that are each home to dozens of households. According to Xcel, these multifamily subscriptions received approximately \$19,000 in bill credits in 2017.

## **Outcomes Achieved: Low-Income Community Solar Programs with Energy Efficiency Linkages in Colorado**

In service of their goal of delivering energy efficiency and renewable energy options and improving energy affordability for low-income families, partners in Colorado have reported accomplishing the following.

### **Secured commitments and demonstrated the value of community solar**

In Xcel Energy territory, there will be an anticipated 95 MW of capacity serving available to customers by the end of 2019, with 5% set aside specifically for low-income customers.

### **Leveraged funding**

Several of the energy efficiency and renewable energy initiatives in Colorado have used diverse funding sources to better serve low-income populations. For example, the CEO's \$1 million seed fund leveraged greater than 2:1 in contributions from participating electric coops for low income community solar demonstration projects.

### **Achieved greater savings for low-income customers**

Xcel reports that subscribers to the CSGs in its territory receive savings of 60% to 70%, which is equivalent to roughly \$0.07 per kWh. Subscribers to the rural co-op CSGs receive a bill credit rate of between \$0.028 and \$0.102 per kWh (Dobos et al, 2017). EOC reports that nearly 78% of subscriptions cover 100% of the bill, and the rest provide a 50% reduction.

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## Lessons Learned from Low-Income Community Solar and Energy Efficiency Programs<sup>1</sup>

### Use different approaches for the low-income sector than for the market-rate retail sector.

In regard to solar PV, low-income customers represent a distinct sector for which the methods and approaches appropriate for the retail solar sector almost never apply. Serving this sector is not “one size fits all,” and others attempting to replicate successful low-income programs should not assume they are similar to other kinds of consumers. As described earlier, multiple low-income stakeholders came together in Colorado to develop a community solar program model that leverages the existing network of energy assistance and weatherization agencies to meet the needs of low-income households.

### Energy efficiency is the foundation of a low-income energy program.

Colorado partners have found that energy efficiency is the starting point and the most cost-effective strategy for building a low-income energy affordability approach in the state. A key example is the CSG subscriptions for low-income customers, which leveraged the energy efficiency network that EOC had already established via its other programs. Likewise, CEO’s community solar demonstration project targeted previously weatherized households as potential CSG subscribers. Both examples used established relationships and trusted organizations to actively incorporate low-income households into an unfamiliar program.

### A functioning community solar market is helpful for making low-income solar programs viable.

After years of investment, partners in Colorado report having a functioning community solar market with existing infrastructure and partners that make it easier to address the needs of low-income households. Other states that attempt to address low-income solar before the retail market matures may encounter barriers, such as a lack of contractors and developers to serve the diverse needs of low-income communities. Stakeholders also cited the importance of favorable systems for providing solar credits from power produced by CSGs, including net metering; without such systems, the economics of low-income solar PV programs can be challenging.

## Resources

- [Colorado Energy Office, Energy Outreach Colorado and GRID Alternatives Colorado Collaborate to Create Milestone Low-Income Solar Access](#). State of Colorado, 2016.
- [Community Solar Gardens Act](#). State of Colorado, 2010.
- [Parties reach settlement on key Colorado energy issues](#). Xcel Energy, 2016.
- Cook, Jeffrey J. and Monisha Shah. 2018. [Reducing Energy Burden with Solar: Colorado’s Strategy and Roadmap for States](#). Golden, CO: National Renewable Energy Laboratory. NREL/ TP-6A20-70965.
- Dobos, H., Artale, E., et al. [Insights from the Colorado Energy Office Low-Income Community Solar Demonstration Project](#). State of Colorado, December 2017.
- Dobos, H., Artale, E., et al. [Analysis of the Fulfillment of the Low-Income Carve-Out for Community Solar Subscriber Organizations](#). State of Colorado, November 2015.
- [Low-Income Energy Affordability Data \(LEAD\) Tool](#), U.S. Department of Energy.

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<sup>1</sup> Lessons learned are based on interviews with the Colorado Energy Office, Energy Outreach Colorado, and Xcel Energy.

## Referenced Programs

Program or Initiative	Key Characteristics
<a href="#"><u>Colorado Weatherization Assistance Program (CEO WAP)</u></a>	<p><b>What:</b> Weatherization services for low-income households  <b>Who:</b> Managed by CEO  <b>Funding:</b> U.S. Department of Energy (WAP) and U.S. Health and Human Services (Low Income Home Energy Assistance Program, or LIHEAP), State Severance Tax, utility revenue contracts  <b>Why:</b> Federal formula funding combined with state and utility funding for weatherizing low-income homes helps save energy and money</p>
<a href="#"><u>Colorado Affordable Residential Energy (CARE) Program</u></a>	<p><b>What:</b> CARE serves previously weatherized and WAP waitlist utility customers (gap customers) with energy efficiency upgrades  <b>Who:</b> EOC manages the program and partners with weatherization agencies and other community organizations on participant engagement and service coordination  <b>Funding:</b> Utility demand-side management (DSM) funding, rural electric associations, and EOC private funding  <b>Why:</b> Expands the pool of customers who can benefit from weatherization</p>
<a href="#"><u>Xcel Energy Income-Qualified Weatherization Program</u></a>	<p><b>What:</b> Single-family and multifamily energy efficiency programs for low-income customers provide ceiling and wall insulation, furnace upgrades, refrigerator replacement, lighting replacement, and other measures  <b>Who:</b> Xcel Energy administers the programs with support from partners  <b>Funding:</b> Ratepayer-funded  <b>Why:</b> Low-income customers lack the upfront capital to invest in energy audits and energy efficiency improvements</p>
<a href="#"><u>Low-Income Community Solar Demonstration Project</u></a>	<p><b>What:</b> Third party-owned systems interconnected with cooperative and municipal utilities; low-income households that had previously received energy efficiency services were targeted for outreach to maximize energy cost savings  <b>Who:</b> CEO partnership with electric cooperative utilities, GRID Alternatives, and others  <b>Funding:</b> CEO provided seed funding to GRID Alternatives and utility partners provided a two-to-one match  <b>Why:</b> Further reduces energy burden by combining energy efficiency with solar subscriptions</p>
<a href="#"><u>Xcel Energy 100% Low-Income Community Solar Gardens</u></a>	<p><b>What:</b> A CSG program that serves only low-income households; the goal is to release RFPs for 4 MW of new capacity annually and serving 3,900 customers; Xcel Energy selects projects based on project cost, REC pricing, percentage of bill reduction, solar job training, coordination with energy efficiency programs, subscriptions across housing types, and other factors  <b>Who:</b> Xcel Energy manages the program and third parties own and administer the CSGs  <b>Funding:</b> Xcel Energy provides an upfront or performance-based incentive of \$0.02124/kWh  <b>Why:</b> Ensures that a portion of utility solar investments serve low-income households</p>