A New View on Community Solar:

A Win-Win Solution for Sacramento Municipal Utility District

Jill K. Cliburn, Cliburn and Associates, LLC
Joe Bourg, Millennium Energy, LLC
Stephen Frantz, Sacramento Municipal Utility District

Overview

In 2008, the Sacramento Municipal Utility District (SMUD) helped to pioneer community solar, when it introduced the first MW-scale solar project to offer customer-participant benefits keyed to the actual output of the plant. Each "Solar Share" was equivalent to the output of 1 kW of PV in Sacramento. The utility worked with a third-party developer to arrange a wholesale PPA. Then, it charged customers a retail price based on the cost, reduced by applicable California solar incentives. SMUD also paid a virtual net metering credit, based on the performance of the overall plant and the customer's actual rate. This program added about $14/month to the average participant's bottom line bill. Yet it was highly popular—a more local and tangible alternative to the wind-based green power program that had come before. Solar Shares still has about 600 participants at any one time.

But the solar market, incentives, economics, and utility considerations have been rapidly changing. Now SMUD is expanding its community solar program, and revamping the business model to take emerging risks and opportunities into account, such as:

- Reduction or conclusion of state solar incentives (California Solar Initiative—CSI or SB1program), which is anticipated in the next few years, and expiration of federal tax credits, with follow-on policies uncertain.
- Anticipated (2015–2017) changes in the utility rate structure, replacing a complex tiered rate system with a simpler time-of-use rate. The new rate also would revise the customer charge to better reflect fixed service costs.
- Continuing cost reductions and innovations from the solar industry, along with recognition that solar is a key renewable resource, requiring business model innovation to support its cost-effective long-term growth.

The utility pursued research as a basis for the proposed new program. There were two aspects: first, benchmarking utility-driven community solar programs nationwide (especially as suited to public power), and second, modeling customer economics under the anticipated TOU rates, as they would affect customers with HELOC-financed or leased rooftop residential systems and self-financed or third-party commercial systems *compared to* the results for participants in the proposed "virtually net metered" community solar program.

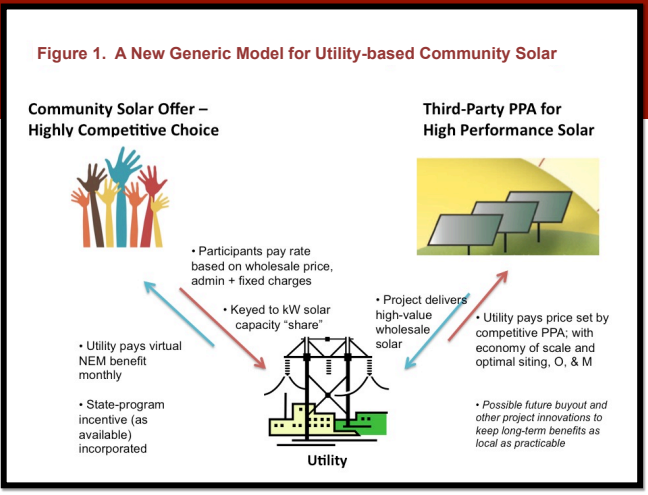
Findings discussed here summarize the recommended program model and focus on its comparative impacts on residential customer economics. In short, the economics are very favorable to this type of utility-driven community solar program. Findings suggest that community solar could be a win-win for the customer and the utility.

Modeling the Impacts

The proposed new community solar program is similar in many ways to SMUD's original Solar Shares program. It would take advantage of economies of scale and, this time, a single-axis tracking, ground-mount PV system design. A competitive RFP would secure a third-party PPA that passes through some tax benefits, which a public power utility could not otherwise utilize.

The resulting per-kWh retail community solar rate would allow customers to scale their participation to match both their interests and their budgets. It would allow them to enter or leave the program, with few limitations. The rate would equal the utility's wholesale PPA cost plus a portion of its standard gross margin, to cover its costs. Yet even in the early years, virtual net metering payments nearly offset the slight initial $/kWh premium for community solar power. Over a longer term, the stability of the community solar rate would generously pay off.

Figure 1. A New Generic Model for Utility-based Community Solar



Utilities that take leadership in designing community shared solar programs may create a win-win proposition for the customer and for the utility. These projects can accelerate work toward utility solar and sustainable development goals, ease solar interconnection and operational requirements and risks, create a virtual net metering experience for more customers, stay current as solar markets change and grow, and meet more customers' solar siting and economic needs.

Every utility's situation differs, but representative results from this study show that residential customers who participate in this community solar program could be cash flow positive in less than 3 years. A customer that buys new solar shares equivalent to an average-sized residential rooftop system would enjoy an average annual positive cash-flow (savings) that exceeds the savings from either HELOC-financed or leased solar systems—by roughly $200 per year, on average. That makes it a winning offer for customers—and especially for customers who cannot properly site, finance or lease a typical rooftop solar system. The utility would benefit, too, from maintaining its role as the retail solar energy provider, diminishing its exposure to revenue loss, and speeding the transition to greater, high-performance solar market penetration.

While the commercial options are not the focus of this poster, it is notable that a similar modeling analysis was also completed for SMUD's large commercial sector. That analysis assumed a 250-kW commercial PPA, using a fixed-tilt rooftop system, versus the community solar option as described above. The economic results are almost identical for both these large commercial options, with neither being as strongly favorable as the community solar option for residential customers. This suggests the importance of economic modeling for each customer group, using applicable systems and rates. In this case, SMUD has found the results useful not only for broad program design, but also for developing properly targeted program marketing plans for different customer groups.

One key to this analysis is the utility's proposed new TOU rate. Bottom-line NEM benefits for solar customers are affected, because there are fewer and later peak hours in that rate. But the rate treats customers in each class the same—i.e., there are no special solar charges and no fundamental changes to NEM. The SB1 incentive was incorporated, but at its current, nearly negligible benefit per kWh. Because it would be impractical to guess future solar costs, future tax incentives, and financing options, the analysis used current data. While this means the outcomes are not an exact prediction, the all-important comparative relationships among different modeled outcomes are intact.

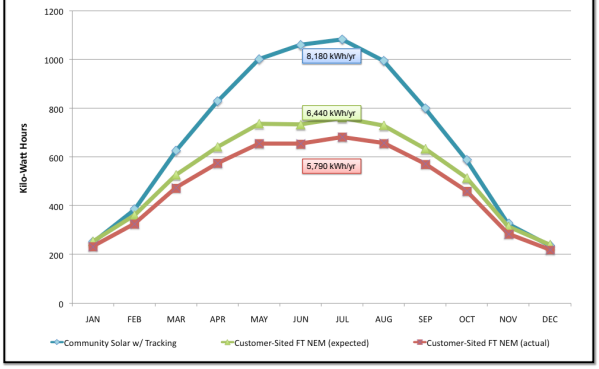
Discussion

The primary reason to focus on a comparative economic analysis from the customer's point of view was to ensure that the utility's updated community solar offer would be attractive. Note that this analysis compares "apples to apples" as much as possible, wheras different companies' solar marketing materials may use differing assumptions.

Here, community solar succeeds primarily because it utilizes optimal solar siting, design, and financing. Also, this program design retains virtual net metering, though NEM is somewhat restrained by the new, broadly applicable TOU rate. PPA costs—especially in California—have fallen to levels that nearly balance falling state incentives. Yet this analysis underscores the importance of federal tax incentives. At least until solar costs fall further, they drive economic benefits for every option modeled. The residential leased and customer-financed (HELOC) options show nearly identical cumulative cash flows over 20 years. The leased system offers attractive, steady monthly costs and benefits from the outset and a shorter term to "cash-flow positive." The leasing option has some risks, however (in terms of long-term system disposition, etc.), and leasing still cannot reach broadly across customers of all income levels—a goal the community solar program could achieve. The customer-financed option presents even greater barriers in terms of up-front costs and long-term O&M requirements. Nevertheless, each option has some advantages, and some customers prefer solar ownership. Community solar is not presented as a replacement for either of these options, but only as an alternative choice.

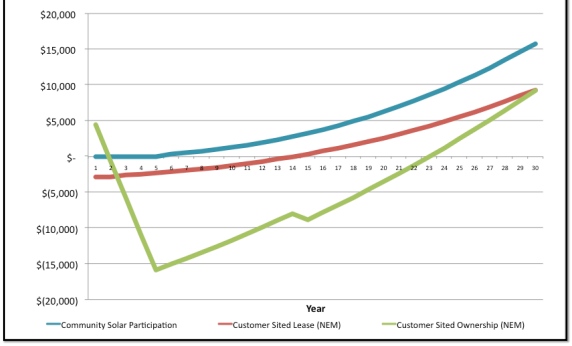
SMUD anticipates fine-tuning this program before full implementation, and then growing its community solar fleet. Options include planning to adjust the rate for all participants as the fleet grows, to minimize risks to the utility, to keep the program vibrant, and (assuming solar costs come down) to reward early adopters.

Figure 2. Comparative Output of Residential Options



Annual solar performance for residential options, based on an approximately 4.5 kW system or share. On average, customer systems deliver less than ideal (expected) results, due mostly to variations in orientation and tilt. The commercial option uses single-axis tracking technology, which delivers greater production, especially in summer months.

Figure 3. Cumulative Cash-Flow Comparison



This comparison is based on assumptions for residential customers, as discussed above. The proposed community solar model shows the best results. The leased system and the HELOC-financed options have nearly identical cumulative cash flows over 20 years. However, the leased system offers practically steady monthly costs and benefits from the outset. Like community solar, the lease takes advantage of commercial tax incentives. Note that if federal tax incentives expire, then all modeled results would be affected.

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For more information:

Jill K. Cliburn
Cliburn and Associates, llc
Santa Fe, New Mexico
jkcliburn@gmail.com