Reducing Electric Bills in California Multifamily Affordable Housing with Solar+Storage: Q&A Follow-up

On June 15th, Clean Energy Group hosted a webinar, titled Reducing Electric Bills in California Multifamily Affordable Housing with Solar+Storage, along with experts from the California Housing Partnership, the Center for Sustainable Energy, and Geli. The presentations reviewed the background, methodology, and findings of our recent report, Closing the California Clean Energy Divide. The report examines the utility bill savings impact of adding battery storage to stand-alone solar in multifamily affordable housing properties in California. The report was prepared in part to help inform implementation of AB 693, which establishes California's Multifamily Affordable Housing Solar Roofs program and provides up to $1 billion for the installation of solar energy systems in multifamily affordable housing.

We received more than 70 questions and comments from attendees during the webinar, which we did not have time to fully address. Since the webinar, the presenters have collaborated to provide answers to many of the remaining questions. We hope that these answers will be helpful to those interested in gaining a better understanding of solar+storage for affordable housing and California's new incentive program.

General Questions

Will the slides and recording be made available after the webinar?

Yes. A recording of the webinar and PDF of the slides are available on the Clean Energy Group website at http://www.cleanegroup.org/webinar/reducing-electric-bills-california-multifamily-affordable-housing-solar-storage/.

Has this type of analysis been done for states other than California?

Yes, though not to the same depth as the California analysis. Clean Energy Group released a report last year, Resilience for Free, which explores the economic case for resilient solar+storage in affordable housing in Chicago, Washington DC, and New York City.

AB 693 Questions

Is there a single docket at Public Utility Commission for AB 693 implementation or is it being done across several dockets?

The implementation of AB 693 is being taken up as part of a phase of the *Rulemaking to Develop a Successor to Existing Net Energy Metering Tariffs Pursuant to Public Utilities Code Section 2827.1, and to*

Address Other Issues Related to Net Energy Metering, Rulemaking 14-07-002. Refer to Second Amended Scoping Memo and Ruling if Assigned Commissioner, March 4, 2016.

Where in AB 693 legislation is storage addressed?

In AB 693 a qualified energy system is defined as "a solar energy photovoltaic device that meets or exceeds the eligibility criteria established pursuant to Section 25782 of the Public Resources Code." The definition of a solar energy system under with respect to Section 25782 is provided under 25781. The definition states,

> *"(e) "Solar energy system" means a solar energy device that has the primary purpose of providing for the collection and distribution of solar energy for the generation of electricity, that produces at least one kW, and not more than five MW, alternating current rated peak electricity, and that meets or exceeds the eligibility criteria established pursuant to Section 25782."*

We believe that energy storage can be included under this definition. When energy storage systems are combined and integrated with a solar PV system, the storage system complements the collection and distribution of solar energy.

Is the AB 693 program addressing energy efficiency for low income houses? Or is it just providing funds to install PV and storage?

AB 693 mandates that energy efficiency requirements be established as part of the Multifamily Affordable Housing Solar Roofs program. Minimally, energy efficiency requirements must be equal to requirements specified in Section 2852, including participation in a federal, state, or utility-funded energy efficiency program. Section 2852 requires participation in the Energy Savings Assistance Program (ESAP). Efforts are underway to enhance multifamily energy efforts under the ESAP and other utility sponsored programs. Moreover, under SB 350, the Public Utilities Commission is required to set targets to implement the state's goal doubling of statewide energy efficiency savings and enhance programmatic efforts.

When will projects be able to apply for the AB 693 funds? Is there a timeline for the projects to be completed in?

The launch of AB 693 will occur in 2017. Under the law, by June 30, 2017, the commission shall authorize the award of monetary incentives for qualifying solar energy systems.

What happens to the program if auctions of cap and trade credits continue to disappoint?

Funding for AB 693 is tied to cap and trade allocations. The $100 million annual funding level is based on projections of future revenue proceeds. If cap and trade allocations do not reach projections, funding levels for the program will be lower than currently projected. The May 2016 cap and trade auction revenues were several hundred million dollars less than projected. This result was unexpected and we expect that adjustments will occur to correct for weakness in future cap and trade auctions.

Economics

Can AB 693 projects use third-party owned financing (ie PPAs)? How would this be implemented in a multifamily property whereby tenants are receiving the benefits of solar PV generation?

Yes. Third-party owned PV systems can be installed under the program, provided that the PV generation from these systems is allocated to tenant units and the tenants receive an economic benefit from solar offsets on their utility bill. Additionally, the law places restrictions on costs passed through to tenants.

Assuming that the subsidies provided by the program, leveraged resources such as the ITC, and other contributions can cover a substantial portion of the projects installation costs, which seems likely, pre-paid solar leases or PPA agreements could provide a realistic and viable pathway for financing and installing these systems. It is also possible that the program will provide useful options for system purchases by property owners.

In cooperatives, where residents are also the owners, would the value proposition be cleaner?

Perhaps. However, because the intent of the AB 693 program is to increase access by addressing split incentive barriers, we expect that the final program design will provide financing options that allows property owners to contract for the installation of the PV system, either as a direct purchase by the property or through a third-party PPA, and also provide tenants and property owners with the economic benefits.

Could PACE finance fit into AB 693 projects?

Yes. The PACE program could provide financial options useful to property owners. However, the Commercial PACE program in California has not been widely used by affordable multifamily property owners due to lender approval and property lien requirements. If these barriers can be mitigated, Commercial PACE could have a significant role in providing capital to financing systems under this program.

While the savings are great on the solar+storage, it appears the payback for the total investment is still a long time. Would energy efficiency be a much better investment for building owners?

Reducing energy consumption through energy efficiency should always be a first choice even in cases where solar PV gains ground in relative load order of investment options. The point made in the presentation is that as we transition to a smarter grid, and as tariff structures changes, more integrated energy solutions that combine energy efficiency, solar PV, and energy storage will provide a better value proposition for an owner or renter. Energy efficiency reduces demand. Solar PV offsets electricity use. Energy storage preserves value. We need all three.

What utility rate tariff was used in this analysis?

Rate tariffs used in the analysis represent actual utility tariffs for affordable housing owners and tenants in California, which vary depending on location and load profile. Please see Appendix B of the report, Closing the California Clean Energy Divide, for more information about the specific rate tariffs used in the analysis.

In order to make battery economics work, are you advocating for switching to a utility rate structure with high demand charges?

Not at all. Many affordable housing properties in California already pay high demand charges. Those that do may have an economic incentive to install batteries to manage demand and lower the associated demand charge costs. For those properties with low or no demand charges, batteries may not be a suitable option at this time, though changes to utility rates and how distributed resources are valued may soon open new value opportunities for storage.

How does a property change to a non-demand rate?

If a property can demonstrate that it can hold its electricity demand below a certain utility-defined threshold, it can switch from a rate tariff with demand charges to one without demand charges. In order to make that switch, a property may be required to demonstrate demand below the specified threshold for a period of 12 months; however, some utilities may allow customers to switch earlier and demonstrate demand performance while being billed under the new, non-demand tariff.

What happens if, for one month, you exceed the defined demand threshold?

If a building exceeds demand during the demonstration period, the tariff may be switched back retroactively; however, with proper management software this scenario should be able to be avoided.

How would a reduction in California Self-Generation Incentive Program (SGIP) value impact the economics of battery storage?

Any decrease in the SGIP incentive level could reduce the economic opportunity for batteries. It is partly for this reason that the report authors advocate for a storage incentive to be included within the AB 693 program framework, so that affordable housing properties have a dedicated, dependable source of funding to support solar+storage installations. If there is any group of utility customers who deserve a reliable source of support to access clean energy like storage in the future, it is low-income tenants of affordable housing.

How do tenants directly benefit from battery storage? How will storage demand charge savings work within the AB 693 legislative framework?

Tenants benefit from energy storage in the same way they current benefit from PV generation through virtual net energy metering (VNEM). Under VNEM, solar credits are allocated to tenants based on the electricity production provided to the grid. With energy storage, a portion of the generated power is stored, and delivered to the grid to offset peak demand or during peak periods when the value of the

electricity is higher. The specific metering rules for AB 693 have not been adopted, but we expect a VNEM tariff to also apply to this program.

The report covered in this webinar simply outlined that there is a greater pool of savings available to tenants through solar+storage than through stand-alone solar. By increasing the total savings available to owners and tenants, including storage may enable greater AB 693 participation by properties with limited suitable space for solar panels. Also, as time-of-use rates are implemented for solar customers and net metering policies change over time, batteries can help preserve the value of solar for both property owners and tenants.

What additional cost is associated with adding resiliency benefits to a solar+storage system?

The additional cost of making a solar+storage system resilient varies greatly depending on the existing electrical configuration of a building. For new construction and existing buildings with critical loads already isolated, the incremental cost may be no more than a small fraction of the cost of the entire system. However, the cost may be prohibitively expensive for buildings requiring extensive electrical reconfiguration. See Solar+Storage 101: An Introductory Guide to Resilient Solar Power Systems for more information on resilient solar+storage system design.

How would benefits to tenants affect utility allowances generally allowed for state/federal multifamily financing?

The legislation requires that the program allocate PV generation to tenants in order to provide them with a direct economic benefit. The economic benefit is received as an offset or credits on their utility bills. As the credits provided are intended for use by tenants, federal housing agencies or property owners cannot recapture the mandated assistance to low-income households. Accordingly, utility allowances should not be changed as a result of the program. We expect that the eventual program guidelines will clarify requirements that the property owner cannot increase tenant rent payments as a result of participating in the program.

Up to what size load do the three California investor-owned utilities allow for net energy metering on affordable housing units?

The PV system can supply up to 100% of the property's tenant and common area electricity loads. We expect a typical PV system size for tenant units will be 2 to 3 kilowatts per unit, subject to site conditions.

What are the grandfathering rules behind NEM 2.0?

Under NEM 2.0 utility tariffs rules adopted in January 2016, customers served by a solar PV system implemented under the NEM 2.0 rules must convert to the applicable NEM 2.0 time-of-use rate tariff and will be able to use the NEM tariff for 20 years from the year of interconnection.

How many customers in Multifamily Affordable Solar Housing (MASH) units are part of California Alternate Rates for Energy Program (CARE)? Will time-of-use rate be applied to (CARE)?

Yes. Tenants on CARE rates that reside at properties participating in the multifamily solar roofs programs will continue to be eligible for the CARE program. Based on NEM 2.0 rules, tenants will be required to convert to a CARE time-of-use utility rate schedule.

Technology

What type of battery storage system was used in your study?

We used LG Chem lithium-ion battery model in our analysis. LG Chem is a tier one battery vendor whose products are available via Geli's partnership with Gexpro.

Did the long-term modeling account for battery replacement costs over 20 years? Did the analysis include disposal of batteries?

No, the modeling did not account for replacement or disposal of batteries. The project term was 15 years for the energy storage system, which is the anticipated lifetime of the battery modeled under this use case.

What spacing and ventilation/cooling requirements are there for the batteries in this analysis?

Battery module and power converter footprints depend on the specific technology chosen. Project economics were based on indoor installations. Outdoor enclosures typically require outdoor rated enclosures and, depending on the climate, cooling systems.

Software seems key in allowing storage to target peak demand because it's a moving target. Is the technology there?

Yes, advanced real-time software is required to forecast facility load and dynamically target variable facility peaks. The Geli Energy Operating System is a robust software platform with drivers to communicate and operate multiple hardware sets including batteries, BMS, and power converter systems. The Geli Demand Charge Management energy application is production-ready.

In the analysis, did you restrict the battery to only charging from the PV system in order to capture the investment tax credit (ITC)?

Yes, the simulation constrained the energy storage system to charge only on the solar generation.

Does affordable housing need to be sub-metered to realize solar+storage savings?

No. All of the properties examined in this analysis had one meter for common area loads and individual meters for tenants, but there's no reason the same or even greater savings couldn't be achieved by a housing property that is master-metered, with a single meter for both common area and tenant loads.

What is minimum PV system size/load offset that is required for storage to make sense? Does a project have to be a certain size to work?

There is no clearly defined PV system size required for storage to make sense. Properties that have periodic spikes in demand typically have the greatest potential for storage to make economic sense, but any property that is subject to demand charges may have an opportunity to increase savings by adding batteries to manage demand.