Community Shared Solar in Minnesota: Learning from the First 300 Megawatts

By Gabriel Chan, Matthew Grimley, Elizabeth Arnold, Issac Evans, Jacob Herbers, Maureen Hoffman, Benjamin Ihde, Jordan Morgan, Nick Neuman, Ryan Streitz
CONTACT Gabriel Chan | gabechan@umn.edu

Introduction

Community shared solar (CSS) is an emerging approach to deploying solar energy that seeks to expand the market for solar to electricity customers who do not necessarily have appropriate roof space or access to capital. CSS allows customers to own, finance, or lease a share of an offsite, centralized solar facility.

As of March 2018, Minnesota has 33 utility- or developer-led CSS programs, totaling over 300 MW, making it the state with the most CSS in the country. While Xcel's CSS program contributes the most capacity to this total, by program, several voluntary cooperative and municipal utility projects preceded Xcel, and others have followed. Rapid deployment of project sites has created large advances in renewable generation without a full understanding of the impact CSS has on subscribers, developers, and utilities. Our research seeks to understand how flexibility in program design drives potential opportunities and barriers for those involved and how fairness in the outcomes of CSS programs is considered

Community Solar in Minnesota's Utility Landscape

Minnesota's largest community solar program was created in Xcel Energy's territory by the 2013 Solar Energy Jobs Act. The first CSS projects came online in Xcel's territory in late 2016, and as of March 2018, there were 300 MW-AC of operating capacity in Xcel's territory, with nearly twice that in the design and construction stage. Outside of Xcel's territory, municipal and cooperative utilities, serving more than 35% of Minnesotans' electricity, have taken a diversity of approaches to CSS, offering a rich setting for comparative analysis.

Community Shared Solar: A Strategy

CSS offers a variety of contractual arrangements with new possibilities in the negotiation of fairness in the clean energy transition. In Minnesota's programs alone, our group has collected more than 100 different payment plans, largely for residential subscribers. We found several major innovations in financing, technology, and system use behind CSS projects. In all, these innovations in community solar program design point to the difficulties of shifting consumer and utility agency and of uncertain risk in a fragmented energy system. We categorize five key differences in Minnesota's CSS program design in Table 1.

Findings

The accessibility and affordability of CSS programs rest heavily on how flexible payment options are for the utility customer and on the ease of subscription transfer options. These variables carry different risks for the utility and for the customer. Up-front payments decrease the utility's risk for the project, but they create a significant financial hurdle. Loan-lease or pay-as-you-go financing may make it easier for low-income customers to subscribe to a CSS program. Lifetime costs of CSS subscribers vary significantly across utilities (see Figure 2).

Minnesota's Cooperative, Municipal, and Nonprofit Developer Community Solar Programs

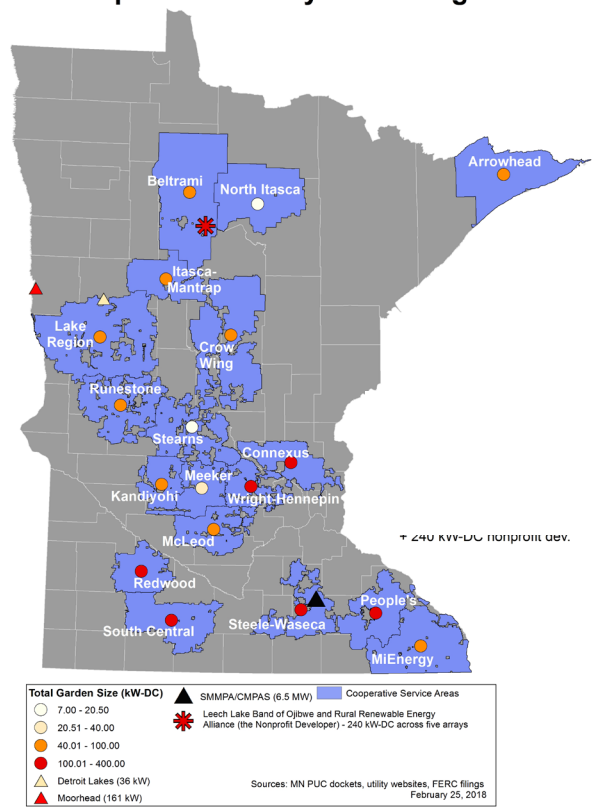

Figure 1. CSS programs have been voluntarily established by 18 cooperative utilities and one nonprofit developer, totalling 2.2 MW-DC. Joint action agencies SMMPA and CMPAS manage a 6.5 MW-DC solar array with subscriptions allocated to 10 municipal utilities. Moorhead and Detroit Lakes have also established their own CSS programs with 0.17 MW-DC of capacity. Data Source: [FERC Form 556 filings, MN PUC docket -10 filings, utility and developer newsletters and updates]

Different approaches to CSS program design are starting to reveal opportunities and barriers to success. Developers, subscribers, and utilities all have vested interest in the outcomes of program design, but these interests still leave a wide breadth for variance.

1. Contract structures vary between pay-up-front (PUF), pay-as-you-go (PAYG) and loan-lease (LL) options. This presents a range of cost between fully upfront,high-capital investments and rate-structured billable payments;
2. Payback varies anywhere between immediate and never. Of contracts that do offer payback capital, PUF typically offers forecasted savings in the latter years of contracts, from either fixed rate agreements, rate credits, or both;
3. Subscriber acquisition and agency follow parallels across programs and are led either by subscribers, nonprofit/for-profit intermediaries, or utilities;
4. Motivations for development range widely and are not mutually exclusive: appeasing solar mandate requirements, job creation and innovation, member demand concerns, low-income accessibility to renewable energy, and mitigating the revenue-erosion or cost-shifting effects of net-metered distributed generation.

Looking Ahead

Analysis of existing CSS projects provides insight into future areas of research for utility renewable energy programs:

- How does CSS impact consumers' perceptions during this "renewable energy transition?"
- How can utilities identify, communicate, and meet demand for consumers' renewable energy preferences?
- What is the impact of CSS on distributed energy resources more generally, and how does CSS affect the future business model of a utility?
- What policy alternatives exist to address barriers currently facing CSS projects across the state?
- What is the role of nonprofit and for-profit intermediaries in customer acquisition and low-income access to the benefits of solar energy?

The views expressed in this brief are the views of the authors and not the University of Minnesota or the Center for Science, Technology, and Environmental Policy.

A full report on Minnesota's community solar programs and a complementary report on community solar programs in states around the country are now available. We invite you to keep up to date on our ongoing research at chan-lab.umn.edu.

Table 1. Community Shared Solar Program Design Considerations

Program Design Aspect	Considerations
Accessibility	Are contracts flexible, (e.g. with variable lengths and accommodating exit provisions), and are multiple payment offerings available for the same CSS project?
Affordability	What is the lifetime net present value per watt (NPV/watt) of the subscription? Do subscription options offer potential savings upfront or over the life of the contract? Does the program offer flexible payment options, such as loan/leases or pay-as-you-go subscriptions?
Subscriber Acquisition	What outreach and partnership strategies did the program pursue to acquire its subscribers? How fully subscribed is the program and what are the incentives/penalties for less-than-full subscription?
Utility and Developer Motivations	Does the utility identify social or ancillary services/benefits from the CSS project that motivate the utility or developer? How is CSS viewed as part of other utility and developer objectives (e.g. mitigating revenue erosion from DER adoption)?
Subscriber Agency	How engaged are utility customers or member-owners in CSS program design? Do potential subscribers have the political, economic, or institutional capacity to drive CSS development? Are program design decisions democratic or focused around particular interests?

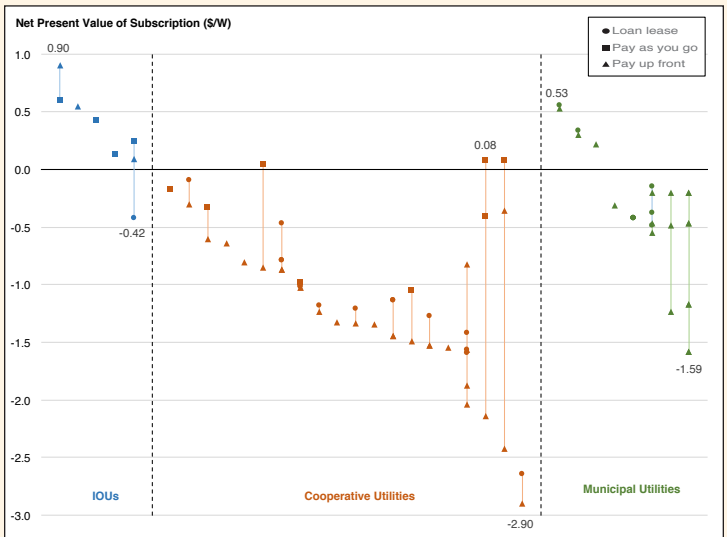

Figure 2. Net Present Value of Residential Community Solar Subscription Contracts in Minnesota Investor-Owned, Cooperative, and Municipal Utilities. (Net present value shown at a 5% discount rate and a 2.5% annual rate increase). Developers or utilities offering multiple contracts for the same CSS project are stacked vertically. Data Source: [MN PUC Dockets 17-9, 17-10, 17-11, and utility newsletters and news filings]