The Political Economy of Community Solar: Lessons from Minnesota

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Overview

Innovation in "finance and business solutions to expand access to capital" is a major focus of public policies to address the non-hardware costs[1] of installing solar power (1). One promising approach to addressing solar energy's financing challenges are community solar programs, now adopted in 15 states (and the District of Columbia), along with an increasing number of electric utilities. Traditionally, solar energy requires either centralized planning for large, utility-scale project development or for customers to own or finance single solar projects located on their own property. In contrast to traditional models, new community solar programs allow multiple electricity consumers, often in close geographic proximity, to collectively finance a single offsite centralized solar project by purchasing shares or subscriptions to power generated by the project. Participants who finance the development of a community solar project receive bill credit for electricity generated by their share in the project. By expanding the market in this way, community solar programs potentially double the number of customers who can access solar energy (2).

Community solar programs offer several streams of potential benefits. First, community solar projects can lower average costs of solar energy by capturing economies of scale relative to rooftop installations. Second, because they pool together many consumers, community solar programs are amenable to affordable finance models (3, 4), thereby creating the potential to address existing inequities in the energy system (5, 6). Finally, community solar programs may provide unique opportunities for community-level mobilization of resources (7), which could enable niche-level technology adoption as part of a larger-scale energy transition (8).

Increasing public resources at the federal and state level are being dedicated to accelerating these programs (1). As a relatively new area of practice, community solar programs have been studied in only very limited fashion in the scholarly literature (3, 9). As states and businesses consider adopting or reforming community solar programs, it is critical to build on the experience of the 15 states (and even more utilities) who have been early adopters. Yet no two community solar programs are identical (10, 11). It is likely that how these programs are designed and implemented impact the pace and scale of community solar development as well as the fairness of how energy consumers participate.

Minnesota has long been on the forefront of community solar. But its program for the state's largest utility has gone through several reforms that have created uncertainty and slowed development. Still, with over 50 megawatts operating by the end of 2016, Minnesota has one of the country's largest community solar programs in the country. Beginning with programs in Minnesota, this paper seeks to fill the gap in understanding in how community solar program design impacts who can access solar energy and the pace and magnitude of new solar development.

Methods

This paper will rely on a combination of original datasets, publicly available datasets, privately shared proprietary datasets, and original case studies. This project will apply a variety of social science methods, both quantitative and qualitative.

In this paper, I evaluate Minnesota's community solar programs, some of the earliest and largest in the country. I utilize data on project development across the state and case studies of projects in several Minnesota utility territories to study the implementation of community solar programs. Of particular interest is the cost-effectiveness, equitable sharing of costs and benefits, and community engagement in developing community solar.

To understand how community solar program design affects outcomes, I am taking several methodological approaches. First, I will assess the distribution of economic benefits through financial cash-flow models of community solar project developers and household subscribers. I plan to parameterize these models with the data collected on subscription contracts and demographic data. This would allow for a quantification of overall economic benefits as well as economic benefits by income groups. A critical piece of this analysis is to understand the overall rate impacts of mandated tariffs paid to community solar programs – I will quantify rate impacts by building on the

[1] The U.S. Department of Energy estimates that the non-hardware costs, or "soft" costs, comprise 64% of the total installation cost of a new solar power system (1).

large literature that has examined this question in the context of traditional energy capital investments (12). A major concern underlying this part of the analysis is that despite increasingly favorable economics of community solar subscriptions, factors associated with lower income levels (particularly liquidity constrains, limited access to credit, and information barriers) regressively bias the distribution of benefits created by community solar programs.

Results

My preliminary findings indicate that community solar programs have increased the overall level of solar deployment. However, this increase is primarily due to favorable financial incentives for project developers. These policies have created financial benefits for community solar subscribers, but these subscribers are primarily in the highest income brackets due to restrictive barriers to subscription access. The control of renewable energy assets in community solar projects resides primarily with large electric utilities that use community solar to achieve a wider array of policy (and other) objectives

Conclusions

The results of this paper will help illustrate how the implementation of community solar programs affects performance, offer lessons to better anticipate the potential downfalls in program design, and identify best practices to enhance equitable access to the market for solar energy.

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