

Community Solar Opportunities for Low to Moderate Income Households in the Southeast

North Carolina Clean Energy Technology Center

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About the NC Clean Energy Technology Center

The North Carolina Clean Energy Technology Center is a UNC System-chartered Public Service Center administered by the College of Engineering at North Carolina State University. Its mission is to advance a sustainable energy economy by educating, demonstrating, and providing support for clean energy technologies, practices, and policies. The Center provides service to the businesses and citizens of North Carolina and beyond relating to the development and adoption of clean energy technologies. Through its programs and activities, the Center envisions and seeks to promote the development and use of clean energy in ways that stimulate a sustainable economy while reducing dependence on foreign sources of energy and mitigating the environmental impacts of fossil fuel use.

About the Community Solar for the Southeast project

The Community Solar for the Southeast project is focused on making solar more affordable and accessible through shared solar projects developed by electric cooperatives and municipal utilities across the Southeast. The project aims to lead a stakeholder process with public power utilities to determine solutions needed to increase community solar project development. The team will provide technical assistance to analyze, design, and implement community solar projects.

The project is led by the NC Clean Energy Technology Center with partners, including: Rocky Mountain Institute, Fayetteville Public Works Commission, North Carolina Justice Center, National Rural Electric Cooperative Association, Roanoke Electric Cooperative, Strata Solar, EcoPlexus, Geenex, and GreenLink. The project is funded by the U.S. Department of Energy Solar Energy Technologies Office under Solar Energy Evolution and Diffusion Studies-2-State Energy Strategies (SEED2-SES).

Please contact communitysolar@ncsu.edu for more information.

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Prelude

This report was developed following a workshop held on December 11, 2017 in Raleigh, North Carolina to explore the opportunities and barriers to making community solar available for low income households. The North Carolina Clean Energy Technology Center and the North Carolina Justice Center hosted *Identifying Benefits, Barriers, and Solutions to Low-Income Community Solar for Cooperative and Municipal Utilities in the Southeast*, an in-person, half-day workshop with 38 attendees from 24 different organizations.

The workshop participants represent a broad range of interests needed to address the challenges and opportunities for low to moderate income (LMI) community solar development in the Southeast. Workshop participants included:

- *Municipal and cooperative utilities and umbrella organizations:* ElectriCities of North Carolina, Randolph Electric Membership Cooperative, Roanoke Electric Cooperative, and Town of Apex Utilities
- *Low income advocates and attendant organizations:* Chatham Habitat for Humanity, North Carolina Community Action Association, North Carolina Housing Finance Agency, and North Carolina Justice Center
- *Clean energy advocacy organizations:* Coalition for Community Solar Access, Environmental Defense Fund, North Carolina Interfaith Power and Light, NC Solar Now, North Carolina Sustainable Energy Association, and Sierra Club
- *Government and researchers:* City of Raleigh, EQ Research, North Carolina Clean Energy Technology Center, North Carolina Department of Environmental Quality, U.S. Department of Energy Solar Energy Technologies Office
- *Solar developers, legal counsel, and financial institutions:* Cypress Creek Renewables, Self Help Credit Union, Smith Moore Leatherwood LLP, Southern Environmental Law Center, and Strata Solar

The workshop included several speaker presentations and breakout group discussions focused on answering three primary questions:

- 1) What can utilities and solar developers do to bring community solar costs down?
- 2) What program designs best enable low-income participation in community solar programs?
- 3) How can collaboration between utilities, developers, and low-income advocates and service providers be improved?

The report authors wish to recognize and thank the speakers and participants for their contribution. This report is based on the information shared at this workshop.

Executive Summary

Community solar projects are typically ground-mounted photovoltaic (PV) systems that are often smaller in size than other utility-scale solar projects. These projects can offer an opportunity for those who rent their homes or have shaded roofs to take advantage of solar energy, as many of the siting requirements associated with rooftop solar installations are removed.

The Southeast has some of the highest rates of poverty in the U.S, while three states in the region also rank among the top states for installed utility scale projects.^{1,2} This example highlights both the challenges and opportunities for community solar across the region. Electric cooperatives and municipal utilities are uniquely positioned to lead the way in providing low-income residents with access to community solar. Within the nine states covered by the Community Solar for the Southeast project, there are 472 electric cooperatives and municipal utilities, with over 50 community solar projects in place or under consideration. However, we are not aware of any projects specifically serving low-income households (defining low-income as those with incomes below 80% of area median income).

For community solar projects serving underrepresented, low-income residents, subscription costs and associated benefits are of significant importance. In order to enable low-income participation, these projects should offer an immediate savings on monthly electricity bills. To reduce upfront costs in order to support low-income community solar access, the following can be considered:

1. Solar developers and utilities may voluntarily agree to lower power purchase agreement rates³ in order to reduce community solar participation costs for low-income residents.
2. The utility can elect to credit customers for the output of the community solar project at the retail rate or the value of solar, a rate that can include demand charges and other considerations, rather than an avoided cost rate, to generate more immediate savings for subscribers
3. A two-tiered subscription structure, whereby participants voluntarily agree to pay more for community solar shares, may be utilized to offset costs for lower income participants.
4. Voluntary contributions, where utility customers donate monthly through bill roundup programs or other utility lead charitable giving opportunities that help reduce electric bills for customers in need, can be expanded to include reductions for community solar subscriptions. Refer to Community Solar Low Income Assistance Programs at Roanoke Electric Cooperative's Roanoke Center for more information on voluntary contributions.⁴
5. Utility shut off funds and federal assistance programs, such as weatherization, housing and low-income home energy assistance programs, can be examined for opportunities to provide financial support for community solar for low-income households. Refer to 2019

¹Tracey Farrigan, *Geography of Poverty*, <https://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/geography-of-poverty.aspx>, USDA, March 2017

² *Top 10 Solar States*, <https://www.seia.org/research-resources/top-10-solar-states-0>, SEIA, 2019

³Herman K. Trabish, *Top 10 Solar Utilities See Growth Through Declining Prices, Favorable Policies*, <https://www.utilitydive.com/news/top-10-solar-utilities-see-growth-through-declining-prices-favorable-polic/417990/>, Utility Dive, April 2016

⁴ <https://www.roanokeelectric.com/roanoke-center/donate/>

Weatherization Assistance Program funds providing community solar benefits to qualified low income resident through three North Carolina utilities.⁵

6. Electric cooperatives and municipal utilities can consider group bids, developing larger solar projects, and donating project land to reduce costs.
7. Access to inexpensive capital to pay for the construction and set up of a community solar project, as well as a willingness on the parts of both the developer and the utility to have a lower internal rate of return, can support lower cost solar access for low-income households.
8. Leveraging additional value streams from battery storage systems can be considered to make the project more cost effective.

A community solar program that is “purpose built” to include a percentage of low income residents may be more successful in attaining low income household participation than projects already underway. There are more options to explore to reduce the upfront costs to facilitate the involvement of community members with limited means. However, no matter at what part of the community solar program process, there are advantages in bringing together utilities and energy related government programs and initiatives with low income advocates and environmental nonprofits. Each entity has a unique perspective and expertise that, upon collaboration, can enhance the potential for community solar to serve a broader economic and environmental justice movement.

Background: Low-Income Households in the Southeast

The southern region of the U.S. has the highest rates of poverty in the country, especially the rural regions of the South. According to the U.S. Department of Agriculture (USDA), 20.5% of non-metro residents live in poverty, compared to other regions of the country where rural poverty rates range from 13.1% to 16.2%

Moreover, residents of the South suffer from more persistent poverty than their counterparts in other U.S. regions. In Figure 2, the USDA’s Economic Research Center illustrates counties identified as persistently poor.

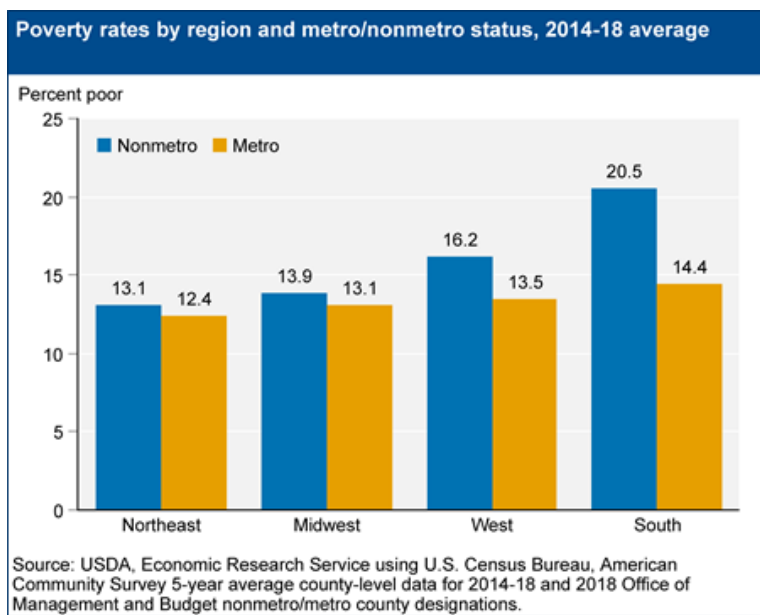
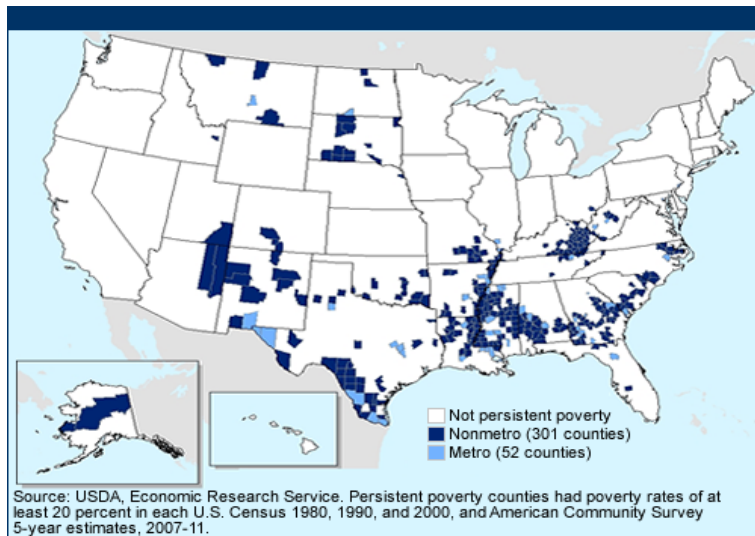


Figure 1: Poverty rates by region and metro/nonmetro status

⁵ North Carolina Weatherization Assistance Program announces Community Solar Pilot grant recipients. <https://deq.nc.gov/news/press-releases/2019/10/15/north-carolina-weatherization-assistance-program-announces-community>



Persistently poor counties are defined as those with 20% or more of their populations living in poverty over the last 30 years (as measured by the 1980, 1990, and 2000 decennial censuses and 2007-2011 American Community Survey 5-year estimates).

Figure 2. Persistent poverty counties

Federal guidelines in 2020 define poverty for a household of four as having a collective annual income of \$26,200⁶ or below as indicated in Figure 3 below

HHS POVERTY GUIDELINES FOR 2020

The 2020 poverty guidelines are in effect as of January 15, 2020

The [Federal Register notice for the 2020 Poverty Guidelines](#) was published January 17, 2020.

2020 POVERTY GUIDELINES FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA	
PERSONS IN FAMILY/HOUSEHOLD	POVERTY GUIDELINE
For families/households with more than 8 persons, add \$4,480 for each additional person.	
1	\$12,760
2	\$17,240
3	\$21,720
4	\$26,200

Figure 3. U.S. Dept. of Health & Human Services 2020 Poverty Guidelines

⁶ <https://aspe.hhs.gov/poverty-guidelines>

In 2016, over 1.5 million North Carolina residents lived in poverty.⁷ Furthermore, those living in poverty spend a significant amount of their incomes on utilities, including electricity and heating. In North Carolina, households living below 50% of the federal poverty level spent 33% of their income on utilities, while those living up to the federal poverty level had an 18% home energy burden rate.⁸

Energy burden refers to the percentage of household income spent on home energy bills. For example, a household of four earning an income of less than \$12,500 is spending \$3,524 – 29% of their income – on utilities, while a family earning \$24,300 is spending 16% or \$3,888 on utilities. Lower income households typically have higher energy burdens, highlighting the importance of opportunities for these customers to reduce their electric bills.

Background: Community Solar

Community solar, also known as solar gardens or shared solar, offers an opportunity for those who rent their homes, have roofs unsuitable for solar, or without sufficient capital to invest in systems to take advantage of solar energy. Community solar also provides an option for those who would rather not go through the labor or expense of purchasing their own solar photovoltaic (PV) systems. Utility led community solar can provide opportunities for businesses and nonprofits to partake as well.

Community solar projects are generally ground-mounted PV systems and are often smaller than utility-scale solar projects. They are often small enough to have more siting flexibility, allowing electric cooperatives and municipal utilities to better take advantage of localized benefits offered by these projects, but large enough to achieve economies of scale.

A community solar program allows utility customers to sign up to receive bill credits for a portion of the output of the solar PV system. In addition to, or instead of, having customers sign up to participate, a utility could also passively subscribe a portion of the community solar project to a segment of its customer base or allocate the benefits across all of its customers. Some programs require an upfront purchase of a share of the PV system, but many others offer a no-obligation monthly subscription in discrete kilowatt or kilowatt-hour blocks.

The nine states served by the Community Solar for the Southeast project include a range of existing community solar projects, interest levels, and experience. A summary of electric cooperative (“co-ops”) and municipal utility (“munis”) community solar projects and policies is provided in the Community Solar Policy Landscape in the Southeast report.⁹

⁷Alfred Ripley, *Community Solar in the Southeast for Low Income Customers*, <https://nccleantech.ncsu.edu/wp-content/uploads/Ripley-Alfred-NCJC-Community-Solar-Presentation.pdf>, NC Justice Center

⁸ North Carolina Clean Energy Plan (draft 8.22.19) Supporting Document Part 3 Electricity Rates & Energy Burden, pg. 14 <https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/3.-Electricity-Rates-and-Energy-Burden-draft-8.22.19.pdf>

⁹ *Community Solar Policy Landscape in the Southeast*, https://nccleantech.ncsu.edu/wp-content/uploads/State-Profiles_Community-Solar-for-the-Southeast.pdf, NCCETC, August 2017

At the state level, community solar development is often driven by policies, such as virtual net metering and other community solar legislation. At electric cooperatives and municipal utilities, community solar projects are often driven by the desire to meet growing customer demand for clean energy, as well as the cost-effectiveness of solar PV projects. These projects can be owned and developed by an electric cooperative, a municipal utility, or a third-party developer. While there are a number of existing community solar projects across the Southeast, there are none the authors are aware of that exclusively focus on low or low to moderate-income (LMI) populations. However, a growing number offer benefits to LMI subscribers.

Community Solar for Low to Moderate Income (LMI) Households

When designing a community solar project to reflect local and regional differences, it may be beneficial to define low to moderate income households using the U.S. Housing and Urban Development's (HUD) Area Median Income (AMI) rather than the Federal Poverty Level guidelines, because the HUD AMI takes regional differences into account, whereas the Federal Poverty Level guidelines are set uniformly based on national averages.

For the purpose of low-income solar PV access, the Interstate Renewable Energy Council (IREC) identifies "moderate-income" earners as making 120% of HUD's Area Median Income (AMI), and "low-income" earners as making 80% of AMI.¹⁰ Electric cooperatives and municipal utilities can also incorporate socioeconomic and environmental factors into low-income eligibility when developing a program to serve these residents. Examples of socioeconomic and environmental factors could include factors such as whether or not the potential participants are retired, whether or not the residence is in a flood or fire prone area, and the type of housing the potential participant lives in (for example, a mobile home or multi-family housing). Other criteria could be if a subscriber had been a beneficiary of or is eligible for federal weatherization and/or utility bill assistance programs.

When designing a program to support low-income residents, it is recommended that the program policy goals and metrics for customer participation rates be as specific as possible. This specificity will help garner buy-in from all involved stakeholders (including low income advocates, project developers, lenders, utilities, and program administrators), and to offset costs for lower income participants, help determine the appropriate level of assistance and/or financial tools needed to achieve the goals set forth.¹¹

Income limits for public assistance are based on median family incomes adjusted for family size. In 2020, HUD's North Carolina Family AMI is \$70,000 and Very low income (VLI) limits for four-

¹⁰Shared Renewable Energy for Low- to Moderate-Income Consumers: Policy Guidelines and Model Provisions, <https://drive.google.com/file/d/1E4RuW6Bi5muxvJlwEjxvTeBh1kKmqqo5/view?usp=sharing>, IREC

¹¹ Shared Renewable Energy for Low-to-Moderate Income Customers: Policy Guidelines and Model Provisions, <https://irecusa.org/publications/shared-renewable-energy-for-low-to-moderate-income-consumers-policy-guidelines-and-model-provisions/>, Page 14, IREC, March 2016

person families are calculated as 50% of the Family AMI, with adjustments for high and low cost areas.¹² HUD's 2020 Estimated Median Family Incomes for 2020 includes AMI figures for every state.¹³ Using North Carolina as an example:

- If an electric cooperative or municipal utility in a metropolitan area wants to serve VLLs in its community, this would include households with an annual income of \$37,100.
- If an electric cooperative or municipal utility wants to serve low-income customers in a non-metropolitan area, using 80% AMI for low-income and adjusting for rural areas, this would include households with an annual income of \$46,480 or less.

A key consideration of serving low-income households is that these households have a very limited amount of disposable income, underscoring the importance of providing an immediate and ongoing savings on utility bills. It is unlikely that low-income customers will be able to participate in a community solar program if it requires participants to pay an additional fee on their electric bills. While some existing community solar projects in the Southeast offer immediate savings to subscribers, many existing program do not. A “purpose built” community solar project, designed from the start to serve low-income customers, can make it easier to ensure success because it can allow for more options to reduce project costs and therefore enable more participation from those with limited means. However, there are also opportunities for utilities and low-income stakeholders to make adjustments to existing community solar projects that will improve the ability to serve these customers.

Opportunities

Power Purchase Agreement (PPA) Rates (for new projects only)

A power purchase agreement (PPA) is a financial agreement in which a developer arranges for the design, permitting, financing, and installation of a solar energy system at little to no upfront cost. The developer sells the power generated by the system to the utility at an agreed upon rate, typically for a term of 10 to 25 years.¹⁴ With the continued decline in solar PV costs, there are increasing reports of PPA prices that were lower than the wholesale cost of electricity.¹⁵ This introduces a potential opportunity for a utility to sign a PPA for solar PV for a lower rate than the wholesale cost of electricity and pass on savings to all of the utility's customers or specifically to its low-income customers in the form of a reduced electricity rate. Increasing the capacity of solar facilities can result in economies of scale and a lower PPA rate. While an individual electric

¹² HUD USER FY2020 Income Limits Documentation System
https://www.huduser.gov/portal/datasets/il/il2020/2020summary.odn?inputname=STTLT*3799999999%2BNorth+Carolina&selection_type=county&stname=North+Carolina&statefp=37.0&year=2020

¹³Estimated Median Family Incomes for Fiscal Year (FY) 2020
<https://www.huduser.gov/portal/datasets/il/il20/Medians2020r.pdf> ; U.S. Dept. of Housing and Urban Development HUD, April 2020

¹⁴Laurel Passera, *Community Solar for Low-Income: Benefits and Barriers*,
<https://nccleantech.ncsu.edu/wp-content/uploads/Passera-Laurel-Community-Solar-for-Low-Income-Benefits-and-Barriers.pdf>, CCSA; *What is a Solar Power Purchase Agreement?*,
<https://www.seia.org/research-resources/solar-power-purchase-agreements>, SEIA

¹⁵ [On December 2017, Austin Energy \(TX\) reportedly signed for 150MW solar PPA between 2.35-2.725 c/KWh](#), GTM Research, December 18, 2017

cooperative or municipal utility may not have the interest in or ability to own a large solar project, interested utilities may aggregate their projects to commission a larger amount of total capacity.

Solar Energy Valuation

The compensation rate (cents per kWh) for electricity generated by a solar facility makes a significant difference in the economic value of community solar. An electric cooperative or municipal utility may choose to credit the solar output at the retail rate for electricity, which averages around 12 cents per kWh in South Atlantic states. A utility may also choose to credit the solar output at its avoided cost rate. Avoided cost rate compensation typically requires customers to pay a bill premium to participate, offering no economic value to participants.

A utility may also utilize a value of solar rate. The value of solar.¹⁶ approach was implemented by Xcel Energy in Minnesota as a compensation rate for community solar. The value of solar approach monetizes different values provided by solar facilities, including avoided energy, generation capacity, distribution and transmission capacity, and environmental benefits. For electric cooperatives and municipal utilities that pay a high demand charge for their power supply, this benefit could include the value of demand charge reduction provided by the solar project, in addition to avoided energy costs. Including a demand charge reduction value typically results in a final rate between.¹⁷ the avoided cost rate and retail rate.

For new community solar projects, these compensation approaches can be built into system subscription modeling and program design. For existing community solar projects that may be undersubscribed, a cost and crediting review may identify values that participants are not currently being compensated for. Reviewing these costs and credit rates, and adjusting the program accordingly, can potentially increase the economic value to all subscribers, not just low income customers.

Developer Donations and Support

Utility-scale solar projects are often developed in rural areas, where a large portion of a state's low-income population often resides. For a project initiated by a municipal or cooperative utility, a solar developer may be willing to agree to a lower PPA rate or accept a lower return on the project in exchange for recognition that their contribution will specifically serve the region's low-income residents with reduced subscription rates. This agreement could provide the developer with an opportunity to visibly contribute to the community in which they are developing projects. Similar to the way in which businesses sponsor local sports teams and are recognized on the team's uniforms or through signage at the ball field, utilities may recognize the developer's contribution on their website, in bill inserts, or through local newspaper articles.

A solar developer may also consider donating excess Renewable Energy Certificates (RECs) that it holds from its other projects to the municipal utility or electric cooperative. RECs, also known

¹⁶[Minnesota Value of Solar Rate](#), MN Department of Commerce, April 2014.

¹⁷ For instance, if an electric cooperative procures solar energy at 7.5 cents per kWh, the cooperative can include the value of benefits at 2 cents per kWh, effectively valuing the cost of solar energy to the utility at 5.5c/kWh. *Id* 16

as Green Tags, Renewable Energy Credits, Renewable Electricity Certificates, or Tradable Renewable Certificates (TRCs), are tradable, non-tangible energy commodities in the U.S. that represent the environmental attributes of one megawatt-hour (MWh) of electricity generated from an eligible renewable energy resource.¹⁸ The donated RECs could be used by utilities, local governments and businesses to lower their carbon footprints and meet renewable energy commitments. The funds generated could be used to support low income community solar subscriptions (see voluntary contributions below). These solar developer contributions would also alleviate utility concerns of providing one class of subscribers (low income residents) with a benefit that would come at the expense of higher rates for other customers. For example, in 2018 Strata Solar donated \$20,000 worth of RECs to Roanoke Electric Cooperative that are being utilized to reduce monthly utility bills for qualifying low income utility member owners.¹⁹

Two-Tiered Rates and Voluntary Contributions

Utilities and others have expressed concerns about cost shift between customer classes—especially where it is perceived that customers participating in a community solar program are being subsidized by non-participants. Electric cooperatives and municipal utilities are generally committed to minimize cost shifts in their rates. To minimizing cost shift issues with their entire customer base, a utility could create a voluntary two-tiered rate within a community solar program, where one tier of customers voluntarily pays higher rates to reduce the cost of participation for low-income customers. Another option could involve commercial customers voluntarily agreeing to pay more for shares of a community solar project to sponsor reduced rates for qualifying low-income residents. By providing this type of support, these businesses can be recognized as leaders in their communities for both their commitment to supporting clean energy and alleviating poverty.

Federal Assistance Programs

There are number of federal assistance programs administered by state and local social service agencies to provide energy bill assistance to low-income families. If a community solar program is designed to provide immediate cost savings, funds from these assistance programs could potentially be used to reduce the cost of community solar participation for low-income households. Low income community solar savings programs can be included in annual plans submitted to federal funding agencies. For example, the North Carolina Department of Health and Human Services submits a federal fiscal year Detailed Model Plan for the federal funds it receives for energy related programs which could potentially include community solar. Colorado and Minnesota are currently working with federal energy assistance programs to support solar. For example, the nonprofits RREAL developed a scalable model for community solar²⁰ and installed

¹⁸ DSIRE Glossary, <http://www.dsireusa.org/support/glossary/>, NCCETC

¹⁹ <https://www.stratasolar.com/news/news/press-release-nc-partnerships-bring-community-solar-low-and-middle-income-customers>

²⁰ Community Solar for Community Action, https://docs.wixstatic.com/ugd/eed9c8_85e8f825029242069838dcf1af972800.pdf, RREAL

a low-income community solar array in Minnesota in 2016.^{21,22} In the RREAL project, the project developers used the Low-Income Heating Energy Assistance Program (LIHEAP) client list as the basis for identifying potential subscribers, but no LIHEAP funds were used to pay for the project.

When considering the use of existing low-income assistance programs to promote community solar, it is important to avoid diverting these program funds unless such a diversion results in a net financial benefit to the communities and individuals served by the program. Many federal assistance programs may be oversubscribed and lack sufficient funding to meet current demand. In addition, prior approval to utilize federal energy assistance funding is necessary from state and federal agencies.

The following section reviews the existing federal assistance programs and their relevance for community solar for LMI households.

Housing Assistance Programs

Assistance programs offered through the U.S. Department of Housing and Urban Development (HUD) provide federal support to state and local public housing authorities and initiatives.²³ HUD's Renew300 Initiative aims to help federally assisted housing residents save money through the installation of on-site or community-based renewable energy. Federally assisted housing includes HUD's rental housing portfolio (Public Housing, Multifamily Assisted) and the U.S. Department of Agriculture's Rural Development Multifamily Programs, as well as rental housing supported through the Low-Income Housing Tax Credit (LIHTC). A 300 MW target aims to make use of millions of federally subsidized roofs with on-site or community generation potential.²⁴

In 2014, HUD made it financially advantageous for housing authorities to utilize solar PV by allowing them to benefit from its savings. Every three years, HUD reviews the operating budgets of the public housing authorities (PHAs), and issues them the amount of money needed to cover their expenses — before 2014 this meant that any savings realized from an energy efficiency or renewable energy investment would be negated, as HUD would simply issue the PHA the amount of money needed to cover its expenses. PHA assistance covers a portion of rent and utility costs for its clients.²⁵ Therefore, if a consistent utility savings can be anticipated through community solar project subscriptions, the PHA may be able to invest in a project. This opportunity may be especially attractive for local municipal governments that have their own electric utilities and also serve as PHAs in their communities.

For these solar PV projects to be realized, they must be profitable for the housing developers/owners and must be financially beneficial for low-income tenants. HUD currently

²¹ Solar Assistance Projects, <https://www.rreal.org/solar-assistance-projects>, RREAL

²² Anna Carlson, [Leech Lake Community Solar Array First in MN to be 100% Dedicated to Low-Income Residents](http://www.resilience.org/stories/2017-08-22/leech-lake-community-solar-garden-first-in-mn-to-be-100-dedicated-to-low-income-residents/), <http://www.resilience.org/stories/2017-08-22/leech-lake-community-solar-garden-first-in-mn-to-be-100-dedicated-to-low-income-residents/>, Clean Energy Resource Teams, August 2017

²³ State Information, <https://www.hud.gov/states>, US HUD

²⁴ <https://www.hudexchange.info/programs/renewable-energy/>

²⁵ Public Housing Energy Conservation Clearinghouse: Utility Allowances, https://www.hud.gov/program_offices/public_indian_housing/programs/ph/phecc/allowances, US HUD

includes utility allowance policies that might be challenging the low-income customers to benefit from these projects.²⁶

Low Income Home Energy Assistance programs ~ U.S. Dept. of Health and Human Services

Low Income Home Energy Assistance programs (LIHEAP) provide eligible households with support for their heating and cooling costs, bill payment, energy crisis assistance, weatherization, and energy-related home repairs. Federal guidelines determine eligibility based on household size and maximum annual income.²⁷ In North Carolina, funds are distributed to local agencies through the state Department of Health and Human Services (DHHS) and the Department of Environmental Quality (DEQ). North Carolina's portion of LIHEAP funds providing weatherization assistance program (WAP) and crisis Heating Appliance Repair and Replacement program (HARRP) support are administered by the DEQ's Weatherization Assistance Program. LIHEAP funding includes different programs, such as:

- Low-Income Energy Assistance Program (LIEAP): LIEAP provides for a one-time vendor payment to help eligible households pay their heating bills. In North Carolina, federal funding is distributed by the state Department of Health and Human Services to county and city social service departments and agencies. Funds are available annually beginning December 1st for qualifying households until exhausted.²⁸
- Crisis Intervention Program (CIP): CIP funds are also available through state Department of Health and Human Services to qualifying households facing disconnection after receiving a utility shut off notice, a health crisis, or an energy-related life endangering threat. Assistance is limited to \$600 annually. Utility bill assistance to avoid a shut off is paid directly to the utility. This direct relationship between social service agencies and utilities provides municipal and cooperative utilities considering a low-income community solar program with the opportunity to discuss a collaborative approach to the use of federal LIEAP or CIP funds to reduce costly shut off and late fees.
- Heating Appliance Repair and Replacement Program (HARRP) funds are provided to eligible applicants. HARRP funds provide repair or replacement of primary home heating units for eligible low-income homeowners.

Weatherization Assistance Program ~ U.S. Dept. of Energy and U.S. Dept. of Health and Human Services

The Weatherization Assistance Program (WAP) enables low-income, senior citizens, and disabled residents to save energy and reduce their utility bills by making their homes more energy

²⁶ Jeffrey Cook, Lori Bird, [Unlocking Solar for Low-and Moderate Income Residents: A Matrix of Financing Options by Resident, Provider, and Housing Type](#), NREL, January 2018

²⁷ [Low Income Home Energy Assistance Program \(LIHEAP\)](https://www.benefits.gov/benefits/benefit-details/623), <https://www.benefits.gov/benefits/benefit-details/623>, Benefits.gov

²⁸ [Low Income Energy Assistance](https://www.ncdhhs.gov/assistance/low-income-services/low-income-energy-assistance), <https://www.ncdhhs.gov/assistance/low-income-services/low-income-energy-assistance>, NC DHHS

efficient. Weatherization assistance is available for most types of housing (single family, apartments, condominiums, and mobile homes). Typical energy efficiency upgrades provided through WAP assistance include new insulation, air sealing, and heating system upgrades. Qualifying households must have incomes that are 130% -200% below the Federal Poverty Level.

Funds are typically distributed on the local level through Community Action Agencies (CAA), as well as local nonprofit organizations. The Southeastern Association of Community Action Agencies represents over 99% of the counties served in the southeastern U.S.²⁹ As solar costs have declined, interest in using WAP funds for low-income solar deployment has increased. A state seeking to integrate solar into WAP must obtain approval from the U.S. Department of Energy to include the technology in its program. This approval process includes demonstrating the effectiveness of solar in generating savings. In January 2018, the Clean Energy States Alliance hosted a webinar that explores this opportunity.³⁰

In 2019 the N.C. Weatherization Assistance Program (WAP) awarded \$128,000 to three NC utilities (two electric cooperatives and one municipal utility) with community solar programs to support qualified low income residents. NCWAP is providing \$3,200 per home to Roanoke Electric Cooperative, Blue Ridge Energy and Fayetteville Public Works Commission for a pilot project covering 40 homes. Through this innovative initiative, these single family households will also receive weatherization services such duct sealing, insulation and heating, cooling refrigeration evaluation and replacement if needed.

Fayetteville Public Works Commission's will use the funding to support the participation of 10 eligible households in their PWC Community Solar Weatherization Pilot project. Fayetteville's model operates as a prepaid subscription with accrued interest over the project life to further support the project.

Blue Ridge Energy's Community Solar Savings Pilot will serve 10 households, with each receiving a bill credit for the energy generated by solar panels plus a rate reduction from the standard residential energy charge.

Roanoke Electric Cooperative (REC) will serve 20 homes participating in REC's Upgrade to Save Community Solar Program or federally funded Weatherization Assistance Program funding provided through the NC Dept. of Environmental Quality. The community solar participation will allow the households to share in the community solar garden and receive future billing credits. Target benefits of the community solar pilot program will be approximately \$365 per year per eligible household for a period of no less than 15 years.³¹

²⁹ <https://www.seacaa.org/>, SEACAA

³⁰ Using Weatherization Assistance Program (WAP) Funds for Low-Income Solar, <https://www.cesa.org/webinars/using-wap-funds-for-low-income-solar/?date=2018-01-11>, CESA, January 2018

³¹ Michael Cooper (2019, October 15) Program announces Community Solar Pilot grant recipients . Retrieved from <https://deq.nc.gov/news/press-releases/2019/10/15/north-carolina-weatherization-assistance-program-announces-community>, NC Dept. of Environmental Quality

Working with two area Community Action Agencies, 19 homes have received WAP upgrades to date. Further, as of July 17, 2020, each member owner is also receiving a monthly \$30-\$31 credit on their electricity bill equivalent to the output of 17 solar panels through the Roanoke Center (RC) [Community Solar Low Income Assistance Program](#).³² Funding for these benefits has been facilitated by grant funds provided to the non-profit RC from private foundations. Currently the REC has a 360 panel solar garden with expansion plans underway.

Utility Donation Programs

Utilities with bill roundup and donation programs that support energy bill assistance and/or area nonprofit projects could expand these customer contribution programs to support low-income community solar. Residential and commercial accounts could be offered opportunities like those already provided through utility-managed donation programs that support community projects. North Carolina's Roanoke Electric Cooperative (REC) *Operation Roundup*³³ is one example. In bill roundup programs, member donors voluntarily round up their monthly utility bills to the nearest dollar, and generated funds are distributed to area nonprofit service projects. These programs could be expanded to support community solar access for low-income households by eliminating or reducing solar panel subscription and/or purchase rates. In addition, utilities may elect to develop specific community donation initiatives to "crowd source" funds to offset subscriptions for its low income residents.

Piedmont Electric Membership Cooperative (PEMC) member-owners must opt out of their *Helping Hand* bill roundup program, whereby generated funds are distributed through PEMC's Helping Hand Foundation to assist low-income customers.³⁴ Currently, funds are used to support community projects, including aid for members during crisis situations, *Bright Ideas Grants* for educators, college scholarships, youth leadership camps, and other projects. Another example of local energy-related charitable giving that could be developed or designed to support low-income community solar subscriptions is North Carolina's Town of Apex *Neighbors Helping Neighbors* program.³⁵ Similarly, voluntary investor-owned utility programs like *Energy Neighbor Fund*,³⁶ by which utility customers donate monthly or provide a one-time donation — could be established through electric cooperatives or municipal utilities to reduce electricity bills for low-income residents by subsidizing community solar subscriptions.

Utility Funds from Late Fees

Most utilities collect late fees and/or disconnect fees from customers who are unable to pay their utility bills on time. These fees can add up to a significant amount. A municipal utility in North

³² Community Solar Low Income Assistance Program <https://www.roanokeelectric.com/roanoke-center/donate/>

³³ *Operation RoundUp*, <https://www.roanokeelectric.com/content/operation-roundup>, Roanoke Electric Cooperative

³⁴ *Opt Out of Supporting the Helping Hand Foundation*, <https://pemc.coop/helping-hand-info/>, Piedmont Electric Membership Corporation

³⁵ *Neighbors Helping Neighbors*, <https://www.apexnc.org/236/Neighbors-Helping-Neighbors>, City of Apex

³⁶ *Customer Assistance Programs*, <https://www.duke-energy.com/community/customer-assistance-programs/energy-neighbor-fund>, Duke Energy Progress

Carolina reported collecting up to a million dollars each year in late fees.³⁷ These charges are collected disproportionately from low-income customers in the utility's service area. In addition to offsetting their losses, these funds could be used to support community solar to benefit low-income customers. Lowered energy costs for low-income customers can result in a positive cycle, where low-income customers are better able to pay their bills, and are in turn less likely to default on payment.

Providing support for low-income customers through these identified avenues should not be seen only as donation or support programs. These programs have the potential to provide value to the utility by reducing i) uncollectable debt from delinquent bills, ii) costs related to repeated customer complaints, and iii) costs related to customer electric meter shut offs and the expense to connect them again at a later date.

Leveraging Value from Battery Storage Systems

A cooperative or municipal utility could also choose to add a battery storage component to a community solar facility. Depending on the site and the use case, the battery system could provide additional value streams making the system more cost-effective.³⁸

Rural electric cooperatives and municipal utilities typically purchase bulk electricity from wholesale generators to distribute to their customers. The rate at which the cooperative and municipal utilities purchase energy from wholesale suppliers often has two components: a flat energy charge (cents/kWh) and demand charge (\$/kW). The energy charge is based on the total amount of electricity (kWh) consumed over the billing period, while the demand charge is based on the individual utility's electric load during the grid's critical load period. These critical load periods are usually the monthly or annual coincident peak periods. The cooperative or municipal utility could design the battery storage system to store a portion of the energy generated by the solar PV facility and discharge it during critical peak periods. This load shifting from the battery system could provide other benefits to the grid, in addition to helping reduce the utility's wholesale electricity cost. The cost savings from the battery system could make the community solar project more affordable to all participants.

Conclusion

Community solar development in the Southeast is in a nascent stage due to many challenges outlined in this document. This is especially true when considering the inclusion of low-income individuals and households in community solar programs. However, as discussed, there are pathways for implementation that interested utilities, advocates, and solar developers can consider to provide opportunities for low-income families to access solar energy and its benefits.

³⁷ Our Opinion: Wilson utility late fees should help customers, not pay city slush fund, The Wilson Times Editorial. September 29, 2017. <http://wilsontimes.com/stories/our-opinion-wilson-utility-late-fees-should-help-customers-not-pad-city-slush-fund,98084>

³⁸ "Community Solar for the Southeast Implementation Guide ", NC Clean Energy Technology Center July 2018.

The *Community Solar for the Southeast* project, through subsequent meetings, is working with attendees of the December 2017 Low-Income Community Solar Workshop to put into practice some of the opportunities discussed at the meeting and in this report. One result is the framework to serve Roanoke Electric Cooperative's low-income member-owners with reduced monthly utility bills through the Community Solar Low Income Assistance Program initiative developed in late April 2018.³⁹

Questions and Answers

The following is synthesized from the Raleigh, North Carolina December 11, 2017 workshop presentations and breakout session discussion. Note that the redundancy in suggestions outlined below illustrates the overlapping of provided solutions from various perspectives.

What can utilities and solar developers do to bring community solar costs down?

- **Battery Storage:** In designing community solar projects, solar developers and utilities may be able to monetize the benefit of using batteries for peak shaving. These batteries may be oversized to ensure that the batteries are able to provide enough energy to offset peak energy use.⁴⁰
- **Project Size:** There are economies of scale to be gained by developing larger community solar projects that could potentially include a carve-out for low-income residents.
- **Land Use and Citing:** From a solar developer's perspective, land lease expenses are a considerable cost component and continue for the life of the project. Land leases typically cost several hundred dollars per acre annually. These leases can be 30 to 40 years in length, with an escalating rate after a short-fixed rate, typically 5 years. If a municipal or cooperative utility has vacant land that is close to energy distribution sources, development costs can be reduced considerably.⁴¹
- **Financing Costs:** Utilities and solar developers can seek out and develop greater access to low cost financing for community solar projects that will serve low-income residents. Banks, foundations, organizations, and individual investors with sufficient capital may be willing to accept a lower return on investment (IRR) for these projects. Strata CFO David Scoglio provided three hypothetical examples of the economics for community solar projects, and each demonstrated an IRR of 6-7%.⁴² Financiers may consider a reduced IRR in exchange for furthering opportunities for low-income communities. Low-income communities can benefit through energy cost savings, while investors may receive recognition for their support of community solar for low-income households.

³⁹ The Roanoke Center Community Solar Low Income Assistance Program

<https://www.roanokeelectric.com/roanoke-center/donate/>

⁴⁰ See additional resources from Community Solar Value Projects- [Solar-Plus storage companion measure](#)

⁴¹ *Community Solar for the Southeast* workshop: Solar Project Economics, <https://nccleantech.ncsu.edu/wp-content/uploads/Scoglio-David-Community-Solar-Projects.pdf>, NCCETC

⁴² *Community Solar for the Southeast* workshop: Solar Project Economics, <https://nccleantech.ncsu.edu/wp-content/uploads/Scoglio-David-Community-Solar-Projects.pdf> slides 2,3,4, & 8, NCCETC

- Power Purchase Agreement Terms: The primary cost in developing a solar project is the upfront cost of purchasing components and installing the system. This investment is often recouped and financed through long term power purchase agreements (PPAs). Longer PPA terms will facilitate more investment in solar, as these provide greater certainty to investors.
- Long Term Ownership of Projects: Cooperative and municipal utilities usually have access to low interest credit, which could be used to finance the project themselves. Long-term ownership provides greater benefits to the utility.
- Credit Structures: Many community solar projects require participants to pay a monthly premium, due to the credit rate structure in use. Utilities can revise participant credit structures in order to provide a monthly financial benefit to participants.
- Use of Shut Off Fees: Shut off fees may be utilized to support community solar subscriptions for low-income customers. Many electric cooperatives and municipal utilities serving high poverty areas generate considerable customer complaints through their late fees and discontinuance of service for nonpayment of fees. A portion of generated funds could be directed to support low-income community solar subscriptions that reduce customer utility bills. This can initiate a positive cycle reducing difficulties for both the utility and its customers.
- Bundling of Project Bids: Projects may be bundled across utilities to achieve economies of scale and reduce costs. Organizations representing the interest of electric cooperatives and municipal utilities can work to aggregate interests in community solar development across jurisdictions. By requesting bids on a larger portfolio of projects, economies of scale can be achieved, reducing the cost for each smaller individual project and serving a wider area.

What program delivery works best for low-income households?

- Provide Immediate Bill Savings: Utilities should develop programs that generate immediate, meaningful savings on utility bills
- Eliminate Upfront Costs to participate and/or on bill financing that generates monthly savings.
- Credit Participants at Retail or Value-Based Rates: Currently most community solar programs in the Southeast require participants to pay a monthly premium due to the wholesale credit rate structure.
- Use Funds Generated by Utility Shut Off and Reconnect Fees: Utility customers that have trouble paying their utility bills could be prime candidates for community solar subscriptions that generate monthly bill savings, supported (in part) by utility shut off and reconnect fees.
- Partner with Social Service Agencies and Local Nonprofits: Partnering with social service agencies and nonprofits such as Habitat for Humanity, County Social Services, and Community Action Agencies, can help identify eligible candidates and provide additional support.

How can utilities, developers, and low-income advocates and service providers work effectively to serve low-income households?

- Develop Cross Function Groups Within Utilities: Develop groups within utilities with representatives from leadership, delinquent accounts, commercial accounts, customer service, marketing, and communications to strategize internally on ways to serve low-income customers.
- Develop/Convene Volunteer Working Groups: Low-income advocates and utilities can work together in the communities they serve to develop a “purpose built” low-income community solar project.
- Seek Individual, Financial Institution, Nonprofit, and/or Foundation Support: Obtaining external support to develop and get paid back their investment with little or no profit. Structure the project with a 7% internal rate of return (IRR) and use a portion of the 7% IRR payments to provide credit for low income subscribers
- Meet with Public Social Service Agencies: Encouraging utilities to meet with social services agencies to see how they may be able to work together to help reduce the energy burden of low-income residents in their communities. This could be especially useful to municipal utilities, whose municipal governments administer federal social service funding providing energy assistance.
- Involve Federal Agencies to Increase Land Availability: HUD has land for federal housing development, and the Environmental Protection Agency assists with the development of brownfields that may serve as potential sites for community solar projects.

Resources

1. [Community Solar for Low Income Benefits & Barriers](#), Coalition for Community Solar Access, December 2017
2. [Community Solar in the Southeast Low Income Customer Program Design](#), North Carolina Justice Center, December 2017
3. [Community Solar Policy Decision Matrix and Guidance for Designing Community Solar Programs](#), Coalition for Community Solar Access , December 2017
4. [Community Solar Policy Landscape in the Southeast](#), NC Clean Energy Technology Center, August 2017
5. [Estimated Median Family Incomes for Fiscal Year \(FY\) 2019](#), Department of Housing & Urban Development
6. [Insights from the Colorado Energy Office Low-Income Community Solar Demonstration Project](#), Colorado Energy Office, December 2017

7. [Quick Reference Guide, Shared Renewable Energy for Low- to Moderate-Income Consumers: Policy Guidelines and Model Provisions](#), Interstate Renewable Energy Council, Accessed March 2018
8. [Shared Renewable Energy for Low- to Moderate-Income Consumers](#), Policy Guidelines and Model Provisions (LMI Guidelines), IREC
9. [Unlocking Solar for Low and Moderate Income Residents](#), National Renewable Energy Laboratory, January 2018
10. [Solar Project Economics](#), Strata Solar, December 2017
11. [Value of Community Solar](#) NC Clean Energy Technology Center, December 2017