



**COTUIT SOLAR**  
**CUSTOMER**  
**MANUAL**

**info@cotuitsolar.com ~ 508-428-8442**





**COTUIT SOLAR**

**508-428-8442**

Congratulations! You are now generating your own electricity! Our partnership doesn't end with installation. We are here to help with any questions you might have.

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## Attachments

Understanding Your Electric Bill

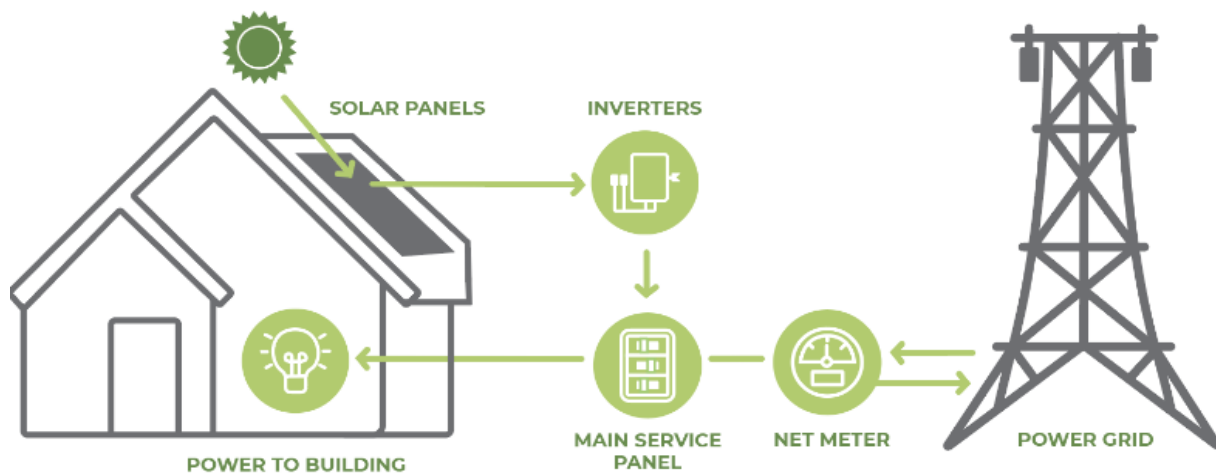
Envoy (Gateway) Communications Troubleshooting Guide

## How Your Grid Tied Solar System Works

The PV (Photovoltaic) modules capture the sun's energy and convert it to direct current (DC) power. The micro-inverter converts the DC power to alternating current (AC) power for household use. Your solar energy system is grid tied and net metered, which means your meter runs backward and feeds electricity back into the utility grid when there is excess solar production.

The installation seamlessly connects to your home or business power supply, reducing and potentially eliminating charges on your electric bill.

Grid tied solar systems without battery backup do not power your home in the event that the utility grid goes down. Solar modules do not produce power at night.



# System Terms and Components

## ***DC vs. AC (Direct Current vs. Alternating Current)***

Solar modules produce direct current (DC). Your inverter converts this electricity to alternating current (AC) for household use. Your solar system is measured both by the DC rating (solar module rating) and by the AC rating (inverter rating).

## ***Watt (W)***

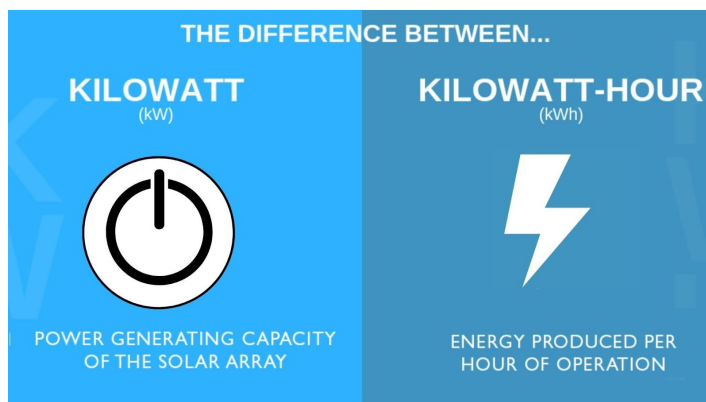
A Watt is the unit of electrical power equal to one ampere under the pressure of one volt. The power rating of a solar module is measured in Watts.

## ***kilowatt (kW)***

A kilowatt (kW) measures the power of a solar panel or an electrical device or appliance. A kW is equal to 1,000 Watts. A PV system is referenced by the power rating of the solar module in W's times the number of modules. For example, if your system has twenty, 420W modules, the total capacity of your system would be 8,400W, which equals 8.4kW.  $20 \times 420W = 8,400W$  (8.4kW).

## ***kilowatt-hours (kWh)***

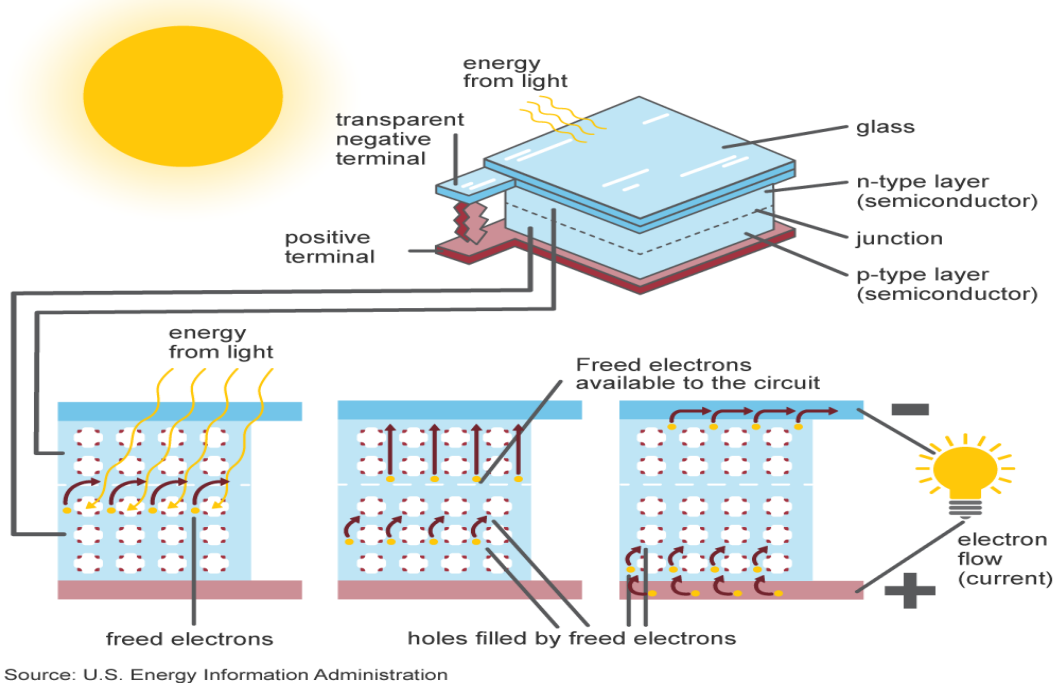
A measure of energy, or power over time. For example, if a solar system produces 1kW continually for an hour, it produces 1kWh. Kilowatt hours are an accurate representation of overall solar production, as it shows value over time rather than in a single moment.



## ***Photovoltaic (PV) Modules (Solar Panels)***

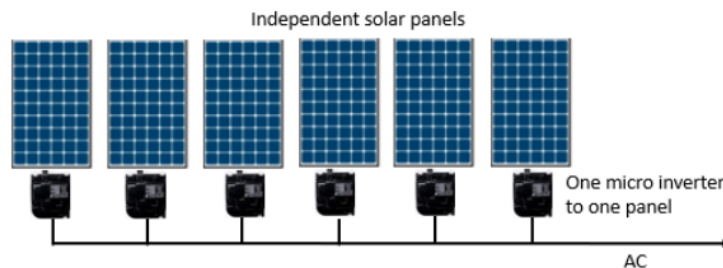
Photovoltaics (PV) is the conversion of light into electricity using semiconducting materials. Solar panels or modules convert the sunlight into direct current (DC) electricity. Solar electric producing modules are most commonly referred to as PV modules.

### **Inside a photovoltaic cell**



## ***Micro Inverters***

The microinverters convert direct current (DC) to alternating current (AC). AC is the same as the electricity you purchase from the utility and use in your household. Each solar module has a micro inverter paired with it.



## Gateway (Envoy)

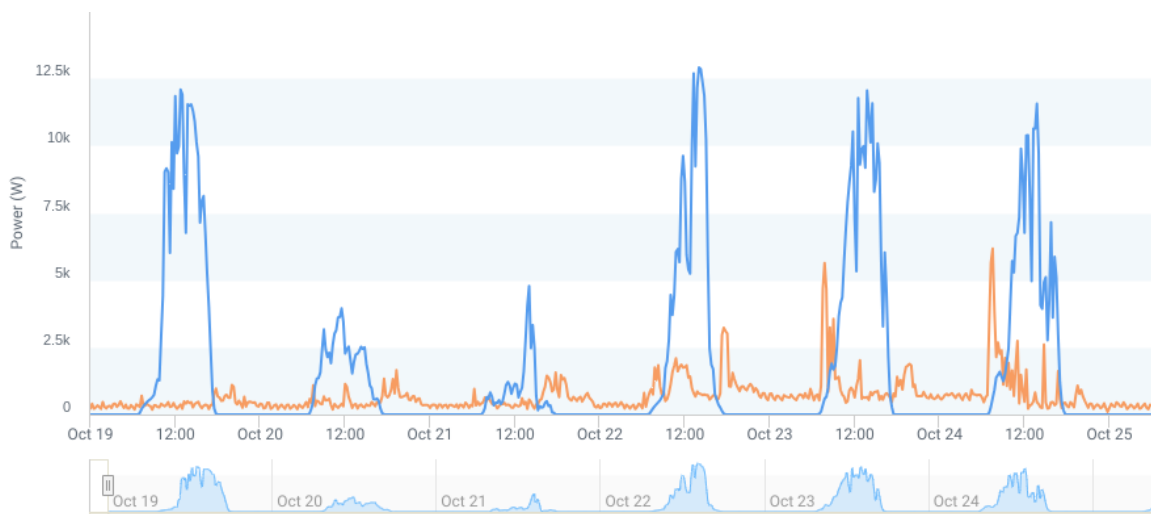
The Enphase IQ Gateway bridges communication between Enphase IQ Microinverters and the Enphase App called MyEnlighten which provides remote monitoring and visibility into system performance. The IQ Gateway communicates with IQ Microinverters via standard AC power lines and the Enphase App via cellular or wireless internet.



## Consumption Monitoring (CT's)

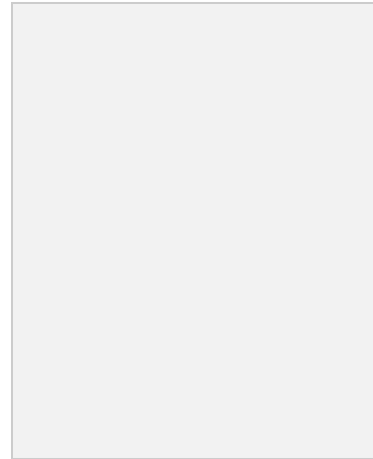
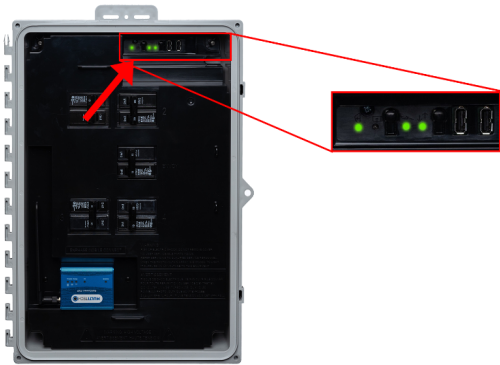
Consumption monitoring measures household consumption using Current Transducers (CTs). Consumption monitoring can be added in some situations at an additional cost.

*The blue line represents PV production, the orange line represents consumption*



## ***Combiner***

The combiner box's function is to combine AC power that comes from your roof. This combiner houses the Gateway (Envoy) in Enphase systems.



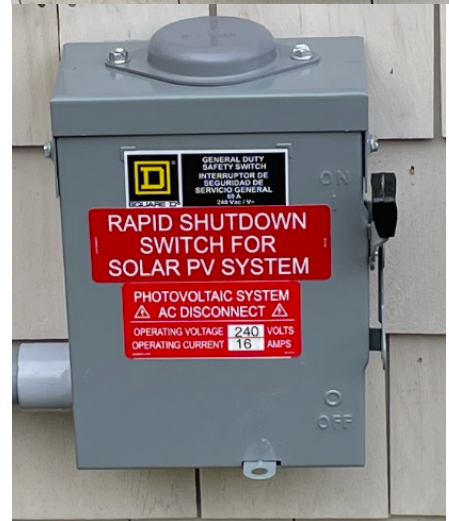
## ***Production Meter***

The production meter measures your solar system's total production.



## ***Net Meter***

The utility will swap your existing meter and replace it with a net meter after your solar installation is complete. The net meter will run backward when you are producing more electricity than you are using on-site. The meter will run forward when you are using more electricity than you are producing. The net meter is read each month by your utility. The net meter is a utility owned meter. You will be billed or credited for your net monthly electric use.



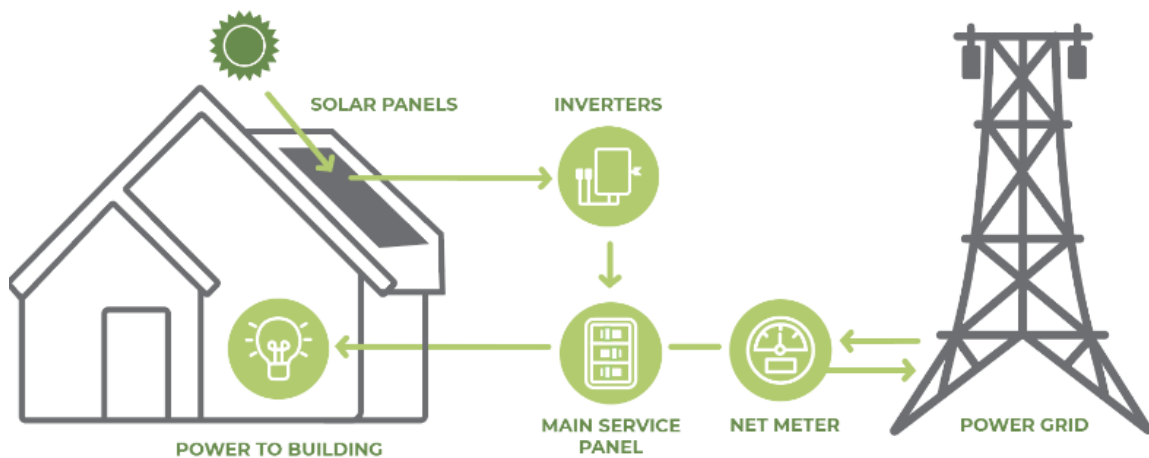


## ***Exterior Disconnect Switch***

Massachusetts utilities require solar systems to have an exterior disconnect switch (located on the exterior of the home), so the system can be shut down from the exterior of the home if needed.

## ***Utility Grid***

The electricity provided by your utility flows through the electric grid that your solar system is tied to. When your solar system is not producing enough electricity to power your home, the additional power needed will come from the electric grid.



# Turning Your System On

## ***STEP 1. Locate your Exterior Disconnect***

The AC Disconnect will have a lever on the right side of that box. Please make sure that the lever is up and in the **ON** position. It is usually located next to your utility meter (if your meter is on the house).



## ***STEP 2. Locate your solar breaker***

This is either in the main electric service panel (MSP) for your home, or a separate electrical enclosure on the side of the MSP. Locate the Solar PV Breaker. This breaker will have a red sticker next to it. Please make sure that these are in the **ON** position.



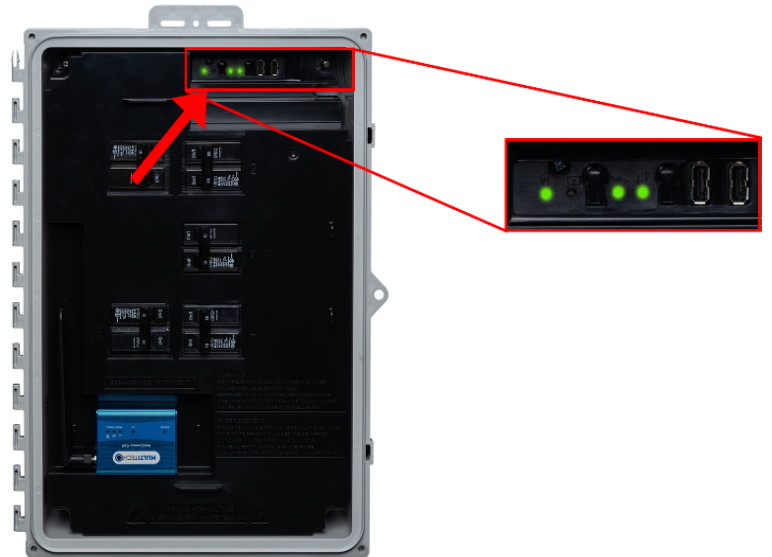
## ***STEP 3. Open up your Enphase combiner (big gray box)***

Please open the box using the clips on the right side and flip the breaker switches in the **ON** position. Please flip any other breaker switches with an electrical wire connected to them into the **ON** position.



## ***STEP 4. Check for green lights***

After 10 minutes look for the black rectangle device inside the combiner box. This device will have symbols on the right-hand side. Please make sure the cloud with an arrow, the lightning bolt, and arrows pointing in opposite directions show a green light. (If you do not see these right away, give it about 10 minutes to power up).



## ***STEP 5 Your system is now on and producing***

Once all the steps are completed your system will be up and running and you will have officially gone solar!

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*If you change your internet or router you will need to reconnect your Gateway to your internet, see the attachment:*

***Envoy (Gateway) Communications Troubleshooting Guide***

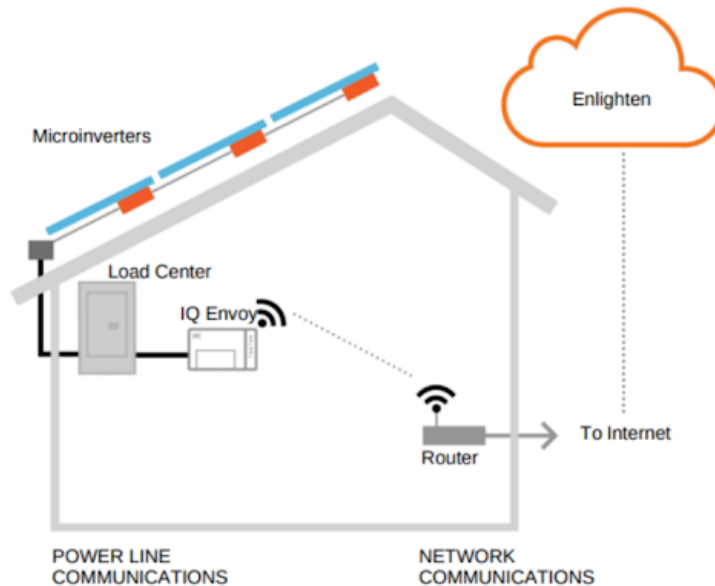
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**Please note: Restoring your internet connection is the only thing that is not covered in your Cotuit Solar contract.**

# ***System Monitoring and Maintenance***

**Monitoring system production is the owner's responsibility.**

## ***Monitoring Your System***

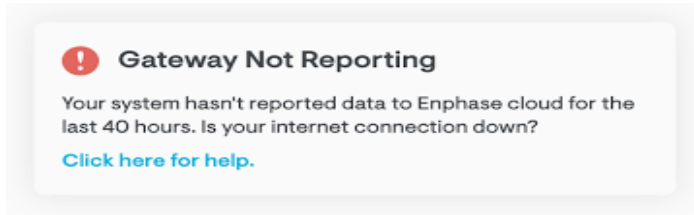


You will have access to the Enphase Enlighten portal to view your solar system's production and performance.

Once your system is turned on, you will receive an email that contains a link to follow with directions on how to access and set up your login credentials to the Enphase Enlighten portal. This will allow you to view your solar system online at any time. While we do our best to monitor your system, we cannot guarantee that we will catch everything, especially if the system becomes disconnected from the internet.

Please check your system periodically on a sunny day to make sure everything is working properly. You can do this by looking at your Enlighten portal, and/or looking at your production meter and **seeing that the numbers are counting upward.**

**If the system is not communicating, you will receive an email alert. Don't worry, your system is most likely still producing power.**



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## ***Maintaining Your System***

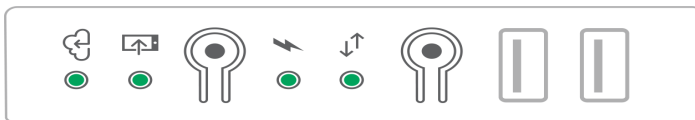
Generally, a solar system requires very little maintenance once it is installed.

Gateway (Envoy): It is a good idea to check your Gateway (Envoy) inverter periodically to make sure the green LED lights are illuminated. If the green LED lights are not lit during the daytime hours kindly refer to the next section.

## ***How do I read the LEDs on the Envoy-S or the IQ Gateway?***

The LED/Buttons panel may be arranged horizontally (IQ Combiner) or vertically (IQ Gateway or Envoy S) based on your Gateway model.





### ***LED/Button arrangement as seen on iIQ Combiner***









### ***LED/Button arrangement as seen on IQ Gateway or Envoy S***



# Envoy-S / IQ Gateway Displays and Controls Envoy-S / IQ Gateway LED States

LED	State	Description
All	Flashing amber in unison	The Envoy-S is booting up
	Flashing green sequentially	Software upgrade in progress
Network Communications 	Solid green	Communicating with Enlighten
	Flashing green	WPS connection in progress or the Envoy-S is attempting to connect to Enlighten
	Solid amber	Local network connection only
	Off	No network connection
AP mode 	Solid green	AP mode enabled: Envoy Wi-Fi network available
	Off	AP mode disabled: Envoy Wi-Fi network unavailable
Power production 	Solid green	All communicating microinverters are producing
	Flashing green	Microinverter upgrade in progress
	Solid Amber	At least one microinverter is not producing
	Off	Microinverters are not communicating (low light or night time)
Microinverter Communications 	Solid Green	All microinverters are communicating
	Flashing Green	Device scan in progress
	Solid Amber	At least one microinverter is not communicating
	Off	Microinverters are not communicating (low light or night time)

-  — **Network Communications LED:** Green when Envoy-S is connected to Enlighten.
-  — **AP Mode LED:** Green when Envoy's AP Wi-Fi network is available.
-  — **AP Mode Button:** Press to enable Envoy's AP Mode for connecting with a mobile device. Hold for 5 seconds to start WPS connection to a router.
-  — **Power Production LED:** Green when microinverters are producing power.
-  — **Microinverter Communications LED:** Green when microinverters are communicating with Envoy-S.
-  — **Device Scan Button:** Press to start/stop 15 minute scan for microinverters over the power line.

## ***Cleaning Panels:***

Annual rainfall should be enough to keep your solar panels clean. Typically, dirt has little to no effect on energy production. However, if you notice that the panels are dirty you can hose them off but only in the early morning or late afternoon. **Never get on the roof to do this.** Some companies clean solar panels, and you can call us for a reference.

If your system is covered in snow and ice, do not attempt to remove it, as it could result in damaged equipment. Let the snow and ice melt naturally and your system will soon be back to normal production.

## ***Shade:***

At least once a year, examine any trees surrounding your home to see if they've grown enough to shade your system.

## ***Roof Repairs:***

Your rooftop solar system can last more than 30 years. If your roof requires repairs or is being altered due to remodeling, your solar system may need to be removed and reinstalled. Please contact us for an estimate to remove and reinstall the system.

## ***Critter Presence:***

Critters such as squirrels like to settle under solar arrays and other wires! If you hear critter activity on your roof, please contact us ASAP to come take a look and remove the critters. Critter Guards are only a deterrent and are not guaranteed to prevent critters from getting under your array.

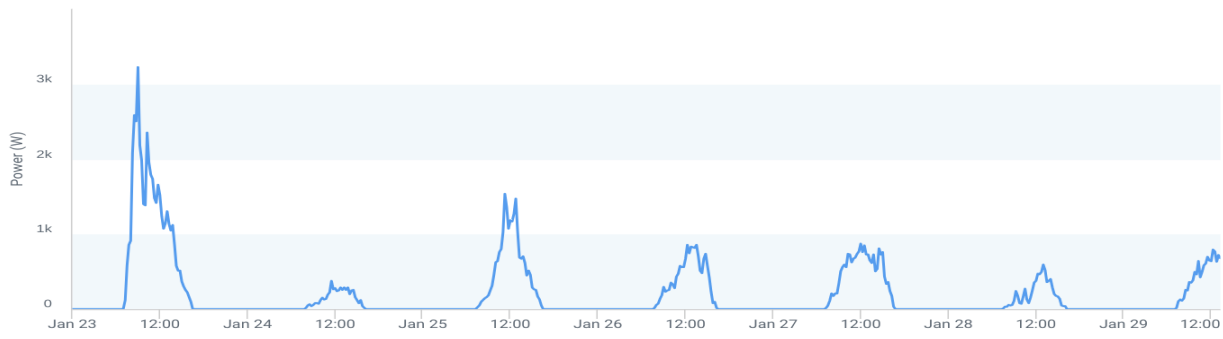
If you notice leaves under your Critter Guard please give us a call and we will put together an estimate for removal.

# System Performance

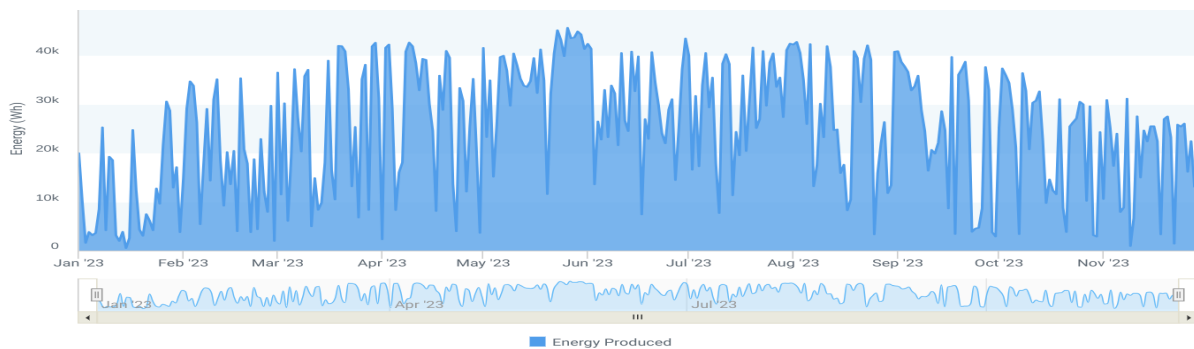
Solar system performance is measured by the number of kilowatt hours (kWh) it produces. Solar system production can be found in your Enphase Enlighten monitoring portal or App.

Each solar array will perform differently based on the pitch, orientation, and shading of the particular site, as well as weather (seasonal) fluctuations.

Please reference your proposal for an annual production estimate for your site. During high production months (summer) you may build up a credit that will be used during lower production months (winter).

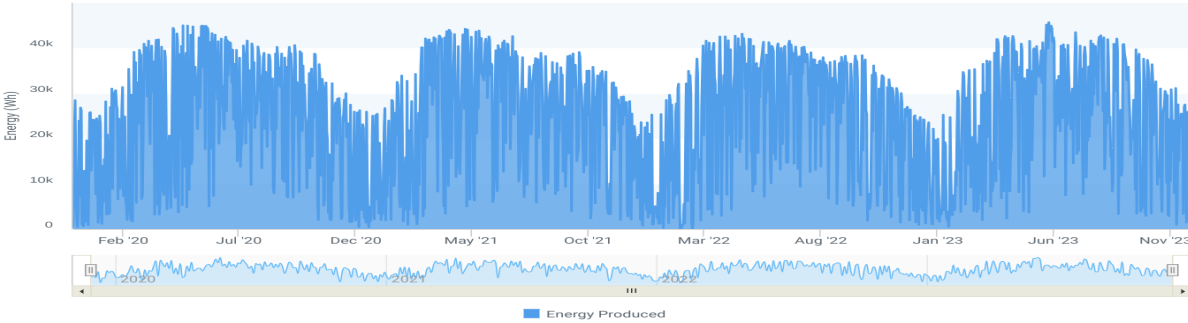


***Graph showing 1 week of solar production***



***Graph showing 1 year of solar production***





***Graph showing 4 years of solar production***

## ***Seasonal Fluctuations***

Your solar array will produce the most power during the summer months, given the longer daylight hours. A typical solar production curve looks like a bell- with the lowest production in the winter and the highest production in the summer months- see the images on page. 16.

Solar systems operate most efficiently in cooler temperatures and are capable of producing the most power at any given moment in the spring and fall. A solar system does not produce power at night or with snow covering the modules.

# **Economics & Ownership**

## ***Federal Tax Credit (IRS Form 5695)- Residential***

Your solar system is eligible for a Federal Tax Credit for the year it became operational. A tax credit is a dollar-for-dollar reduction in the amount of income tax you would otherwise owe. For example, claiming a \$10,000 federal tax credit reduces your total federal income taxes by \$10,000. There is no maximum amount that can be claimed. If you can not realize the full tax credit amount in the first year, it will roll over to the subsequent year/s.

For more information kindly click this link.

<https://www.irs.gov/credits-deductions/residential-clean-energy-credit>

## ***Investment Credit- (Form 3468) -Business***

Businesses can use this form for their solar project to receive the 30% Federal Tax Credit.

<https://www.irs.gov/forms-pubs/about-form-3468>

New, in 2023, Non-Profits can take advantage of the 30% Federal Tax Credit through a Direct Pay option, or a Credit Transfer option. More information can be found here:

<https://www.energy.gov/eere/solar/federal-solar-tax-credits-businesses>

## ***State Tax Credit (MA Schedule EC)***

The state tax credit is for primary residences only and capped at \$1000. It is a one time tax credit.

## ***Good Documentation to File with Your Taxes***

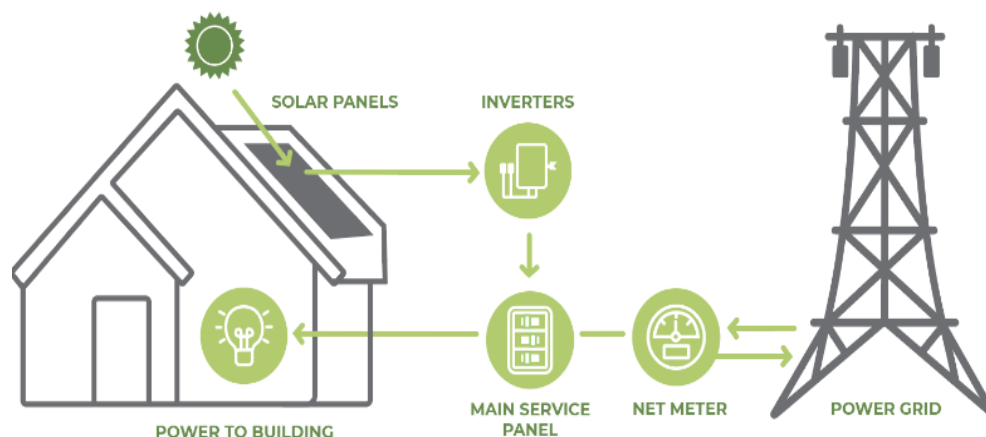
Your signed contract, your paid invoice, and your permission to operate (PTO) (also referred to as Authority To Interconnect (ATI)).

## ***Net Metered Solar System***

With a net metered system, the utility will “swap out” your existing meter and replace it with a net meter after your solar installation is complete. The net meter will run backward when you are producing more electricity than you are using on-site. The meter will run forward when you are using more electricity than you are producing. The net meter is read each month by your utility.

## ***Net Metering***

Net metering is an agreement with the Utility where you get compensated for your solar production. This will come in the form of a credit on your electric bill. You will never receive a check for the excess electricity that you produce. Your Net metering compensation is for both your Supply (Eversource Basic Service) and Delivery Charges. The Energy Efficiency, Renewable Energy, and Distributed Solar Charges are the only charges that are excluded from the compensation you receive from your solar production.



***Energy you produce - Energy you consume = net energy***



## ***Monetizing the Excess Credit on Your Utility Bill***

If, after one year your solar system has produced more electricity than you used, you will have a credit on your account. You can monetize this credit by sending your monthly excess to another account within the same ISO NE Load Zone, and the same utility. This is done by filing a Schedule Z form. You can file the Schedule Z up to 2x/calendar year. Excess can be allocated as a percentage (of your choice) to one or more accounts of your choice.

The utility is not obligated to, but may do a one time transfer of a credit that is sitting in an account.

Please contact us, and we can assist with the process of filing an updated Schedule Z.



**ISO New England Load Zone: South Eastern Massachusetts (SEMA) Map (in green)**

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## ***Understanding Your Electric Utility Bill***

Please see the separate attachment for an explanation of your electric utility bill.

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## ***Keeping Records on Your System***

Here is a list of records that are important to keep on file:

- Copy of your signed contract (includes warranty information)
- Copy of your final permission to operate (PTO) from the utility
- Spec sheets for your modules and inverters
- Copy of the module and inverter warranties
- Copy of your final statement

All of these documents are sent with your final statement from [Diane@cotuitsolar.com](mailto:Diane@cotuitsolar.com).

## ***Homeowners Insurance***

As with any large expenditure in your home, you may want to contact your insurance company and let them know you have installed a solar system on your property.

## ***Selling Your Home***

In the event that you sell your home, you may need to do the following:

- Transfer of ownership of your system monitoring portal (there may be a fee for the new homeowner for this transaction).  
<https://tinyurl.com/59s83e48>
- Transfer of Renewable Energy Attributes or incentives associated with your system.
- The new owner will have to file a Schedule Z form when they set up their electrical account with the utility.

Please contact us to help you with the above items.