Solar Electricity For Community Buildings Pilot Program

Workbook

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What is the Solar Electricity for Community Buildings Pilot Program?

Nova Scotia is continuing on a path toward a cleaner energy future, and you can help. The Solar for Community Buildings Program enables your community group or organization to participate in greening Nova Scotia's energy mix by generating solar PV electricity on your roof or property and selling it to your electric utility.

What is solar PV?

Solar photovoltaic (PV) panels convert the sun's light (photons) directly into electricity (voltage and current). They work best in full sun but will also produce electricity on cloudy days, too.

Each panel generates a fixed amount of energy per hour of sun; the more panels you have, the more electricity the system generates.

Solar PV panels are different from other solar energy technologies. In solar hot water or solar air heating systems, the water or air is heated by the sun for use in the home or business where the system is installed. In a solar PV system, the electricity generated can be used both on site or sold to your electric utility.

The amount of electricity produced by a solar array (a collection of panels) varies depending on many different factors, such as the mounting angle of the panels and the amount of shade they receive. Under ideal conditions a well-sited solar array produces approximately 1,100 kilowatt-hours (kWh) every year for each Kilowatt (kW) of panels.

How does the program work?

Under this program, you sell the electricity you generate to your electric utility in units of kilowatt hours (kWh). You determine your selling price by completing this workbook.

The price you set should be high enough to cover your investment, but also low enough to be competitive against other applicants. This is a competitive process—applicants with lower prices have a better chance of being chosen for the program.

How do I apply?

You work with the solar supplier of your choice to research, prepare, and submit an application for the program.

Your application must include

- your total project costs to buy and install the photovoltaic (PV) solar panels—it is your responsibility to finance the cost of equipment and installation

- an estimate of how much electricity you will produce each year in kilowatt hours (kWh)
- the price you propose to sell this electricity back to the utility, in cents per kWh; this should be high enough to cover all your costs, but low enough to be competitive against other applicants

An independent procurement administrator reviews your application. If it is approved, you will sell solar electricity to the utility under a 20-year contract called a power purchase agreement (PPA). You can find a copy of the PPA on the program website at **novascotia.ca/solar**.

The maximum size of your solar installation is 75 kilowatts (kW). There is no minimum size.

About the Solar for Community Buildings Program

This is a pilot program run by the Nova Scotia Department of Energy. The program's goals are to support community participation in renewable energy generation and to learn more about how solar electricity can help Nova Scotia in it's clean energy transition.

The program is separate from other solar energy programs, such as Nova Scotia Power Inc.'s Enhanced Net Metering program or any program offered by your municipality.

Are you Interested?

Could your group be part of the Solar for Community Buildings Program? This workbook helps you determine if you are eligible and leads you through the steps to prepare a for your application.

How to use this workbook

First, determine if you are eligible for the Solar for Community Buildings Program. You do that by answering the questions in **Section 1**. If any of your answers indicate that you are not eligible, stop. These are not negotiable.

Next, complete this workbook. It leads you through the process of preparing your application. Include your group or organization's accountant or chief financial advisor when completing this workbook.

The application you create during this process should accurately reflect your costs and your ability to handle the financing you need to be part of this program. There is no opportunity to revise your costs after your project has been selected. Once you have gathered all the information in the workbook, you are ready to complete your final application. Find the application online at **novascotia.ca/solar**.

Section 1

Are you eligible for the Solar for Community Buildings Program?

Answer the following question to find out. If any of your answers indicate that you are not eligible, stop. Do not complete the application.

1. Are you a private business?

   - ☐ **Yes**. You are NOT eligible for the program.
   - ☐ **No**. Continue with the questions below.

2. Does your community group or organization fit within one of the following descriptions? Select one:

   - ☐ Mi'kmaq band in Nova Scotia or an organization owned by a Mi'kmaq band
   - ☐ Registered non-profit or charitable organization
   - ☐ Municipality or an organization wholly owned by a municipality
   - ☐ University or community college
   - ☐ None of the above. Do not continue with the application.

3. Are you interested in installing solar PV panels on your building or property to generate electricity under a 20-year power purchase agreement?

   - ☐ **Yes**. Continue with the questions below.
   - ☐ **No**. Do not continue with the application.

4. Are you in a position to finance this project?
   The cost of buying and installing solar PV equipment for this project can range from $20,000 to over $200,000 and there may be other costs as well. You can finance your project through any combination of your own funds, loans, grants or fundraising and use the revenue generated by your solar system to repay loans. For more information on financing, see Section 3.

   - ☐ **Yes**. Continue with the questions below.
   - ☐ **No**. Do not continue with the application.

5. Do you own the building in which you operate and intend to remain there for at least 20 years?

   - ☐ **Yes**. Continue with the questions below.
   - ☐ **No**, we rent or lease the building.

   If you rent or lease the building, do you have written permission from the building's owner confirming that they are aware of the size, timing, funding model, and construction impacts of the project? This permission should be a legal agreement that defines what will happen to the solar panels and the electricity they generate if your organization moves to new premises. Attach this permission to your application.

   - ☐ **Yes**. Continue with the questions below.
   - ☐ **No**. Do not continue with the application until you have permission from the building owner.

6. Is your building a registered heritage property?

   - ☐ **Yes**, but we have a permit from our municipality to install a solar energy project. Continue with the questions below.
   - ☐ Yes, and we have NOT received a permit to install a solar energy project. You may continue, but be aware that there is a risk you may be denied a permit.
   - ☐ **No**. Continue with the questions below.

7. Do you have existing electrical service to the property from the grid where you plan to install the panels? Or, if the building is under construction, will it have electrical service from the grid upon completion?

   - ☐ **Yes**. Continue with the questions below.
   - ☐ **No**. Sorry, your building or property does not qualify for the program. Do not continue with this application.

8. Does your building or the immediate surrounding area (within 100 m) have room for a collection of solar PV panels? Note: you must not clear forested or agricultural land to make space for the panels. Find out more about space requirements in Section 2: Where to put your panels.

   - ☐ **Yes**. Continue with the question below.
   - ☐ **No**. Sorry, your building or site is NOT suitable for the program. Do not continue with the application.

9. Does your building or site receive full, unshaded sunshine each day? Note: you must not clear forested land to eliminate shade. Find out more about sun requirements in Section 2: Sunshine.

   - ☐ **Yes**. Continue with the question below.
   - ☐ **No**. You are still eligible, but may be considered a poor site, which will affect the success of your application. Continue with the questions below.

10. Do you have other solar projects?

- ☐ **Yes**. You can still apply for the Solar for Community Buildings Program even if you have solar projects on your property through other programs such as Enhanced Net Metering, HRM Solar City, or Renewable to Retail. Continue with the question below.
- ☐ **No**. Continue with the question below.

11. Do you understand that your application may not be chosen?
All applications will be reviewed, but only those with the most competitive price per kWh will be accepted. Learn more about competitive pricing in Section 4.

- ☐ **Yes**, we can live with that uncertainly. Continue with the application.
- ☐ **No**, too much effort to face that disappointment. Do not continue with the application.

Congratulations. Your answers indicate that you are eligible for the Solar for Community Buildings Program. Continue with this workbook to prepare your application.

Section 2
How much electricity can you generate?

The amount of electricity you will be able to generate	=	The number of panels you can physically accommodate on your building or site	X	The amount of sun your panels receive (orientation and shading)

To install the largest allowable solar array under this program (75 kW), you need unshaded space with room for up to 300 solar PV panels, each measuring 100 cm by 165 cm (sizes vary) and producing 250 W. The installed cost of an array is typically between $2,000 and $5,000 per kW.

A collection of connected solar panels is called an array.

You do not have to install the maximum. Even if you plan on installing only one solar panel, you can still apply to this program. However, larger projects typically have lower costs per unit of energy sold (kWh) as a result of economies of scale; that makes their bids more competitive and means they have a better chance of being selected for this program.

Work with a solar equipment supplier to find out what your site's orientation is, how many panels you can accommodate, what technology is most appropriate for your site, how much the equipment will cost, and how much electricity you can generate.

Find a solar equipment supplier

Your solar supplier plays an important role throughout your application process and beyond, so choose carefully. Talk to a few to find the one that best suits your needs. Find a list of Atlantic Canadian solar contractors on the Solar Nova Scotia website at: **http://www.solarns.ca**.

Ask these questions before you agree to work with a solar supplier:

What is your previous solar installation experience?
The many solar supplier companies available have varying levels of experience. Ask potential contractors about their experience before you choose one for your project.

If you hire one that is short on experience, but with whom you have a good relationship, make sure they have a solid warranty. You should also establish clear, written agreements with them in case any issues come up.

Do you have insurance?

Make sure your solar supplier—and therefore, you—is protected in case of harm, injury, or damage to your property or a neighbour's during the installation of your solar panels. A typical standard is $2 million. Do not assume that your building insurance policy will cover this; you could be liable so check that your supplier has coverage.

What does your warranty cover?

Ask if your supplier has a warranty included in their price and if it covers

- their work for up to 2 years
- the solar panel output for at least 20 years
- the inverter for 5 to 10 years
- all aspects of removing, shipping, repairing and/or reinstalling components (some warranties cover only the material cost of the component)
- repair of the various parts the system (if their warranty does not cover this, ask if the manufacturer or the dealer has a warranty that does)

Also, be sure to ask if there are any safeguards to deal with a dealer or manufacturer that goes of business during the warranty period.

What are your references?

Ask for references from installations three or more years old so you know about the quality of this supplier's work. Ask if any issues arose over the long term and how they were resolved.

Do you offer a maintenance and servicing agreement?

This helps validate your warranty. It includes things like regular cleaning, periodic checking and tightening of panel fasteners, check-ups for possible unforeseen issues, and replacement parts. Inverters typically need to be replaced at least once during the life of your project. If your installer doesn't offer this, or you decide you don't want to purchase it, you will need to estimate the costs of maintenance and cleaning yourself.

For your own records

Name of your solar supplier: _____

What does their warranty cover?

Do they have insurance?

- ☐ **Yes**.
- ☐ **No**, we are prepared to cover liability for harm, injury, or damage under our insurance.

For your application

What is the annual cost for a maintenance and servicing agreement? (Estimate this cost if necessary.)

$_____

Where to put your panels

You and your solar supplier work together to decide the best site for your solar panels and how many you can accommodate.

The location you choose needs

- space on a structurally sound roof, or on grounds near your building
- full sun access every day—some shade is not a problem
- pre-existing electrical service from the grid

Your roof and grounds

You can install solar PV panels on the roof of your building or on the surrounding grounds, such as over a parking lot or in the landscaped part of the yard. You must NOT clear forested or agricultural land to make space for the panels or to eliminate shade.

Panels can be installed on pitched or flat roofs—special racks will tilt them to the right angle if your roof is flat.

If your roof is flat, the panels will be mounted on racks that may be bolted to the roof, or held down by weights that keep the panels from blowing away. The added weight can be a problem, but bolting the panels to the roof can also create problems when the wind blows on the panels. A structural engineer can tell you whether your roof can support the solar panels.

Sunshine

Solar panels work best when they are south facing with little or no shading from other buildings and trees. A small amount of shading, especially in the winter, will not have a significant impact on how much electricity you generate.

Your solar supplier will provide you with a site assessment that tells you how much sunshine and shading your site receives. The assessment should include as estimate of the annual electricity production from the proposed solar array.

Ask your solar installer to point out where any of the information required for your application is written in the site assessment, if it is not clear to you.

For your application

You will attach your supplier's solar site assessment electronically to your application.

Panel tilt (degrees from flat; if you have multiple groups at different angles, give the predominant or the average tilt): _____

Panel azimuth (degrees; compass direction of panels, clockwise from North, where due south is 180): _____

Maximum output your system is rated to produce. (This is most often the rating of your inverter, or sum of inverter ratings.) _____ kW

What is your planned annual energy production in kWh? (Usually between 1,000 and 1,400 kWh per kW of capacity.) _____

Installation costs

Your solar supplier needs to install the solar panels and wire them to one or more inverters to complete your solar array. The cost of inverter(s), wiring, mounting hardware, and labour are required for your application. Ask your solar supplier to break these prices out in the estimate they give you.

There could be additional costs from your supplier that do not fit into the categories listed in the application. These costs are administrative or overhead and are part of the total price.

For your application

Cost of panels: $_____

Cost of inverter (s): $_____

Cost of the hardware including mounting system, wires, meters, and related electronics: $_____
(Add this to line 8 in Section 5)

Cost of direct labour for the installation: $_____

Administrative or overhead costs not captured elsewhere: $_____ *(Add this to line 12a in section 5)*

Other considerations

Replacing your roof

If your roof has recently been replaced, contact your roofers to ensure that your roof warranty is not affected by your solar installation.

Solar panels last at least 25 years, which means you may need to replace your roof during that time. Get an estimate from your solar supplier for the cost of removing and re-installing the solar panels once for roofing replacement.

> Longer-lasting roofing materials, such as metal roofs, are ideal for solar panels because they last as long or longer than the solar panels.

For your records

Cost of removing and reinstalling the panels:
$_____

Property insurance

Talk with your insurance company about adding the solar array as an upgrade to the insurance on your community building. If this increases the cost of your insurance, add the amount to the ongoing costs of your project.

For your application

Will having solar panels affect the cost of insurance you have on the building?

- ☐ **Yes**. Amount of increase: $_____
- ☐ **No**.

Interconnection

If your application is chosen for this program, you must obtain permission for an interconnection with your utility to sell energy from your solar array. Your utility has requirements around the type of equipment that is allowed to connect to the grid and how it must be configured. You must apply for the appropriate interconnection and your equipment must meet these requirements before your utility will allow your solar installation to sell electricity. There is no cost in getting the interconnection approval, and this is not required for your application, but there could be costly changes to your plans if you don't ensure you can meet the requirements before applying.

Electrical Service

Your building's existing electrical service is tied to your electricity use, if the amount of solar energy you intend to produce exceeds the capacity of your electrical service you may need to upgrade your electrical service to proceed.

Talk to an electrician or an electrical engineer to determine if your existing service can handle the amount of electricity you plan to generate. If it will not, you can pay to upgrade your service, or install fewer panels so you will not exceed your existing capacity.

Upgrading increases the cost of your project and may, as a result, increase the selling price you need to bid for the electricity you generate. Projects that fit within an existing service capacity have a cost advantage.

For your application

Cost of upgrading your service to receive interconnection, if any:
$_____

Municipal by-laws

If your application is chosen for this program, you will need a building renovation permit to add a solar array to your community building.

Solar panels might not be permitted for a registered heritage property. Check before you send in your application to see if you can get a permit to install.

Some municipalities have a permitting process just for solar energy projects.

Contact the Planning Services or Building Permits staff at your municipality to get your permit, or ask your solar supplier if they will get the permit.

For your application

Total cost of all permits to install a solar project on your property: $_____

Electrical Inspections

To install a solar system, you will require an electrical permit and inspections by your utility. Only a Nova Scotia certified construction electrician can obtain electrical permits. Electrical drawings of the planned solar installation may be required by the utility as part of the request for a permit.

Your project must meet specific requirements in the Canadian Electrical Code before you can sell electricity, and these requirements are verified by an electrical inspector from your utility. An inspector will need to visit your site before it can begin operating. You and your installer are responsible for making any changes required as a result of these inspections to your solar installation before it can begin operating.

Work with a knowledgeable construction electrician early in the design process to minimize the risk of delays and added costs and to ensure you meet the requirements. Ask your solar supplier to recommend a qualified construction electrician.

Include the cost of the inspection(s) in your application. A qualified electrician can help you estimate that cost, or you can contact your utility to estimate it yourself.

For your application

Total cost of all electrical permits and inspections to install a solar project on your property:
$_____

Other costs

Taxes
The total cost of sales taxes for all elements of your proposal.
$_____

If there are costs associated with any of the items above that were not captured, such as having an Engineer perform structural analysis of your roof, that you feel are part of the cost of installing your solar system, indicate them below.

For your application

Costs of any studies, reports, overhead (assigned staff), or consultations with electrical engineers, structural engineers, or solar contractors you expect during this process that you wish to recover:
$_____

Additional annual costs not covered elsewhere (leasing, accounting, etc)

$_____

Section 3
Financing your project

The installed cost of a solar PV project in Nova Scotia in 2017 is between $2,000 and $5,000 per kW for the panels and other equipment. That does not include some of the other costs you explored in the previous section.

Depending upon your organization's financial situation, you may need to

- fundraise or access grants
- get a loan from a bank or other financial institution
- do a combination of the above

Include all costs of financing in your application.

Fundraising and grants

This is money you do not need to repay, but that you have received from a source outside your organization. You do not need to indicate the source of the funding, and you do not have to have certainty about obtaining it. Your organization must evaluate the risk of the funding not being available when determining if you should apply.

For your application

Amount of grants, incentives, or fundraised money: $_____

Loans

If your project is selected you may be able to use the contract with your utility to help secure a loan from a financial institution. Different institutions have different levels of comfort with renewable electricity projects, you may have to provide additional information to secure a loan.

A loan of $140,000 over a 10-year term at 4 per cent interest would amount to about $18,250 annually in payments. The price you charge for the solar electricity you sell will need to cover those payments.

After the loan is paid off in 10 years, your project will have a much more positive cash flow for the time remaining in the 20-year power purchase agreement.

Talk to your lender to ensure you understand the requirements and terms of the loan before you proceed with the application.

For your application

Estimated amount of indebtedness. This is the sum of all repayable loans, and must be less than total installation cost. $_____

Interest rate of debt incurred: _____%

Term of debt. This is the length of time you will take to repay the debt. If you have more than one source of debt, enter the shortest term. _____ (years)

Your financial situation

A third-party procurement administrator analyzes your application to ensure that you are able financially to be part of this program. You must attach your most recently available financial statements for this purpose. This information is used only to analyze your financial suitability for the program and will not be shared.

Attach your most recent financial statements that have been either independently reviewed or audited to your application electronically.

Section 4
What's your selling price?

Now it's time to determine your bidding price which is the price to sell your solar electricity to the utility. The price of that energy, combined with the amount of energy you produce, determines how much money you receive each year. The amount of energy your panels produce depends on your individual solar array.

Your bidding price should be high enough to cover the costs you calculated in Section 3 and low enough to be competitive when compared to other proposals. Generally speaking, lower bid prices are more competitive.

If you constructed a 20 kW solar array, and sold your electricity for 25 ¢/kWh, you would make around $5,500 each year from your utility.

Bidding prices are presented in cents per kilowatt hour, ¢/kWh, meaning the price, in cents, that you sell each individual unit of energy for. The most straightforward way to calculate a sales price is to divide your total costs, including interest, by the total energy sold across all 20 years of the contract. However, if you use this price, it will take 20 years to pay off your investment.

According to work done by the Ecology Action Centre for the Department of Energy, solar electricity in 2014 cost between 22 cents and 29 ¢/kWh. Prices vary, but in 2016 solar electricity arrays in Nova Scotia cost from about $2000 to $5000 per installed kW. Every kWh generated by your solar array may cost between 15 and 30 cents, depending on your individual circumstances.

Work with your solar supplier, your accountant or financial consultant, and any other third-party expert to help you determine a bid price that is fair for you.

You can also use the Natural Resources Canada RET Screen tool, or the Excel bid price calculator on our website to help.

Your organization's situation is unique, and only you can decide what is an acceptable price—and an acceptable risk—for you. There is no requirement that your selling price be directly derived from your costs, or that your cash-flow must be positive. Make sure you understand the implications of your price selection before you apply.

Keep your bid as competitive as possible. Projects priced greater than 35 ¢/kWh are much less likely to be successful.

Your selling price in ¢/kWh: _____¢

Section 5
Application information

When you have prepared and gathered all the information in this workbook, you are ready to complete your final application. Find the application online at **novascotia.ca/solar**.

Complete this checklist before you go online so you have all the information required.

About your organization

- ☐ Name of your organization
- ☐ Street address of the building that will host the project
- ☐ Contact name
- ☐ Contact email address
- ☐ Contact phone number
- ☐ Describe your community group or organization _____
  (First Nation, municipality, educational institution, or non-profit/charity)
- ☐ Letter of agreement from building owner if you lease the building where the panels are installed.
- ☐ Solar supplier's solar site assessment. (You will need to attach this electronically to your application)

- ☐ 1. Panel tilt _____
- ☐ 2. Panel azimuth _____
- ☐ 3. Maximum output your system is rated to produce. _____kW
- ☐ 4. Annual energy production in kWh _____
- ☐ 5. Annual operating costs (Add together all items below) $ _____
  - a. Maintenance and servicing $ _____
  - b. Increased building/property insurance $ _____
  - c. Other annual costs $_____
- ☐ 6. Cost of panels $ _____
- ☐ 7. Cost of inverter(s) $ _____
- ☐ 8. Cost of the hardware including mounting system, wires, and related electronics $_____
- ☐ 9. Cost of direct labour for the installation $ _____.

☐ 10. Cost of all permits and inspections $ _____ *(Add together items below)*

a. Building permits $ _____

b. Electrical Inspections and permits $ _____

☐ 11. Total Sales Tax $ _____

☐ 12. All other costs $ _____ *(Add together all items below)*

a. Overhead costs of installation $_____

b. Upgrading service for interconnection $_____

c. Studies, reports, inspections, overhead, or consultations _____

Total upfront installation costs: $_____ *(Add together lines)*

☐ 13. Amount of grants, incentives, or fundraised money $_____

☐ 14. Estimated amount of indebtedness $_____

☐ 15. Interest rate of debt incurred _____%

☐ 16. Term of debt _____(years)

☐ Financial statements. (You will need to attach this electronically to your application)

☐ 17. The bid price on which your application will be evaluated_____¢/kWh

Section 6
How long will this take?

The process from when you start your application to when you are generating solar electricity could vary from less than one year up to two, depending on your situation.

Assign at least one person from your organization to be committed, on an as-needed basis, to oversee the application and installation process for about one year. You should also establish a strong working relationship with your solar supplier—their input will help you build a solid application and a successful bid.

If your bid is successful, you will sell solar electricity to the utility under the conditions of a power purchase agreement (PPA) that will last 20 years.

During that time, your organization needs to

- receive and account for the revenue from electricity sales
- deal with maintenance contracts and/or physical upkeep of the solar PV equipment
- check periodically on generation performance data to verify that the system is operating as expected (your solar supplier can help you understand this)

These should be part-time commitments of staff or volunteers, as maintenance on a solar PV array is typically minimal. Having a maintenance contract with your solar supplier helps with this responsibility.

What if I don't win?

The program runs for three years—2017, 2018, and 2019. If you are not successful one year, you may apply with a new proposal again the next. Winning bids will be published on the program website to help you understand how others are pricing their energy.

Thank you for your interest in the Solar Electricity for Community Buildings Pilot Program.
Good luck with your application.