*DER*iving Community Economic Development through Distributed Solar

November 2024

COOPERATIVE ENERGY FUTURES
COMMUNITY POWERED ENERGY

Written by Sachiko Graber

Photos courtesy of Cooperative Energy Futures

Acknowledgments

The following individuals and organizations substantially contributed to this report:

Ali Andrews, Shake Energy Collaborative
Nora Barger, Working Power
Hannah Colter, Waxwing Consulting LLC
Ariel Drehobl, U.S. Department of Energy
Katie Kienbaum, Institute of Local Self-Reliance
Sasha Lewis-Norelle, Clean Water Action
Linda Lu, Clean Mallard LLC
Dana Clare Redden, Solar Stewards
Yesenia Rivera, Energy Allies
Regina Speed-Bost, Black Owners of Solar Services
Christian Warren, Black Owners of Solar Services

Thank you to hundreds of individuals who engaged with this content via interviews, focus groups, convenings, webinars, and other mechanisms.

Contact

For questions about this report, contact Sachiko Graber, sachiko@waxwingllc.com or Timothy DenHerder-Thomas, timothy@cooperativeenergyfutures.com

This report was produced by Waxwing Consulting.

This project was funded by the U.S. Department of Energy.

Acknowledgment: This material is based upon work supported by the U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) under the Solar Energy Technologies Office. These opportunities are managed by ENERGYWERX in partnership with DOE, a collaboration made possible through an innovative Partnership Intermediary Agreement (PIA) between DOE's Office of Technology Transitions (OTT) and DEFENSEWERX, the parent organization of ENERGYWERX. This agreement enables ENERGYWERX to broaden DOE's engagement with innovative organizations and non-traditional partners, facilitating the rapid development, scaling, and deployment of clean energy solutions.

Table of Contents

List of Figures and Tables

Executive Summary

To meet the urgency of climate action today, many programs seek to advance infrastructure projects—such as clean energy, stormwater systems, and resilience hubs—without centering communities. Yet, our society also faces crises of poverty, debt, economic challenges, and social inequality and injustice.[1] Sectors of rapid growth, as in the distributed solar sector, can be optimized to address multiple societal challenges by stimulating wealth-building and local economic development while also addressing the climate crisis.

Across the U.S., distributed solar offers substantial opportunity for community and community-led economic development. While utility-scale solar is booming, stakeholders are also eager to identify new mechanisms to support and scale smaller community-led projects and the accompanying community-led economic opportunities they can offer. However, support is needed for community-based solar developers (e.g., small developers who have fewer than 20 staff, are based in the same community where a project will be developed and have multiple mechanisms in place to enable the community to inform, shape, and/or own the project) to best support their communities. One respondent to a Cooperative Energy Futures survey noted:

> *Our community wants a transition away from an extractive economy and toward a regenerative one. We've had multiple experiences with developers who care mostly about their bottom line and make minimal effort to engage community early on in a meaningful way that centers their priorities and decision-making. We see community benefits agreements as providing trinkets, rather than transformative investments.*[2]

This report explores how distributed solar stakeholders can plan and align economic development with existing community priorities while advancing new solar projects. Because the amount of local community influence drives community economic development, we note the need for investment in community ownership models, which are scarce today. This report seeks to outline the current barriers to community-led economic development through distributed solar, best practices for implementation, and recommendations for sector stakeholders (outlined in *Box 1*).

In this report, we distinguish between "**community** economic development," referring to an increase in the standards of living across a community, versus "**community-led** economic development," which refers to economic development that is *specifically envisioned and prioritized* by community members on behalf of the full community's well-being.

Box 1. Scaling Economic Development through Solar

The following recommendations offer strategies for four key solar sector stakeholders to support greater community-led economic development through distributed solar projects. More detail is provided in *Section 5*.

For the Federal Government

- Increase the emphasis on high-poverty, low-income rural communities.
- Build on existing accelerator platform(s) to support startups, cooperatives, and other community-based project developers.
- Incentivize developers to implement best practices included in *Section 4* through existing channels, such as investment tax credit adders and multipliers or grant funding.
- Limit the use of community benefits agreements/plans to situations where they can have meaningful impact, rather than requiring them for all projects in a certain program.

For State Governments

- Enable net metering, virtual net metering, community solar with consolidated billing, and household solar incentives through legislative and regulatory action.
- Make affordable financing more available to communities, and specifically incentivize programs targeting low- and moderate-income (LMI) and historically underserved populations.

For Project Developers/Leads

- Engage the community early and often in the pre-development and project development process.
- Involve community-based organizations with the potential to support solar development.
- Create educational channels for communities to leverage cooperative and other structures that create greater ownership and consumer protections.

For Financiers

- Provide low-cost, non-extractive capital that covers a meaningful amount of project cost.
- Provide longer-term credit to projects that offer outsize community benefits.
- Make targeted efforts to reduce the specific barriers that community-based developers face when building distributed solar projects.

1. Introduction

The end of the year 2024 marks another year of record-breaking heat and extreme weather events. These events underscore the reality that climate change has the most adverse impact on low- to moderate-income (LMI), under-resourced, and frontline communities.[3] Black, Indigenous, and people of color (BIPOC) are "hurt most by climate change," contributing to systemic racism and expanding the racial wealth gap.[4] The rapidly growing solar sector offers one mechanism for addressing this systemic inequality through efforts to confront climate change.

More than half of U.S. states have climate action plans in place.[5] Country and global commitments to climate action are also growing.[6] Across these plans, clean electricity development is one of the most common strategies. U.S. solar deployment has grown at 25% annually over the last decade, and strong growth is expected to continue.[7] In this critical clean energy sector, local economic development is often advertised in the forms of job creation, local tax revenue, and energy bill savings. However, only some distributed solar realizes these community economic development benefits.

In this report, we define "community economic development" as an increase in the average standards of living within a solar host community due to the presence of the solar project. This term includes financial, indirect financial, and non-financial mechanisms that influence standard of living. More specifically, "community-led economic development" refers to these improved standards of living that are specifically envisioned and prioritized by the community itself. This report includes both terms as they can be differentially applied by different solar project models.[i] We also use the term "distributed solar" to refer to relatively small solar arrays including household rooftop arrays, community solar projects, and behind-the-meter installations used to directly power community-serving facilities such as nonprofit institutions. Community solar refers to small solar arrays (usually in the 100 kW-5 MW size) that provide electricity to multiple off-takers, such as households in the vicinity. Because community solar is the newest and most inclusive of these models to emerge, we spend more time discussing the nuances of these projects.

This report was developed by Cooperative Energy Futures (CEF) through the U.S. Department of Energy (DOE) Equitable Solar Communities of Practice Program.[8] The

[i] While this report has been written using standard federal terminology including terms like "economic development" and "Low and Moderate Income", many of these terms are not appreciated by many of the communities they refer to. Communities don't identify as needing economic development, for instance, but may identify as historically underserved, under-invested, or self-sufficient. Consider using different terminology at both the DOE and individual project level.

methodology utilized by Cooperative Energy Futures to collect information through the community of practice is detailed in *Appendix A*.

1.1. State of the Distributed Solar Sector

Solar energy usage is critical for decarbonizing the economy, reducing energy prices, reducing pollution, providing clean energy jobs, and reducing water use for energy generation. Over the next 25 years, solar capacity in the U.S. is expected to increase by 10 times and provide up to half of the country's energy capacity.[9]

By 2020, there were about 18,000 MW of rooftop solar directly powering homes in the U.S.[10] This equates to just over one percent of total generation capacity.[11] Rooftop solar directly provides solar energy to households but requires certain conditions, such as control of a home's roof, capacity to afford new solar panels upfront (or lease, take out a loan, or enter a power purchase agreement), a sturdy roof without replacement needs, and clear access to the sun without tree and other shadows.

Community solar, another distributed solar mechanism, is currently authorized in 22 states plus Washington, D.C. Each state's legislation is different, and even with this legislation, some states still face challenges to equitable implementation of affordable community solar.[12] However, in states with enabling legislation, community solar offers more universal access to the benefits of solar and is critical for increasing equitable access to energy savings, transitioning from fossil fuels, and providing stability to solar managers. [13] Community solar programs are growing. National Renewable Energy Laboratory (NREL) data show fewer than 20 registered community solar projects across the U.S. in 2012, and 20 times that many a decade later.[14] Total generation capacity was 7.3 GW at the end of 2023—about three percent of total U.S. capacity.[15]

Despite its benefits, solar can contribute to energy inequity due to its inaccessibility for many households in the U.S. DOE notes:

> *Under-resourced households... dedicate greater shares of household income towards energy expenses than do high-income households... Many under-resourced households are energy insecure, meaning they cannot afford to buy enough energy to meet basic needs.*[16]

Energy burden, defined as the percent of a household's annual income that is spent on annual energy costs, averages 8.3% for median low-income households.[ii][17] A 2020 study found that 67% of low-income households experience high or severe energy burden (>6% or >10%), and energy burden for low-and moderate-income (LMI) households is three times as high as for non-LMI households.[18] Black and Native American household energy

[ii] Outside of this report, energy burden in a larger context should also seek to incorporate transportation energy burden as well as electricity and heating costs.

burdens are 43% and 45% higher than white households.[19] Non-white households are also less likely to own or have access to solar energy.[20] Socioeconomic, structural, and policy-related factors, linked to historic racism and structural disparities, drive these disparities.

Despite strong national growth, solar energy faces significant resistance in many rural and low-income communities.[iii][21] Solar developers are often perceived as outside corporations infiltrating communities to drive profit. Others may dislike the visual impact of solar arrays or disagree with the push for clean energy—especially in energy transition communities (such as those that host coal mines or fossil fuel power plants).

Community economic development through solar can counter negative perceptions, increase public support, and ensure that local projects provide benefits to the communities in which they are hosted. Community solar specifically expands solar access for renters, residents of multifamily buildings, and lower-income households—and good policy can increase the extent of these benefits.[22] Community solar benefits may be similar to those from leased rooftop solar. Leased household-scale rooftop solar also minimizes initial investment compared to units purchased upfront. However, NREL and the Lawrence Berkeley National Laboratory (LBNL) also note, "In the absence of policy mandates to acquire LMI customers, profit-maximizing community solar providers may thus prioritize marketing to relatively affluent customers, consistent with evidence from rooftop solar markets."[23] Today, 69% of rooftop solar users make the area mean income or more.[24] Extra efforts are required to ensure equitable access to solar resources.

In many marginalized and LMI communities, residents perceive the climate benefits of solar as beneficial but less of a priority than the household savings, wealth building, and democratic benefits it can offer.[25] Solar resources must be viewed with an intersectional lens to address multiple challenges simultaneously. DOE's *Solar Futures Study* notes the need to address income inequality and structural racism through clean energy efforts, and this report seeks to inform that goal.[26]

1.2. Federal Solar Programs

The U.S. government has been increasingly investing in solar solutions that produce cleaner energy and reduce poverty. DOE oversees energy resources across the country. DOE's National Community Solar Partnership+ (NCSP+) set a national goal for community solar to power 5 million households and save customers $1 billion in bill savings by 2025, which was a 700% increase in community solar deployment.[27] NCSP+ also centers the meaningful benefits of solar in their efforts to increase benefits to LMI households. These meaningful benefits include equitable access and consumer protections; meaningful

[iii] According to the University of Jaen, low-income communities may view solar through a legacy of distrust and the burden of access.

household savings; resilience, storage, and grid benefits; community-led economic development; and solar workforce. NCSP+ has developed numerous programs to scale these benefits, such as the Community Power Accelerator, Clean Energy Connector, and Sunny Awards. These programs aim to achieve 20% household savings and increase LMI solar access in line with DOE's Justice40 Initiative.[28] Through NCSP+, DOE hopes to support community wealth building, governance, and ownership. The 2021 DOE Solar Futures Study noted that:

> *Solar deployment—at the scale envisioned in the Solar Futures Study—presents an opportunity to maintain the benefits of the modern energy system while mitigating the costs and distributing costs and benefits more equitably... New approaches to energy policy and development may be needed to ensure that the benefits of the zero-carbon system are equitably distributed.*[29]

The U.S. Environmental Protection Agency (EPA) has estimated that the $7 billion Solar for All program, enabled through the 2022 Inflation Reduction Act (IRA), will save participating LMI households 20% on their electricity bills for a total of $350 million for participating households. The Solar for All program will fund awardees who will provide low-income rooftop and community solar to households across all 50 states and territories. Solar for All projects must meet prevailing wage and Build America Buy America requirements, and the updated Investment Tax Credit for solar projects (also enabled through the IRA) similarly requires prevailing wages.

1.3. This Report

This report consolidates existing knowledge on the mechanisms for distributed solar to drive community economic development and explores opportunities for scaling economic development by new distributed solar. The effort behind this report—which included a community of practice and public events to solicit information—sought to explore how nationally focused efforts can scale both the volume of distributed solar capacity and *also* expand the depth of community-led economic development provided by those installations. This report explores the following questions:

- What do U.S. solar host communities perceive as the economic development benefits of distributed solar projects?
- Through what mechanisms can distributed solar projects create community economic development, and especially enable communities to receive the benefits they prioritize?
- What different resourcing needs do community-led projects feature, compared to third party-led projects?
- How can we minimize economic risk to communities seeking to own and/or host solar projects?

- What is needed for us to better understand the ways in which distributed solar projects drive economic development?

The remainder of this report is organized as follows. *Section 2* provides an overview of community economic development, including key outcomes, drivers, and barriers associated with accessing and providing economic development. *Sections 3 and 4* delve into the key findings, addressing two related sets of problems: first, what do we know (and not know) about how to effectively stimulate the growth of distributed solar projects; and second, where are the opportunities and gaps for creating greater community benefits as envisioned by host communities? *Section 5* offers best practices and recommendations for scaling. *Section 6* presents conclusions and reiterates key takeaways. Additional resources for review including case studies, policy design recommendations, economic impact studies, and this study's methodology are provided as appendices.

Photo courtesy of Cooperative Energy Futures

2. Community Economic Development

In this report, the term "**community** economic development" refers to an increase in the standards of living across a community. In general, economic development mechanisms increase household and community-wide incomes and/or decrease costs; but we attempt to cover non-financial mechanisms as well.

We differentiate the former from "**community-led** economic development," which refers to economic development that is *specifically envisioned and prioritized* by community members on behalf of the full community's well-being. The community should see these projects as being developed "with us, not for us." Therefore, all community-led economic development is a type of community economic development, but community economic development may also be enacted by outside actors.

Both community and community-led economic development capture important benefits, including bill savings, generational wealth building, resilience to climate change, and community-centered decision-making power.[30] Community members note that social and decision-making power are important priorities, but there are few successful models for how to create and sustain solar projects that provide these benefits. Many respondents to a survey referenced their communities' excitement to develop project models rooted in collective decision-making (see *Appendix A* for more information on the survey and other methodology behind this report). Other benefits, such as community services like childcare offerings and municipal tax revenue, are less of a priority to many communities.[31] Of course, projects must be designed to offer benefits for benefits to materialize. Third party-owned projects often do not offer generational wealth-building in the same way as cooperatively-owned projects.

2.1. Driving Community Economic Development with Solar

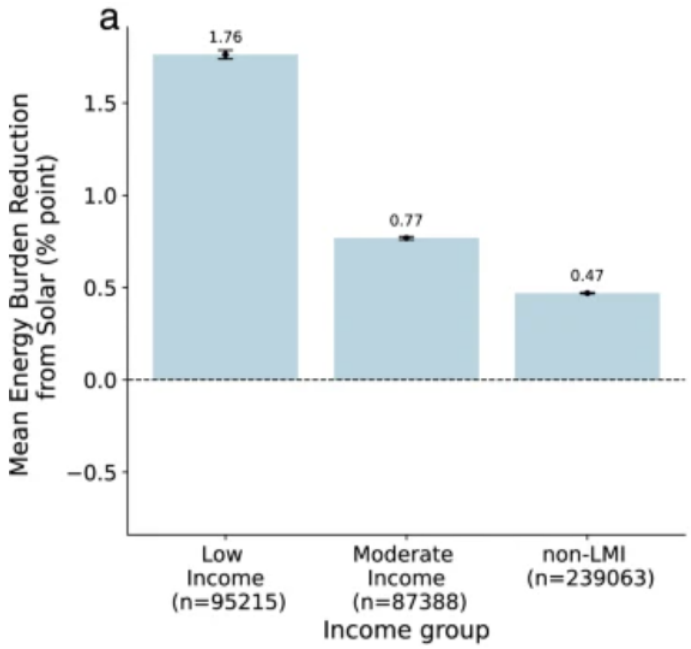
The Biden Administration's Justice40 framework reflects a commitment to making things better for under-resourced communities. Distributed solar can drive equitable community economic development while also accelerating the pace towards a clean energy transition using sustainable solutions and improving global climate resilience.

Community Economic Development Potential of Distributed Solar

Very few solar projects today provide meaningful community economic development with sustained community investment. Community economic development is particularly important in low-income communities, where there is substantial potential and need to reduce energy burden and increase wealth generation. With strong consumer protections in place, LMI households see significant reduction in energy burden through the installation of rooftop solar.[32] Solar projects can offer long-term electricity bill savings for a sustained period (i.e. a project lifetime of 25 years), while alternative energy

assistance programs often provide only short-term benefits. For instance, the Low-Income Home Energy Assistance Program (LIHEAP) lowers household energy costs for a discrete time period, and the Weatherization Assistance Program can usually not be used to support rooftop solar.[33] *Figure 1* visualizes the outsize impact of solar on energy burden.

Figure 1. Reduction in Energy Burden from Solar Adoption, by Income Class



Note. Reprinted from "Modeling the potential effects of rooftop solar on household energy burden in the United States", by Forrester, S.P. et al., 2024, *Nature Communications* 15:4676, https://doi.org/10.1038/s41467-024-48967-x.

Good data on the community economic impacts of solar energy is not always available. One peer-reviewed study notes, "Of the impacts identified, 'empowerment' and 'access to affordable energy' are found to be the least studied."[34]

Distributed Solar's Community Economic Development Benefits

Direct Financial Benefits

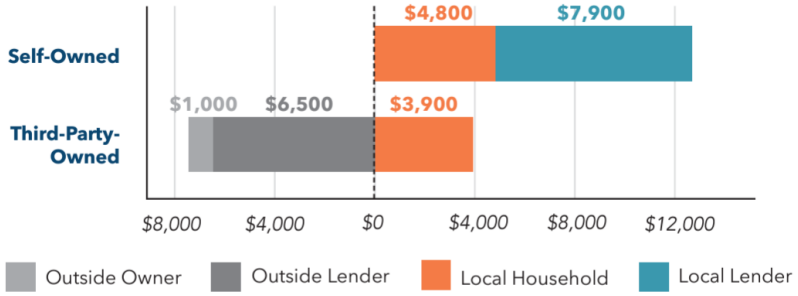
Participants engaged through the course of this study highlighted bill savings and generational wealth building as the most important direct financial benefits. Direct financial benefits include the following economic mechanisms:

1. **Lower electric bills.** Many state and federal programs allow distributed solar to offer lower electricity rates. These rates may be enabled through policy mechanisms like net metering and virtual net metering, cross-subsidization, or the availability of incentives like tax credits or the purchase of Solar Renewable Energy Credits.[35] However, bill savings are dependent on the ownership structure of the solar project. For instance, one analysis

found that rooftop solar ownership would increase lifetime savings by $12,000 over savings derived by a third party-owned project (*Figure 2*).[36] Bill savings may enable new forms of generational wealth building, as savings can be invested in other assets and forms of equity. Bill savings can also help reduce the risk of utility disconnection for customers who struggle to keep up with their utility bills.[37] One state attempted to quantify the benefits of its solar incentive programs:

> *[Minnesota] authorized a state-wide community solar program in 2014. Four years later, roughly 12,000 residents and 2,000 business, non-profit, and public sector customers have saved money… In 2018, community solar employed 4,000 Minnesotan workers, generated land leases worth $5 million and direct tax revenue of $1 million, and reduced global warming emissions by nearly one million tons.*[38] [While bill savings and tax revenues reflect direct financial benefits, job, lease, and climate impacts are examples of indirect and non-financial benefits.]

Figure 2. Value of Rooftop Solar Net Benefits by Project Ownership Structure



Note. Reprinted from "Report: How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power", by Kienbaum, K. and Farrell, J., 2023, Institute for Local Self-Reliance, https://ilsr.org/articles/report-advantage-local/.

2. **Increase home value**. In 2015, rooftop solar increased home values by $4,000 per kW installed.[39] One study suggests that property values increase by 20 times a household's annual bill savings: "an array that made a home grid-neutral would decrease the average California residence's annual electricity bill by $1,037, leading to a $20,741 increase in the property's resale value."[40] However, especially for lower-income households, additional structures such as property tax exemptions may be necessary to ensure that additional property tax does not offset the increased value.

3. **Provide land lease or royalty payments**. Landowners may receive lease or royalty payments for allowing developers to build solar on their land or rooftop, providing diversified sources of revenue for their households, businesses, or farms.[41]

4. **Increase municipal tax revenues**. In the Midwest, clean energy projects pay tens of millions of dollars in property taxes. Across the country, distributed solar projects offer opportunities for substantial increases in property taxes paid.[42] Large projects can offer

hundreds of thousands of dollars in property tax revenue alone, which can provide new resources to communities seeking economic development.[43] These revenues can offer local governments the flexibility to provide a greater range of community services, reduced tax rates, or other economic benefits. However, tax contributions are ranked as a lower economic development priority by stakeholders, who note few examples of impactful re-investment of solar tax revenues.[44]

Indirect Financial Benefits

Participants engaged in this study highlighted jobs, resilience, and health benefits as the most important indirect financial benefits of distributed solar. Indirect financial benefits include the following mechanisms:

1. **Increase job quality and quantity**. Solar project development can improve access to living wages, worker retention, and opportunities for local operators.[45] New jobs are often driven by state or local hiring requirements. However, some survey respondents note that solar projects do not often lead to permanent jobs in the community, and ongoing operations and maintenance jobs are often outsourced.[46]

2. **Provide community services**. Some solar projects provide benefits like childcare, neighborhood services, or improvement funds to contribute to the local community.[47] A 2023 community benefits agreement in the town of Riverhead, New York provided for community health and welfare, protection of open space, emergency services, education, and workforce development.[48]

3. **Provide climate resilience**. Climate change drives natural disasters that create more electricity outages, which have a disproportionate impact on environmental justice communities.[49] Distributed generation allows local electricity that can be made available during a power outage. Maya Earls, editor with Bloomberg Law, notes:

> *Under-resourced communities tend to have less durable infrastructure and less access to information and resources to prepare for and avoid the health risks of extreme weather events. They also have fewer economic resources to respond to and recover from extreme events.*[50]

Solar plus storage and microgrid projects offer the best resilience today due to their ability to generate and store power for future events.

4. **Reduce healthcare costs**. Solar energy generation is considered clean and renewable. It can offset the use of more polluting technologies, like fossil fuel-based energy sources, which emit greenhouse gas and particulate pollution for every kWh produced. These pollution sources are important causes of heart, lung, and other health concerns—especially for children, the elderly, and in underserved and environmental justice communities. One study estimates that at scale, solar energy will "yield about $300 billion of air-quality and health benefits… largely due to reduced emissions."[51] The U.S.

EPA's peer-reviewed Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) offers a mechanism for estimating air quality and health improvement from renewable energy policies and projects.[52]

5. **Support affordable housing**. "Solar can be integrated into [affordable] housing and community facilities to reduce energy costs, increase resilience, and improve equity."[53] For instance, Jubilee Housing has partnered with the National Housing Trust in Washington, D.C. to provide energy savings through solar along with additional wraparound services to support low-income housing residents.

6. **Drive economic ripple effects**. Solar projects save customers on electricity costs and can free up cash to support business growth, local sales, and local hiring. Increasing local productivity can drive additional investment in the local economy.[54]

7. **Increase mission impact**. By saving nonprofit subscribers on energy, distributed solar projects can enable the reallocation of funding to other areas of work.[55] For example, a solar project in Washington, D.C. saves enough money for the Capital Area Food Bank to provide hundreds of thousands more meals per year.[56] Beyond nonprofit beneficiaries, project owners can also reinvest in the community. One project currently enrolled in DOE's Community Power Accelerator prize is utilizing agrivoltaics–inter-planting food crops between rows of solar panels–to grow and provide fresh food to the community.[57] Cooperatively-owned projects are also able to return dividends that can be reinvested in nonprofit and other subscribers' missions.

8. **Allow communities to avoid or defer costly infrastructure upgrades** at a lower total resource cost. By generating electricity close to the point of consumption, distributed solar projects can reduce overall line loss and reduce demand for medium voltage distribution and transmission lines, whose expansion is a substantial cost driver for electricity utilities. These costs are passed on to the ratepayer, so reducing these cost needs avoids increases to customer utility bills.

Non-wires alternatives are an increasingly utilized mechanism for utilities to postpone distribution and transmission system upgrades, which would otherwise be rate-based and increase overall customer costs. Non-wires alternatives include mechanisms like energy efficiency, demand response, or energy storage—which reduce the overall need for distribution capacity. Distributed solar is also a non-wires alternative because of its ability to locate electricity generation near the point of consumption.[58]

9. **Diversify revenues**. Ground-mount solar projects sited on farmland can help farmers to diversify their income streams while also potentially providing opportunities for grazing and pollinator habitat.[59] Similarly, rooftop solar leases offer an additional revenue stream that can diversify revenue for large establishments.

Non-Financial Benefits

Participants in a community convening hosted by CEF (see *Appendix A*) emphasized the importance of non-financial benefits, which often provide the greatest impact to communities but are the most difficult to quantify. Quantification of some of these benefits may also ignore some of the moral or ethical factors associated with them. Non-financial benefits can include:

1. **Increase democratic decision-making and energy democracy**. Distributed solar projects can help communities overcome historic challenges and environmental injustices.[60] *Table 5* in *Section 4.1* demonstrates how various types of solar projects can drive community participation and involvement. The benefits to community—project origination, development, management, ownership, and benefits—reflect self-determination and opportunities for all types of development.[61]

2. **Increase community knowledge and competencies**. Participation in the development of distributed solar projects can grow community understanding and competency not only around renewable energy, but also finance, project management, and other areas.[62] It also provides a deeper understanding of how energy bills and the energy system work.[63]

3. **Drive social change**.[64] Community-led and community-centered projects have high potential to organize the community and build relationships among organizers. Solar projects may be used as an engagement mechanism for building awareness of climate change, inequality, and other social challenges.

4. **Provide environmental co-benefits**. Solar projects are increasingly designed to provide co-benefits like erosion control, soil stabilization, pollinator habitat, and more. Dairyland Power Cooperative has 15 pollinator-friendly solar projects in Wisconsin, Minnesota, and Illinois that provide erosion control and other co-benefits.[65]

5. **Equity of access**. An NREL report shows "that 42 percent of the technical potential for rooftop solar exists on buildings owned or rented by low- or moderate-income households, a demographic segment that makes up 43 percent of the U.S. population."[66] Depending on the type of distributed solar, new projects can facilitate equity of access by including more types of participants to utilize solar energy.

6. **Reduce greenhouse gases**. Solar generation of electricity does not emit greenhouse gases and can reduce overall sector emissions by replacing higher-emitting technologies.[67] Emissions impacts can be estimated using the U.S. EPA's AVERT tool or tools like eGRID.[68]

Distributed solar can replace highly polluting energy facilities–reducing air pollution in communities.[69] Solar electricity can provide a clean heating source, reducing indoor air pollution by reducing the use of less appropriate heating sources:

A 2018 National Energy Assistance Study found that prior to receiving a federal subsidy, 30 percent of LIHEAP recipients were unable to use their main source of heat at some point in the previous year because their fuel was shut off, they could not afford fuel delivery, or they could not afford to fix their broken heating system. When residents are unable to use their main source of heat, they often turn to potentially dangerous heat sources to stay warm. Thirty percent of LIHEAP recipients resorted to using a kitchen stove or oven for heat.[70]

7. **Help towns, counties, and states meet their clean energy goals**. Increasingly, local municipalities are setting their own climate and clean energy goals, and local solar projects can help to achieve these targets.[71]

2.2. Barriers to Accessing Economic Development Benefits of Distributed Solar

Many factors limit the ability of households and communities to access economic development. These barriers may center on economic development itself or may have to do with the ability to access distributed solar at all. In many cases, those who have the most to gain through economic development—LMI households and households of color—are not able to access common forms of distributed solar such as household rooftop systems. This and other barriers are critical to understanding how future solar projects can better distribute economic benefits in an equitable and meaningful way.

Evidence of Barriers

Unequal representation across households who benefit from solar projects indicates a significant disparity in access. For instance, rooftop solar tends to be adopted by higher income, white households, while Black, Hispanic, and otherwise disadvantaged households are substantially underrepresented in rooftop and community solar deployment.[72] DOE notes that "when controlling for income, Census tracts with majority Black and Hispanic populations exhibit 30% and 69% less rooftop PV [photovoltaic] adoption, respectively."[73]

Third party ownership can make solar more accessible to lower-income households but can diminish their access to the financial benefits of solar adoption.[74] Conversely, innovative ownership structures like cooperatives can let member-owners receive a greater return on their investments and greater bill savings. Many cooperatives provide distributions so that members build generational wealth as the cooperative profits—but cooperatives are uncommon. Despite increasing innovation in the structure of solar projects, only 5% of community solar projects had 10% or more of low-income subscribers in 2018,[75] and a recent NREL and LBNL study does "not find that community solar expands access in terms of race."[76] The Low-Income Communities Bonus Credit Investment Tax Credit (ITC) adder—which was passed after the NREL and LBNL study

was completed—is expected to incentivize project owners to engage substantially more low-income subscribers.[iv]

Policy is both a challenge and an opportunity for driving community economic benefits. States with explicit LMI community solar programs show increased participation by non-white and Hispanic households, but these benefits require enabling policy to be enacted.[77]

Community and Household Barriers to Solar Access

Table 1 outlines current barriers for individual households and collective communities to access economic development through distributed solar development.

In addition to those included in *Table 1*, communities seeking to own solar facilities face additional barriers. Community groups usually struggle to access capital, so community-owned projects tend to be smaller.[78] Evidence from Canada suggests community-owned solar cooperatives "are isolated, volunteer-run and lack support and resources."[79] Financial capacity, knowledge, and personnel are also barriers to community ownership of solar projects.

2.3. Barriers to Providing Economic Development Benefits

DOE *Solar Futures Study* notes, "The underperformance of solar in LMI markets represents a missed opportunity to alleviate LMI energy burdens and their direct impacts on household health and wellbeing."[80] Barriers to the provision of community economic development are not only on the customer side. Many service providers, including project developers, financiers, and policymakers also create and/or face barriers that limit the economic development benefits offered to subscribers and host communities. These barriers are exacerbated for projects in underserved communities that are developed or financed by smaller entities.

Sections 3 and 4 contain detailed descriptions of barriers that often prevent developers and other service providers from offering robust community access to economic development benefits.

[iv] However, we note that this is the only clean energy tax credit or bonus credit that has limited capacity, which may indicate a challenge with federal prioritization of low-income community benefit allocation.

Table 1. Community and Household Barriers to Community Economic Development

LMI Household Barriers	Collective Community Barriers
▪ LMI renters are often limited from accessing rooftop solar due to lack of roof control. ▪ LMI households can be excluded due to lower credit scores, lower roof quality, or limited ability to do roof repairs or roof replacements. ▪ LMI households tend to lack the tax liability that would allow them to benefit from federal tax credit programs. ▪ Discriminatory financing limits individual households and whole communities from investing in solar projects based on race, income, and other factors. ▪ Predatory solar subscription models have taught many vulnerable communities that solar sales may not be trusted. ▪ Limited awareness of available solar program offerings.[81] ▪ Language barriers in communication materials, enrollment contracts, and system or subscription support exclude many who don't speak English as a first language. ▪ Electric bill arrears may prevent households from participating in rooftop or community solar programs.[82] ▪ Community and rooftop solar size minimums can prevent households from participating (if they cannot afford the minimum or have a smaller load than the minimum size).[83]	▪ Community-based organizations in LMI communities may lack the tax liability to directly participate in federal tax credit programs. The Inflation Reduction Act's Direct Pay program helps some tax-exempt institutions to directly access the incentive but does not cover all ownership types. ▪ Despite recent improvements, housing assistance programs may legally limit residents' ability to participate in solar programming.[84] ▪ Long-term rooftop solar contracts, especially for rooftop solar, can pose risks to both communities and individuals. ▪ Cultural barriers prevent many communities from participating. Translation of resources and contracts into additional languages adds to the expense of community engagement, which is likely passed on to the consumer. ▪ "Historically Black Colleges and Universities, Tribal Colleges and Universities, Hispanic Service Institutions, and other Minority Serving Institutions often serve as hubs for technical assistance and outreach to small, rural, and high-poverty school districts, which are less likely to be exposed to solar career opportunities."[85] ▪ High insurance premiums for solar installations prevent communities from owning solar projects. ▪ Split incentives insulate multifamily building owners from solar incentives because bill savings are provided to individual tenant utility bills rather than the building owner. ▪ Regulatory systems meant to ensure that LMI programs are not abused can inadvertently limit low-income customers access. In some markets, requesting data needed to confirm low-income status is often viewed as predatory, so subscriber managers often struggle to build trust.[86]

3. Pathways to Scale Community-Led Distributed Solar

Distributed solar must continue scaling to create an equitable clean energy transition. Distributed solar growth can provide socioeconomic, environmental, and health benefits to our clean energy future. The ability to develop multiple projects and increase the total generation capacity can significantly contribute to the total benefits from distributed solar projects (see *Section 2.1*).

To effectively scale the capacity of distributed solar projects in the U.S., project developers, financiers, regulators, policymakers, and advocates should consider the following understandings, targets, and benchmarks of solar project development. Guided by the Design, Monitoring, Evaluation, Research, and Learning (DMERL) framework,[87] we suggest incorporating:

- **Project Design** (see *Section 3.1*) using metrics to ensure a baseline of ownership models, public inputs, siting, community benefits, financing, procurement and construction, and customer engagement. These metrics not only inform the community impact of current solar projects, but they can also focus target-setting efforts by institutions like project funders or regulators.
- **Monitoring** (see *Section 3.2*) measuring a wide array of project impacts, including direct financial, indirect financial, and non-financial benefits. Monitoring data can enable program and project leads to most effectively develop distributed solar while maximizing the socioeconomic, environmental, health, and well-being benefits to the developer and community.
- **Evaluating and Learning** (see *Section 3.3*) by listening to all stakeholders, seeking feedback on outreach and community engagement practices, system planning, and operation, and incorporating best practices into programs and services (see *Appendix B* for additional recommendations about policy design).

3.1. Design: Holistic Benchmarks for Solar Project Design

Project developers and owners are most able to engage communities, develop benefit plans, and minimize harm through solar project development. *Table 2* outlines minimum expectations that should be presented for project developers and highlights opportunities for community decision-making and self-determination. Some of these best practices may require policy or programmatic action.

Table 2. Recommended Requirements and Best Practices for Project Design

Project Development Component	Recommended Minimum Requirement	Recommended Best Practice
Community Benefits Planning	Discuss community economic priorities before initiating project work and invest in at least one local program/priority.	Hold multiple meetings to discuss economic priorities with a range of stakeholders. Explore opportunities for community ownership and democratic decision-making.
Leasing and PPA Models	All solar customers with incomes under the area median income earn, or at a minimum do not lose, money compared to their baseline utility bills monthly, annually, and over their full subscription.	Ensure that all subscribers receive 20-50% bill savings on a monthly basis (e.g., through a state accountability mechanism).[v]
Public Input	Hold at least one public meeting in the community before beginning the project permitting process.	Hold a series of well-advertised public meetings in a variety of community gathering places, with translation services, at varying times, considering transportation and childcare, and providing food.
	Provide a clear channel for multiple correspondence mechanisms (e.g., in-person, surveys, social media, written comments) and respond to community questions.	Identify a local partner for project development (or work on a project that can be locally owned).
	Explain how public input is being used to shape the project approach.	Develop multiple mechanisms to hear community priorities, identify places where these

[v] One respondent to CEF's survey noted that "20% is becoming the standard discount aligned with incentives, but this doesn't amount to a material change in quality of life for most people."

Project Development Component	Recommended Minimum Requirement	Recommended Best Practice
		can be incorporated into the project plan, and communicate these changes back to the community.
Siting	Avoid displacing local businesses including agricultural businesses, through project siting.	Require transparency. Prioritize local landowners rather than corporate entities. Provide mechanisms for democratic community decision-making.
	Pay prevailing lease rates for land or rooftops rented for project deployment.	Explore mechanisms for direct system ownership by landowner.
Engineering, Procurement, and Construction (EPC)	Post request for proposals (RFP) publicly and invite local EPC companies to apply.	Evaluate EPC applications with a fixed rubric and allocate extra points to local and disadvantaged group applicants.
	Develop a community workforce agreement with host community partners.	Require a minimum proportion of local labor, contracts with disadvantaged markets, and training opportunities.
Subscriber Acquisition	Hire community members to act as primary messenger for community conversations and subscriber outreach.	Utilize teachers, religious leaders, community-based organization representatives, and elders to communicate about the solar opportunity, and compensate them accordingly.[88] Partner with and compensate at least one CBO partner to support customer outreach.
	Prioritize outreach to LMI and customers of color.	Prioritize alignment with Justice40, serving at least

Project Development Component	Recommended Minimum Requirement	Recommended Best Practice
		40% historically underserved customers. Do not charge a subscription fee. Eliminate early termination fees for subscriptions.
	Offer translations of subscription documents in all relevant languages.	Hire multilingual staff from the host community to support outreach operations.
Financing	Invite local investors to participate and earn a return on their investments, such as through a crowdfunding or cooperative model, and/or ensure that public or other forms of ownership contain mechanisms for ongoing community benefit.	Offer dividends based on the project or company's profits back to subscribers.
	Keep financing and profits within the community–e.g. project ownership.	Enable community financing and project ownership.
Operations and Maintenance (O&M)	Identify a system maintenance lead and subscriber management lead for the full lifetime to ensure that consumers don't get "stuck" with a failing project.	Engage community-members as O&M leads, to provide invoicing, and for other local services.

3.2. Monitoring: Tracking Project Impacts

To fully understand community economic development, the solar sector needs better data describing the economic impacts of distributed solar projects. *Table 3* provides a proposal for easily tracked metrics that can be used today. These metrics and targets should be adjusted over time and for specific project circumstances. Additional metrics such as specific pollution levels and health impacts should be tracked across the sector; however, today this cannot be done universally. We note that some of the targets (e.g.,

20% bill savings for LMI customers) are not feasible in every state or geography due to policy limitations.

The development of baselines for the targets in *Table 3* would be useful for enabling informed project comparison; however, these data are not readily available today. A majority of baseline references today rely on a single EnergySage page.[89] Entities like NREL might consider further exploring baseline for the recommended metrics.

Table 3. Proposed Economic Development Metrics and Targets

	Economic Development Mechanism	Metric	Target[vi]
Direct Financial Benefits	Energy Bill Savings	Average % savings	Break even at minimum
		% Annual savings for LMI customers	20% savings or greater
		% monthly savings for LMI customers	10% savings or greater
		% LMI customers benefitting	50% of net benefits flow to LMI households[90]
	Home Value	$ increased home value per kW installed	Equivalent to present value of residential rooftop installation
	Land Lease Payments	$/acre or $/sq. ft.	Meet or exceed the county average rate
	Municipal Tax Revenues	$ revenue from solar project used to improve livelihoods	$5/resident/yr
Indirect Financial Benefits	Job Quality and Quantity*	$/hr compensation rate	Meet prevailing wage rate
		Job benefits	Use a Project Labor Agreement
		% workforce hired locally	50% minimum
		% workforce hired from marginalized populations	50% minimum

[vi] Targets provided are intended as initial starting points for conversations about project design and benefits and do not necessarily reflect a universal standard.

	Economic Development Mechanism	Metric	Target[vi]
	Health Costs	Estimated savings in public health costs due to improved air quality	N/A; Use tools like EPA's COBRA to estimate**
		Home comfort	Increased number of customers self-report heating and cooling their homes comfortably
	Community Services	$ contributed to provision	$1,000/MW minimum
		Number of individuals served	50/MW minimum
	Economic Ripple Effects	Percent of project costs (hard and soft costs) that are paid locally (i.e. within the county)	50% including labor costs
	Ongoing Community Impact	$/kWh savings reinvested in nonprofit mission (for nonprofit owners)	$0.01/kWh
		$/kWh profit reinvested in the community (for other projects)	$0.02/kWh
	Climate Resilience	kWh distributed solar produced	N/A
		kWh storage installed	
Non-Financial Benefits	Democratic Decision-Making	Number of individuals involved in project planning	The greater of 50 per community or 1% of the target community***
		Range of stakeholders engaged	At a minimum, including community-based organizations (CBOs), local government, multi-family housing representatives
		Shared decision-making	

	Economic Development Mechanism	Metric	Target[vi]
		Community ability to enforce benefits	Qualitative paragraph written by a CBO partner indicates meaningful input to decisions Contracts include "teeth" and a low-cost mechanism for communities to seek a cure if benefits do not materialize
	Community Competencies	Number of educational trainings held	3 per project
		Number of specific skills taught	3 per project
	Environmental Co-Benefits	$/MW ecosystem service valuation	$100/acre/year
	Equity of Access	Demographics of subscriber base	Proportional to overall regional demographics, or skewed towards marginalized populations
	Greenhouse Gas Emissions	Marginal CO_2e avoided	75 lb/MWh
	Pollution	Marginal pollution avoided	N/A; Use tools like EPA's AVERT to estimate**
	Clean Energy Goals	Alignment with local clean energy goals	50% of projects are in communities with clean energy goals and align with those goals

Notes: * Over 90% of CEF survey respondents said that their state's programs have not been successful at creating opportunities for workforce development.[91]

** Accessible tools and reporting techniques tend to lack the ability to consider other social determinants of health, such as race and income. Washington, D.C.'s Health Equity Office is currently exploring ways to quantify and map these determinants.

*** Developer should define the 'community' they purport to engage; this should be as specific as possible, such as a specific neighborhood or township within a large city. Ideally, the community should encompass a clearly delineated area within 2 miles of the project center. Community representatives should also sign off on the metric used and reporting mechanism to protect against bad-faith engagement efforts by developers.

3.3. Evaluating and Learning: Project Evaluation

Community outreach and engagement is difficult to measure. *Table 4* provides a proposal of metrics and targets that could be achieved during the engagement phase of a project; these are metrics that would evaluate the distributed solar project developer and their implementation.

Table 4. Proposed Distributed Solar Metrics and Targets

	Economic Development Mechanism	**Metric**	**Target**
Outreach and Engagement	Advance on the *Spectrum of Community Engagement* [92]	Current location on the *Spectrum*	Collaborate With or Defer To communities
	Responsive workgroup to drive local engagement	Number of developer staff / subcontractors in the workgroup	> 3 per community
	Partner with community-based organizations (CBOs)	Number of CBOs engaged	At least one per community
		Customer interactions through CBOs	At least 2 touchpoints per subscriber
Governing Principles	Support community leadership development	Number of collaborative training or project engagements with community leaders	3-5 per project
		Number of community leaders engaged	At least 5 per project
		Long-term availability of expert to answer	Dedicated resource available for full project

	Economic Development Mechanism	Metric	Target
		questions about project/subscription	lifetime with easily accessible contact info
	Provide education to empower community	Number of educational resources shared	At least 3 per project
		Format of resources	Minimum print and online resources
	Multiple payment methods	Number of payment methods	At least 3: ACH, credit card, check/cash
	Clear communication about savings, participation	Clear disclosure form and subscriber documentation tailored to host community	
		Availability of multi-format information	At least 2 languages and at least two formats (i.e. written and verbal)
LMI Focus	Provide incentives for community institutions	Number of institutions eligible for incentives	At least 2 per community
	Minimize financial risk to LMI households/orgs	Irrecoverable cost invested	No upfront subscription or early termination fee
		Strategically engage LMI households	Provide compensation for events
	Prioritize local training & workforce development	Number of training opportunities provided	At least 3 per community
		Number of training locations utilized	At least 3 per community
	Increase financing for under-	Carve-outs of local, state, federal, and	40% of available funding goes to under-resourced

	Economic Development Mechanism	Metric	Target
	resourced communities	private funding sources	communities to align with Justice40

Photo courtesy of Cooperative Energy Futures

4. Pathways to Community Economic Benefits

While the previous section tackles how to intentionally stimulate the growth of distributed solar projects, particularly community-led projects, *Section 4* addresses a related but distinct issue: *As we develop more distributed solar projects, how can stakeholders ensure these projects truly engage communities and lead to equitable community economic development?*

The passage of the Inflation Reduction Act (IRA) galvanized businesses, civil groups, researchers, and legislators to improve the quality of life of many people in the United States. Especially with new structures like the Biden Administration's Justice40 Initiatives and prevailing wage requirements for federal incentives, a new rally behind the community-led development model promises to provide important opportunities for driving community benefits. The following mechanisms may most effectively deliver those opportunities and benefits that solar host communities envision and prioritize.

4.1. Increasing Community Ownership of Solar Systems

Community ownership of clean energy assets can optimize the zero-sum tradeoff of solar benefits that must be shared among community-members, subscribers, and organization staff; it allows more profits to accrue to community members. Community ownership also enables direct control of energy resources, keeps dollars circulating locally, and seems to be the only model that lets communities collect the full benefits of a project.[93] For instance, Grid Alternatives states that Tribal clean energy programs "typically reduce energy bills for households by 75-90%, savings that can be re-invested in the community."[94] Many Tribal leadership teams prefer projects to be community-owned rather than third party-owned within Reservation lands. One solar project by the Iñupiat Villages of Shungnak and Kobuk in northern Alaska, built by a local contractor and local labor, saved the village $130,000 in one year, which enabled system expansion and household efficiency investments.[95] This project provides microgrid access to the two communities and serves all of their households with a clean source of electricity.[96]

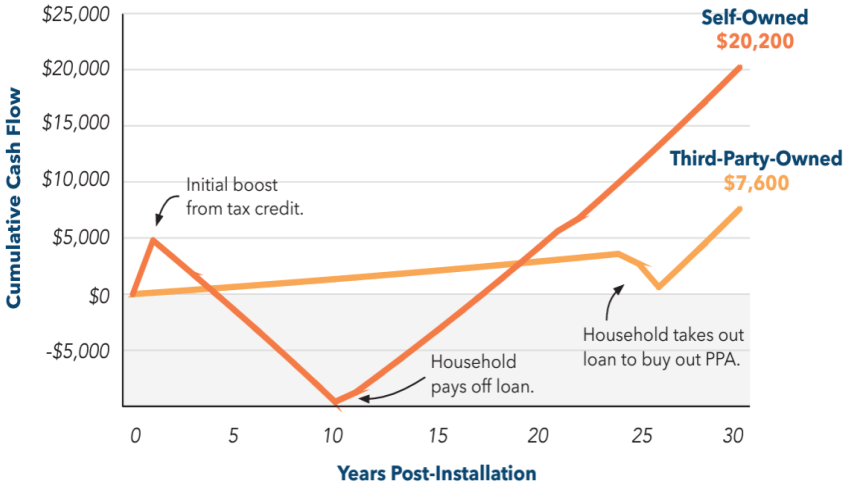
However, national community ownership of projects is extremely low. Customers own less than 1% of solar installations, and cooperatives, municipalities, and their suppliers owned only 10% of solar installations as of 2020.[97]

Community solar ownership comes in many forms. A local government, local private LLC, consumer-owned cooperative, housing cooperative, Tribal government, or local nonprofit can directly invest and own a project on behalf of the community. A consumer-owned or cooperative utility (such as a rural electric cooperative) could own the project. More innovative structures can also include ownership by a worker-owned cooperative or community land trust.[98]

Community ownership is studied more often than community investment, fundraising, or other mechanisms. *Figures 3, 4, and 5* demonstrate the increase in direct financial impact from community ownership versus third-party ownership.

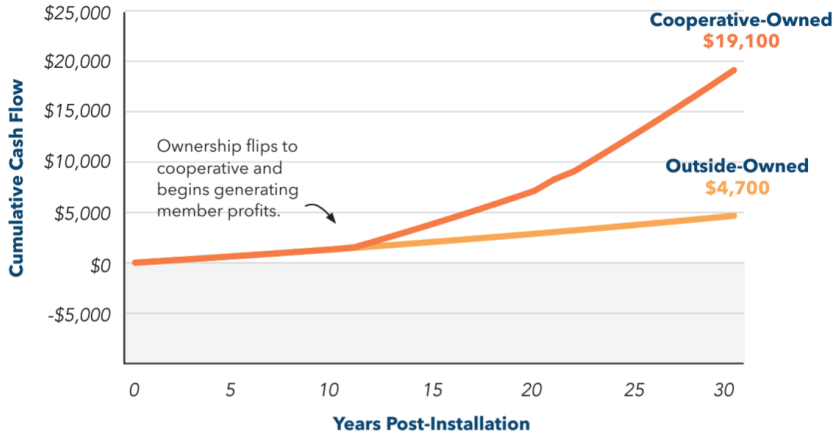
As opposed to household rooftop solar, which serves one homeowner through a hyper-local array situated on their home's roof, community solar lets multiple customers tap into the benefits of a single project array. Cooperatively-owned community solar provides exclusive financial benefits to its subscribers, who opt into the service, often through a contract. Community solar requires virtual net metering capability, typically enabled through state policy, to indicate how much an array's generation accrues to an individual subscriber.[99] One study covering 11 states shows that community solar subscribers are six times more likely to live in multifamily buildings, four times more likely to be renters, and earn almost 25% less than homeowners who install rooftop solar.[100]

Figure 3. Individually Owned Solar Projects Offer 3x the Total Household Savings



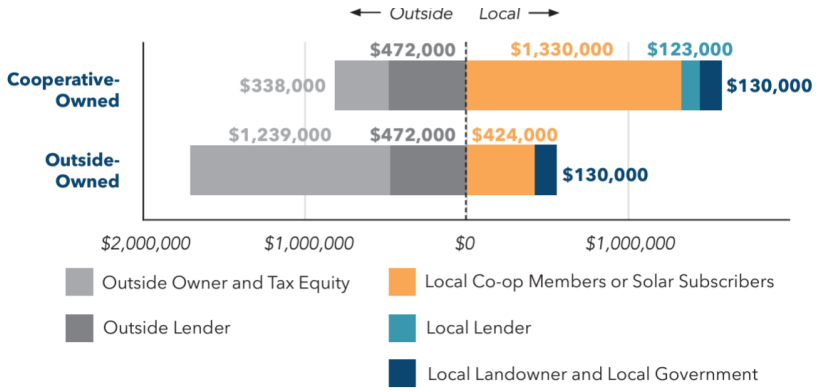
Note. Reprinted from "How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power", by Kienbaum, K. and Farrell, J., 2023, pp. 13 and 41.

Figure 4. Cooperatively Owned Solar Projects Offer 3x the Community Savings



Note. Reprinted from "How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power", by Kienbaum, K. and Farrell, J., 2023, pp.13 and 41.

Figure 5. Locally Retained Net Present Value of Community Solar



Note. Reprinted from "How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power", by Kienbaum, K. and Farrell, J., 2023, Institute for Local Self-Reliance, p.41.

Not all community solar is equitable—not all programs save their subscribers money, and only a small portion of community solar customers are currently low-income (by one estimate, only 4% of the entire community solar market is LMI community solar[101]). Equitable community solar projects intentionally seek to benefit marginalized communities, prioritize those communities over other stakeholders, and invest in local governance models.[102] Today, 19 states and the District of Columbia have community solar programs with provisions that explicitly require the participation of LMI households.[103] All LMI community solar programs provide direct financial benefits to subscribers. When compared with traditional residential rooftop solar development, community solar offers a number of additional benefits that can be expanded with strategic deployment. These benefits can include:[104]

- Can be designed with lower (or no) cost to entry
- Available to households without an available roof to host a system—whether they are renters, homeowners with older or shaded roofs, or live in condos or apartments without a dedicated unit rooftop
- Access economies of scale by serving multiple households
- Take advantage of the federal ITC and pass savings on to customers
- Save customers 10% in average bill costs; some projects save substantially more (for instance, the Solar for All program will deliver 20% savings)[105]
- Build local wealth through local investment, jobs, public tax revenue, and education
- Reduce heat islands in urban areas by reducing asphalt surface temperatures (i.e. if installed as parking canopies)
- Build local resilience, especially when combined with storage and/or microgrid design[106]

Variants of Community Ownership

Distributed solar projects reflect a range of structure and orientation towards project impacts. Utilizing the *Spectrum of Community Engagement to Ownership*, a tool which explores the types and impact of community involvement in any type of project, *Table 5* maps out possible combinations of attitudes about project origination, development, management, ownership, and meaningful benefits.[107]

Table 5. Community Influence on Solar Projects Based on Involvement Types

Project Type	Stance towards Community	Impact to Community	Community originated?	Community developed & managed?	Community owned?	Community benefits?
Outside Investor Owned	Ignore	Marginalization	No	No	No	Very little
Investor Owned, Community Informed	Consult	Tokenization	No	No	No	Some
Investor Owned, Community Participation	Involve	Voice	Maybe	Maybe	No	Significant
Investor Owned, Community Participation	Involve	Voice	Maybe	Maybe	No	Significant
Nonprofit Owned	Collaborate	Delegated Power	Yes	Yes	Yes	Substantial
Community Owned	Defer to	Community Ownership	Yes	Yes	Yes	Substantial

4.2. Community Engagement Mechanisms

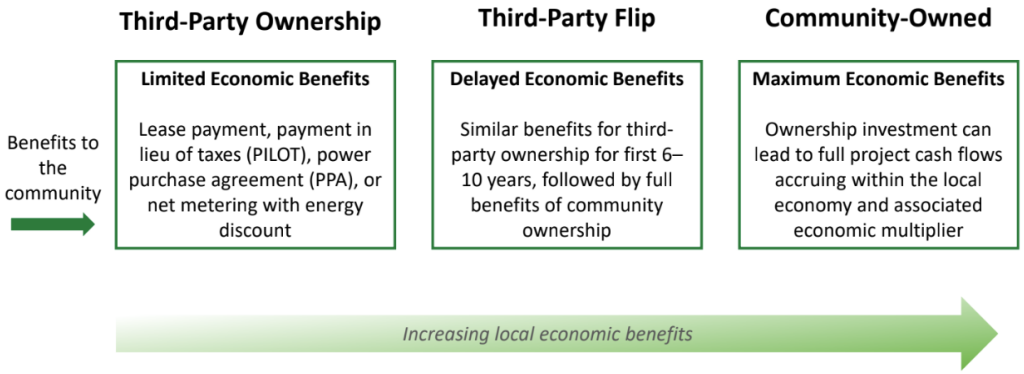
Economic development that aligns with community priorities cannot occur without a strong understanding of community priorities. This requires substantial community engagement. Community engagement represents channels for community members to develop competence in understanding solar project development, express the community outcomes they most desire, and guide developers to facilitate the subsequent processes (design, permitting, construction, and interconnection, and others) in a community-centric manner. These may include:

- Creating a community engagement work group and utilizing tools like the *Spectrum of Community Engagement to Ownership.*[108]
- Partnering with community-based organizations (CBOs) to support outreach, education, and subscriber sign-ups.
- Nurturing trust and authentic ties with the community via events held at community-centric locations, offering translation services, providing space for feedback, and offering clear and direct communication from the developer.

Proactive Community Engagement

There is broad agreement that greater community involvement in solar projects leads to greater community-led economic development. *Figure 6* reproduces a DOE visual showing that greater community ownership increases the speed and accrual of community economic benefits. Participants in the community of practice that led to this report (see *Appendix A*) added that this phenomenon is not limited to ownership per se, but includes involvement through ownership as well as governance, fundraising, visioning, planning, participation, and other mechanisms.

Figure 6. Community Benefits Accrue with Community Leadership



Note. Reprinted from "Community Solar: Overview, Ownership Models, and the Benefits of Locally-owned Community Solar Projects", Office of Energy Efficiency and Renewable Energy, 2023, U.S. Department of Energy.

One innovative community engagement mechanism is fundraising and crowdsourcing. Nonprofit organization *Anpetu Wi* has raised funds for Standing Rock to de-risk a renewable energy project and help cover project development costs.[109]

Barriers to Community Engagement

Equity and Access Barriers for Low-Income Constituents

While some barriers to LMI solar customers are provided in *Section 2.2*, we expand on these to offer greater insight into specific challenges faced:

- LMI households disproportionately lack access to solar. This discrepancy is likely to be perpetuated, because LMI households are less attractive to solar marketers due to the higher costs of customer acquisition and perceived higher risk. They are "more likely to need home repairs before install, more likely to have financing challenges and less likely to speak formal English."[110]
    - LMI households often have difficulty building wealth.
    - It has historically been especially hard for LMI customers to access solar due to high upfront costs and the prevalence of scams promising zero costs but delivering otherwise. Household-scale solar ownership is often not an option because of upfront costs, low credit scores, old roofs that cannot support a solar installation, and the fact that many LMI households rent and do not have the authority to install solar on their property. LMI individuals also tend to lack the tax liability that would allow them to benefit through the ITC.
    - Long-term solar contracts can pose risks to LMI households, who are more likely to move or face income instability.[111]
- Households with high energy burdens often lack the cash and willingness to invest in new energy programs. In some parts of the country, households below 50% of the federal poverty line spend a median of over half their income on energy.[112] Although these households may benefit the most from access to a more affordable electricity source, any upfront cost presents a substantial barrier.
- Households face complexity in navigating the solar market and identifying trusted programs and offers.
- The solar market is not yet mature. Some states lack sufficient interest in solar, limiting customer awareness and program availability, and these barriers tend to impact lower income households more.[113] For instance, while a high-income household might choose to install solar despite a lack of bill savings, LMI families are unlikely to make this choice in the absence of enabling programs.
- Solar programs are forced to compete with existing low-income energy programs—rather than coordinating efforts to provide streamlined services for low-income customers, most programs have unique and separate sign-up processes. For instance, federal programs focus on bill payment and energy efficiency through programs like LIHEAP and the Weatherization Assistance Program (WAP). In some cases, greater familiarity with these types of energy assistance programs and participation in these programs means that households may accrue less savings through solar energy so are less likely to apply.[114] Even so, solar energy offers long-term savings that, combined with weatherization, can be impactful. The Clean Energy States Alliance notes,

    > *Annual LIHEAP appropriations from Congress cover only about 20 percent of those eligible for support. Also, LIHEAP caps the number of years that a*

recipient can get support, creating the potential for gaps in coverage. Assistance program models based on solar can be structured to deliver steady savings to customers over the full 20- to 30-year life of the solar installation.[115]

Policy Barriers

- State policies for household and community solar are all different; many require customers to contribute money up front through a program enrollment fee. State and local policies to enable or incentivize distributed solar, such as community solar, bill crediting, net metering, and virtual power plants, are not available in every state.[116] Existing state and local policies tend to have limited carve-outs for community solar and especially community-owned solar.[117]
- Community engagement has not been prioritized through policy mechanisms. Justice40 requires Community Benefit Plans (CBPs), but DOE projects have not historically prioritized them.[118] This history means that many developers lack deep experience partnering with communities to develop appropriate projects.
- Excluding cooperatives, community receipt of benefits through cash payments can trigger securities regulations.[119] Federal and state securities compliance can be difficult for community-based developers due to limited capacity.[120]
- Program and policy design often allows first-come capacity to be filled by wealthier entities and doesn't leave time and space for community engagement.[121] This challenge is exacerbated when demand for available low-income program slots vastly outstrip the income-qualified household base.
- The definition of disadvantaged communities can change from place to place and can also exclude some people deserving of extra attention.[122]
- Local permitting and interconnection delays add to transaction costs for community-based developers and contribute to customer unaffordability.[123] In addition, "many of the states with the largest percentage of low-income residents are those least likely to have pro-solar policies."[vii][124]
- Uncertain rate-setting and program integration prevent developers from participating in certain state programs.[125]
- Investor-owned utilities often oppose distributed solar. These utilities profit substantially when they build and use their own infrastructure, so they have disincentives to support third-party owned solar projects. They may seek to dissuade customers from building these systems through increased fixed charges, interconnection delays, or changing net metering policies.[126] Stances like these

[vii] States with the most low-income residents include Louisiana, Mississippi, New Mexico, West Virginia, Alabama, Kentucky, Georgia, Arizona, North Carolina, South Carolina, and Oklahoma; of these, Clean Energy States Alliance rates only Washington, D.C. and New Mexico as having strong distributed solar policies.

can have a disproportionate impact on low-income customers through ratemaking. The Consumers Union notes:

> *Fixed charges tend to increase bills for low-usage customers while decreasing them for high-use customers. Because low-income households generally consume less electricity than other residential customers with larger homes and more appliances and electronic equipment, higher fixed charges increase utility bills most for those who can least afford the increase.*[127]

- Rental models tend to work against solar. Landlords tend not to pay for solar installation, since their tenants—not themselves—will benefit through reduced electricity costs. Meanwhile, renters are not incentivized to make long-term investments in properties they do not own. Even when a building is master-metered and the landlord pays for electricity costs for all tenants, it is difficult to pass on savings to renters.[128] There is no standard methodology for calculating utility bills for public housing across different states, which adds a lack of predictability and oversight in these situations.[129]

Finance Barriers

Respondents to CEF's survey stated that "community does not have the capital to invest to develop community-owned projects" as the highest and most common barrier that prevents solar projects from driving local economic development.[130] NREL studies confirm this sentiment.[131] Other financial barriers include the following:

- The primary federal incentive for solar deployment is the ITC, which provides a tax credit for investments made in solar. These are highly inequitable.[132] The ITC means that developers, including community-based developers, must come up with the cash to build a full project up front, before getting reimbursed by the government 12-24 months later through their tax return. The ITC is predominantly intended for corporate investors, with a recent concession allowing tax-exempt entities to directly access a payment in the amount of the tax credit. Some nonprofits and all cooperatives and corporations face high transaction costs for workarounds if they do not have the tax liability to take advantage of the ITC.
- Non-monetary benefits are usually excluded from state cost-effectiveness tests required for projects to access funding or program admission.[133] Efforts like community engagement are therefore not rewarded at the program level.
- It is often costly to conduct community engagement in a truly inclusive way, without treating it like an "item on a checklist" or viewing it through the lens of customer acquisition.[134]

Data Barriers

- While data already show the inequality of energy costs and benefits distribution, DOE notes that:

  > *Much remains unknown about the energy justice implications of the transition to a clean energy economy. Much more research is needed to identify effective restorative measures, maximize the benefits of the transition, and mitigate potential future harms to historically impacted communities.*[135]

- Many economic and resilience benefits of solar accrue to households and communities, but it is not clear how these benefits are distributed in terms of race, income, or other factors.[136]
- Air quality and health impacts cannot be easily measured at a hyper-local level, which is the scale that most individuals and communities care most about.[137]
- The impacts of the energy transition—how workers from "displaced industries" like fossil fuel plants will fare in the long term—are not fully understood.[138] Stakeholders have not aligned on metrics for assessing an equitable transition.
- The impact of electrification on reducing pollution burden at industrial sites within environmental justice communities is not well understood.[139]

4.3. Equitable Project Governance

Project governance mechanisms regulate how a project is operated. They provide for community activation, community ownership, and capacity to ensure that communities can make informed decisions. These mechanisms also contribute to long-term sustainability of the project and community well-being. They may include:

- Offering flexible payment options, such as upfront payment and monthly pay-as-you-go; credit card, check, cash, and digital options; and other forms that are accessible for all types of customers.
- Creating avenues for recognizing, compensating, or rewarding the time and energy the community puts into equitable governing practices (i.e. through serving on a workgroup or Board of Directors).
- Increasing the availability of financing for under-resourced communities and community-oriented developers.

The ability to develop projects "with us, not for us" highlights the key differentiating factor between community-led economic development and other development.[140] By incorporating community agency and decision-making at the forefront of project design *and* governance, developers can build equity into distributed solar projects.

Photo courtesy of Cooperative Energy Futures

Governing Principles

Some representative governing principles for equitable solar projects might include:

- Develop projects "with us, not for us" to build equity into solar development.[141]
- Support community leadership to build capacity for local decision-making.[142]
- Empower the community by providing education, utilizing existing leadership structures rather than seeking new channels, addressing biases and barriers, constructively involving all relevant stakeholders, and mobilizing resources on behalf of the community.[143]
- Utilize "clear, multilingual communication around savings, enrollment requirements, and program participation[, and recognize that] LMI households have historically suffered from predatory energy products and contracts."[144] Demonstrate bill savings through multiple mechanisms, such as bill explanations and annual meetings, for subscriber comprehension.

Prioritize LMI Access

- LMI communities often do not see solar itself as a high priority; instead, project managers can attract subscribers by focusing on bill savings, community wealth building, and other community priorities.[145] Community engagement professionals recommend engaging communities of color by discussing not only financial savings, but also expanded access to other programs and connection with other participants. Mention of financial savings without discussing other factors may encourage distrust and skepticism in historically underserved communities.
- Partner with local, trusted community organizations. "Although it takes time and financial resources for community organizations and other players in the solar market to work in partnership, it ultimately leads to greater efficiency and a reduced chance of project failure."[146]

- Provide extra incentives for community institutions, whose high visibility can encourage other participants, and for whom savings can be redirected program areas.[147] For instance, engaging a local school as an anchor customer might open new avenues for engaging parents across the community while saving money to purchase additional school supplies.
- Minimize financial risk to LMI households and community organizations such as through strong consumer protections, savings guarantees, easy opt-out conditions, low subscription fees, and especially consolidated billing that combines bills due to the utility and to the solar subscriber. Payment programs to normalize the seasonal difference in costs per month will also help fixed income households to have more predictable bills.[148]
- Prioritize local training and workforce development.

Barriers to Equitable Project Governance

Stakeholders experience significant burdens bringing the community together during solar project decision-making processes. There are three sets of challenges to equitable governance: resource, finance, and structural barriers.

Time, Capacity, and Resource Barriers

- Community-led efforts often lack institutional and organizational support like training and technical assistance availability.[149]
- Diverse communities can intensify the burden of consensus building and collective planning. Community-oriented developers often wear multiple hats (e.g., serve multiple roles within the community), which strains resources.[150]
- Strong community engagement can elevate a greater range of community needs, which can create pressure for solar projects and programs to effectively deliver more benefits and services.
- Developers may be strained by the necessary reporting, compliance, tax liabilities, and relationship management.[151]
- It costs more time and money to serve LMI customers, because many follow-ups are often required to finish registration.[152]

Finance Barriers

- Financial institutions continue to prefer to work with larger developers and give them preferential loan terms.[153] This further exacerbates burdens shouldered by newer developers that aim to work with rural, marginalized, or environmental justice communities—who struggle to access affordable debt.[154]
- Community groups require significant access to capital to fully own solar projects.[155] Community-based developers may lack a strong balance sheet or the ability to provide project guaranties and face a higher cost of capital than experienced developers or large project owners. Community groups may also take

longer to access private funding if it is their first time seeking to execute a large debt agreement.
- Community groups generally struggle to access pre-development financing (i.e., before beginning construction) due to the high risk of project cancellation and the limited collateral they may be able to offer.
- Distributed solar projects have higher costs per unit than utility-scale projects, so they are more reliant on incentive programs.[156] This may risk the long-term sustainability of distributed solar development models.
- Federal tax credits do not support low-income groups or households with low tax burdens. Therefore, many community-based developers may struggle to access tax equity or be forced to accept non-optimal terms with a tax equity investment partner.[157] Accessing the federal investment tax credit requires third party financing, which disadvantages community-based project leads.[158]

Structural and Policy Barriers

- As there is not yet a mature market mechanism for rewarding solar developers that follow equitable governing practices, developers see these governing principles as ideals and additional costs.[159]
- State and utility programs create disadvantageous economics for community solar, including through the threat of rate and policy changes to net metering and solar programs, which could make projects that were economical when developed uneconomical in the future.[160]
- National laboratories lead many solar development efforts, including processes around metrics and evaluation, but lack deep community connections.[161]
- Governments underestimate subscriber management costs compared to other projections, which can skew project models, feasibility, and profitability. [162]
- Newer, smaller, and community-oriented developers must compete with already established solar companies for grants and technical assistance.[163]
- Community-based developers may struggle to fulfill grant contract and reporting responsibilities due to limited experience in working with federal and state agencies or other grantors.
- Small developers often cannot meet high minimum property insurance premiums.

4.4. Policy Mechanisms

There exist complex dynamics between policies, policymaking process, and the resulting landscape in which developers must operate and compete. Policy changes can contribute to effective scaling mechanisms by seeking to:

- Enable a greater variety of policy tools, such as net metering, virtual net metering, virtual power plants, and community solar enabling legislation for non-utility development schemes to encourage residential distributed solar development.

- Support private project coordination with utility distribution systems.
- Improve incentive structures for community-led projects with features that communities most desire. For instance, policies could seek to incentivize the best practices laid out in *Table 3*.
- Reduce financing costs for developers through government-backed affordable financing rates, loan guarantees, grants, or other mechanisms.

Barriers to Creating and Maintaining Enabling Policies

While many states have enacted enabling policies, there are also many states that have not supported and incentivized distributed solar and economic development.

Process Barriers

- Due to grid congestion and other programming and technical constraints faced by local utilities, negotiating and finalizing interconnection agreements is a long and costly process for both developers and the utility.[164] Investor-owned utilities are not incentivized to make interconnection easy and affordable for third-party energy generators.
- Enabling programs tend to be legislated by a bill passed by the state governing body during legislative sessions, which must compete for attention among other socioeconomic issues. Windows of opportunities to pass laws vary significantly by macro-economic factors. For example, in response to the IRA and the EPA's Solar for All programs, a significant swath of states have formed pro-solar coalitions to increase solar generation capacities.[165] Such states generally have still not sought to pass community solar policy.

Corporate Barriers

- Excessive utility lobbying and influence can stymie solar policies. In particular, large investor-owned utilities have lobbied against policies like community solar that would create opportunities outside of the utility profit model. Even in states where community solar legislation is in place, utilities can be slow to implement or do a poor job of executing programs. Perverse incentives and lobbying may intentionally slow down or defeat pro-solar bills.
- Profit-oriented actors often invest in lobbying practices to block or rewrite existing solar policies to better their profit margins. For example, the California Public Utility Commission walked back the Net Metering compensation rates for new California solar customers by about 75% in 2023, which directly increased the net revenues of the investor-owned utility.[166]
- Typical state incentives encourage utilities to prioritize owning infrastructure, even if it limits benefits for communities.

Policy Best Practices

Some best practices require changes in policy and other systems. The following opportunities for policy, programs, and information will fill important gaps. Alternative ideas for states lacking strong solar policy support are provided in *Appendix D*.

- Implement state policy to support local ownership—this includes net metering or feed-in tariffs as well as community solar policies—as in Illinois or Oregon.[167]
- Reduce upfront costs for community-based and -oriented developers through a more inclusive tax credit or replacement structure, or through bridge loan programs that provide upfront access to funding while entities wait to take advantage of tax credits.
- Incentivize local ownership–for instance, through new ITC bonus adders—for both residential and community solar.[168]
- Provide technical assistance and other institutional support, such as through resources, training and direct technical support, and accelerator programs[169]
- Provide data differentiation and disaggregated analysis on the benefits of rooftop, community, and utility-scale solar and on various ownership models.

Photo courtesy of Cooperative Energy Futures

Box 2. Community Benefits Agreements

Community benefits agreements (CBAs) are:

> *Legally binding contracts between two or more of the following parties: a project developer, a community coalition, and potentially the local government. Coalitions are widespread groups of citizens representing their diverse community's beliefs, socioeconomic classes, and races. CBA coalitions typically consist of nonprofit, advocacy, or minority rights organizations, and faith-based groups. While different groups may initiate coalitions, all should seek to act in their community's best interest.*[170]

As identified through CEF's survey, CBAs are important because "project developers stop caring about the community after the solar project is built" is ranked by stakeholders as the second greatest barrier preventing economic development.[171] CBAs offer one mechanism to require developers to support local community development, especially when a project comes with a high capital cost and will have substantial community impact.

There are several tools that offer similar benefits to CBAs: community benefits plans, project labor agreements, community workforce agreements, good neighbor agreements, and community benefits funds can provide some similar outcomes, but this report focuses primarily on CBAs and CBPs (which are very similar but lack an enforcement mechanism).

CBAs and CBPs are tools utilized to describe and enforce how infrastructure projects will provide benefits to the host community. CBAs have been used in large wind and solar projects to ensure that project development has a net positive impact on the community. CBPs are required for projects associated with Justice40 and some DOE-funded projects.[172] CBAs are required by some states: New Jersey requires CBAs for projects with total cost over $10 million, which applies to larger community scale solar projects. Michigan asks project owners to compensate host communities $2,000 per MW nameplate capacity, and California mandates a binding agreement with a community organization.[173]

Federal application of CBPs is intended to reduce carbon emissions, engage labor, create good jobs, drive diversity, equity, inclusion, and justice, implement Justice40, and create equitable economies.[174] Several DOE offices are exploring the use of CBPs, including Clean Energy Infrastructure and the Office of Energy Justice and Equity.[175]

CBAs used in conjunction with renewable energy generation usually focus on cash contributions to households, local government, local nonprofits, or a community fund.[176] Conversely, urban development CBAs tend to deprioritize monetary benefits and focus more on jobs, labor, displacement, and community programming.[177]

Some studies posit that meaningful economic development cannot occur as a byproduct of solar project development without an enforcement device like a CBA. For instance, the Initiative for Energy Justice that "Communities in the immediate vicinity of utility-scale energy projects will generally not receive benefits from the project without an externally imposed benefits reallocation framework."[178]

Failure of CBAs

Historically, CBAs and similar tools have not had the significant positive impact they were developed to create. The Initiative for Energy justice writes:

> *In creating a predictable environment for CBAs, expediting the development process tends to be prioritized over maximizing community benefits and engagement. Community benefits ordinances have generally led to non-binding agreements, excluded grassroots groups from the negotiation process, treated community benefits*

as a box-ticking exercise, and provided community benefits ceilings instead of starting points.[179]

Other points of failure for CBAs include insufficient organizing, high legal expenses, failed replication between communities, and lack of developer interest.[180] One individual noted, "we generally experience CBAs as providing communities with relatively small, insignificant amenities that are seen as charity and 'buying' a community's support."[181] CBA challenges include:

1. **Poor community engagement**. The most common point of CBA failure seems to be insufficient resources for community engagement. This can erode community trust, limit the developer's ability to identify legitimate CBA projects, and drive community discontent.[182] DOE funding application periods may be too short to enable deep engagement, driving CBP challenges for some programs.[183]

2. **Unclear or wrong engagement of community leadership**. CBAs represent an agreement between a developer and an entire community, so it is critical to define the right representative(s) for the community. Developers often work with the local government but not community groups or may select a single nonprofit and expect them to represent the full community. This dynamic can lead to inequitable provision of benefits as well as eroding trust from the rest of the community.[184] Developers should seek to engage existing coalitions within the community and to leverage existing leaders.[185]

3. **Systemic racism**. CBAs often ignore the strengths of the host community. CBA processes usually fund a third party (outside of the community) to identify and serve community needs. This ignores the important perspectives, lived experiences, and priorities within the community that can provide resources to provide for community needs. Developers should work to create a culture of listening and respecting these communities, including by providing direct support.[186]

4. **Unclear community priorities**. The World Resources Institute notes that although there is mounting interest in CBA processes, "there's relatively little research on the kinds of benefits people want, what they need to be able to engage with developers, and what mechanisms can ensure accountability and faithful execution of these agreements."[187] Community leaders should develop a wish list of shared priorities to yield specific tangible benefits.[188]

5. **Generic goals**. Templates are easy but do not create successful CBAs; contents should be tailored to specific community priorities.[189]

6. **Unclear enforcement mechanism**. CBAs often fail because communities do not know how, or cannot afford, to enforce them through existing channels. The CBA contract should specify who may enforce it and through what channels to ensure that the community can enforce it afterwards.

7. **Developer equity concerns**. Energy developers who have already developed CBA or CBPs tend to be more willing to pursue them again. DOE programs utilizing CBPs have preferenced developers with prior experience, because those with pre-existing experience "had an easier time interpreting and navigating DOE's expectations and developing positive working relationships with the agency [DOE]."[190] Strict requirements around CBP or CBA processes may limit the ability of new developers to enter the space.

8. **Limited community capacity**. Especially in rural communities, communities do not always have the capacity to provide new employment or meaningful new infrastructure development.[191]

CBA Best Practices

Best practices from successfully implemented CBAs and other similar agreements can offer insight. However, there are limitations to the transferability of these best practices. Some researchers say that "CBAs are successful because of the uncertainty of the project's

outcome; this uncertainty derives from the very real risk that the community coalition demanding a CBA will be able to block the project from moving forward if the coalition's demands are not met."[192] Such risks may limit the usefulness of CBAs/CBPs as a mandated tool as required by Justice40 projects, if utility is situational. It is also possible that CBAs are only useful tools for large, privately owned solar projects given the power dynamics and scale involved.[193] Other mechanisms might be more appropriate for these smaller-scale projects.

Best practices for CBA implementation include the following, which are generally best practices for all solar developers working in a host community and are provided in approximate order of importance:

1. **Sufficient outreach**. CBAs require there to be a relationship of trust between a developer and host community. Many failures occur because developers do not allocate sufficient time to relationship development and community engagement. DOE Phase 1 funding through various Prize mechanisms can often be used to support outreach directors, who can support CBP development on behalf of a company.[194]

2. **Provide the economic benefits relevant to the community**. Economic benefits from CBAs can include jobs, living wage programs, targeted hiring programs, training, affordable housing programming, prioritization of small local businesses, and protection if project funding falls short.[195] Other nonfinancial benefits can include inclusiveness, enforceability, transparency, coalition-building, efficiencies, and clarity of outcomes.[196]

3. **Responsive communication**. Developers should indicate clear communication channels where community-members can ask anything related to the project and/or the CBA, and the developer *always* responds in a helpful and timely fashion.[197]

4. **Peer learning**. Communities who have successfully utilized CBAs to derive economic benefits are a crucial resource for communities beginning the process. In a Montana mining town, community leaders brought in representatives from nearby communities, who had already completed CBAs with industrial partners, to provide a full day workshop sharing lessons and best practices.[198] Not only should community groups seek out peer learning, but federal funding mechanisms could also enable accelerator type programs that bring together new and experienced representatives to hasten this process.[199]

5. **Inclusive workforce development**. Workforce development is often limited through technical colleges and community colleges, which can leave certain demographics out for socioeconomic reasons. One survey respondent noted that "the solar industry near me has been particularly bad in creating jobs accessible to the majority of poor people…solar jobs training programs [are located] in the deep suburbs where you need a car."[200] These facilities also may not be readily accessible to all community-members; in large cities, workforce development should be provided at a number of locations.[201]

6. **Clear expectations**. The U.S. Bureau of Ocean Energy Management (BOEM) sets a dollar value for expected community benefits realized through the CBA–this expected value is a percentage of the project bid price.[202] BOEM also offers certain credits to contractors who can demonstrate that they implemented a CBA that meets certain conditions. This model could be translated to solar energy projects.

7. **Measurable metrics**. CBAs should include measurable commitments so that it is obvious whether or not the developer is meeting commitments and enforcement mechanisms can be triggered as appropriate.[203] These metrics could include:

> *1) The number of stakeholder events, participants, and/or dollars spent to engage with organizations and residents [of communities], including participation and notification of how input was used; 2) Number of tools, trainings for datasets/tools, people trained and/or hours dedicated to dataset/tool and technical assistance and knowledge transfer efforts [to communities]; 3) Dollars spent or number of hours*

spent on technical assistance [for communities]; 4) Dollar value and number of clean energy assets owned [by community] members.[204]

8. **Third party evaluation**. Some stakeholders recommend that IRA and IIJA funding be utilized to fund third party evaluations of CBPs required through funded programs, as well as to track benefits across multiple projects and communities through long-term evaluation.

9. **Education**. Developers should have a pre-existing understanding of the CBA process before engaging with a community. Many developers are unaware of CBAs as a tool, and substantial education will be required for them to effectively participate in a CBA process.[205] Report contributor Solar Stewards is developing a CBA generator, which may be a useful resource for entities developing these agreements.

10. **Compensate communities** just like every other partner. All entities involved in the development of a solar project are compensated–except, usually community representatives. DOE and project developers should provide technical assistance, capacity, training, and financial compensation to host community members involved in a solar project.[206]

11. **Better agency coordination**. CBPs should trigger cross-agency coordination at the federal, state, and local levels "to make substantial and aligned investments... such as investments in workforce housing, local water systems, public health services, or public parks and trails."[207] Cross agency coordination could also better take advantage of investments in supply chains and equity.[208] Better communication within branches of government, such as within DOE, would also enable smoother project development.[209]

12. **Clearly define the community**. Ideally, CBAs should be implemented across a clearly defined community, such as a clearly delineated neighborhood or a city or county boundary. Projects should not create new boundaries to define the "community" as this can create new tension locally.[210]

13. **Clear timeline**. CBAs should include a clear start and end date that aligns with project construction and the time horizon of expected project impacts. Many CBAs include a limited term length, but a multi-year CBA can best align economic development benefits with a project lifespan.[211]

CBA Resources

Because we believe CBAs have limited universal applicability to distributed solar projects, we are not replicating case studies or other resources here. However, many examples of successful CBAs and CBA policies are available. These include:

- A Community Benefit Fund[212] was used to pass savings on from several church subscribers of a community solar garden to community members in Mississippi.
- The People's Justice40+ Comunity Benefits Playbook[213] provides detailed information about the formation of a CBP, community action, where to start, and a guide to creating a CBP or community workforce agreement.
- The Portland Clean Energy Community Benefits Benefits Fund[214] provides long term funding to support community action.
- The City of Detroit's Community Benefits Ordinance[215] requires proactive community engagement to realize millions of dollars of community benefits through certain projects.

5. Recommendations

5.1. For Project Developers

Project developers and owners determine how projects will be developed and who will benefit. The following recommendations offer ways that developers can optimize community economic development outcomes.

1. **Engage the community early and often** in the pre-development and development process. Developers should engage the community before beginning to make demands (e.g. through public permitting meetings). Consider creating a local, representative workgroup to support engagement within the community,[216] and "insist on the involvement of community organizations."[217]

   Milestones: Seek to engage the community multiple times before beginning the permitting process. Best practices for engagement could include:

   - Provide food at community events
   - Meetings should be accessible; vary times and locations to allow for more participation and provide childcare
   - Provide stipends to participants
   - Share stories of what good projects look like, including key elements that make a "good site" or what a "good deal" can look like
   - Begin engagement before permitting process, not during or after—starting from the beginning of site consideration
   - Provide additional offerings for home energy audits or evaluations, which can provide guidance or aid in prioritizing immediately beneficial steps as well as offering a "free" point of engagement with a tangible opportunity for follow-up engagement

   Example: Many of the recent DOE Prize programs have required proactive community engagement before project planning begins in earnest. Through a Clean Energy Innovation Prize, East Phillips Neighborhood Institute—a Minneapolis-based community group—and Cooperative Energy Futures—a Minneapolis-based community solar developer—hosted multiple community meetings to discuss a shared vision for community solar on the roof of an industrial building at a former SuperFund site. Community members had many questions about the project, but early engagement provided opportunities for concerns to be heard and questions to be answered.

   The PUSH Buffalo Community Advisory Board, Energy Allies, and People Power Solar Cooperative have conducted high quality community engagement and training activities that incorporate discussion around project finance, ownership, operational models, energy democracy, and leadership development. Similarly, Sustainergy in

Cincinnati provides examples of labor union and worker-owned cooperative project development. Most participants in CEF's survey, however, noted their interest in accessing these types of educational tools and their capacity constraints in providing them locally.[218]

2. **Involve Community-Based Organizations (CBOs) who can support solar projects**. CBOs are often the best messengers for technologies like solar that can require technical expertise and may experience local resistance. CBOs are rooted in communities, hold trusting relationships, and have the skills to conduct outreach and engagement on sensitive topics. Developers, funders, and state and federal agencies should provide greater support to CBOs to engage in outreach to develop a base of engaged potential solar subscribers. In particular, developers should engage—and appropriately compensate—CBOs to support subscriber acquisition.

   Milestones: CBOs should be engaged at the outset of project development and can be a key partner in customer and subscriber acquisition.

   Example: Green Energy Justice Cooperative (GEJC), a South Chicago-based community solar developer, engages a local (township- or county-based) CBO to support subscriber acquisition for every project. This engagement with local women- and minority-led institutions, such as Accelerate Climate Solutions, Will County Center for Community Concerns, MECCA Marketing, and Blacks In Green, ensures that subscribers can work with a trusted partner to understand the nuances of Illinois's community solar program. GEJC compensates its CBO partners at a base rate plus a per-subscriber commission. The community-oriented nature of GEJC's approach allowed their 2023 project proposals to be ranked in positions 1, 2, and 4 for all community solar applications across the Illinois Shines sub-program.[219]

3. **Create trusted educational channels** so that communities can learn about cooperative and other structures that can be more beneficial than third-party owned systems. Especially in states that have carve-outs for community-owned projects, education and other solar incentives can encourage knowledgeable customers to participate in solar programs and access the corresponding economic development benefits. Strategies to support community education could include:
   - Discuss how ownership structure can unlock potential benefits
   - Communicate transparently about the value and benefits of solar
   - Share a transparent financial model
   - Move away from third party ownership of solar projects and communicate other possible ownership structures to communities (cooperatives, etc)
   - Hire outreach leads who look like their communities. I.e. more Indigenous workforce members

- Compensate community members to show up to engagement and educational events; provide meals, gift cards, and other perks

Milestones: When signing up prospective solar customers, developers should provide educational materials to strengthen customers' understanding of the programs they may participate in.

Example: To promote distributed solar solutions in an area with a substantial low-income population, the city of Richmond, California used incentive programs, deep customer engagement, workforce development programming, and community choice aggregation. Local and state incentives enabled household rooftop solar to be cost-effective for residents, and the city partnered with GRID Alternatives, a nonprofit organization, to conduct community outreach, home assessments, and solar installations. Because rooftop solar was not appropriate for all residents and buildings, the city also implemented a Community Choice Aggregation program that allowed customers to select 50% or 100% renewable electricity service options that are comparable in price to default PG&E utility service.[220]

4. **Coordinate solar with other social services, especially in LMI markets**. Consider offering or coordinating with energy efficiency initiatives to enhance and compound the value of distributed solar installations. These efforts will be beneficial where feasibilities for solar installations are low, ensuring that there is "something for everyone" in the company's offerings.[221]

   Milestones: Before initiating new programs, local, state, and the federal government should conduct a cross-team interdisciplinary exploration of relevant programming and create mechanisms for customers to access multiple programs through one sign-up process.

   Example: DOE notes in a report that:

   > *LMI adoption could be accelerated by integrating solar installation with other LMI services… such as weatherization efforts, or even more broadly focused on other LMI housing services or other benefits, such as financial assistance for families. Packaging solar with other service delivery options can provide additional savings for tenants and streamline the customer-adoption process. Packaging solar with service delivery targeted to LMI customers could be a way to expand solar access in LMI communities. Service delivery of onsite solar via the Weatherization Assistance Program has been demonstrated, and renewable energy is considered a weatherization measure.*[222]

   These recommendations are of course in addition to ensuring that solar projects have strong consumer protections, which may require state leadership.

5. **Manage bills to maximize clarity and affordability** for customers. Solar benefits can be confusing for customers. Rooftop solar, for instance, usually requires an upfront payment that prevents customers from comparing monthly bill impacts. Community solar programs often require a separate billing process, so customers may receive one community solar bill and one electricity utility bill. Instead, states, utilities, and in the meantime, project managers should seek to implement consolidated billing, combining all electricity program benefits and fees, so that customers can fully understand and manage their electricity bills.[223] Managers should match their billing structure to customer needs; for instance, a fixed capacity-based subscription will charge a fixed $/W monthly rate—this provides cost certainty but may not guarantee monthly bill savings.[224]

   Solar project managers should also develop structures that maximize subscriber economic benefits, especially for LMI customers. The National Consumer Law Center recommends the following:

   - *Transparent and reasonable contract terms*
   - *Clear communication in appropriate formats*
   - *Accessible complaint mechanism and data disclosure*
   - *Effective evaluation and enforcement process*[225]

   Milestones: Project managers should ensure on an annual basis that customers are breaking even or saving money through their solar subscription.

6. **Include non-energy benefits** when calculating project benefit-cost ratios to demonstrate the positive impact for communities and lenders.[226] For instance, project developers should seek to quantify the metrics listed in *Section 3.3* and to provide estimated values when discussing project details with community-members, financiers, and other partners. States can support this action by ensuring that non-energy benefits are included in their value of solar calculations.

   Example: Olympia Community Solar provides a range of metrics in their project summaries including electricity production, customer savings, energy burden reduction, and greenhouse gas emissions avoided.[227] These metrics make it easy for consumers, funders, and other partners to easily understand the impact of the company's project-level impacts.

7. **Develop innovative partnerships** to increase access to the right project sites at the right time, increasing solar penetration and decreasing overhead costs. Developers can partner with roofing contractors and real estate investors to align rooftop projects with roof replacement or installations. Developers might also benefit from partnerships with energy efficient housing builders and other real estate developers who can include the installation of a solar project in their construction loans.[228] Partnerships with HVAC, carpentry, and insulation trade services offer holistic

services. Finally, partnerships with training programs for formerly incarcerated people or those recovering from addictions can often provide training during probationary periods, which can help companies to hire job-ready citizens while also giving back to the community.

Example: Uprise Solar, based in Washington, D.C., recently partnered with an experienced roofing to offer a combined roofing-plus-solar business model. One article notes,

> *Around 2.3 million single-family detached houses will need roof replacements every year until 2030... If even some of those houses went solar around the same time as their roof replacement, the United States could leap towards decarbonization goals.*[229]

8. **Follow other industry best practices**, including:
    - Developing portfolios rather than single projects to access economies of scale
    - Ensuring a clear process and point person for operations and maintenance of the project after it is online
    - Pursuing solar plus storage to provide resilience and enhance the value of distributed solar to the host community
    - Minimizing jargon and acronyms for clear and understandable communication with communities

5.2. For Financiers

1. **Provide low-cost, non-extractive capital** that covers a meaningful amount of project cost.[viii] It is not manageable for most community-based developers to navigate multiple small sources to fund their projects. Financiers can support developers in establishing a single relationship with a lender that supplies the majority of their financing needs.

   Example: CollectiveSun provides low-cost capital to finance mission-aligned solar projects through an innovative financing model. CollectiveSun takes on the legwork to identify a suite of philanthropic lenders willing to back the project and delivers one loan to the project developer, while they manage multiple loan syndication. They strive to offer this service specifically to nonprofit and community-owned projects that will drive benefits into the community.

2. **Provide longer-term credit** with lower interest rates to projects offering outsize community benefits.

[viii] For instance, such capital should be offered at 5% interest rate or lower and be offered for a loan term of 7-12 years.

Example: The Climate Access Fund, a Maryland-based nonprofit green bank, "originates, develops, and finances" distributed solar projects tailored to benefit nonprofit, public, and low- and moderate-income customers. The Fund requires 50% of subscribers to come from low- or moderate-income households, and offers extremely attractive financing terms to ensure that subscribers save 20-25% on their electricity costs. The Fund also offers a "Solar Bill Guarantee" product that backstops community solar bills to address the challenge of bill defaults.[230]

3. Make focused efforts to **reduce financial barriers that community-based developers face** when trying to build projects of 5MW and smaller. For instance, lenders can adjust requirements when lending to community-owned projects to provide more flexibility for community groups that have smaller account balances and less ability to contribute equity into the project. Lenders should also provide funding and financing to support community outreach and engagement, with recognition that these activities are key to optimizing community benefits

   Example: Afterglow Climate Justice Fund, a loan fund owned by the Candide Group, provides flexible funding for climate justice-focused work targeting historically disadvantaged communities. Afterglow provides affordable interest rates and flexes traditional lending requirements, such as the availability of certain types of collateral, in order to facilitate community-based organizations in developing important projects. The Candide Group describes their fund:

   > *The Afterglow Climate Justice Fund focuses on the root causes of the climate crisis through an intersectional lens of racism, classism, capitalism, economic injustice, and environmental harm. The Fund will lend to organizations serving communities living in persistent poverty, facing high energy costs, lacking access to clean transportation, and disproportionately suffering from the effects of extreme weather. We share movement leaders' views of shifting to a regenerative economy based on ecological restoration, community protection, equitable partnerships, justice, and full and fair participatory processes. Across the board, our investments will support the creation of green jobs and solutions with leadership and ownership proximate to the communities served.*[231]

5.3. For State Governments

1. **Enable net metering, virtual net metering, community solar programs with consolidated billing, and household solar incentives**. States may also consider interconnection reforms (flexible interconnection, cost-share upgrades, proactive upgrades), virtual power plant legislation, and battery energy storage incentives. Collectively, these programs will drive the inclusive distributed solar efforts that provide community economic development. DOE notes:

Offsite solar options, such as community solar, can mitigate the need for individuals to secure their own financing and host a solar system, while still providing bill credits to LMI customers. State-level community solar programs with carveouts or other measures to support LMI subscribers have been implemented in at least 17 states and Washington, DC.[232]

States should seek to develop programs that equitably distribute solar costs on the grid.[233] This can include the inclusive and innovative design of developer and subscriber program access requirements such as application fees, bond minimums, and agent training requirements to align with project and organization size to eliminate procedural barriers for smaller market actors. Programs should also require a minimum fraction of participation by LMI customers.

Examples: The Minnesota State Legislature passed a bill in 2013 to enable a community solar garden program that integrates with the state's largest utility, Xcel Energy. The 2013 legislation enabled community solar gardens to operate starting in 2014, and structured an incentivizing reimbursement rate to drive new solar projects.[234] The reimbursement rate meant that customers could generate savings by subscribing to community solar projects. However, in 2023, the Public Utilities Commission retroactively adjusted this structure to substantially decrease reimbursement rates from the state's first projects. Xcel Energy is now instructed to compensate these community solar gardens at a much lower rate that reduces customer bill savings. In 2023, the legislature also passed a bill to implement a Low and Moderate-income Accessible Community Solar Garden program to funnel more of the impacts towards LMI households.[235] Xcel Energy is the only utility in Minnesota required to support a community solar program, creating inequities among Minnesota communities and geographically restricting this tool.

Lack of regulatory certainty and changing conditions have hindered rapid solar growth in Minnesota. A similar ruling by the California Public Utilities Commission in 2023 similarly reduced rooftop solar incentives and in turn collapsed the market for most homeowners.

California, a long-time leader in the renewable energy space, also retains policy challenges. Survey respondents noted that "The regulatory environment in California is extremely friendly to the investor-owned utilities and increasingly hostile to distributed energy resources–rooftop solar, as well as community solar." They also flag changes to the state's net metering policy that have reduced the availability of local rooftop solar job opportunities.[236]

2. **Make affordable and accessible financing available** to communities and specifically incentivize LMI solar programs.[237] Access to affordable and accessible financing is one of the biggest problems facing community-based solar developers and owners.

Affordable financing is a solution to additional barriers, such as the provision of ITC incentives *after* a project has already been completely built.[238] Federal IRA dollars, such as through the Greenhouse Gas Reduction Fund (GGRF) and Solar for All programs, may offer an initial starting point for state financing entities like state green banks to offer more affordable financing terms for mission-aligned projects. Community-based developers may require additional assistance in securing financing. Green Banks or their partners could provide practical technical assistance accessing funding for first-time developers.

Example: States are increasingly creating green banks that can utilize GGRF funding to jump-start projects with outsize impacts. Most lenders provide GGRF resources at an interest rate of 5%, which is well below the market average today. The utilization of these funds, often matched with other sources of funding, is important for enabling community-based and other projects—especially those targeting historically disadvantaged communities—to realize their goals.

3. **Support LMI solar adoption through electricity rate design**. Utilities themselves are not incentivized to democratize energy access and to support LMI household access to clean resources. State oversight is likely required to ensure that economic development benefits of distributed solar reach LMI households.[239] States should consider providing and/or requiring utilities to provide direct bill payment support, training, education, and energy efficiency programming to expand the benefits of community solar to LMI households.[240] Fair and reasonable residential rates for distributed solar net metering, incentives that scale with LMI inclusion, and incentives that scale with frontline community representation can help to expand LMI programming.[241] Stable rates are also critical, and states should think carefully before changing net metering rates and community solar program structure, which can disincentivize new investment. Finally, states should consider subsidizing solar through incentive programs like rebates, tax credits, and production incentives.[242]

   States can consider replicating successful programs, such as Illinois Shines or New Hampshire's Low and Moderate Income Community Solar Grant, which incentivize electricity bill savings for low-income customers. They can also consider leveraging incentives geared toward improving housing quality standards and impacting health benefits of housing voucher recipients.

   Example: State legislation in New Hampshire requires the state energy regulator to allocate at least 15% of its Renewable Energy Fund to "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 multi-family rental housing."[243] Allocation is granted through a Request for Proposals process, and the "Net Direct Benefits to LMI Participants" is the highest scoring selection criterion.[244]

4. **Control the predatory practices of many solar companies.** Many communities and individual customers are prevented from accessing the benefits of distributed solar due to simple distrust of the companies developing projects. Not only are there direct scams that take advantage of household subscribers, but poor consumer protections also allow some corporate developers to implement projects that do nothing to expand local economic development in host communities. States should expand efforts to reel in these bad actors while providing more education and marketing, and market information (how and where to find providers), to drive customers to high-quality solar installers and developers.[245]

5. **Encourage municipal electricity utilities and rural electric cooperatives** to implement programs that support LMI solar access. These entities tend to have less oversight from state utility regulators and have different motivations than investor-owned utilities, and they offer massive opportunities for rural and LMI community-oriented solar projects. They are often ignored in broad efforts to encourage distributed clean energy; for instance, in Minnesota, only one investor-owned electricity utility is required to enable community solar projects, leaving customers in the rest of the state with limited or no access to such opportunities.

   To encourage these programs, the state government should consider supporting new capacity for city and municipal sustainability programs.

   Example: DOE's Achieving Cooperative Community Equitable Solar Sources (ACCESS) project funded electric cooperatives from 2021-2023 to develop "innovative ways to bring the benefits of solar power to their low- and moderate-income members."[246] Similarly, the National Rural Electric Cooperative Association (NRECA)'s Advancing Energy for All program is a co-learning space for rural electric cooperatives to better serve LMI members and increase the availability of economic benefits to those customers; and NREL's Communities Local Energy Action Program offered a certain amount of technical assistance through a direct pay model.

6. **Encourage participation in solar adoptions and awareness programs** to engage multiple tiers of government and community organizations in distributed solar programming. For instance, Solar for All and Solarize programming often seek to educate and create communities of interested stakeholders, which can increase visibility, trust, and education about the availability of appropriate programming for wary customers. Solarize campaigns are noted for offering competitive processes for installer selection, strong community outreach, and a limited sign-up window that can drive an increased rate of customer opt-ins.[247] Solar for All projects are also easily adapted to local community conditions.

   Example: Solarize programs in both rural and urban Iowa communities created platforms for municipal, county, nonprofit, advocacy, and developer partnerships.

Implementers note, "By bringing communities together and investing wisely, we can build a prosperous clean energy future where nature and people thrive."[248]

7. **Measure and publicly report on energy equity indicators**. Without strong metrics and indicators of progress, we cannot effectively track or cite how distributed solar is driving equitable outcomes. States should implement consistent tracking processes to track progress, measure programmatic efficacy, and help communities and project developers understand the impact of their work.[249] One stop shops or energy navigator services can offer regionally specific resources and support customers in navigating program availability.

   Example: California's *Energy Equity Indicators* provide a number of energy equity metrics, summary reports, and other tools to help stakeholders "identify opportunities to improve access to clean energy technologies for low-income customers and disadvantaged communities, increase clean energy investment in those communities, and improve community resilience to grid outages and extreme events."[250] As indicated in *Figure 7*, an associated story map provides easy access to this effort.

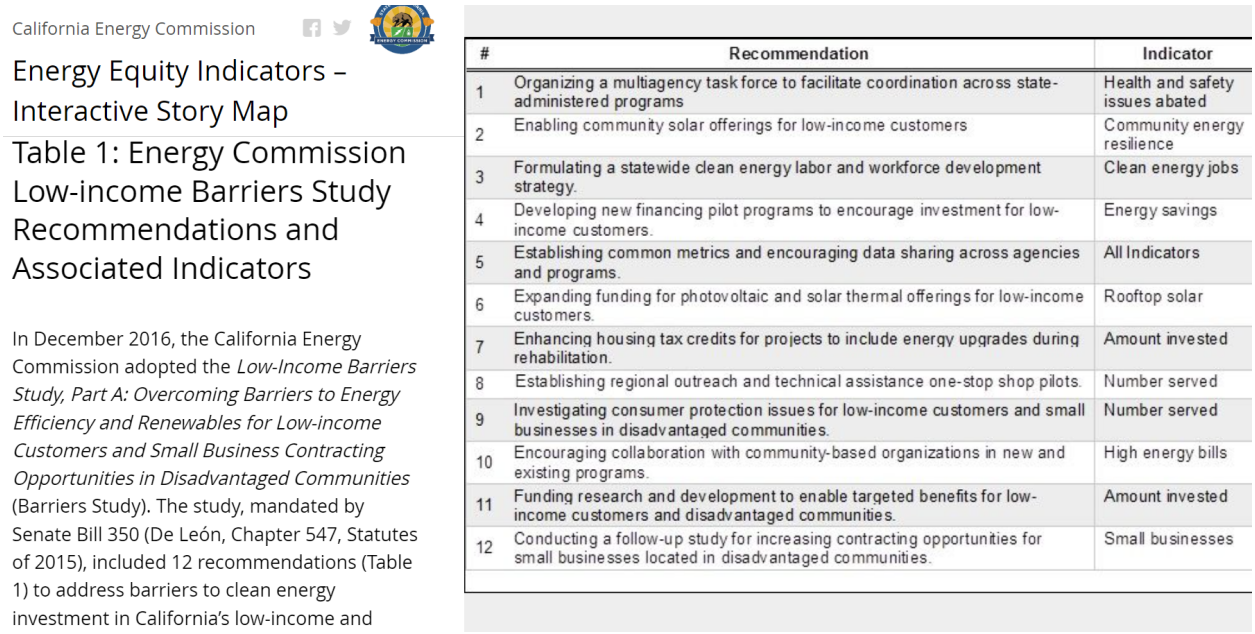
8. **Coordinate across state agencies and income-qualified programs**.[251] In many states, it can be challenging for community groups to identify and navigate various clean energy programs and the availability of technical assistance, funding, outreach, and other tools.[252] States should consider creating one-stop-shops that offer regionally specific resources and support stakeholders in navigating state program availability.

   Example: The State of Colorado includes rooftop solar as an eligible measure for its Weatherization Assistance Program (WAP). The Colorado Energy Office notes:

   > *Colorado was the first state in the nation to receive approval from the U.S. Department of Energy (DOE) to integrate rooftop PV into WAP and continues to lead the charge across the country. CEO WAP includes rooftop PV as a measure to specifically target expensive residential electricity expenditures. WAP anticipates being able to save each of its rooftop PV clients more than $400 annually by reducing electricity costs.*[253]

   Example: Additionally, the Clean Energy Connector streamlines income verification from LIHEAP for eligible individuals and families to enroll in community solar. By adopting this tool, states could help support the National Community Solar Partnership target of "enabling community solar systems to power the equivalent of 5 million household and create $1 billion in energy bill savings by 2025."[254]

Figure 7. California Energy Commission's Energy Equity Indicators Story Map



#	Recommendation	Indicator
1	Organizing a multiagency task force to facilitate coordination across state-administered programs	Health and safety issues abated
2	Enabling community solar offerings for low-income customers	Community energy resilience
3	Formulating a statewide clean energy labor and workforce development strategy.	Clean energy jobs
4	Developing new financing pilot programs to encourage investment for low-income customers.	Energy savings
5	Establishing common metrics and encouraging data sharing across agencies and programs.	All Indicators
6	Expanding funding for photovoltaic and solar thermal offerings for low-income customers.	Rooftop solar
7	Enhancing housing tax credits for projects to include energy upgrades during rehabilitation.	Amount invested
8	Establishing regional outreach and technical assistance one-stop shop pilots.	Number served
9	Investigating consumer protection issues for low-income customers and small businesses in disadvantaged communities.	Number served
10	Encouraging collaboration with community-based organizations in new and existing programs.	High energy bills
11	Funding research and development to enable targeted benefits for low-income customers and disadvantaged communities.	Amount invested
12	Conducting a follow-up study for increasing contracting opportunities for small businesses located in disadvantaged communities.	Small businesses

Note. Reprinted from "Energy Equity Indicators", California Energy Commission, 2024.

9. **Provide stricter guidelines for equitable access to community solar.** Community solar is regularly identified as the most accessible and inclusive mechanism for household access to solar; yet today, most community solar programs are highly inequitable. Despite substantial investment, "the share of community solar capacity serving LMI subscribers grew from 2% in H2 2022 to 12% in H1 2024;" these figures are far from proportional for LMI communities.[255] Community solar is enabled in less than half of U.S. states, and tends to be missing in states with the highest rates of poverty. Not all community solar programs have LMI provisions, meaning benefits do not always accrue to LMI households. All states should work to enable community solar, require minimum local customer and LMI participation levels, a minimum fraction of local jobs, and strong consumer protections.

Example: In Illinois, the Illinois Shines program (also known as the Community Solar Block Grant program) has taken great strides to enable community solar across the state. Incentives and grant opportunities make community solar accessible through a range of providers and across all publicly regulated utility territories in the state. Illinois Shines offers a number of sub-programs that offer varying levels of incentives. The Community-Driven Community Solar sub-program is directly targeted towards community-led efforts that provide meaningful benefits to the host community.[256] Programs like this should be replicated across the country to allow efforts like that

led by the Green Energy Justice Cooperative, who seeks to drive energy democracy in Chicago's South Side.

10. **Enhance procedural justice in decision-making spaces**. Today, state decision-making spaces are often exclusive and inaccessible to most communities. State energy regulators often meet during the workday, in inaccessible venues, and require deep understanding of sector jargon and docket processes in order to understand proceedings. States should seek more inclusive and participatory regulatory and utility processes and greater transparency in community energy planning and decision-making through more accessible meeting processes, providing compensation to participants, and other best practices.[257]

    States must also protect decision-making spaces from the outsize influence of special-interest groups. To set a robust an unbiased trajectory, states can design of climate action plans to address economic impacts of changes in environment and promote strategies to fortify economic benefits of energy transition.[258]

    Example: DOE's *Solar Futures Study* explains that:

    > *There are several approaches to advancing procedural justice in the energy decision-making process, many of which may begin by developing a community energy plan. For example, ongoing efforts by the U.S. Department of Energy (DOE) and NREL have focused on community energy planning and increasing stakeholder participation in the strategic energy planning process. Through development of an inclusive planning method and workshops held in collaboration with local organizations, DOE and NREL have worked to advance participatory energy planning processes at the local level. The method begins by identifying and convening stakeholders to understand the various interests across a community. Stakeholders are diverse and may include utilities, government entities, local businesses, nonprofit organizations, residents, and more.*[259]

5.4. For the Federal Government

The following recommendations for the federal government offer actions (prioritized by participants in our community of practice) that could help to scale the breadth and depth of community economic development offered through distributed solar projects.

1. **Focus resources to high poverty low-income rural communities**. Low-income rural communities are often ignored in today's policy landscape, where urban environmental justice communities tend to receive the emphasis as "environmental justice communities." Rural communities are likely to be the host of significant renewable energy buildout in the coming decades, yet their perspectives are not often prioritized in specific project development nor in policy arenas. DOE notes that by "providing incentives to site wealth-building [solar] in under-resourced

neighborhoods or on land owned by members of under-resourced communities... [solar] systems can build wealth in several ways."[260] Generic federal programs like the Rural Energy for America Program (REAP) that provide non-place-specific resources are an important start but do not offer the tailored solutions required to address vulnerable community needs.

The federal government should consider creating Justice40-like carve-outs for all programs. In particular, rural programming could include:

- Incentives for developers who attract whole-community buy-in in rural areas
- Funding for transportation to enable rural residents to participate in workforce programming usually located in urban or suburban regions
- Funding to offset the higher per-subscriber cost of attracting community solar subscribers in rural areas
- Targeted small-farm grants for behind-the-meter projects
- A platform to matchmake between interested rural landowners and developers
- New efforts to bring returning citizens into energy-transitioning community jobs

Example: The Reclaiming Appalachia Coalition represents a coalition of local organizations focused on achieving a just transition for Appalachian coal communities. The coalition seeks to funnel resources to these communities to support brownfield reclamation projects while providing local economic development. The coalition has secured over $25 million in funding to provide research on best practices for just transitions, inform mine reclamation programming nationwide, provide educational resources, and make direct grants to impacted communities throughout the Appalachian corridor. One respondent to CEF's survey noted that the U.S. Department of Agriculture REAP (Rural Energy for America Program) grant has been an important driver for solar growth in Kentucky.[261]

2. **Build on existing solar financing platform(s)** to support startups, cooperatives, and other community-based developers. In particular, DOE should expand and increase advertising about the Community Power Accelerator platform to amplify a network that bridges private enterprises and funding, in the ways that Alectriq.com or People's Solar Energy Fund also support community-based developers. DOE and EPA should also continue to offer Community Power Accelerator and other prizes that provide substantial financial awards to help community-based developers. DOE could create a list of approved "Big Brother/Big Sister" developers who are willing to be paired with other companies in order to reduce the burden on emerging companies. DOE-facilitated matchmaking services could also provide for organizations who are willing to support community-based developers in applications for grant and other funding programs.

Example: Effective accelerator programs often include a mentorship or peer learning component that allows more experienced project developers to share their knowledge with more emerging companies. The DOE Community Power Accelerator prize offers "teaming," a mechanism for a larger and smaller developer to partner on a project. However, thus far it has proved challenging for emerging community-based developers to identify a larger partner willing to invest in a new project.

3. **Incentivize developers to implement the best practices** included in *Section 5.1*. For instance, ITC adders or multipliers could be utilized to incentivize certain best practices such as those outlined in *Section 3.3*. Incentive programs may consider recommendations from *Box 3* included at the end of this section.

   Example: The Inflation Reduction Act uses the ITC to provide a baseline incentive for solar development but an increased incentive for best practices–today, all projects are eligible for a 6% ITC, but projects see a 5x bonus adder if they meet prevailing wage and apprenticeship requirements.[262]

4. **Limit the use of CBA/CBPs to situations where they can have meaningful impact.** Prevailing evidence and stakeholder consensus suggest that Community Benefit Plans (CBPs) are not an effective mechanism for driving community economic development. This can be due to too-short of a timeline for agreement development, lack of developer relationships in the community, and limited enforcement mechanisms.[263] Participants at Cooperative Energy Future's convening also questioned whether, through CBPs, DOE is asking communities to take on the role of watchdogs to ensure durability and enforcement of community benefits.[264] DOE should not support CBPs that do not offer enforcement mechanisms to the community, as this creates one more burden for the host community without ensuring true benefits are returned. Initiative for Energy Justice writes:

   > *Benefits reallocation policies have so far not advanced decision-making justice in the energy system—this would require ownership and control over the projects developed in a community. The lack of decision-making justice is a serious gap in benefits reallocation policies; policymakers should consider whether existing benefits reallocation policies are capable of incorporating decision-making justice, or whether additional policy interventions are necessary to fully realize energy justice*.[265]

   To ensure the effectiveness of CBA-type contracts, DOE should consider:

   - Conducting broad outreach and training about community benefits, CBAs, and CBPs to developers—even those who are not funded by programs that require CBP processes[266]
   - Hosting training cohorts for communities involved in CBP processes through government funding[267]

- Requiring CBAs instead of CBPs, and pairing this with availability of funding for community enforcement needs
- Withholding project incentives until developers have proven that an impactful and enforceable contract has been executed
- Providing additional funds to compensate communities for time sunk into CBA development
- Creating a funding channel to support community legal fees for CBA enforcement as needed
- Setting a minimum investment requirement for CBAs (e.g., % of project cost or $/kW minimum) to ensure that meaningful amounts of resources are flowing to the community through the process
- Improving resource availability on the DOE CBA Toolkit landing page

Example: The Portland Clean Energy Fund provides an alternative to direct developer-community CBA processes. This fund, enabled at the city level through a ballot measure, "provides a consistent, long-term funding source and oversight structure to ensure that our community's climate action efforts are implemented to support social, economic and environmental benefits for all Portlanders, particularly communities of color and people with low incomes."[268] Supporting the development of other such funds could be a better use of DOE and developer dollars than unenforceable CBPs, and could provide more clarity in terms of developer contribution and the use of funds within the community.

5. **Create more accessible affordable financing mechanisms** to better support community-led efforts. DOE should consider creating targeted funding and financing opportunities that can be leveraged to develop community-owned projects. These projects are more effective at driving community economic development but face outsize barriers in accessing third party financing. While many mechanisms are available for creating such a fund, DOE can consider:

    - Creating a mechanism to de-risk traditional project finance for community-owned projects[269]
    - Making the ITC more accessible—for instance, including community-led, community-owned and cooperative project efforts as Direct Pay eligible or replacing the ITC structure with a direct project incentive rather than a credit[270]
    - Add an economic development ITC adder of 10% to incentivize developers who adequately implement and measure community economic development[271]
    - Ensuring that federal project funding and financing can be utilized to support community engagement and outreach

    Example: In 2024, the federal government released IRA-enabled solar project through the GGRF, including Solar for All, National Clean Investment Fund, and Clean

Communities Investment Accelerator. Through these programs, nearly $30 billion dollars is available to support clean project development, with $7 billion directly dedicated to solar through Solar for All. However, these funds come with strings attached and are not easily available to community-based developers. For instance, significant institutional capacity is required for developers and owners to meet Davis-Bacon Prevailing Wage and Build America, Buy America requirements, which prevents many community-based developers from accessing funding. The funding rollout has also been slow and non-transparent, with many community groups hoping to access GGRF funding but unsure when funds will be available to them or what the spending rules will allow.

6. **Coordinate with other low-income programming** to stack and streamline enrollment across low-income customer incentives. For instance, LIHEAP, WAP, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), or the Supplemental Nutrition Assistance Program (SNAP) are all income-qualified programs that provide resources to lower-income households. While some LIHEAP and WAP programs are beginning to incorporate solar, an intentional effort should be made to coordinate across *all* federal income-qualified programming to ensure that maximum benefits accrue to households in need. This effort will also substantially reduce the burden on community-oriented solar developers, who often struggle to identify and coordinate with busy low-income heads of households. DOE notes that "tighter coordination of solar incentives and policies with energy assistance programs, home and vehicle electrification efforts, and disaster planning and mitigation may be helpful."[272]

   Example: Jubilee Housing has partnered with the National Housing Trust in Washington, D.C. to provide energy savings through solar along with additional wraparound services to support low-income housing residents. Jubilee uses solar energy to save its residents $40-$60 per month on electricity bills in addition to other energy efficiency and sustainability efforts.[273] Among other programs, Jubilee offers a "Reentry Housing Initiative" which "provides supportive transitional housing and wrap-around services for men and women who are looking to rebuild their lives in a supportive, drug- and alcohol-free environment."[274] This program includes, in addition to access to affordable and respectful housing, support through case management, money management, employment support, and recovery support.[275]

   Example: Another possible avenue could be expanding the Clean Energy Connector to incorporate additional income-qualified programs (beyond LIHEAP), to streamline enrollment in energy assistance programs for households.

7. **Implement more effective training and accelerator programs** to build community-led teams to develop and finance distributed solar projects.[276] While some accelerators are already available at federal and regional levels, greater availability of

such programs—and more localized programs that tailor to specific types of community-based organizations—is an important step to enable more community ownership over solar projects and in turn to drive community-led economic development. In conjunction, the federal government should conduct targeted outreach to make funding and incentives available to small businesses and participation by disadvantaged business owners.[277]

Example: The People's Solar Energy Fund (PSEF) offers BIPOC-centered capacity-building accelerator programs, technical assistance, a resource commons, solar project insurance pools, and dedicated grant and financing to support community-owned community solar projects. The PSEF network is an important channel for peer education and learning as well as for uplifting and supporting the work of community-based project developers.[278]

Box 3. Recommendations for IRA and Other Distributed Solar Funds

Many organizations still struggle to access funding through the Inflation Reduction Act (IRA) and other large opportunities. For those who can access these funds, we recommend that the federal government consider making the process as easy as practical.

The government should acknowledge that engaging LMI communities is messy, and that mistakes will be made, without over-penalizing program participants. Federal partners could consider the following:[279]

- Forgive up to 10% mis-characterized LMI subscribers in a solar project with no penalty
- Assign contractual flexibility to the extent possible when it comes to implementation timelines for community-focused projects
- Provide upfront clarity about the timeline of funding availability through new programs. For instance, the rollout of Greenhouse Gas Reduction Funds has been deliberative and slow; it would be helpful to small community projects to have a clearer understanding of when, for instance, those funds could be accessed.

5.5. Other Recommendations

Additional mechanisms are proposed in literature and by current sector stakeholders:

- Pursue and/or incentivize **solar plus storage** in order to enhance the value of distributed solar installations. "Financing resilience or electrification upgrades with pooled electricity subscriptions reduces the cost burden on individuals, increases

community ownership of energy systems, and offers new opportunities to spread out fixed costs over time."[280]

- Develop metrics and monitoring and evaluation structures to better **quantify the economic benefits** of distributed solar. For example, see EPA's Quantified Climate Action Measures Directory, which assesses state and local climate action plans and awarded Climate Pollution Reduction Grants from 2018-2024 and provides information on measures, tools, and geographies of quantification efforts.[281]
- **Utilize existing tools** like the EPA's AVERT, COBRA, and ESIST to estimate the financial value of non-financial benefits and incorporate these into state and project cost benefit analyses.[282]
- **Increase federal funding and beneficial policy** to drive greater investment in distributed solar projects–especially programs that prioritize LMI communities. Incentives are likely required to ensure that the recommendations included here are feasible, practical, and attractive to all parties.
- As recommended in *Section 3.4*, *e*ntities like NREL might consider further exploring baseline for the recommended metrics.

Photo courtesy of Cooperative Energy Futures

Acronyms

CBA	Community Benefits Agreement
CBO	Community-Based Organization
CBP	Community Benefits Plan
CEF	Cooperative Energy Futures
DMERL	Design, Monitoring, Evaluation, Research, and Learning framework
DOE	The U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EPC	Engineering, procurement, and construction
IIJA	Infrastructure Investment and Jobs Act
IRA	Inflation Reduction Act
ITC	Investment Tax Credit
LBNL	Lawrence Berkeley National Laboratory
LIHEAP	Low Income Home Energy Assistance Program
LMI	Low- or Moderate-Income
NCSP+	National Community Solar Partnership+
NREL	National Renewable Energy Laboratory
O&M	Operations and Maintenance
WAP	Weatherization Assistance Program

Glossary

Behind-the-Meter (BTM): Behind-the-meter solar installations are located literally on the customer side of the meter used by the utility to track electricity. This means that the customer may consume electricity from the solar project without paying the utility for distribution or supply costs.

Community-based developers: distributed solar project developers who have fewer than 20 staff; are based in the same community where a project will be developed; and have multiple mechanisms in place to enable the community to inform, shape, and/or own the project.

Community Benefits Agreements (CBAs): CBAs are "legally binding contracts between two or more of the following parties: a project developer, a community coalition, and potentially the local government. Coalitions are widespread groups of citizens representing their diverse community's beliefs, socioeconomic classes, and races. CBA coalitions typically consist of nonprofit, advocacy,

or minority rights organizations, and faith-based groups. While different groups may initiate coalitions, all should seek to act in their community's best interest."[283]

Community Benefits Plans (CBPs): CBPs are very similar to CBAs, but are non-binding.

Community Economic Development: an increase in the average standards of living within a solar host community due to the presence of the solar project.

Community-led Economic Development: Improvements in a community's standards of living through actions that are prioritized and enabled by the community itself.

Community Solar Project: A small solar array (usually in the 100 kW - 5 MW size) that provides electricity to multiple offtakers, such as households in the vicinity.

Distributed Solar: Distributed solar refers to relatively small solar installations near the point of energy consumption. It can include household-scale rooftop arrays, community solar gardens, and behind-the-meter installations used to directly power community-serving facilities such as nonprofit institutions.

Economic Development: Economic development refers to an increase in an individual, household, community, or nation's living standards, and the mechanism through which that improvement is realized.

Energy Burden: Energy burden refers to the relative impact of energy costs to a household's finances. Energy costs are inclusive of electricity, natural gas, and other heating sources. According to DOE, "Energy burden is defined as the percentage of gross household income spent on energy costs. It is calculated by dividing the average housing energy cost by the average annual household income. A household with 6% or greater energy burden is considered to be a high energy burden household."[284]

Energy Democracy: Energy democracy refers to public participation in the energy sector, including decision-making on where energy comes from and how it is managed.

Inflation Reduction Act (IRA): One of the largest one-time federal investments in U.S. history, enacted in 2022 to provide funding targeted at climate action, clean energy, and economic development.

Justice40: A policy included by the Biden administration's Inflation Reduction Act that requires 40% of certain funding to be allocated to environmental justice communities.

Mitigation: Actions to reduce the overall impact of climate change, usually by reducing greenhouse gas emissions.

Resilience: Ability to adapt to changing circumstances caused by climate change.

Appendix A: Methodology

The contents of this report were developed through a community of practice funded and supported by the U.S. Department of Energy Solar Energy Technologies Office.[285] Cooperative Energy Futures utilized the following methodology, in line with DOE's recommended process, to build the community of practice and collect information from additional stakeholders:

1. Literature review. Cooperative Energy Futures reviewed approximately 50 resources, including websites, white papers, and scientific papers, that were independently identified and recommended by DOE and core team partners. These resources were used to establish an initial framework for conversations around distributed solar and community-led economic development, and for the structure of this report.

2. Core team. As recommended by DOE, CEF led a group of six expert organizations with experience on community-led economic development. CEF convened five 90-minute meetings with these organizations over a six month period to collect insights and input into research questions defined by the team. The core team members also provided asynchronous input into project documents and recommendations. Core team members were compensated for their time and expertise.

3. Focus groups. CEF convened three 90-minute focus groups to solicit input from specific sector experts with lived experience, whose feedback required more dedicated discussion and listening than a large convening would allow. These experts were community representatives, leaders from community-owned solar projects, Tribal representatives, and community-based organizations with specific insights into community benefits agreements. CEF offered to compensate participants in these focus groups, although the majority declined.

4. Survey. In collaboration with Solar United Neighbors, a survey based in Google Forms was shared with sector participants to provide additional quantitative and qualitative information on our research questions. The survey contained 22 questions, including demographics, and 18 responses were collected. Survey questions are available to view at https://forms.gle/GG9rpgh3DA7dYd9aA.

Survey respondents represented a broad mix of the distributed solar sector, including:

- 35% female, 41% male, and 23% nonbinary or bigender;
- 11 U.S. states; and
- 13 different roles across the solar sector (e.g., private project developer, funder, etc.).

5. Community convening. As a part of this DOE collaboration, CEF hosted a three-hour virtual community convening that invited relevant organizations, individual experts, researchers, and government officials to join a conversation around scaling community-led economic benefits from distributed solar. Approximately 100 participants joined the conversation, which included about one hour of presentations from CEF and DOE and two hours of breakout group discussions around open questions in this area of work. Resources from the community convening are available on the CEF website.

6. DOE feedback. CEF joined five conversations with relevant DOE representatives to share progress towards the final deliverable (this report) and collect input and feedback from those experts.

7. Federal government recommendations. In addition to the recommendations provided in Section 5 of this report, CEF provided a standalone ten-page document outlining specific

recommendations to the federal government for scaling community-led economic development through distributed solar projects. These recommendations were requested by the government and provided more detailed suggestions for policy and process changes that could better support community-led economic development outcomes.

Appendix B: Policy Design Recommendations

Drawing from the Institute of Local Self-Reliance (ILSR), we have the following recommendations, grouped by what the practitioners call "content areas."[286] ILSR's insights stem from their "experience in Minnesota, Maryland, Washington, D.C., California, and other geographies across the country to assemble policy and program guidance for creating equitable community solar programs," which would be valuable materials for policymakers, funders, and other stakeholders to consider when designing their programs.[287] For the most detailed explanations and alternative options, review Appendix A[288] in their report.

Content Area	Recommendations	Type	Examples/Further Reading
Compensation	Ensure **residential subscribers** (community residents) have full access to benefits of the program: *Differentiated rates for residential, commercial, nonprofit subscribers*	Legislative	Residential adder in Minnesota
	Ensure **low- and moderate-income** residents have full access to benefits of the program: *Adders for LMI subscribers, or a substantial (40%) carve out of program capacity for LMI communities*	Legislative	See the Colorado example in this NREL report
	Ensure **frontline communities** have full access to benefits of the program: *Adders for residential subscribers in priority census block groups*	Legislative	Using the EJScreen or other empirical tools to identify and incorporate census block groups based on environmental justice burden into the bill
	Increase the economic impact of local hiring: *Minimum workforce target utilization of minority, women, and local workforce, plus adder for projects that exceed minimum*	Legislative and/or program specifics	Local workforce utilization as criteria for program evaluation in Minnesota (pdf) Local hiring guidelines for California Community Solar Green Tariff (pdf)
	Facilitate siting consistent with smart growth principles: *An adder for siting in locations consistent with smart growth principles (e.g., rooftop, brownfields, etc.)*	Legislative	Massachusetts SMART brownfield adder (pg. 13)

Content Area	Recommendations	Type	Examples/Further Reading
	Guarantee that the rate utility pays subscribers is adequate to finance a range of projects: *Retail rate net metering, value of solar, value of distributed energy resources, feed-in tariffs*	Legislative	Retail rate net metering for community solar (retail rate virtual net metering) • Net metering changes allow Ashland, Oregon residents to build community and offsite solar projects Value of Solar: • Austin Energy Value of Solar • Minnesota Value of Solar Value of Distributed Energy Resources: • New York: Value of Distributed Energy Resources
	More on rates: Maintain stable and predictable rate structure over the life of a solar garden (or at least many years of development). Compensate unsubscribed energy at a fair base rate that provides a meaningful incentive to subscribe	Legislative	See Appendix A in DenHerder-Thomas and Welle, 2020 (pdf).
Consumer Participation	Simplify billing and repayment for subscriber: *Allow collection of subscriber payments to the developer on a utility bill alongside delivery of utility bill credits*	Legislative and/or program specifics	See recommendations by the Coalition for Community Solar Access (CCSA) (pg. 16)
	Ensure subscribers get full bill credit for the time they're enrolled in the program, including partial months *Provide bill credits for any portion of the month that a subscriber is subscribed AND back-date credits for replacement subscribers to the date the first subscriber left*	Program Specifics	n/a
	Improve user experience:	Program Specifics	

Content Area	Recommendations	Type	Examples/Further Reading
	Accommodate changes in address. Simplify subscriber sign-up and validation process. Allow sign up through multiple methods.		See Colorado's Low Income Verification Form. See Appendix A in DenHerder-Thomas and Welle, 2020 (pdf), pg.23.
	Verify income without placing undue burden on low- and moderate-income subscribers or project operators	Program Specifics	See also "Design and Implementation of Community Solar Programs for Low- and Moderate-Income Customers." NREL (2018), pg. 19-25
	Share the financial benefits of solar subscriptions: *Allow commercial, residential, and nonprofit subscribers on the same array*	Program Specifics	n/a
	Distribute financial benefits of solar subscriptions: *Require at least 3 subscribers per garden. Limit initial base subscription by any one customer to no more than 40% of the garden*	Legislative	See "Focusing the Sun: State Considerations for Designing Community Solar Policy." NREL (2018), pg. 11-13
	Promote financial stability of projects by allowing backup subscribers: *Permit any single subscriber to take up to 50-60% of project kWh generated on an annual basis*	Legislative	See "Design and Implementation of Community Solar Programs for Low- and Moderate-Income Customers." NREL (2018), pg. 11-14.
	Accommodate changes in electricity usage: *Allow resizing*	Program Specifics	n/a
	Expedite subscriber transitions: *Utility must allow developer to adjust subscription base in a real-time basis with clarity on when change in bill credit rights will occur*	Program Specifics	n/a
	Allow individual subscriber to subscribe to more solar than they consume:	Program Specifics	n/a

Content Area	Recommendations	Type	Examples/Further Reading
	Subscribers eligible to subscribe to up to 120% of annual usage		
Program Structure	Create community standards for advancing equitable community solar: *Delegate the development of community standards to the Community Solar Advisory Committee. Use the community standards as criteria to prioritize projects and target areas.*	TBD	n/a
	Implement a project selection process that empower community oriented developers to fairly compete with for-profit development: *A. All projects that meet program requirements and deadlines are approved and grouped into batches (e.g., there are no program caps)* *B. Approved projects within a batch are ranked based on community standards around participation and local ownership; highest ranked projects are prioritized for interconnection and bureaucratic support*	Program Specifics	n/a
	Make it easy for all developers, including community-based and community-oriented developers, to identify sites based on grid capacity: *Require the local grid operator to provide transparent "hosting capacity" data that includes how many megawatts of solar can be added to which distribution feeder lines, where those lines are located, and the utility service territory of each line*	Program Specifics	Xcel Energy's Minnesota subsidiary provides a minimally detailed hosting capacity map; California investor-owned utilities also provide online maps (registration required)
	Streamline application and interconnection process:	Program Specifics	n/a

Content Area	Recommendations	Type	Examples/Further Reading
	Develop municipal utility capacity to run transparent, streamlined application and interconnection process		
Other	See Appendix A in DenHerder-Thomas and Welle, 2020 (pdf).		

Note. Generated based on "Equitable Community Solar: Policy and Program Guidance for Community Solar Programs that Promote Racial and Economic Equity" by DenHerder-Thomas, T. and Welle, J., 2020, *Institute for Local Self-Reliance.*

Appendix C: Additional Resources

Economic Development

California Air Resources Board. (n.d.). *California Climate Investments Co-benefit Assessment Methodologies.* https://ww2.arb.ca.gov/resources/documents/cci-methodologies

Environmental Law & Policy Center. (September 30, 2022). *Community-Owned Community Solar: Opportunities and Challenges*. https://elpc.org/resources/community-owned-community-solar-opportunities-and-challenges/

Gridworks. (April 2024). *Electric transmission development and community engagement: Literature review and best practices*. https://gridworks.org/wp-content/uploads/2024/04/CETA-Community-Engagement-Toolkit-Lit-Review.pdf

- Best practices for several stages of community engagement with electricity projects

Knapp, D. and Dospoy, K. (2023). *The Economic Contributions of Building Out Community Solar in Wisconsin.* Coalition for Community Solar Alliance. https://wi4communitysolar.com/wp-content/uploads/2023/08/Community-Solar-in-Wisconsin.pdf

- Economic benefits of 1,750 MW community solar facilities, over seven years, estimate to contribute $2.49 billion of economic activity in Wisconsin, 63% of which would realize during the first seven years.
- 2,713 fulltime equivalent jobs, on average, will be created or supported in the state.

Leonhardt, R., Pigeon, M., and Boucher, M. (2022). A *Census of Renewable Energy Co-operatives in Canada.* Canadian Centre for the Study of Co-operatives. https://usaskstudies.coop/documents/research-reports/2022.02.08-renewable-energy-co-operatives-in-canada_final.pdf

- This research on Renewable Energy Cooperatives in Canada provided comprehensive overviews and specific case studies in tracing cooperative efforts in the renewable sector.

Lu, L. (2024). *Community Owned Community Solar in the United States: Emergence and Organizational Strategies for Success*. Reed College.

- Abstract and introduction; Slide deck.
- Explores various burdens associated with community-led development models, such as community-owned community solar facilities, which include costs of organizing in a collective way, costs of competing with traditional developers in the market, and costs of maintaining the mission to uplift communities and equity.

Miller, S. R. and Knudson, W. (2021). *Michigan Community Solar: An Economic Assessment*. Michigan State University. https://www.canr.msu.edu/cea/uploads/files/Com%20Solar%20Report%20Final%20Edits.pdf

- Estimated 900 MW new community solar capacity could contribute an average of $952.01 million of economic activity annually over the life of these projects.

Pham, T. and Bone, C. (2023). *Economic Impact Analysis of a Community Solar Program in the State of Ohio*. Ohio University. https://economicdevelopment.ohio.edu/wp-content/uploads/2023/06/Economic-Impact-Analysis-of-a-Community-Solar-Program-in-the-State-of-Ohio.pdf

- Estimated the creation of 67 new jobs per 5 MW solar project; 23 direct job opportunities in construction and 20 indirect jobs.
- Under model assumptions, these projects can bring in $7,000-$9,000 per MW capacity in county taxes per year.

Pitt, D., Michaud, G, and Rafferty, D. *Estimating the Economic Impacts of Shared Solar in Virginia*. Virginia Commonwealth University. https://rampages.us/wilderresearch/wp-content/uploads/sites/37363/2023/01/VCU-Report-Estimating-Economic-Benefits-of-CSS-in-VA-Final-1.pdf

- Economic impact study on Virginia. Notable benefits of a 200 MW Community Solar scenario, including over $450 million in lifetime economic benefits (over 30 years); creation of 40x new jobs as compared to ongoing jobs in operations and maintenance.

ReImagine Appalachia. (2024). *Community Benefits*. https://reimagineappalachia.org/community-benefits/

Romero, P. (2023). *Primer: Maximizing Co Benefits through Clean Energy Procurement*. Clean Energy Buyers' Institute.

- Descriptions and links to sample CBAs

Sabin Center for Climate Change Law. (2024). *Community Benefits Agreements Database*. Columbia Law School. https://climate.law.columbia.edu/content/community-benefits-agreements-database

- Sabin Center for Climate Change Law has compiled a database of publicly available energy-related CBAs in the United States, categorized by project type
- Only includes utility scale renewable projects

Community Engagement

Department of Energy. (2022). *Summary: Solar Energy Technologies Office State Convenings.* Energy.gov. https://www.energy.gov/sites/default/files/202203/Summary%20-%20Solar%20Energy%20Technologies%20Office%20State%20Convenings.pdf

- Tools on subscriber outreach and other engagement dilemma.

Emerald Cities Collaborative. *Anchor-Community Engagement Workbook: Strategies to Promote Community Health, Wealth, and Climate Resilience*. https://emeraldcities.org/wp-content/uploads/2023/01/Anchor-Community-Engagement-Workbook.pdf

- Messaging and organizing tools based on 3 pilots across the country.

State Policy and Market Transformation

Burton, R. and Xu, K. (2022). *Community Solar Resource Database.* National Renewable Energy Laboratory. https://data.nrel.gov/submissions/201

- NREL database of community solar reports through 2021.

Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice

- Lots of case studies
- 10 state policies to replicate

Xu, K. et al. (2024). *State Policies and Programs for Community Solar* (2024 Q3 Update). National Renewable Energy Laboratory Data Catalog. DOI: 10.7799/2377753.

General

American Cities Climate Challenge. (2019). *Evaluate Solar Potential.* https://cityrenewables.org/on-site-solar/siting-and-potential/

California's Solar on Multifamily Affordable Housing (SOMAH) program. https://calsomah.org/

Climate Act. (2023) *Investments and Benefits Reporting Guidance*. New York State. https://climate.ny.gov/Resources/Disadvantaged-Communities-Criteria/Investments-and-Benefits-Reporting-Guidance

Connecticut Green Bank. https://www.ctgreenbank.com/

Energy Trust of Oregon. https://www.energytrust.org/

Hawaii's Green Energy Money $aver (GEM$) On-Bill Program. https://www.eesi.org/obf/case-study/hawaii

Illinois' Solar for All program. https://www.illinoissfa.com/

Maryland's Resiliency Hubs program. https://energy.maryland.gov/Pages/Resiliency-Hub.aspx

Massachusetts' Solar Loan program. https://www.masscec.com/program/mass-solar-loan

People's Solar Energy Fund. https://psef.network/members/

Portland Clean Energy Fund and Community Responsive Grants. https://www.opb.org/article/2024/09/11/portland-clean-energy-fund-invest-92-million-community-grants/

- The Portland City Council approved fundings for local, community-led climate justice initiatives.

Appendix D: Driving Economic Development in Disadvantaged Communities

In some regions of the U.S., such as the southeast, states are less likely to have strong net metering and/or community solar policies, and this creates challenges to the business model utilized in other areas with larger incentives. However, we recognize that some developers may still seek to deliver meaningful benefits to local communities through clean energy project development.[289]

Developers in such circumstances may consider:

- Working with rural energy cooperatives who have member ownership and direct contact with members to identify target customers
    - Utilizing trusted messengers to explain their offerings
    - Utilizing accessible language to make programs understandable to all potential subscribers
    - Talking about the right issue--i.e. low-income communities care more about short-term bill savings than long-term carbon impact
- Using scores for utilities, coops, and municipal utilities to assess how much the public trust them and in turn, what is needed to build strong customer relationships in the future
    - E.g., scorecards from Smart Electric Consumer Collaborative does something similar to this
- Focusing on providing and describing high-priority benefits through customer relationships
    - E.g., communicating resilience benefits
    - Maximizing regulatory transparency to build consumer confidence
- Exploring LBNL's "alternatives to subscription-based community solar models":[290]
    - Utilizing community benefit funds to distribute savings through an alternative mechanism, replacing bill credits
    - Following a cooperative ownership model to further distribute project benefits to the community
    - Working to conform projects to net metering or other unique project configurations, for instance by rewiring connections rather than relying on virtual net metering if the latter is not enabled

Endnotes

[1] World Bank Group. (2024). *2023 in Nine Charts: A Growing Inequality*. https://www.worldbank.org/en/news/feature/2023/12/18/2023-in-nine-charts-a-growing-inequality

[2] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.

[3] U.S. DOE Office of Energy Efficiency and Renewable Energy. (n.d.). *Energy and Environmental Justice.* https://cleancities.energy.gov/energy-and-environmental-justice/

[4] Smith, K.A. and Bailie, K. (June 2021). *How Communities of Color are Hurt Most by Climate Change. Forbes Advisor*. https://www.forbes.com/advisor/personal-finance/communities-of-color-and-climate-change/

[5] Center for Climate and Energy Solutions. (2023). U*.S. State Climate Action Plans*. https://www.c2es.org/document/climate-action-plans/

[6] Victor, D.G., Lumkowsky, M., and Dannenberg, A. (2022). *Determining the credibility of commitments in international climate policy*. Nature Climate Change 12, pp. 793-800.

[7] Solar Energy Industries Association. (2024). Solar Industry Research Data. https://www.seia.org/solar-industry-research-data

[8] U.S. Department of Energy. (2024). *Equitable Solar Communities of Practice.* https://www.energy.gov/communitysolar/equitable-solar-communities-practice

[9] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy.

[10] Energy Star. *Rooftop Solar*. Accessed August 23, 2024. https://www.energystar.gov/products/rooftop_solar

[11] U.S. Energy Information Administration. (2024). *Electricity Explained*. https://www.eia.gov/energyexplained/electricity/electricity-in-the-us-generation-capacity-and-sales.php

[12] U.S. Department of Energy. (2024). *States Collaborative*. https://www.energy.gov/communitysolar/states-collaborative and McCoy, M. (2024). *The 2024 Community Power Scorecard*. Institute for Local Self-Reliance. https://ilsr.org/articles/2024-community-power-scorecard/

[13] Hessel, M. (2022). *The Whys of Community Solar*. Environmental Law and Policy Center. https://elpc.org/blog/the-whys-of-community-solar/

[14] Xu, K., Chan, G., and Kannan, S. (2024). *Sharing the Sun Community Solar Project Data.* National Renewable Energy Laboratory. https://data.nrel.gov/submissions/233

[15] U.S. Department of Energy. (2024). *Community Solar Market Trends.* https://www.energy.gov/communitysolar/community-solar-market-trends

[16] Ibid.

[17] ACEEE. (September 2024). *Data Update: City Energy Burdens*. https://www.aceee.org/sites/default/files/pdfs/data_update_-_city_energy_burdens_0.pdf

[18] Drehobl, A., Ross, L., Ayala, R., Zaman, A. & Amann, J. (2020). *How High are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burden Across the United States.* ACEEE. https://www.aceee.org/research-report/u2006

[19] Sippert, E. (2022). *Community-Owned Community Solar: Opportunities and Challenges*. Environmental Law and Policy Center.

[20] Sunter, D.A., Castellanos, S. & Kammen, D.M. (2019). *Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity.* Nature Sustainability. https://www.nature.com/articles/s41893-018-0204-z

[21] Fernandez, E. F. et al. (2024). *Shady solar: understanding barriers and facilitators to residential solar adoption for low- and moderate-income homeowners in New York City.* Frontiers in Energy Research 12:1293291

[22] O'Shaughnessy, E. et al. (2024). *Evaluating community solar as a measure to promote equitable clean energy access.* Lawrence Berkeley National Laboratory, Berkeley, CA, and National Renewable Energy Laboratory, Golden, CO.

[23] O'Shaughnessy, E. et al. (2024). *Evaluating community solar as a measure to promote equitable clean energy access*. Lawrence Berkeley National Laboratory, Berkeley, CA, and National Renewable Energy Laboratory, Golden, CO. p. 2.
[24] Office of Energy Efficiency and Renewable Energy. (2021). *Solar Futures Study*. U.S. Department of Energy. https://www.energy.gov/eere/solar/solar-futures-study
[25] Survey, focus groups, and meetings hosted by Cooperative Energy Futures. (July-August 2024).
[26] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy.
[27] U.S. Department of Energy. (October 8, 2021). *DOE Sets 2025 Community Solar Target to Power 5 Million Homes.* https://www.energy.gov/articles/doe-sets-2025-community-solar-target-power-5-million-homes
[28] U.S. Department of Energy. (2024). *Community Solar Best Practices Guide: Developing Projects with Meaningful Benefits*. Energy.gov
[29] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 77.
[30] Survey, focus groups, and meetings hosted by Cooperative Energy Futures. (July-August 2024).
[31] Survey, focus groups, and meetings hosted by Cooperative Energy Futures. (July-August 2024).
[32] Forrester, S.P., Montañés, C.C., O'Shaughnessy, E. et al. (2024). *Modeling the potential effects of rooftop solar on household energy burden in the United States*. Nat Commun 15, 4676. https://doi.org/10.1038/s41467-024-48967-x
[33] Office of State and Community Energy Programs. (2024). *Solar Resources in WAP and LIHEAP. U.S. Department of Energy*. https://www.energy.gov/scep/wap/solar-resources-wap-and-liheap
[34] Berka, A. and Creamer, E. (2018). *Taking stock of the local impacts of community owned renewable energy: a review and research agenda.* Renewable and Sustainable Energy Reviews **82**. pp. 3400-3419.
[35] Rivera, Y. (2020).*Solar for All Lessons Learned.* Solar United Neighbors. https://solarunitedneighbors.org/wp-content/uploads/2020/04/2020-04-28-Solar-for-All-programs-in-DC-and-IL-Yesenia-Rivera.pdf
[36] Kienbaum, K. and Farrell, J. (2023). *Report: How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power.* Institute for Local Self-Reliance. https://ilsr.org/articles/report-advantage-local/
[37] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice
[38] DenHerder-Thomas, T. and Welle, J. (2020). *Equitable Community Solar: Policy and Program Guidance for Community Solar Programs that Promote Racial and Economic Equity*. Institute for Local Self-Reliance.
[39] Kienbaum, K. and Farrell, J. (2023). *Report: How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power. Institute for Local Self-Reliance*. https://ilsr.org/articles/report-advantage-local/
[40] Banoni, V.A. et al. (April 2012). *The place of solar power: an economic analysis of concentrated and distributed solar power*. Chemistry Central Journal **6**:S6. https://link.springer.com/article/10.1186/1752-153X-6-S1-S6
[41] Navajo Power. https://www.navajopower.com/
[42] Krishnaswami, A. and Mittelman, E. (2018). *Clean Energy Sweeps Across Rural America*. Natural Resources Defense Council.
[43] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice
[44] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.
[45] The Alliance for Metropolitan Sustainability. (2016) *Community Benefits Agreements: Growing a Movement in Minnesota*. https://thealliancetc.org/wp-content/uploads/2019/07/CBA-report.pdf

[46] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.
[47] The Alliance for Metropolitan Sustainability. (2016) *Community Benefits Agreements: Growing a Movement in Minnesota*. https://thealliancetc.org/wp-content/uploads/2019/07/CBA-report.pdf
[48] Sabin Center for Climate Change Law. (2024). Commu*nity Benefits Agreement Database*. Columbia Law School. https://climate.law.columbia.edu/content/community-benefits-agreements-database
[49] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy.
[50] Earls, M. (2019). *Climate change exacerbates the affordable housing shortage*. https://www.scientificamerican.com/article/climate-change-exacerbates-the-affordable-housing-shortage
[51] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 79.
[52] Tancabel, D. (August 27, 2042) *EPA Tools to Support States: Quantifying emissions reductions and the health and economic co-benefits of clean energy policies*. U.S. Environmental Protection Agency.
[53] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice
[54] Ibid.
[55] Ibid.
[56] Jesmer, G. (2007). *A Gift of the Sun: Donated Solar Systems Power Food Banks from East to West.* Renewable Energy World.
[57] *Personal communication*. (2024). Renewable Energy + Conference.
[58] National Grid. (2020). *National Grid's Responsible Business Charter 2020*. Responsibility, National Grid plc.
www.nationalgrid.com/document/134426/download and Howland, E. (August 2020). *Pepco Considers Non-Wires Alternatives, Issues RFI*. Microgrid Knowledge. https://www.microgridknowledge.com/distributed-energy/article/11428705/pepco-considers-non-wires-alternatives-issues-rfi
[59] Gahl, D. (2020). *How Community Solar Supports Rural Communities and Farmers*. Solar Energy Industries Association. https://www.seia.org/blog/how-community-solar-supports-rural-communities-and-farmers
[60] Nitta, N. (2024). *On a rural Hawaiian island, solar provides a path to energy sovereignty.* Grist. https://grist.org/energy/molokai-rural-hawaiian-island-community-solar-energy/
[61]Ibid.
[62] Berka, A. and Creamer, E. (2018). *Taking stock of the local impacts of community owned renewable energy: a review and research agenda.* Renewable and Sustainable Energy Reviews 82. pp. 3400-3419.
[63] Cooperative Energy Futures Staff. (September 25, 2024). *Personal Communication*.
[64] Kienbaum, K. and Farrell, J. (2023). *Report: How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power*. Institute for Local Self-Reliance. https://ilsr.org/articles/report-advantage-local/
[65] Krishnaswami, A. and Mittelman, E. (2018). *Clean Energy Sweeps Across Rural America*. Natural Resources Defense Council.
[66] Sigrin, B and Mooney, M. (NREL, April 2018). *Rooftop Solar Technical Potential for Low-to-Moderate Income Household in the United States.* https://www.nrel.gov/solar/solar-potential-low-to-moderate-income-households.html
[67] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy.
[68] Tancabel, D. (August 27, 2042) *EPA Tools to Support States: Quantifying emissions reductions and the health and economic co-benefits of clean energy policies*. U.S. Environmental Protection Agency.

[69] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice

[70] National Energy Assistance Directors' Association. (2018). *National Energy Assistance Survey Final Report*. http://box2085.temp.domains/~neadaorg//wp-content/uploads/2015/03/liheapsurvey2018.pdf

[71] Gahl, D. (2020). *How Community Solar Supports Rural Communities and Farmers*. Solar Energy Industries Association. https://www.seia.org/blog/how-community-solar-supports-rural-communities-and-farmers

[72] Kienbaum, K. and Farrell, J. (2023). *Report: How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power.* Institute for Local Self-Reliance. https://ilsr.org/articles/report-advantage-local/

[73] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 82.

[74] Kienbaum, K. and Farrell, J. (2023). *Report: How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power*. Institute for Local Self-Reliance. https://ilsr.org/articles/report-advantage-local/

[75] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report. Community-Led Economic Development.* U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review

[76] O'Shaughnessy, E. et al. (2024). *Evaluating community solar as a measure to promote equitable clean energy access.* Lawrence Berkeley National Laboratory, Berkeley, CA, and National Renewable Energy Laboratory, Golden, CO. p. 1.

[77] O'Shaughnessy, E. et al. (2024). *Evaluating community solar as a measure to promote equitable clean energy access.* Lawrence Berkeley National Laboratory, Berkeley, CA, and National Renewable Energy Laboratory, Golden, CO.

[78] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report. Community-Led Economic Development.* U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review

[79] Chung, E. (June 15, 2024). *Solar co-ops help more people get a piece of the sun's energy*. CBC News. https://www.cbc.ca/amp/1.7235236

[80] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study.* U.S. Department of Energy. p. 83.

[81] California Energy Commission. (2016). *Commission Final Report for the SB 350 Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities. SB 350 Barriers Report*. https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350-3

[82] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[83] Sandler, S. 2024. *Community Solar Program Design Considerations & Modeling Inputs.* Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-89948. https://www.nrel.gov/docs/fy24osti/89948.pdf

[84] Survey, focus groups, and meetings hosted by Cooperative Energy Futures. (July-August 2024).

[85] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report. Community-Led Economic Development*. U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review

[86] Cooperative Energy Futures Staff. (September 25, 2024). *Personal Communication*.

[87] American Red Cross. (2020). *Design, Monitoring, Evaluation, Research and Learning Framework*. Disaster Preparedness Center. https://preparecenter.org/site/dmerl-framework/

[88] Respondents. (2024). Survey: *How does Distributed Solar Support Communities?* Cooperative Energy Futures.

[89] Walker, E. (2024). *Community solar: Everything you need to know.* EnergySage. https://www.energysage.com/community-solar/

[90] Vero Bourg-Meyer. (September 24, 2024). *Personal Communication*.

[91] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.
[92] Gonzalez, R. (2019). *The Spectrum of Community Engagement to Ownership.* Facilitating Power.
[93] Grid Alternatives Tribal Program https://gridalternatives.org/what-we-do/tribal-program
[94] Ibid.
[95] Grid Alternatives Tribal Program https://gridalternatives.org/what-we-do/tribal-program
[96] U.S. Department of Energy. (2022). *Shungnak-Kobuk Community Solar Independent Power Producer: Sunny Awards Winner*. https://www.energy.gov/communitysolar/shungnak-kobuk-community-solar-independent-power-producer-sunny-awards-winner
[97] Ibid.
[98] Grimley, M. and Chan, G. (2023). *Community Ownership in Community Solar Projects*. University of Minnesota. and Sippert, E. (2022). *Community-Owned Community Solar: Opportunities and Challenges*. Environmental Law and Policy Center.
[99] Office of Energy Efficiency and Renewable Energy. (2023). *Community Solar: Overview, ownership models, and the benefits of locally-owned community solar projects*. U.S. Department of Energy. NREL/PR-7A40-86210
[100] O'Shaughnessy, et al. (2024). *Evaluating community solar as a measure to promote equitable clean energy access*. Nature Energy 9, 955-963. https://www.nature.com/articles/s41560-024-01546-2
[101] Xu, K., Chan, G., and Kannan, S. (2024). Sharing the Sun: Community Solar Deployment and Subscriptions (as of June 2024). National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy25osti/91361.pdf
[102] DenHerder-Thomas, T. and Welle, J. (2020). *Equitable Community Solar: Policy and Program Guidance for Community Solar Programs that Promote Racial and Economic Equity*. Institute for Local Self-Reliance.
[103] Heeter, J. et al. (2022). *Status of State Community Solar Program Caps*. National Renewable Energy Laboratory and University of Minnesota. https://www.nrel.gov/docs/fy23osti/84077.pdf
[104] Abbott, S. et al. (2022). *Community Solar+: How the Next Generation of Community Solar Can Unlock New Value Streams and Help Communities Pursue Holistic Decarbonization*. RMI. p. 6.
[105] U.S. Environmental Protection Agency. (April, 2024). *Solar for All: Solar for Household Savings Highlights*. https://www.epa.gov/greenhouse-gas-reduction-fund/solar-all-solar-household-savings-highlights
[106] Hausman, N. (2022). *How Community Solar can Benefit Low- and Moderate-Income Customers.* World Resources Institute. https://www.wri.org/insights/community-solar-low-income-customers
[107] Sippert, E. (2022). *Community-Owned Community Solar: Opportunities and Challenges*. Environmental Law and Policy Center and Gonzalez, R. (2019). *The Spectrum of Community Engagement to Ownership*. Facilitating Power.
[108] Gonzalez, R. (2019). The Spectrum of Community Engagement to Ownership. Facilitating Power. https://movementstrategy.org/resources/the-spectrum-of-community-engagement-to-ownership/
[109] Anpetu Wi. https://anpetuwi.com/
[110]Ibid.
[111] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice
[112] Ibid.
[113] Ibid.
[114] Cooperative Energy Futures Staff. (September 25, 2024). *Personal Communication*.
[115] Ibid, p. 28.
[116] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report.* Community-Led Economic Development. U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review

[117] Sippert, E. (2022). *Community-Owned Community Solar: Opportunities and Challenges*. Environmental Law and Policy Center.
[118] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report*. Community-Led Economic Development. U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review
[119] Sippert, E. (2022). *Community-Owned Community Solar: Opportunities and Challenges*. Environmental Law and Policy Center.
[120] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report.* Community-Led Economic Development. U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review
[121] Sippert, E. (2022). Community-Owned Community Solar: Opportunities and Challenges. Environmental Law and Policy Center.
[122] California Energy Commission. (2016). Commission Final Report for the SB 350 Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities. SB 350 Barriers Report. https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350-3
[123] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.
[124] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. p. 29.
[125] Ibid.
[126] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.
[127] Whited, M., Woolf, T., and Daniel, J. (February 2016). Caught *in a Fix: The Problem with Fixed Charges for Electricity*. Consumers Union. https://advocacy.consumerreports.org/wp-content/uploads/2016/02/Caught-in-a-Fix-FINAL-REPORT-20160208-2.pdf.
[128] Newhouse, C. (n.d.) *Treatment of Solar Benefits for Residents in Master-metered Buildings*. U.S. Department of Housing and Urban Development. https://www.google.com/url?q=https://www.hud.gov/sites/dfiles/Housing/documents/MF_Memo_re_Community_Solar_Credits_in_MM_Buildings.pdf&sa=D&source=docs&ust=1727809582361044&usg=AOvVaw0BCxf2aSEOL12Hao5WH64v
[129] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance.
[130] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.
[131] NREL. (n.d.) *Low- and Moderate-Income Community Solar Policies*. https://www.nrel.gov/state-local-tribal/lmi-solar.html
[132] Moorjani, T. (August 22, 2023). *Pros and Cons of Residential Tax Credits for Clean Energy*. The Alliance for Citizen Engagement. https://ace-usa.org/blog/research/research-environmental-policy/pros-and-cons-of-a-residential-tax-credit-for-clean-energy/.
[133] Ibid.
[134]U.S. DOE National Community Solar Partnership (July 25, 2023). *Webinar: Building with Benefits: Community Ownership*. https://www.youtube.com/watch?v=xOjqFcYYrKs
[135] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 98.
[136] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 78.
[137] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy.
[138] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 78.
[139] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy.

[140] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice
[141] Ibid.
[142] Ibid.
[143] Ibid.
[144] Ibid.
[145] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.
[146] Leon, W. (March 5, 2020). *Will solar work for low-income communities?* Utility Dive. https://utilitydive.com/news/will-solar-work-for-low-income-communities/573492/.
[147] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market.* Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice
[148] Cooperative Energy Futures Staff. (September 25, 2024). *Personal Communication.*
[149] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report*. Community-Led Economic Development. U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review
[150] Grimley, M. et al. (2022). *The Grassroots Are Always Greener: Community-Based Organizations as Innovators of Shared Solar Energy in the United States.* Energy Research & Social Science 90:102628. Doi.10.1016/j.erss.2022.102628.
[151] Lu, L. 2024. *Thesis: Community-Owned Community Solar in the U.S.: Emergence and Organizational Strategies for Success*. Available on request.
[152] Cooperative Energy Futures Staff. (September 25, 2024). Personal Communication.
[153] Farrell, J. (2016.) *Report: Beyond Sharing: How Communities Can Take Ownership of Renewable* Power (Energy Democracy Initiative). Institute for Local Self-Reliance. https://ilsr.org/articles/report-beyond-sharing/
[154] DenHerder-Thomas, T. (2016). *Podcast: Sunshine and Ownership: A Cooperative Solar Garden Blooms in North Minneapolis. Local Energy Rules*. Institute for Local Self-Reliance https://ilsr.org/articles/sunshine-and-ownership-a-cooperative-solar-garden-blooms-in-north-minneapolis-episode-34-of-local-energy-rules/
[155] Sippert, E. (2022). Community-Owned Community Solar: Opportunities and Challenges. Environmental Law and Policy Center.
[156] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report*. Community-Led Economic Development. U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review
[157] Ibid.
[158] Sippert, E. (2022). *Community-Owned Community Solar: Opportunities and Challenges*. Environmental Law and Policy Center.
[159] Leon, W. et al. (2019). Solar *with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice
[160] Sandler, S. 2024. Community Solar Program Design Considerations & Modeling Inputs. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-89948. https://www.nrel.gov/docs/fy24osti/89948.pdf
[161] Solar Energy Technologies Office. (2024). *Workforce and Equitable Access Report*. Community-Led Economic Development. U.S. Department of Energy. https://www.energy.gov/eere/solar/2024-seto-peer-review
[162] Ibid.
[163] Farrell, J. (2016.) *Report: Beyond Sharing: How Communities Can Take Ownership of Renewable Power (Energy Democracy Initiative*). Institute for Local Self-Reliance. https://ilsr.org/articles/report-beyond-sharing/
[164] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[165] U.S. EPA. (2024). *Press: Biden-Harris Administration Announces $7 Billion Solar for All Grants to Deliver Residential Solar, Saving Low-Income Americans $350 Million Annually and Advancing Environmental Justice Across America*. https://www.epa.gov/greenhouse-gas-reduction-fund/solar-all

[166] Huang, C. (2022). *High Equity Stakes in California's Solar Fight*. Convergence. https://convergencemag.com/articles/high-equity-stakes-in-californias-solar-fight/

[167] Kienbaum, K. and Farrell, J. (2023). *Report: How Local Ownership of Clean Energy Boosts Benefits, Busts Barriers, and Builds Power.* Institute for Local Self-Reliance. https://ilsr.org/articles/report-advantage-local/

[168].Ibid.

[169] Ibid.

[170] Battle, L. and Zaveri, H. (July 2020). *Community Benefits Agreements in a Rural Context: Coal Mine Reclamation*. Reclaiming Appalachia Coalition. P. 3.

[171] Ibid.

[172] Haggerty, M. and Chryssikopoulos, A. (2023). *Leveraging Renewable Energy Investments for Rural Development: The DOE Community Benefits Plans*. Center for American Progress. https://www.americanprogress.org/article/leveraging-renewable-energy-investments-for-rural-development/

[173] Sotolongo, M. (June 2024). *Community benefits policy and energy justice*. Initiative for Energy Justice.

[174] Haggerty, M. and Chryssikopoulos, A. (2023). *Leveraging Renewable Energy Investments for Rural Development: The DOE Community Benefits Plans*. Center for American Progress. https://www.americanprogress.org/article/leveraging-renewable-energy-investments-for-rural-development/

[175] Clean Energy Infrastructure. (2024). *About Community Benefits Plans*. Department of Energy. https://www.energy.gov/infrastructure/about-community-benefits-plans and Office of Energy Justice and Equity. (2024). *Community Benefit Agreement Toolkit*. Department of Energy. https://www.energy.gov/justice/community-benefit-agreement-cba-toolkit

[176] Sotolongo, M. (June 2024). *Community benefits policy and energy justice*. Initiative for Energy Justice. pp. 7-8.

[177] Ibid, p. 9.

[178] Ibid, p. 2.

[179] Ibid, p. 3.

[180] Gross, J., LeRoy, G., and Janis-Aparicio, M. (2005). *Community Benefits Agreements: Making Development Projects Accountable*. Good Jobs First and the California Partnership for Working Families. https://juliangross.net/docs/CBA_Handbook.pdf

[181] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.

[182] Rose, J.C. and Haggerty, J.H. (2018). *Community Benefits Agreements and Funds: A summary of key literature and case studies*. Resources and Communities Research Group.

[183] Haggerty, M. and Chryssikopoulos, A. (2023). *Leveraging Renewable Energy Investments for Rural Development: The DOE Community Benefits Plans*. Center for American Progress. https://www.americanprogress.org/article/leveraging-renewable-energy-investments-for-rural-development/

[184] Rose, J.C. and Haggerty, J.H. (2018). *Community Benefits Agreements and Funds: A summary of key literature and case studies*. Resources and Communities Research Group.

[185] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[186] Ibid.

[187] Said, E. et al. (2023). *US Clean Energy Projects Need Public Buy-in. Community Benefits Agreements Can Help*. World Resources Institute. https://www.wri.org/insights/community-benefits-agreements-us-clean-energy

[188] Ibid.

[189] Gridworks. (April 2024). *Electric transmission development and community engagement: Literature review and best practices.* https://gridworks.org/wp-content/uploads/2024/04/CETA-Community-Engagement-Toolkit-Lit-Review.pdf

[190] Haggerty, M. and Chryssikopoulos, A. (2023). *Leveraging Renewable Energy Investments for Rural Development: The DOE Community Benefits Plans*. Center for American Progress. https://www.americanprogress.org/article/leveraging-renewable-energy-investments-for-rural-development/

[191] Rose, J.C. and Haggerty, J.H. (2018). *Community Benefits Agreements and Funds: A summary of key literature and case studies*. Resources and Communities Research Group.

[192] Sotolongo, M. (June 2024). *Community benefits policy and energy justice*. Initiative for Energy Justice. p. 18.

[193] Sotolongo, M. (June 2024). *Community benefits policy and energy justice*. Initiative for Energy Justice.

[194] Haggerty, M. and Chryssikopoulos, A. (2023). *Leveraging Renewable Energy Investments for Rural Development: The DOE Community Benefits Plans*. Center for American Progress. https://www.americanprogress.org/article/leveraging-renewable-energy-investments-for-rural-development/

[195] Kadish, H. and Partelow, L. (2024). *Making Infrastructure more Equitable and Inclusive: How and Why Community Benefits Agreements can be Incorporated into Infrastructure Projects.* Local Infrastructure Hub. https://localinfrastructure.org/news/making-infrastructure-more-equitable-and-inclusive-how-and-why-community-benefits-agreements-can-be-incorporated-into-infrastructure-projects/

[196] Gross, J., LeRoy, G., and Janis-Aparicio, M. (2005). *Community Benefits Agreements: Making Development Projects Accountable.* Good Jobs First and the California Partnership for Working Families. https://juliangross.net/docs/CBA_Handbook.pdf

[197] Rose, J.C. and Haggerty, J.H. (2018). *Community Benefits Agreements and Funds: A summary of key literature and case studies.* Resources and Communities Research Group.

[198] Participants. (July 25, 2024). *Focus Group: Community Benefits Agreements [Meeting].* Cooperative Energy Futures and Department of Energy.

[199] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[200] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.

[201] Haggerty, M. and Chryssikopoulos, A. (2023). *Leveraging Renewable Energy Investments for Rural Development: The DOE Community Benefits Plans.* Center for American Progress. https://www.americanprogress.org/article/leveraging-renewable-energy-investments-for-rural-development/

[202] Ibid.

[203] Office of Economic Impact and Diversity. (2017). *Guide to Advancing Opportunities for Community Benefits through Energy Project Development*. U.S. Department of Energy. https://www.energy.gov/justice/community-benefit-agreement-cba-toolkit

[204] Sotolongo, M. (June 2024). *Community benefits policy and energy justice*. Initiative for Energy Justice. p. 13.

[205] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[206] Haggerty, M. and Chryssikopoulos, A. (2023). *Leveraging Renewable Energy Investments for Rural Development: The DOE Community Benefits Plans*. Center for American Progress. https://www.americanprogress.org/article/leveraging-renewable-energy-investments-for-rural-development/

[207] Ibid.

[208] Ibid.

[209] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[210] Rose, J.C. and Haggerty, J.H. (2018). *Community Benefits Agreements and Funds: A summary of key literature and case studies.* Resources and Communities Research Group.

[211] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[212] Sandonato, A. et al. (2024). *Community Solar for Opportunity States*. https://www.energy.gov/sites/default/files/2024-07/Opportunity%20States_EMP_tech-brief_06.26.2024.pdf

[213] Emerald Cities Collaborative. (2024). *The People's Justice40+ Community Benefit Playbook*. https://emeraldcities.org/j40playbook/

[214] Portland.gov. (2024). *About the Portland Clean Energy Community Benefits Fund (PCEF)*. https://www.portland.gov/bps/cleanenergy/about#toc-about-the-portland-clean-energy-community-benefits-fund-pcef-

[215] City of Detroit. (2024). *Community Benefits Ordinance*. https://detroitmi.gov/departments/planning-and-development-department/community-benefits-ordinance

[216] Emerald Cities Collaborative. *Anchor-Community Engagement Workbook: Strategies to Promote Community Health, Wealth, and Climate Resilience*. https://emeraldcities.org/wp-content/uploads/2023/01/Anchor-Community-Engagement-Workbook.pdf

[217] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice

[218] Respondents. (2024). Survey: *How does Distributed Solar Support Communities?* Cooperative Energy Futures.

[219] Casey, J. (December 15 2023). *Blacks in Green-founded co-op wins solar development award.* Energy Global. https://www.energyglobal.com/solar/15122023/blacks-in-green-founded-co-op-wins-solar-development-award/

[220] Solar Outreach Partnership. (June 2015). *Solar Case Study: Richmond, CA.* https://icma.org/documents/solar-case-study-richmond-ca

[221] USAID. (2024). *Energy efficiency is a powerful strategy that emerging economies can use to secure their energy future while also pursuing prosperous and sustainable development. Learn how efficiency reduces energy consumption while creating jobs and bolstering economies*. Energy Efficiency. https://2017-2020.usaid.gov/energy/efficiency/economic-impacts

[222] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 85.

[223] Sandler, S. 2024. *Community Solar Program Design Considerations & Modeling Inputs*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-89948. https://www.nrel.gov/docs/fy24osti/89948.pdf

[224] Sandler, S. 2024. *Community Solar Program Design Considerations & Modeling Inputs*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-89948. p. 11. https://www.nrel.gov/docs/fy24osti/89948.pdf

[225] National Consumer Law Center. (February 2024). *Community Solar: Expanding Access and Safeguarding Low-Income Families*. https://www.nclc.org/resources/community-solar-expanding-access-and-safeguarding-low-income-families/

[226] California Energy Commission. (2016). *Commission Final Report for the SB 350 Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities. SB 350 Barriers Report*. https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350-3

[227] Olympia Community Solar. (2024). *Solar Projects*. https://olysol.org/projects/

[228] Participants. (September 9, 2024) *Equitable Solar at Scale: Leveraging Public and Private Capital to Deploy Solar and Storage with Meaningful Benefits. RE+*. Cooperative Energy Futures and Department of Energy.

[229] Cooke, L. (July 2024). *Uprise is Now a Roofing and Solar Company! Uprise Solar & Roofing.* https://www.uprisesolar.com/blog/uprise-is-now-a-roofing-and-solar-company/

[230] Personal Communication. (September 24, 2024). *Maryland Climate Access Fund. And Climate Access Fund*. (2024). What We Do. https://www.climateaccessfund.org/what-we-do

[231] Candide Group. (2024). *Afterglow Climate Justice Fund*. https://www.candidegroup.com/afterglow-cjf

[232]Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 85.

[233] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study. U.S. Department of Energy*. p. 88.

[234] Eleff, B. (August, 2013). 2013 Solar Energy Legislation in Minnesota. *Minnesota House Research.* https://www.house.mn.gov/hrd/pubs/ss/sssolarleg.pdf

[235] Minnesota Commerce Department. (2024). *Community Solar Gardens*. https://mn.gov/commerce/energy/consumer/energy-programs/community-solar-gardens.jsp

[236] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.

[237] California Energy Commission. (2016). *Commission Final Report for the SB 350 Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities. SB 350 Barriers Report*. https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350-3

[238] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting]*. Cooperative Energy Futures and Department of Energy.

[239] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice

[240] Light, A., Hausman, A., and Bird, L. (2022). *How Local Governments Can Advance Community Solar for Low- and Moderate-Income Households*. World Resources Institute. https://www.wri.org/insights/how-local-governments-can-advance-community-solar-low-and-moderate-income-households

[241] DenHerder-Thomas, T. and Welle, J. (2020). *Equitable Community Solar: Policy and Program Guidance for Community Solar Programs that Promote Racial and Economic Equity*. Institute for Local Self-Reliance.

[242] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy.

[243] New Hampshire Department of Energy. (2024). *Low-Moderate Income Solar Grant Program*. https://www.energy.nh.gov/renewable-energy/renewable-energy-rebates/low-moderate-income-solar-grant-program

[244] State of New Hampshire Department of Energy. (2023). *Grants for Community Solar Photovoltaic (PV) Projects Providing Direct Benefits to Low and Moderate Income Residential Electric Customers: Request for Proposals*.

[245] National Consumer Law Center. (February 2024). *Community Solar: Expanding Access and Safeguarding Low-Income Families*. https://www.nclc.org/resources/community-solar-expanding-access-and-safeguarding-low-income-families/

[246] National Rural Electric Cooperative Association. (2023). *Along Those Lines: ACCESS Project Delivers Benefits of Solar to Co-ops' Lower-Income Members*.

[247] American Cities Climate Challenge. (2024). Solarize. https://cityrenewables.org/solarize/

[248] The Nature Conservancy. (January 2020). *Choosing Clean Energy in Iowa*. https://www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/iowa-clean-energy/

[249] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice

[250] California Energy Commission. (2024). Energy Equity Indicators. https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350-3

[251] California Energy Commission. (2016). *Commission Final Report for the SB 350 Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged*

Communities. SB 350 Barriers Report. https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350-3

[252] California Energy Commission. (2016). *Commission Final Report for the SB 350 Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities. SB 350 Barriers Report*. p. 63.https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350-3

[253] Colorado Energy Office. (2024). *Low-income solar through Weatherization*. https://energyoffice.colorado.gov/weatherization-assistance/low-income-solar-through-weatherization

[254] Energy.gov. *Clean Energy Connector*. https://www.energy.gov/communitysolar/clean-energy-connector

[255] Wood Mackenzie. (August 8, 2024). *US community solar market to break 14 GWdc of cumulative capacity by 2029.* https://www.woodmac.com/press-releases/2024-press-releases/us-community-solar-market-to-break-14-gwdc-of-cumulative-capacity-by-2029/

[256] Illinois Shines. (2024). *Welcome to Illinois Shines*. https://illinoisshines.com/

[257] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy.

[258] Wing, H. (April 2024). *The Economics of Climate Action Plans*. League of Women Voters. https://www.google.com/url?q=https://my.lwv.org/sites/default/files/leagues/alachua-county/theeconomicsofclimateactionplans-one-pagesummary.pdf&sa=D&source=docs&ust=1727530577916405&usg=AOvVaw0WpWosYdOVBwHnjjcxWM1B

[259] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 93.

[260] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures* Study. U.S. Department of Energy. p. 85.

[261] Respondents. (2024). *Survey: How does Distributed Solar Support Communities?* Cooperative Energy Futures.

[262] U.S. Environmental Protection Agency. (2024). *Summary of Inflation Reduction Act provisions related to renewable energy.* https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy

[263] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[264] Ibid.

[265] Sotolongo, M. (June 2024). *Community benefits policy and energy justice*. Initiative for Energy Justice. p. 16.

[266] Ibid.

[267] Ibid.

[268] City of Portland. (2024). *About PCEF*. https://www.portland.gov/bps/cleanenergy/about

[269] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice

[270] Participants. (July 30, 2024). *Solar and Economic Development Community Convening [Meeting].* Cooperative Energy Futures and Department of Energy.

[271] Participants. (September 9, 2024) *Equitable Solar at Scale: Leveraging Public and Private Capital to Deploy Solar and Storage with Meaningful Benefits*. RE+. Cooperative Energy Futures and Department of Energy.

[272] Office of Energy Efficiency and Renewable Energy. (September 2021). *Solar Futures Study*. U.S. Department of Energy. p. 86.

[273] Participants. (July 17, 2024). *Focus Group: Community Organizations [Meeting].* Cooperative Energy Futures and Department of Energy.

[274] Jubilee Housing. (2024). *Jubilee Housing's Reentry Housing Initiative Program.* https://jubileehousing.org/reentry/

[275] Ibid.

[276] Leon, W. et al. (2019). *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market*. Clean Energy States Alliance. https://cesa.org/resource-library/resource/solar-with-justice

[277] California Energy Commission. (2016). *Commission Final Report for the SB 350 Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities. SB 350 Barriers Report*. https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350-3

[278] People's Solar Energy Fund. https://psef.network/

[279] Cooperative Energy Futures Staff. (September 25, 2024). *Personal Communication*.

[280] Abbott, S. et al. (2022). *Community Solar+: How the Next Generation of Community Solar Can Unlock New Value Streams and Help Communities Pursue Holistic Decarbonization*. RMI. p. 19. https://rmi.org/insight/community-solar-plus/

[281] Tancabel, D. (August 27, 2042) *EPA Tools to Support States: Quantifying emissions reductions and the health and economic co-benefits of clean energy policies*. U.S. Environmental Protection Agency.

[282] Ibid.

[283] Battle, L. and Zaveri, H. (July 2020). *Community Benefits Agreements in a Rural Context: Coal Mine Reclamation*. Reclaiming Appalachia Coalition. P. 3.

[284] Office of State and Community Energy Programs. *Low-Income Energy Affordability (LEAD) Tool and Community Energy Solutions*. U.S. Department of Energy. https://www.energy.gov/scep/low-income-energy-affordability-data-lead-tool-and-community-energy-solutions

[285] U.S. Department of Energy. (2024). *Equitable Solar Communities of Practice*. https://www.energy.gov/communitysolar/equitable-solar-communities-practice

[286] DenHerder-Thomas, T. and Welle, J. (2020). *Equitable Community Solar: Policy and Program Guidance for Community Solar Programs that Promote Racial and Economic Equity*. Institute for Local Self-Reliance.

[287] Ibid.

[288] Ibid.

[289] Participants. (September 9, 2024) *Equitable Solar at Scale: Leveraging Public and Private Capital to Deploy Solar and Storage with Meaningful Benefits*. RE+. Cooperative Energy Futures and Department of Energy.

[290] Sandonato, A. et al. (June 2024). *Community Solar for Opportunity States: An exploration of development models for community solar projects in states that lack explicit enabling policies*. Lawrence Berkeley National Laboratory. https://emp.lbl.gov/publications/community-solar-opportunity-states