MAYORS' MEGAWATT CHALLENGE
Leadership by example

Solar PV Implementation Webinar - Q&A

What can you do when your solar panels start to degrade? Is it a full panel replacement or are there other solutions to continue to maximize the benefits of the panels? We don't see full replacements often, as the panels can typically be functional past 30-35 years. Continuing to use the panels and replacing on failure is more common than a full array replacement. I believe Rick may add if there are other solutions.

What are some of the new mounting systems that can overcome the challenge of a large building with very little roof weight load available? There are options other than typical ballast system such as mechanical fastened anchor. These anchors are commercially available and has long history in reliable performance. These anchors typically can eliminate the ballast and significantly reduce the system weight.

What is the efficiency range of solar panels? What is the typical efficiency of solar panels currently available on the market in Ontario, and what would be suitable for implementation on municipal buildings (their efficiency)? Highest panel efficiency is about 20~21%. The panel will be 450W to 500W depends on the size. These are readily available.

If you had the area, would it be more advisable for a ground mount system or several roof systems. What are the various pros and cons for each This would depend on the capacity, access, needs, etc., but typically if you have available roof area, and it can be used to provide for the facilities, it would minimize footprint and shading risk, and may pan out with the better NPV.

How does the design integrate a battery system? You will need to set the goal of the battery system. Is it for resiliency, demand response, or Class A peak demand factor curtailment? That should be included once preliminary solar PV system is designed.

What drives the 2X cost of the car port array compared to the roof array? Easier access and mounting seems like it should drive lower cost This would be best answered by an installer, but from my understanding, it's the significant material cost, and integration through/below the parking lot.

Positive NPV over how many years?! I think it depends on the years of cashflow! Our studies are for 30 years pathways, NPV is calculated over that same period.

Can we get a copy of Kajen's presentation? The recording will be available on our website.

Is it becoming more and more common to add battery storage to any solar PV system? From a climate / embodied carbon perspective does it make sense for communities with a more GHG-intense grid? That depends on the building and load profile, and account type. But in general, with GHG intense grid, solar PV could result in significant GHG reduction.

Make *more sense for communities with a GHG intense grid rather than clean grid? Yes, totally agree.

What types of facilities are more amenable to behind the meter DER compared to net metering? There are no differences in Load Displacement vs Net Metering in terms of connection. From what I have studied so far for load displacement vs net metering, there are no particular building types which are better. It all depends on the building operations, load profile etc., as well as the future work such as energy retrofits. In general, a Load displacement connection and utilizing the incentives would generate the best business case.

Curious to know about the financial options and funding/incentives/tax credits available for implementation? https://saveonenergy.ca/Retrofit

Has the City of Toronto conducted a comparative assessment for a net-metering system vs a zero export (load displacement) system, with and without factoring in the recent behind-the-meter incentive offered by IESO? Yes, this scenario is presented in the webinar. See the answer above.

In the sample business case slide does the "load displacement" simple payback reflect the available incentives/rebates to reduce capital costs for projects that aren't net-metered? From our discussions with Rick, the simple payback does include the current incentives.

Do you do the preliminary work - site selection, modelling internally? or do you also work with consultants for this piece? For the decarbonization projects, developing the high level models and site selection is internal (CCN). Many PV contractors do offer feasibility studies, using software such as Holioscope/PVSyst.

Has the City of Toronto installed a PV system on a pre-engineered roof over the ice pads in ice rinks? How are the mounting methods for them? We have multiple ice rinks installed with solar PV. Majority of them utilized ballast system. We do have some arenas with ETS system but those are in FIT program, but we have not had any ETS system since FIT 2.

What's the typical maintenance cost in terms of $/W? We use $17/kW dc annually in our financial case.

What are the major maintenance issues you encountered over the years? Who are the preventative maintenance vendors you have? From our discussion with Rick, and other municipalities, inverters failures and replacements have been the most significant maintenance issue, having established experienced vendors/contractors that have a long history in the market are likely good bets.

How much of the 10MW was incentivized? For the IESO load displacement incentive, it is capped at 1 MW worth of capacity.

Rick - awesome presentation! When comparing between load displacement versus net metering, do you consider resizing arrays to account for impact the electricity use profile of the building? I tried but I found out it is not necessary. In general, if you are within 10-15% excess, I would just go to max system size on the roof, connect as load displacement and take the save-on energy incentives.

Is solar tracking an option in these installations and what is its impact in performance and ROI? Solar tracking is not seen as often anymore, so we don't have any recent ROIs. From other

studies we've seen, the cost to performance has been excessive when done at local facility capacities (not grid level) and would not be feasible.

Curious about why the Load Displacement systems had shorter paybacks than Net-metering. What is driving the payback discrepancy? From our discussions with Rick, the current incentives are really attractive for the buildings where it is most applicable (not requiring net metering/benefiting from load shaving).

What has been the panelists' experience with replacing the inverters? Couple of our oldest inverters are still in good condition even after 14 years. In general, our inverter replacement follows the manufacturer warranty period of 12 years +/-2 years.

If we have applied to get an incentive from another partner to complete a feasibility PV study, will this interfere with the IESO incentive once its commissioned? This should not interfere with the IESO offered incentive.

Which costs are eligible for IESO incentive? Typically, it covers labour and material.

Any timelines on how long the IESO incentives is expected to last for projects planned in next few years? No deadline set at this point, we continue to monitor and assess, and in case of any changes we provide a sufficient market notice to react.

Can the Save on Energy program application be submitted and incentive claimed by a project developer on the property/building of a client since we would have ownership of the project? Typically, incentives are directed to the owner of the facility.

Is the design cost included in the system cost? Yes, design cost is included

How is the incentive money quantified, based on the final cost of the system from the final invoice? Yes, that is correct, the process in place will require submittal of costs elements to determine final incentive amount.

Is proximity to a supply substation or utility provider important for net metering? Will it affect the financial analysis and overall feasibility of the project? This would be better answered by the Utility/LDC, as they would better understand the advantages or limitations on their infrastructure with respect to a local PV install. There may be cases where bi-direction metering isn't possible regardless of proximity. This question is best answered by the relevant Utility where the Solar PV with net metered arrangement is connected to.

Our understanding is that for a 10 kW DC system costing $30,000 the project would be capped at $1,000/kW DC system size which is $10,000 SaveOneEnergy Incentive. A 100 kW AC solar system would be eligible for $860/kW AC SaveOneEnergy incentive which is $86,000 providing it does not exceed 50% pf the project eligible capex. I am unclear that kwh savings is a determining factor in the amount of incentive but could be mistaken. Your understanding is correct, the incentive is based on the $/KW for Micro or small/medium category, it is not based on the savings generated. The incentive is capped at 50% of project cost.

Our understanding for Load Displacement that there is zero kWh fed back permitted into the grid and in fact the system must have protections and controls to guarantee no flow back and the non-consumed kWh due to lack of local load is spoiled and not fed to the LDC grid. Load

Displacement systems require a thorough review of the 8760 facility load consumption to properly size the solar system for Load Displacement. From the IESO perspective, we are not mandating any controls to prevent exports. These requirements are addressed through the connection process with the LDC.

Any estimation for the average supply cost per kW of solar panel output, and for the typical installation cost? Supply cost/installation? Our experience shows that in a typical ballast system larger than 50kW usually lies around $2/W dc, that is given multiple projects bundled in a contract (larger than 500kW total) The smaller the system the higher the cost/W and vice versa.

Would the IESO ask for proof of Energy efficiency before proving incentives? Yes, Businesses must submit a Retrofit application through the Save on Energy website before entering into a binding commitment for their solar PV project to qualify for a Save on Energy incentive. Links to our Retrofit FAQs have been embedded for more information on when you can start you project and what a binding commitment is. Applicants that start their project or enter into a binding commitment before receiving pre-approval for their Retrofit application may receive a lower incentive amount than what they applied for or may not receive pre-approval.

It was stated that there's a 30% ITC for a taxable entity only and a 15% proposed Clean Economy Tax Credit that has not yet been passed. Is this correct? My understanding is that:

1- Clean Electricity ITC
    a. For non-tax paying corporations
    b. Not yet integrated into the Income Tax Act (could be integrated soon but no timelines to our knowledge)
    c. 15% refundable tax credit
2- Clean Technology ITC
    a. For tax paying corporations
    b. Integrated into the Income Tax Act as of June 2024
    c. 30% refundable tax credit

Load Displacement solar systems get the benefit of the Ontario SaveOnEnergy Incentive plus the Federal Government's Clean Energy ITC plus Accelerated Depreciation for the shortest ever payback periods. Is this correct? These appear to be the opportunities supporting solar PV systems that operate under load displacement that are available at this time, subject to the eligibility requirements for these tax credits. Online resources such as the Ontario website and Save on Energy website post new opportunities to adopt energy efficiency technologies that can be referred to in the future.

Are all of the city of Toronto systems owned by the city? Yes, almost all solar systems are owned by the City. Some early FIT projects are co-owned with Toronto Hydro.

Is it possible to bundle ITC and Save on Energy incentives for a Solar PV project? The Save on Energy Retrofit program does not prevent you from applying for an Investment Tax Credit (ITC), such that you may be eligible to receive a Save on Energy incentive and an ITC for a solar PV project, subject to any requirements there are to receive an ITC.

Does Toronto have any unique budget lines (install and revenue) set up for solar? Yes, we use a program to finance these projects which has a cost-avoidance component in it. In simple terms it is a line of credit to fund these renewable energy projects. Hence, the system size is flexible as long as the cost-avoidance can satisfy the financial requirement of the program. Our program required positive NPV within 20 years.

Are you looking at the benefits of adding batteries so that we have better use of renewables? We have facilities with batteries and continue evaluate the potentials of BESS in new buildings. There are different considerations other than cost in most cases, such as resiliency requirement, cost avoidance, etc. I am still learning in this area and happy to collaborate with other municipalities on this.

Do buildings need to be class A to achieve a positive NPV? No, that is not necessary. In reality, due to the billing method for Class A, facilities with Class A account have less desirable business case compared to Class B, and accounts under 50kW. However, we have noticed that the GA amount has been changing lately and the HOEP rate contribute to a higher portion of the bill. We are still investigating this.

What is the average supply cost per kW of solar panel output, and what is the typical installation cost? Additionally, what percentage of the total cost is typically attributed to equipment (supply) versus installation? See my response regarding pricing above. The equipment cost is usually about 30-40% of the total cost for an installation, the rest will be engineering, permit and labour.

How often do the panels need to be replaced (e.g. how many times over a 100 year building life expectancy) and is there a recycling program for them? The oldest panel we had only lasted 13 years. We have not had any replacement project yet, Currently most PV modules manufacturer provide a warranty of 25 years at 80% power production. We continue monitoring the degradation of the panels in our systems. We do not have a recycle program for the panel at this point. That is something we are investigating also.