Community Energy Storage and Energy Equity

Introduction

Community ownership of assets is one way to deliver a more equitable distribution of benefits and control in the energy sector. Energy storage in particular can be adopted at the local level due to the flexible and scalable nature of the technology. As a result, with the wider adoption of community solar, interest in community energy storage (CES) is growing. However, CES projects are still uncommon and lack the comparatively clear compensation signals, policy support, and deployment experience as with community renewables. New business models are emerging to support CES, and some regulators are beginning to develop programs designed to support the framework. While early results are promising, there is more to be done to capture the full value of energy storage deployment for communities and to expand access to investing in and benefiting from these installations. Key findings and strategic highlights include:

- Community energy storage encompasses a wide variety of business models and can have differing impacts on community wealth and wellbeing.
- Disparate value streams can make CES difficult for nonutility entities unless customers have high demand charges or are maximizing the self-consumption of rooftop photovoltaics.
- An expansion of community energy storage will not necessarily lead to more equitable outcomes. Greater regulatory and financial support will be needed for these assets to be accessible to underrepresented communities.

Current Models

The "community" of community energy storage as a business model is broadly defined. As an example, the California Public Utility Commission (CPUC) defines community storage as storage connected at the distribution feeder level, associated with a cluster of customer load (California Public Utilities Commission 2013). This definition could include storage systems owned and controlled by any entity, so long as they are sited on the distribution grid and serve more than one customer. While this definition could enable several use cases, in practice most community energy storage projects feature direct utility ownership and control; they are not community owned. However, other models are emerging that tie the asset more directly to the community.

Utility Ownership

As previously mentioned, most community energy storage projects in the United States are distribution sited and utility owned. The community indirectly benefits from cost-effective investments that reduce system costs. There is also the potential for distribution sited storage

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systems to improve local reliability and resiliency. These are positive outcomes in cost and in grid performance, but do not offer the community a wealth-building opportunity through direct monetary payments. While some investor-owned utilities advertise their projects as community storage, these systems are more likely to labeled as CES by industry observers and academics if they are owned and operated by a municipal or cooperative utility (Flanegin 2018; Petta and McConnell 2018). In general, these utility-controlled programs are the least community oriented of the CES business models.

Storage Shared by Rooftop Solar Customers

A small but growing share of CES systems feature batteries that are installed in tandem with rooftop PV or other behind-the-meter renewables. Rather than each household separately installing a behind-the-meter battery, a communal battery is sited on the local feeder and each household purchases fractional shares. This model is most popular in Australia, where a drop in compensation for exported solar power has led many PV owners to retrofit their systems with batteries (Kurmelovs 2021). Though many households are simply adding a behind-the-meter battery, these customers have chosen to pool their resources into a communal battery. This arrangement can offer lower costs through economies of scale. In the US these programs have been more limited, though several exist. For example, the Sacramento Municipal Utility District's (SMUD) Anatolia Solar Smart Homes projects features this sort of CES system (Takata 2017).

Virtual

Virtual arrangements leverage common business models from the community solar area and apply them to storage. Virtual net energy metering (VNEM), which allows solar customers to directly offset their energy consumption with PV, even if the system is offsite, has been extended to storage systems in some areas. As an example, SMUD's StorageShares program allows commercial customers to offset their demand charges by subscribing to an offsite storage system (Howland 2020). This form of virtual CES is particularly popular in Germany, where the SonnenCommunity project has more than 10,000 subscribers (Koirala, van Oost, and van der Windt 2018).

Additionally, many traditional community solar providers have expanded their product lines to support solar plus storage. In general, these programs are more common in areas that have reduced support for net metering, as solar and storage behind the meter would be more lucrative and valuable to a customer where viable. Hawaii and Texas, for example, both have programs that offer customers virtual access to large offsite solar + storage arrays (Spector 2017a; 2017b). In Hawaii for example, time-of-use rates make it less lucrative to generate during the day. The community solar + storage project allows customers to buy electricity for a lower rate than the utility, while providing more valuable generation to the grid.

Campus and Multi-tenant Buildings

Energy storage can also be installed in campuses or multifamily buildings and shared among the tenants. In multifamily environments, where renters do not control their roofs or the building envelope but likely pay the power bill, there is a split incentive between the landlord and the tenant. Community storage offers a pathway for tenants to invest in energy systems without the ownership prerequisites. For example, a single storage system could help multiple users manage demand charges or be paired with PV to encourage self-consumption. In New York, developers have been specifically targeting public housing for solar + storage upgrades (Lillian 2019). The virtual arrangement can lower project costs on a per unit basis due to economies of scale, making it ideal for low- and moderate-income households. Furthermore, the state has offered generous grants and rebates to ensure equitable access to the technology.

Existing State Programs

Community storage is still a nascent business model, and state programs to support CES are just beginning to emerge. Regulators are looking to CES to promote access, decarbonization and improve community resilience (Koirala, van Oost, and van der Windt 2018). Likewise the goals of community energy storage are broadly in line with the principles of a just transition (Atteridge and Strambo 2020). To date, the most common step regulators have taken is an incremental one to open community solar programs to solar + storage projects. For example, New York provides technical assistance and predevelopment services to assist affordable housing providers in installing community solar + storage (NYSERDA 2020). Likewise, Oregon has expanded their rebate program for solar on multifamily housing to include solar plus storage (Oregon Department of Energy 2020).

Perhaps the most advanced policy support for CES comes from California's Self-Generation Incentive Program (CPUC 2021). This program was amended following the Camp Fire in 2018 and is designed to promote resilience in communities that are at risk of wildfires. Though much of the funding is dedicated to single-family, behind-the-meter battery systems, multi-tenant, campuses, and critical facilities are also eligible to receive the rebate for CES projects. These systems are intended to promote resilience and provide backup power in the event of a disaster or grid shut-off.

Challenges to Community Benefits from Storage Deployment

Disparate Revenue Streams Makes Community Storage Difficult

Value streams for community energy storage are more disparate than those associated with shared renewables. Except in a handful of cases (i.e. high demand charges, paired with non-net metered solar), CES will require multiple revenues in order to make financial sense. Utilities are better equipped to capture these benefits than ordinary consumers, especially in places where third-party markets for transmission and distribution deferral and ancillary services do not exist. Split ownership models between utility payments and revenues and customer payments and revenues are one path forward. Another is to quantify and compensate developers for resilience and other community benefits.

Consumer Ownership Opportunities are Limited

Many utility programs only allow consumers to benefit from storage systems indirectly. If storage can avoid system costs or improve reliability, consumers will pay lower rates. However, these programs allow few opportunities for non-utility entities to invest, reap direct benefits, and build wealth. Opening ownership models and associated revenues to nonutility ownership can promote a more equitable distribution of benefits from grid investments. They could also be more targeted to community design and interests, rather than optimal grid and system cost conditions.

Expand Community Solar Programs to Storage

Many states offer rebates, grants or have carve outs for community solar projects. Allowing solar + storage projects to access these programs would increase demand for community storage. Some states seeking to expand access to CES have already taken these steps. Likewise, community solar has benefited from the expansion of virtual net metering. Developing tariffs that pass through the benefits provided by energy storage to customers would enable more hybrid solar + storage projects.

Expand Availability to Financing

Providing financing to low- and moderate-income (LMI) households has proven difficult with community renewables and will continue to be an issue with community storage. Expanding grants and rebates will lower costs for frontline communities, and explicit financing opportunities will also be significant for technologies that have high up-front costs. PACE and on-bill financing are often cited as more equitable mechanisms to finance clean energy than traditional loans (Bird and Hernández 2012).

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