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The next big thing in renewable energy: Shared solar

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ABSTRACT

The U.S. shared solar market is poised for growth, boosted by initiatives supported by state and federal agencies, customers, contractors, and utilities. Full-scale adoption will require addressing political and economic barriers, which vary between states and program models. Investor-owned utilities will be working with regulators to define enabling policies in the coming years, while municipal and cooperative utilities will continue to pilot programs.

1. Introduction

According to multiple forecasts, community shared solar is expected to grow exponentially over the next five years,[1,2] but there are a number of barriers that will first have to be addressed. This article defines community shared solar, characterizes its status in the U.S. including barriers to its implementation, outlines program design considerations, and offers predictions about what the future might hold for the shared solar market.

2. Background: what is community shared solar?

Solar energy in the United States has increased dramatically in the last 10 years, from 58 MW of annual installed capacity in 2004 to 6,201 MW in 2014.[3] Residential installations make up a significant portion of the overall solar growth, and have increased from 27 MW of annual installed capacity in 2005 to 1,231 in 2014 (Fig. 1). The total installed cost of residential solar systems has dropped by approximately 50% over the same time period.[4]

And public demand for solar energy continues to build. A recent study published by SolarCity and Clean Edge in collaboration with NASDAQ found that Americans overwhelmingly chose solar and wind over natural gas, nuclear, and coal when asked which generation sources were most important to America's energy future.[5] Solar topped the list, with 50% of respondents identifying it as one of their top three candidates for energy reliance. Still, solar photovoltaic (PV) energy represents only 0.2% of U.S. electricity generation, and only 0.3% of U.S. households have solar panels installed on their rooftops.

Despite becoming more cost-competitive and desirable as a source of generation, several barriers have limited the adoption of residential solar. First, much of the population, particularly in urban areas, rents or lives in multi-family households, where they are unable to put solar on their roof. The National Renewable Energy Laboratory (NREL) estimated that 49% of households are unable to host a PV system either because the occupants do not own the building, the building is a multi-unit facility, or the roof space is insufficient.[1] Additionally, the interconnection process can pose soft costs to customers, including lack of access to information, difficulties with application submission, and strin-

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[1] Feldman, D., Brockway, A.M., Ulrich, E., Margolis, R. (2015, April). Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation (Rep.). Retrieved February 8, 2016, from National Renewable Energy Association website: http://www.nrel.gov/docs/fy15osti/63892.pdf.

[2] Chwastyk, D., Sterling, J. (2015, October). Community Solar Program Design Models (Rep.). Retrieved February 8, 2016, from Solar Electric Power Association website: https://www.solarelectricpower.org/media/422096/community-solar-design-plan_web.pdf.

[3] GTM Research & Solar Energy Industries Association, 2015. US Solar Market Insight Report: 2014 Year in Review (Rep.). Retrieved February 8, 2016, from http://www.seia.org/sites/default/files/HOlFT6ym3i.pdf.

[4] Barbose, G., Dargouth, N., (2015, August). Tracking the Sun VIII (Rep.). Retrieved February 8, 2016, from Lawrence Berkeley National Laboratory website: https://emp.lbl.gov/sites/all/files/lbnl-188238_2.pdf.

[5] Solar City & Clean Edge (2015, March). U.S. Homeowners on Clean Energy: A National Survey (Rep.). Retrieved February 8, 2016, from NASDAQ website: http://www.solarcity.com/sites/default/files/reports/reports-2015-homeowner-survey-clean-energy.pdf.

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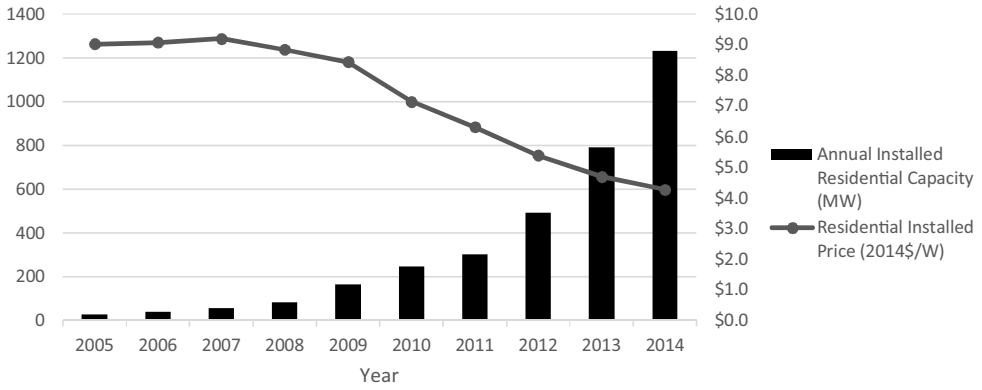

Fig. 1. Annual installed residential solar price[4] and capacity[3].

gent inspection requirements. Finally, solar incentives and interconnection and net metering standards vary from state to state, and even utility to utility, creating a disparity in program attractiveness between customers.

Community shared solar provides a way for all customers to access solar. Community shared solar or, more simply, shared solar, refers to a PV system that provides power and/or financial benefit to multiple community members. We distinguish shared solar from community solar, which can include community group purchasing of solar equipment (as in "solarize" campaigns) in addition to shared solar. While the terms have been used interchangeably in many publications, we will refer to shared solar here.

Shared solar offers many attractive benefits to utilities and subscribers. First, for utilities it can increase customer satisfaction and engagement, addressing customer demand for clean energy, reduce carbon exposure (in anticipation of regional, state, and local greenhouse gas reduction programs), and increase utilization of larger centralized (and potentially utility-controlled) renewable energy generation as opposed to small distributed generation resources, potentially enhancing overall grid power quality. For subscribers, depending on the model structure and economics, it can provide positive revenues and can serve as a hedge against rising electricity prices. Moreover, by providing access to solar to a broader pool of customers, society benefits from lower criteria pollutant emissions (leading to improved public health), lower greenhouse gas emissions, economic development/local jobs, reduced water consumption, and reduced dependence on fossil fuels. A caveat here is that, in many instances, the total cost of this form of generation may be higher than other generation resources or market power.

Different owner-operator models exist for shared solar programs. These programs can be sponsored by utilities, third-party developers, or special entities. Utility-sponsored programs involve system purchase and ownership by the utility. These programs are open to voluntary ratepayer participation and are financed through utility capital and/or ratepayer subscriptions. Customers participate by providing an upfront investment or ongoing payment to support system costs. They then receive a payment or bill credit that is proportional to their contribution and the overall system production. The participants do not necessarily own any part of the system, but instead own rights to the electricity produced by the installation. Generally, the utility would purchase energy from a solar developer through a power purchase agreement or would hire a contractor to build the solar array on its own behalf. Depending on how the utility is regulated and how it structures its program, it may or may not be able to benefit from tax incentives.

Special-entity-sponsored systems are supported by businesses created with the intent to produce community solar power. These can be established either by utilities or by customers. To take advantage of tax incentives available for community solar projects, some organizers have chosen to structure their projects as a business, or lean on existing business entities to help support the initiative.[6] Utilities can also set up a separate business enterprise to develop a community solar project or utilize an existing for-profit subsidiary. Developer sponsored models operate in a similar fashion, but systems are owned and operated by solar developers. These can be financed through third-party capital, utility capital, and/or ratepayer subscriptions.

Subscriber involvement in projects can vary, but typically involve one of the following:

1. Purchasing panels: customers pay an upfront fee for all of the future generation from a panel or a portion of a panel and get a proportional share in bill credits or financial credits
2. Leasing panels: customers make an upfront or ongoing payments in order to secure energy for a finite term
3. Investing in system: customers come together and each pay a percentage of project costs to receive a pro rata share of generation

3. The current state of community shared solar

Shared solar is still in its early stages of development in the country, with only about 100 projects on the ground. These tend to be limited in both size and location. Most projects are located in states that have passed legislation to encourage or mandate community solar projects. In other states to date, municipal and cooperative utilities have been leading the charge to develop shared renewables programs for their customers. Of the utility-sponsored shared solar programs operational to date, two-thirds are operated by municipal or cooperative utilities. Investor-owned utilities have tended to proceed more cautiously, with many responding to, or waiting to respond to, enabling legislation.

[6] Coughlin, J., Grove, J., Irvine, L., Jacobs, J.F., Phillips, S.J., Sawyer, A., Wiedman, J. (2010, November). A Guide to Community Shared Solar: Utility, Private, and Nonprofit Project Development (Rep.). Retrieved February 8, 2016, from National Renewable Energy Laboratory website: http://www.nrel.gov/docs/fy12osti/54570.pdf.