

***First Steps Guide: Opportunities for Municipalities
to Lower Energy Costs by Investing in Solar.***¹

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Background

In principle municipalities (or related facilities such as water utilities or sewage treatment plants) can use solar energy to lower energy costs in two main ways: (1) large utility-scale projects that export electricity to the grid, using contracts allowing the municipality to buy some portion of it back, and (2) somewhat smaller projects in which the solar is generated “behind the meter” and consumed directly either entirely or in part by the municipality. Large utility-scale projects are a common form of investment in Maine, but are currently rarely used as a means for municipalities to generate electricity for their own use. In an earlier First-Step guide we explained why that electricity is focused more on export than self-consumption².

In this guide we focus mainly on strategies for municipalities to participate in solar programs designed mainly to provide them with lower cost electricity.³

Take two recent examples.

The Kennebec Sanitary Treatment District (KSTD) in Waterville is installing a 968.76-kilowatt solar array, which is expected to cover 84 percent of the facility's electricity needs each year. According to KSTD Superintendent Tim LeVasseur the project could generate long-term savings of up to \$2 million over 40 years.⁴

As a result of a town vote in August 2018 Tremont, Maine⁵ will be entering a six-year contract to supply solar power for municipal buildings like the town office and the public works garage. According to Town Manager Christopher Saunders the town, which currently pays between 17 and 18 cents per kilowatt hour, will be paying about 12.5 cents to buy solar-generated electricity under this contract.

¹ First-step guides are designed to help municipal decision-makers explore new or emerging energy options. Because costs and specific technologies change and one size does not fit all, these guides do not attempt to suggest specific choices, but rather help define the options, provide some basis for deciding whether further exploration is worthwhile and provides a series of further references to facilitate a deeper exploration. These guides are supplied by the Sustain Mid-Maine Coalition, a nonprofit group of volunteers, that aims to promote energy conservation and alternative energy use for Kennebec Valley area residents, businesses, and municipal operations, thereby reducing energy costs for taxpayers while also cutting harmful greenhouse gas emissions.

² First Steps guide to Utility-Scale Solar.

³ We are indebted to Holly Noyes of Revision Energy and Vaughan Woodruff of Insource Renewables for answering our questions about the municipal solar energy market and reviewing draft documents. This document has been significantly improved by their contributions.

⁴ <https://www.centralmaine.com/2018/12/11/solar-project-at-kennebec-sanitary-treatment-district-on-target-for-jan-1-launch/>

⁵ <https://www.foxbangor.com/news/item/28761-tremont-residents-vote-to-install-solar-panels>

The Economics of “Behind the Meter” Solar

Solar’s economic attractiveness is due to a combination of two things: (1) technical innovation has simultaneously lowered solar panel prices while increasing the panel efficiency and (2) public policies such as federal investment tax credits and a state net metering program, both of which lower the cost of electricity from solar. The investment tax credit lowers the after-tax cost of investing in panels, while net metering allows the acquisition of credits from the sale of “excess”⁶ electricity to the grid at favorable prices. These credits are applied against the supplier’s bill. All of these factors help solar generation to lower their electricity costs. Finally, unlike other fuels, the solar radiation that is converted into electricity by the panels is free and will remain free, while fossil fuels prices are expected to keep rising over time.

Municipalities can negotiate an immediate outright purchase of the panels, but that is not currently the most popular option. Although panels targeted at producing electricity for self-consumption are typically installed on municipal property, they typically are owned by private Maine companies - perhaps with a financial partner⁷. These companies then negotiate purchase power agreements (PPAs) with the municipalities to sell them the electricity produced by the solar panels at a stipulated price, usually with a provision offering the municipality the opportunity to buy the panels later, once the financial benefits from the tax credit have been used up.

In terms of overall energy cost savings the best time to purchase the solar array under a PPA is the earliest possible option to buy, in year six. Eventually, however, the inverters need to be replaced, usually around year 15, and this maintenance cost will be born by the owner. So some municipalities choose to delay purchase of the array, while others want to purchase the array early.

The preference for PPAs has been due primarily to the federal investment tax credit, which is of no use to municipalities (since they pay no federal tax), but can be used by any private investor who has a “tax appetite”. This tax savings for the investor allows them to offer lower purchase power agreement prices than would be the case without an investment tax credit. As the federal tax credit declines, the incentives for PPAs will diminish and the incentives for outright purchase will increase.

Municipalities who enter into solar agreements as described above frequently can lower their electricity costs. Further with PPAs they can do it even if they are reluctant to put up the up-front money to buy the panels.

Additional Considerations

⁶ In this case excess means electricity in excess of that which is needed by the municipality for its own consumption at that moment.

⁷ Some solar companies have chosen to own the panels without involving a financial partner, but the trend seems to be moving away from that choice.

A complicating factor in determining how large the savings could be from pursuing behind the meter solar is when the municipality also pays a demand charge. A demand charge is based upon the greatest amount of power drawn from the grid (measured in kilowatts (kw) during any 15-minute interval within a billing cycle). In our area CMP has several different billing categories based upon the amount of kw used. In general the larger the kW drawn during the peak interval, the higher the charge in that billing category will be. Some municipalities draw so few peak kW that their billing category does not involve a demand charge.

Why do utilities use demand charges? Since they are required to supply what is needed at all times for all customers, they are required by regulation to have enough capacity to serve all customers when the demand is at its peak. In order to meet this requirement they have to invest in some capacity that is excess most of the time, but is available, as required, when the demand is at its peak. Utilities finance this capacity with demand charges that allocate the costs among larger users depending upon their peak kW demand during that billing period.

Investing in “behind the meter” solar can reduce the demand charge as well as the cost of the electricity itself, but it may not. It depends on whether the panels generate electricity during the user’s peak demand period. Consuming electricity from the panels, not the grid, during this peak period will lower the recorded peak and, accordingly, the demand charge portion of the bill based upon that measurement. If the normal solar generation period does not coincide with the period involving the municipality’s peak demand, it will not affect the demand charge.

How important the demand charge is in the municipality’s bill potentially matters a lot. However high demand charges do not always prevent solar investments from lowering costs. For those towns with high demand charges, combining solar generation with energy efficiency and solar storage may make it easier to reduce bills.

Storage allows the municipality to take the generation whenever it occurs and store it to be used during the peak period. This switch in timing can reduce the demand charge because it reduces the size of the kW peak that the demand charge is based upon. In our area some solar projects are expected to not only lower the billing category the municipality faces (and hence the demand charge), but possibly even eliminate the demand charge completely by reducing their billing category to one that does not involve a demand charge at all.

Recognizing this opportunity some Maine projects are now including solar storage and data are being collected to pin down when complementing solar panels with solar storage can be a cost-effectively package. Other states such as Vermont are already offering incentives for making solar storage part of the package (due to its benefits in making the grid more stable). Rumor has it that Efficiency Maine may be rolling out solar storage incentives soon. Stay tuned!

Finally, complementing investments in solar panels with investments in energy efficiency (reducing waste) can also increase the savings⁸. Eliminating wasteful energy use produces two

⁸ Part of Buckport’s expected \$400,000 savings from their investments in energy efficiency and solar panels came from LED lighting installed before the solar panel project was sized.

different sources of savings: (1) energy no longer used obviously costs nothing and (2) the size of the solar installation can involve fewer panels, since less electricity is needed. In the quest for lower costs, these complementary opportunities are worth keeping in mind.

Next Steps

Because each municipality faces different circumstances, one size does not fit all. The site matters, for example. Is roof space adequate and appropriately situated to host the panels? Or are other possible sites such as closed landfills or transfer stations available? Additionally, as noted above, how important are demand changes for this municipality?

The best way for a municipality to determine the right package would be to have one or more solar companies look at their specific circumstances and craft a package specifically for them. Sometimes this is accomplished by putting out RFPs (Requests for Proposals). Other municipalities⁹ have chosen to hire a contractor to guide them through how their specific situation affects their opportunities or simply chosen to work with one company. Whatever path is chosen, involving companies with experience in the area can help the town determine its optimal project size and the potential effect of that specific investment on the town's electricity bill.

To a certain extent timing matters because both the financial benefits from the federal investment tax credit and the state net energy credit program are currently scheduled to decline over time. While these declines lower the economic incentives to invest to over time, the fact that solar prices have declined a lot and are expected to continue to decline in the future tends to offset this advantage. Additionally the 2019 Maine Legislature is likely to initiate legislative changes to the state solar program programs that could improve their financial benefits. This could include a move to time-of-use pricing as an alternative to demand charges.¹⁰ Only time will tell where all this will end up.

Additional Resources

Resource Persons

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⁹ Bangor took this approach. See <https://bangordailynews.com/2018/11/05/news/bangor/bangor-oks-8600-study-to-look-into-solar-power-on-city-property/>

¹⁰ See A REVIEW OF ALTERNATIVE RATE DESIGNS INDUSTRY EXPERIENCE WITH TIME-BASED AND DEMAND CHARGE RATES FOR MASS-MARKET CUSTOMERS available on the web at: <https://rmi.org/wp-content/uploads/2017/04/A-Review-of-Alternative-Rate-Designs-2016.pdf>

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Maine Solar Companies

Revision Energy (Liberty Maine)

<https://www.revisionenergy.com>

Insource Renewables (Pittsfield, Maine)

<https://www.insourcerenewables.com>

Sundog Solar (Searsport, Maine)

<http://sundog.solar>

Articles

“Bucksport’s new solar array could save the town \$400,000”

<https://bangordailynews.com/2018/09/22/news/hancock/bucksports-latest-energy-saver-a-solar-array-comes-online/>