

Implementing Solar for Your Town or School District

Energy Committees around Vermont have been doing some amazing work to help reduce their town's energy use. Doing this has saved money for their towns, schools and neighbors and is helping to mitigate their impact on climate change. There are many good ideas that are being implemented that some communities may not be aware of or know how to do in their town. It is in the spirit of trying to spread these good ideas that the South Burlington Energy Committee provides this outline of how you might implement solar for your town or school district.

The city of South Burlington is in the process of developing a large solar array (1.8Mw) on our former landfill that will meet a substantial percentage of the city's and the school district's electrical demand while saving about 10% on the power produced by that array. This brief paper is based upon our experiences and what we have learned and is intended show you one approach as to how you might begin your own project to develop a solar array on town or school property. There are other options for developing solar on land not owned by a town or school district that will be explored in another paper.

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Introduction:

The costs to develop solar arrays have been steadily dropping and are now at a point where it makes sense for every town and school district to consider developing a solar array that will save money and lessen their impact on climate change. Moreover, options are now widely available that allow a town or school district to develop a solar array with no investment or operating costs.

In most instances your community will need to work with a developer who will build and own the array on your town or school's land. This is generally the most financially viable method because only "taxable entities" (usually businesses that pay taxes) can take advantage of the 30% federal tax credits that are in place to stimulate construction of renewable energy projects (in effect until the end of 2016).

The developer will design the solar array, get permits, arrange financing, manage construction, manage the solar array over its expected lifetime (20 – 25 years) and be responsible for decommissioning at the end of its life. The city or town will generally have little or no upfront costs (usually legal fees to help develop a contract) no operating costs and the only staff time required will be to work with the developer to plan the project and to work with the developer and attorney representing the town to finalize the contract with the developer.

There is some urgency to begin your efforts soon. It takes time to develop a project of this type and there are several factors that will change over time and will potentially make these projects less financially favorable:

- Federal subsidies that make these projects more financially viable are due to expire at the end of 2016 (see Solar Investment Tax Credit – www.seia.org/policy/finance-tax/solar-investment-tax-credit)
- Vermont's latest updates to our net metering legislation will gradually, over time, reduce the solar adder that utilities are required to pay for net-metered renewable energy
- That recent update also allowed for larger net-metered solar installations for cities and town if the arrays are sited on former landfills (up to 5Mw). This will allow larger towns and cities to offset more of their electrical usage and utilize the efficiencies of scale that larger arrays afford (see H.702 No.99 – www.leg.state.vt.us/docs/2014/Acts/ACT099.pdf)
- The sooner these arrays can come on line the less CO₂ will enter the atmosphere and thus the future impact of climate change will be reduced

Although developing a solar array can be an involved process it can be both financially beneficial and good for the environment.

Solar arrays are often built on what is known as "greenfields" – land that can be used for any purpose. Where possible we should be developing them first on "brownfields" – land that can be used for little else. These brownfields are often lands that maybe contaminated or were used as a former landfills.

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There is a significant amount of expertise among solar developers for developing ground mounted solar arrays in Vermont and there is growing expertise in developing solar arrays on “brownfields” including former closed landfills.

Preparations:

If you don't already know the key stakeholders in your town: town manager, select board or council members, public works director, etc. (or Superintendent, School Board, Facilities Manager for your school district) begin building relationships with them. Begin attending town/city meetings or meet individually with them to talk about energy issues.

To be able to explain how solar works and develop a proposal for a solar array for your town you should begin researching how net-metered solar works and what the benefits can be for your town. One of our first suggestions after you finish reading this paper is to talk to solar developers for advice. Renewable Energy Vermont (www.revermont.org) is an organization that is working to expand the use of renewable energy in Vermont. Their website offers some introductory information and they also have a list of solar installers/developers.

VECAN (the Vermont Energy & Climate Action Network) also has a number of important “How To” resources and contacts with other energy committees around the state to help communities reach their energy efficiency and renewable energy goals <http://www.vecan.net/going-solar-in-vermont/>.

A solar developer can give you a broad overview of what is involved in developing a solar array and help you understand the benefits of solar. Topics you should investigate with their help or on your own:

- How to use Net-metered Solar Power to reduce your electric bill through a Power Purchase Agreement
- How a solar array will feed renewable energy into the grid to help reduce CO₂
- Financing methods that will require very little upfront effort and costs (largely to seek bids and to negotiate a contract), and no operating costs
- Confirming if the site(s) you have identified are truly viable for a solar array

Inventory your Town or School District's Potential Solar Sites:

The first step is to decide if you will be developing a proposal for just the town, the school district or one project that could serve both. Having decided that, you can begin to look for land for a solar array. Sometimes doing a project for school and town together will add a little complexity since the financial affairs of the two need to be managed somewhat independently. We found for our project that we had a large city owned site that we could develop to meet a large portion of the city's needs and through an arrangement with the developer we share a percentage of the array's output with our school district.

Having determined who the project will be for then we suggest the following steps:

1. Inventory town (and/or school) owned open land that is relatively level and shade free. The larger the parcel the more economically viable the project will be due to economies of scale.

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2. Focus on land that has little other good use or will not be needed for expansion of existing facilities. Landfills or other land not developable for other use due to environmental issues ("brownfields") should be a major focus before any "greenfields" are considered.
3. Your array will need to tie into your utility's electric distribution system and larger arrays (above 50-100kw) will require a connection to a 3 phase power line. Your public works director may be able to help you determine if a power line like this is close to the parcels you have identified. Your power company will be able to help with this too. If you are served by Green Mountain Power check their website www.greenmountainpower.com/innovative/solar_capital/3-phase-service-vermont/ to see if a 3 phase line runs close to your sites.
4. You will also need to avoid flood plains and designated wetland areas. For an initial look at these check the Agency of Natural Resources website www.anr.state.vt.us/site/html/maps.htm.
5. Select the sites that seem best suited and estimate the amount of land available in each parcel

Begin to Enlist Community Stakeholder Support:

If your community does have one or more potential sites that could work for a solar array you will need to enlist the support of your key stakeholders before you spend too much time fleshing out a detailed proposal. There may be other views on what these potential solar sites might be used for so it is best to get an agreement on this right up front.

Meet with your town or city manager, select board or council members (and/or stakeholders from the school district such as the superintendent, the finance director and the school board) to discuss the potential for a project and the benefits to community. Explain how other communities are taking this path like South Burlington, Rutland and Waterbury/Duxbury to name a few, and outline how a solar array sited on one of the municipal or school parcels previously identified could benefit them. See Attachment A for a list of communities that we are aware of.

This may take a little time as many of these folks are very busy and some may at first be a little skeptical. Share your thoughts and listen to theirs and try to find ways that this effort fits within their goals. Nearly everyone will respond to the idea of reducing expenses and many will also be interested in the benefits to the climate.

Begin to Develop a Proposal:

To develop a detailed proposal you need to answer a few questions first: how big of an array your community / school district could use and will one or more of the previously identified sites meet those needs?

Estimate the Size of the Array Needed:

Power generated by the solar array will produce a credit on your power bill of \$.19/kwh generated for arrays commissioned in 2015 or 2016 (it will be lower in later years). You will need to estimate the maximum size of an array to offset your expected annual power bill. Here are the suggested steps to do

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this. By the way, this would be an excellent point to ask a developer to help you through the math once you get past step 1 and 2.

1. Call your town's (and /or school's) power company to get your last year's annual electrical cost. You will need account numbers (and possibly meter numbers) – see the person responsible for paying your town and/or your school districts bills for account information. Total all up the annual cost for all accounts, keeping town and school district totals separate. Note that the bills for non-metered streetlights (paid for by a monthly tariff from the power company) generally can't be offset through net-metering. Don't include those amounts in the total.
2. Since there is a great need for everyone to become more efficient to meet Vermont's Energy Goals, and to help ward off climate change you should deduct some from the total cost for expected reductions due to conservation and efficiencies (20% might be a good starting point)
3. You will not need to generate 100% of the kwh remaining because you will receive a higher credit on your power bill for solar energy produced than you pay per kwh used. A quick way to estimate how many kwh your array will need to produce is to divide the remaining energy cost (after your efficiency deduction) by .19/kwh. Note: If you produce more credits than are needed to offset your bill your power company is not required to refund the extra to the account holder. It is important to get this math right so you don't have an array that is larger than you need.
 - a. An example: if your town's annual electric bill is \$100,000. Future conservation and energy efficiency projects could reduce your bill by 20% to \$80,000/year. Dividing that by the expected net metering credit of \$.19/kwh to get an estimated array size of about 420,000 kwh or .42 MWh per year from your solar array to maximize the value from net metering.

Estimate How Much Solar Power

You Can Generate:

With current solar technology (as of late 2014) you can generate from .25MWh to .30MWh of electricity per acre of clear land available with a fixed mounted array. For example, if you have 2 acres your town could produce .5 to .6MWh per year

- If you have bills that are higher than your proposed array can offset with net-metered credits – try to find additional sites to increase the amount of solar power you can generate. If there is no more land available, proceed with developing the land that you have and consider adding rooftop solar later if you have clear south facing roofs.
- If you can generate more than your town (or school) needs consider sharing with your school district (or municipality) through Group Net Metering if they are not already partners. You could also consider sharing with another municipality.

Estimate the Potential Savings:

As mentioned above, the town or school district will receive a net meter credit on their bill for the power generated by the solar array. That credit is the rate that your utility charges for residential power plus what is known as the solar adder. The solar adder is an extra payment per kwh to stimulate the

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installation of solar. Currently, the total credit is \$.19/kwh for the first year your array is producing power. This credit will rise in lockstep with the residential rate for the following 9 years after which the credit will equal your utility's residential rate for the remaining time.

If you follow the model we are using, it is very likely you will be working with a developer who will build and own the array on your town or school's land. A contract will be developed outlining the developer's responsibilities and it will specify the discounted rate that the town and / or school district will pay for the power the solar array generates. It is very important to note that generally the rate that your town will pay (as specified in the contract) will not increase even though your utility will probably raise their rate. Also, remember that the town and/or school district will receive a higher net-metered credit on their power bill (based on the residential rate) so the savings will typically grow from year to year.

There are a lot of factors that go into estimating how much money your town (or school) can save through the difference in the net meter credits received and the discounted rate you pay the developer.

- Larger arrays cost less to build per kwh produced due to economies of scale.
- Some installations are more expensive to build – for example an array on a landfill must be built using foundations on the ground's surface (often called a ballasted installation) which is more expensive than on a green field where posts can simply be driven into the ground and the array is built attaching by to those posts.
- Difficulty and expense of connecting to the power company's distribution network can vary

Given those and other factors you might expect to save between \$.01/kwh for a small solar installation to \$.02/kwh for a large installation. Using the example above where your town needs 420,000 kwh to offset its power then you might save as a minimum \$4,200 in the first year. The annual savings will likely increase over the course of the 20 year contract period as the net-meter credit increases with the underlying increases in your utility's residential rate. This could result in savings well over \$100,000 over 20 years.

We hesitate to make this even more confusing, but many developers can insert a provision in the contract that will allow the town to buy the array after a specified time period. Depending on your town's cost to borrow money this could make the saving greater but it would also mean the town would be responsible for maintenance and operation.

Develop a Final Proposal:

Develop a proposal considering all of the steps above that includes the your suggested location(s) for the array, your analysis of the town and /or school district's electric bill, the potential for efficiency and the remaining cost that could be offset by a solar array, your estimate of the size of the array needed and the potential benefits (\$ saved and reduction in impact to the climate).

If you have a solar developer who has been helping you it would wise to review this proposal with them at this time to get a sanity check.

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Present the results of your analysis to your stakeholders and get approval to develop a Request for Proposal (RFP) to send out to developers.

Select a Solar Developer:

Work with your town and/or school staff to develop an RFP requesting bids for the development and operation of a solar array that will meet your needs on the site(s) you recommend. Submit to developers with experience building solar arrays on the type of land you have, particularly if the recommended sites are brownfields or landfills. In any case, you want to specify that the developers outline the experience they have had in those types of situations in their proposals.

When received, carefully review proposals from developers with stakeholders and select a solar developer (experience must be a key factor in your considerations). There may be instances where some interaction with developers will be necessary to ensure they all understand what you are trying to accomplish.

After selecting a developer with the best proposal and credentials, your city/town manager negotiates and signs a contract that will include each party's responsibilities, the financial terms and timeline for implementation among other considerations. It will be wise to seek out legal council who has experience in developing these types of contracts.

Please contact Ilona Blanchard (iblanchard@sburl.com), South Burlington Project Director if you would like a copy of the contract that we have with our developer.

Monitor Implementation:

There may be some additional involvement on the part of your town or school district staff through the implementation process to monitor progress but it is largely the responsibility of the developer to manage the following steps:

- Final design
- Permitting
- Construction
- Commissioning

Summary:

No brief paper can cover all of the detail involved in organizing a project such as this but we hope it will give you an initial roadmap that you can use to help your town or school district save money by going solar.

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We expect that South Burlington's solar array will provide a significant financial benefit to our city and school district over the 20 year contract period. In addition, it will be feeding clean carbon free electricity into the electric grid.

We have other resources that you might find helpful in selling your project: a FAQ document and a PowerPoint presentation that we used to explain the proposal to our school board - you can tailor either to your specific projects. If there are any questions, the members of the South Burlington Energy Committee are very willing to help. Contacts are:

Don Cummings d.r.cummings@att.net

Linda McGinnis lindamcginnis0@gmail.com

Our last words of advice:

Don't delay! It always takes longer than you think and the financials will probably never be better than they are now – start your solar project today!

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Appendix A: List of Schools and Municipalities with Solar Projects (as of mid-2014)

<u>School</u>	<u>Savings/Year</u>
<p>✓ Burlington School District (229kw) 2012 <i>(largest roof-mounted school solar in VT)</i> On-site. Encore Redevelopment/GroSolar – BHS, C.P. Smith Elementary Later added a 150kW roof array on JJ Flynn Elementary http://vtdigger.org/2012/05/11/solar-arrays-on-schools-give-burlington-clean-energy-revenue/</p>	\$ 5,000/year
<p>✓ Duxbury Crossett Brook MS – Dec 2013 (157kw) <i>(largest ground mounted on-site school solar in VT)</i> On-site. Green Lantern Capital/Suncommon, 480-panel array http://www.wptz.com/news/vermont-new-york/burlington/vts-largest-school-solar-array-coming-online/23457330</p>	\$ 6,000/year
<p>✓ Middlebury College (500kW) <i>(first 500kW group net metered solar project commissioned in Vt)</i> Off-site. Encore Redevelopment (750,000 kWh/year) http://encoreredevelopment.com/project-status/completed-projects/</p>	\$ 40,000/year
<p>Jan 2012 (143kw) All Earth Renewables 34 solar trackers; 200,000 kwh/year, 1.5 acres http://www.middlebury.edu/sustainability/news-events/news/2012/NL12/node/423400</p>	\$ 5-10,000/year
<p>✓ Essex School District (158kw) Encore Redevelopment</p>	in progress
<p>✓ Brattleboro School District – March 2013 (500kw) Soveren Solar Net Metering Credit Purchase Agreement Off-site (Westminster, VT). Metering credits applied to school electricity bill, savings of 10% on electricity. http://www.reformer.com/localnews/ci_22896855/solar-power-shines-brattleboro-schools</p>	\$13,000/year
<p>✓ Rock Point School – Jan 2012 (147kW) All Earth Renewables 35 Solar Trackers = 60-75% electricity use on property On-site. Will purchase after 5 years. Curriculum tie-in http://www.allearthrenewables.com/news/press-releases/Largest-Solar-Installation-in-Burlington-Now-Operating/</p>	
<p>✓ Richmond Camel’s Hump Middle School – Nov 2011 Roof mounted solar panels (507 total) = 25% of schools annual electricity Owned by the school. DOE funding (\$250,000) + GMP Solar Schools (\$20,000) http://chms.k12.vt.us/modules/cms/pages.phtml?pageid=252684</p>	\$25,000/yr
<u>Municipalities</u>	
✓ City of Vergennes (158kw)	\$ 4-5,000/year
✓ Town of Randolph (158kw)	\$ 4-5,000/year
✓ Town of Bennington (500kw)	in progress (\$500k over 20 yrs)
✓ Town of Waterbury (500kw)	in progress