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Solar 101

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1. How do solar panels work?

Traditional energy generation requires spinning a turbine by burning fossil fuels or harnessing the flow of water or wind. Rotating the turbine causes a magnet to spin around a copper wire, which creates a flow of electrons through the wire – electricity. Solar photovoltaic (PV) panels generate electricity in a different way, with no moving parts. The PV cells are made out of two layers of crystalline silicon; the top layer is crafted to have more electrons than bonds for the electrons, and the bottom layer is crafted to have too few electrons. This results in an electric field that forces electrons, when free, to flow through a wire – electricity. Light photons from the sun journey through space and are absorbed by your solar panels, freeing the “extra” electrons from the top layer and powering the flow of electricity. Solar panels essentially create an electron Ferris wheel that provides an electrical current.

2. What is net metering?

Most solar installations must interconnect to the grid in order to ensure a reliable supply of power to customers. Net metering allows solar system owners to track and receive credits for the energy they generate. If you produce more energy than you consume, National Grid provides credits that can be applied to your bill in less productive months. Virtual or remote net metering functions in the same way, but the credits being applied to your bill reflect electricity generated by solar panels located somewhere besides your home, like in a solar field.

3. Why go solar now?

Financial benefits: The recent boom in the solar market has been driven by a simple reality - using solar can help you pay less for your electricity. Many homeowners are able to cover a significant percentage of their usage with solar, decreasing or eliminating that portion of their bill. Some are able to cover 100% of their electricity usage with solar, and even sell excess energy back to the grid. Electricity prices have been increasing over the years and this trend is projected to continue. As prices rise, your savings from solar will increase as well. An important support for solar adoption has been federal and state tax credits and



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incentives, which have helped to significantly drive down the cost of going solar. Solar panels also increase your home value. Lawrence Berkley National Laboratory's "[Selling into the Sun](#)" study shows that host-owned solar systems actually increase home value.

Energy security and independence: Most solar systems will be connected to the grid, so in the event of a power outage, solar systems will not keep electricity flowing into your home or business. However, solar does reduce strain on the grid, which reduces the overall risk of costly and inconvenient blackouts. Increasing Rhode Island's clean energy resources makes the state more resilient and prosperous by reducing our reliance on foreign gas and oil supplies, supporting local, clean jobs, and keeping energy money in the state.

Environment and Public Health: Most of our electricity in Rhode Island comes from the burning of fossil fuels like natural gas, oil, and coal. This process leads to myriad environmental and public health concerns. The extraction and burning of fossil fuels have adverse impacts on the health of people living nearby. Pollution from mining, drilling, and fracking includes the release of dangerous chemicals and minerals into the soil and water supply of surrounding communities, which often leads to adverse health impacts, especially for those most vulnerable like infants, children, and the elderly. Countless studies have shown that burning fossil fuels releases toxic air and water pollutants linked with higher rates of diseases like asthma, pneumonia, kidney disease, and cancer.

Climate change is already impacting Rhode Island; [local sea levels](#) have risen roughly 10 inches since 1930 and are projected to continue rising. As the "Ocean State", we need to act fast to preserve our beautiful shoreline by reducing the amount of carbon dioxide we emit into the atmosphere. Providence has a goal of becoming carbon neutral by 2050 – let's see if we can beat that goal!

4. Should I wait to go solar?

In most cases, no. Solar panel technology has been operating by the same principals since its inception. However, there have been continuing innovations in panel aesthetics and battery storage options, among other things. If aesthetics or off-grid storage options are a deal breaker for you, you might consider waiting, but it's worth exploring the options available to you now. The cost of solar panels has continued to decrease, but if you're waiting for the cost to get even lower, you'll lose out on the savings you could be benefiting from now. Additionally, the federal and state incentives for solar that have made the technology so competitive are not going to last forever. The federal solar tax credit, aka investment tax credit (ITC), is scheduled to be phased out for residential systems and reduced for commercial systems beginning in 2020. Another consideration: the grid is limited in the load it can transfer, so most neighborhoods have a maximum number of solar systems that the grid can handle. This creates a "first-come-first-serve" race between neighbors. If you find yourself locked out in this way, you can look into community solar as an alternative.



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5. Should I own or lease the panels? (And what the heck is a PPA?)

Are you ready to make the investment of purchasing a solar system? The average roof top system costs between \$12,000 and \$18,000, and takes between 4 and 9 years to pay for itself through electric bill savings, after which time the savings and potential profit are financial benefits. Purchasing a solar system is an extremely safe investment. As the system owner, you benefit from the tax credits and incentives. Generally, you are responsible for maintenance when you own the panels.

If you're not ready to make an investment like that, even after exploring your financing options, you can still go solar through a Power Purchase Agreement (PPA) or lease. This option will save you money by lowering your electricity bills, and you'll help bring more solar energy to Rhode Island, along with the associated environmental, health, and security benefits. When going solar through a PPA, there is usually no, or minimal, upfront cost. The company will own, manage, and maintain the solar system, while selling you electricity at a lower rate than you are currently paying. This is a great option for a lot of homeowners, since they don't have to worry about upfront costs or panel maintenance, yet are able to enjoy a reduced electricity bill. As the system owner, the company benefits from the tax credits and incentives.

6. Do I need a southern facing roof?

No, your roof does not need to be facing south for you to go solar! For us in the northern hemisphere, it is true that southern facing panels can maximize energy production, but significant solar production can occur from panels facing west or east, as well. If your only available roof space is north facing, you may encounter extra challenges in going solar. Your solar contractor will design a system that maximizes your home's solar production, and can discuss your panel placement options further.

7. What are my options if I don't own my roof or my property is not suitable for solar?

Not all roofs are suitable for solar, often due to shade from trees or roof restrictions. If you own your property but your roof isn't great for solar, you can consider ground-mounted solar panels. In truth, the solar market is not currently set up to make it easy for renters or condo/apartment owners to benefit from solar. Landlords often don't feel motivated to go solar if they don't pay the electricity bill themselves.

Community Solar has made huge strides in addressing these market barriers. Virtual net metering allows people's electricity bills to reflect the financial benefits of solar located off site. Solar panels no longer need to be on your roof for you to realize the benefits! Some community solar plans allow you to purchase panels, some act like a PPA and allow for short time commitments, and some are able to transfer with you from place to place as long



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as you stay within the same utility zone. Community and shared solar was recently expanded in Rhode Island in 2016, so keep an eye out for opportunities to join.

If you're a renter, you have a few options.

- Talk with your landlord about solar – Many landlords might not have even considered the idea and could be open to it! If the landlord installs solar panels and includes electricity in the rent, they can increase the rent in a way that reflects the lowered electricity bill. This will put more money in their pocket and save the renter money as well. It's a win-win! Note that owning panels increases home value, and including electricity makes it a more desirable rental property.
- Participate in community solar, if there are options available.
- Use small solar powered devices, like a solar phone charger, that can reduce your electricity bill.