

# Need some reasons to go solar? Here are 10.

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ReVision Energy has been helping homes, businesses, and institutions in Maine, New Hampshire, and Massachusetts switch to clean, renewable, solar power since 2003. Now, the pace of that transition accelerates rapidly as product costs go down and solar efficiency goes up.

We've been asked plenty of times, "why go solar?" The goal of this guide is to shine some light (hehe) on the subject and to answer that question in 10 thorough, bite-sized chunks:

## 10 (Very Important) Reasons to Go Solar

### 1 SOLAR IS AN ABUNDANT RESOURCE

Maine, New Hampshire, and Massachusetts' solar resource is a full 33% greater than Germany, a world leader in solar. And it's not going anywhere.

### 2 SOLAR REDUCES DEPENDENCY ON FOSSIL FUEL

Knowing the basics of solar electricity and how it is billed to you is the start to learning how anyone can reduce their fossil fuel use with solar energy.

### 3 SOLAR IS LOCAL & SUPPORTS LOCAL COMMUNITIES

Whether it's generated on your roof or in your town, solar is a local product that generates savings, benefits, and jobs directly impacting your local community.

### 4 SOLAR LOWERS YOUR ENERGY COSTS & LOCKS IN YOUR ELECTRICITY RATE FOR YEARS

Even with a big initial investment, going solar reduces your electric bill, saving you money for years to come and keeps you safe from spiking electric costs.

### 5 SOLAR IS MORE AFFORDABLE

Numerous financing and loan options, plus a decreased cost in technology, make the transition to solar technology more affordable than ever.

## **6** **SOLAR IS A STRONG INVESTMENT & ADDS VALUE TO YOUR HOME OR BUSINESS**

Considering significantly reduced equipment costs and reliable performance, the average return on investment of solar energy ranges from 8% to 12% per year.

## **7** **SOLAR IS VERSATILE AND WORKS ON THE ROOF, GROUND, OR FAR AFIELD**

Solar is a versatile technology! No matter where you live, there are many ways to go solar, including rooftop, ground mount, and solar farm options.

## **8** **SOLAR DOES IT ALL: HEATING, COOLING, AND BACKUP POWER FOR YOUR HOME**

A lower electric bill is just the beginning. Thanks to continued innovation, solar can be stored in batteries, heat and cool your space, and even power your car.

## **9** **SOLAR WORKS IN THE WINTER**

For New Englanders, nothing is more promising than learning a solar electricity system's performance rises when the temperature drops. Sun power all winter long!

## **10** **SOLAR IS AN ENVIRONMENTAL SOLUTION TO HUMANITY'S BIGGEST PROBLEM**

Arguably the most important reason for going solar: ensuring a livable future for our kids and grandkids. The costs of the climate crisis are real and daunting, and solar is the most promising technology for transitioning to a clean energy economy.

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# **1. Solar is an abundant resource.**

So, why solar? Out of all of the available renewable energy options (including wind, biomass, ocean power, etc.) and, for that matter, conventional options (natural gas, oil, coal, nuclear) why is ReVision Energy in the business of solar and why should Northern New England implement solar as the solution to our energy insecurity? Because solar is plentiful. It is the most abundant and accessible resource available to humanity.

Traditional methods of energy generation through the use of fossil fuels are limited, as the resources—such as coal, uranium, and natural gas—are finite. On the other hand, sustainable energy resources—such as solar, wind, and geothermal are renewable. Of the many sustainable

options, the amount of solar energy that the earth receives each year dwarfs all of the other resources. In fact, enough solar energy falls on the earth's surface each minute to meet world energy demand for an entire year (DOE).

OK, so – there is a lot of solar energy that hits the earth. But is there really enough available sunshine in New England for solar to offset my energy needs?

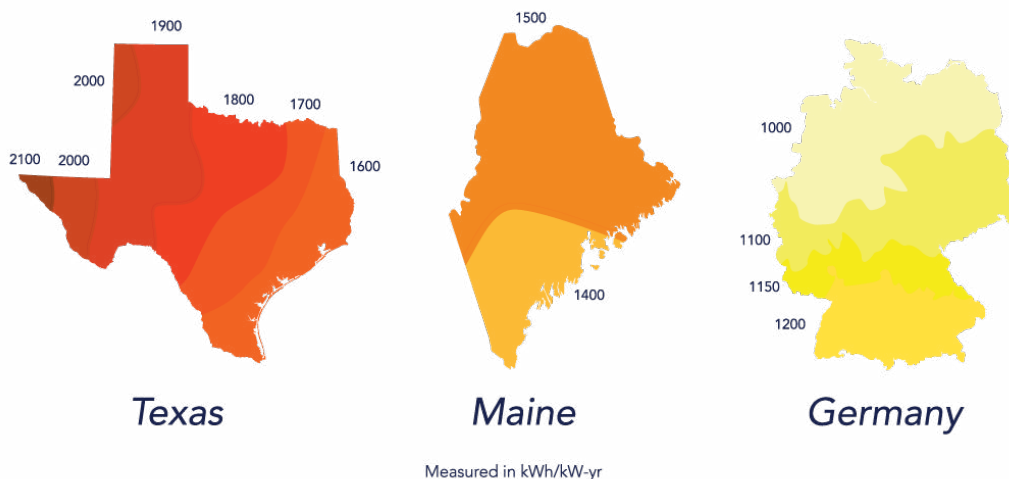
The answer is absolutely yes! Maine, New Hampshire, and Massachusetts have very favorable solar energy resources, also known as solar insolation.



## New England receives a ton of sun.

Insolation is the amount of solar energy hitting the earth's surface and is measured in kilowatt-hours per meter-squared per day (kW-hr/m<sup>2</sup>/day). New England's sunny solar insolation makes it an ideal location for widespread solar energy transition – even more so than the leader in renewable energy, Germany.

The [National Renewable Energy Lab](#) has assembled worldwide insolation data to learn how much sun falls in a particular location so that one can draw a reasonably accurate conclusion as to the amount of solar energy that can be harvested on an annual basis. New England receives a great amount of solar energy, making it an even more favorable location for solar than Germany, the world's leader in solar power. The map below shows how the available solar insolation in Maine compares to both Texas and Germany:



What we can learn from the chart is that Maine has a similar amount of solar insolation as Texas, a very sunny state and a 26% greater resource than Germany. Maine is on the same latitude as the French Riviera!

Though Germany's solar resource is on par with Alaska, they have a much higher level of solar adoption than New England thanks to making it a national priority and creating policies that drove market investment in solar energy. Ironically, it is Germany's deep investments in solar that spurred the growth of the modern solar electricity as we know it, and resulted in the reduction of costs that has made solar more cost-effective globally ([SEIA](#)). At times during the year, Germany may be running as high as 95% on renewable energy!

It's important to understand that when we're talking about solar energy as a resource, we are talking about annual potential, not monthly potential. In December, a solar panel in Austin, Texas, will beat the pants out of one installed in Maine. However, our summers have longer days and our cooler climate allows the equipment to produce more power than it would the Southwest (more detail about this in Reason #9 Solar Works in Winter), making up for the lower energy production experienced in winter.

## Harnessing Solar Energy in New England

When we started installing solar electric systems in the early 2000s, prices were well north of \$9/watt installed. A typical home needs roughly 5,000 watts of installed solar electricity to meet all its needs, so that meant a typical system for the home was \$45,000. By Spring 2023, that price had declined to roughly \$4/watt in most places where ReVision Energy does business, meaning the same system would be only \$25,000!

Over that same period of time, grid electricity rates have gone up across the board, making solar a significantly more affordable and cost effective option for energy. And lucky for us all, the sun isn't going anywhere anytime soon, making solar an abundant resource, even with our bleak New England winter.

Solar's unending abundance makes it the best energy option for the future, since there is enough of it to go around and the technology needed to harness it is only getting better.

Unlike solar, fossil fuels are a finite resource that come with plenty of destructive (dare we say, world-ending) side-effects. There is no reason to continue to burn fossil fuels to power our homes, businesses, and communities, and thankfully



solar can offset fossil fuel use in New England.

Read on to learn some core concepts of electricity generation – how it's measured, how you're billed for it, and how adding solar electricity can lower both your electricity bill and your fossil fuel dependency, leading us all towards a cleaner, more energy independent future.

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## 2. Solar reduces our dependency on fossil fuel.

Most people are aware that renewable energy sources are better for our planet and the people on it, when compared to nonrenewable forms of energy production such as burning fossil fuels. But it's worth knowing why solar is the best longterm energy production option.

The energy sector, currently based on fossil fuel combustion, along with industrial production that requires high amounts of this energy, are responsible for releasing [60 percent of carbon dioxide emissions globally](#). Solar power has a great potential for mitigating the impact of the energy sector on climate change. A research study by the National Renewable Energy Laboratory (NREL) indicates that replacing coal power plants with 100 gigawatts of solar power could eliminate over 100 million tons of carbon dioxide emissions each year.

As with most industries requiring manufacturing, the solar industry does emit some greenhouse gases during the manufacturing process. However, the carbon footprint is still much smaller.

A single solar module takes just about one year to generate more electricity than what was used to manufacture it. That is a one-year energy payback. Since photovoltaic solar panels last up to 30 years, they save 29 years of emissions that would have come from gas or coal.



Long story short, transitioning to solar lessens our need to burn dirty fossil fuels.

That is HUGE, since emissions from fossil fuel usage is the greatest contributor to the climate crisis. We get into all the nitty gritty details of solar electricity below (lots of math down there), but if you're more interested in learning about the benefits of solar as a locally generated power

source, head on to Reason #3: Solar is Local.

## The Nitty Gritty of Electricity

Before we go too far, to really understand and appreciate solar electricity (and how it can offset your fossil fuel use), you first should understand some basic concepts of electricity, and how that electricity is billed to you.

All electrical appliances tell you the number of amps, volts, and watts that they use. Their relationship is simple:  $\text{Watts} = \text{Volts} * \text{Amps}$  ( $W = V * A$ ). Many battery systems run on 12V, so for example, a 12V cell phone charger might be 0.9 amps, or,  $12 * 0.9 = 10.8$  watts. That's about as much electricity as can be pumped into a smartphone battery at one time.

Most devices in your home consume a lot more power than a smartphone, however. Your home (if it's in the US) is wired at 120V Alternating Current (AC) and some appliances (dryers, water pumps) are wired in at 240V. A washing machine may have a peak load of around 12 amps at 240 volts, or, close to 2,880 watts. That's as much current as can charge 160 smartphones!

1,000 watts = 1 kilowatt. However, you are billed for electricity in kilowatt-hours, the product of a certain amount of electricity over a period of time. So for instance, that washing machine, pulling 2,880 watts, for 5 minutes, would consume 240 watt-hours (0.24 kilowatt-hours) of electricity. At today's rate (around 15.5 cents) that amount of electricity would cost you about 4 cents.

The accumulation of ALL of the electric loads in your household, times the amount of time that you run them, culminates in your total electric bill from the utility. The energy loads that end up being big hogs can be deceiving. For example, a 100-watt incandescent light bulb, left on 24 hours a day, 365 days a year, will consume 876 kilowatt-hours each year, at a cost of over \$130 (now you know why you should switch over to LEDs)!

## So, how does solar electricity fit into all this?

Solar panels are the opposite of electric loads, they generate a certain amount of electricity for every minute they are exposed to the sunshine. Solar panels are rated in watts (typically 265 to 320 watts) and collections of them for homes are rated in kilowatts (1,000 watts). For example, 20 solar electric panels rated at 250 watts results in a 5-kilowatt solar electric array (5,000 watts = 5 kilowatts).



An oversimplification is to say that a 5-kilowatt solar electric system will generate 5 kilowatt-hours (kWh) for each hour that they are exposed to sunlight. Realistically, some amount of the solar energy is lost in the wiring process and conversion from the direct current (DC) electricity generated by sunshine into the 120V alternating current (AC) electricity consumed in your home. Also, the sun is rarely constant for a full hour; any clouds or changes in sun intensity will affect the real-time performance of a solar array.

So to predict how much electricity a 5-kilowatt solar array will generate, we take the data on regional solar insolation that we saw in the last chapter and build out a model of expected solar generation. The National Renewable Energy Labs (NREL) has an excellent calculator, PV Watts, which uses 25 years of weather data to assess expected solar insolation for a location.

A full analysis of a solar array's expected production based on climate, adjusted for the angle of the solar array, and orientation (azimuth) towards the sun, and adjusted again for any shading, results in a prediction of a system's output over the course of the year. As a rule of thumb, each 1-kilowatt of installed grid-tied solar, on a good site will generate around 1,250 kWh/year in New England. A typical 5 kW array for a home will generate about 6,250 kWh/year. In the next chapter when we get into talking about the economics of solar, we will also talk about how to convert a solar energy system's potential output into dollars saved on your electric bill, and how that savings justifies investing in the project.



## Efficiently used solar power is the best path towards energy independence.

Energy efficiency enthusiasts make the claim that the easiest kilowatt-hour to create is the one you don't have to use. When we start designing a solar electric array for a system, our first step is to figure out exactly how much electricity they are using, and how much solar resource is available at their location.

A homeowner with a very tight roof, who can only fit 16 panels, for instance, has a different set of decisions to make than a homeowner who has a vast south-facing barn where they could potentially install much more solar electric generation than they actually need.

Most of our customers see solar as part of a road towards [energy independence](#), and taking reasonable aims to reduce energy consumption in tandem with a solar installation is a highly

recommended strategy. It can work out to be much more expensive to produce electricity that is used relatively inefficiently – for example, powering old refrigerators and water heaters. Generally, it is cost-effective to make some (not all) energy efficiency upgrades as a path towards meeting all of your needs with solar electricity.

## You can offset fossil fuel use with solar electricity.

There are, however, “good” reasons to increase your electric bill! With heat pumps, electric cars, and electric water heating solutions available, a home can essentially eliminate oil, propane, or natural gas completely and be fully electric powered.

Many of our customers add enough solar electricity to meet all of their needs initially, then upgrade the system over time to supply power for an air-source heat pump, an electric water heater, or an electric car. Solar energy can also heat your water directly with solar hot water panels, and be stored for later usage.

In addition to greatly reducing our states’ dependency on fossil fuel, solar is also a low impact form of energy production that has little longterm impact on its surrounding and the neighborhoods it’s in. Solar is produced locally, and benefits the communities it serves in many ways.

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## 3. Locally generated solar supports our communities.

Producing energy on your own roof? It doesn’t get more local than that. But if you use renewable solar energy produced in a neighboring field or from a solar farm a couple towns over, you’re still enjoying the benefits of locally produced energy. Better yet, that sweet, sun powered energy is bringing numerous benefits to your local community, through financial savings, jobs and economic support, and a cleaner, healthier environment.

## Solar supports local economies.

Billions of dollars flows out of our states every year in order to purchase coal, oil, and gas for our cities and towns. Solar allows homeowners, businesses, and municipalities alike to keep their energy sources local and invest money into their economies by investing in locally produced solar.

Transitioning to solar also saves towns, business, and organizations money on their electric bills and operation costs, and these savings can be directly returned to local communities. A small business owner can use their solar savings to give raises to their employees, or extend savings to their customers.



A municipality with a solar farm can reallocate money that would be spent on out of state energy production to increase budgets that benefit their constituents, for infrastructure improvement or school funds. Organizations offering housing and support Low-Moderate Income communities, such as the Keene Housing Authority in New Hampshire, can extend the savings from their solar energy systems to the families they house, and offer more sustainable and affordable housing.

Locally generated solar brings more wealth, opportunity, and stability to our communities, and democratizes the benefits of renewable energy for our families, friends, and neighbors.

## Solar supports local jobs, even in unstable times.

Locally produced solar also generates local jobs. In fact, solar energy creates over 4 times more jobs than other energy sources. Growing solar business means more job opportunities for local communities. This brings increased financial security to our states, especially in challenging times.

During the COVID-19 pandemic, even as jobs declined nationally, the solar industries in Maine, New Hampshire, and Massachusetts continued to grow, providing career opportunities in the toughest of times. This is especially true for local solar companies, such as ReVision Energy, which continued to hire rapidly during the pandemic. [According to Larry Sherwood](#), Administrator of The Solar Foundation and President and CEO of IREC, "Even as the pandemic brought unprecedented challenges, the 11th annual Solar Jobs Census shows the solar industry continues to create hundreds of thousands of high-quality jobs for men and women of all education levels and backgrounds."

In the face of potential economic and legislative challenges, solar is expected to grow in the next 25 years. This will demand increased training, benefits, and wages, and continued focus on developing a solar workforce.

Solar occupations, especially for locally focused solar companies, earn wages comparable to or better than those same occupation types in other industries. For example, solar wages continue to beat other industry averages, when comparing pay for positions such as construction managers, electricians and installers.

Finally, solar supports local job growth with a critical focus on equity and increasing opportunities for underrepresented populations. [Representation among women and minority demographic groups continues to improve significantly](#) within the solar industry since 2015, including a 39% increase for women, 92% increase for Hispanic or Latino workers, 18% increase for Asian American and Pacific Islander workers, and a 73% increase for Black or African American workers. Local training and apprenticeship programs, which are state specific, often connect solar careers to those who have historically had a hard time accessing such opportunities, and enables the solar workforce to more accurately represent the communities it serves.

## Solar benefits all ratepayers in a community.

You probably already know that if you have solar on your roof or property, you can protect yourself from spiking energy prices. However, did you know that even your neighbors who don't have solar can benefit as well? Solar protects and lowers electricity rates for all ratepayers in a community, even those who don't have solar.

A growing body of research, including a report from [Synapse Energy Economics](#) from 2020, demonstrates that solar has tangible benefits for all electricity ratepayers, and not just those who use solar power. Synapse calculated the region's total wholesale energy savings due to local solar to be over \$1.1 billion. It also showed the monetary value of additional widespread benefits, such as the reduction of carbon emissions, avoided pollution and health costs, and job creation.

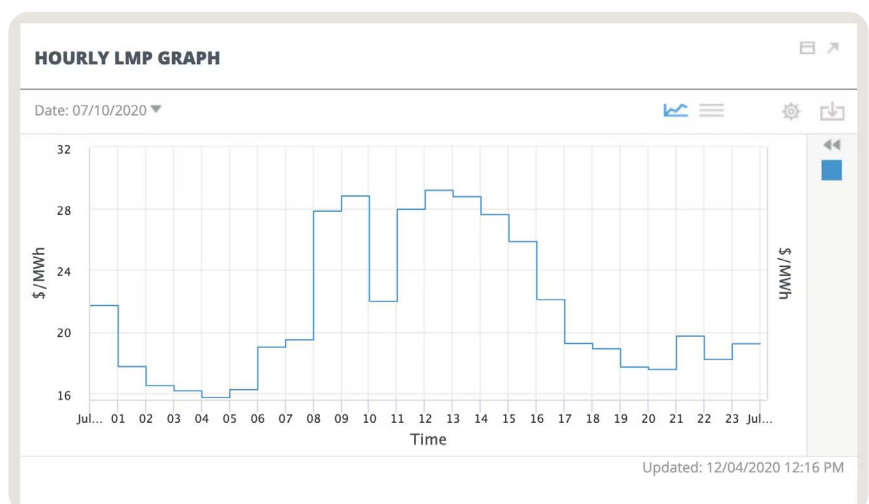
## How does solar save everyone money?

With grid tied solar, everyone pays less for electricity because it reduces the amount and the cost of electricity purchased by utility companies:

- ✓ During the hours of peak grid usage, solar lowers the demand for additional electricity
- ✓ This in turn reduces the need for utility companies to buy expensive energy from highly polluting standby power plants
- ✓ With lower demand for this costly energy, the wholesale price of electricity decreases

Let's dive in. For utility companies, the most expensive time to operate the grid is during the middle of the day, when demand for electricity is at its highest. During the height of summer, when the endless running of air conditioners causes the grid to hit "peak-load," utility companies are forced to tap into their backup systems, which tend to be less-efficient, more expensive oil burning power plants.

On a hot July day, energy demand is highest during the middle of the day – right when solar panels are generating their most energy for the grid. The more solar generated



during these peak times, the less utility companies will have to rely on pricey electricity from standby peaker plants.

Solar panels generate power during these sunny, peak-demand times, which reduces the need for utilities to turn to back up power plants. These “peaker” plants require copious amounts of money to stay operational, despite only being utilized a couple days a year. Reducing the need for them keeps the price of wholesale energy from skyrocketing during peak demand days, and eliminates the burning of an enormous amount of oil.

Additionally, most small-scale solar is generated locally and used close to the source, which lowers the need for expensive lines, poles, and the maintenance of the grid’s general wear and tear. The more solar power there is in the grid, the more utility companies save, and those savings are passed on to all customers, solar and non-solar alike.

## Solar improves the public health of our communities.

If you’ve made it this far, we’ve got just one more way solar positively impacts our local communities, and it’s a big one. Locally generated solar power is better for our public health.

Unlike other forms of energy such as burning fossil fuels and natural gas, which emit byproducts like sulfur dioxide, nitrogen oxides, and smog that have been linked to symptoms like respiratory and cardiovascular distress, solar is a clean and low impact form of energy production. Additionally, solar panels do not pollute the ground or air, and don’t absorb water or contaminate rivers in any way.

The Synapse report, mentioned earlier, calculated the total avoidance of carbon emissions and pollutants as a result of small-scale NE solar. From 2014 – 2019, New England solar alone prevented “4.6 million metric tons of climate-damaging carbon dioxide emissions” and the release of hundreds of thousands of pounds of pollutants, which contributed to “\$87 million in public health benefits.”

Table 1. Estimated emissions avoided by BTM solar

| Pollutant                                                 | Avoided emissions |
|-----------------------------------------------------------|-------------------|
| <b>Greenhouse gases (reported in million metric tons)</b> |                   |
| Carbon dioxide (CO <sub>2</sub> )                         | 4.6               |
| <b>Criteria pollutants (reported in pounds)</b>           |                   |
| Sulfur dioxide (SO <sub>2</sub> )                         | 2,380,000         |
| Nitrogen oxides (NO <sub>x</sub> )                        | 3,280,000         |
| Particulate matter (PM <sub>2.5</sub> )                   | 340,000           |

The World Health Organization estimates that [4.2 million people](#) die prematurely due to outdoor air pollution every year. These are huge amounts of harmful pollutants kept from our cities and towns, and avoided in our farm, parks, and natural spaces. Solar arrays also require little maintenance and replacement over time, and have almost no impact on the biodiversity and physical areas in which they are installed (if sited properly).

In fact, many solar farms have granted new, productive use to otherwise unusable land, such as covered landfills. Some farmers and landowners have even found creative ways to use the unique space of a solar panel covered field.

We've seen solar farms used for all sorts of activities including bee keeping areas, and-everyone's favorite-sheep grazing! So yes, solar benefits everyone in our local communities, even if they don't have solar themselves (and even if they are sheep).



If you're not a sheep and ready to learn about the specifics of solar's many financial benefits, read on.

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## **4. Solar saves you money on your electric bill and locks in a lower rate for years to come.**

Solar panels and their related hardware can be a major investment, especially if you are planning to pay for everything upfront. Making the transition may seem expensive at first, but you should know that in most locations, your solar payback period is less than 10 years – and that isn't even accounting for all the money saved on reduced utility bills.

Before we get ahead of ourselves and tell you about all the longterm financial benefits of a solar investment, let's cover how installing solar for your home or business reduces your utility bill.

Depending on some factors, such as your average energy consumption and the cost of electricity in your area, solar can reduce or even eliminate your monthly electricity bill. Even if you only use enough solar to cut your bill in half, saving \$50 on an otherwise \$100 electric bill will save you \$18,000 in energy costs over the lifespan of your solar system.

Additionally, utility rates are only increasing, while the sun charges the same rate for its power (that's a joke, sunshine is free). In 2022, residential electricity prices increased on average by at least 3.8% when compared to 2021 (SEIA). We've also seen a drastic increase in natural gas and oil prices. Solar protects you from these spikes in cost; when you transition to solar, you lock in your electricity rate for the total lifespan of your system.

Let's think of an example using an average home in northern New England (specifically Maine, Massachusetts, and New Hampshire). In 2020, the average New England household's energy bill was \$116 per month, around \$1,400 annually (EIA).

Regardless of the upfront costs for the equipment and the payback period, if you were to install a solar photovoltaic system that generated enough power to offset this bill entirely, you would be saving \$1,400 in year one. With a 3.8% utility rate increase each year, your savings would grow to \$1,454 in two years, \$1,508 in three years, and increase continuously throughout the lifespan of your system.

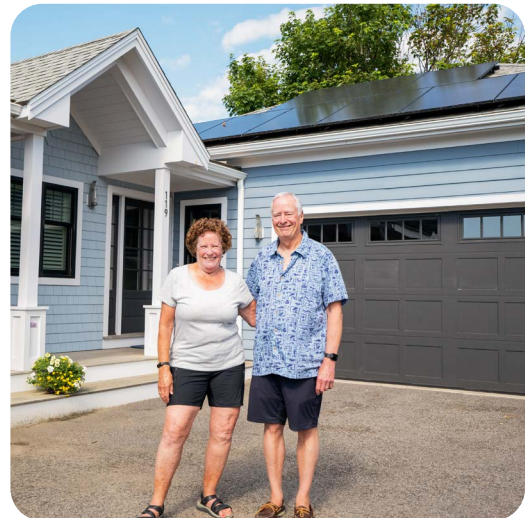
While the exact amount you can save monthly with solar will vary depending on your lifestyle, your location, and how you pay for your solar (upfront or through financing), installing solar is a surefire way to decrease your electricity bill and protect you from volatile utility rate increases. You can use our solar calculator to estimate how much you could save with solar.

Even if your solar system doesn't cover 100 percent of your home or business' energy demand, you will still save money on a reduced utility bill. Additionally, if your solar energy system is connected to the grid (most are), you will benefit from net metering, regardless of your array's size.

## Net metering gives solar customers control over their electricity bills.

Net metering is a way of energy billing that credits people with solar systems for the electricity they add to the grid. It allows you to divert any excess power produced by your solar panels to the grid and receive monetary credits on your utility bills for the amount you contribute. A solar array that meets even half your needs will still be economically advantageous if you can utilize net metering in your area.

An average residential solar system may generate more electricity than the home uses during daylight hours. If the home is net metered, the electricity meter will run backwards to provide a credit against what electricity is consumed at night or other periods when the home's electricity use exceeds the system's output. Customers are only billed for their "net" energy use (hence net metering). On average, 20-40% of a solar energy system's output goes into the grid, and this exported solar electricity serves nearby customers' loads.



Net metering allows utility customers to generate their own electricity cleanly and efficiently. During the day, most solar customers produce more electricity than they consume; net metering allows them to export that power to the grid and reduce their future electric bills.

## How does net metering work?

At the end of the month your utility will reconcile the difference between your solar production vs. electrical consumption, and you either earn a credit or are billed accordingly. Earned credits carry forward up to a year.

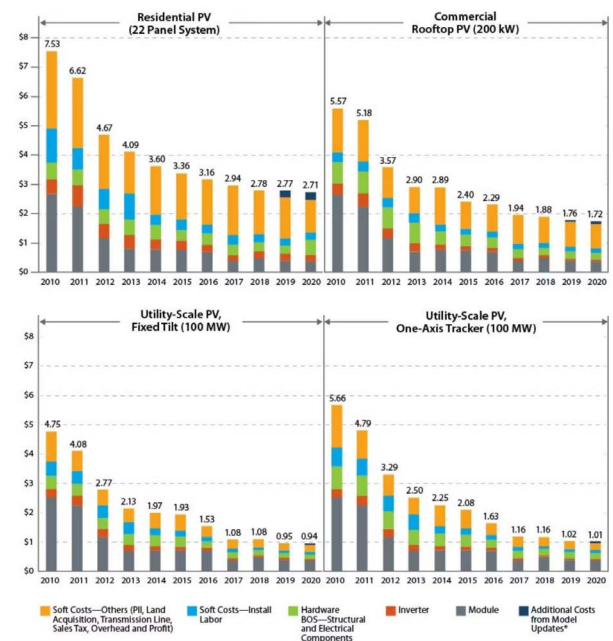
Retail net metering is currently protected and accessible for new customers in all the states where we offer service: Maine, New Hampshire, and Massachusetts.

Going solar saves you money in the short-term and long-term, through a lower (or non existent) electric bill and a locked in rate that won't increase with utility price hikes. But you may be thinking, "hey, disembodied voice of ReVision, tell me how I'm going to save money when going solar is so expensive?" The answer: it's not! Solar is more affordable than ever, thanks to decreasing overall cost of the technology, increased efficiency, and a plethora of incentives, tax credits and state specific programs that help reduce the cost of installing solar.

## 5. Solar is increasingly affordable, thanks to decreased technology costs, financing options, and rising efficiency.

We've established that going solar can save you money on your electric bill, which is a compelling reason to make the switch. However, many people are still daunted by the upfront cost of solar product and installation, and believe it to be expensive and unobtainable without a large chunk of savings.

We're here to tell you that solar is actually more affordable than ever, thanks to an increase in product innovation and lower technology costs. Additionally, an increase in financing and loan options take away the need for a large upfront payment. In the last ten years we've seen a sharp, though steady, decline in solar costs, driven largely by photovoltaic (PV) module efficiencies (now 19.5%, up from 19.2% in 2010) and lower hardware and inverter costs. Since 2010, there has been a 64%, 69%, and 82% reduction in the cost of residential, commercial-rooftop, and utility-scale PV systems, respectively.



Aside from decreasing costs for products, hardware, and from the need for service or maintenance, incentives and credit programs make solar more affordable for homeowners and businesses.

## Finance your system with a solar loan.

If you can afford a monthly energy bill, you can afford to go solar! By financing your solar you can replace your monthly bill with a loan payment at no upfront cost.

For many, financing is a way to go solar earlier and easier than would be possible if an upfront cash purchase was required. With low interest rates and no large, upfront payment, solar loans allow customers to keep cash in their pockets and take advantage of the financial and environmental benefits of going solar. Plus, customers can enjoy the peace-of-mind and security of a fixed electricity payment that will not fluctuate with local electricity prices.

Unlike other loans, a [solar loan](#) grants you ownership of an asset (solar panels) that provide you with significant long-term savings, even as you pay off the loan.



- ✓ **No upfront cost:** Own your solar power without needing to pay the entire upfront sum.
- ✓ **Accessible solar option:** Go solar without needing to save or drain your bank accounts to cover the full cost of the solar system.
- ✓ **Immediate solar benefits:** Enjoy clean, sun-powered energy while you pay off your loan, as soon as your panels are installed.
- ✓ **Consistent long-term savings:** Save on electricity costs over the lifetime of your system, as your loan payment remains constant regardless of utility rate hikes.

Solar loans are enabling Americans to go solar like never before. Solar energy is also one of the safest investment options on the market today, delivering a 100% guaranteed financial return on investment, along with community and environmental returns on investment.

## 6. Solar is a strong economic investment.

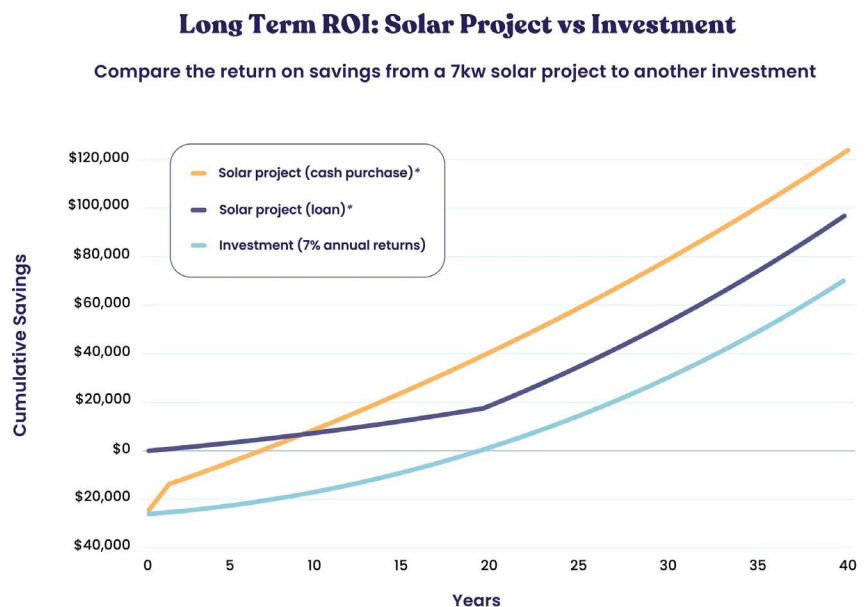
It's well known that solar is the most efficient renewable energy source and helps protect our communities and environment. But did you also know that solar is now the least expensive source of electricity on the planet, and has become the fastest growing new electricity source in the United States? **Let's repeat it, to be clear: Solar is the least expensive source of electricity on the planet.**

Not only is solar electric equipment incredibly inexpensive, but it is extremely reliable. By making the upfront investment to go solar, you gain a system that produces electricity (worth money!) for decades, with little to no maintenance required.

**With multiple financing options, solar is a sound investment with a strong ROI.** Start "paying" yourself for electricity. People are surprised to learn that in Maine, New Hampshire, or Massachusetts, the economics of [solar energy outperform traditional investment products](#). Sound crazy? It's true!

Let's compare a solar project to a common marketplace investment. With an average annual return on investment (ROI) ranging from 7% to 15%, solar is a much stronger investment than a common savings account, which generally yields annual returns of 0.5% to 5%. Long-term average stock market returns are around 7% but there is huge volatility depending on the time frame or sector, and market performance is uncertain today.

Whether you pay for your solar in cash upfront, or finance through a solar loan, your system will generate fruitful returns in the years it generates clean solar energy and savings. Furthermore, would you prefer to see your dollars in a fund of unknown stocks, or put to use improving the resale value of your home and boosting your local economy?

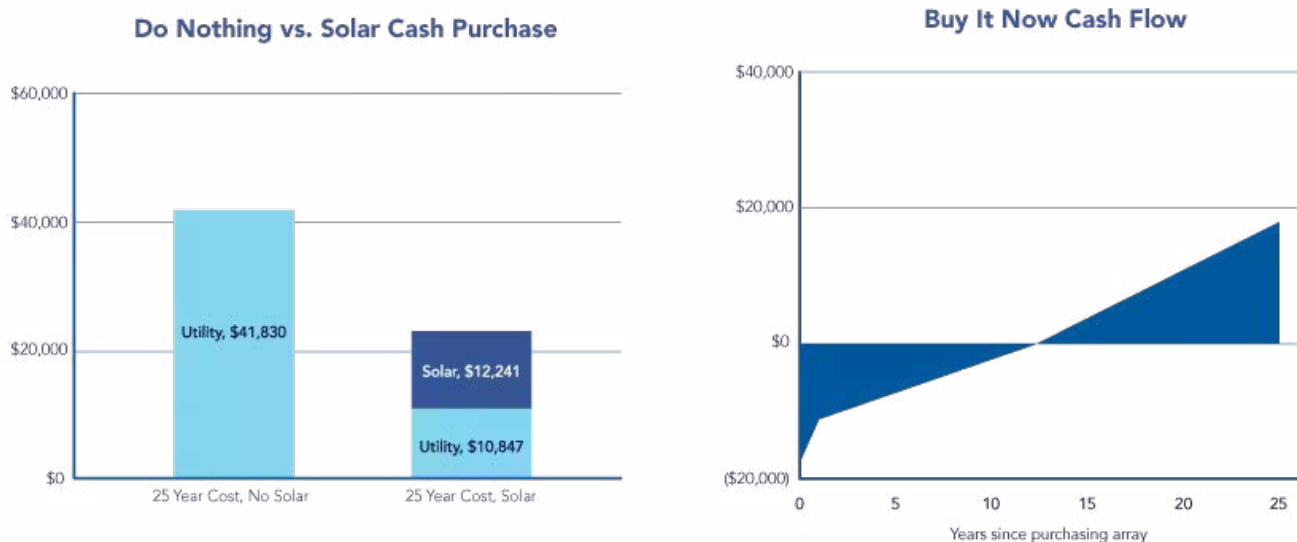


\*Solar project savings don't include added home resale value, which accounts for further ROI.

## Solar Cash Purchase: Reliable Savings Over Time

Every solar project we design includes graphs like the following, which compare (Left) the cost of doing nothing versus investing in a solar array, and (Right) the relative cash flow of an upfront cash purchase versus the ROI in terms of energy savings over time.

Paying for a solar system upfront grants you long term savings over time, even with the larger upfront payment.



The exact Internal Rate of Return (or IRR) of a solar investment will vary based on a number of conditions, including a site's solar access, the local rate for electricity, and available state incentives. However, most solar investors see a 25-year IRR of 8-12%, vastly superior to any other risk-free investment. Interested in solar for your home? Check out our [solar calculator](#) and see about how much you can save by going solar.

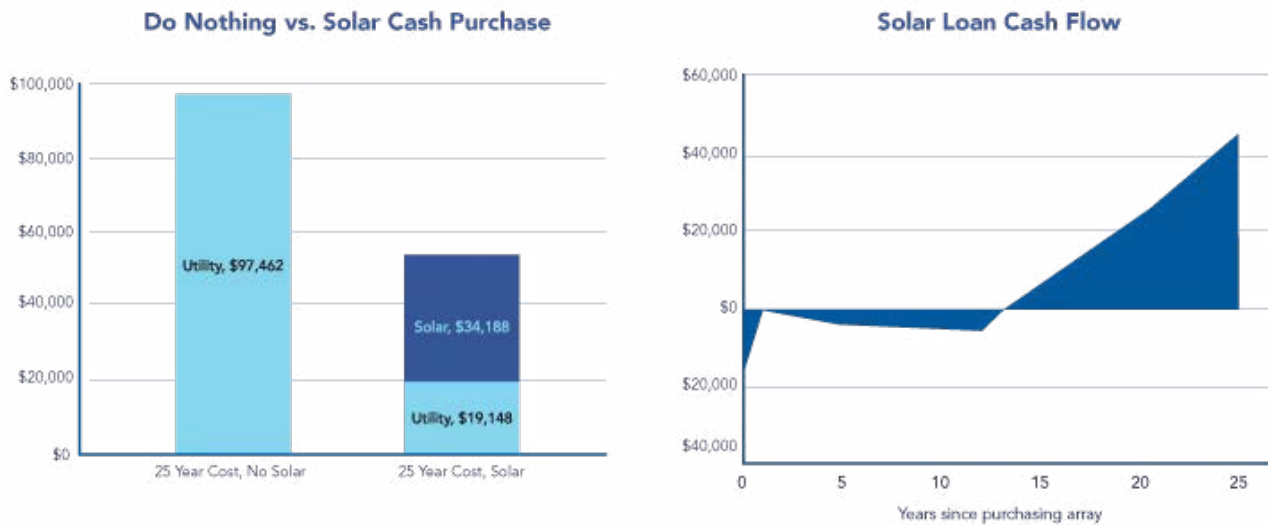
For businesses and institutions, the math is a little different, as the incentive structures are a bit different, and larger electricity consumers are usually billed on-demand profiles rather than a fixed rate for kilowatt-hour consumption. However, the business case is quite solid and especially with financing solar is an excellent choice for businesses who are keen to reduce their long-term operating expenditures.

## Solar Loans: An Affordable Way to Get Fixed-Price Power

One of the biggest reasons to choose to finance a solar array (beyond simply wanting to have solar on your roof) is to enjoy the peace-of-mind and security of a fixed payment for electricity that will not fluctuate with local electricity prices.

Buying solar using a loan product makes for a slightly different decision-making process. For those who are choosing to finance, usually it is a way to go solar earlier than would be possible if an upfront cash purchase was required.

Here is a simulation of the economics of solar electricity through a loan package:



The graph above simulates the economics of a solar project financed by a loan. There is a small premium (vs current electric bill) paid in the 1st 12 years, but once the loan is paid off there is quick payback and overall vast savings. Compare this to a solar lease where you would continue paying for the system for a full 20 years. Learn more on our [financing and solar loan page](#).

## Solar Increases Property Value

One of the lesser-known reasons for installing solar panels is that it [increases the value of your home](#). This will come in handy if you are looking to sell or rent your property. As residential solar gains momentum, it is becoming increasingly easier to sell your solar powered home. In New England, a solar photovoltaic installation will on average raise the value of the home roughly \$20,000 (based on a 4-5kw solar electric system).

As solar has become mainstream, a number of recent studies have sought to help homeowners, appraisers, and [real estate professionals](#) through the process of assessing the appropriate value for a solar energy system on a home in the event of a sale. Here are some take aways from their findings:

- The Berkeley National Laboratory ([“Exploring California PV Home Premiums”](#)) found that “each 1-kW increase in size equates to a \$5,911 higher Premium”
- The National Bureau of Economic Research ([“Understanding the Solar Home Price Premium: Electricity Generation and ‘Green’ Social Status”](#)) found that PV systems “add 3.6% to the sales price of a home ... [which] corresponds to a predicted \$22,554 increase in price for the average sale with solar panels installed”
- The Colorado Energy Office (“The Impact of Photovoltaic Systems on Market Value and Marketability”) found that “owned PV systems typically increase market value and almost always decrease marketing time.” Leased PV systems caused problems with the sales transaction in a number of cases.

We appreciate that market research proves what to us seems obvious: solar is an excellent investment, whether you are staying in the home long-term or need to sell. Solar provides a powerful suite of benefits not seen in any other home improvement:

- ✓ Proven ROI in the form of reduced energy costs for the life of the home
- ✓ Environmental ROI in the form of reduced carbon emissions
- ✓ Long-lived and durable equipment increases in value over time as costs of traditional energy rise

## Standing Out in a Crowd

While the actual dollar value of solar improvements is still an area of study, what is more easily observed is how solar helps sell homes more quickly. In addition to findings in the Colorado report (with realtors reporting feedback like “PV was a major marketing factor,” “Sold very fast,” and “Listing agent liked the system so much, he had it installed in his own personal home after this sale”).

Solar on your roof is definitely an eye catcher, but even if you don’t have an ideal roof for installing panels you can still enjoy the benefits of solar (property value and other). Thanks to the versatility of its technology and installation, solar can work for you on your roof, in your backyard, or in a field far away.

## 7. Solar works on the roof, ground, or in a field far afield.

The 75% decline in the cost of solar panels over the past 10 years has turned solar into a practical investment that is accelerating New England's transition to clean energy. Whether purchased upfront or financed, whether you own your home or rent, solar technology can help your household, business, or organization save money and the environment. This section of the guide covers many of the solar options available today. There is a viable way for everyone to go solar!

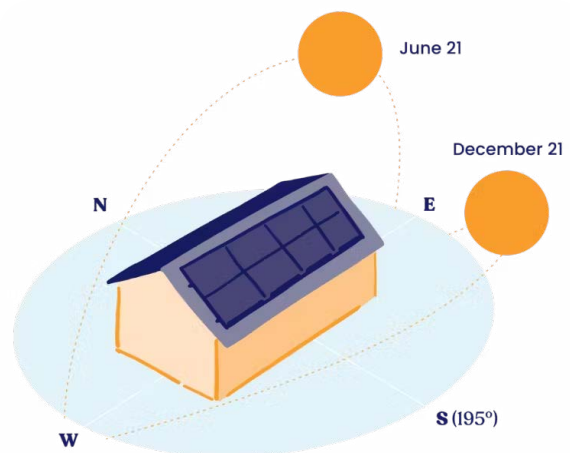
### The Basics of Rooftop Solar

Rooftop solar is what people often think of when they hear 'solar,' and it is ReVision Energy's most common installation. But after twenty years there have been advancements in the way we approach rooftop solar as equipment prices decline and electrical/fire codes become more rigorous.

Any roof that faces between southeast and southwest makes a great solar roof. If you want to get scientific, use a compass to see which direction your roof faces. The perfect solar orientation in New England is 195 degrees (15 degrees west of due magnetic south on a compass, also known as 'true south') but any orientation between 150 and 240 degrees is within 10% of perfect.

With that said, as equipment costs have dropped, our tolerance for off-axis systems has increased somewhat. For example, a solar array that is positioned due west may (depending on the roof slope) harvest within 20% of its ideal annual production. Since much of a solar project's total cost is fixed overhead (electrical connections, inverter, permitting, getting a crew on-site, etc.) it may be possible to simply add extra solar panels on a strongly east or west facing roof to make up for the production loss. You will still see a very strong ROI for your solar project. Because solar panels have become relatively inexpensive, adding additional solar panels does not significantly impact the fixed costs of the project but allows you to generate more power (and, accordingly, more savings).

What about the slope of the roof? Most common roof pitches, e.g. 4/12 to 12/12 are fine for solar and do not significantly impact the overall yearly solar harvest. More extreme angles (mounting on a flat roof or an awning mount) require special hardware but are also good options in many cases. **The graphic on the right compares the relative height of the sun in the skyline, to its orientation, at various times during the year.**



## Shading (Solar Access)

Ideally, we like to see a shade-free solar 'window' between 9am-3pm, year-round. When evaluating your site, a solar professional will use a tool such as a SunEye. These tools take a fish-eye photo of the open sky and then super-impose the sun's arc (adjusted for longitude) as well as any tree coverage onto the open sky photo. The results can be interpreted by software to develop a percentage figure of available solar access at a site (a sample rendering is pictured below).

Any significant shading during the 'peak' hours of the day will affect solar production and reduce the system's ROI, but because ReVision Energy employs module level optimizers on most of our residential projects, solar systems are more tolerant of partial shading than ever before.

Our team works hard to design the optimal solar array for every home we visit. When rooftop arrays are not possible or ideal, we can easily find other options, such as ground mounts.

## Solar Ground Mounted Arrays

For all those situations where a roof mounted system is not viable or wanted, another option is to install solar panels on the ground. Our Ground Mount array design and install team enables customers with unideal roofs to harness the power of the sun for their homes or businesses.

Due to the need to survive decades of punishment from harsh winters, ground-mounted solar arrays must be built particularly tough in the Northeast. The footings and wire management system must be able to handle hundreds of freeze/thaw cycles, and the panels must be able to withstand uplift from the wind, multiple feet of snow, and pummeling from rain and hail.

Historically, that has meant that ground-mounted systems in the northeast involve heavy excavation to pour large concrete footers to support the solar array. The concrete work is not only carbon-intensive and disruptive to the site, but costly. As a result, ground-mounted solutions have historically commanded a significant premium over roof-mounted projects of a similar size.

Our engineering team, not to be deterred by the challenge of marrying absolutely perfect product performance with a need to reduce costs and gain efficiency, has evaluated hundreds of racking and foundation solutions over the years. In 2016, we made an investment that significantly improves our ability to install ground-mounted arrays: a Pauselli 900 solar pile driver, which allows us to install pile-driven posts or ground screws for solar arrays without the need for any concrete.



With the new equipment in play, our premium for installing a ground-mounted solar array has dropped by over 26%, to the point where in some instances the ground mount solution will be cost-competitive with roof mounted installations.

Some advantages of ground-mounted arrays compared to roof mounts are:

- ✓ Systems can be oriented at perfect angle and shade-free area, no need to accept imperfect home orientation.
- ✓ Arrays can be located in less conspicuous area than on the roof.
- ✓ Arrays are not hindered with on-roof obstructions like dormers, skylights, and plumbing vents.
- ✓ No rooftop work is required, so certain parts of the installation go much more quickly.

## Member-Owned Community Solar (MOCS)

Available in Maine, Member-Owned Community Solar, or MOCS, offers home and business owners to receive the many benefits of solar without the need to install solar panels.

ReVision Energy's member-ownership approach to Community Solar is similar to Community Supported Agriculture (CSA). Rather than building the solar array on site at their own home (growing your own garden), a MOCS shareholder invests in a solar project somewhere offsite and gets credited for that solar energy (getting veggies grown by a local farm).

Thanks to pro-solar legislation in Maine, MOCS projects can have 100+ members, where each member receives a share of solar production from the total array relative to their percentage of ownership in the project.

Billing-wise, a MOCS share works identically to having solar production at your home. 100% of the solar electricity generated by the solar array is sent back to the grid. Each shareholder gets a credit—based on their percentage share—that is automatically applied to their utility account, which can accumulate for up to a year and be used for any electric load, whether that be heating water, heating the home, or powering an electric car.

The MOCS share is utility-specific. Should you move within your region and stay with the same electric utility, your share simply transfers with you. Should you need to move out of the region,



your share can be transferred to a new owner. ReVision Energy maintains a long wait list of people eager to buy out existing MOCS shares and can help set up the transaction.

## Practical considerations for going solar

When we discuss solar with a prospective customer, we need to know a lot about them in order to design a system. For example:

- Is a rooftop array feasible? If so, how much roof space is there? If not, is a ground mount feasible?
- Beyond pure production economics, what other factors are important? Aesthetics? Carbon reduction?
- What is the rate currently paid for electricity? How much electricity is used per month?
- Has this building had efficiency improvements? Is there room to decrease their need for energy inputs?
- How many people live in the home? How much hot water do they use? How is that hot water heated?

In addition to offsetting household electric bills, we look at every opportunity to reduce dependence on oil or gas by converting water heating and space heating equipment to solar, as well as storage options for solar battery backup. A very powerful reason to go solar is the technology's ability to be used in many ways and transform your house into a more renewable, energy efficient home.

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## 8. Solar can heat & cool your home and can be stored for backup power.

Solar isn't a one trick pony. When combined with various compatible technologies (all of which ReVision installs), solar can help your home or business become more efficient and less costly.

### Solar can heat and cool your home for less.

Today, efficient air source heat pumps are the system of choice for both new construction and existing homes to heat and cool efficiently, with or without solar energy. An air source heat pump uses the same technology as a geothermal heat pump, but since it uses ambient air as its source it is a much simpler project and, as a result, a smaller upfront investment.

Heat pumps have been used for decades in the Southern states, but thanks to dramatic improvements in their low-temperature performance, they are now being rapidly adopted in the Northeast. The latest generation of heat pumps can work in temperatures as low as -17 Fahrenheit.

The vast majority of systems we install are ductless, consisting of an outside compressor/evaporator and an inside air handler. The units are connected using copper refrigerant line; we triple evacuate the lines with a deep vacuum and dry nitrogen purge before charging them with an advanced refrigerant for the most efficient and reliable installation.



Based on current grid electricity prices, it costs the equivalent of around \$2.30/gallon of oil to heat with a heat pump, and using solar, as little as \$0.84/gallon! In cooling mode, a modern heat pump is roughly 1/2 the operating cost of a window unit air conditioner.

Learn more on our [dedicated Heat Pump page](#).

## Efficiently heat your water with solar.

Water heating is one of the most cost-effective solar technologies. For an average 4-person home currently heating domestic hot water with an oil-fired boiler, you can save more than 300 gallons of oil per year by switching to solar hot water!

The most efficient way to get hot water currently is to install a solar electric system and then generate electricity which can be used to power an electric water heater. We strongly recommend a well-made Heat Pump Water Heater (HPWH) which offers an incredible combination of efficiency and convenience.

## Some facts about Heat Pump Water Heaters:

- ✓ Instead of creating heat, they simply move heat from one place to another, so they are much more efficient than conventional electric water heaters.
- ✓ They help dehumidify the room they are in.
- ✓ They are highly insulated, meaning the energy you do use for hot water is not wasted in 'standby losses' as the tank sits idle.

- ✓ They are available in large tank sizes, which means that you can easily meet the needs of a 4+ person household.
- ✓ Many states have cash rebates for installing them.
- ✓ They are one of the only water heating systems that can be powered by the sun.

## Store your power with battery backups.

The climate crisis is leading to [an increase in extreme weather events](#) and power outages across New England. Combined with our growing reliance on home electronics, this has led many New England homeowners to install fossil fuel-powered generators to provide backup power in case of a grid outage. Thanks to rapidly improving solar technology, we can now offer a cleaner, quieter, more efficient method of backup power: Solar Battery Storage.

Every solar system we are currently designing is 'forward compatible' with storage, whether or not a battery pack is installed at the time of the solar installation. Not only can these "solar batteries" keep the lights on when the grid is down, but they can also support the utility grid by filling intermittent gaps in renewable energy production on stormy days.

A lot of progress has been made in the technologies that are involved in solar electric power production. The area of batteries is no different. Just a few years ago, the cost and challenge to integrate battery systems with a solar electric array meant that unless there was a specific use case—remote location, critical 24/7 electric loads—we would often advise a customer against adding battery storage. Simply put, a grid-tied solar array (dependent on the grid with no on-site battery backup) was simpler, more reliable, and a better overall investment.

Learn more on our dedicated [Solar Battery Backup page](#).



## Solar Battery Storage vs. Generator

The increased frequency of extreme weather events in New England (which scientists link to the effects of increasing carbon pollution in our atmosphere), together with our increasing reliance on electronics in the home has led many New England homeowners to install fossil fuel powered backup generators to provide assured power in the case of a grid outage.

Many homeowners also are concerned about the [threats of cyber attacks or terrorism on grid infrastructure](#). Hundreds of thousands of generators are sold across the United States each year, the majority of them dirty, inefficient, gas-burning portable backup generators sold at big box stores.

For the homeowner considering a propane or gas powered standby generator, the economics and properties of a solar-powered storage solution can be quite attractive. While a generator can provide power for everything, for a limited period of time, a solar + battery solution can provide power for the essentials, for a near unlimited period of time.

Additionally, solar arrays perform consistently well in New England's snowy, storm-prone climate, granting residents with solar powered homes a great level of security during our tough, unpredictable winters.

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## 9. Solar panels work in the winter.

One of the most frequent questions we get about solar is "do solar panels work in winter?" The answer is yes, even in blustery New England.

Many people are shocked to hear that solar panels work in winter weather, especially with the Northeast's frequent snowstorms. And it's true that because of shorter days and snow cover, a solar system's output can be lower than on a long summer day. However, thanks to solar panels' increased efficiency in colder months and the surplus of energy produced in the summer, your solar system will generate power and achieve its estimated output as it continues to work during the winter.

Solar panels are a resilient and reliable source of energy all year long, and are actually more efficient in colder temperatures. We at ReVision Energy have been installing solar arrays in New

England for 20 years and we know how winter and solar interact. During our free site evaluation, we use sophisticated solar path modeling equipment to estimate how much solar energy your roof or yard receives. Depending on your exact location, we 'de-rate' the predicted annual output based on the average amount of snow your region receives. While there will always be seasonal



variations, over the course of your 40+ year solar investment, your system should produce very close to our estimate.

Technical excellence is a key value at our company. Though some solar installers are tempted to be a bit...optimistic...with their production numbers, we prefer to give more conservative figures when we calculate your potential system and savings. (You can do this too with our [Solar Calculator!](#)) We would rather have your solar array outperform our estimates rather than underperform.

*It's important to note that because solar energy output is tracked on an annual basis (thanks to net metering), you stand to benefit from the higher overall summer output vs. winter. Since you always have the grid for a back-up, real-time 100% solar power to your home from your panels in winter is not critical.*

Even in the nastiest of winters, solar is a solid investment with numerous benefits for you and your community. Additionally, if you pair solar with a battery backup, your home can thrive in the winter, even during a famous New England winter power outage.



## Do solar panels work in winter?

Yes! Many people are surprised to learn that solar panels in winter conditions can actually improve their performance, further minimizing the drop in production due to snow on the panel or the loss of daylight hours. The photovoltaic (PV) technology in solar panels is able to more efficiently convert sunlight to power when it is colder. [We have a whole blog post about this](#), if you're interested in learning more.

Further still, snow reflects additional sunlight onto your panels, increasing the amount of energy your system is able to generate on any given day.

## Do solar panels work covered in snow?

When a solar panel is covered with snow, it cannot produce electricity. However, solar arrays tend to shed snow pretty well—the panels themselves absorb the sun's heat as well as its light, they are mounted to face the sun and are often on a slope.

While it's true that snow covered solar panels produce less energy when they're covered with snow, the percentage of overall yearly production lost is actually very small, which still makes them a good investment for prospective customers.

We do not recommend that owners of solar systems clear the snow from their arrays as this could damage the array and is not covered under the warranty. Additionally, the panels themselves tend to be in difficult or even dangerous areas to access on the roof.



## Do I need to clear the snow from my roof or panels?

If your roof and panels are covered in snow, no need to panic. When the sun reemerges after a storm, sunlight will hit the snow on your roof and cause it to shed from the panels fairly quickly. Additionally, our solar panels are built to withstand heavy weather and piles of snow. So no need to try to get the snow off your roof. We think your time is better spent indoors enjoying a cup of hot chocolate and looking forward to the next sunny day!

*Here is a picture showing a large rooftop array "shedding" its snow on a sunny day.*



Some customers have solar arrays that are easy to access and are willing to put in some effort to optimize their system for every possible ounce of performance. If you fall into this camp, here are a few tips. If you have a roof rake, use it to clear the area beneath the panels so that snow has a place to slide to when it sheds from the panels.

Be careful! While customers have reported success using this technique, any damage caused to your panels will not be covered under warranty. Absolutely do not try to clear the snow from collectors with the sharp edge of a metal roof rake (and never use any type of rake on evacuated tube collectors). Also, be mindful of your safety—a few extra hours of production in the shortest daylight times of year are not worth you injuring yourself.



## Solar is a great choice, no matter the time of year.

We've seen that even in the nastiest of winters, solar is a solid investment with numerous benefits for you and your community. It is an abundant resource with many different implementations, and one that heats and cools your home and even works in the winter. Additionally, if you pair solar with a battery backup, your home can thrive in the winter, even during a famous New England winter power outage.

Essentially, aside from saving you money on your electric bill solar can do it all, and turn your house into a more sustainable, low impact home.

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## 10. Solar is the solution to humanity's greatest problem: the climate crisis.

More than 60% of the electricity generated in New England comes from natural gas and oil, followed by nuclear (14%) and coal (9%). Maine and New Hampshire emit over 10,000,000 metric tons of CO<sub>2</sub> emissions annually, a result of burning over 50,000,000 gallons of oil and 2,800,000,000 lbs. of coal. Additionally, the use of these fuels exports more than \$5 billion annually out of the local economies.

Our region's over-reliance on fossil fuels and the resulting carbon pollution is threatening to

our tourism industry, our marine fisheries industries and our way of life. As a region, nation, and planet, we face stunning environmental challenges over the next 25 years, yet, the sunny news is that for all of the doom and gloom, there is a solution out there... In fact, that solution rises every morning!

The team at the [Solutions Project](#) recently crunched the numbers to figure out what a carbon-free future would look like. Their research supported our own, which suggests that converting just 1.5% of our region's land mass to renewable energy generation would be able to meet all of our energy needs now and forever.

This initiative is mandatory should we hope to stop the worst effects of climate change; however, for the climate skeptics, there are vast benefits beyond saving the planet.

This initiative is also the fix for our economic woes, as the work needing to be done to integrate a renewable energy economy requires skilled workers, and somewhere in the order of 500,000 new jobs would be created were we to full transition to renewable energy in the next 25 years.



## Solar supports social justice and energy democracy.

Widespread adoption of solar technology is also necessary for the democratization of energy, and the increase of equity and justice for populations who have disproportionately suffered from the effects of the climate crisis. We also need to grow solar access for communities of color, indigenous communities, and other underserved populations who have been disproportionately disadvantaged by our fossil fuel based economy.

The more our states turn to locally produced solar energy to power our homes, businesses, schools, and neighborhoods, the more we can spread the environmental and economic benefits of solar to underrepresented and low-and-moderate income communities. Going solar supports the intersectional movements of environmentalism and social justice, in your community and beyond.

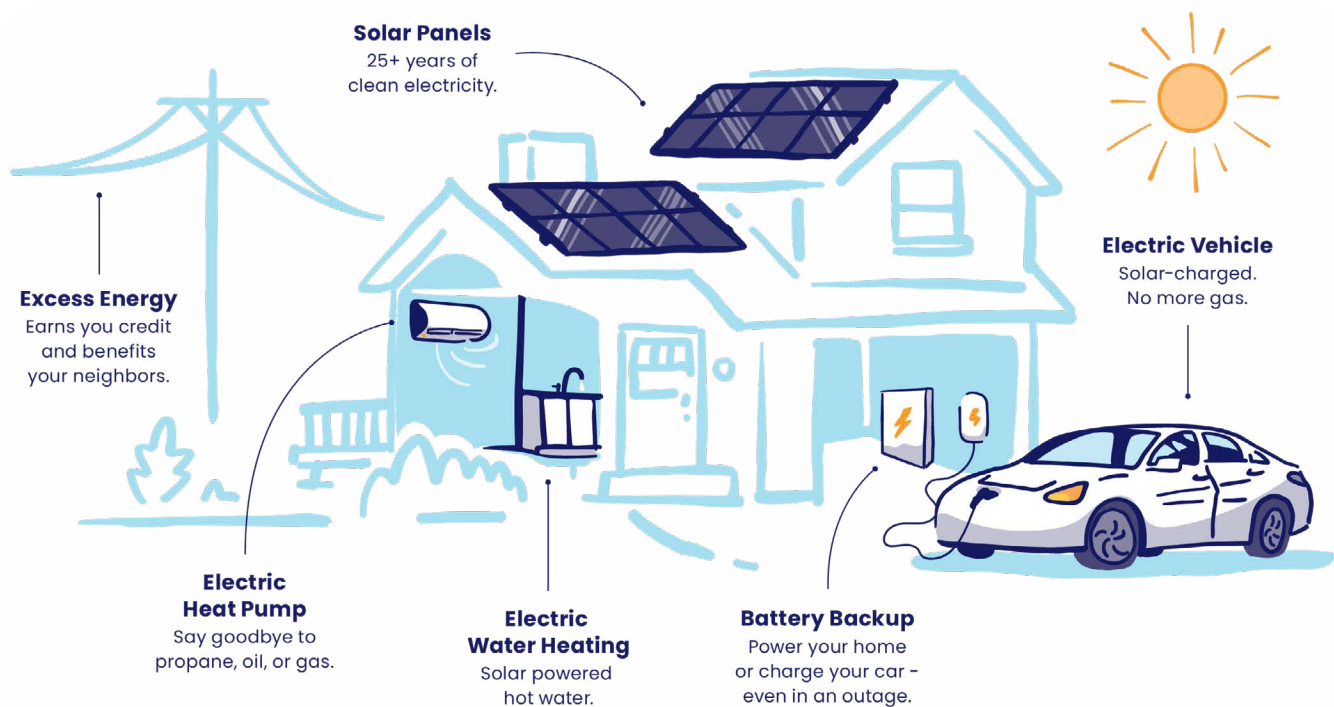


The technology is here and throughout this website, we explain how it works, and the powerful

economic and environmental benefits. While State and National leadership leaves a lot to be desired in this major initiative (which truly should be a national effort, of the same order as the Space Race), we are excited and energized that the grassroots growth of solar is fast, and rapidly growing, thanks to conscientious, and financially-savvy solar enthusiasts throughout Northern New England.

## More Than Just a Sunny Dream

Lucky for all of us, there is hope. The Solar Household (or business) is a tangible, affordable, and logical option for New Englanders eager to take advantage of our sunny resource. While a fully 100% renewable household is not an immediately viable option for everyone, we can all take tangible steps towards lessening our impact through solar technologies.



Combining the benefits of year-round reliable solar energy, the efficiency of heating and cooling pumps, and the savings of solar backup storage, the 100% Renewable Household (or 90%, or even 60%) is a real possibility for homes and businesses today.

At ReVision Energy we have helped hundreds of customers complete the transition to living fully off of the sun's power and more on the path to doing just that. So, whether you are just Solar Curious or already a committed Solar Champion, on your merry way to making the switch to the solar power, there are plenty of options available. Plus, the solar professionals at ReVision are ready to advise you.



## Next Steps

This guide provides some general information about what going solar looks like, but everyone's situation is different. Legislation and incentives differ from state to state, nor are any two houses the same.

**Reach out to our expert Solar Advisor team and start your unique solar journey with a [Free Solar Site Evaluation](#) to see what options are available to you.**