Shining a Light on Equitable Solar Energy: Addressing Challenges and Enhancing Opportunities for Business Participation in Community Solar

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Keywords: community solar; non-residential solar; energy equity; solar incentives; clean energy transition; business participation

Executive Summary: Solar energy plays a vital role in achieving the United States' decarbonization goals. Enabling community solar projects is an underutilized strategy for increasing renewable energy generation and offers potential solutions for addressing disparities in solar energy distribution. Although community solar use has been initiated through utility-scale platforms, less attention and efforts have gone into facilitating community solar programs that collaborate with businesses who use distributed solar (i.e., rooftop) panels. Engaging businesses in community solar programs provides opportunities for commercial buildings to expand solar energy panels, maximizing use of available space for solar installations and decreasing land-use for solar farms, increasing use and energy resiliency at the residential level, and improving equitable access. We propose three policy recommendations: (1) Renewing and expanding the Sunny Awards recognition program; (2) Modifying tax incentives for businesses to reduce costs of solar installation and encourage energy distribution; and (3) Introducing a new business model for energy distribution. These recommendations provide strategies and insights for encouraging businesses to implement community solar on a broader scale.

I. Introduction

Solar energy is crucial for achieving decarbonization goals in the United States. According to the US Department of Energy's (US DOE) Solar Futures Study report, solar energy must account for 45% of all electric generation to achieve a decarbonized electric grid by 2050, yet US electricity currently stands at only 3.9% solar (DOE 2023), underscoring the urgency for development and implementation.

Despite burgeoning interest in solar energy use among homeowners, barriers like prohibitive upfront costs, limited sunlight access, and temporary rentals hinder widespread residential adoption. Community solar programs, where multiple stakeholders share solar systems, emerge as a promising solution. While residential participation with community programs has already been encouraged by utility solar power groups (Holt &

Galligan 2017), initiatives engaging non-residential solar sectors remain underexplored.

Non-residential solar systems include solar installations that are not classified as residential systems or utility-level, but rather installations on business-owned commercial or industrial buildings and properties (Wussow et al. 2024). Businesses present untapped potential for expanding community solar endeavors, leveraging spaces like rooftops, carports, or off-site facilities for solar installations. With over 19 gigawatts of energy generation capacity as of 2022 (Solar Energy Industries Association 2022), installations of commercial enterprises are poised to significantly contribute to community solar initiatives. Rooftop solar on buildings larger than 1,000 square meters, for instance, could allow community microgrids to meet at least 20% of the total electricity energy demand (Wussow et al. 2024). The exponential growth in new solar installations underscores the escalating momentum in this domain.

A single Walmart rooftop, for instance, has more than 16,500 square meters of space and, thus, can harness enough energy to power nearly 200 homes, showcasing the transformative impact of leveraging commercial spaces for solar deployment (Bolinger & Bolinger 2022). Enabling partnerships between community solar programs and businesses not only accelerates solar adoption but also cultivates economic benefits for involved parties.

Together, community solar projects represent an underutilized strategy for increasing renewable energy use, particularly in low- to moderate-income (LMI) homes and areas lacking robust solar resources. Leveraging businesses' unused spaces can foster equitable solar distribution while unlocking economic opportunities through customer use. However, infrastructure development to facilitate partnerships and manage associated risks is imperative to realize this potential.

II. Statement of issue

Despite immense potential for businesses to contribute to community solar initiatives, multiple barriers impede their participation and hinder increasing widespread deployment of renewable solar energy. Key challenges include upfront costs, financial risk mitigation, and lack of incentives.

The significant financial costs associated with solar installation, maintenance, and operation pose a major barrier for businesses considering participation in community solar projects. Several mechanisms have been implemented to make solar energy more accessible and sustainable, such as government subsidies, tax breaks, and feed-in tariffs (Klein, Hargreaves, and Coffey 2021; Krupa and Harvey 2017; Tabassum et al. 2021). Although tax incentives can significantly reduce the installation cost, upfront costs can still reach $1,000,000 for large buildings and can increase depending on size and energy needs of the building (Zito & Saddler 2024).

Moreover, despite any availability of tax breaks, financial support, or risk management strategies, it is possible businesses may lack the motivation to host community solar projects due to competing priorities or limited understanding of potential benefits. Expansion and promotion of award programs that offer recognition, technical support, and grant money to businesses could fuel company involvement.

Incentives and infrastructure need to be modified to build confidence in investment, ensure resultant energy would be cost effective, and cultivate the value of consumer-business partnerships within solar energy. Creating and reforming incentives for larger corporations to install and contribute to solar energy generation stands to benefit businesses, communities, and decarbonization goals.

III. Policy options

Here we present policy options to further engage businesses in community solar energy programs while increasing benefits for both the surrounding communities and business participants.

i. Option 1: Renewing and expanding the Sunny Awards recognition program.

The US DOE's Sunny Awards was a monetary prize competition which ran in 2022 and 2023 for recognizing community solar programs with demonstrable benefits in equitable development (DOE 2024b). We propose renewing and extending the Sunny Awards to (1) provide up to $50,000 startup grants to lower cost barriers for business participation in new community solar projects and (2) maintain technical support via competitive

applications at milestones in program development between $5,000 to $10,000 per year for up to ten years. This would ensure that promising programs continue and can be scaled effectively. Additionally, the DOE could articulate additional targets for Corporate Social Responsibility (CSR; e.g., a business requiring community engagement to reach their internal renewable energy goals) in the evaluation of applicants. Just as the National Community Solar Partnership (NCSP) set a 2025 target for community solar systems (DOE 2024a), CSR could also be integrated into the NCSP's next set of renewable energy goals for 2030.

This option provides an additional, more sustainable incentive for businesses to participate in community solar projects and promote the normalization of CSR in their energy operations. Disadvantages include the lack of any mandate for participation, meaning that businesses may still lack sufficient incentive to partner with the community. Depending on the size of a proposed project, newer community solar projects may still experience cost barriers in start-up capital.

ii. Option 2: Modifying tax incentives for businesses to reduce costs of solar installation and encourage energy distribution.

Federal solar tax incentives, such as the investment tax credit (ITC) and production tax credit (PTC), provide financial benefits for business participation in solar energy systems (DOE 2023). However, to accelerate participation and access, these incentives should be modified and expanded to include additional tax credit bonuses. The overall aims should include leveraging growing capacity for business solar, need for energy storage, and improved distribution to communities.

Modifications to the ITC could include the following: (1) Increasing the program cap and project size limits for low-income ITC bonuses to encourage large business participation in community partnerships; (2) Raising the maximum production limit that allows businesses to receive credit for their interconnection property costs; (3) Adding a storage tax credit (STC) bonus of 10-20% to help reduce the financial burden of investing in battery storage systems; and (4) Adding a small business bonus of 10-20% for projects under a specified production size (e.g., 0.5 MW or less).

The PTC could be adjusted by: (1) Adding a redistribution tax credit (RTC) bonus to incentivize businesses to return their excess energy to the surrounding community (such as 0.1-0.3 ¢ per kWh more if distributed to the community instead of being used by the business); and (2) Extending the ten-year limitation to incentivize businesses interested in long-term benefits, with a corresponding requirement for businesses to demonstrate specific project milestones or best practices in order to qualify for the extension (DOE 2023).

At the state level, efforts to expand access for community and business participation in solar are evident, such as within the NY-Sun program (over $1 billion in funding), which offers incentives for solar projects benefiting LMI customers and affordable housing and projects paired with storage capabilities (Kinross 2022; NYSERDA 2024). Moreover, many states offer some upfront rebate or county-specific property tax credits, but these policies vary widely by location. A federal RTC would support local initiatives and provide new business incentives in states with more restrictive solar energy legislation. Establishing business eligibility criteria for federal RTC could also be used to shape best practices, such as emphasizing community engagement, ensuring equitable distribution of financial benefits, and promoting transparent reporting of activities and outcomes. Implementing the RTC bonus and eligibility criteria could be challenging due to political obstacles (i.e., differing viewpoints or potential conflicts between state and federal policies), or other financial and logistical limitations. However, the current federal solar ITC and PTC already include eligibility criteria designed to incentivize businesses to engage in preferred practices (such as meeting labor requirements or using domestic sources), and the current low-income residential project bonus for ITC requires that financial benefits must be allocated equitably between residents (DOE 2023). Therefore, it's been shown that implementing these types of federal tax bonuses with business eligibility criteria is possible.

iii. Option 3: Introducing a new business model for energy distribution.

We propose the creation of partnerships between businesses and the public community, which integrate tax incentives at the state and federal

levels. Businesses are often offered preferential or per-kiloWatt rates from electrical companies, which makes business energy less expensive per unit than domestic energy. This as well as state and federal tax incentives (e.g. Option 2), and the potential of an untapped business opportunity may make it more beneficial for businesses to sell or donate a portion of their solar energy rather than entirely using it.

Therefore, businesses with sufficient surface area and revenue to afford the upfront costs of solar panels can be encouraged to either (1) donate or (2) sell a portion of their collected solar energy at a subsidized cost to disadvantaged communities who cannot readily afford upfront costs of solar panels themselves. This concept has been previously implemented within a business model which takes advantage of another major barrier of solar energy: battery storage. Octopus Energy provides intelligent green energy to residents throughout the UK and in Texas by selling renewable energy and subsidizing installation of large batteries to homeowners (Octopus Energy USA 2024; Hill 2022). Batteries allow homeowners the flexibility to optimize costs by purchasing solar energy during low-demand, peak-production hours (i.e., afternoons) and utilizing stored energy during high-demand, low-production hours (i.e., evenings).

At the state level, corporations have already begun working with community solar projects to distribute solar energy to local communities, including lower-income households. For instance, a community solar project, Florida Power and Light, will be working with Walmart, which currently has 148 stores and four distribution centers. This business community solar project will receive 1,490 MW, 10% of which will be reserved for lower-income households (Smart Energy Decisions 2019; Morehouse 2019). The remaining solar energy is said to be sold to households via a subscription; these types of partnerships have tremendous advantages for the businesses, the residential community, and the US.

By creating and implementing federal storage tax credits, both homeowners and businesses could be incentivized to integrate solar energy. Redistribution tax credits would further encourage large corporations to inject a portion of their produced solar energy into local communities. Both storage and redistribution tax credits could be modulated depending on the amount of solar energy deployed and whether solar energy is donated or subsidized to homeowners. Legislation could further enforce a minimum subsidization (e.g., 25%) of produced solar energy, which has been shown to be sufficient to cover more than 20% of annual residential electrical demand (Wussow et al. 2023), to ensure equitable energy, specifically to disadvantaged communities. Additional regulations to ensure fair pricing and energy allocation for LMI households can be further discussed within the proposed workshop in the conclusion.

Another way to incentivize business participation in community solar programs is by linking access to cheaper and cleaner energy to loyalty/membership programs. For instance, Amazon, with 180 million prime memberships as of March 2024, has tremendous reach. However, only ~20% of its purchases come from LMI households (Cleveland Admin 2023). Offering prime members access to cheaper renewable power from rooftop solar could drive membership adoption among LMI families who are typically burdened by utility costs. For businesses with extensive real estate, like Amazon, implementing rooftop community solar in this manner offers a profitable opportunity to foster consumer loyalty with innovative energy offerings and showcase corporate environmental leadership. Disadvantages of our policy recommendation include the risk that businesses may prioritize revenue from solar energy, potentially leading to price hikes and neglect of LMI communities. However, businesses have shown a commitment to affordability for LMI households—e.g., Amazon and Walmart offer 50% discounted memberships for recipients of qualifying governmental assistance. Additionally, similar to other utilities (e.g., energy, gas, water), fair pricing can be regulated at state (e.g., Florida Public Service Commission) and federal levels.

IV. Conclusion

The most appropriate solution for any community will likely involve a mix of the proposed recommendations. Due to heterogeneity in solar capacity and uptake across states, implementation costs will vary per state. Some states have legislation that restricts or prohibits community solar projects. Thus, the proposed recommendations must be

tailored to fit state-specific regulations. We suggest a workshop, hosted by DOE, nationwide community solar nonprofits such as Solar United Neighbors, Florida Public Service Commission, existing customers of Florida Power and Light, and other relevant stakeholders to further address how the US can implement these recommendations while ensuring fair pricing and energy allocation for LMI communities to mitigate financial and motivational barriers and improve access to renewable energy. The workshop would focus on learning from stakeholders which have already implemented collaborations between corporations and community solar projects (e.g. Florida Power and Light & Walmart). State level stakeholders (e.g. Florida Public Service Commission) can further inform the audience on fair pricing and energy allocations regulations.

Despite LMI households representing the majority (about two-thirds) of all US households, they have adopted 67% less than all residential solar systems (Barbose et al. 2022; Wussow et al. 2024). Reasons include a lack of incentives to participate and a lack of or ineffective LMI consumer protections in solar energy regulations (Heeter et al. 2021). Energy needs for disadvantaged communities are also especially high, due to being below an income threshold and overburdened by other issues such as climate change and housing affordability (Wussow et al. 2024). This significant gap in solar equity can be filled by solar power from large buildings or warehouses owned by corporations (i.e. Walmart, Amazon). Solar energy technologies are rapidly developing within the private sector, but the federal government plays an essential role in driving policy to promote equitable distribution of these technologies and their benefits (National Academies of Sciences, Engineering, and Medicine 2023).

Although investing in other renewable energy sources (e.g. nuclear, wind energy) is critical for the US to reach decarbonization goals, solar energy is a feasible strategy for implementation at the homeowner level. Partnerships between businesses and community solar projects tap an unrealized potential for solar energy generation and use. Incentivizing businesses to provide 25% of their collected solar energy can reduce up to 20% of energy demands in disadvantaged communities (Wussow et al. 2024).

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