EXPANDING SOLAR PARTICIPATION THROUGH COMMUNITY SOLAR

A Win-Win for Utilities and their Customers

The Electric Power Research Institute (EPRI)

This SolSmart Issue Brief describes the community solar model and highlights approaches for developing new projects.

WHAT

is Community Solar?

Community solar, or shared solar, is a model that allows customers ("subscribers") to lease or own shares of an offsite solar photovoltaic (PV) array and receive compensation for the electricity that their portion of the system produces (see Figure 1). Instead of purchasing and physically mounting PV panels on their rooftops (or in their yards), community solar subscribers participate in a collaborative effort that supports the construction and ongoing maintenance of a large PV array. As a result, community solar programs broaden solar access to interested parties, including low-income households [1]. The success of community solar, however, depends on regulatory and legislative conditions, as well as program design approaches.

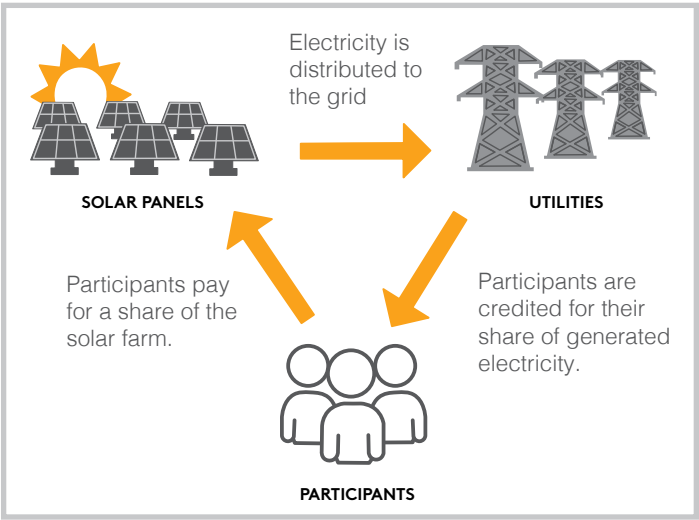

FIGURE 1. OVERVIEW OF THE COMMUNITY SOLAR MODEL

Source: Smart Electric Power Alliance (SEPA), Solar Market Pathways

WHY
Community Solar?

Despite the significant growth of installed solar PV capacity throughout the U.S. over the last 10+ years (see Figure 2), a large portion of the American population has been unable to adopt solar energy. In fact, a report from the National Renewable Energy Laboratory (NREL) estimates that as many as 49% of American households cannot install PV because, for example, they do not own their homes (i.e., they rent), they live in apartment buildings, their rooftops are structurally unsuitable, and/or the upfront cost is too high [1]. Because community solar programs can overcome all of these obstacles, it's no surprise that they have become increasingly popular over the last five years. According to a recent report from the Smart Electric Power Alliance (SEPA) [2], community solar capacity has more than doubled from 347 MW in 2016 to 734 MW in 2017 (see Figure 3).

Multiple "win-win" factors for both utilities and their customers are contributing to community solar's growing appeal (see Table 1). On the customer side, two of the main drivers of community solar programs are that they 1) increase access to solar, and 2) lower costs (through economies of scale that accompany the development of larger PV systems). For utilities, community solar offers the ability to provide greater customer service and engagement by accommodating local interest in "going solar." The arrangement also gives utilities more control over PV system siting decisions that can impact distribution system reliability.

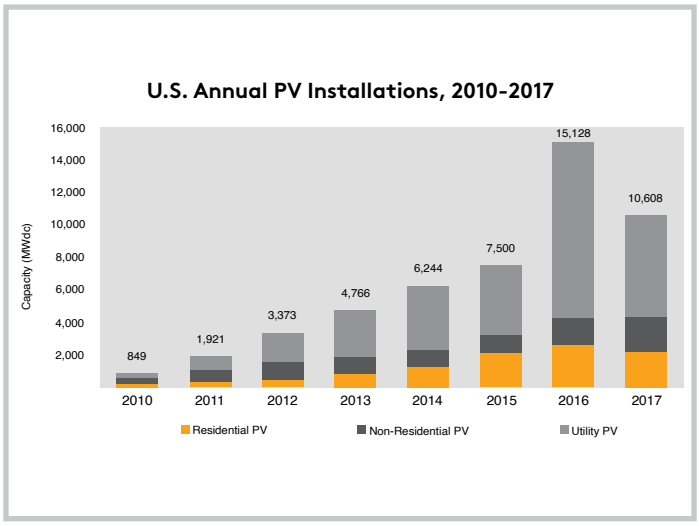

FIGURE 2. ANNUAL PV INSTALLATIONS IN THE U.S., 2010-2017

Source: U.S. Solar Market Insight Q4 2018. Wood Mackenzie, Limited, and the Solar Energy Industries Association (SEIA)

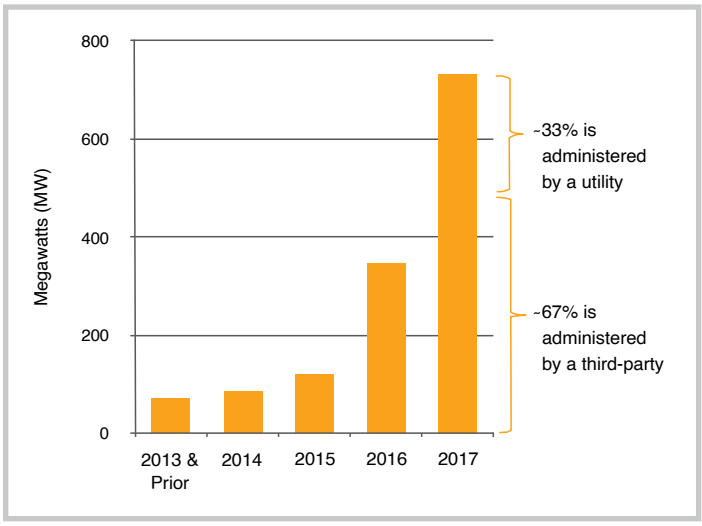

FIGURE 3. CUMULATIVE COMMUNITY SOLAR INSTALLATIONS

Source: SEPA Community Solar Database

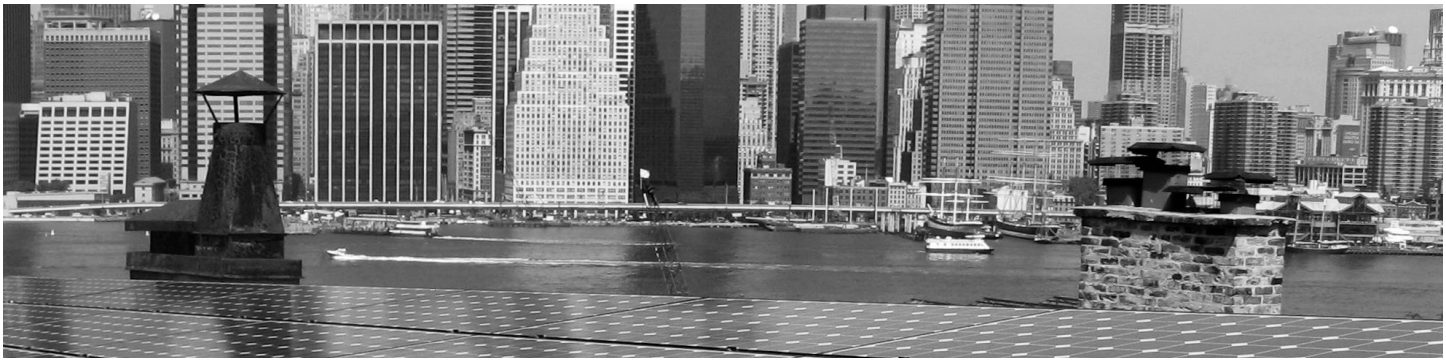

TABLE 1. COMMUNITY SOLAR DRIVERS FOR CUSTOMERS AND UTILLITIES

Source: EPRI

Customer Drivers	Utility Drivers
Increased customer access to solar	Proactive customer engagement
More cost effective than distributed projects	Preserved customer base
• Lower install / maintenance costs	Model/structural flexibility
• Higher per kW energy production	Utility siting control / influence
• Reduced upfront investment by spreading costs across multiple subscribers	Lower cost of compliance, portability
Increased customer equity from solar projects	Support to local PV industry
	Gain experience in PV market

WHAT

are Key Ingredients to Successful Community Solar Programs?

Regulatory and legislative conditions are key factors governing the success of community solar deployment. Enabling policies (see Figure 4) and considerations include:

- Federal tax benefits, such as the Investment Tax Credit (ITC)[1], which improve program economics by reducing upfront costs.[2]
- Virtual net energy metering (VNEM), a billing mechanism that allows bill credits earned through solar generation at one location (i.e., the community solar array) to reduce the bill of an account tied to another location (i.e., a subscriber's home or business). VNEM is a utility regulatory issue that is handled by public utility commissions.
- Shared solar mandates, laws passed by state governments that require utilities to offer some form of shared solar to their customers. States with a shared solar mandate have higher numbers of community solar programs and projects than those without mandates.
- Grid benefits, related to the location (or "siting") of a community solar array may, to a lesser extent, also help "green light" projects.

Policies and considerations, such as those listed above, can affect a community solar project's ability to compete on price (particularly in regions with low retail electricity prices). Also, they can affect the type of community solar models and features that are feasible.

There is no "one-size-fits-all" community solar model, but most fall into one of two broad categories: 1) Utility-sponsored, and 2) special purpose entity (SPE). A third category, the non-profit model, is often included in a list of basic community solar models, but it is less well-defined and often relies on unconventional financing structures.

1. The ITC is a tax credit for solar systems on residential (under Section 25D) and commercial (under Section 48) properties. Residential and commercial PV projects will receive a 30% credit through 2019, after which the incentive will step down to 26% in 2020, and to 22% in 2021. After 2021, the residential credit will end, and the commercial and utility credit will drop to 10%.
2. Federal tax benefits are only realizable by for-profit companies with appropriately-sized tax appetites, so the type of utility servicing a community matters.

The utility-sponsored model is the most common structure employed in the U.S. today. In this model, the community solar plant is owned either by the utility or a third party. Customers of the utility can subscribe by either leasing or buying panels from the community solar plant; depending on the program design, they may purchase the share entirely upfront, pay a monthly fee to the utility, or purchase increments of solar power (kW) or electricity (kWh). Subscribers earn credits based on the solar energy produced by their panels, and these credits are then applied to the subscriber's bill to lower it.

The main difference between utility- and developer-owned variations of the utility-sponsored model is the party responsible for designing, building, administrating, and operating the community solar plant. For example, in developer-owned approaches, which are becoming increasingly prevalent, the developer can be responsible for finding and leasing a host site; securing the necessary financing, permits, and insurance to construct the project; and working with the utility to both acquire and manage subscriptions, as well as manage the bill crediting. In general, investor-owned utilities, (IOUs)

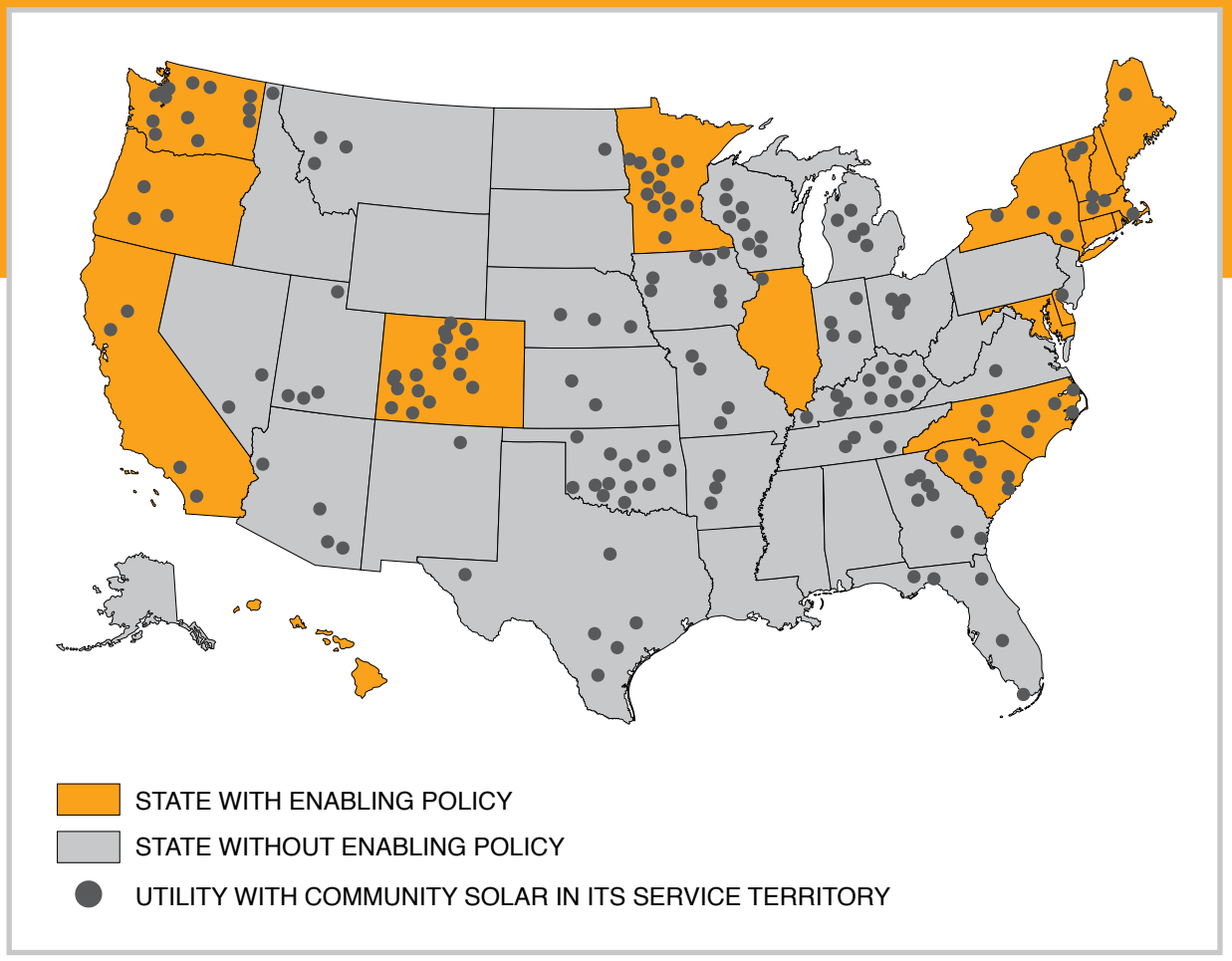

FIGURE 4. STATES WITH ENABLING POLICIES FACILITATE COMMUNITY SOLAR

Source: SEPA Community Solar Database

can take advantage of federal tax benefits, while municipal utilities usually need to involve a third party to realize federal tax benefits.[3]

In the SPE model, a for-profit or non-profit business owns the community solar project, and subscribing members either buy the panels, or agree to pay for the output of a number of panels over a period of time. SPEs are designed to pass the economic benefits of federal and state incentives on to subscribers and to ensure that most of the project's benefits stay with the community. However, only for-profit organizations with a "tax appetite" can take advantage of significant tax credits and other incentives; non-profits and newly-formed for-profits with little tax appetite cannot directly access tax benefits.

The SPE model varies based on ownership and incentives. For instance, some SPEs require partnering with capital and tax investors that share in the benefits and incentives, but allow ownership to stay with the SPE. Some nonprofit SPEs work with donor communities to fund the project, foregoing most incentives. Other SPEs take advantage of IRS laws[4] that allow Renewable Energy Credits (RECs) and tax incentives to be passed through to subscribers without the complexity of tax investor partnerships. Whatever the structure, the SPE model can involve complex legal, financial, and regulatory preparation in exchange for potentially greater benefits for the community.

COMMUNITY SOLAR IN ACTION:

Case Studies

Numerous examples of successful community solar programs exist throughout the United States today. The diversity of projects offers helpful insights that can inform those seeking to develop their own community solar strategies. The three case studies that follow convey different community solar approaches. Following each case study are links to additional information for those interested in learning more.

Georgia Power Community Solar Program (IOU Example)

Georgia Power offers a relatively straightforward community solar program. Comprised of 3 MW of solar projects, the program's main objective is to make solar available to all of the utility's residential customers, but not necessarily to save program subscribers money. The structure is simple: Depending on historical electricity use, customers can purchase up to 10 1-kW blocks of the community solar array. (Each 1 kW block will reportedly produce an estimated 130-240 kWh per month, which amounts to approximately 20% of a typical residential customer's usage.) The price of a block is $24.99/month. Any electricity produced by a 1-kW share of the array during a billing cycle is credited on the customer's bill. So, participating customer bills reflect both the reduction in overall electricity consumed due to the contribution of their community solar array block, as well as the $24.99 program charge. This arrangement is an example of an (investor-owned) utility-sponsored program.

For more information:

- Georgia Power. (2018). Community solar program information. Retrieved from https://www.georgiapower.com/communitysolar
- Georgia Power. (2017, December 6). Georgia Power Dedicates First Community Solar Facility. Georgia Power. Retrieved from. Community solar program information. Retrieved from https://www.georgiapower.com/company/news-center/2017-articles/community-solar-facility.html
- Williams, D. (2017, November 3). 'Community solar' program gives Atlantans chance to invest in solar farms. Atlanta Business Chronicle. Retrieved from https://www.bizjournals.com/atlanta/news/2017/11/03/georgia-power-giving-customers-new-way-to-go-solar.html
- Roselund, C. (2017, October 3). Georgia Power to open community solar program in January. PV Magazine. Retrieved from https://pv-magazine-usa.com/2017/10/23/georgia-power-to-open-community-solar-program-in-january/

3. Note that some states do not allow investor-owned utilities to own generation such as distributed generation, making them ineligible to pursue this community solar design.
4. In late August 2015, the IRS issued a private letter ruling to an individual investor of a community solar array in Vermont, allowing the investor to take advantage of the 30% ITC according to Section 25D of the Internal Revenue Code.

City of Fremont Community Solar Program (Municipal Utility Example)

In 2017, the City of Fremont, NE, (pop. 27,000) launched a community solar program that has since been expanded twice due to customer demand. Despite the rural town's low retail electricity rates ($0.05/kWh), residents have purchased all of the shares offered by the 1.5 MW program. A growing waiting list has justified the development of another solar array. The success of the municipal utility community solar offering is a reflection of its design.

Customers can participate in the program in one of two ways:

1. Purchase one or more panels up front at a cost of $180 per panel (up to 80% of an account's total consumption). For each panel purchased, a customer pays $0.0277/kWh (a solar maintenance fee) and receives an on-bill credit of $0.0544/kWh (the amount the utility saves by not having to produce that kWh from coal; this price is variable and can change in the future). The output of a panel, annualized and averaged over the life of the plant is expected to be 43 kWh/month. Here's how the math works out:

$$\begin{aligned} \textit{Monthly Solar Savings} &= \textit{\# of purchased panels x 43kWh x (-\$0.0277/kWh+\$0.0544/kWh)} \\ &= \textit{\# of purchased panels x \$1.1481} \end{aligned}$$

   Savings to the customer will be positive so long as the cost of producing a kWh from coal stays above $0.0544. By purchasing and owning the panels, customers are also eligible to take advantage of the federal ITC. If the customer no longer wants to participate, they have the option of selling the panel back to the utility at a prorated rate.

2. Purchase blocks of 150 kWh at $0.06/kWh, where the price will be fixed for 20 years. The on-bill credit is $0.0544/kWh. Again, here's the math:

$$\begin{aligned} \textit{Monthly Savings} &= \textit{\# of Solar Blocks Purchased x 150kWh x (-\$0.06/kWh+\$0.0544/kWh)} \\ &= \textit{\# of Solar Blocks Purchased x 150kWh x (-\$0.0056/kWh)} \\ &= \textit{\# of Solar Blocks Purchased x (-\$0.84)} \end{aligned}$$



As in the first option, savings to the customer will be positive if the cost of producing a kWh from coal exceeds $0.0544 (which is not the case in the above example). Under the program's current terms, purchasing blocks of output instead of panels does not save the customer any money, although it does provide price stability.



For more information:

- City of Fremont. (2018). Community solar program information. Retrieved from http://www.fremontne.gov/DocumentCenter/View/4535/Solar-Participation-Options-and-Pricing-Examples
- Farrell, J. (2018, February 20). Fremont moves forward on second solar farm due to high demand. Fremont Tribune. Retrieved from https://fremonttribune.com/news/local/fremont-moves-forward-on-second-solar-farm-due-to-high/article_9c516614-1347-5306-b110-e9ef104cf22f.html
- Smart Electric Power Alliance (2017, December). Selling Out 1.55 MW of Community Solar in 7 Weeks: Inside the City of Fremont, Nebraska's Community Solar Program: Inside the City of Fremont, Nebraska's Community Solar Program. Retrieved from https://sepapower.org/resource/selling-1-55-mw-community-solar-7-weeks-inside-city-fremont-nebraskas-community-solar-program-2/

Ameresco Community Solar Offering (SPE Example)

In 2017, Ameresco, a renewable energy company, constructed a quintet of community solar arrays in southeast Massachusetts totaling 6.9 MWdc that it now owns and operates.

Blue Cross Blue Shield of Massachusetts is the "anchor" off-taker (a subscriber purchasing a significant share of panels) of the projects, and has entered into a long-term agreement to purchase 2.6 MW of net metering credits that will be generated from the solar arrays. An additional 200 residents and small businesses are also taking advantage of the program.

BlueWave Solar, a community solar developer and service provider, is the administrator of the program, which works as follows: Participating members receive credits on their utility bill (from National Grid, the local utility) for the number of kWhs generated by their portions of the community solar array. Members then also receive a bill from BlueWave Solar for 90% of the value of the credits that were applied to their utility bill. The duration of the arrangement is 20 years. The value proposition for the customer is the guaranteed 10% in savings. The value of any (federal) tax benefits and solar renewable energy certificates (SRECs) belongs to the system owner (Ameresco). This arrangement is an example of a SPE model.

For more information:

- Blue Cross Blue Shield of Massachusetts. (2018). Retrieved from http://www.ameresco.com/wp-content/uploads/2017/11/cs-blue-cross-blue-shield-of-massachusetts.pdf
- Ameresco. (2018). Ameresco Case Study: Blue Cross Blue Shield of Massachusetts. Retrieved from https://www.ameresco.com/portfolio-item/blue-cross-blue-shield-massachusetts/
- Blue Cross Blue Shield (2017, January 26). Blue Cross Blue Shield of Massachusetts Partners with Ameresco and BlueWave to Support Community Solar and Clean Air in Massachusetts. Retrieved from http://newsroom.bluecrossma.com/2017-01-26-Blue-Cross-Blue-Shield-of-Massachusetts-Partners-With-Ameresco-and-BlueWave-to-Support-Community-Solar-and-Clean-Air-in-Massachusetts



Recommended Reading

For more on community solar, we recommend the following resources:

- Community Solar Value Project: https://www.communitysolarvalueproject.com/
- Chwastyk, D., Sterling, J. Community Solar Program Design Models. Smart Electric Power Alliance and Solar Market Pathways. 2016.
- Wilkerson, M., et. al. The Community Solar Playbook. National Rural Electric Cooperative Association. Washington, DC: 2016.
- Jones, C., Banks, R., Geschiere, A. Community Renewables Rising. Electric Power Research Institute. Palo Alto, CA: 2015.
- Propper, S. Alternate Utility Revenue Streams: Expanding Utility Business Models at the Grid Edge. GTM Research. May 2015.
- Siegrist, C. Utility Community Solar Handbook: Understanding and Supporting Utility Program Development. Smart Electric Power Alliance. Version 1: December 2013.
- Coughlin, J., et. al. Wiedman, J. A Guide to Community Solar: Utility, Private, and Non-profit Project Development. Prepared for NREL, Subcontract No. AGJ-0-40314-01. November 2010.

REFERENCES

[1] M. W. Kahn, "Bringing the Power of Community Solar to the Entire Community," America's Electric Cooperatives, 2018.

[2] D. Feldman, A. M. Brockway, E. Ulrich and R. Margolia, "Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation," NREL, Golden, CO, 2015.

[3] D. Chwastyk, J. Leader, J. Cramer and M. Rolph, "Community Solar Program Design Models," Smart Electric Power Alliance, Washington, D.C., 2018.

[4] "Elevate Energy," [Online]. Available: https://www.elevateenergy.org/programs/solar-energy/community-solar/business-models/. [Accessed 1 11 2018].

[5] D. Chwastyk and M. Taylor, "Are Customers of Community Solar Programs Actually Buying Renewable Energy," Smart Electric Power Alliance, Washington, D.C., 2016.

[6] "Community Solar Hub," [Online]. Available: https://www.communitysolarhub.com/. [Accessed 1 11 2018].

[7] C. M. Jones, R. D. Banks and A. Geschiere, "Community Renewables Rising," Electric Power Research Institute, Palo Alto, CA, 2015.

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