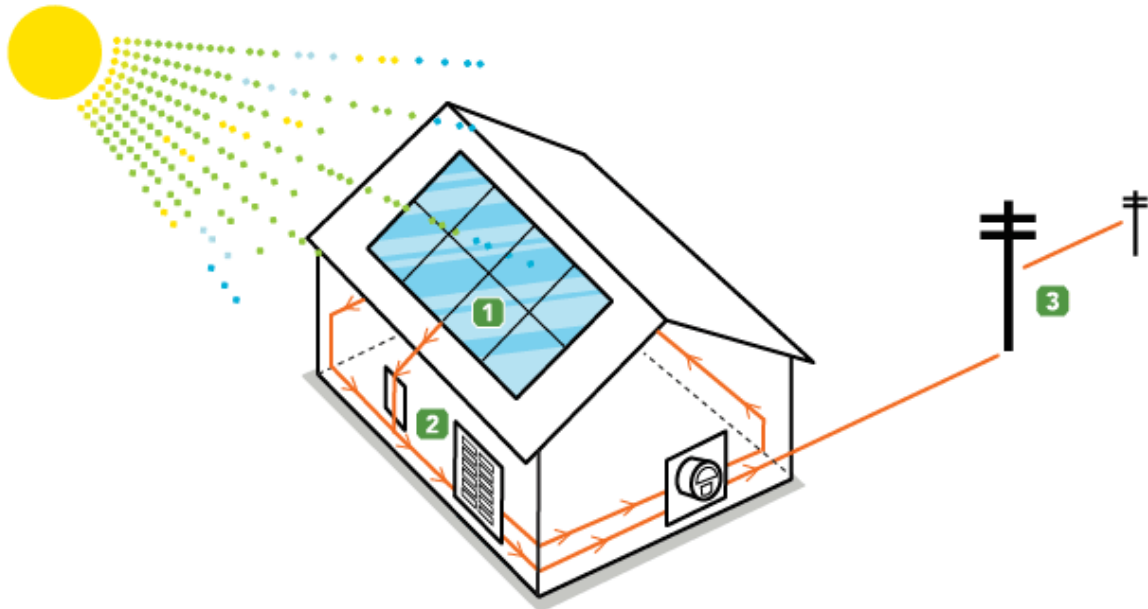




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## FREQUENTLY ASKED QUESTIONS

### 1. How do solar panels work?



- ① Your solar panels capture sunlight and convert it to DC electricity
- ② Your solar system converts that energy to an AC current that can power your home
- ③ Energy you don't use flows back to the utility grid (and creates a "credit" for you)

Solar panels that convert light into electricity are called photovoltaics (PV). When the sun shines, the electricity travels down wires into a piece of installed equipment called an inverter. An inverter converts the type of electricity produced by the panels (called Direct Current, or DC) into the type of power your home uses (called Alternating Current, or AC). Once the electricity goes through the inverter, it travels through another length of wire into your home's electrical panel. At night, when your panels are not generating electricity, you continue to get electricity from the local utility. But during the day, your solar panels can produce more power than you consume, feeding power into the utility grid, supplying clean electricity to your community and spinning your meter backward. If you ever produce more than you use in one month, you will get a credit on your electric bill, which will apply to your next bill.

### 2. How much impact can solar panels have on the environment?

Solar panels have a life of about 30 years (many from the 1950s are still in operation, actually), so once you install your solar panels, the environmental benefits last for decades. Here are some ways to think about the environmental impact that an average (5 kW system) solar home can have on the planet over the life of the panels:

- 3,030 trees planted

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- 22 cars taken off the road for a year
- 41 tons of waste recycled vs. land filled

Once your Astrum Solar system is installed, you can track your daily personal energy stats and see exactly how much money you're saving and how much you've reduced your carbon footprint. Just log onto your personal online Performance Monitor and you can look at how each individual solar panel as well as your whole system, is performing, hour by hour. Astrum Solar systems employ microinverters (compact units that are attached to each solar panel in the system) so that you can track the performance of your system panel by panel, hour by hour.

### **3. How much power can my home produce?**

The amount of energy generated from solar panels depends on the size of the system; the larger the system (i.e. the more panels you have), the more electricity generated. The size of your system is limited only by your roof size and your site quality. It's possible to supply 100% of your home's electricity from solar panels, but most solar homes are "hybrids," with part of their electricity coming from panels and part from the utility grid. Generally you can get about 1 kW on 100 square feet so an average size 5 kW system (5,000 watts) covers about 500 square feet.

### **4. With energy costs steadily rising, how will going solar impact my electric bills?**

Having solar panels can reduce your electricity bills by a significant amount. Every watt-hour of electricity your panels produce is one less watt-hour you have to buy from your utility company. If 60% of your power is produced by your solar panels, your electric bill will be 60% lower because only 40% of your electricity has to come from your utility company. And with rising electricity prices over the long-term, the value of your savings increases over time. A home with an average-size solar installation (5 kW) can generate \$40,000 in energy savings over the course of 20 years (not even the full lifetime of the panels).

### **5. How much will installing solar panels cost?**

The cost of solar panels varies from home to home, depending on the size of the system. The larger the system, the more panels you have and the more your electricity bills go down. You choose your system size based on what portion of your electricity needs you want your panels to supply. There are a wide variety of federal, state, local, and utility incentives that will drive down the total costs of the system considerably. There is a federal tax credit that will absorb 30% of the cost, often a state rebate that will pay you an additional 10-15% of the cost and a variety of utility programs and local incentives that might be available to you depending on where you live. The incentives require some paperwork, which Astrum Solar will do for you, and some waiting, and are sometimes limited, but in general they will decrease the cost of the system by up to 70%.

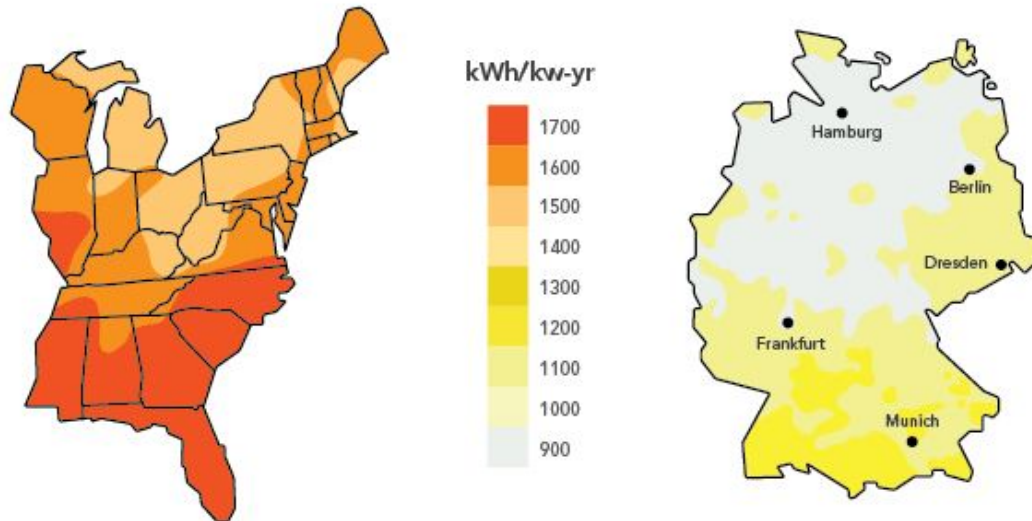
### **6. I can see how going solar would make sense in a place like Arizona, but is the Eastern U.S. really a good place to install solar panels on your home?**

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Believe it or not, the region gets 85-95% as much sunshine per day as Florida, the official “sunshine state.” And we get almost twice as much sun as Germany, the world leader in solar installations.



#### 7. How does installing solar panels affect the value of my home?

Solar panels are one of the few home improvements guaranteed to increase the value of your home. Most home renovation choices are subjective. In contrast, the value of solar panels is objective – they decrease your electricity bills, providing value to you and anyone else who owns your home. According to *The Appraisal Journal*, a home’s value is increased by \$20,000 for every \$1,000 reduction in annual operating costs from energy efficiency. This is the basis for the default setting in our online Solar Calculator. A recent *BusinessWeek* article reported that homes with solar panels sell faster than non-solar homes (outselling others by as much as 2:1) and at a premium price. And unlike most home improvements, which depreciate in value with age, solar panels will increase in value over time as electricity prices grow. So even if you don’t plan to stay in your home for a long period of time, your solar panels are still a good investment – better even than a kitchen or bath remodel.

#### 8. Once solar panels are installed, how much maintenance is required?

The reason why this technology makes so much sense for homes is its low maintenance needs and long-term reliability. It is basically a sheet of silicon in between two sheets of tempered glass. It has no moving parts so things don’t break down, and you don’t need to perform maintenance. Rain typically provides all the cleaning the panels need.

In the unlikely case of an issue, the diagnostic capability of the microinverters Astrum Solar uses will send an alert to the monitoring system via the Internet. If something isn’t working or a panel isn’t producing like it should, Astrum Solar will troubleshoot the issue and deal with it. With traditional inverters, you wouldn’t know if you had a performance issue if a specific panel.

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In the event something requires maintenance, Astrum Solar provides a 10-year warranty that covers everything free of cost.

### 9. Why go solar now? Won't the technology just get better and cheaper if I wait?

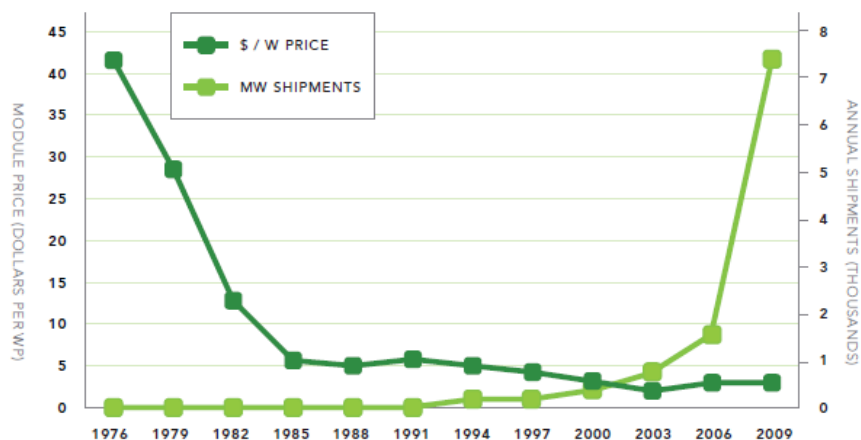
You actually did wait. The movement to microinverters has dramatically increased solar panel performance for the first time in decades. We constantly monitor the industry and that is what led us to make this new technology a part of all our installations. Solar panels are a very mature technology that has not changed much since its development as part of the space program in the 1950s. There are a few headline-grabbing technologies that are currently being developed in university labs, but they won't be available to consumers for about 10 years, and even then most of those technologies involve low efficiency panels or centralized power stations which are not appropriate for homes.

Material costs have dropped around 5%, but incentives have gone down by 10-25%. So yes, if you wait, you can get slightly lower prices on the panels, but the incentives could be much lower and you will end up paying the same or even more out-of-pocket to install solar panels. Plus, you also just postpone achieving the energy savings.

In the first 30 years, the prices of solar panels DID come down dramatically as the technology got better and we found new ways to make more efficient and cheaper panels. But most of those gains were achieved by the 1980s and since then the panel prices have dropped but much more slowly. Over the last 20 years, solar panels have declined about 5% per year. With the recession, the commodity input costs are as low as they have ever been so panel prices are artificially low today. Much of the cost of solar panel is 'refined' silicon, like what is used in semiconductors. These prices dropped along with other commodities in the recession. The price of panels is expected to rise when the economy recovers.

## SOLAR PANEL PRICING TRENDS

Price declines have slowed considerably and are unlikely to drop much further



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The reason you are hearing so much about solar panels now is that the incentives for solar exploded over the last 10 years. The incentives actually peaked in 2002 in California and a few years later on the East Coast. The incentives are now decreasing, as states run out of money, and as more and more people adopt solar. Also the Solar Renewable Energy Credit prices are scheduled to decrease as well.

**10. How does Astrum Solar assist in the process of applying for tax credits and incentives?**

Once you decide to move forward with the installation, you can sit back and relax. We'll write up a contract and secure all necessary electrical and building permits. We'll also help you fill in and file the paperwork for your rebates from the federal, state and local government. We'll send or bring all the forms to you for signature and follow-up on your behalf.

**11. How long does the entire process of going solar take?**

From start to finish, projects usually take 2-4 months. The time frame is due to the complexity of dealing with county, city, HOA and utility stakeholders. On average, it takes 30-45 days to pull all the required building permits. HOA approval can usually be done in parallel, but sometimes it adds time if, for example, they only meet once per month to review. It also can take some time to get all the necessary forms from utility companies processed, though usually this is able to be completed in parallel with the permits. The installation itself usually takes only 2-3 days.

**12. Does Astrum Solar offer a warranty/guarantee on its solar panels?**

Our guarantees extend beyond the installation itself to other "what if's": we offer simple solutions if you move or change your roof, or just change your mind. Want to take your solar panels with you to a new home? We'll take them down and reinstall them at your new house for a low flat rate (to cover labor and new parts). Or, we'll buy the panels back from you for \$1,250 per kilowatt. We warranty our installations for 10 years, and our microinverters and panels (the most expensive part of your system) are warranted for 15 and 25 years respectively. We monitor your solar panel system remotely. If anything goes wrong, we'll show up and fix it.

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