New Hampshire Public Utilities Commission

NEW HAMPSHIRE
Low-Moderate Income Community Solar Projects

Costs and Benefits Report

June 1, 2020

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Executive Summary

In 2019, the General Court passed Senate Bill 165[1] requiring the Commission to report on the costs and benefits of Low-Moderate Income (LMI) Community Solar no later than June 1, 2020. The report that follows describes proposed projects as well as the annual costs and benefits of the three projects that were operational in 2019.

Approximately 16 percent of the Renewable Energy Fund has been allocated to the Low-Moderate Income Community Solar Grant Program (Program) since fiscal year (FY) 2018. A competitive solicitation process, which included requests for proposals (RFP), led to the award of grants to projects proposing different models:

- subscription-based community solar;
- manufactured housing resident-owned community (ROC) solar; and
- multifamily rental housing behind-the-meter solar.

Project models varied in upfront costs, ownership, ongoing operational costs, and methods for providing direct benefits to LMI participants. In FY 2018 and FY 2019,[2] the program awarded $904,721 to six LMI community solar projects, with proposed total system capacity of 405.2 kilowatts (kW) alternating current (AC) or, on average, the equivalent of each household receiving the benefits generated from a 3 kW AC system. When operational, the projects, as proposed, will generate an estimated 600,000 kilowatt-hours (kWh) annually and provide direct benefits to 123 LMI households, plus 21 non-LMI households. These grant awards helped mitigate market barriers to solar energy participation by LMI households.

Results

Of the six projects awarded grants, three projects became operational in 2018. Annual reports containing data for 2019 were provided to the Commission for each project's first full year of operation. This data, as well as information received through follow up discussions with grant recipients, are the sources for the annual costs, direct benefits, non-monetary benefits, and observations.

In calendar year 2019, after accounting for ongoing expenses, each participating household received direct benefits ranging from $20 to $53 per month; between $240 and $645[3] per year. Direct benefits were provided in the form of lot rent reductions, electric bill credits, and the inclusion of electricity in rent. The direct benefits provided through these methods did not impact household eligibility for other income-qualified assistance programs, thereby overcoming another barrier for LMI households' access to solar. In the case of the multifamily rental housing project, the property owner purchased the solar array and the tenants receive direct

[1] *See* Senate Bill 165 (2019), http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2019&id=1054&txtFormat=pdf&v=current.
[2] As of the issuance of this report the FY 2020 grant award contracts were not yet approved by Governor and Executive Council.
[3] Upper range based on average savings of all Avery Hill project participants.

benefits from the generation. This model overcomes the barrier to solar that exists for rental property tenants.

The ongoing annual costs to participants ranged from no cost to $20 per month. The subscription-based model does not charge an annual subscription fee to LMI participants; instead, annual program costs are covered by donations and volunteer services. The resident owned community model included a power purchase agreement (PPA), resulting in the purchase of the array's generation from a third-party at a rate lower than the rate offered by the electric utility. In the case of the multifamily rental housing model, tenants realized a $20 per month rent increase, but tenants no longer are responsible for electric bill payments. From the perspective of the system owners, ongoing expenses varied depending on the model. The annual costs included, for example, debt service on loans, program management, insurance, and property taxes incurred due to the solar installation. **Overall, the three operational projects provided net positive direct benefits with no upfront costs to participants.**

Observations

After thoroughly analyzing the program and the different models, the Commission observed that each model has different characteristics that impact ongoing annual costs and benefits. For example, two of the models target LMI households already enrolled in state and federal assistance programs or residing in income-qualified housing, thereby eliminating the need for additional program-specific income verification and reducing administrative costs. Two models developed solar projects to directly benefit an established "community," eliminating the need for ongoing marketing and participant recruitment.

When considering installing solar, securing suitable land or roof space is a requirement and is often a barrier for renters and individuals residing in buildings or on lots without adequate solar exposure. Two projects consisted of ground-mounted arrays built on donated land, thereby eliminating the need for direct land ownership or ongoing lease payments, while the other project installed behind-the-meter rooftop arrays. Whether installed on land or rooftops, solar arrays may impact property taxes. Some cities and towns offer property tax exemptions for solar, others do not. A property tax exemption for solar or the ability to negotiate a payment-in-lieu-of-taxes (PILOT) agreement is essential to keeping ongoing costs low and maximizing the direct benefits.

Upfront project financing is a challenge for LMI communities. Each of the three projects utilized different financing mechanisms, including grants, loans, donations, and PPAs. Financing can impact ongoing costs and benefits. Each model worked to provide the maximum benefits possible to LMI participants.

The Program has reduced or eliminated market barriers to solar energy that LMI residential customers face. As more data becomes available and the various project models are evaluated, opportunities for improvement may be observed in the areas of administrative efficiency, income verification, and project financing. All project models were designed in a manner lending themselves to replication while allowing for improvements in their design and implementation. In summary, while the models vary **the solar projects receiving grant funding from the Renewable Energy Fund are efficiently providing both direct and indirect benefits to LMI families in New Hampshire.**

Background

Low-Moderate Income Community Solar Legislation

With the passage of Senate Bill 129[4] (SB 129) in 2017, the General Court found it to be in the public interest to promote customer choice and energy independence by eliminating market barriers to solar energy that low-to-moderate income residential customers face, by sustaining and promoting local renewable energy resources. Among other things, SB 129:

- Required the Commission to develop a program for LMI residential electric customers, which "directly benefit a group of at least five residential customers, where at least a majority of the residential customers are at or below 300 percent of the federal poverty guidelines." *See* RSA 362-F:10, X.
- Provides the program with the ability to finance or leverage financing for LMI community solar projects in manufactured housing communities or in multifamily rental housing.
- Mandates the Commission allocate no less than 15 percent of the Renewable Energy Fund annually to the LMI program.
- Requires the Commission to issue a report on the costs and benefits of low-moderate income community solar projects on or before June 1, 2020.[5]

In 2019, in an effort to further remove barriers and improve low-moderate income solar participation, the General Court passed and the Governor signed into law Senate Bill 165[6] (SB 165). Among other things, SB 165:

- Amended the definition of "low-moderate income community solar project" to include a requirement that no more than 15 percent of the projected load may be attributable to non-residential customers.
- Provides group hosts with the ability to elect to receive on-bill credits rather than receiving compensation by check for excess generation at the end of each billing cycle. Members of those groups may also receive on-bill credits.
- Allows eligible LMI community solar projects to receive a 3 cent adder per kilowatt-hour through June 30, 2021, and 2.5 cent adder per kilowatt-hour (the adder) after that time. The adder is a per kilowatt-hour amount that increases the net metering tariff (rate) paid for net excess generation.
- Mandates the Commission report on the development of the LMI community solar market and recommend whether the adder should be modified on or before July 1, 2022.
- Requires the Commission to authorize at least two new low-moderate income community solar projects per year in each utility's service area starting on January 1, 2020.

[4] SB 129 is known as the New Hampshire Clean Energy Jobs and Opportunity Act and was enacted as 2017 N.H. Laws Chapter 226.
[5] Report originally due no later than December 31, 2019. Due date was amended by SB 165 (2019) to June 1, 2020.
[6] SB 165 is known as the Low-Income Community Solar Act and was enacted as 2019 N.H. Laws Chapter 271.

Low-Moderate Income Community Solar Program Development

After SB 129 was enacted, the Commission initiated an extensive stakeholder process which included multiple stakeholder meetings and direct public comments through which the public and parties to the docket provided input on the most appropriate design and implementation of the LMI Program. As a result of that process, the Commission issued Order No. 26,113,[7] which found that "issuance of an RFP represents a reasonable and appropriate means of meeting the statutory requirements of SB 129," and provides "an efficient vehicle for implementing a program for the current fiscal year." The Commission also recognized that, "the RFP approach should permit review and evaluation of multiple project models and potentially facilitate the implementation of a non-RFP LMI program in future years."

The Commission issued the first request for proposals for the LMI Community Solar Development Program in March 2018. The request for proposals sought were for "Community Solar Photovoltaic Projects Providing Direct Benefits to Low and Moderate Income Residential Electric Customers." The request for proposals process led to the selection of three projects, each proposing a different model. Through annual reporting from those projects, the Commission gained insight into the implementation and effectiveness of each model.

Grant awards help mitigate market barriers to solar energy participation by LMI households.

Based on a second round of stakeholder meetings and direct public comment, the Commission issued Order No. 26,214,[8] which approved the use of competitive solicitations to select projects to be funded by the Renewable Energy Fund LMI Program in FY 2019 and FY 2020. The Commission determined that "implementation of the Renewable Energy Fund LMI Program through the issuance of an annual RFP represents a reasonable and appropriate means of meeting the statutory requirements of SB 129." Furthermore, "the RFP approach should permit review and evaluation of data from multiple project models, and potentially facilitate the implementation of an alternative program in future years." [9]

In FY 2021, with three years of experience administering the Program, Commission Staff will meet with stakeholders to discuss whether the request for proposals process remains the most reasonable and appropriate means of meeting the statutory requirements, or whether, in light of the history of the LMI Program, other approaches should be considered, including a first-come, first-served incentive program.

[7] *See* https://www.puc.nh.gov/Regulatory/Orders/2018orders/26113e.pdf, Order No. 26,113, Docket DE 17-172.
[8] *See* https://www.puc.nh.gov/Regulatory/Orders/2019Orders/26214e.pdf, Order No. 26,214, Docket DE 17-172.
[9] *See* Order No. 26,214, Docket DE 17-172.

Low-Moderate Income Community Solar Competitive Grant Program

RSA 362-F:10, X, requires allocating "no less than 15 percent of the Renewable Energy Fund annually to program(s) that benefit low-moderate income residential customers, including, but not limited to, the financing or leveraging of financing for low-moderate income community solar projects in manufactured housing communities or in multifamily rental housing."

In FY 2018, $405,000 was allocated to the LMI Program which represented approximately 15 percent of 2016 Renewable Energy Fund revenues. In FY 2019, $650,000 was allocated to the LMI Program. This was approximately 16 percent of 2017 Renewable Energy Fund revenues.

At the end of FY 2019, $150,000 of the funds allocated to the LMI Program remained unspent, and unencumbered. These funds carried forward to FY 2020 and were added to the $600,000, approximately 16 percent of 2018 Renewable Energy Fund revenues. The total budget for the LMI Program in FY 2020 was $750,000.

Grants Awarded

The Commission issued the first request for proposals (RFP) in March 2018 for "Community Solar Photovoltaic Projects Providing Direct Benefits to Low and Moderate Income Residential Electric Customers." The Commission received five proposals that represented $1.2 million of total investment. These projects requested approximately $680,000 in grant funds. The RFP process led to the selection of three projects, each proposing a different project model.

The Commission recommended, and the Governor and Executive Council approved, three grant awards totaling $404,721 of the $405,000 allocated to the LMI Program in 2018. Projects awarded grants under this RFP all began operation in late 2018 and represented various models, including:

- resident-owned community solar photovoltaic (solar or PV) utilizing a power purchase agreement with benefits provided as lot rent reductions,
- rooftop solar on income restricted multifamily rental housing with benefits provided as electric bill elimination, and
- a subscription-based model with benefits provided as on-bill credits.

Through follow up reporting from grant recipients, the Commission gained insight into the implementation and effectiveness of each model.

The Commission issued the Program's second RFP in February 2019, seeking proposals for community solar

projects providing direct benefits to LMI residential electric customers. The LMI Program had $650,000 in available grant funds. The Commission received four proposals representing $1.3 million of total investment. The developers of these proposals requested $700,000 in grant funds. Three community solar projects were selected to receive a cumulative amount of $500,000 in grant funding, and were approved by the Governor and Executive Council on May 15, 2019.

Similar to the first Program RFP, the projects selected represented various models, including: resident-owned community solar utilizing a power purchase agreement with benefits provided as lot rent reductions, rooftop solar on income restricted multifamily rental housing with benefits provided as electric bill elimination, and a solar array owned by a resident-owned community with benefits provided as lot rent reductions.

The table below summarizes Renewable Energy Fund LMI Program grants awarded in FY 2018 and FY 2019 as proposed.

Grantee	Location	FY Award	Status	Total Project Costs	Grant Funding	Total Projected Annual Benefits	Proposed LMI Participants
Laconia Area Community Land Trust Inc. Avery Hill	Laconia	FY 2018	Operational Nov. 2018	$ 275,398	$ 150,000	$ 7,741	12
Mascoma Meadows Cooperative Inc.	Lebanon	FY 2018	Operational Dec. 2018	$ 300,000	$ 168,000	$ 16,800	39
NH Solar Shares LLC	Plymouth	FY 2018	Operational Oct. 2018	$ 133,417	$ 86,721	$ 2,820	10
Laconia Area Community Land Trust Inc. Pine Hill	Laconia	FY 2019	Operational Dec. 2019	$ 269,461	$ 150,000	$ 5,076	12
White Rock Cooperative Estates	Tilton	FY 2019	Under Development	$ 201,798	$ 200,000	$ 9,324	21
Gaslight Village Cooperative Inc.	Tilton	FY 2019	Withdrawn[10]	$ 296,833	$ 150,000	$ 8,700	29
Totals				**$ 1,476,907**	**$ 904,721**	**$ 50,461**	**123**

[10] After selection for a grant, contracting, and approval by the Governor and Executive Council, this project was withdrawn by Gaslight Village Cooperative Inc.

For FY 2020, the Commission issued an RFP on December 20, 2019, with proposals due no later than January 24, 2020. One proposal was received in response to the RFP. Grant contract documents for that proposal are under development and, upon completion, will be submitted to the Governor and Executive Council for approval.

The operational projects are described in detail in the "Project Case Studies" section of this report. The grant award summaries to follow are provided for projects that were awarded grants but were not yet operational in 2019.

Laconia Area Community Land Trust, Inc. – Pine Hill

In 2016, Laconia Area Community Land Trust, Inc., d/b/a Lakes Region Community Developers (LRCD) received funding to conduct a solar feasibility study of their multifamily rental housing portfolio. Of the fifty buildings evaluated, six of LRCD's Pine Hill properties were determined to be feasible for rooftop solar. As proposed, the Pine Hill Solar project consists of the installation of rooftop solar arrays on six duplexes, each unit with between two and four bedrooms. The energy generated from the PV systems on each building power the units in that building. The solar systems became operational in December of 2019 and LRCD increased monthly tenant rent by $20 to cover debt service costs and assumed full responsibility of the twelve residents' electric bills. Before program implementation, tenants paid their own electrical costs. As tenants' monthly electric bills were consistently over $20, this model provides the LMI residents with net positive monthly savings and does not impact their eligibility for other assistance programs.

White Rock Cooperative Estates

As proposed, the White Rock Cooperative Estates model is structured to maximize direct benefits to resident-owned community residents by providing community ownership of a ground-mounted solar system. The project is currently in the development stage. The project developer will design and build the community solar project. Grant funds will be used to pay for the installation of the solar array, allowing White Rock Cooperative Estates to own the array outright at the commencement of operation. Direct resident-owned community ownership will provide additional benefits to the LMI residents, including renewable energy certificate (REC) ownership and full net metering credit compensation for the energy produced.

Under New Hampshire's group net metering program, White Rock Cooperative Estates will qualify as a "host" and receive monetary compensation for all excess energy generated. White Rock Cooperative Estates, in turn, will provide direct benefits to its "members" (i.e., participating cooperative residents) in the form of lot rent reductions. By reducing lot rents, the LMI residents reduce their monthly expenses and avoid any unintended consequences to any other public assistance received.

Gaslight Village Cooperative Inc.

After selection for a grant, contracting, and approval by the Governor and Executive Council, this project proposal was withdrawn by Gaslight Village Cooperative Inc., in part due to the inability to negotiate a payment-in-lieu-of-taxes agreement with the Town of Tilton. As proposed, the Gaslight Village Cooperative Inc., model was expected to maximize direct benefits to LMI resident-owned community residents through a power purchase agreement where an investor leveraged tax incentives, owned the project for the first five years, and sold the generation to resident-owned community residents for $0.0530 per kWh. After two years, the energy rate was to increase by 2 percent annually. The project would have registered to participate in New Hampshire's group net metering program.

Through group net metering proceeds, and after purchasing the electricity based on the power purchase agreement terms, Gaslight Village Cooperative Inc., would have provided direct benefits to its members (i.e., participating cooperative residents) in the form of lot rent reductions. By reducing lot rents, the LMI residents would reduce their monthly expenses and avoid any unintended consequences to any other public benefits received. After five years, the Gaslight Village Cooperative Inc. would have had the option to purchase the project at fair market value. Resident-owned community ownership would provide additional benefits to the residents, including REC ownership and full net metering credit compensation for the energy produced.

Project Case Studies

Since its inception in 2018, the LMI Program has issued a request for proposals annually for community solar PV projects providing direct benefits to LMI residential electric customers. Since the Program began, the Commission has awarded six grants for projects utilizing various project models as highlighted in the previous section.

Three projects became operational in the winter of 2018; and each provided the Commission with an annual report in February 2020 containing data for one full year of operation.

Through annual reporting from grant recipients, the Commission gained insight into the implementation and effectiveness of each program model; multifamily rental housing model, community solar subscription model, and manufactured housing community solar model. The data provided in the annual reports and follow up discussions with grant recipients are the sources for the analysis of annual costs, direct benefits, non-monetary benefits, and observations for each project presented in this section. Given the unique characteristics of each model, the analysis, and specific costs and benefits data vary by project.

Lakes Region Community Developers: Multifamily Rental Housing Model

Project Overview and Model

Lakes Region Community Developers (LRCD) created a project model that maximizes direct benefits to LMI residents in the Avery Hill community. The community consists of six multifamily buildings.[11] Each duplex contains two 2- or 3-bedroom, income-restricted rental housing units each with its own retail electric meter.

A property management company conducts income qualification for residence and annual income verification, which is required for continued residence, thereby ensuring that 100 percent of the residents continually meet the eligibility requirements for LMI households as defined in statute.

Prior to applying for grant funding, LRCD conducted a solar feasibility study and determined that the roofs of six duplexes in the Avery Hill community were suitable for solar installations. Each roof was

Avery Hill Community Duplexes Suitable for Solar

[11] The Avery Hill community consists of seven buildings, but only six of the building roofs were suitable for solar.

structurally sound with minimal shading, and optimal solar orientation and roof pitch.

On June 20, 2018, this project received the approval of the Governor and Executive Council, and LRCD received a $150,000 grant from the Renewable Energy Fund's LMI Program. LRCD received additional grant funding from other non-profit organizations; however, additional capital was required. LRCD secured a loan for the balance with an interest rate of 3 percent, for a 10-year term.

This community solar project included twelve, single inverter, 5 kW AC solar arrays installed on each of the six multifamily building roofs and interconnected to each of the twelve unit's residential electric meters. Each system net meters generation to reduce energy consumption behind-the-meter and earn a credit for any surplus energy produced.

The solar arrays became operational in the fall of 2018, and each was certified as eligible to generate New Hampshire Class II (New Solar) RECs. During the first year of operation, the systems in cumulative generated a total of 74,280 kWh, and 74 Class II RECs.

Behind-the-meter solar installed on Avery Hill multifamily rental housing buildings.

Under the current net metering tariff for small systems, generation used behind-the-meter offsets the tenant's demand for electricity. Each billing cycle, the distribution utility determines the "net" purchases by subtracting the energy exported to the grid from the energy imported. If more energy was imported, the net kilowatt-hours are used to assess the Energy Supply Charge, the Distribution Charge, and the Transmission Charge. If there was excess generation exported, the net kilowatt-hours are converted to a monetary bill credit equal to the sum of

the Default Energy Service charge, the Transmission Charge, plus 25 percent of the Distribution Charge. All kilowatt-hours purchased from the supplier are assessed certain, non-bypassable charges on the bill, namely the Stranded Cost Recovery Charge, and the System Benefits Charge.

Prior to the installation of the solar arrays, residents paid their electrical costs. Under this project, LRCD assumed full responsibility of the twelve residents' electric bills and increased monthly rent by $20 to cover debt service costs. This approach provided the LMI residents with net positive monthly savings and no impact to their eligibility for other assistance programs.

In the first year of the solar array's operation, Avery Hill's LMI residents received net positive monthly savings with no impact on their eligibility for other income-restricted assistance programs.

Annual Costs

Under this project model both the LMI participant and the system owner incur minimal annual expenses. For LMI participants, with the assumption of the electric bills by LRCD, monthly rent increased by $20 per housing unit. This equates to an additional cost of $240 per year to each housing unit regardless of number of occupants or electricity usage. LRCD paid the electric bills for the twelve housing units. In calendar year 2019, with behind-the-meter solar, the net electric bills for all twelve units totaled $686. LRCD's annual expenses related to the solar arrays included loan payments for debt service on the loan; totaling $3,072 in 2019.

The City of Laconia does not offer an exemption from local property taxes for solar installations. Accordingly, the solar systems on the properties are assessed taxes for these systems which are considered an "extra feature."

Annual Direct Benefits

With the installation of the solar arrays, the property and system owner, LRCD, assumed the costs of electric utility bills for the twelve LMI households. Based on historical billing data from a year prior, estimated annual savings per housing unit ranged between $312 and $1,236, **an average of $645 annually** after factoring in the rent increase of $240 per year.[12] On average, LMI residents realized a 70 percent savings on their electricity costs, after taking into consideration the rent increase.

"The Avery Hill solar project meets our goals for sustainability on several levels. First, it provides our community with sustainable energy production. But as importantly, it allows our tenants financially sustainable housing, and LRCD to remain sustainable to continue to provide housing and services for existing and future tenants."

Sal Steven-Hubbard,
Real Estate Development Director LRCD

[12] Tenant turnover necessitates calculating benefits utilizing a rolling average of electric bills and energy usage.

LRCD received additional rental income equal to $2,880, offsetting the majority of the costs of loan debt repayment.

The solar systems were certified as eligible to generate New Hampshire Class II RECs. Collectively, the solar arrays produced 74 RECs, and LRCD has the option to sell the RECs in the regional compliance market creating additional revenue.

Non-monetary Benefits

The LRCD project model removed the economic barriers inhibiting the adoption of renewable energy by LMI residents; and it made clean, renewable energy accessible to LMI residents that do not own their own home. The LRCD project has the additional non-monetary benefit of breaking the rental property barrier by enabling renters in multifamily housing to take advantage of the benefits of solar.

Residents of Avery Hill receive many non-monetary benefits from this community solar project. Due to the nature of the project model, where LRCD owns the solar arrays and has eliminated tenant electric bills, there is no negative impact on a tenant's eligibility for other assistance programs. Tenants also have more predictable monthly expenses by avoiding the uncertainty of fluctuating monthly electricity bills.

Observations

- Avery Hill is an income-restricted community requiring income qualification at the time of initial application to rent and ongoing annual income verification; therefore, there is no cost to the program for income verification.
- This model reduces some of the administrative expenses associated with LMI community solar such as income verification, participant recruitment, and participant enrollment.
- With the installation of this project and receipt of the grant, LRCD was able to cover the cost of all tenant electric bills and pay the annual loan principle and interest, for a combined cost that was slightly higher than the annual cost of the rent increase to tenants.
- Interconnecting the solar systems to individual residential meters allows for behind-the-meter usage of the generation; thereby directly offsetting load.
- LRCD is committed to environmental sustainability and has incorporated clean energy practices across all lines of business. This business philosophy assists in attracting and retaining tenants.

NH Solar Shares LLC: Community Solar Subscription Model

Project Overview and Model

Artist rendition of NH Solar Shares Community Solar Garden and Solar Nature Trail.

NH Solar Shares LLC (Solar Shares) is a not-for-profit charitable organization that established a program to build community solar to provide direct benefits to local LMI families. Solar Shares partnered with the local distribution utility, New Hampshire Electric Cooperative (NHEC), to design and implement a program that provides a "solar share" credit on LMI participants' monthly electric bills.

This credit reduces each LMI participant's monthly electric bill by $25 with no subscription fee or cost to the LMI participant.

A household may participate in the program for a period of two years, at the end of which the participant has the opportunity to "pay forward" the benefit to another income-qualified household. Limiting participation to two-years and paying forward, allows the project a wider reach to benefit more families.

Annually, the on-bill credit is determined based on projected solar production with the goal of 85 to 100 percent of generation revenue benefiting participants; the on-bill credit remains consistent throughout the year. Verification of income eligibility is demonstrated by participation in the Energy Assistance Program, Fuel Assistance Program, or proof of residence in subsidized housing; thereby ensuring that 100 percent of participants meet LMI income eligibility criteria as defined in statute. A part-time program coordinator provides program administration.

On June 20, 2018, this project was approved by the Governor and Executive Council and received $86,721 from the Program. Solar Shares secured additional project financing from grants, individual donors, and business donations including the partner utility. Securing all necessary capital in advance of breaking ground avoided the need for long-term loans or third-party investors.

The community solar project, or solar picnic area, was installed at an ice cream stand in Plymouth, on land leased to Solar Shares at no charge. The project includes three ground-mounted arrays and two picnic pavilion "rooftop" arrays.

In total, the project consists of ninety 320-watt direct current (DC) solar panels, with a 280-watt micro inverter installed behind each panel for a total capacity of 25.2 kW AC. Program participants assisted with preparing the

build site, landscaping, and helped to design the Solar Nature Trail.[13] This trail traverses the ground-mount arrays and has educational signage displayed with information about solar energy and the site's environmental features such as two newly planted chestnut trees. The trail and educational material was developed to instill a sense of community ownership and engagement.

NH Solar Shares first completed project.

The solar array became operational on October 29, 2018, and was certified as eligible to generate New Hampshire Class II RECs. During the first year of operation, the system generated a total of 31,400 kWh, and 31 Class II RECs.

The Solar Shares model is designed to be replicated. The intent of this first community solar installation is to act as a pilot, or demonstration, project. Since receiving this grant funding, Solar Shares has built a second community solar project, in Warren, building on the model to benefit ten additional LMI households.

Annual Costs

Under this project model, there are no upfront or annual costs to the LMI participants. Other than income eligibility, the only requirement is that each participant take part in at least one energy education workshop. The workshop provides information and tools to further lower participant's electricity costs.

Solar Shares hired a part-time project coordinator to confirm income verification, and conduct recruitment, outreach, and ongoing participant administration. The project coordinator also manages energy educational training, schedules volunteers for on-site workdays, and manages on-bill credits with the utility. Annual payroll costs associated with this position totaled $3,175 for 2019 that was not supported by generation revenue. Other annual costs associated with the program are array site liability insurance, which is under $100, and site maintenance and landscaping.

Annual Direct Benefits

During calendar year 2019, the ten participating households[14] each received a $25 monthly on-bill credit, **$300 annually.** In total, the project provided $3,000 of direct benefits to LMI households in 2019. The total annual

[13] The Solar Nature Trail is still under construction and is expected to be complete in September, 2020.
[14] Ten households participate monthly; however, during 2019 a total twelve households participated over the course of the year due to changes in residency.

benefits to all participants equates to more than 90 percent of the solar production value.

More specifically, Solar Shares executed a power purchase agreement with NHEC setting the net metering rate and REC price for 10-years. The net metering credit for generation is used to provide on-bill solar share credits during the subsequent quarter. This project became operational in quarter four of 2018. In 2019, the project's net metering revenues totaled $2,835. The 31,400 kWh generated in calendar year 2019 were valued at $3,213.62.[15] The net metering credit is calculated quarterly and the generation credit is used to fund the next quarter's on-bill credit. Due to this quarterly delay in payment receipt, the revenue received in 2019 and the generation value for 2019 differ.

The solar system was certified as eligible to generate New Hampshire Class II RECs. Cumulatively, the solar arrays produced 34 RECs, which Solar Shares has the option to sell in the regional compliance market creating additional revenue.

Non-monetary Benefits

Involving the participants, community, and stakeholders in the program development, project site upkeep, solar education workshops, Solar Education Trail, and various stakeholder gatherings, has instituted a sense of community involvement, engagement, education and outreach for LMI participants. Enabling participants to transfer their solar share to another income qualified household after two years of participation also lends a unique element to this model.

The Solar Shares program model removes the economic barriers inhibiting the adoption of renewable energy by LMI community residents by providing subscriptions at no cost. It also makes clean, renewable, energy accessible to LMI residents that do not own their own home or do not have optimal solar exposure. Participants' electric bills are reduced by an on-bill credit, resulting in no negative impact on a participant's eligibility for other assistance programs. This credit kept households current on their electric bill payments; reducing arrearages.

> *"This credit made the difference, we are told, on keeping their family current on their electric bill. Plus taking part in Solar Shares provides participants with a feeling of pride that they too were doing their part for the environment. Out of ten shareholders for a year, there were only three occasions where a monthly bill was late."*
>
> *Sandra Jones*
> *Manager, NH Solar Shares*

During the first year, there were only three occasions (out of 120 opportunities) in which a monthly bill payment was late.

[15] Direct benefit calculations based on calendar year revenue or calendar year generation both result in 90% to 100% of the solar generation value directly benefitting LMI participants.

Observations

Solar Education Trail

- This project model received nation-wide recognition through grant assistance received from the United States Department of Energy's Solar in Your Community Challenge. The model closely resembles traditional community solar subscription models currently being deployed across the country, but is unique in offering a no-fee subscription for LMI participants.
- This pilot project fostered collaboration between the local utility, community members and program administrator. The local utility assisted in developing the concept, employees volunteered for the project, and the utility entered into a power purchase agreement even though the project is relatively small. Community members and LMI participants assisted in workdays prepping the build site before hand and following the construction. Ongoing fundraising is necessary to expand the program's reach by building additional community solar projects.
- The project was designed to be replicable, accordingly, economies of scale and improved efficiencies should be achieved as more projects are developed. Furthermore, expenses should decrease on a per project or per participant basis.
- Income verification is confirmed by the household providing proof of current enrollment in a state or federal assistance program; thereby eliminating third-party fees and reducing administrative overhead for the Solar Shares program.
- System operations and monitoring was prepaid for ten years. This is significant for an off-site array to ensure system performance is monitored and a technician can quickly respond to system issues.

Mascoma Meadows Cooperative: Manufactured Housing Community (ROC) Model

Solar located across the street from Mascoma Meadows.

Project Overview and Model

The Mascoma Meadows Cooperative, Inc. (Mascoma), project model is structured to provide direct benefits to LMI and non-LMI residents of resident-owned communities. Resident-owned communities are neighborhoods of manufactured homes, based on a cooperative ownership structure, where every household in the community participates in the ownership of the underlying property. The project developer designed, built and will own the community solar project for a minimum of five years allowing the developer's investor to leverage federal tax credits to lower the overall cost of the project. After five years, Mascoma has the option to purchase the solar system at fair market value using low interest financing from the New Hampshire Community Loan Fund.

Mascoma Meadows and Proposed Solar Location

With the potential for future ownership, Mascoma can provide increased benefits to the residents with increased compensation for energy produced.

Vermont Law School Energy Clinic (VLS) designed and implemented this resident-owned community model, with additional support and guidance from ROC-NH™ and a law firm. *Pro bono* legal services and technical support were also provided to the manufactured housing community. Financing for the project during the first five years is structured as a power purchase agreement through which participating Mascoma residents are able to purchase electricity from the solar array for a fixed price per kilowatt-hour of $0.0335 for the first two years. After two years, the energy rate will increase 2 percent annually.

Mascoma Board members and residents at the ribbon cutting ceremony.

Under New Hampshire's group net metering program, Mascoma is the "host" and receives monthly payments from the utility for the array's generation at a rate that is higher per kWh than the power purchase agreement's kWh price. Mascoma, in turn, pays the project owner according to the terms of the power purchase agreement and provides direct benefits to its participating residents in the form of lot rent reductions from the balance. By reducing lot rent, the LMI residents reduce their monthly expenses and avoid any unintended consequences to any other public benefits received. Income verification is performed by requiring all participating residents to complete an annual income survey, which is submitted to ROC-NH™ and remains anonymous. Resident-owned community residents may participate regardless of LMI income eligibility. Of the 45 households participating in the community solar project, 34 are LMI.

On June 20, 2018, this project received the approval of the Governor and Executive Council and Mascoma received a $168,000 from the LMI Program.

This community solar project was installed on donated land. The array consists of 384 panels each 345-watts, for a total of 132.48 kW DC and two 50 kW inverters for a total capacity of 100 kW AC. The system became operational on December 21, 2018, generating a total of 149,618 kWh in calendar year 2019 and providing Mascoma residents net positive direct benefits in the form of lot rent reduction and accrued savings to put towards possible property tax expenses.

The solar array location is adjacent to Mascoma Meadows and the residents received net positive directs benefits in the form of lot rent reductions.

Annual Costs

With this LMI community solar model the resident-owned community (Mascoma) incurred costs. Under the power purchase agreement between Mascoma and the third-party system owner, Mascoma paid $5,178 to the third-party system owner for energy generated. The payments were made from the monthly net metering credits paid by the utility to Mascoma. None of the community residents were required to make any payments for participating in the program.

Additionally, there were no administration or accounting costs associated with the project in 2019 because VLS continued to provide *pro bono* legal and technical support.

In 2020, Mascoma anticipates that it may have to pay increased property taxes to the City of Lebanon related to the community solar project. Mascoma will use the undistributed net metering credit balance from 2019 to help pay any increase in property taxes. After any necessary tax payment, Mascoma will distribute the remaining balance as reductions in lot rent equally among participating members.

Annual Direct Benefits

Overall project generation netted $17,621 in net metering generation payments from the utility. After subtracting the power purchase agreement costs, the net revenue to Mascoma was $12,443. Participants began receiving lot rent reduction benefits beginning in April, rather than January, to ensure funding was available to enable equal, and consistent, monthly lot rent reductions. Beginning in April 2019, each of the 45 participants, 34 of which meet the statutory definition of LMI, received a **$20 monthly lot rent reduction equating to an approximate savings of 5 percent in lot rent.** Each participant received lot rent reductions equal to $180 in 2019. In total, participating residents received $8,100 in community-wide lot rent reductions for the year.

The balance of $4,343 will be distributed to group members in the form of a one-time special lot rent credit, or used to pay the increased property tax assessment on the third party owned system.

The solar system was certified as eligible to generate New Hampshire Class II RECs. The solar array produced 149 Class II RECs in 2019. The system owner has the option to sell the RECs in the regional compliance market creating additional revenue.

> *"The Mascoma Meadows project has not only brought direct benefits to its members through lot rent reductions and reduced carbon footprint, it has also inspired other communities like it to explore the possibility of renewable energy in their community. One barrier to LMI solar is the perception that solar, and other renewables, are a luxury for wealthy communities only. The Mascoma Meadows project is helping to break down this barrier."*
>
> *Jeannie Oliver*
> *Staff Attorney, Assistant Professor*
> *Vermont Law School*

Non-monetary Benefits

Community, or shared solar programs, such as the resident-owned community model, can enable multiple electric customers to receive benefit from a single solar system through the sharing of the electricity generated by that shared system. The location of the array within the community provides residents with a physical connection to the solar array that is providing the residents with lot rent reduction benefits. Participants' lot rents are reduced resulting in no impact on a participant's eligibility for other assistance programs.

The resident-owned community model removes the economic barriers inhibiting the adoption of renewable energy by LMI residents through third-party ownership, whereby the resident-owned community did not have to raise capital to develop the project. Mascoma also continues to receive *pro bono* legal services and assistance to administer the program.

Energy efficiency training and tips were presented during Mascoma's annual community meeting further promoting energy savings and renewable energy.

Observations

- The model was designed so that the third-party owner could take advantage of the federal investment tax credit, leveraging tax incentives which were up to 30 percent of the total project costs.
- Since Mascoma's project, additional resident-owned community projects have been proposed, each incorporating lessons learned as the model evolves. Since awarding this grant to the third-party owner, the Renewable Energy Fund has awarded funding to two additional resident-owned community projects. By fully funding the development of one resident-owned community project through the Renewable Energy Fund, the model is simplified and residents realize greater benefits beginning day one of operation.
- The group net metering arrangement and power purchase agreement add complexity with record keeping and reporting that requires a significant time commitment from VLS. VLS and ROC-NH™ have developed guidance documents to provide to participating resident-owned communities to ensure that the process is easier and better coordinated in future projects.
- Interconnection cost estimates cannot be provided by the utility until a complete interconnection application is filed. There is a cost associated with submitting the interconnection application and LMI communities do not have, or want, to expend monies until there is greater certainty about grant funds being awarded and project feasibility. Higher than anticipated interconnection costs can impact overall project viability and benefits to residents.
- The City of Lebanon is considering assessing property taxes on third party owned solar arrays. VLS is challenging the legality of such an assessment, but if the challenge is unsuccessful, participants' direct benefits could be impacted significantly by payment of increased property taxes.
- Annual revenue reconciliation was proposed to occur each year in the month of January; however, in January the solar array is generating less electricity and revenue due to limited sunlight hours, possibly causing lot rent reductions to exceed the revenue available for distribution. Going forward, the annual reconciliation will occur during the summer months to help ensure that the resident-owned community is not paying out more in lot rent reductions than it has in reserve. If the resident-owned community decides to purchase the solar array, a portion of the net metering revenues will need to be retained for possible future inverter replacement, instead of distributing all of it as lot rent reductions.

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