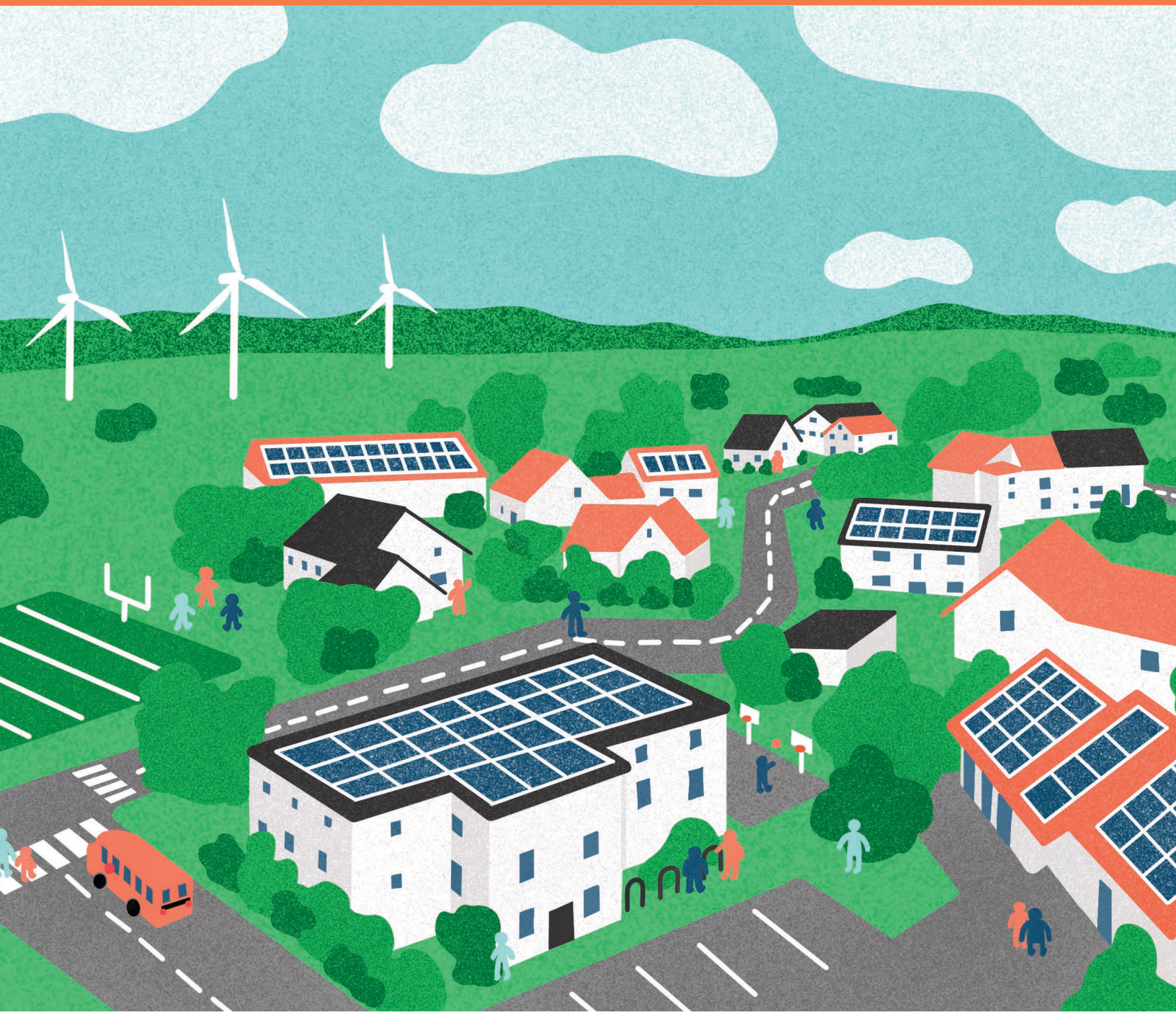

# **Advantage Local:**
## Why Local Energy Ownership Matters

Katie Kienbaum and John Farrell, ILSR
Matthew Grimley, Independent Contractor
June 2023

ILSR INSTITUTE FOR Local Self-Reliance

## About the Institute for Local Self-Reliance

The Institute for Local Self-Reliance (ILSR) is a national nonprofit research and educational organization founded in 1974. ILSR has a vision of thriving, diverse, equitable communities. To reach this vision, we build local power to fight corporate control. We believe that democracy can only thrive when economic and political power is widely dispersed. Whether it's fighting back against the outsize power of monopolies like Amazon or advocating to keep local renewable energy in the community that produced it, ILSR advocates for solutions that harness the power of citizens and communities. More at **www.ILSR.org**.

*We would like to recognize our co-author, Matthew Grimley, for conducting the quantitative research and analysis in this report. We would also like to thank everyone who shared their thoughts with us in the initial phases of developing this project, including Lynn Benander, Glen Brand, Jessica Collingsworth, John Delurey, Haley Havens, Olivia Nedd, and Al Weinrub. Additional thanks to Timothy DenHerder-Thomas and Crystal Huang for reviewing report drafts. We are eternally grateful to our colleagues at ILSR, particularly Maria McCoy, for their support. Lastly, thank you to the people, groups, and organizations who are making local clean energy ownership a reality for themselves and their communities.*

## Related Work from the Energy Democracy Initiative

***Fighting Monopoly Power: How States and Cities Can Beat Back Corporate Control and Build Thriving Communities***

***Energy Self-Reliant States 2020: Third Edition***

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***Reverse Power Flow: How Solar+Batteries Shift Electric Grid Decision Making from Utilities to Consumers***

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***Equitable Community Solar: Policy and Program Guidance for Community Solar Programs that Promote Racial and Economic Equity***

***Beyond Sharing: How Communities Can Take Ownership of Renewable Power***



*Cover illustration by Maria McCoy.*

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# What is Local Clean Energy Ownership?

It means that local people have **Meaningful Decision-Making Power** over construction operations, and distribution of benefits of clean energy projects.

*This includes both individual-owned projects and community-owned or shared projects.*

## Steps Up the Benefits of Clean Energy

### Clean Energy
- Climate
- Health
- Lower Costs

### Local Clean Energy
- Local Jobs
- Bill Savings
- No Transport Costs
- Resiliency

### Locally Owned Clean Energy
- $$$ More Local Jobs & Bill Savings
- Local Wealth Creation
- Community Decision-Making and Economic Democracy
- Support for Renewables and Political Power for Social Change

## 3 Dimensions of Local Clean Energy Ownership

*Projects that fall mostly on the "local" side are locally owned.*

Non-Local ← 1. Owners → Local

Non-Local ← 2. Governance → Local

Non-Local ← 3. Benefits → Local

*Icons by Made by Made, itim2101, exomoon design studio, Those Icons, Aldo Cervantes, and Andy Horvath via Flaticon.com.*

# Key Benefits of Local Ownership

Households save on **Energy Costs** and **Build Wealth.**

Owning your own rooftop solar panels = an extra **$12,000** in lifetime savings, compared to third-party ownership.

Being a part-owner and subscriber of a community solar cooperative = an extra **$14,000** in lifetime savings, compared to third-party ownership.

Rooftop solar increases home values **$4,000 per kilowatt** according to a 2015 estimate![1]

Local clean energy projects are **shared community assets** that build economic resilience and stability.

Locally owned rooftop and community solar projects provide **3x the value** to local owners, energy users, local banks, landowners, and local governments.

If all small solar installed in 2021 was locally owned, it could have created almost **$7.5 billion in extra value** for host communities, compared to outside ownership.

One study found that locally owned wind farms might create **1.1 to 3.1x** more jobs than outside-owned projects during construction.[2]

Communities reinvest in the **Local Economy,** create new **Local Jobs,** and build **Political Power.**

Research from several countries has found that residents prefer **local or community ownership** of wind energy and that it's associated with more positive attitudes to development.

In a 2011 case study, **45%** of residents of a German town home to community-owned wind turbines had a **positive opinion** of future local wind development, compared to only 16% in another town with a wind project owned largely by outside entities.[3]

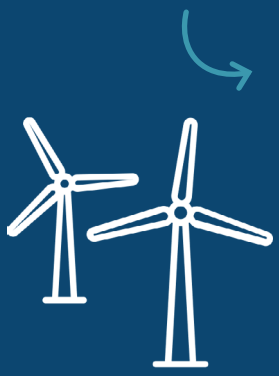
Local clean energy ownership is **essential** to create the public pressure and political will needed to **counter energy monopolies, address energy injustices, and confront the climate crisis**.

*Icons by Smashicons and catkuro via Flaticon.com.*

# Local Ownership for All

**Because of bad government policies and lobbying from big energy monopolies, local clean energy ownership isn't accessible to All Communities right now.**

*Take the example of rooftop solar.*



Rooftop solar adopter **incomes skew high**, especially for host-owned systems. The median household income of all 2021 solar adopters was $110,000 compared to a national median of $63,000.

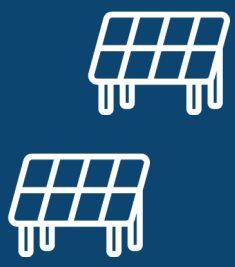
**Black and Hispanic households are underrepresented** among solar adopters. Residents of ***disadvantaged communities*** are only 11% of adopters nationally.[4]

These disparities are the result of **structural barriers** to clean energy ownership, including racial and socioeconomic gaps in homeownership, wealth, and financing, as well as **energy system-specific barriers**, like high upfront costs, inadequate government incentives and policies, and utility interference.

**We Must Expand Access to individual clean energy ownership and shared community ownership, so all communities – no matter their color, income, renting status, or geography – can own part of the clean energy future.**

*Here's how.*

- **Address high upfront costs**, including by improving clean energy tax incentives, providing direct grants and accessible financing, and reforming securities regulations.
- **Pass supportive policies**, including fair compensation for clean energy owners and shared solar programs that enable community ownership.
- **Incentivize local ownership**, including through "adders," prioritization, and carveouts for locally owned projects in clean energy programs.
- **Provide technical support** for locally owned clean energy projects.



*Icons by Made by Made and itim2101 via Flaticon.com.*

# Introduction

With soaring energy costs for American families, electric grid-induced fires burning up the West Coast, and the looming threat of power blackouts, the need for equitable, affordable, and resilient local clean energy has never been clearer.

Clean energy — including rooftop solar panels, community solar gardens, and wind turbines — has many advantages. It eliminates carbon emissions and other pollution from dirty fossil fuels. Often, it's the cheapest source of new power, leading to more affordable and stable energy costs. It also creates jobs in the new energy economy.

Today, corporate utilities and Wall Street control much of the country's clean energy infrastructure. They prioritize profits over people, keeping many of the benefits of clean energy for themselves. But if households and communities owned more of this clean energy, we could maximize the positive local impacts while putting power back in the hands of people to meet their own energy needs. This melds neighbors into a political movement that can push to rapidly transform our extractive energy system into one based on democratic, decentralized renewable energy — an essential tool in the fight against climate change.

Big energy monopolies threaten this vision of local clean energy ownership. To maintain their power, utility monopolies often fight the growth of locally owned clean energy, as they cling to a 100-year-old business model based on centralized control and dirty fossil fuels. Even though some large, investor-owned electric utilities have pledged a transition to renewable energy, their desire to own this new energy generation limits the benefits for families and communities, as utility shareholders gobble up most of the financial returns.

Utility monopolies aren't acting alone. Corporate special interests have pushed state and local governments to pass laws and regulations that prevent competition from locally owned clean energy.

On top of that, a range of financial barriers, systemic disparities, and policy failures unfairly keep clean energy ownership out of reach for many, particularly low-income households, renters, and Black and Brown communities. Even though renewable technologies save money over time, existing program rules and market structures still require individuals and communities to pay high upfront costs to access the benefits of clean energy ownership — unlike electric utilities, which are allowed to socialize the costs of big fossil fuel plants across all customers. Alternatives to rooftop solar for households without a sunny roof, such as community solar, aren't available in all states. Where programs do exist, they don't always enable local ownership or equitable access for all households. New approaches are needed to break down these barriers.

In this report, we define the concept of local ownership and lay out its particular benefits, distinct from the benefits of clean energy or local siting more broadly. (See *Is Bigger Best in Renewable Energy?* for an in-depth analysis of the benefits of small-scale clean energy.)[5] We also identify barriers to local clean energy ownership and potential policy solutions to enable ownership, particularly for low-income communities, communities of color, and other historically marginalized communities. Throughout, we share stories of how communities across the country are taking on adversarial utilities and status-quo politicians to develop creative solutions and achieve local clean energy ownership. While this report focuses largely on solar, many of the learnings could be applied to other clean energy technologies, like wind, geothermal, or energy storage.

# The Foundations of Ownership

## What Is Local Clean Energy Ownership?

Like the many diverse communities involved, local clean energy ownership varies. As we define it, local clean energy ownership means that local residents, groups, or other community-based entities have meaningful decision-making power over key aspects of clean energy projects, including construction, operations, and the distribution of benefits. This applies to both individual (e.g., rooftop solar panels on a home) and shared (e.g., a community solar garden) projects. Though "ownership" may commonly refer to who has legal possession or who profits from a project, the goals and functions of local ownership can take many different forms based on the type of clean energy technology, the people involved and their needs, and the relevant federal and state policies.

For a rural farming community, for instance, local energy ownership could involve residents forming a cooperative to invest in wind turbines. For a faith group, local energy ownership could mean installing solar panels on their house of worship to serve the congregation and nearby households. For communities that don't believe in the commodification or private ownership of energy, including some

### Key Definitions

***Local Clean Energy Ownership -*** Occurs when local residents, groups, or other community-based entities have meaningful decision-making power over key aspects of clean energy projects, including construction, operations, and the distribution of benefits.

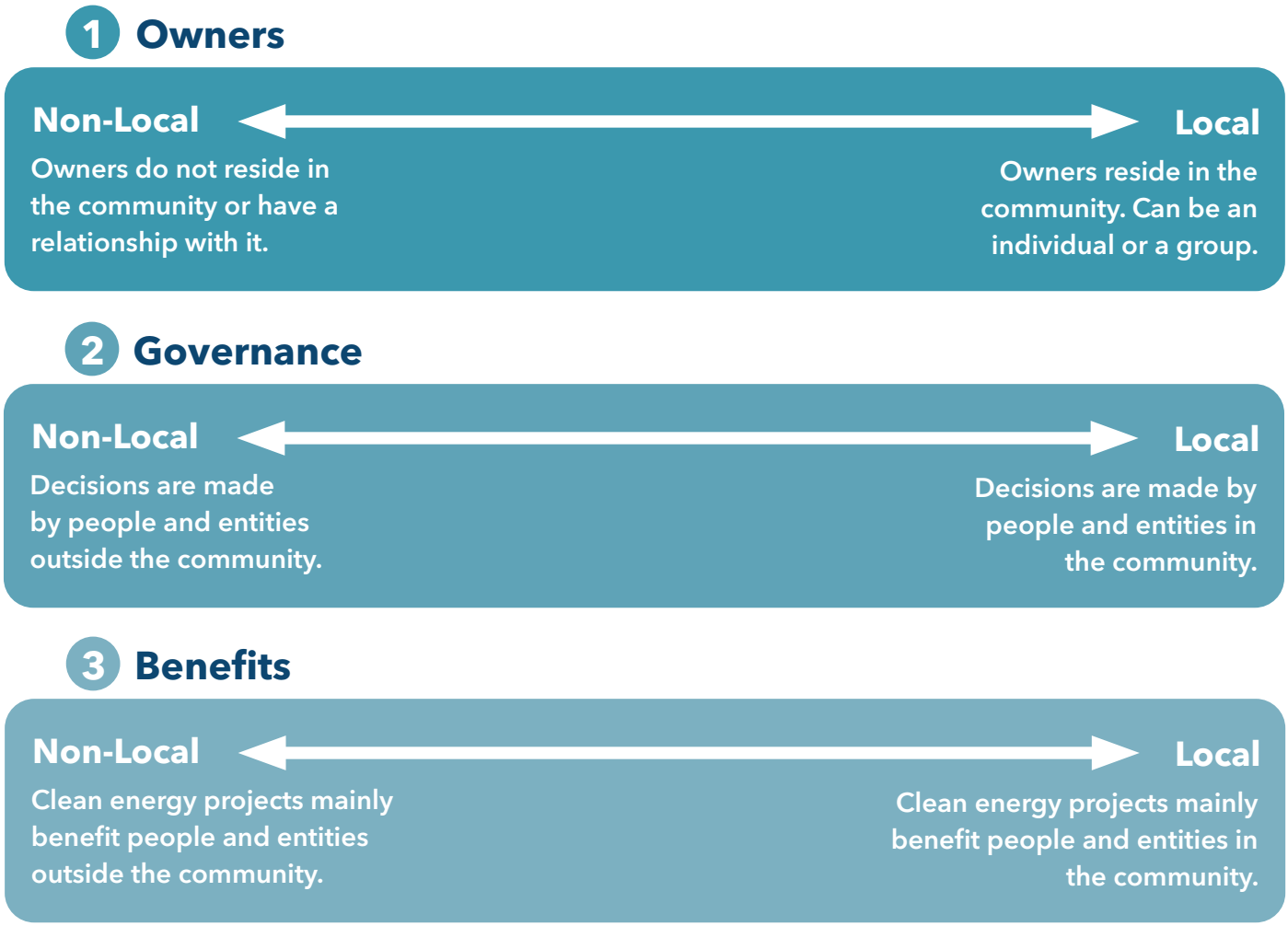
Indigenous Peoples, local "ownership" may mean a practice of community governance and benefits that eschews common legal definitions.[6]

Because of these varying forms, it's important for definitions and descriptions of local clean energy ownership to be flexible. Over the years, community practitioners, academics, and policymakers have identified some key features of community renewable energy and ownership that help us delineate the benefits and responsibilities of local ownership, as we've defined it here.[7] For the purposes of this report, we simplify this to three main dimensions of local clean energy ownership: who the official project owners are, how it's governed (or how decisions are made), and who reaps the benefits. These three dimensions exist in spectrums from non-local to local, as represented in Figure 1.

High "locality" ratings in one dimension often correlate with, but don't guarantee, high ratings in the other dimensions. For instance, a community solar project owned by a cooperative of local residents is more likely to retain local governance

*Figure 1.*

**Three Key Dimensions of Local Clean Energy Ownership**



and local benefits. On the other hand, you can imagine an out-of-town nonprofit developing a project for a community center, delivering most of the benefits to the local community and enabling community engagement in the process while still retaining legal ownership and ultimate decision-making authority.

In general, we consider local clean energy projects that fall mostly on the right side of the spectrums to be locally owned. We explore each dimension in greater detail in the following sections.

In all instances, state laws, federal tax incentives, and other practical considerations determine the possible expressions of local clean energy ownership. From the choices available, communities and individuals can choose the ownership structures that best suit their specific projects, values, and goals.

## How Much Solar is Locally Owned?

Locally owned solar energy systems currently make up a modest — but growing — portion of clean energy capacity in the United States. In the case of community solar, the National Renewable Energy Laboratory reports that customer-owned projects (i.e., local direct ownership) make up less than one percent of capacity installed through 2020, and projects owned by electric cooperatives, municipal utilities, and their suppliers (i.e., local indirect ownership) account for another 10 percent.[8] Rooftop and other on-site solar has a higher rate of local ownership; Lawrence Berkeley National Laboratory data shows that host-owned systems made up about 65 percent of residential capacity installed through the same time period and that this percentage is growing.[9]

## Key Definitions

***Shared Solar or Community Solar -*** An on- or off-site solar project that provides economic benefits, like electricity bill credits, to multiple residents, businesses, or other customers of a single electric utility. Depending on state rules, both utilities and independent entities (such as private developers and community cooperatives) can own community solar projects and offer subscriptions or shares to customers. Community solar programs can provide renters, households without a sunny roof, and others who can't install rooftop solar panels an opportunity to access local clean energy.[10]

***Limited Liability Company (LLC) -*** A business entity owned by one or more members, partners, or investors. LLCs can pass through profits, and the associated tax liability, to individual owners, and owners are not held personally responsible for business debts or decisions.

***Cooperative (Co-op) -*** A business entity that is owned by the organization's users, workers, or producers. Cooperatives typically have elected Boards of Directors and can either retain profits to reinvest or distribute them to the co-op's members based on patronage. Some cooperatives receive tax advantages and exemptions.

***Solar Lease -*** An arrangement where a company leases solar panels to an individual or organization for an agreed-upon monthly fee. This is a common approach for households and businesses that want to install rooftop solar panels but don't have access to capital for upfront costs, don't have sufficient financial risk tolerance, or otherwise can't own the system themselves.

***Solar Power Purchase Agreement (PPA) -*** An arrangement where an individual or organization agrees to purchase the electricity produced by solar panels owned by another party at a certain, agreed-upon rate. This is also a common option for households and businesses that want to go solar but can't buy the panels outright or that are willing to accept lower returns in order to limit their potential financial risks.

## Local Owners

Our first dimension of local clean energy ownership considers the nominal owners of a project. We can categorize clean energy owners broadly as local direct, local indirect, or non-local, all falling along the spectrum of local to non-local ownership.

Individual households, for example, can directly own the solar panels on their rooftop. Those individuals can also join together to create a cooperative, a limited liability company (LLC), or another organizational structure to develop a shared clean energy project.[11] Projects developed by these entities are often on a larger scale, such as a community wind farm or solar garden.

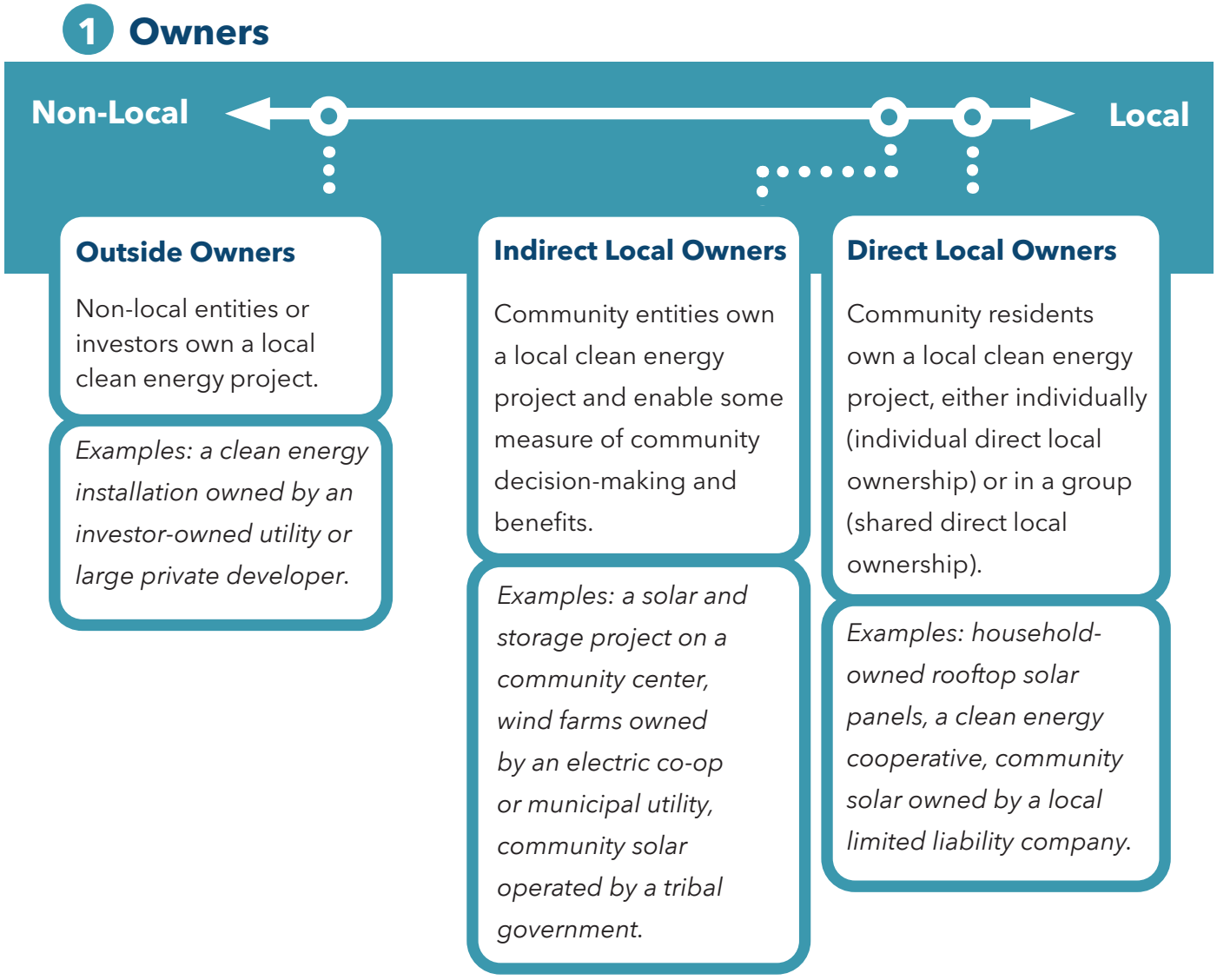
Outside of these examples of direct local energy ownership, other entities — including community nonprofits or trusts, rural electric cooperatives, community choice aggregators, and local and tribal governments — can also develop clean energy projects that allow for a level of indirect community

ownership. These entities answer to the people they serve, either explicitly in the case of governments and electric co-ops, or implicitly in the case of community-based organizations. Even if individuals don't technically own a solar farm built by a municipal electric utility, for instance, there can still be meaningful community governance and benefits if the utility enables customer participation in the decision-making process. Though this report primarily focuses on direct local ownership, many of the noted benefits also apply to indirect ownership models.

In contrast to direct and indirect local clean energy owners, non-local, absentee, or outside owners are external parties that are not accountable to or controlled by local community members. Outside owners can include investor-owned electric utilities, for-profit clean energy developers, and companies that offer solar leases or power purchase agreements. Non-local entities have a place in the clean energy landscape, but the fact that their projects are not locally owned limits the opportunity for community input and benefits.

*Figure 2.*

**Three Key Dimensions of Local Clean Energy Ownership: Project Owners**



## The Sun Doesn't Set on Iñupiat Villages' Solar and Storage Project

***Organization:*** **Northwest Arctic Borough** and the Native Villages of Shungnak and Kobuk

***Project:*** Shungnak and Kobuk Independent Power Producer Solar Project

***Location:*** Northwestern Alaska

***Technology:*** 225 kilowatt solar array and 384 kilowatt-hour battery system.[12]

*Solar on water treatment facility. Photo credit: U.S. DOE*

***Ownership Structure:*** Owned by the Native Villages of Shungnak and Kobuk (federally recognized tribes).

***Financing:*** Included funding from the U.S. Department of Agriculture Rural Utilities Service High Energy Cost Grant Program and from a Village Improvement Fund supported by a payment in lieu of taxes agreement with a local zinc mine.[13]

***Project Benefits:*** Household energy savings, local revenues and economic reinvestment, local jobs, resiliency, innovative community solutions.

***How They Made Ownership Work:*** North of the Arctic Circle, the remote Iñupiat Villages of Shungnak and Kobuk used to rely on expensive, shipped- and flown-in diesel fuel for their energy needs. To cut down on costs, reduce harmful air pollution, and increase local resiliency, the Villages and the local government Northwest Arctic Borough built a solar and storage installation in 2021 in Shungnak, taking advantage of the region's long summer days. The community had already invested in solar panels for the water treatZment facility to save on energy expenses. The Borough contracted with an Alaska-based, Native-owned general contractor for the project and prioritized local hiring.[14] The Villages own the project and operate it as an Independent Power Producer, selling the energy generated to the Alaska Village Electric Cooperative. In 2022, the project saved the communities around $125,000 to $135,000, which can be invested in expanding the system and in cost-saving measures for households, like heat pumps.[15] Building off the success of the Shungnak-Kobuk effort, Northwest Arctic Borough is working on another project in the village of Noatak and is planning to bring locally owned clean energy to other villages in the borough.[16]

***In Their Own Words:***

"The most important benefit is that solar energy reduces electricity bills, has low maintenance costs, (and) reduces reliance on diesel, which is a high cost and produces harmful emissions that affect the quality of air, water and soil."

- Lucy Nelson, Northwest Arctic Borough Former Mayor (via *Tribal Business News*)[17]

To complicate things, nominal project ownership can be split among different entities, perhaps with local residents owning a certain percentage of a project's shares and an outside investor holding the remainder. In addition, certain financing structures allow for majority ownership to shift from one entity to another during a project's lifetime. For instance, a local cooperative can make an agreement with an outside investor to "flip" ownership of a community solar project from the investor to the co-op after 10 years (in order for the investor to capture tax incentives).[18] As another example, rooftop solar power purchase agreements often allow the homeowner to buy the system installed by an outside company on their roof after 25 years.[19]

## Local Governance

The second dimension of local clean energy ownership asks how projects are governed and who makes the decisions.

At one end of the spectrum are projects where local residents or groups have full control and decision-making power over all project aspects, including siting, hiring, financing, and benefits distribution. On the other end are projects where outside entities call all of the shots with no opportunity for input from local community members (for example, a project owned by a large investor-owned utility or a national clean energy developer).

Beyond the extremes, a range of project governance models exist somewhere in the middle, with both local and non-local entities influencing the decision-making process. Outside entities that own and control a local clean energy project — such as an outside developer building a community solar installation — can engage community members and enable a degree of local input into project decisions. Community engagement can range from merely informing the local community about a project to actively consulting local residents and groups in the design of the project to developing a Community Benefit Agreement.[20]

## Local Benefits

Our third and final dimension of local clean energy ownership tracks whether the economic and other benefits of clean energy projects stay in the local community or leave it. At one extreme are projects where the vast majority of benefits, including project revenues, new jobs, and the energy generation itself, accrue to people and groups outside of the community. At the other, these gains primarily benefit local residents and earnings recirculate in the local economy.

Most projects fall somewhere in the middle, with some benefits staying in the community, like new jobs, and other benefits leaving the local economy, like the profits shared with an outside investor.

*Figure 3.*

**Three Key Dimensions of Local Clean Energy Ownership: Project Governance**

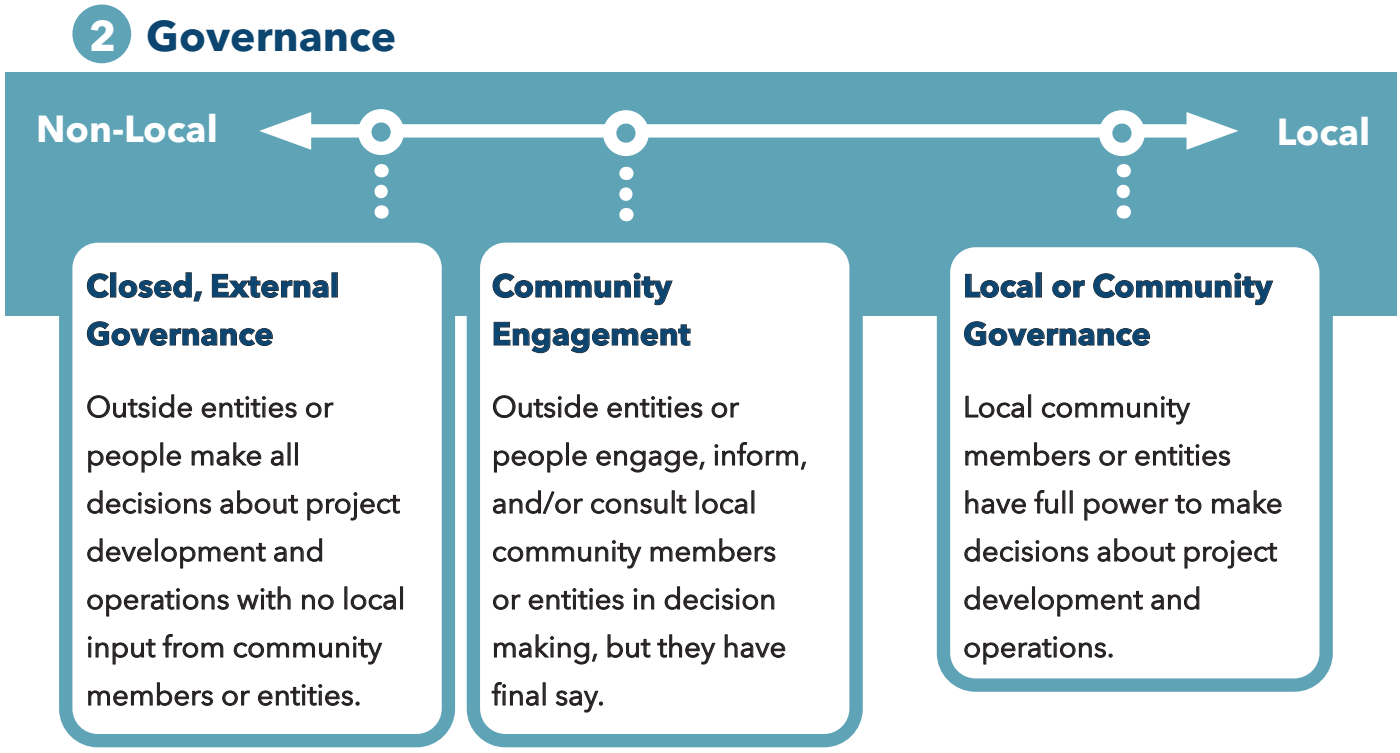
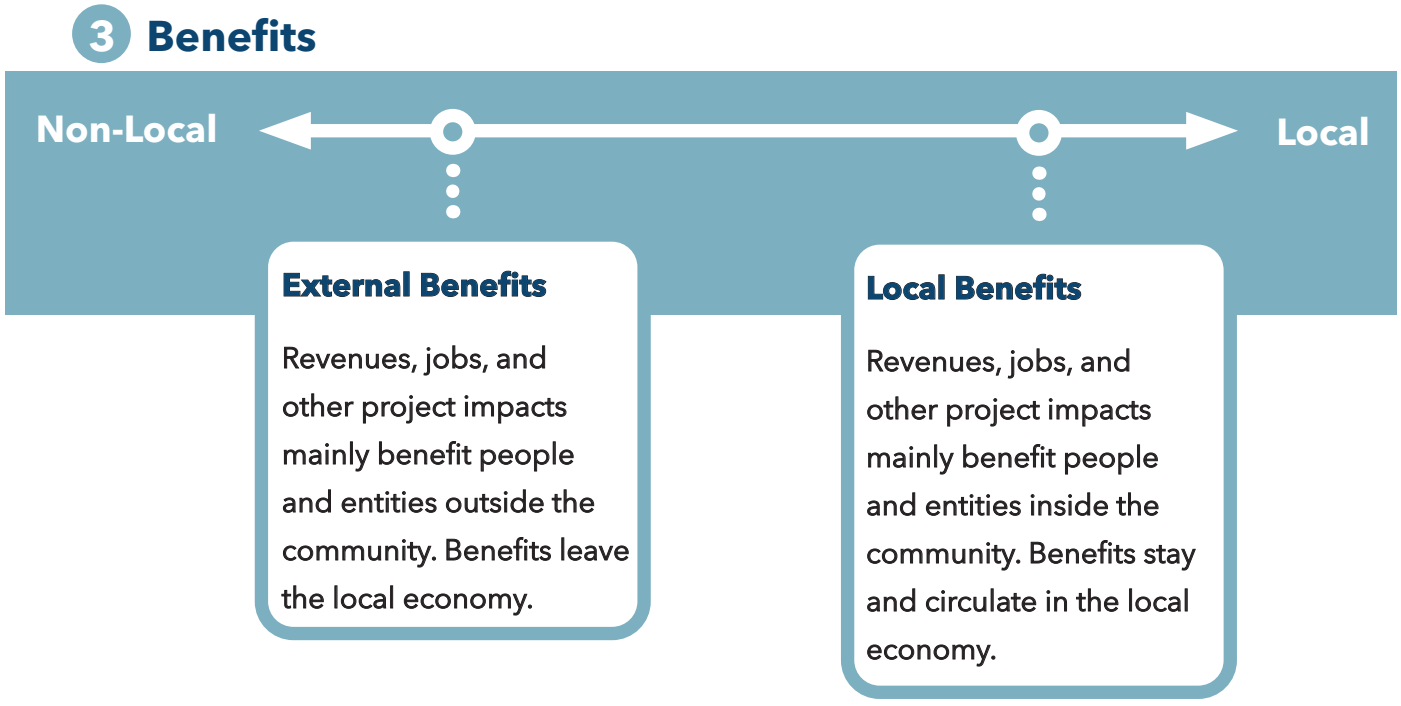



*Figure 4.*

**Three Key Dimensions of Local Clean Energy Ownership: Project Benefits**



## How Small, Local Clean Energy Enables Ownership

Locally owned clean energy projects are often smaller in size and located closer to the people and communities they serve. One of the reasons for this is that, unlike electric utilities and other large businesses, individuals and community groups typically can't access the substantial capital necessary to build, for instance, a sprawling solar farm. In addition to being easier to finance, small energy projects also lower other development hurdles for local owners, including grid capacity limitations and interconnection costs.[23] Another reason is that community-led clean energy efforts usually focus on creating local benefits and services, which they can often best achieve by building small- and medium-scale projects in their own neighborhoods.

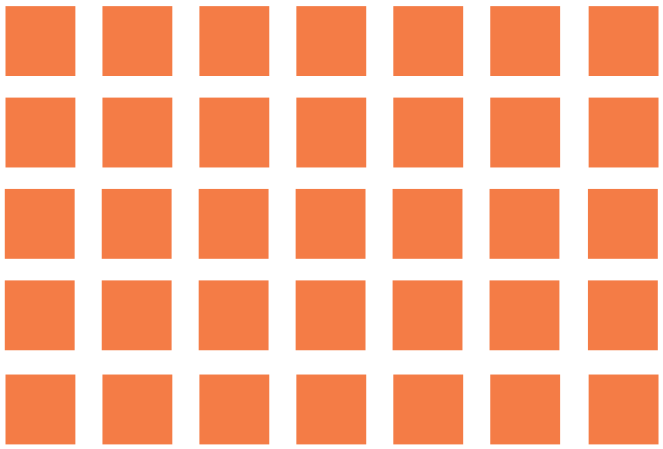
*Figure 5.*

**Comparing Large and Small Solar Development**

### Webberville Solar Farm in Texas (35 MW)[21]

### Shiloh Temple Community Solar Garden in Minnesota (204 kW)[22]

*Photo credit: Cooperative Energy Futures*



= 1 megawatt

Small-scale, community-sited energy installations, like rooftop solar panels and shared solar gardens, can create certain benefits regardless of whether the project is locally owned. These benefits include energy cost savings and new job creation. Small clean energy projects connected to the local distribution grid also avoid the extra costs and energy losses associated with projects built at the transmission scale, far away from the end users of the energy, and they can even help make the grid more reliable.[24] Furthermore, local microgrids and energy storage projects can increase a community's resiliency, even if they're not locally owned.

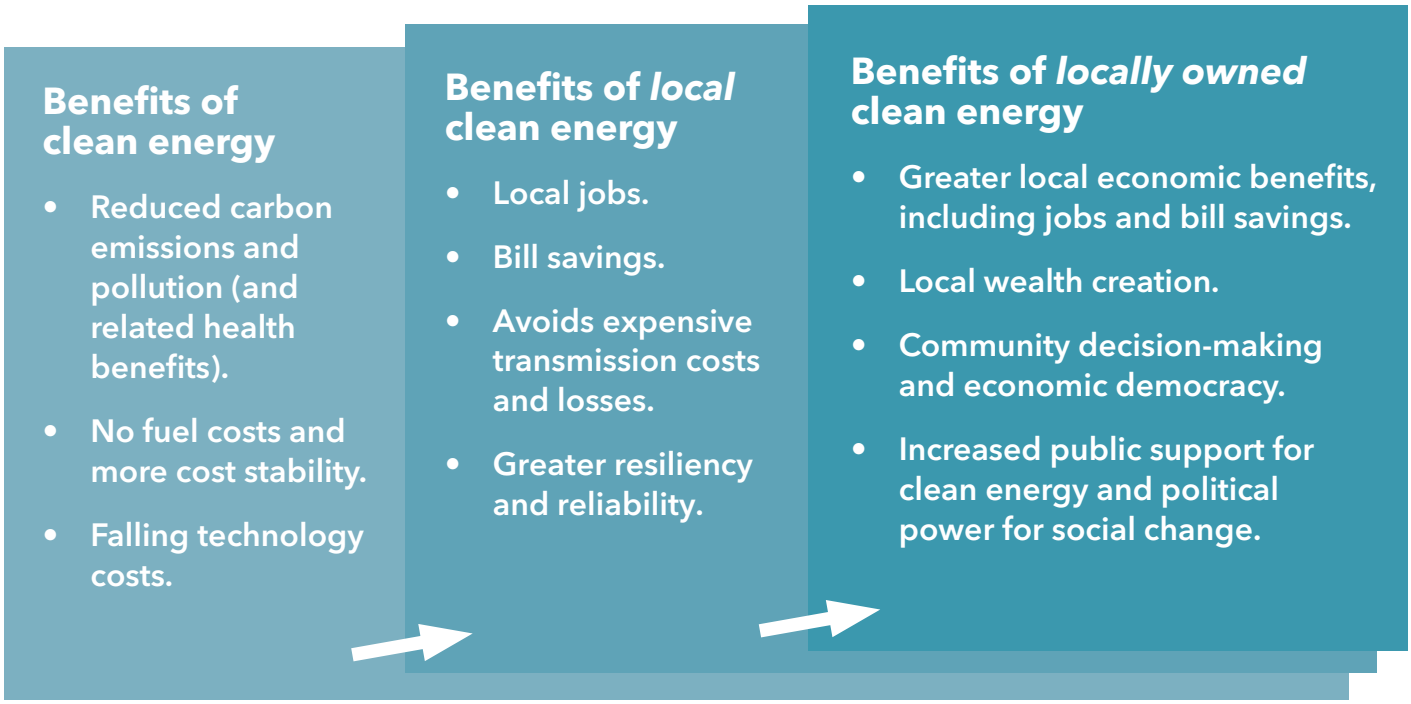
But absentee-owned local clean energy projects, such as small wind farms owned by out-of-state investors or rooftop solar panels owned by electric utilities, fail to maximize many of these benefits for residents and communities.[25] Plus, outside ownership of local clean energy keeps decision-making power in the grip of investor-owned utilities and distant corporations instead of putting it back in the hands of people.

Figure 6 illustrates the overlapping benefits of clean energy, local siting, and local ownership.

This report aims to separate, to the extent that it's possible, the topics of clean energy ownership and scale in order to identify the specific benefits of locally owned clean energy. See ILSR's report *Is Bigger Best in Renewable Energy?* for more on the value of small-scale and locally-sited clean energy, as opposed to local clean energy ownership in particular.[26]

*Figure 6.*

**Overlapping Benefits of Clean Energy, Local Siting, and Local Ownership**



# The Barriers to Ownership

## Unequal Access and Outcomes

Systemic inequalities, policy shortcomings, and utility lobbying keep clean energy ownership out of reach for many Americans. This is especially true for low-income communities and communities of color that big energy monopolies have disproportionately excluded from the gains of clean energy and burdened with the pollution from dirty fossil fuels.

At the same time, many of these communities would benefit immensely from more local clean energy ownership. For instance, maximized electricity bill savings (as described in greater detail in the section "The Impacts of Ownership") would be particularly impactful for households with high energy burdens, who spend higher proportions of their incomes on energy costs. The more money that families save on their electricity bills, the more they're able to reinvest in education, healthcare, and other things to help them thrive, instead of sending their dollars to big electric utilities and polluting power plants. Reducing energy burdens through bill savings also helps families avoid harmful utility disconnections.[27] Research shows that Black, Latino, Native American, and low-income households, as well as older adults and renters, have disproportionately high energy burdens compared to the average household.[28]

To illuminate these gaps in access to local clean energy ownership, we can look at existing disparities in rooftop and community solar adoption. These disparities emerge based on class, race, and homeownership status, among other factors.

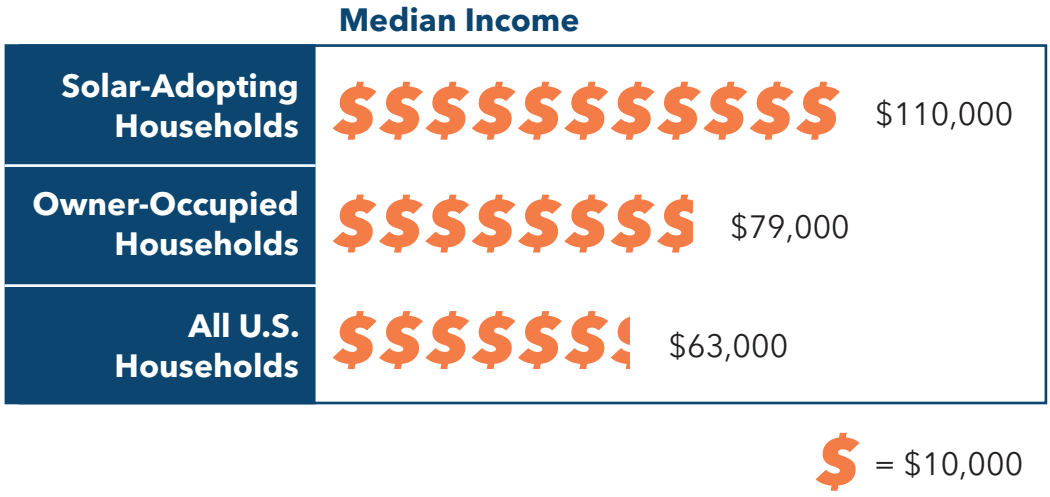
## Disparities in Rooftop Solar Access

In the case of residential rooftop solar, Lawrence Berkeley National Laboratory has found that solar adopters (including households that own their solar panels as well as those with a solar lease or power purchase agreement) tend to have higher incomes than other households, even when compared only to owner-occupied households or to other households in the same census tract.[29] Nationally, solar adopters in 2021 had a median household income of $110,000 — almost twice as high as the U.S. median household income of $63,000 and still substantially higher than the median income of $79,000 for U.S. households that own their home, as shown in Figure 7. Only 22 percent of solar adopters in 2021 had household incomes under 80 percent of Area Median Income (a common measure of low or low-to-moderate income), while just 43 percent had incomes under 120 percent of Area Median Income (a common measure of low-to-moderate and middle income). Yet, a 2018 study estimated that housing occupied by households under 120 percent of Area Median Income represented over half of the total rooftop solar capacity potential on single family homes (both rented and owned) nationally.[30] Figure 8 illustrates this gap.

Solar adoption data suggest that third-party ownership options for rooftop solar, such as leases or power purchase agreements, may be more accessible for low-income households than self-ownership of rooftop solar. Though the median income of households with third-party-owned solar panels is still above the national median income, it's lower than the median income of those with self-owned systems, and research has found that third-party ownership options likely drive additional low-income rooftop solar adoption.[31] However, as explained further in the section "The Impacts of Ownership," typical third-party ownership models for rooftop solar, where outside companies develop and own the systems, do not maximize households' financial returns, build wealth, or grant them decision-making authority. And at a community level, it does not create the same level of economic benefit or community power that locally owned rooftop solar does.

*Figure 7.*

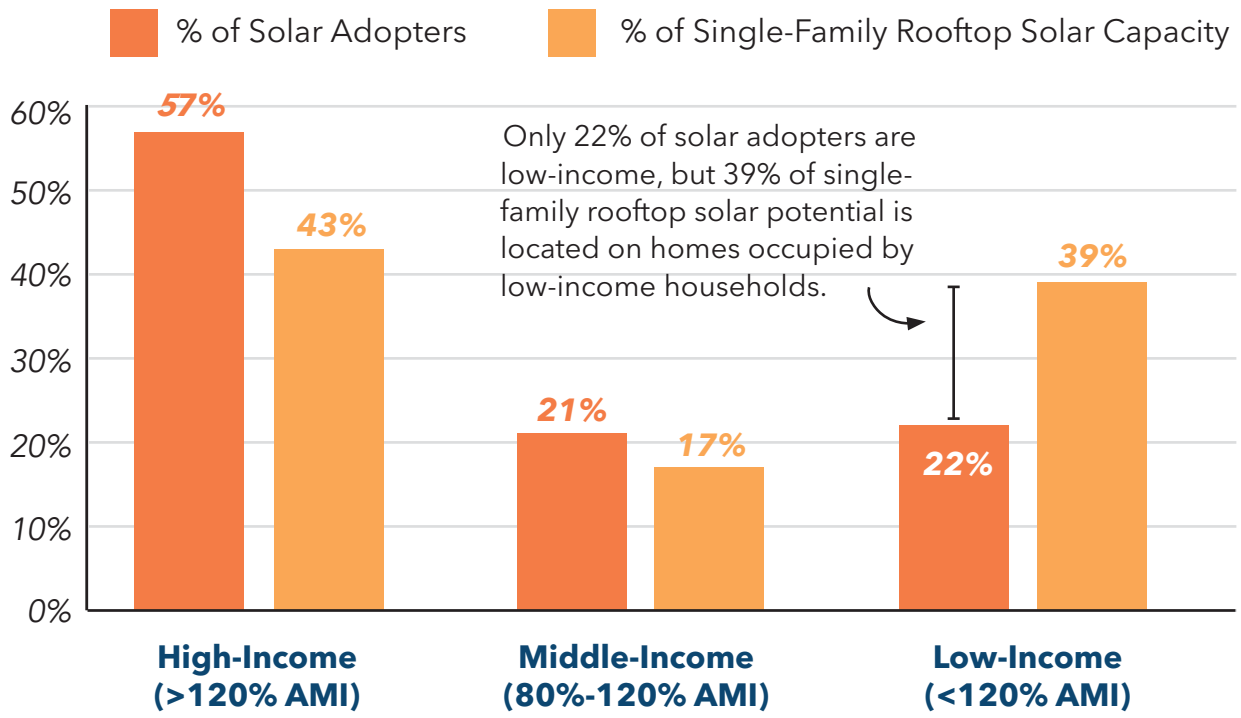
### Solar Adopter Incomes Are High Compared to Other Households




*Data from Lawrence Berkeley National Laboratory, Residential Solar-Adopter Income and Demographic Trends: November 2022 Update.*

*Figure 8.*

## Rooftop Solar Adoption Compared to Rooftop Solar Potential, by Income




*Data from Lawrence Berkeley National Laboratory, Residential Solar-Adopter Income and Demographic Trends: November 2022 Update; National Renewable Energy Laboratory, Rooftop Solar Technical Potential for Low-to-Moderate Income Households in the United States.*

In this way, the differences in household rooftop solar ownership versus third-party ownership by an outside entity can be compared to the differences between owning and renting a home. While both can give you access to certain advantages — well-funded schools, energy cost savings — only owners reap the full benefits.

Income isn't the only demographic feature associated with disparities in rooftop solar adoption. Lawrence Berkeley National Laboratory has also found that Black and Hispanic households are generally under-represented among solar adopters at the state level.[32] While lower median incomes nationally for Black and Hispanic households could account for some of the differences in solar adoption, research has found that these racial disparities remain even when accounting for varying income levels. For instance, a 2019 study found that census tracts with Black or Hispanic population majorities had on average 69 percent and 30 percent less rooftop solar deployment, respectively, when compared to census tracts with similar median household incomes but no racial majorities. White-majority tracts had on average 21 percent *more* deployment than the no-majority tracts.[33]

Furthermore, Lawrence Berkeley National Laboratory's data show that only 11 percent of rooftop solar adopters live in "disadvantaged communities," as defined by the Department of Energy (based on criteria including energy, environmental, and socio-economic vulnerabilities), even though disadvantaged communities represent 18 percent of the population nationally.[34]

## Disparities in Community Solar Access

Data on access to community solar — though less robust and not specific to local ownership — suggest there may be similar disparities as with rooftop solar adoption. A 2018 survey found that fewer than half of community solar developers and program administrators reported serving *any* low- or moderate-income households at all, and only about one in 20 had more than 10 percent low- and moderate-income subscribers, as shown in Figure 9.[35]

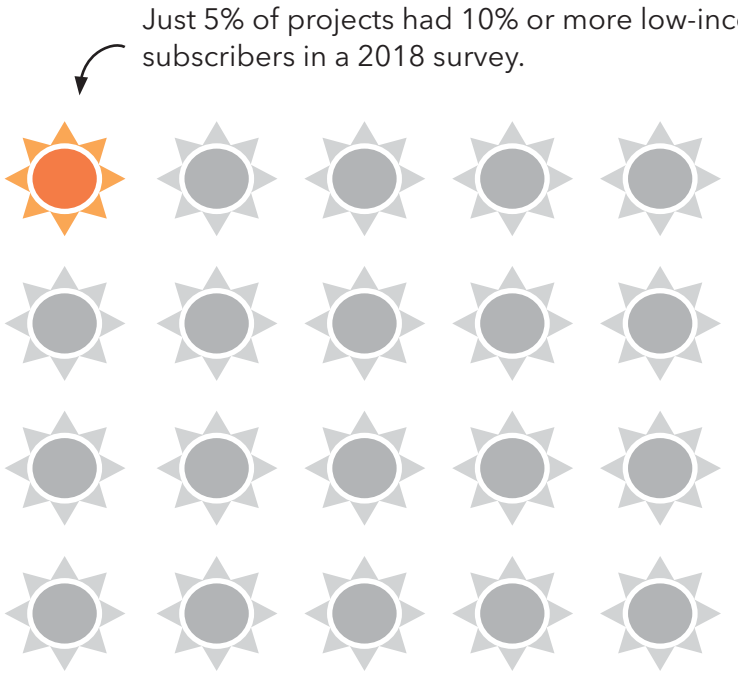
However, for households that rent and low-income households, community solar subscriptions are typically much more accessible than rooftop solar panels, and state community solar programs increasingly include substantial low-income participation requirements, such as in New Jersey's program.[36]

Importantly, community ownership models for shared solar, such as community solar cooperatives, can increase accessibility for low-income households while still guaranteeing them the full benefits of ownership. This is because community-owned projects can access financing and capital for the initial costs without requiring individual participants to make upfront investments, similar to how a third-party owner offers a lease or power purchase agreement. If a household that owns its own solar panels is like a homeowner and a household with a solar lease is like a renter, then a member of a community solar cooperative is akin to a renter who owns their landlord alongside their neighbors — getting the perks of ownership with fewer of the barriers.[37]

We discuss ways to enable more shared clean energy ownership in the section "Enabling Ownership for All."

*Figure 9.*

### Share of Community Solar Serving Low-Income Customers




*Data from Smart Electric Power Alliance, Community Solar Program Design Models.*

## Cooperative Energy Futures Turns Local Investment Into Equitable Community Ownership

***Organization:*** **Cooperative Energy Futures (CEF)**

***Projects:*** Shiloh Temple Community Solar Garden and other community solar installations.

***Location:*** Minnesota

***Technology:*** Community solar/shared solar.

***Ownership Structure:*** Membership cooperative.

***Financing:*** In addition to loans and tax equity arrangements which make up the majority of project financing, CEF solicits investments from its cooperative members, who then have an opportunity to earn returns on those investments.

*General Manager Timothy DenHerder-Thomas. Photo credit: John Farrell*

***Project Benefits:*** Household energy savings and financial returns, membership equity, local jobs, political power.

***How They Made Ownership Work:*** One of the many benefits of CEF's cooperative structure is that it's able to avoid some burdensome securities regulations by sourcing investment from its own member-owners. While designed to protect small investors, these regulatory requirements can be challenging for community organizations looking to raise local funds. Cooperative membership isn't limited to households that make these upfront investments — all who subscribe to CEF's community solar projects are members who share in project profits and have a say in the co-op's operations, making local clean energy ownership possible for more people. Equity is a priority for CEF. They have worked to make their community solar projects more accessible to low-income Minnesotans and to train and hire local workers, through projects like the Shiloh Temple Community Solar Garden, which is located on a church in a historically Black neighborhood in Minneapolis.

***In Their Own Words:***

"To the extent as a cooperative we can actually source our capital from our members . . . we see it as a huge opportunity to cut a lot more of the financial waste out of these projects and direct more of the benefits to the community."

-Timothy DenHerder-Thomas, CEF General Manager (via Local Energy Rules)[38]

# The Forces Blocking Local Ownership

Disparities in clean energy access and ownership aren't inevitable. They're the result of an energy system designed to privilege centralized control and top-down decision making, built upon a foundation of systemic injustices in the American economy.

Big utility monopolies work hard to uphold this system and block locally owned clean energy as a direct threat to their power and profits. Their lobbyists push back against new programs and policy changes that would enable more equitable access to local clean energy, and they press legislators and regulators to continue to prop up their outdated business models.

Making clean energy ownership possible for more people and communities is not just fair; it's essential to realize clean energy's full potential, counter utility monopoly power, and combat the climate crisis. This requires breaking down the structural barriers as well as the energy system-specific barriers to both individual and collective forms of local clean energy ownership.

## Structural Barriers

Pervasive and intertwined structural disparities in housing, wealth, and financial services lay the groundwork for inequitable access to local clean energy ownership. Figure 10 illustrates these structural barriers as they impact access to rooftop solar ownership in particular, though some also apply to shared solar or other community clean energy projects.

For rooftop solar, homeownership is typically a prerequisite, as tenants are unlikely or unable to invest in modifications to a building they don't own, and landlords usually lack incentives to invest in solar panels that reduce their tenants' energy costs. This dilemma, often referred to as the split-incentive problem, effectively shuts out most of the 44 million households who rent from the benefits of rooftop solar ownership, even though rented single- and multi-family homes make up roughly a third of all residential rooftop solar capacity potential in the United States.[39]

Homeownership as a barrier to on-site clean energy ownership disproportionately affects communities of color, particularly Black households. A long history of government-sanctioned racist policies and practices — such as redlining, prejudicial lending, racial covenants, and other forms of housing and financial discrimination — helped entrench the racial disparities in homeownership that persist to this day.[40] In the third quarter of 2022, about 75 percent of white households owned their home, compared to only 45 percent of Black households.[41] In fact, the homeownership gap between Black and white households is greater now than it was in 1960.[42] Modern inequities in rooftop solar in part reflect these disparities in homeownership. (However, research has shown that racialized disparities in rooftop solar deployment remain when accounting for homeownership rates.)[43]

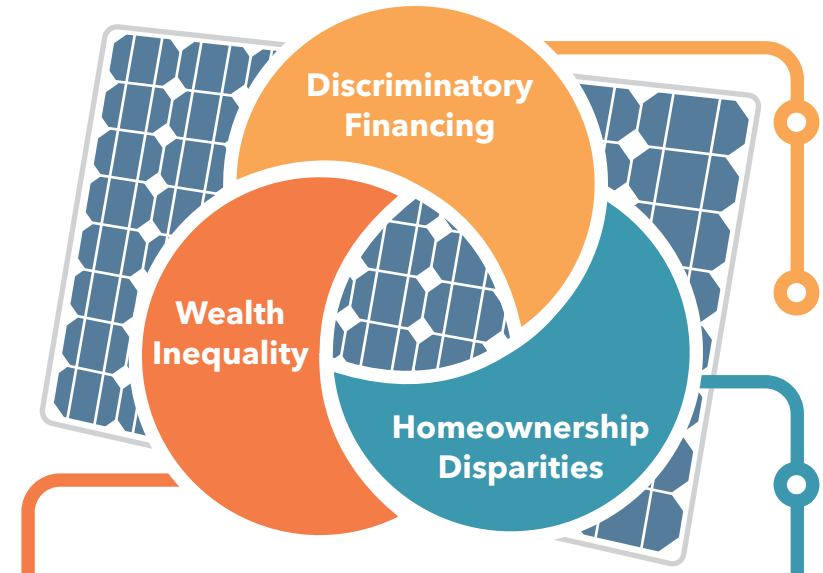
Wealth inequality presents another systemic barrier to equitable rooftop solar ownership. Even if households own their home or otherwise have access to their roof, they may still struggle to pay for the upfront costs of installing solar, including any needed roof repairs. This can be particularly true for low-income communities and communities of color which have lower household wealth and savings, as shown in Figures 11 and 12.[44] Disparities in homeownership rates and home values are significant contributors to wealth gaps by income and race.[45]

Low-income households and people of color who turn to banks to finance rooftop solar installations, instead of dipping into savings, experience similar systemic inequities in the financial sector. For instance, Black, Hispanic, and low-income households are more likely to be unbanked, to use high-cost check cashing services, to have low or no credit scores, and can encounter outright discrimination, limiting their access to loans and other financial services.[46] (Credit score requirements can even prevent households from signing up for community solar subscriptions.)[47] Minority-owned businesses face difficulties accessing credit — to finance rooftop solar, among other uses — as well.[48]

On a broader scale, limited access to capital, through either generational wealth or the financial sector, doesn't only impact a particular person's or household's ability to afford rooftop solar panels. These individual inequities combine to constrain whole communities' abilities to invest in neighborhood-scale clean energy projects, like shared solar installations.

*Figure 10.*

## The Interlocking Structural Barriers to Rooftop Solar Ownership




Black, Hispanic, and low-income households are more likely to be unbanked and have low/no credit scores.

Without access to affordable financing, it's hard to pay the upfront costs of rooftop solar.

**$200k** = the gap in median net worth between Black and white households.

**$670k** = the gap in median net worth between the lowest and highest income quintiles.

Homeownership is the biggest part of most families' wealth.

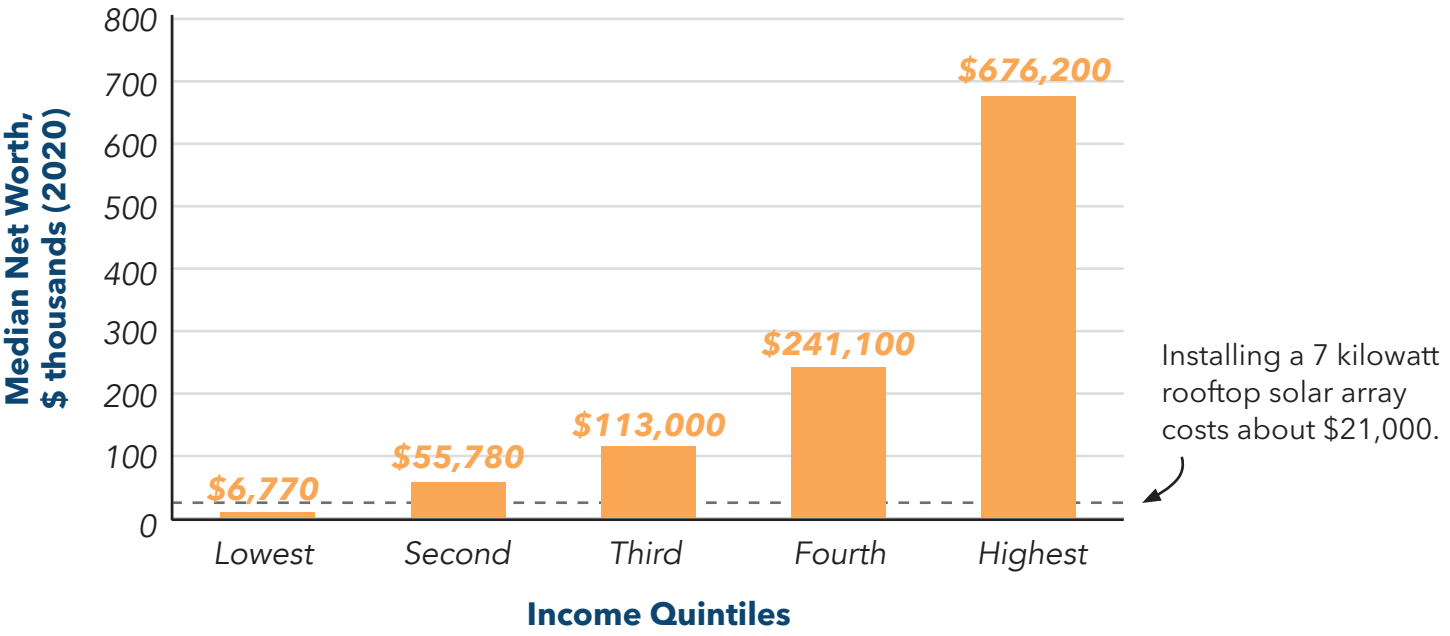
Due to split incentives, the **44 million** households that rent often can't go solar at home.

**30%** = the gap in homeownership rates between Black (45%) and white (75%) households.

Redlining, racial covenants, and other discriminatory practices entrenched these disparities.

*Figure 11.*

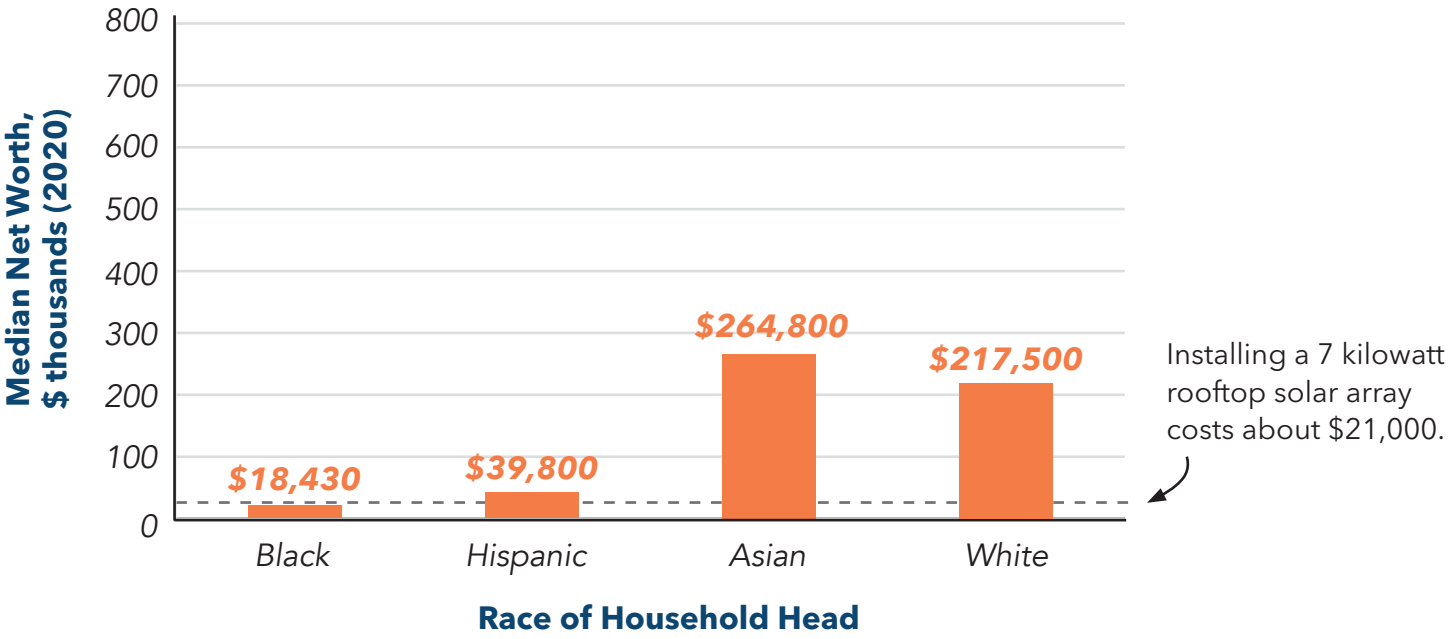
## Disparities in Net Worth, by Income




*Data from United States Census Bureau, Survey of Income and Program Participation, Survey Year 2021; Lawrence Berkeley National Laboratory, Trackng the Sun Tool.*

*Figure 12.*

## Disparities in Net Worth, by Race




*Data from United States Census Bureau, Survey of Income and Program Participation, Survey Year 2021; Lawrence Berkeley National Laboratory, Trackng the Sun Tool.*

## Energy System Barriers

On top of these underlying structural disparities, there are barriers to local clean energy ownership specific to the energy system.

In today's energy system, large corporate utilities that prioritize profits over people generally get to decide which projects are built, who owns them, and to whom the benefits (or burdens) accrue. This model of centralized control views households, small businesses, and community organizations solely as users of energy and not as producers. As a result, the legal and regulatory structures that policymakers have developed over decades often privilege outside ownership of energy resources over local ownership.

Before individuals and communities can even consider building their own clean energy projects, states and utilities must first implement policies that allow these projects to connect to the electric grid and sell power. This includes policies that guarantee sufficient compensation for energy generation, such as net metering requirements for rooftop solar, as well as policies that enable shared clean energy projects, such as community solar programs and virtual net energy metering. Currently, fewer than half of all states have shared renewables rules in place.[49] Monopoly utilities commonly target these policies, especially net metering, with well-funded (and at times, blatantly misleading) lobbying efforts meant to prevent competition from locally owned clean energy.[50] These utility attacks can particularly impact low-income households and people of color by keeping increasingly affordable clean energy from taking root in their communities. Without these legislative and regulatory supports in place, it can be unprofitable or even impossible for households and communities to become local clean energy owners.

If state enabling policies already exist, hopeful project owners must then figure out how to pay for the upfront costs of clean energy. Unlike investor-owned utilities, which can spread the costs of energy projects across all ratepayers and earn guaranteed returns, local owners must independently finance these start-up costs. While all non-utility projects must contend with this to some extent, high upfront expenses are especially challenging for individual households, community cooperatives and other local project owners, who typically have less access to capital than outside investors and may face additional costs for necessary work like roof repairs. This is particularly true for low-income communities and communities of color, as a result of the structural barriers noted above. Even with financing available, higher interest rates and other costs eat into the economic benefits of clean energy projects for local owners.[51]

One of the many challenges that locally owned clean energy projects, specifically community-scale projects, face in accessing capital is the difficulty of complying with federal and state securities regulations. These regulations are intended to protect small investors, but they can be an expensive and complex barrier for community-based clean energy projects that are seeking investments from local residents. (However, locally owned clean energy projects operating only within one state are able to avoid some of the more burdensome federal securities regulations.)[52]

Existing federal incentives don't do enough to help with these initial costs and make clean energy ownership accessible to all households and communities. Notably, clean energy tax credits — one of the federal government's main policy approaches to growing clean energy — fail to adequately address the upfront costs of clean energy ownership and barriers to capital. For one, the tax credits are only issued after taxpayers install the solar panels or other clean energy technology in the form of reductions in taxes owed; they aren't available for

## Olympia Community Solar Finds a Creative Solution to Policy Shortcomings

***Organization:*** **Olympia Community Solar**

***Projects:*** Hummingbird Community Solar and other community solar installations.

***Location:*** Olympia, Washington

***Technology:*** Community solar/shared solar.

***Ownership Structure:*** Olympia Solar, a 501(c)3 nonprofit, owns the project.

***Financing:*** Included solar "units" sold to community members (allowing them to claim the Residential Clean Energy Tax Credit) and grants.

***Project Benefits:*** Household energy savings, local revenues and economic reinvestment, innovative community solutions, political power.

*The Hands On Children's Museum. Photo credit: Jason Taellius (CC BY-SA 2.0)*

***How They Made Ownership Work:*** Unlike states such as Minnesota or Colorado, Washington doesn't currently have a community solar program that enables non-utility developers to deploy projects and provide subscribers with bill credits through virtual net metering. Without that framework, Olympia Community Solar had to get creative when designing their first project, Hummingbird Community Solar, a 117 kilowatt installation on a local children's museum. The nonprofit offered $300 solar "units" to community members, who could subscribe for themselves or for a local nonprofit, and will make payments to the unit-holders from the revenues that the system generates.[53] Olympia Community Solar has since developed further community solar projects, including on a farmers market, a middle school, and an affordable housing development.[54] Additionally, the group has organized a rooftop solar purchasing group, provided education on community solar, and advocated for low-income-accessible community solar policy.

***In Their Own Words:***

"Each solar unit represents about half of one of the solar panels, and then community members could purchase a solar unit for themselves, in which case they are basically subscribing to get the energy benefits of that half of a solar panel for about 20 years, or they could donate a unit to a local nonprofit. We had 14 nonprofits sign up to be participants, and they actually received a lot of donations."

- Mason Rolph, Olympia Community Solar President (via Local Energy Rules)[55]

initial project expenditures. Plus, they only cover a portion of expenses (currently 30 percent of project costs for households and between 6 and 70 percent for commercial projects), leaving households, small businesses, and community groups to cover the remainder.[56]

For households, the applicable federal tax credit, the Residential Clean Energy Credit, is not refundable to the taxpayer, so those that owe little or no federal taxes are unable to benefit fully from the credit if they invest in self-owned clean energy technologies like solar panels.[57] The nonprofit organization RMI has found that as many as seven in ten households would be unable to take the full value of the credit in the first year after installing solar panels.[58]

The design differences between the residential and commercial tax credits can further discourage local ownership of residential rooftop solar — individual households aren't eligible for the larger tax incentives that the recent Inflation Reduction Act made available to commercial projects that meet certain requirements, like locating in a low-income community. While a business could potentially get a tax credit worth up to 70 percent of project costs for installing solar panels on a family's home and offering them a lease or power purchase agreement for the energy, the family would only be eligible for a credit worth 30 percent of project costs if they purchased or financed the panels themselves.[59]

Community-scale projects, such as locally owned community solar and wind farms, have also historically faced difficulties accessing the federal Investment and Production Tax Credits for commercial clean energy projects because of the owners' low tax liability or tax-exempt status. Many community-owned projects must partner with tax equity financiers to capture the full value of the clean energy tax credit (plus accelerated depreciation). Typically in these "partnership flip" arrangements, the tax equity partner maintains a majority share of legal ownership for a period of years before ownership "flips" back to the local project developer, often at the loss of some of the credit value and local ownership share — though the local developer can maintain certain decision-making abilities throughout.[60] (Thanks to the Inflation Reduction Act, new alternatives are on the horizon. The section "Enabling Ownership for All" explains more.)

For both household and community projects, an inability to access federal clean energy tax credits can make it nearly impossible for local ownership to pencil out, pushing people to instead turn to third-party ownership, even if it dilutes the local benefits.

Lastly, in many cases there isn't enough institutional and organizational support (such as trainings, technical assistance, and other resources) available for individuals and groups interested in local clean energy ownership models, especially community ownership models. Governments and nonprofits that provide educational resources for community groups deploying clean energy projects, like community solar projects, don't always include robust information on local ownership options, if any. While initiatives like the Department of Energy's National Community Solar Partnership play an essential role in expanding access to community solar across the country, their main focus isn't on local clean energy ownership. Locally owned clean energy projects often require specific technical advice, financial guidance, and legal help that either isn't widely available or isn't tailored to their specific needs. Without this institutional capacity-building support, many communities can find the process of attempting local clean energy projects too difficult or disempowering, and successful projects may be limited to communities that already have substantial knowledge and resources.[61]

## Maine Electric Co-op Flips the Switch on a Local Wind Farm

***Organization:*** **Fox Islands Electric Cooperative (FEIC)**

***Project:*** Fox Islands Wind

***Location:*** Coastal Maine

***Technology:*** 4.5 megawatt wind farm (3 turbines).

***Ownership Structure:*** Owned by a nonprofit subsidiary of the local electric cooperative.

***Financing:*** Included tax equity financing using a partnership flip model and a loan from the U.S. Department of Agriculture's Rural Utilities Service.

*Fox Islands Electric Cooperative Wind Farm on Vinalhaven Island.*

***Project Benefits:*** Household energy savings, local revenues, resiliency.

***How They Made Ownership Work:*** FIEC serves less than 2,000 member-owners on two islands in Southern Maine. In 2006, cooperative members voted (383-5) to build a local wind farm, to help lower and stabilize the islands' high energy costs. To take advantage of federal tax credits for wind energy (which FIEC itself wasn't eligible for), the co-op formed a for-profit subsidiary and also partnered with a tax equity investor, an international media company headquartered in Maine. The organizations used a partnership flip model, where the tax equity partner provided an upfront capital investment and in return received the value of the federal tax credit and 99 percent ownership interest for the five years following project construction in 2009. FIEC bought out the tax equity investor in 2014 and converted its subsidiary to a nonprofit. The wind farm continues to reduce the amount of wholesale energy that the co-op must buy from the mainland, but changes in Maine's energy market and wholesale costs have lowered the project's financial savings. However, the wind farm promises stability and resiliency to the island communities, and FIEC is considering adding energy storage to boost the project's impact.[62]

***In Their Own Words:***

"Energy decisions should be made locally, allowing customers to decide how to invest their dollars. They're the ones taking the financial risk from a rate perspective, and they're the ones that will experience the beneficial or negative consequences of such risk."

- Amy Watson, FIEC CEO (via National Rural Electric Cooperative Association)[63]

# The Impacts of Ownership

## Benefits to Individuals

Households can benefit in a number of ways from clean energy ownership, whether it's through rooftop solar panels, a community solar share, or another local clean energy source. Ownership maximizes the financial benefits of renewable energy, helping families save more money on their electricity bills, reap project returns, and build greater wealth.

### Bill Savings

Many families make the decision to invest in local clean energy based solely on their pocketbooks. Because of plummeting prices for renewable energy technologies (and the absence of fuel costs), households that put solar panels on their home or subscribe to a community solar project are typically able to slash their electricity bills and save money in the long run, even after accounting for any upfront installation costs or subscription fees.[64]

A household that directly owns its rooftop solar panels, for instance, maximizes these bill savings over the life of the project. When compared to leasing the solar panels or signing up for a power purchase agreement, our calculations show that it can make a difference of as much as $12,000. This is because more of the value of the energy produced by the project flows back to the household in the form of electric bill credits, instead of padding the bottom line of an outside project owner.

Consider a homeowner who wants to put a 7 kilowatt solar installation on their roof. In our analysis, if the homeowner finances and owns the solar panels themself,

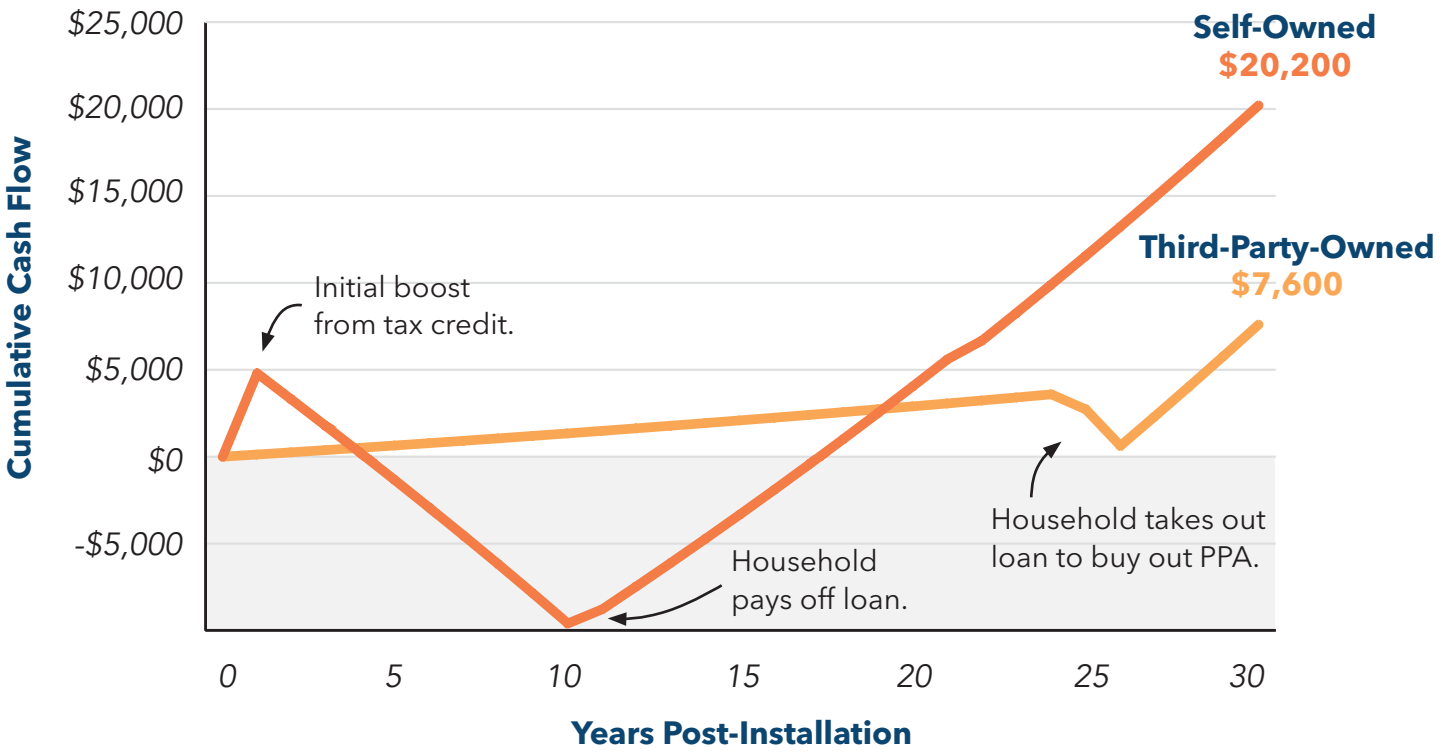
they could earn an estimated cumulative return of about $20,000, through savings on their electric bill.[65] If instead the homeowner signed up for a power purchase agreement with a solar company for the same rooftop system, they could avoid having to finance the upfront costs but would only reap about $7,500 in total net returns. Figure 13 shows the cumulative cash flows over 30 years for the hypothetical homeowner in each of these scenarios.[66]

Likewise, our calculations of the net present value for the household for the two project options suggest that owning the solar panels directly would still be a better financial decision for the homeowner, even after accounting for the time value of the initial project costs. However, this advantage is relatively small in our analysis. This is because we assume the homeowner must take out an initial loan to pay for the rooftop solar panels, so more financial benefits accrue in later project years, when the household has paid off the loan but is still receiving bill credits. (The section "The Barriers to Ownership" further discusses this challenge of upfront costs.) See Figure 14 for a comparison of the net present value that both project types offer to the homeowner in our example.[67]

As with rooftop solar, locally owned community solar projects also have the opportunity to increase household energy cost savings by allocating a greater portion of electricity production revenues to subscriber bill credits as opposed to returns for investors. In instances where the owners are also subscribers, such as a member-owned community solar cooperative, local project owners are especially incentivized to maximize subscribers' electricity bill credits.

*Figure 13.*

**Household Earnings from Rooftop Solar, Self-Owned vs. Third-Party-Owned**



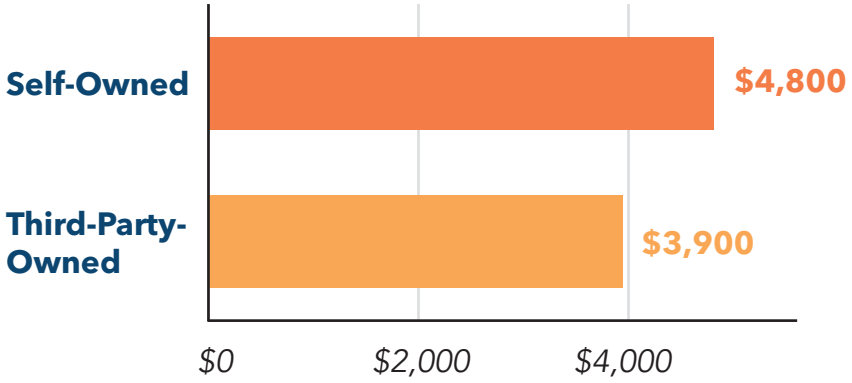

*See Appendix for detailed information on the assumptions for this analysis.*

## Key Definitions

***Net Present Value -*** This is a method of measuring the expected profits of a project or investment by calculating the difference between project costs and the current, or "present," value of anticipated project earnings. Under the assumption that a certain amount of money today is worth more than that same amount of money in the future (i.e., the time value of money), anticipated earnings are discounted using a chosen interest rate or rate of return. Net present value is often used to compare different investment options.

*Figure 14.*

**Net Present Value of Rooftop Solar for Household, Self-Owned vs. Third-Party-Owned**




*See Appendix for detailed information on the assumptions for this analysis.*

## Profit Sharing

In addition to electricity bill savings, local clean energy project owners can reap other financial returns, namely the profits that would have accrued to outside investors if projects were not locally owned.

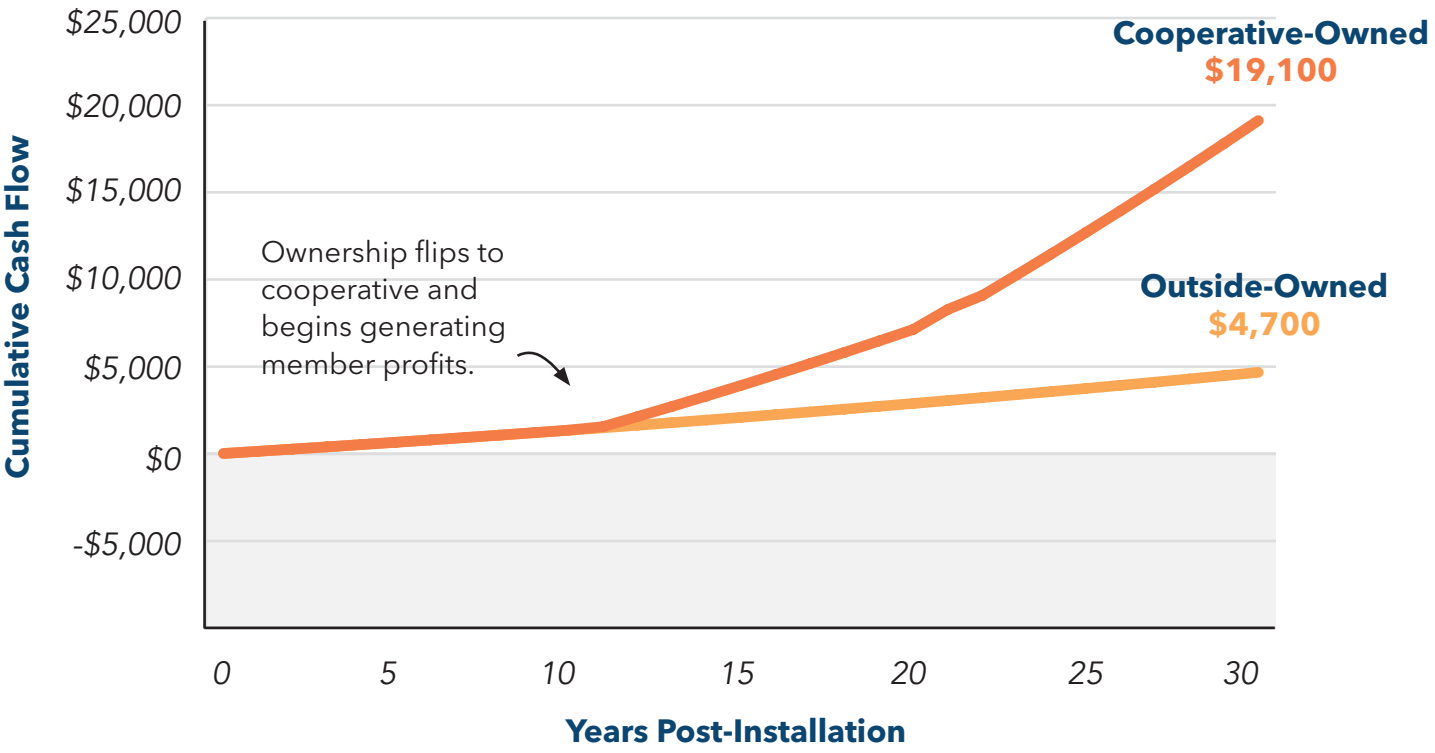
This benefit of local ownership is easily seen when comparing individual household returns from a locally owned community solar cooperative to the value of a third-party community solar subscription. Our analysis shows that in the case of a 1.3 megawatt community solar garden owned by a local cooperative using a partnership flip model, a household that is a member-owner of the co-op and subscribes to a 7 kilowatt share would earn a cumulative return of about $19,000 over 30 years, in the form of electricity bill credits and profit sharing, with no upfront investment required. In comparison, a household that simply subscribes to a similar third-party-owned community solar project would reap less than a total of $5,000 over the life of the project from bill credits alone and would have no opportunity to share in profits. Figure 15 shows the cumulative cash flows over 30 years for these scenarios. [68]

Similarly, the net present values for the hypothetical household of the two community solar project models show that the financial benefits of local ownership are significantly greater than those of third-party ownership, even after discounting future returns. Figure 16 shows this comparison.[69]

Like solar, local ownership of wind energy also maximizes revenues for local project owners. A 2004 analysis from the U.S. Government Accountability Office found that landowners who own wind turbines directly instead of leasing their land for wind energy development to outside investors could potentially double or triple their earnings per turbine.[70] (However, limited access to up-front financing and other barriers can restrict the number of turbines that landowners are able to install without working with third-party owners, and thus could limit landowners' total earnings.)

*Figure 15*

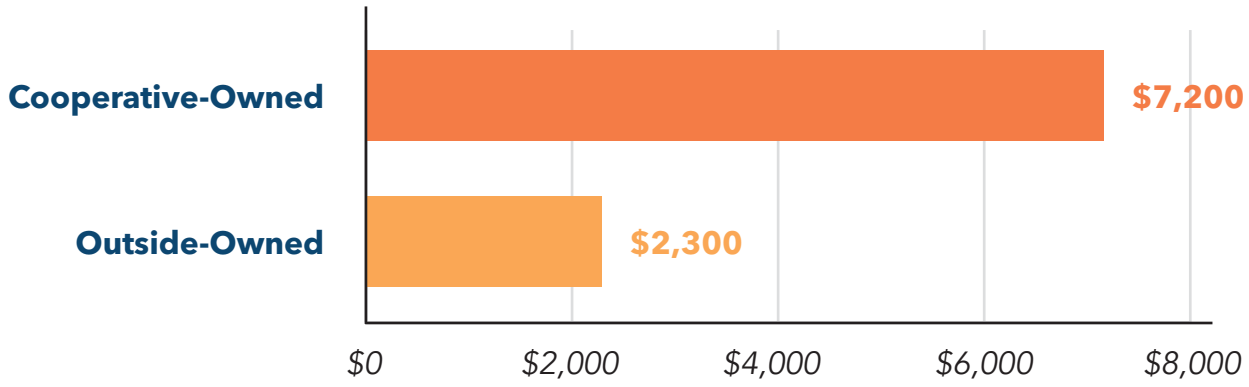
## Household Earnings from Community Solar Share, Cooperative-Owned vs. Outside-Owned




*See Appendix for detailed information on the assumptions for this analysis.*

*Figure 16.*

## Net Present Value of Community Solar Share for Household, Cooperative-Owned vs. Outside-Owned




*See Appendix for detailed information on the assumptions for this analysis.*

## Wealth Creation

Beyond immediate project revenues and savings on energy costs, clean energy ownership is also a wealth-building opportunity for households.

For instance, installing rooftop solar panels can increase a home's value, which is the largest — or *only* — component of many home-owning families' wealth, especially low- and moderate-income and low- and moderate-wealth households.[71] In 2015, Lawrence Berkeley National Laboratory estimated that home buyers were willing to pay roughly a $4 per watt premium on average for houses with resident-owned rooftop solar (which was roughly equivalent to the net cost of rooftop solar panels at the time) translating to an increase in home value of about $28,000 for a seven kilowatt system.[72] The median value of owner-occupied homes in 2015 was $194,500, so that would have represented a 14 percent increase in value for the median home.[73] The research did not analyze price premiums for houses with leased rooftop solar panels, but they would likely have less of an impact on home sale values since they would offer lower revenues compared to a resident-owned system and would not grant immediate ownership to the future resident. Plus, anecdotal evidence suggests that sellers can face difficulties attracting buyers for homes with leased solar panels.[74]

As with rooftop solar, member-owners of a locally owned solar project, such as a community solar cooperative, have a chance to grow their wealth too. Unlike subscribers to a third-party-owned community solar garden, cooperative members can build equity (part ownership) in the business through their energy purchases, in addition to reaping the electricity bill savings and profits associated with their share of the solar project.

## Making the Decision

Households consider a number of different factors when deciding to become clean energy owners. These factors can vary based on whether ownership is individual (e.g., home rooftop solar) or shared (e.g., cooperative solar gardens).

One of these considerations is the financial impact of clean energy ownership. In instances where a household is buying an asset (like solar panels) or making an upfront investment (such as in a local wind farm), they will weigh the financial benefits of ownership against the possible costs and risks, just as they might with a car, home, or any other large purchasing or investing decision.

For households that individually purchase a clean energy system, issues with unexpected maintenance costs or predatory loans could impact their budget and overall energy savings. As an example, some poorly designed residential PACE (property assessed clean energy) programs without sufficient consumer protections have even put some participants at risk of losing their homes after missing payments.[75] And as with home mortgages, lenders may be more likely to offer loans with poorer terms or decline to lend to equally qualified borrowers of color.[76]

Individual clean energy ownership, however, can help households avoid other possible financial risks. For example, rooftop solar leasing companies can take advantage of information asymmetry to steer households into long-term agreements that benefit the business more than their customer, and some have used aggressive tactics to make sales.[77] Plus, when households own their own solar panels or other clean energy technology, they still have an asset they could potentially sell if they are faced with budget shortfalls.

Shared ownership of clean energy projects, like a community solar cooperative, can offer households even greater protection against financial risks while providing the same benefits as individual clean energy ownership. Cooperative members can share in the project's profits without necessarily investing money upfront or exposing themselves to personal liability for project costs.

In addition, many households value the non-financial benefits of clean energy ownership — such as helping the environment or being part of something bigger than oneself — and will consider those alongside the monetary factors.

## Solar United Neighbors Pools Panel Purchases for Local Power

***Organization:*** **Solar United Neighbors (SUN)**

***Projects:*** Solar Bulk Purchasing Groups

***Location:*** National

***Technology:*** Residential rooftop solar panels.

***Ownership Structure:*** Individual households either directly own their panels or choose a solar lease or power purchase agreement (PPA).

***Financing:*** Group purchasing reduces upfront installation costs; households can pay the remaining costs out of pocket, take out a loan, or instead opt for a solar lease or PPA, where allowed. Households that opt for direct ownership can also take the 30 percent Residential Clean Energy Credit.

*Photo credit: John Farrell*

***Project Benefits:*** Household energy savings, political power.

***How They Made Ownership Work:*** As of 2022, SUN has helped more than 7,500 families go solar by pooling the purchasing power of many households in a community to get a discount on installation costs.[78] Participants receive a lower cost solar installation plus the expertise and guidance of SUN along the way, which helps reduce the cost and knowledge barriers to local ownership. Since its first solar group purchase in the Mount Pleasant neighborhood of Washington, D.C., SUN has leveraged the engagement of its members to successfully advocate for pro-solar policies that have helped bring clean energy to a broader range of communities. SUN has also worked with the District of Columbia on its Solar for All program, which provides no-cost solar systems to low-income households.[79]

***In Their Own Words:***

"While rooftop solar has broad appeal, the challenge for many in making the dream a reality is knowing where to start. That's where our solar co-ops come into play: we provide installer-neutral know-how, so folks can feel confident that they're getting a good deal and the right system for their home or business."

-Bobby King, SUN Minnesota Program Director (via *Cook County News Herald*)[80]

# Benefits to Communities

Local clean energy ownership also has a positive impact on the broader community beyond the individual clean energy owners. It maximizes local economic benefits and jobs, enables innovative solutions to community needs, builds public support for clean energy, and strengthens communities' political power.

## Economic Reinvestment

Local ownership multiplies the beneficial impacts of clean energy on the local economy, through direct, indirect, and induced economic effects.

One of the ways that clean energy owners can boost economic impacts is by choosing local small businesses for financing, installation, and other necessary services, resulting in direct benefits in the local economy. By then hiring and buying from other local companies, these businesses can create additional indirect economic impact. Researchers and advocates have repeatedly found that independent businesses create more local economic activity than national chains, both in direct as well as indirect and induced effects.[81] However, the impacts of choosing local inputs may be limited by availability of the labor, capital, and services necessary for clean energy projects.

Local ownership also maximizes the direct returns (bill savings and shared profits) that households receive from a clean energy project, as described in the previous section, "Benefits to Individuals." When households spend these increased earnings at local businesses like grocery stores and mechanics, the dollars stay and recirculate in the local economy instead of leaving to line the pockets of outside investors, leading to even greater induced economic impacts.

Furthermore, collectively owned clean energy projects, such as through a cooperative, municipal utility, or community organization, have the opportunity to intentionally reinvest project revenues into other local economic development efforts.

### Key Definitions

***Direct Economic Effects -*** These are the local economic impacts caused when an entity pays for goods or services or pays its employees, e.g., when a community solar cooperative hires a local solar installation company or pays its own staff members. This can also describe direct job effects.

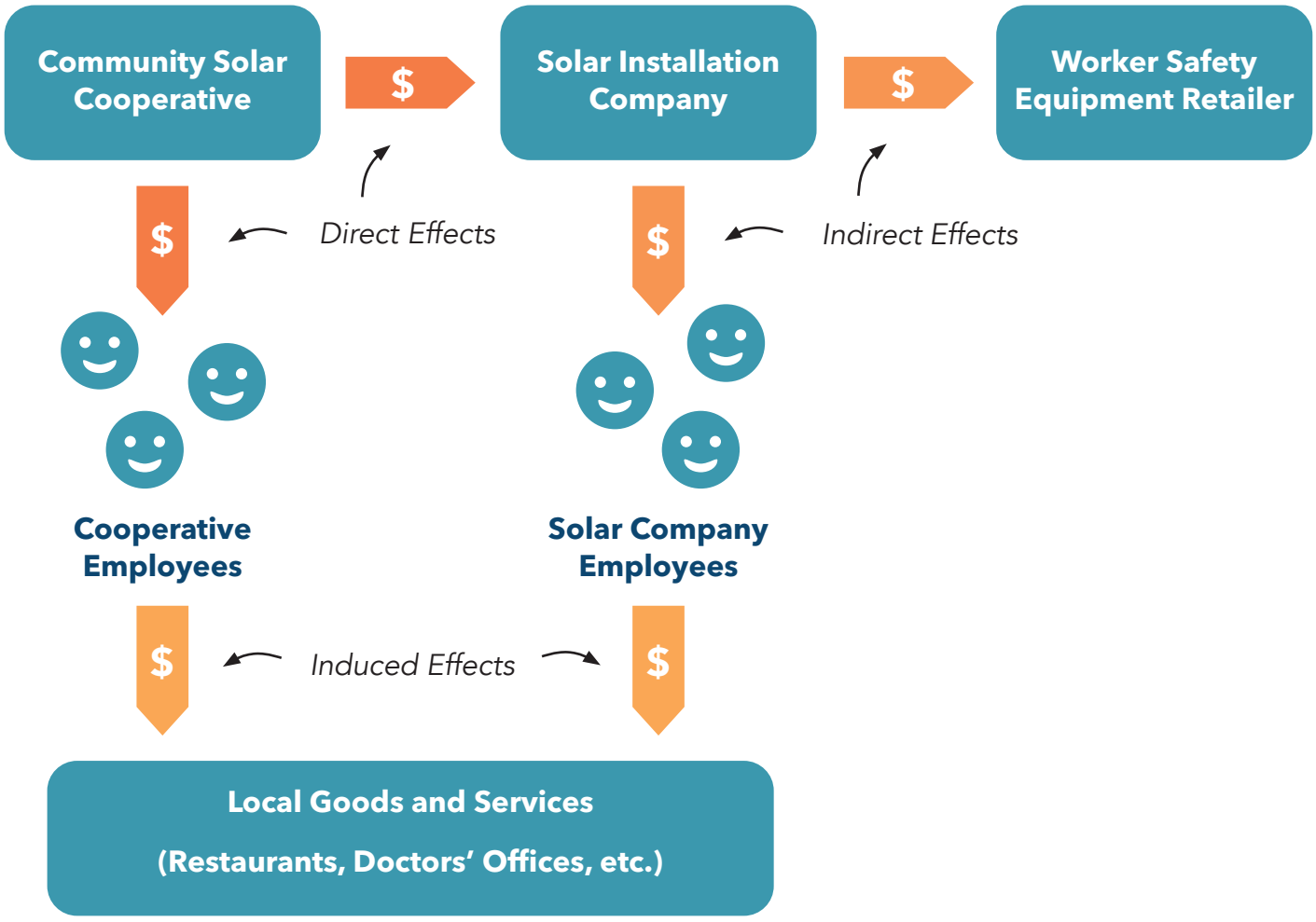
***Indirect Economic Effects -*** These are the local economic impacts caused when that entity's suppliers pay for goods and services or pay their employees, e.g., when the solar installation company pays its workers or purchases safety equipment from a local retailer. This can also describe indirect job effects.

***Induced Economic Effects -*** These are the local economic impacts caused when the employees of an entity and its suppliers then purchase goods and services, e.g., when the workers at the community solar cooperative or the solar installation company spend their earnings at local restaurants, stores, and other locations. This can also describe induced job effects.

See Figure 17 for an example illustration of direct, indirect, and induced economic impacts.

*Figure 17.*

**Example Direct, Indirect, and Induced Local Economic Impacts of a Community Solar Cooperative**




To illustrate these broader local economic impacts, we can consider again the example of a homeowner who either purchases their own 7 kilowatt rooftop solar project or signs a power purchase agreement with an outside company. The previous section, "Benefits to Individuals," outlined the net present value provided to the household under each model. We can expand this analysis to include the net present value offered to other local and non-local entities — namely the lenders and outside owner in this example — to represent some of the other direct economic effects. We estimate that the self-owned solar panels would directly provide more than $12,000 in net present value to the local economy over the life of the installation. On the other hand, solar panels installed through a power purchase agreement would offer less than $4,000 in net present value to the local economy, since the solar company keeps some value for itself and solicits financial services from a non-local lender. Figure 18 compares the amounts of net present value provided to selected local and non-local entities in each project example. (Note that this analysis is illustrative and only captures a portion of the direct economic

effects. It does not include the net present value offered to labor including solar installers, as it's difficult to generalize the share of local vs. non-local labor, or to other providers of goods and services.)[82]

Larger locally owned clean energy projects benefit the local economy as well. Our analysis shows that a 1.3 megawatt community solar project owned by a local cooperative using a partnership flip model could provide almost $1.6 million in net present value to select local entities, including the cooperative's member-owners, a local lender, the relevant landowner, and the local government (via payments in lieu of taxes). Meanwhile, an outside-owned 1.3 megawatt community solar project would only offer about $550,000 in net present value to those local entities, through land lease payments, payments in lieu of taxes, and customer subscriptions. Figure 19 shows the net present value provided to local and non-local entities for each type of community solar project. (Again, this analysis is illustrative, and it does not capture all direct economic effects or any indirect or induced economic effects.)[83]

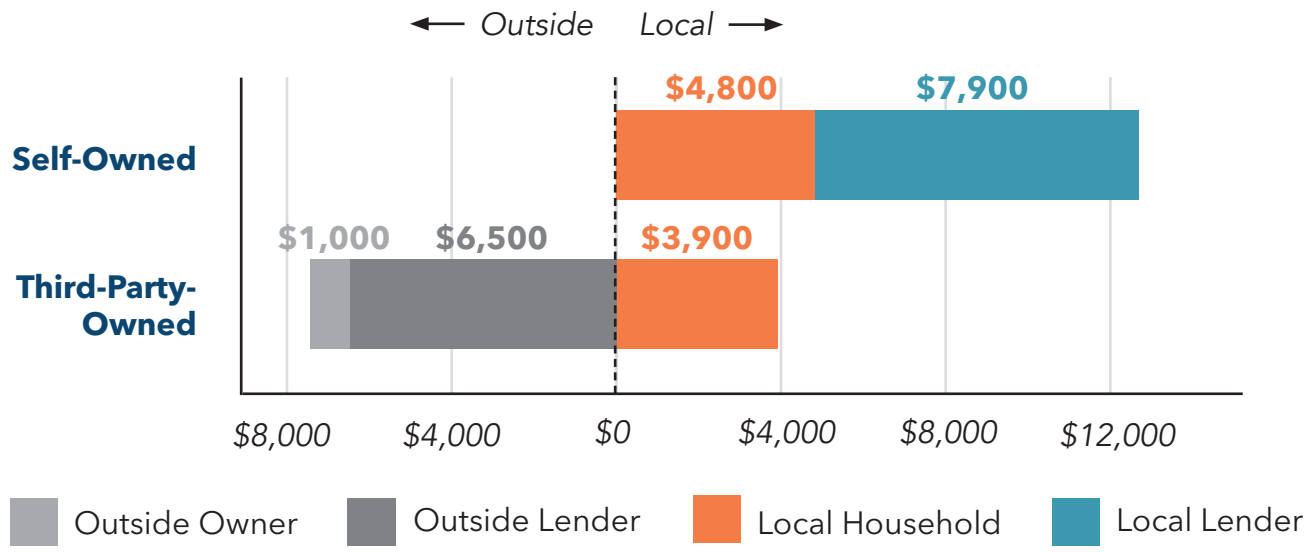
To compare the economic impacts across all of the different ownership models for rooftop and community solar, we can look at the amount of net present value *per watt* that each model offers to select local and non-local entities. This again highlights the increased community benefits of local ownership. Figure 20 breaks down the shares of net present value for the rooftop and community solar example projects as shown in Figures 18 and 19 into shares of net present value per watt for each model.

To put these comparisons into perspective, the United States installed about 6.9 gigawatts of non-utility-scale solar — i.e., residential, commercial, and community solar — in 2021.[84] If all of that small solar capacity had been locally owned, we estimate that it could have directly created about $11 billion in net present value for the communities hosting the solar projects, through the local entities included in our analysis. Alternatively, if that capacity was all owned by outside entities, we estimate that it would have only offered a little over $3.5 billion in direct net present value for local communities. Figure 21 shows this comparison.[85]

*Photo credit: PSNH (CC BY-ND 2.0)*

*Figure 18.*

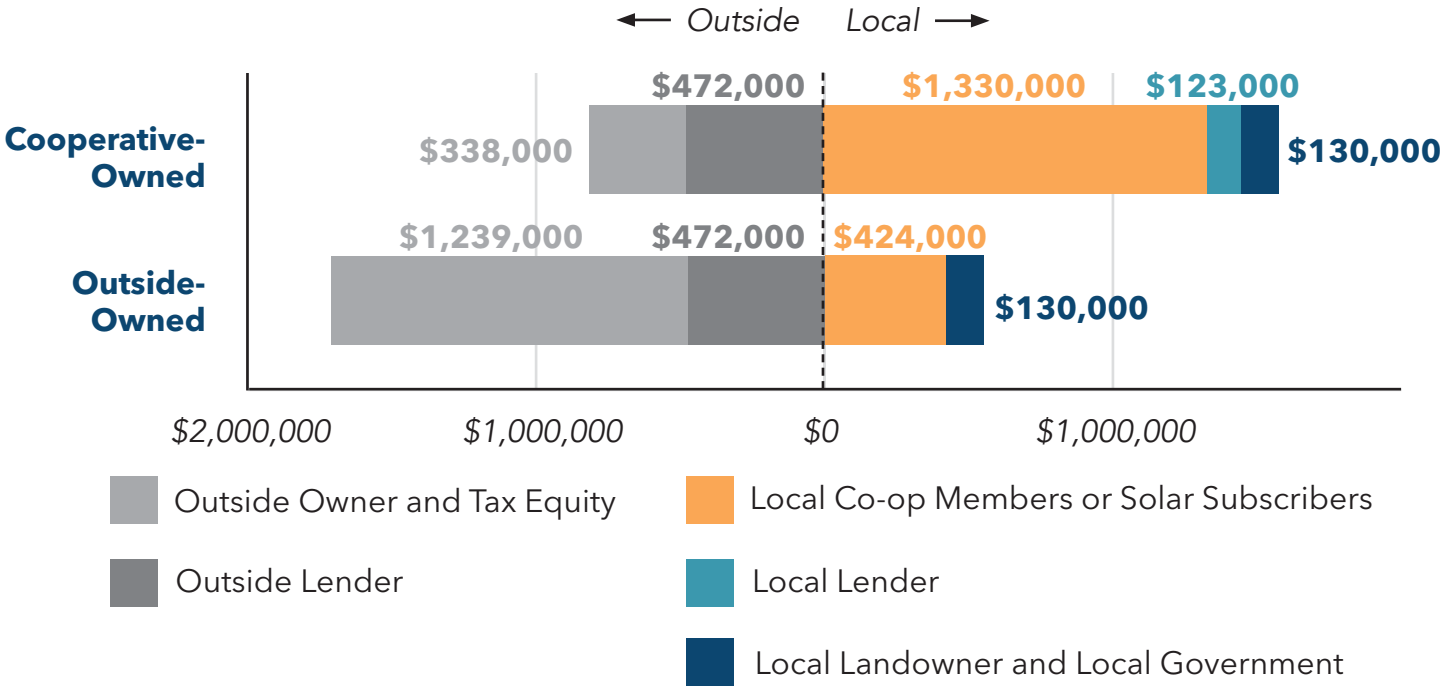
## Net Present Value of Rooftop Solar for Local and Outside Entities, Self-Owned vs. Third-Party-Owned




*See Appendix for detailed information on the assumptions for this analysis.*

*Figure 19.*

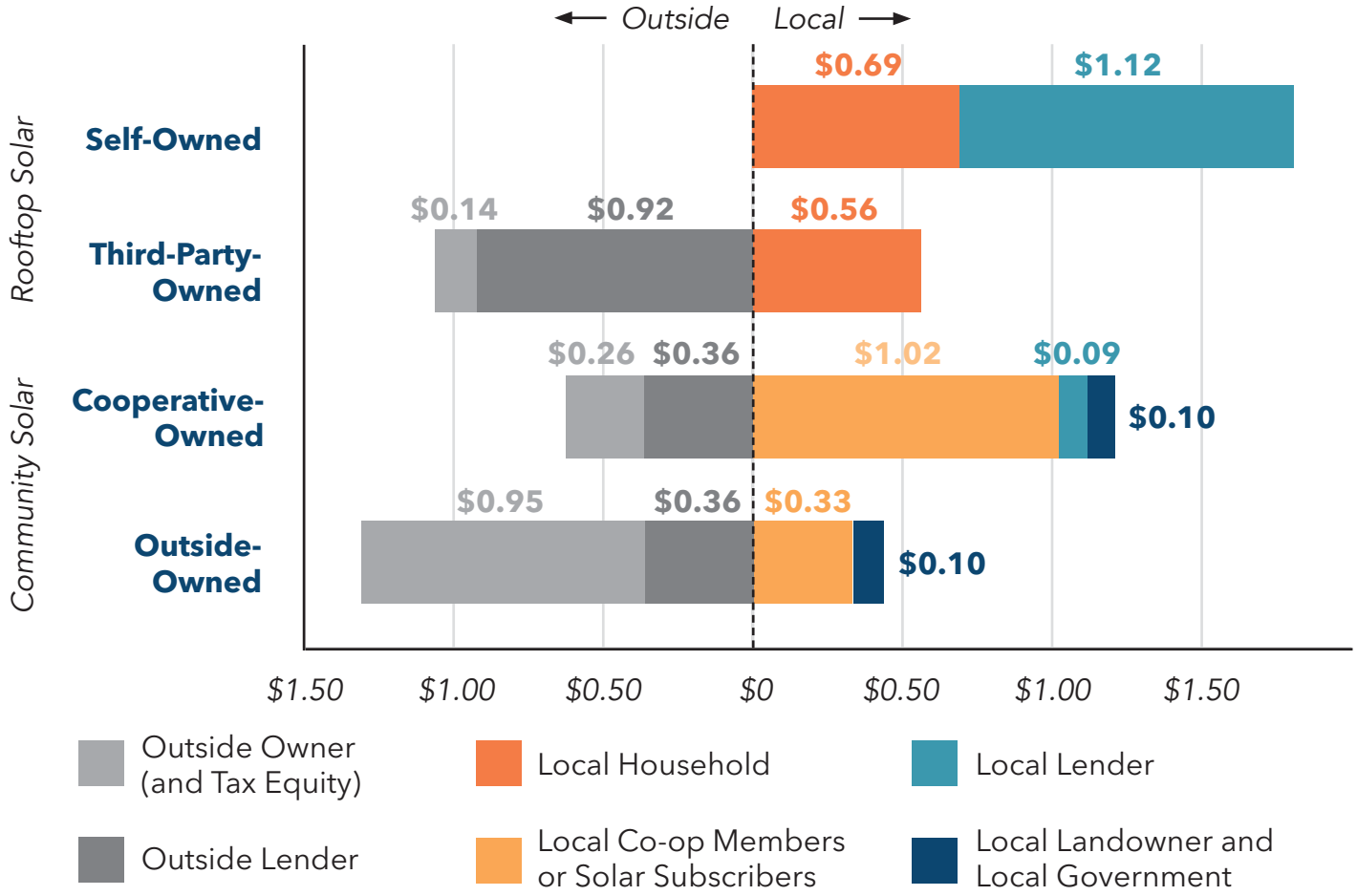
## Net Present Value of Community Solar for Local and Outside Entities, Cooperative-Owned vs. Outside-Owned




*See Appendix for detailed information on the assumptions for this analysis.*

*Figure 20.*

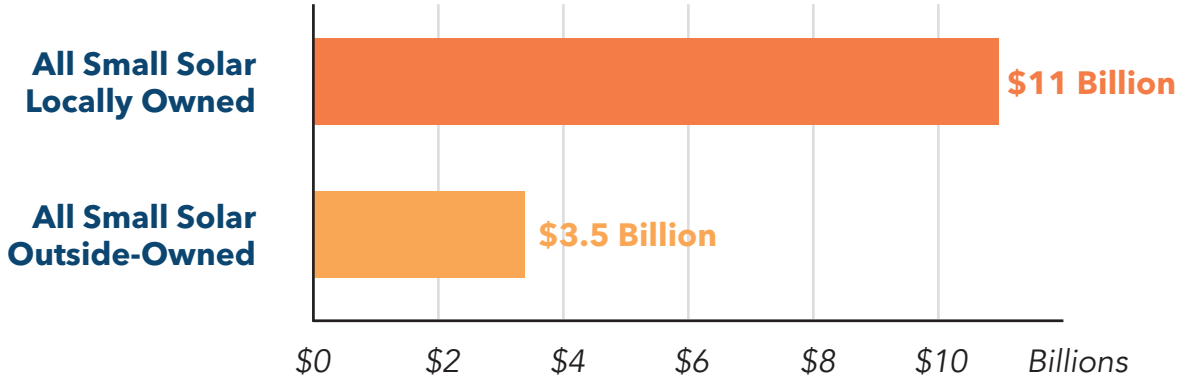
## Net Present Value per Watt of Rooftop and Community Solar Ownership Models




*See Appendix for detailed information on the assumptions for this analysis.*

*Figure 21.*

## Hypothetical Net Present Value for Local Communities of Small Solar Installed in 2021, Under Different Ownership Models




*See Appendix for detailed information on the assumptions for this analysis.*

## Local Jobs

Compared to absentee ownership, local clean energy ownership can create more jobs locally. This includes direct positions involved in the construction and maintenance of clean energy projects as well as direct and indirect roles in project development, supplies and retail, legal services, accounting, and financing to support clean energy projects. It also includes induced jobs at a wide range of local businesses, such as restaurants, bookstores, and doctors' offices.

An analysis of community wind projects in Massachusetts, Minnesota, and Texas by the National Renewable Energy Laboratory in 2009 found that local ownership was associated with greater local employment impact (including direct, indirect, and induced jobs) than absentee ownership.[86] The study concluded that the studied locally owned wind farms created 1.1 to 1.3 times more jobs per megawatt than hypothetical absentee-owned wind farms during the projects' construction phases and 1.1 to 2.8 times more jobs per megawatt during the operations phases, in line with findings from prior studies. The paper authors also compared the impacts of these locally owned wind projects to the impacts of the first 1,000 megawatts of wind power installed in Colorado and Iowa (instead of hypothetical absentee-owned projects). The community wind farms resulted in 2.3 to 3.1 times more jobs per megawatt during the construction phase and 1.5 to 1.8 times more jobs per megawatt during the operations phase than was measured in Colorado and Iowa. The report authors determined that greater local ownership was associated with increased local economic impact (as was the use of local labor and materials, to a lesser extent) and that policies that promote local ownership could increase community economic impacts, such as local employment.

One reason why locally owned clean energy projects can create more local jobs than absentee-owned projects is because local owners may be more likely to employ local workers and businesses, whether because of their existing relationships or their goals for community development. Local clean energy ownership also gives communities the opportunity to prioritize hiring from underrepresented groups, like people of color, women, and veterans.

*Photo credit: Kristelle Batucal/U.S. DOE*

## Community Solutions

Importantly, local ownership empowers the development of creative, community-based solutions that can meet diverse local needs and broaden the impacts of clean energy projects. Some locally owned clean energy efforts may decide to prioritize local hiring, job training, and/or materials sourcing in an effort to support a just transition.[87] Others may focus on increasing accessibility for low-income families and other underserved communities. Yet others may

work to combine clean energy projects with resiliency hubs, to help provide essential services to their neighbors in emergencies and affordable energy to community institutions in normal times.

Shared models of local ownership in particular enable a larger swath of community members to take part in and benefit from clean energy projects. With a community solar cooperative or another collective energy effort, renters, working class homeowners, and even unhoused people can have a say in our clean energy future.

Local ownership can also boost the quality and success rates of clean energy projects. This is because community residents often have a better understanding of the local context — like community preferences for project siting and what the community's unique assets and greatest needs are — than outsiders.

Furthermore, successful clean energy efforts put communities in the position to better tackle other neighborhood projects and to more effectively advocate for themselves in the long run.[88] Like exercising a muscle, local energy initiatives help build the ability of a community to cooperate and solve difficult problems. A 2017 review of research into the impacts of community renewable energy found evidence that community energy projects can help develop local competency in a variety of topic areas (particularly for leaders and other active participants) and that some community organizations have built off prior success with additional efforts.[89]

## Public Support

On a national scale, local ownership of clean energy is essential to help cut through public opposition to project development and build political support to rapidly address the climate crisis.

Local ownership can help stem the restrictive laws and public backlash that have plagued some clean energy projects, especially large-scale solar and wind installations.[90] A relatively robust collection of research on locally owned wind energy (including studies from Canada, Germany, Poland, and the United Kingdom) has found that area residents often favor local and/or community ownership and that it is associated with more positive attitudes toward clean energy development.[91]

For instance, a 2022 study that presented large agricultural landowners in Alberta, Canada, with hypothetical wind energy projects found that survey respondents viewed a potential wind farm owned by their municipality or a local cooperative as more acceptable than one owned by a private utility company.[92]

Even partial community ownership has benefits. In Germany, a comparative case study from 2011 surveyed residents of two towns — Zschadrass, home to a wind turbine co-owned by a community foundation, a local club, and a nearby company; and Nossen, home to wind turbines owned largely by outside investors and operated by a large, international corporation based in the state capital — and found that the residents of Zschadrass had generally more favorable attitudes toward wind energy, both in general and in the specific context of their local community.[93] Nearly two thirds of study participants in Zschadrass had a positive opinion of the local wind project, compared to only a quarter of the participants in Nossen. Plus, 45 percent of the participating residents in Zschadrass had a positive attitude toward future local wind development, compared to just 16 percent in Nossen. Though the researchers only surveyed community members after project construction, they argued that the towns' similar characteristics and the high proportions of respondents in both who indicated concern for the

## Washington Nonprofit Harnesses the Wind for Community Programs

***Organization:*** **Coastal Community Action Program (CCAP)**

***Project:*** Coastal Energy Project

**Location:** Western Washington State

**Technology:** 6 megawatt wind farm (4 turbines).

**Ownership Structure:** Owned by a local community action agency, a nonprofit which receives state and federal funds to provide community services like weatherization.

*Coastal Energy Project wind turbines.*

**Financing:** Included a state grant, a commercial loan, government tax incentives (New Markets Tax Credits and Investment Tax Credits), tax credit investors, and equity investment by CCAP.

**Project Benefits:** Local revenues, economic reinvestment.

**How They Made Ownership Work:** Originally, CCAP explored deploying small wind turbines at the homes of low-income families in the region to reduce energy costs before landing on their final plan for a larger wind installation, which completed construction in 2010. CCAP worked with two community development entities and tax credit investors to access government tax incentives, and the project financing benefited from a provision in the American Recovery and Reinvestment Act that allowed entities to receive a grant in lieu of certain clean energy tax credits for a short period. The project uses an inverted lease structure for the tax equity investors, where CCAP leases to the tax equity investors, passing through the tax credits, and will retain ownership at the end of the lease period. CCAP sells the energy that the turbines generate to its local electric utility, using the earnings (estimated to be around $450,000 annually in 2011) as an unrestricted source of funds for its housing, energy assistance, health, and other programs that serve the local community.[94]

**In Their Own Words:**

"CCAP is all about helping people. We see it as a social service project that just happens to use renewable energy."

- Craig Dublanko, CCAP CFO, now CEO (via Strategic Development Solutions)[95]

environment provide evidence that community co-ownership influenced the opinions of Zschadrass residents.

Some of the reasons why local ownership may boost community acceptance and support for clean energy include the larger economic impacts and the increased tangibility of projects' local benefits, as well as greater trust in fellow community members rather than outside entities. Low-income communities and communities of color in particular may distrust the energy industry because of past (and ongoing) harms and exclusionary practices.[96]

Moreover, local ownership can bolster community perceptions of a fair development process — another important factor in public acceptance of clean energy projects, like wind energy farms.[97] In the 2011 comparative study of the two German towns mentioned above, researchers found that 53 percent of participating residents in Zschadrass, where the community co-owned a local wind turbine, agreed that the planning process was transparent, compared to only 9 percent in Nossen, where mostly non-local residents owned the wind turbines.[98] (However, local ownership alone doesn't guarantee public perceptions of fairness or process involvement.)[99]

## Political Power

Beyond reducing community opposition to clean energy development, widespread local ownership can help create a broad-based political constituency of clean energy owners and practitioners. As direct beneficiaries, owners have greater incentives to lobby their elected representatives for pro-clean energy laws and have potentially more clout with lawmakers, creating positive feedback loops that can strengthen policy supports. Research suggests that broad, dispersed ownership of renewable energy has helped clean energy policies endure in places like Germany. This is especially true when there's the involvement of organized, collective entities like cooperatives, community groups, or municipal governments, which are easier to mobilize for political ends.[100]

Local ownership can also help build a more democratic energy system, as well as a cleaner one. One way is through indirect community ownership of clean energy projects via local governments and rural electric cooperatives, which enable a degree of public governance. Other forms of local ownership, including different types of membership cooperatives, also allow for democratic decision making. In some cases, empowered clean energy owners and organized community members may push to further democratize their energy systems, such as through a municipal takeover of their local investor-owned electric utility. Or they may work to advance social and political change in other areas.

This community-level political power is essential to confront challenges to local clean energy from utility monopolies threatened by the transition away from centralized fossil fuels — including deceptive practices like fake "citizen" groups and manipulative charitable donations.[101] More democratic control of energy systems and an expanded base of local clean energy proponents are key to defeating these efforts to subvert the political process.

There is an ever-narrowing window of opportunity to avoid the most catastrophic climate outcomes.[102] At the same time, growing economic inequality is threatening the financial futures of many families.[103] Local clean energy ownership is a key part of building the political will necessary to take bold, equitable climate action and to bring the economic benefits of clean energy to communities of all incomes, colors, and zip codes.

## People Power Solar Co-op Makes Rooftop Solar a Community Effort

***Organization:*** **People Power Solar Cooperative**

***Project:*** Cooperatively owned solar panels installed on single family homes.

***Location:*** Oakland, California

***Technology:*** 7 kilowatt residential rooftop community solar project.

***Ownership Structure:*** Multi-stakeholder membership cooperative.

***Financing:*** Community members purchased $100 shares (up to 10 shares each).[104]


*People Power's first project. Photo credit: People Power Solar Cooperative with photography by Survival Media Agency*

***Project Benefits:*** Household energy savings, local revenues, innovative community solutions.

***How They Made Ownership Work:*** While California does technically have a community solar program, the complex rules have made it difficult to create successful projects. Instead, People Power Solar Cooperative takes advantage of cooperative law to pool funds from community members to collectively own rooftop solar installations, including a 7 kilowatt system on a home in Oakland. The project receives net metering credits, which allows People Power Solar Co-op to establish a Site Host Agreement (similar to a power purchase agreement) and provide returns to its share-buying members. Notably, unlike other cooperative-owned solar projects and community solar gardens in the country, the project is much smaller in scale and installed on residential duplex, not on a larger multifamily or commercial building or in a field.[105] This scale allows everyday people to organize shared solar projects that provide financial returns and are visible assets in the community. Furthermore, the solar cooperative effort has enabled People Power members to explore other innovative, community-scale solutions to provide climate resilience, including a mutual-aid battery network that allows members to share power during shutoffs and outages.[106]

***In Their Own Words:***

"One of the gaps we saw was not just there was these policy barriers, but there was really a barrier for folks to get involved in something to really feel like they were empowered and able to be agents of change in the future that they wanted to see."

- Subin DeVar, Initiative for Energy Justice Executive Director and People Power Solar Cooperative Co-Founder (via Local Energy Rules)[107]


*Photo credit: People Power Solar Cooperative with photography by Survival Media Agency*

# Enabling Ownership for All

## Breaking Barriers

In some instances — as highlighted in the case studies throughout the report — people have found creative ways around barriers to local clean energy ownership. However, new policies and programs could push locally owned clean energy to the next level, reducing inequities, maximizing the benefits, and building the political power we need to fight polluting energy monopolies.

Policy solutions fall into a few buckets of general approaches:

- Passing state policies that enable locally owned clean energy projects.
- Addressing upfront costs through improved incentives and funding.
- Incentivizing local ownership through new and existing clean energy programs.
- Providing technical support for locally owned clean energy projects.

While some of the identified policy solutions are not particular to local ownership, overcoming these barriers has the potential to disproportionately benefit locally owned projects.

## Pass Enabling Policies

There are a number of key policies that legislators and regulators, especially at the state level, must adopt to make many locally owned clean energy projects feasible in the first place.

In the case of community solar, policymakers typically must pass enabling legislation that makes it possible to share the output of a shared solar garden among many customers via virtual net metering. Crucially, community-owned projects must be allowed to participate, not only utility-owned or privately owned systems. Though this provision can benefit outside owners as well, it's still an essential piece of policy support for locally owned clean energy — especially since shared solar makes clean energy ownership much more accessible for low-income households and renters. A flexible ownership structure that allows for non-utility owners is one of ILSR's four principles of successful community solar projects and programs. The other principles include: tangible benefits for participants, additionality to other clean energy policies, and access for all.[108] See the report, *Equitable Community Solar: Policy and Program Guidance for Community Solar Programs that Promote Racial and Economic Equity*, for more on designing community solar programs.[109]

Another key set of supportive state policies ensure adequate and fair compensation for the energy that locally owned projects produce.

Robust net metering rules can help guarantee stable compensation for rooftop solar owners. A majority of states have net metering requirements, which typically apply to large, investor-owned electric utilities.[110] For more detail on net metering policies, see ILSR's Community Power Scorecard, which has an assessment of state policies.[111] Virtual net metering plays a similar role for subscribers to community solar projects.

Feed-in tariffs are another method of compensating local energy producers by providing payment for renewable energy at clear, set rates over the course of a long-term contract. Unlike net metering, feed-in tariffs can be used to set rates that account for the many benefits that locally owned clean energy provides, including increased resiliency, lower emissions, greater local economic impacts, and better air quality. Though not as common in the United States, feed-in tariffs played a key role in growing Germany's clean energy capacity, nearly half of which consisted of locally owned projects by 2012.[112] For examples in the United States, look to Minnesota's value of solar policy or the Solar Massachusetts Renewable Target (SMART) program.[113]

## Address Upfront Costs

Federal, state, and local governments can help communities afford the upfront costs of local clean energy ownership in a variety of ways, including through improved tax incentives, direct grants, accessible financing, and reformed securities regulations.

At the federal level, reforming the currently available clean energy tax credits — including the Residential Clean Energy Credit under Section 25D, the Investment Tax Credit for commercial property under Section 48, and the Clean Electricity Investment Credit under Section 48D — could make it easier for households and communities to take advantage of the tax credits for locally owned projects.

We've already seen some progress on this front. The Inflation Reduction Act, passed in August 2022, made a number of changes to the two clean energy Investment Tax Credits for commercial property that should help level the playing field for locally owned projects.[114] Most notably, a direct pay option for tax-exempt entities, like nonprofit organizations and rural electric cooperatives, should allow them to directly

access these credits for the first time. There's also a new transferability mechanism that will allow projects to transfer credits to other entities in exchange for a cash payment instead of pursuing more complex tax equity financing options, though this is still likely to reduce the tax credit value that's passed on to local owners. In the past, a temporary cash grant option for the Investment Tax Credit (which the federal government enacted after the 2008 financial crisis under Section 1603) delivered more value to clean energy developers and enabled greater local ownership.[115]


*Photo credit: Dennis Schroeder/NREL (CC BY-NC-ND 2.0)*

Unfortunately, these changes do not apply to the Residential Clean Energy Credit available to households that install rooftop solar panels or other renewable technologies. Allowing households with low or no tax liability to take the credit as direct pay or making it refundable to taxpayers would greatly expand access, particularly for many low-income families. Expanding eligibility to households for new bonus credits that the Inflation Reduction Act instituted for commercial clean energy projects could further encourage and reward local ownership.[116]

An even more efficient and equitable approach is to create direct grants in place of or in addition to the tax incentive regime, particularly for small, locally owned clean energy projects. (In theory, this is similar to the tax credit direct pay option, but implementation details and the timing of funds may vary.) The federal government already has some modest grant programs available for locally owned clean energy projects, such as the Rural Energy for America Program at the U.S. Department of Agriculture, but significantly expanding grant funding to replace or supplement clean energy tax credits would have an even greater impact. State and local governments could create grant programs as well and prioritize or restrict the funding for locally owned clean energy projects in their jurisdictions.

Creating more accessible financing options for locally owned clean energy projects is another part of the puzzle. This could encompass a wide range of public and private sector approaches, including utility inclusive financing programs, low- or no-interest government loans, green bank programs, and clean energy loan funds, specifically targeted for locally owned clean energy projects. As one example, the U.S. Department of Agriculture could provide low-interest loans to community cooperatives building wind, solar, and other clean energy technologies in rural areas, as it already does for rural electric cooperatives. New federal programs in the Inflation Reduction Act, like the Greenhouse Gas Reduction Fund, can provide additional support for state and local efforts to expand financing for locally owned clean energy projects, like individual rooftop solar projects and shared solar gardens.[117]

In addition to actual project deployment — putting wind turbines in the ground and solar panels up on roofs — locally owned clean energy projects often need funds to address other barriers, like roof repairs, interconnection costs, and project pre-development expenses. This is another place where federal, state, and local governments can provide financing and grants to help close the gaps between local clean energy owners and outside investors.

Finally, reassessing state and federal securities regulations for locally-owned clean energy projects could enable greater local investment in — and local returns from — these projects.

## Incentivize Local Ownership

Policymakers can encourage local ownership by incorporating adders, prioritization, or carveouts for locally owned projects into the design of new and existing clean energy programs and policies.

"Adders," or bonuses, for locally owned projects in clean energy compensation rates and other incentive programs could provide increased funds to projects that meet local ownership targets. This would make locally-owned projects more financially feasible and encourage their development. For example, Ontario's feed-in-tariff program paid increased rates for the clean energy generated by projects that had certain levels of local community ownership.[118]

Decision-makers can also choose to prioritize locally owned clean energy projects for funding opportunities and capacity-limited incentive programs. This could be done through a points system that awards extra points to projects with local ownership (among other beneficial project features) when evaluating applications for a competitive grant or otherwise capped program. Similarly, locally owned clean energy projects could be prioritized during other essential project development activities, including in interconnection queues.

To further ensure that locally owned projects are able to access competitive clean energy incentives and grants, policy makers can reserve certain amounts of program capacity for these projects via carveouts. As an example, Illinois's wide-ranging Climate and Equitable Jobs Act, passed in 2021, required that the state's solar procurement program must reserve at least five percent of program capacity for "community-driven" community solar projects.[119]

## Provide Technical Support

Policy isn't always the main barrier to clean energy ownership. In those instances, governments, legislators, and nonprofit organizations can explore how connecting interested people and groups with technical assistance, training, and other resources can empower more projects across a broader range of communities.

This institutional support for locally owned projects could take a variety of forms. Private and public entities could incorporate a greater focus on developing locally owned clean energy projects into existing technical assistance programs, such as the Department of Energy's National Community Solar Partnership. Alternatively, entities could establish and fund new training or accelerator programs, helping communities develop locally owned projects by providing education on clean energy technologies, organizational structures, financing options, legal considerations, public engagement processes, and more.

One example of an organization that's already providing this type of technical support is the People's Solar Energy Fund. More information on their efforts is provided in the following case study.

## People's Solar Energy Fund Supports Community Ownership

***Organization:*** **People's Solar Energy Fund (PSEF)**

***Location:*** National

***Technology:*** Community solar/shared solar.

***Ownership Structure:*** PSEF members develop community-led and community-owned projects.

***How They Made Ownership Work:*** PSEF is a national network of community-based and cooperative solar developers, such as Cooperative Energy Futures, People Power Solar Cooperative, and Co-op Power, that are owned by and serve low-income and BIPOC (Black, Indigenous, and People of Color) communities. To help its members successfully develop locally owned community solar projects, the nonprofit organization provides a variety of technical support, training, and knowledge sharing opportunities targeted to the needs of community-owned projects. The organization also helps members finance their projects, offering forgivable pre-development loans and as well as connections to tax equity partners and other financiers.[120] By pooling together multiple smaller community-owned projects, PSEF can reach the scale that's necessary to attract investors and access better borrowing terms.[121]

***In Their Own Words:***

"What we've done by forming the People's Solar Energy Fund is effectively created an alliance of all of these local groups around the country who can, number one, pool their projects… It allows us to have kind of a much stronger negotiating position."

- Timothy DenHerder-Thomas, Cooperative Energy Futures General Manager (via Local Energy Rules)[122]

*Photo credit: Werner Slocum/NREL (CC BY-NC-ND 2.0)*

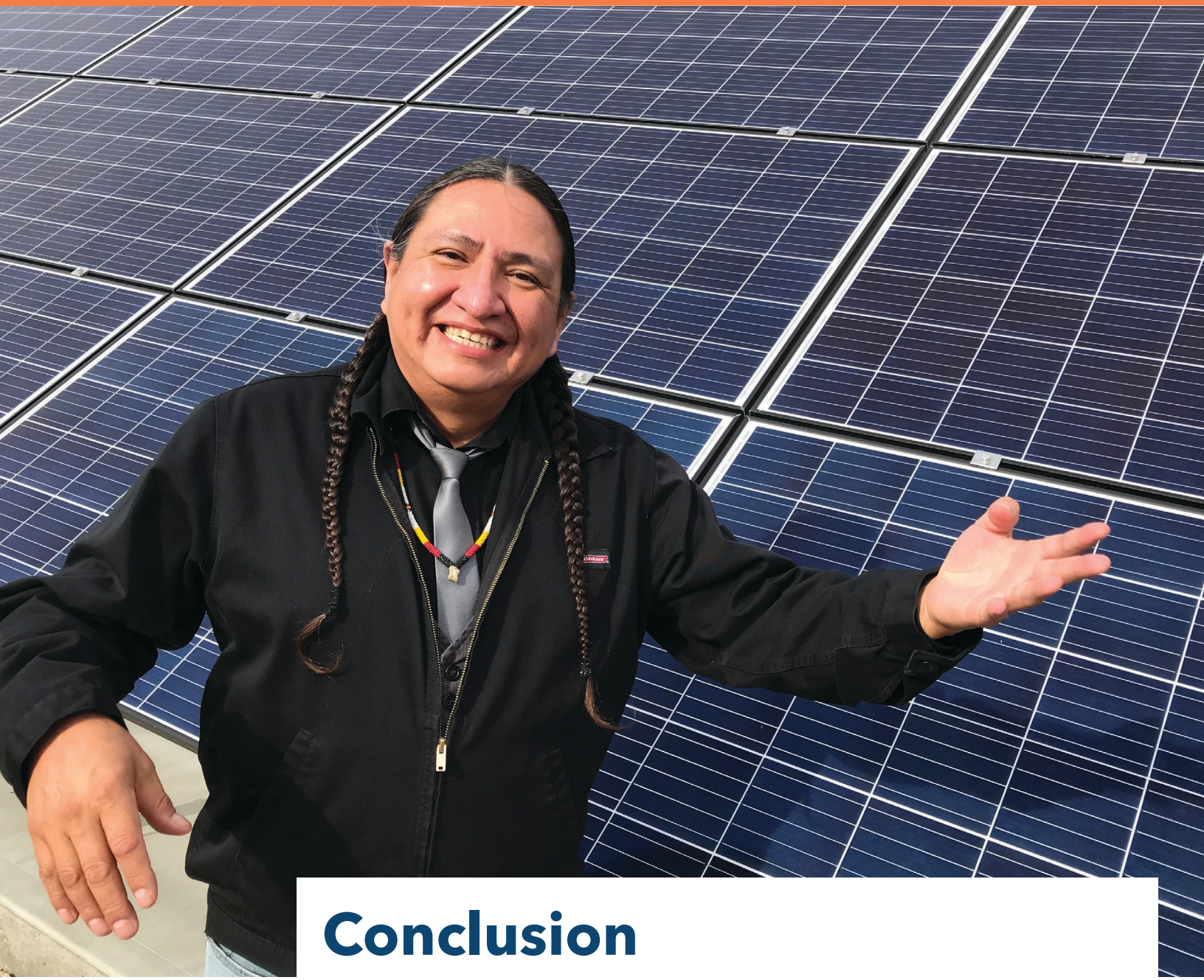


*Photo credit: David Dodge/ GreenEnergyFutures.ca (CC BY-NC-SA 2.0)*

# Conclusion

Equitable, local ownership of clean energy creates many benefits at the individual and community levels. It allows households to maximize personal financial benefits, no matter their color, wealth, or zip code. It enables communities to grow economic opportunities and develop innovative solutions to meet local needs. And perhaps most importantly, it puts power back in the hands of people, empowering them to fight the polluting big utilities and to advocate for a fairer clean energy future.

To fully realize those benefits, policymakers, organizations, and local advocates need to make sure all communities have equitable access to clean energy ownership. We won't be able to fight climate change, eliminate energy poverty, or build the world we want to see without it.

# **Appendix:** Methodology and Assumptions

To provide a quantitative example of the economic benefits of local clean energy ownership, we estimated the potential cash flows of two sample solar projects, a 7 kilowatt-DC rooftop solar project and a 1.3 kilowatt-DC community solar project, under different ownership conditions. For this analysis, co-author Matthew Grimley adapted a tool created by the Clean Energy Extension at the University of Massachusetts Amherst Center for Agriculture, Food, and the Environment called the "Solar Financing and Ownership Options: Cash Flow Model" to evaluate the distribution of cash flows, in 2021 dollars, to select local and outside entities under different models.[123] The entities include: the initial project owner [local or outside], the "flip" owner [local, if applicable], project offtakers (i.e., energy users) [local, if applicable], lenders (i.e., banks) [local or outside], and payment-in-lieu-of-taxes (PILOT) taxors (i.e., local governments) and land lessors (i.e., landowners) [local, if applicable]. Notably, this analysis does not attempt to capture all entities that would benefit financially from a solar project, excluding for instance both labor and equipment manufacturers, in part because of the difficulty in generalizing the effect of project ownership on the percentage of local vs. outside labor or manufacturing.

We've listed the various assumptions made and tool inputs used in the analysis below.

## 7 Kilowatt Rooftop Solar Installation, Self-Owned and PPA

### Model Inputs

* Variable added to original tool.

- **Initial Owner Location:** Self-owned in local economy, PPA in outside economy.
- **Tax Status:** Assumed each was taxable and had enough tax liability to use (and met requirements for) a 30% solar Investment Tax Credit (ITC) or Residential Clean Energy Credit, but with only the owner of the PPA example able to take advantage of both accelerated depreciation and the ITC, since accelerated depreciation is a business-only incentive in our model.[124]

- **Size:** Assumed 7 kilowatt-DC, the median taken from Lawrence Berkeley National Laboratory's Tracking the Sun data for 2021.[125]
- **Price:** Assumed $3.00/Watt-DC in 2021 dollars for both cases, as Lawrence Berkeley National Laboratory's Tracking the Sun cost data shows both host-owned and third party-owned arrays feature similar pricing. To show a reasonable long-term assumption for photovoltaic pricing, we used 20th percentile data for installations sized between 7 and 8 kilowatt-DC taken from Lawrence Berkeley National Laboratory's Tracking the Sun cost data.[126]
- **Federal ITC:** Assumed 30%, in line with new tax policy advanced by the Inflation Reduction Act.[127]
- **Electricity Avoided Retail Rate:** Assumed $0.127/kilowatt-hour. The calculation is from the U.S. Energy Information Administration data for 2021, for bundled investor-owned utilities with more than 10,000 residential customers. Once each utility's average rates subtracted a $10/month fixed charge, the median rate was taken from the group of utilities.[128]
- **Electricity Retail Annual Escalation Rate:** Assumed 2%. Although the U.S. Energy Information Administration predicted electricity rates to increase by about 10% from 2021 to 2022 and by 2.5% from 2022 to 2023, we assumed that on the long run, electricity rates will increase by less than that, on average.[129]
- **Solar Tariff and Renewable Energy Certificate (REC) Prices:** Assumed no solar tariffs or REC prices.
- **Electric/Net-Metering Off-Taker Discount:** Assumed 0% for self-owned model, since solar production is assumed to offset electricity usage. Assumed 10% for PPA model, a standard savings for solar PPAs from anecdotal data.
- **Percent of Offtakers in Local Economy:** Assumed 100% for both cases.
- **Payment in Lieu of Taxes (PILOT) Agreement:** Assumed no property tax.
- **Land Lease Payment Agreement:** Assumed no land lease.
- **Percent Project Cost Financed with Equity and Loan Conditions:** Assumed 0% for self-owned and 50% for PPA, since a solar loan could cover all of the cash needed for a homeowner with self-owned panels, while a corporate owner in the PPA example would be funded by a mix of debt and equity. The homeowner in the first example receives a 7.5% home loan for 10 years (following some examples in Minnesota, Iowa, and nationally) and the solar developer in the second is funded by general corporate debt at

6% for 25 years.[130] At 25 years of a PPA (in line with Sunrun's length of PPAs at 20 or 25 years), the rooftop solar array is flipped to the offtaker for the remaining 5 years of the analysis.[131] We assume the flip comes at a small cost to the offtaker (5% of original project cost, purchased outright with cash), as the fair market value of the array has been nearly fully depreciated.

- **Project Lender Location:** Local for self-owned and outside for initial owner in PPA. We assume that cash flows to a local lender represent local economic impact, but the actual local economic impact of a project using a local lender would depend on how the financial institution sources capital and reinvests funds. For instance, a locally located bank that largely sources capital and reinvests funds outside of the community would still have local economic impact through, e.g., employee salaries, but it would create as much local economic value as an institution focused on community benefits, such as a Community Development Financial Institution, or CDFI.
- ***Energy Revenue Taxable for Initial Owner:** We assumed no for self-owned (since energy savings on-bill aren't taxable) and yes for PPA.
- ***Energy Revenue Taxable for Post-Flip Owner:** We assumed no for PPA, where ownership flips to the residential owner at year 25.
- ***Operations and Maintenance Taxable for Initial Owner:** We assumed no for self-owned (since it isn't a business expense) and yes for PPA.
- ***Operations and Maintenance Taxable for Post-Flip Owner:** We assumed no for PPA, where ownership flips to the residential owner at year 25.
- ***Post-Flip Offtaker Discount:** We assumed 0% for PPA because ownership flips to the residential owner at year 25 and energy is used for self-usage at that point.
- **Capacity Factor:** Assumed 16.1%. Data drawn from assumptions from the National Renewable Energy Laboratory's Annual Technology Baseline.[132]
- **Degradation:** Assumed 0.5%, in line with National Renewable Energy Laboratory assumptions.[133]
- **Life Span:** Assumed 30 years, in line with the National Renewable Energy Laboratory's Annual Technology Baseline.[134]
- **Annual Operations and Maintenance Cost Factor:** Assumed $20/kW-year, remaining flat over time. Data taken from $0 to $40 range given by the National Renewable Energy Laboratory's Annual Technology Baseline. Assumed decommissioning funds are included in operations and maintenance.[135]

- **Inverter Replacement:** Assumed a cost of $7/kilowatt-year. Data interpreted from National Renewable Energy Laboratory assumptions.[136] Assumed 11 year replacement horizon, in line with industry expectations.
- **Tax Rates:** Assumed 21% and 7% for federal and state taxes, respectively. Both tax rates are assumed to stand-in, roughly, for personal and corporate tax levels.
- **Discount Rates:** Assumed 5% for all cash flow recipients. A discount rate is used to account for the time value of money in order to estimate the current value of expected future cash flows. The discount rate is often estimated as the rate of return that an investor expects or the interest on debt, but it can also incorporate other factors. Here we estimate the same number for all parties as a means to present comparable cash flows between parties.

## 1.3 Megawatt Community Solar Installation, Community-Flipped and Third Party-Owned

### Model Inputs

* Variable added to original tool.

- **Initial Owner Location:** For community-flipped, the initial owner is an outside, third-party investor, and then the project ownership is flipped to a cooperative in the local economy. For simplicity, the model assumes that in the community-flipped example the outside party owns 100% of the project and receives all revenues for the initial 10-year period. For third party-owned, the owner is solely in the outside economy.
- **Tax Status:** Assumed each was taxable, as a simplification. The third party owner is able to take depreciation and monetize the ITC. As a co-op, we assume the community owner is taxable but lacks enough tax liability to take depreciation and monetize the ITC, so it works with a third party tax equity partner under the partnership flip model. For simplicity, the model shows that any revenue is taxed at the cooperative level, but there may be some discrepancy in how the co-op and members are taxed in an actual project, depending on the timing of the patronage disbursement and the incorporation status of the co-op. Since the cooperative (and member households) would likely not owe taxes on any profits shared with members, this simplification results in a notably conservative estimate of member financial benefits.
- **Size:** Assumed 1,300 kilowatt-DC.

- **Price:** Assumed $1.50/Watt-DC in 2021 dollars. To show a reasonable long-term assumption for photovoltaic pricing, we used 20th percentile data for installations sized between 500 and 1,000 kW-DC taken from Lawrence Berkeley National Laboratory's Tracking the Sun cost data.[137] This also assumes that a 1.3 MW-DC array's price would be on the lower end of the 500 to 1,000 kW-DC pricing spectrum. We added in $0.1/Watt-DC, in line with customer acquisition assumptions from GTMResearch and VoteSolar, for a final cost of $1.60/Watt-DC.[138]
- **Federal ITC:** Assumed 30%, in line with new tax policy advanced by the Inflation Reduction Act.[139] We do not assume the project is eligible for any new bonus credits created by the Inflation Reduction Act.
- **Electricity Avoided Retail Rate:** Assumed $0.127/kilowatt-hour. The calculation is from the U.S. Energy Information Administration data for 2021, for bundled investor-owned utilities with more than 10,000 residential customers. Once each utility's average rates subtracted a $10/month fixed charge, the median rate was taken from the group of utilities.[140]
- **Electricity Retail Annual Escalation Rate:** Assumed 2%. Although the U.S. Energy Information Administration predicted electricity rates to increase by about 10% from 2021 to 2022 and by 2.5% from 2022 to 2023, we assumed that on the long run, electricity rates will increase by less than that, on average.[141]
- **Solar Tariff and Renewable Energy Certificate (REC) Prices:** Assumed no solar tariffs or REC prices.
- **Electric/Net-Metering Off-Taker Discount:** Assumed 10% for both cases.
- **Percent of Offtakers in Local Economy:** Assumed 100% for both cases.
- **Payment in Lieu of Taxes (PILOT) Payment Agreement:** Property tax regimes for solar farms vary across the United States. Minnesota taxes $1.20/megawatt-hour on arrays larger than 1 megawatt-AC.[142] North Carolina multiplies the undepreciated cost of a solar farm, after first multiplying the cost by 20%.[143] Using the cost and capacity factors from the assumptions, the property tax averages from Minnesota and North Carolina came out to $1,650/megawatt-DC and $1,200/megawatt-DC. An estimate of $1,500/megawatt-DC was used for all cases.
- **Land Lease Payment Agreement:** Assumed $5,000/megawatt-DC. This assumes that a 1,300 megawatt-DC array takes up 5 acres (on the lower end of estimates from the National Renewable Energy Laboratory), reimbursing a landowner at $1,000/acre (in line with research from Penn State University), more than three times the highest rates in the nation for renting cropland.[144]

- **Percent Project Cost Financed w/Equity and Loan Conditions:** Assumed 45% of costs, in line with estimates with the National Renewable Energy Laboratory and anecdotes from reviewers of this report, since both are assumed to be financed on a project and non-corporate basis, but with varying interest rates and loan terms.[145] The initial owner is assumed to include both tax and sponsor equity. Both arrays are assumed to have an initial loan at a 6% interest rate for 15 years. The community-flipped array is flipped to a community owner at Year 10 for 30% of the original project cost, but the initial owner continues paying the last 5 years of the initial loan, giving the original outside owner an internal rate of return roughly the same as the third party-owned array. In the community-flipped array at the time of the buyout, the community owner is assumed to take out a loan at 6.5% for 10 years that would cover 100% of the buyout amount.
- **Project Lender Location:** Outside for third party-owned and the initial owner in the community-flipped example, and local for the cooperative owner in the community-flipped example. We assume that cash flows to a local lender represent local economic impact, but the actual local economic impact of a project using a local lender would depend on how the financial institution sources capital and reinvests funds. For instance, a locally located bank that largely sources capital and reinvests funds outside of the community would still have local economic impact through, e.g., employee salaries, but it would create as much local economic value as an institution focused on community benefits, such as a Community Development Financial Institution, or CDFI.
- ***Energy Revenue Taxable for Initial Owner:** We assumed yes for both.
- ***Energy Revenue Taxable for Post-Flip Owner:** We assumed yes for community-flipped, where ownership flips to the cooperative owner at year 10.
- ***Operations and Maintenance Taxable for Initial Owner:** We assumed yes for both.
- ***Operations and Maintenance Taxable for Post-Flip Owner:** We assumed yes for community-flipped, where ownership flips to the cooperative owner at year 10.
- ***Post-Flip Offtaker Discount:** We assumed 10% for community-flipped.
- **Capacity Factor:** Assumed 16.1%. Data drawn from assumptions from the National Renewable Energy Laboratory's Annual Technology Baseline.[146]
- **Degradation:** Assumed 0.5%, in line with National Renewable Energy Laboratory assumptions.[147]

- **Annual Operations and Maintenance Cost Factor:** Assumed $10/kilowatt-year, remaining flat over time. Added in $10/kilowatt-year for customer management for subscription, billing, acquisition, and outreach. Data taken from $0 to $40 range given by the National Renewable Energy Laboratory's Annual Technology Baseline, and customer acquisition estimates given by GTMResearch and VoteSolar, along with anecdotal reviewer data.[148] Assumed decommissioning funds are included in operations and maintenance.
- **Life Span:** Assumed 30 years, in line with the National Renewable Energy Laboratory's Annual Technology Baseline.[149]
- **Inverter Replacement:** Assumed a cost of $7/kW-year. Data interpreted from National Renewable Energy Laboratory assumptions.[150] Assumed 11 year replacement horizon.
- **Tax Rates:** Assumed 21% and 7% for federal and state taxes, respectively.
- **Discount Rates:** Assumed 5% for all cash flow recipients. A discount rate is used to account for the time value of money in order to estimate the current value of expected future cash flows. The discount rate is often estimated as the rate of return that an investor expects or the interest on debt, but it can also incorporate other factors. Here we estimate the same number for all parties as a means to present comparable cash flows between parties.

## Other Model Assumptions

- **Individual Owner/Subscriber Share:** We assumed a household would own or subscribe to a 7 kilowatt-DC share for both.
- **Owner Profit Distribution and Taxation:** For the community-flipped example, we assumed cooperative member-owners would receive 100% of project profits distributed as cash on an annual basis. In an actual project, timing and scale of profit distribution to members may vary based on their share types and could include a mix of cash payments and equity in the cooperative. In addition, as noted above, the incorporation status of the cooperative and timing of the profit distribution will affect what the cooperative is taxed for and when. For simplicity, we assumed that all profits are taxed at the cooperative level (a significantly conservative assumption), and any profit is distributed to the members.

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67. The total NPV of the self-owned example is not equal to that of the third-party-owned example because of varying assumptions for each model, such as different borrowing rates and equity amounts for the local household and the outside owner. See the Appendix for detailed information on the assumptions for this analysis.

68. The locally owned community solar project model assumes the household does not need to provide an upfront investment to become a cooperative member and that project profits, when generated, are distributed to members on an annual basis; in an actual project, timing and scale of profit distribution to members may vary based on their share types and could include equity shares. It also assumes that the cooperative-owned community solar project uses a partnership flip model to access the value of the solar Investment Tax Credit, where ownership flips to the cooperative after 10 years. Both the locally owned and outside-owned models are assumed to provide identically valued bill credits to the subscribers, but only the locally owned model provides profit sharing. Because of model assumptions on tax timing and status, this estimate likely understates the actual financial benefits for a cooperative member. See the Appendix for more information on the assumptions for this analysis.

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83. The total NPV of the locally owned example is not equal to that of the third-party-owned example because of varying assumptions for each model, such as different borrowing rates and equity amounts. We assume that the NPV provided to a local lender represents local economic impact, but the actual impact would depend on how the financial institution sources capital and reinvests funds. See the Appendix for detailed information on the assumptions for this analysis.

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