



## A Resident's Guide to Solar Power

---

## Contents

|                                           |   |
|-------------------------------------------|---|
| What is Solar Power? .....                | 2 |
| Solar basics .....                        | 2 |
| Costs and financial considerations.....   | 3 |
| Incentives and programs.....              | 3 |
| Is your property a good fit? .....        | 3 |
| Permits, approvals, and regulations ..... | 4 |
| Maintenance and performance .....         | 4 |
| Battery storage and backup power .....    | 4 |
| Sources.....                              | 5 |

## A Resident's Guide to Solar Power

---

This guide introduces solar power as one option residents can consider if they want to lower greenhouse gas emissions and produce some of their own electricity. It explains how solar power works, what to expect in Ontario, and what Stratford residents should think about before deciding whether solar is right for their home or property.

Stratford's Community Climate Action Plan (CCAP) includes actions related to efficient homes and buildings, energy supply and distribution, and community-wide climate action. Solar is one of the ways that residents can take part in that broader transition. For residents, solar can support those goals by:

- Helping some households generate cleaner electricity
- Providing clean electricity back to the grid through [net metering](#)
- Supporting the transition to lower-emission homes
- Working alongside other home upgrades such as insulation, air sealing, heat pumps, and efficient appliances

Solar is only one option and not necessarily the right fit for every property. For many homes, efficiency upgrades may be the first or most cost-effective step.

### What is Solar Power?

Solar energy comes from the sun as heat and light. It can provide natural light and heat for buildings and can also be converted into electricity. It is available only during daylight hours and works best when sunlight is not blocked by clouds, buildings, trees, or other obstacles.

Two active solar technologies that use electrical or mechanical equipment are increasingly common:

1. [Solar thermal](#) collectors or panels heat water or ventilation air for use in buildings.
2. [Solar photovoltaic \(PV\)](#) technology uses solar cells to convert sunlight directly into electricity.

### Solar basics

Most home solar systems in Ontario use solar PV panels. These panels turn sunlight directly into electricity through a process called the photovoltaic effect. Simply put, sunlight strikes the solar cell, energizing electrons and causing them to move, which generates electricity.

Some key terms:

- kW (kilowatt): A measure of power. Solar systems are usually sized in kilowatts.
- kWh (kilowatt-hour): A measure of energy. This is the unit shown on electricity bills.
- Net metering: A billing arrangement that lets eligible customers send surplus renewable electricity to the grid and receive credits on their bill.

A typical home solar system may include:

- Solar panels

- An inverter, which changes electricity into a form your home can use
- Mounting equipment
- Wiring and electrical safety equipment
- A battery for backup or storage

## **Costs and financial considerations**

Solar is a long-term investment. Upfront costs can be significant, and results vary based on the home, the equipment, and the installer.

Total cost depends on:

- System size
- Roof type and roof complexity
- Equipment brand and warranty
- Whether battery storage is included
- Electrical upgrades, if needed
- Labour and installer pricing

Payback periods vary widely. They depend on installation cost, electricity use in the home, system output, net metering bill credits, financing costs, and future electricity prices. Solar panels can generate electricity during the day, helping your home use less grid power during higher-cost peak periods, and saving you money.

Solar energy can help lower a homeowner's carbon footprint since it is renewable and emission-free. Residents should be cautious about sales claims that promise unusually fast savings or guaranteed results.

## **Incentives and programs**

[Ontario's net metering framework](#) allows eligible customers to lower their electricity bill by generating renewable electricity and receiving credits for surplus electricity sent to the grid.

Through the [Home Renovation Savings program](#), Ontarians can you can access rebates for energy-saving upgrades like insulation, heat pumps, smart thermostats, solar panels, as well as energy-efficient appliances.

[Natural Resources Canada](#) provides information on federal home energy programs and home energy evaluations. At the time of preparing this document, the Canada Greener Homes Grant and Canada Greener Homes Loan under the [Canada Greener Homes Initiative](#) have closed.

Programs can change. Residents should confirm current details before making decisions.

## **Is your property a good fit?**

Good signs:

- The roof is in good condition

- The roof gets a lot of sun
- There is limited shade
- The property has enough space for panels
- The home's electrical service can support the installation
- The homeowner expects to stay for several years

Caution signs:

- The roof may need replacement soon
- Large trees create heavy shade
- The roof layout is complex
- The electrical system may need upgrades
- The property has heritage features or other planning constraints

Some Stratford properties may need extra review. Residents should confirm local requirements early, especially if exterior changes are visible from the street.

## **Permits, approvals, and regulations**

Solar projects often require more than one approval.

- A building permit may be required, depending on the project.
- Electrical work must comply with the Ontario Electrical Safety Code.
- Solar installations generally require inspection and approval before they are connected and energized.
- Net-metered systems must complete the local distributor's connection process, in this case, Festival Hydro.

## **Maintenance and performance**

Home solar systems usually need limited maintenance.

- Watch the system's monitoring app or portal
- Check for visible debris or damage
- Trim trees if shading becomes an issue
- Call a qualified professional if performance drops unexpectedly

Snow can temporarily reduce output. In many cases, panels will clear naturally as conditions change.

## **Battery storage and backup power**

Battery systems can store electricity for later use and may provide limited backup power during outages.

Many standard grid-tied systems do not power the home during an outage unless they include battery backup or another approved backup arrangement.

## Sources

- City of Stratford Climate Action: <https://www.stratford.ca/live-here/climate-action/>
- City of Stratford Community Climate Action Plan: <https://www.stratford.ca/media/5nin5hlg/community-climate-action-plan-2024.pdf>
- Electrical Safety Authority YouTube: <https://www.youtube.com/@ElectricalSafetyAuthority>
- Electrical Safety Authority: <https://esasafe.com/>
- Government of Ontario Net Metering: <https://www.ontario.ca/page/save-your-energy-bill-net-metering>
- Government of Ontario YouTube: <https://www.youtube.com/@ONgov>
- Home Renovation Savings: <https://www.homerenovationsavings.ca/>
- Independent Electricity System Operator: <https://ieso.ca/>
- Natural Resources Canada Photovoltaic Potential and Solar Resource Maps of Canada: <https://natural-resources.canada.ca/energy-sources/renewable-energy/photovoltaic-potential-solar-resource-maps-canada>
- Natural Resources Canada Solar Energy: <https://natural-resources.canada.ca/energy-sources/renewable-energy/solar-energy>
- Natural Resources Canada Solar Photovoltaic Energy: <https://natural-resources.canada.ca/energy-sources/renewable-energy/solar-photovoltaic-energy>
- Natural Resources Canada YouTube: <https://www.youtube.com/@NRCan>
- Ontario Energy Board: [https://www.oeb.ca/consumer-information-and-protection/net-metering?utm\\_source=openai](https://www.oeb.ca/consumer-information-and-protection/net-metering?utm_source=openai)

# Solar Power at a glance

“

If only there was some kind of an infinite power source that was free to use all day every day...

—  
author unknown

## COST

Upfront costs:  
\$\$-\$\$\$

## IMPLEMENTATION

Medium to difficult

## ELECTRICAL NEEDS

120V 15-20amp  
to 240V 20-30amp

## EMISSIONS REDUCTION IMPACT

High

## EQUIPMENT LIFESPAN

10-20 years

## BONUS

Heat pump water heaters  
are many times more  
efficient than alternatives

### Links to further resources:

- You can estimate the power generation for solar panels on your roof using [this resource](#)
- [FAQs about rooftop solar panels](#)
- [Comprehensive guide to rooftop solar](#)
- [Guide to clean energy in Canada](#)

11.

## Solar Power

**Solar photovoltaic (PV) panels generate free electricity from the sun, and the cost to install PV panels has dropped significantly over the past few decades.<sup>15</sup>**

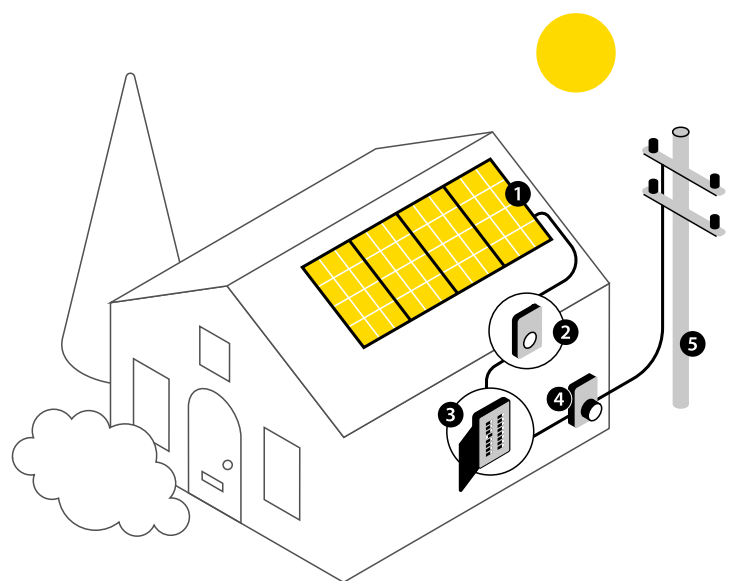
Adding solar panels to a home can reduce utility bills, reduce emissions, and may even increase a home's resale value. A home that can generate as much electricity as it uses in a year is considered net-zero electricity. If the home

is both net-zero electricity and fully electrified, then it would also be net-zero energy and emissions. Now that is something to brag about! For those who do not own a roof but still want to use solar power, other ways to support renewable energy include buying green energy from your utility or retailer, or investing in or subscribing to a community solar project.

### WHAT IS A SOLAR SYSTEM?

A solar system consists of panels that convert sunlight into direct current (DC) electricity and string inverters or microinverters that convert that electricity from DC to alternating current (AC), the form that powers our homes. Some systems also have optimizers to minimize losses.

Most solar systems use solar panels mounted on top of an existing roof surface.



- |                    |                       |
|--------------------|-----------------------|
| 1 Solar Panels     | 2 Inverter (DC-to-AC) |
| 3 Electrical Panel | 4 Electric Meter      |
| 5 Utility Grid     |                       |

“

**When there is a huge solar spill it's just called a nice day.**

—  
author unknown

## OPTIONS

### Solar shingles:

Solar shingles are an alternative to solar panels that also protect the roof from the elements. They can be used alongside conventional roofing materials on surfaces that are not well oriented for solar.

### String inverters:

One string inverter is used to convert the electricity generated from all panels into AC power. This results in simpler installation and lower upfront costs. However, these systems will have shorter warranties (10-13 years) compared to microinverters (25-30 years), and unless power optimizers are used, they may have lower outputs as shading on one panel can reduce the power output of the entire array.

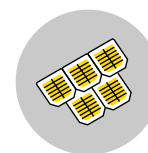
### Microinverters:

A microinverter is installed on each solar panel to ensure optimal performance for each panel. While it is easier to add more panels when microinverters are in use, it can be difficult to access and replace a failed microinverter. Microinverters are more expensive upfront than string inverters but come with longer warranties (25-30 years vs 10-13 years).

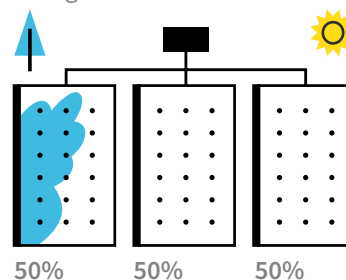
### Power optimizers:

Power optimizers (aka Module Level Power Electronics or MLPE) can be installed on each solar panel when string inverters are used. They help ensure each panel can produce maximum power without being affected by the output of other panels. They have long warranties (20-25 years).

### Solar shingles

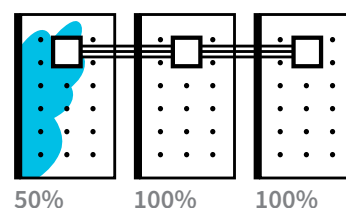


### String Inverters



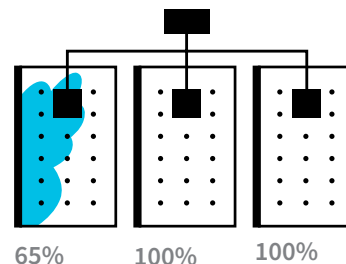
Shade cuts **ALL power** by 50%

### Microinverters



Shade cuts power by 50% on **only one panel**

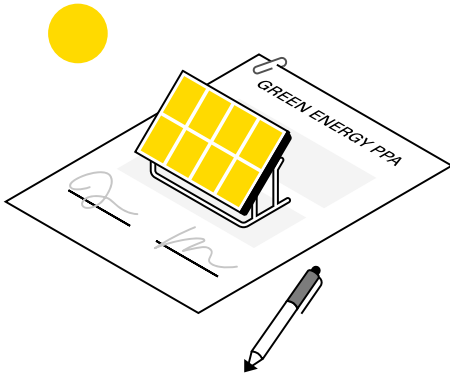
### Power Optimizers



Shade cuts power by 35% on **only one panel**

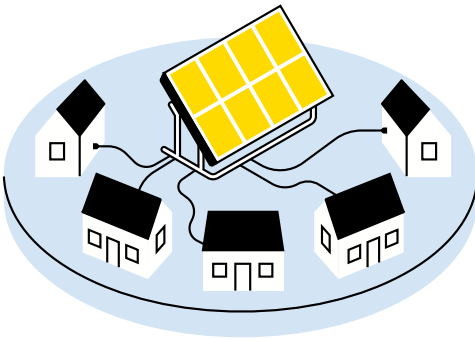
## SOLAR POWER

### Green energy retailers:



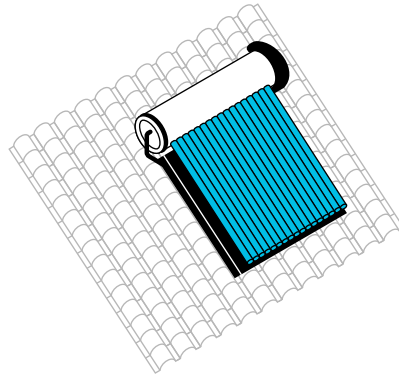
If you are a renter or otherwise not able to add solar panels to your roof, you can buy renewable electricity each month from a green energy retailer. The clean electricity that you pay for is added to the grid mix and you get credit for using that fraction of clean electricity while supporting the growth of renewables.

### Community solar, solar farms, solar gardens:



These are large solar installations where community members can purchase some of the solar panels (ownership model) or commit to purchasing a fraction of the electricity generated by the installation (subscription model). Members then receive credits on their electricity bills for their share of the electricity generated by the system. It is a way for residents to invest in solar generation even when they cannot install systems where they live.

### Solar hot water:



Solar hot water systems are more complex than solar PV and require backup hot water systems for cloudy days. Check out [Section 4](#) for more information on solar hot water.

### BENEFITS



With solar panels, you can save on electricity costs. Most provinces and territories use net metering where the electricity generated is either used directly in the home or sent to the grid to earn credits toward your electricity bill.



Solar panels can add up to 3-4% to a home's sale price above those without.<sup>16</sup> You can think of your solar system as an investment in your home's equity.



When solar panels are connected to batteries, they can power your home in the case of a power outage. This allows you to take advantage of both the electricity stored in the battery and the electricity generated by the solar panels. See [Section 10](#) for more information.



Other than regular inspections, solar panels are a low-maintenance addition to your home.

## SOLAR POWER

### CHALLENGES

- The upfront costs of solar systems are significant and, depending on local utility rates, the payback period can be quite long, especially for smaller systems. Ask about incentives and financing options that will improve the economics for you.
- Solar shingles have higher upfront costs than solar panels.
- Check with your local utility about the maximum inverter size for home batteries and solar installations that can be connected to the grid without paying for a grid impact assessment. The cap applies to the nameplate size of the solar system plus the batteries. The cap is 100 kW in most provinces, but in Ontario it is currently 10 kW.

### SIZING ARRAYS

Sizing arrays will depend on your energy use, the space you have available, your electrical panel size, the amount of electricity you want to generate and your budget. To give a better idea of what it would take to go net-zero electricity or net-zero energy, here is what you would need to do:

1. Calculate your average annual electricity use in kWh from past bills.
2. Look for ways to reduce your total electricity use through more efficient equipment or changes to habits.
3. Using the PVWatts calculator, find out how much electricity you can generate with a 1 kW solar array on your home (4 kW is the default).
4. Divide your annual kWh of electricity use by the kWh/yr of generation in your location. This is the size of solar array needed to reach net zero.
5. Check your province's regulations for net metering to learn how the credits are calculated.

### ADDITIONAL CONSIDERATIONS

- Expect to generate more electricity in summer and use these credits in winter, but avoid adding a large solar array that generates more electricity than you use in a year because utilities typically do not allow you to carry credits forward for more than a year.
- Solar panels will not provide power to a home during power outages unless they are connected to a battery and wired to safely produce backup power.
- Solar panels can last for decades. Ideally your roof should be made of long-lasting surfaces such as metal, or have been recently resurfaced. Removing solar panels and then reinstalling them to resurface a roof can be a major expense.
- Ideal roofs for solar panels are South, East or West facing, are unshaded, and have few gables, vents and other features.
- Solar panels have expected lifetimes of about 25 years, but in practice will continue to generate electricity for far longer. String inverters may have to be replaced sooner. There is also a market for older solar panels and growing options for recycling end-of-life panels.
- Connection fees and average time to connect solar panels to the grid can vary significantly by region.
- Sometimes permits for solar panels are denied due to grid constraints. Call your local utility to find out if your home is affected. If you are denied a permit, you may try again in a few years as the constraints may have been addressed.
- Electrical panel sizing can also limit the size of solar array that can be installed on your home. Your installer should assess the capacity of your electrical panel.
- Snow guards mounted on the roof can ensure that when the snow melts off the panels, the resulting avalanche is broken up, causing less damage when it hits the ground.

## SOLAR POWER

- Squirrels will sometimes build nests under solar panels and chew on the wires. Ask if this is a concern in your area and consider adding squirrel guards.
- You generally do not need to wash solar panels as rain and snow will do the work for you.
- Combining solar panels with batteries and/or an energy management system can maximize how much solar energy is used by your home. This can be important in areas such as Manitoba and Saskatchewan where grid electricity prices are higher than the credits earned for electricity sent to the grid. See [Section 13](#) on energy management for more information.

### EXAMPLES OF QUESTIONS TO ASK AN INSTALLER

- ☐ How much experience do you have installing residential solar systems?
- ☐ Can you give me references for similar installs and show me the qualifications of the installers who will do the work? Do you have worker's compensation insurance?
- ☐ Do you check that my roof is structurally fit to support solar panels? Do you check if my electrical panel can support the proposed solar panels?
- ☐ What size system do you recommend? How much electricity do you expect it to generate per year?
- ☐ What is the total cost of the system, and the upfront deposit? What financing options do you offer?
- ☐ Will I be required to make any roofing or panel upgrades? If so, what would be the estimated cost?
- ☐ Will you be taking care of all permits?
- ☐ Are you aware of any incentives that I qualify for? Do you secure building permits for the installation?
- ☐ What will my net savings be? What utility rate assumptions are included in your calculations?
- ☐ If your province or territory has options for electricity rate structures, which rate structure provides the best savings?
- ☐ How long will the whole process take?
- ☐ Who deals with the utility and arranges for connections and inspections?
- ☐ How do you protect my roof surface during installation and ensure water cannot enter through the mountings?
- ☐ Where will you run the wires from the solar array to the electrical panel and how will you make these visually unobtrusive?
- ☐ What is the estimated cost to remove and reinstall the solar panels when my roof surface needs replacing?
- ☐ Can I add more panels later?
- ☐ Is the system configured so I can add a battery system later?
- ☐ What do the warranties cover and what are their durations? If the company fails, who should I contact about warranties and replacements?
- ☐ How can I monitor the performance of the system?

**NOTE:** It is always a good idea to get multiple quotes before selecting an installer.

---

## CASE STUDY

### Home electrification:

Amelie and Darren of Airdrie, Alberta dreamed of getting their home off the gas network.

It took professional air sealing, a ground-source heat pump pre-heater tank with an electric water tank, and a ground source heat pump (GSHP) with a vertical loop installed in their backyard.

As a bonus, they installed solar panels that should offset their annual electricity use.

The project achieved a 79% energy savings and was paid for with a renovation loan added to their mortgage, a Greener Homes Grant (GSHP) and a personal bank loan for the solar.

More details can be found at [Green Communities Canada](#).

