Lessons Learned in C-PACE Energy Efficiency and Renewable Energy Project Development Webinar

Sponsored by:

Presented by:

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June 23, 2016

Questions & Answers from the Webinar

Thank you for participating in the Connecticut Green Bank and Sustainable Real Estate Solutions, Inc. sponsored webinar, *Lessons Learned in C-PACE Energy Efficiency and Renewable Energy Project Development.* As discussed on the webinar, below are listed the participant questions and the answers provided by Mr. Buonicore.

(1) *Can you explain the ratchet provision you referred to when you spoke about energy savings projections?*

This is best illustrated using a utility rate example. Under Eversource's electricity billing under Rate 35 (maximum demand < 200 kW), there is a distribution demand ratchet provision. This provision indicates that the distribution demand is the highest average 30 minute kW demand in the current month, or the highest in the preceding eleven months (the ratchet). What this means is that even though ECMs may have just been installed to reduce kW demand, it may not be reflected in current utility bills as the governing "highest average 30 minute kW demand" may be not be found in the current month, but rather in the preceding 11 months (prior to installation of the ECMs). You would see on the utility bill the actual demand used in the current period, but also a higher distribution demand from

the preceding 11 months that would actually have been used in determining your charges. You would also see under "Service Account Messages" on the utility bill the message that distribution demand was based on the ratchet. As such, it could take up to 11 months for the utility bill to reflect the demand savings.

I would note that if you install on-site generation capacity (e.g., a CHP system), the property owner can execute a Distributed Generation (DG) Rider that can waive the distribution demand ratchet provision if one exists under the rate structure being used.

There is also a ratchet provision on the natural gas side as well. For example, under the common Rate 30 structure with Yankee Gas, the billed demand is specified as either the highest daily usage during the current month, or the highest daily usage during a winter period (defined as November through March) in the most recent 11 months prior to the current billing period (the ratchet provision). You could see on the utility bill both the actual demand and the billed demand, where your cost could reflect the highest demand ("billed demand") from the previous 11 months if greater than the actual demand in the current month, no matter what you did to reduce gas demand. Similar to the electricity Distributed Generation Rider, Yankee Gas has a Distributed Generation Delivery Rebate that if applicable can rebate a significant portion of the gas demand/delivery charges.

(2) *Why can't maintenance savings be included in the SIR calculation?*

Maintenance savings that are difficult to document and track can't be used in the SIR calculation. For example, many maintenance savings claims such as those commonly associated with lighting upgrades are associated with theoretical labor savings that have not actually resulted in "real savings" or reductions in personnel (but more often than not merely shifted maintenance personnel to doing other things). In addition, labor costs associated with maintaining many ECMs in most instances are difficult to quantify because time spent on these specific tasks has not been well documented. Notwithstanding, if maintenance savings can be documented such as through elimination of a maintenance contract or reduction in the cost of a maintenance contract compared to the baseline period or elimination of maintenance personnel, then such savings may be included in the SIR calculation.

(3) *What building models have you found to be the most commonly used by contractors?*

The most common building models we have seen used in contractor submittals are Trane's Trace 700 and Carrier's HAP models. However, the vast majority of projects rely not on these types of sophisticated models but rather spreadsheets using bin data.

(4) *What is your basis for using only a 3% electricity cost escalator?*

We looked at electricity costs in CT back to 2000. The Compound Annual Growth Rate (CAGR) for commercial electricity rates was 3.18%. For industrial rates, the CAGR was

3.19%. As such, we selected 3% as a reasonable escalation rate. This was also consistent with the ISO New England assumed 20 year escalation rate.

(5) *Why do you need the cut sheets?*

Cut sheets specify the specific equipment being installed. When C-PACE performs Cx oversight to support release of any contractor funds held back, these cut sheets are referred to in order to validate that what was sold was actually installed. Moreover, cut sheets can also be used to corroborate projected efficiencies of certain types of ECMs (HVAC equipment) having AHRI performance certificates.

(6) *I noticed you referred to the extended inverter warranty over either the financing term or the EUL. Can you elaborate?*

When the C-PACE program was first launched in CT, the savings in the SIR calculation were limited to those savings realized during the finance term. However, a decision was made this year to allow the savings to be extended more realistically over the full EUL of the ECMs/RE systems. In order to take advantage of these additional savings for Solar PV systems, the inverter warranty would have to be extended to cover the EUL. So, for example, if it is desired to include in the SIR calculation the savings over solar's 25 year EUL, the inverter warranty would have to be extended to cover the 25 year energy savings term. If it is not, and the extended warranty only covers a 20 year term, for example, it would mean that additional costs to achieve Solar PV savings in years 21 through 25 could not be realized without additional investment.

Interestingly, we are beginning to see more expensive microinverters being used rather than the traditional string inverters. While string inverters typically are warrantied for 10 years and have an expected lifetime of 12 to 15 years, microinverters can be warrantied for up to 25 years.

(7) *I have been hearing about C-PACE's Project Accelerator Service. Can you tell me more?*

Project Accelerator Service (PAS), using SRS staff engineers, provides C-PACE stakeholders with technical support services across the entire project life cycle – from building pre-qualification through project finance closing. The goal is to accelerate development and underwriting of C-PACE energy efficiency projects. The PAS service is now available to all C-PACE contractors requiring technical assistance and is provided at no cost for the first five projects developed.

(8) *What are you seeing on combining battery technology with Solar PV systems?*

There is no question that battery technology is advancing at a feverish state. However, today the technology is still not economically justifiable to include with Solar PV technology. The current cost for battery storage technology is typically in the $300-$500/kWh range.

Commercial lithium ion batteries today, for example, are in the upper end of this range. To make economic sense, experts believe energy storage using battery technology would have to come down below $200/kWh and preferably below $100 per kWh. Moreover, their lifetimes would need to be much greater than currently. For example, lithium ion batteries today typically have a lifetime less than 10 years. Such lifetimes would have to at least double for battery technology to be economically justifiable with Solar PV systems. Interestingly, flow batteries, which have significantly greater projected lifetimes than lithium ion batteries are in a commercial launch phase, but unfortunately have pricing in the $700-$800/kWh price range.

(9) *Why is it necessary to get Fire Marshal approval on roof-top Solar PV systems?*

Solar PV systems on roof-tops introduce firefighting safety concerns because they may interfere with being able to ventilate a roof adequately in the event of a fire and also cause trip/slip concerns. In addition, the solar systems may continue to operate during a fire presenting firefighters with a potential shock hazard. Fortunately, the solar industry and the firefighting community are working together to refine construction codes and standard operating procedures for firefighters to make roof-top Solar PV systems safer.

(10) *What ECMs do you now see most often combined with Solar PV systems to achieve an SIR > 1?*

The most often we see in C-PACE are lighting upgrades and boiler fuel switch conversions, i.e., converting from oil to natural gas, both of which have relatively short payback periods. Though lighting opportunities will reduce the facility's demand profile and may ultimately affect the recommended PV system size, the trade-off is such that the result will be an improved SIR that will ultimately improve the likelihood of a project going forward. Combinations such as solar with lighting today are becoming more and more necessary as utility tariffs shift more and more of the cost burden from the consumption side to the demand/delivery side.

(11) *Could you speak to the recently launched C-PACE Energy On the Line Program and the benefits for my manufacturing clients?*

This is an exciting new C-PACE program applicable to any manufacturer that has actual manufacturing facilities in the state and is an owner-occupier of these facilities. For any C-PACE project developed for the site, a grant is available equivalent to a 1% interest rate buy-down. For example, a $600,000 C-PACE project with a 15 year financing term at 5.5% would be eligible for a $38,365 grant. A $300,000 project with the same terms would be eligible for a $19,182 grant. Applications must be submitted by September 16, 2016 and will be awarded on a first-come, first-served basis. A total of $800,000 in funding has been made available for this program. Additional information may be obtained directly by contacting the Connecticut Green Bank.

(12) Can any demand reduction savings be included with Solar PV systems?

Not at this time. While theoretically Solar PV should result in a demand reduction, unfortunately it is too easy for weather variability in CT to interfere with solar energy production for the 30 minute interval period in any month where electricity demand would be determined for the entire month. For example, if an afternoon thunderstorm rolls through on the day when the building's energy use is the highest for the month (e.g., hottest summer day of the month), the output from the solar system can drop to nearly zero and the building's energy will have to be drawn entirely from the grid. If this sudden increase in demand from the utility lasts more than 30 minutes, this high point in demand will become the demand peak for the month. So all it takes is one ill-timed thunderstorm a month or snow storm in the winter or system outage for some other reason to ruin all potential demand charge savings.

Until such time as a representative Solar PV demand reduction database is available in CT, it is not possible at this time to give a Solar PV system credit for demand reduction.

It is worth noting, however, that the demand reduction situation may change once energy storage (battery) technology becomes financially viable and commercially attractive to incorporate into a Solar PV system

(13) Is a minimum number of years for M&V still a requirement for non-Solar projects?

There is no minimum number of years for M&V for non-solar projects. The contractor is only required to have an M&V plan.

(14) Does the LED lifecycle/hours apply for exterior site lights as well.

The LED lifecyle/hours referred to in the presentation was meant to illustrate that because of continued development and advancement of LED technology, this can render lifetime results obsolete even before lifetime testing is finished. That is why it is necessary to keep up with technology developments. The specific example I chose to show was for white LEDs and represented an L_{70} rating (the point at which light output has declined to 70% of the initial lumens). For high-power white LEDs, there are some manufacturers today that, depending on drive current, operating temperature, etc., claim an L_{70} EUL of 100,000 hours.

(15) Can you provide insight on the interest rates with C-PACE financing?

To date, interest rates have been in the 5-6% range, depending on term.