

**B R O O K L Y N
S O L A R W O R K S
S Y S T E M G U I D E**

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Equipment & Communications

1. Hardware

Solar Panels:

Your solar panels are mounted on your roof. They are most likely LG modules, but may be another brand if required by site specific conditions. Regardless of their brand, they have no moving parts or electronics and are therefore quite long lasting, requiring no regular inspection or maintenance. The array should be angled sufficiently to allow rain water to run off naturally, taking with it any pollen or particulate build up, so washing them is not required. Snow removal is also not required nor recommended, as the power lost during snowstorms is exceedingly small and it can be dangerous on icy/snowy rooftops. If you do choose to clean your panels, avoid harsh detergents and metal or hard plastic brushes that could scratch the glass.

SMA SunnyBoy Inverter:

Your inverter converts your solar panels' DC electricity into AC electricity used by your home and the utility grid. Larger systems will have multiple inverters. It is typically mounted in the basement near the main electrical service, or on the roof, attached to the solar array. The "brains" of the operation, it monitors the health of your solar array as well as the utility grid and will isolate itself and send an alert if either becomes unsafe for operation. It has LEDs and a display in the bottom right corner which provide a snapshot of its operating status.

The lefthand green light indicates the current power production status. It will pulse on and off slowly or quickly depending on how much power it's creating. It will blink on and off when it is in standby. The light will be off if the inverter is off or it is hibernating at night.



The center red light is the fault/error light and will only illuminate if there is a problem somewhere in the system. The display will also show an error code and time stamp when the error began. If your equipment is connected to SMA's monitoring system, Sunny Portal, errors will be automatically reported to the BSW fleet management team within 24 hours.

The right hand blue light is the communication light. If your inverter is connected to a wifi network or hardwired with an ethernet cable, it will be solid blue. It will blink slowly while connecting, and if it loses connection, the light will turn off.

While in normal operation, the display will show the current power output and total lifetime energy production of the inverter. By knocking on the display with a knuckle (some force is required), it will illuminate, and a second knock will make it scroll through different menus with readouts on software versions, wifi communication info, and AC/DC voltages and currents. At night it will be dark as the inverter hibernates.

2. Turning Off/Rebooting Your System

In the rare case that we ask you to reboot your system, or if you have an electrician working on your house who wishes to power it off (please make sure they don't forget to reactivate your system before leaving) you can follow these steps. To turn off an inverter, first turn off the DC disconnect (a black dial on the left side of your inverter) by turning a quarter turn counterclockwise from the 'I' position to the 'O' position. Then turn off the AC disconnect: If your inverter is in the basement, you will either have a circuit breaker in your electric panel labeled PV Solar Breaker with a red sticker) or an electrical switch outside your electric panel that should have a red sticker labeled AC Solar Disconnect with either a black lever on the right hand side or a circuit breaker. If your inverter is on the roof, there should be a box within 5 feet of the inverter labeled as an AC disconnect, operated either by an external switch or a circuit breaker covered by a weatherproof door.

After turning off the inverter, allow at least one minute for the inverter to fully discharge before rebooting. To do so, turn both the DC and AC switches back on. Either order is fine, but turning on the AC connection first will allow the inverter to resume operation more quickly. The inverter will take up to 5 minutes to fully reboot and reconnect to wifi/cell networks, and potentially another 5 minutes to begin making power.

DC Disconnect



External AC Disconnect



Main Panel AC Disconnect



3. Inverter Communications Options

Sunny Boy inverters are able to send data out to be recorded on SMA's monitoring website www.sunnyportal.com. This allows system owners to track the output of their system and allows Brooklyn Solarworks to monitor system performance against guaranteed output levels as well as receive automatic notifications should any errors occur.

The inverter can connect to most standard wifi networks, which is the preferable communication method where available. BrooklynSolarworks will connect your inverter to your wifi network initially, but may ask for your assistance to reconnect should you change your wifi equipment or password in the future. Those instructions can be found in Section 4.

When a wifi network does not reach or has low signal strength at the location of the inverter, Brooklyn Solarworks may install a wifi booster to extend the range of the existing wifi network. The booster plugs into an outlet and is positioned between the router and inverter. The booster connects to the router and broadcasts another wifi network with the same name as the existing wifi network with "_EXT" appended to the end and has the same password as the existing wifi network. The inverter is then connected to the booster's stronger network.

4. Connecting/Reconnecting an Inverter to a WiFi Network

If we have installed a wifi booster in your home to increase signal strength and you've changed your wifi network name or password, you will need to follow the instructions for reconfiguring your wifi booster in Section 5 prior to updating your inverter's settings.

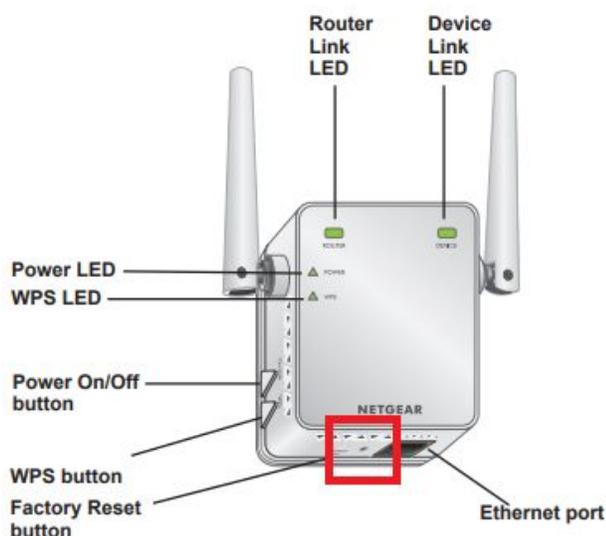
1. While near the inverter, look on your phone or laptop for wifi networks and connect to the one that says SMA#####. It will ask for a password, which is located on a sticker on the right hand side of the inverter under the heading WPA2-PSK: an example picture is shown here. If you don't see the network on your phone, shut the inverter down (both the AC & DC disconnect, see Section 2) for 60 seconds then turn it back on. It will take 2-3 minutes to reinitialize and the wifi network to appear.



- a. Sometimes you will be redirected to the SMA sign in page automatically where your device might say "Sign into Wifi Network". If that happens, you may be asked to set a user password. You can choose any password you like that meets the password criteria. You will only ever need to remember it if you wish to communicate directly with your inverter in the future, which is normally not necessary. Once you have set a user password, you should be redirected to the login page and can skip to step 3.
2. Open chrome or safari on your phone/computer and enter 192.168.12.3. It will say there's a potential security issue because your device is currently not connected to the internet, but it is safe to proceed. You'll need to hit Advanced Options or something similar depending on your device and there should be an option to proceed anyway.
3. The inverter will ask you to log in. Select the Installer category, then type in the password "Canopy123" without quotations and confirm. (If "Canopy123" doesn't work, please try "Canopy123!")
4. You should now be on the home page. Look for the dropdown menu on the right. It looks like a hamburger or 3 horizontal lines. Select User Options > Start The Installation Assistant. You should now be on the network settings page. Under the Type of Communication section, select the WLAN tab and it will have a list of nearby networks. Select the cogwheel next to your network (or the wifi booster network if one is installed), enter your password, and confirm. The blue light on the inverter will blink to indicate it is attempting to connect. Within 3-5 minutes, it should stay solid, meaning it's connected successfully. If the connection fails, repeat the process 1-2 more times. If still unsuccessful, it means the password supplied is incorrect, or the wifi signal is too low for the inverter to stay connected.
 - a. If you don't see the network, uncheck the Activate WLAN box, click Deactivate Now to confirm, wait about 45 second, and then turn it back on. This should refresh the list of available networks. If your network doesn't appear in the list, it could mean that it is the wrong type (the inverter can only communicate with 2.4GHZ networks, not 5GHZ networks) or it could be that the signal is too weak.
5. Once the inverter is connected to your network, select the dropdown menu again and choose Home. After that page loads, select the dropdown menu, then Instantaneous Values. On this page, scroll down to and select the category System Communication, then the subcategory WLAN. The first item in this section is Signal Strength of the Selected Network. The value will refresh every few seconds to show how strong the connection to the wifi network is. If it's consistently below 60%, there is a good chance the inverter will lose connection in the future, so please notify Brooklyn Solarworks and we can look into improving the signal strength.

5. Updating/Resetting a WiFi Booster

If you have a wifi booster that we installed, we may ask you to check its status or reset/reboot it if there are communication problems with your system. The booster has two large LEDs labeled Router and Device, which indicate whether a connection is active to your Router and to the inverter (Device). A green light indicates a strong connection, orange/red are poor, and no light indicates the connection has dropped.



To reboot the wifi booster, simply unplug it from the wall, wait 30 seconds, then plug it back in.

If you have changed your wifi network or password, we will ask you to reconfigure your booster. To do so, you just need a paperclip and a smartphone/laptop. You must reconfigure the booster prior to setting up your solar equipment, since the booster rebroadcasts your existing wifi network to make the signal stronger wherever your solar equipment is located.

1. While the booster is still plugged into the wall, insert a paperclip into the Factory Reset pinhole and hold the button down for about 7 seconds. Specifically, a small light on the front will turn orange while the button is pressed, when that light turns off, you can release the button.
2. After about 1-2 minutes, the device will have finished rebooting and you should see a new wifi network called NETGEAR_EXT. Join that network (it should not require a password). If you don't see that network on your list, repeat step 1.
3. Once connected to the NETGEAR_EXT network, your device may automatically take you to a webpage to set it up. If not, open a web browser (chrome, safari, etc.) and go to mywifiext.net. If that page doesn't load, try 192.168.1.250 instead, which should always work. No matter which of those methods work, you should arrive on a page with a button that says 'New Extender Setup'. Click that to proceed.
4. The booster requires an email and password to set up, as well as some security questions. These are just to prevent someone else from logging on to the booster later and changing settings, which isn't really a concern, so you can use any email and password you like, and don't worry about the questions, just fill in

anything. You shouldn't ever need them again after you finish this process. **In the following steps, if you get kicked off the webpage before you finish step 7, you can return to mywifiext.net or 192.168.1.250 and will need to type in the email address and password you've set in this step.**

5. Press Next to continue and the following page should take 30 seconds to a minute to finish scanning, after which a list of nearby wifi networks will be listed. Find your existing wifi network and select it, then click Next. On the following page, enter your wifi password, then click Next.
6. On this page, you can set what the extender wifi network should be called. It will default to copy whatever your network is called with '_EXT' at the end. In most cases you can just leave it as the default. You can also choose to have it use the same password as your primary network, or set a different one. Again, we recommend leaving it as the default. click Next when you're done on this page.
7. The booster will now restart itself and kick you off of the NETGEAR_EXT network. You don't need to log back into it, just wait 30 seconds to a minute and the ROUTER light should light up. If the ROUTER light does not come on, it means you supplied the wrong password for your network, or the booster is too far away and needs to be moved closer to your router. If so, go back to step 1, resetting the booster, and start again.
8. You're now ready to move on to connecting your solar equipment to the newly created booster network, following the instructions in Section 4. If you check your phone/laptop's list of available wifi networks, you should see a new network with whatever name you chose in step 6, usually your main network with '_EXT' at the end. When you move on to the instructions for connecting your solar equipment, remember to connect to this new booster wifi network instead of your main network, since it should have a stronger signal.

6. Checking WiFi Strength

The inverter is not as good at receiving wifi as smart phones or laptops, and a poor connection may lead to missing data on Sunny Portal or a completely dropped connection. If we ask you to check the wifi signal strength on your inverter, the two methods are:

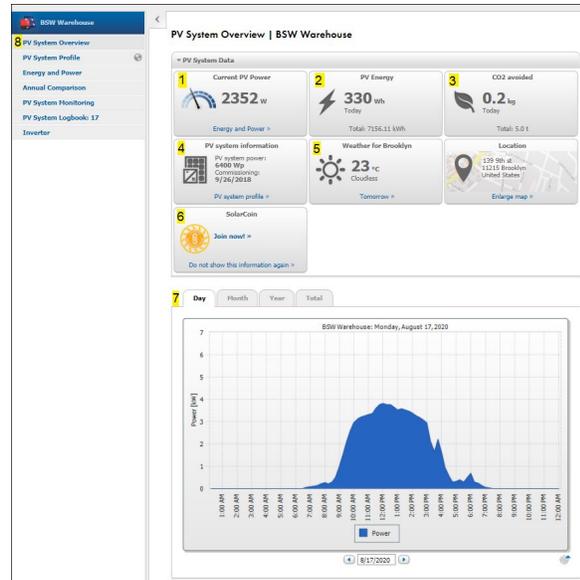
1. Knock the inverter display with your knuckle (somewhat hard) repeatedly to cycle through the different readouts. One of them will list
 - a. SSID: "your wifi network name"
 - b. RSSI: XX% (RSSI is the signal strength)
2. If you are already logged into the inverter interface on a phone or laptop (outlined in Section 4), you can use the main menu (top right) and select the Home screen. Then, use the main menu again to select Instantaneous Values ->

System Communication -> WLAN. The first item in the list should be Signal Strength of the Selected Network: XX%

65%+ will generally stay connected with little to no data transmission problems. 40-65% should stay on but may have prolonged disconnected periods. <40% may lose connection completely and fail to reconnect on its own.

Using Sunny Portal

Shortly after your inverter is connected to your wifi network, we'll register it in Sunny Portal and you'll receive an email invitation from noreply@sunnyportal.com to log into your account. Both a website and mobile app are available. This overview will discuss the website, as the app is just a trimmed down version with slightly less information.



- 1) Readout of the real-time output of your system. The value will update every few seconds, so you may see it jump around with passing clouds. If the wifi connection is poor, it may show a value from the last time the system was connected.
- 2) Total energy output for today is listed in the center in kWh. Total output all time of your system is listed at the bottom. As of 2020, residential electricity in ConEd territory costs between 22 and 25 cents per kWh.
- 3) Approximate CO₂ emissions avoided for the current day and lifetime of the system.
- 4) Basic info on system equipment: System nameplate power capacity and date of system commissioning
- 5) Local weather info
- 6) Your system comes with an option to automatically send production data to SolarCoin, who will track it and assign an amount of solarcoin to you. We can't provide assistance with understanding or managing anything to do with solarcoin, but if you would like to register your system let us know and we can set it up.
- 7) This graph will update every few hours throughout the day and displays the output of your system. Tabs are available which display the total kWh output per

day/month/year in blue. There will also be gray prediction bars which show how much energy we expect from your system on a monthly/yearly basis.

- 8) This menu leads to some other pages, however most of that information is already conveyed on the home page layout.
 - a) Annual Comparison will show a summary of each years performance and numeric values for each month
 - b) PV System Logbook contains a history of messages sent out by your inverter. Most of these are just informational and can be ignored. Any equipment faults will have a red X and will send an automated alert to Brooklyn SolarWorks.
 - c) The Inverter tab is useful if you have more than one inverter. It will show a breakdown of what each is doing individually.

Reading Your ConEd Bill & Net Meter Summary

Getting your first ConEd bill is an exciting step, but can unfortunately be a bit confusing because ConEdison does a poor job of explaining their billing and recordkeeping system. Below is an example of what your bill will look like after going solar. The new section, titled Your Net Meter Summary lists ConEd's record of how much energy you've bought from them or how many solar credits (if any) you have stored up. The first column, 'Your Electricity Use', should really read 'Your Grid Electricity Use'. If your house required more electricity than your solar array produced in a month, the value will be positive, since you bought some extra from the grid to make up the difference. If your array made more than you needed in a month, the value will be negative because you gave away your excess to the grid. That negative value gets stored in the next column, 'Cumulative Net Meter Energy Credit', which is your "bank" of stored up credits. If your grid use in the first column is negative in a given month, that amount will get added to the previous month's banked amount. If your grid use is positive, that amount will be withdrawn from your credit bank if you have any. If your credit bank hits 0, ConEd will then charge you for any remaining amount of power, which is listed in the last column, 'kWh billed'. As a side note, if you get an unusual bill, it's good to check the reading type, which we've highlighted in red below. If the most recent reading says 'Estimated', ConEd didn't take a true reading this month and your bills may be much different than what really happened (if your system was recently installed, they often incorrectly estimate that the system was not active). They should take a true reading within a month or two and will correct for any overcharges.

Your electricity charges

These charges are for the electricity you used (supply) and getting that electricity to you (delivery). Rates are based on a 30 day period. When your billing period is more or less than 30 days, we prorate your bill accordingly.

Electricity you used during this 30 day billing period from Feb 11, 2020 to Mar 12, 2020	
Rate: EL1 Residential or Religious - Net Metering	Meter# XXXXXXXX
We measure your electricity by how many kilowatt hours (kWh) you use. One kWh will light a 100 watt bulb for 10 hours.	
Mar 12, 20 actual reading	998581
Feb 11, 20 actual reading	-998424
Your electricity use	157 kWh
kWh Billed	157 kWh
For details, see Your Net Meter Summary in this bill.	

► Your Net Meter Summary

Billing period	Your electricity use	Cumulative net meter energy credit	kWh billed
JUN 11, 2019 - JUL 11, 2019	352	0	352
JUL 11, 2019 - AUG 09, 2019	93	0	93
AUG 09, 2019 - SEP 10, 2019	-252	-252	0
SEP 10, 2019 - OCT 09, 2019	-411	-663	0
OCT 09, 2019 - NOV 07, 2019	-152	-815	0
NOV 07, 2019 - DEC 11, 2019	319	-496	0
DEC 11, 2019 - JAN 10, 2020*	403	-93	0
JAN 10, 2020 - FEB 11, 2020	440	0	347
FEB 11, 2020 - MAR 12, 2020	157	0	157
Credit Carried Forward to Next Period		0	

Your electricity use 157 kWh
 The electricity supplied to you by Con Edison or the electricity

The other potentially confusing factor here is that ConEd cannot see how much power your solar system generates. All they can see is how much power you take from or give to the grid. The chart below adds two more columns to the Net Meter Summary to show how adding your solar production data (which is available in your Sunny Portal monitoring account) can give the complete picture of your home's energy consumption. As an example if the solar system produced 598 kWh between 9/10/19 and 10/9/19, the fact that 411 kWh were sent back to the grid means the home consumed 187 kWh in that period. Similarly, if between 2/11/20 and 3/12/20, the system produced 498 kWh and an additional 157 were brought in from the grid, that means the home consumed a total of 655 kWh. Keep this in mind if you need to figure out your home's true electric consumption for any reason, or are interested in determining your true solar offset percentage for a given month or year (Solar Production divided by Actual Home Usage). If you have trouble finding your solar production numbers, please let us know and we can direct you to them.

*Info from
ConEdison*

*Info from Sunny Portal
Combined Results*

<-----> <-----> <----->

Start	End	Your Electricity Use	Cumulative Net Meter Energy Credit	kWh Billed	Solar Production (kWh)	Actual Home Usage
Jun 11, 2019	Jul 11, 2019	352	0	352	635	987
Jul 11, 2019	Aug 09, 2019	93	0	93	662	755
Aug 09, 2019	Sep 10, 2019	-252	-252	0	652	400
Sep 10, 2019	Oct 09, 2019	-411	-663	0	598	187
Oct 09, 2019	Nov 07, 2019	-152	-815	0	479	327
Nov 07, 2019	Dec 11, 2019	319	-496	0	430	749
Dec 11, 2019	Jan 10, 2019	403	-93	0	357	760
Jan 10, 2019	Feb 11, 2020	440	0	347	429	869
Feb 11, 2020	Mar 12, 2020	157	0	157	498	655

If, after reading this section, you believe there are issues with your solar system's performance please feel free to contact Brooklyn SolarWorks. If you believe there is a problem with your billing, you can contact ConEd's Net Metering division at netmetering@coned.com or 212-780-6600. Keep in mind that they can only see their portion of this data and have no idea how much energy your system has made.

Claiming Your Tax Credits

When it comes time to file your taxes, there are four credits your system may be eligible for. Your system installation date and signed contract are available in your Brooklyn SolarWorks customer portal. As we are not tax professionals, please look to your accountant or tax preparer for guidance first, but we can answer basic questions specific to the solar credits if needed.

The **Federal Residential Energy Credit** forms can be found [here](#). This form is submitted with your federal return in April the year after your system is installed. Installations from January 1st, 2020 to December 31st, 2020 would file in April 2021. The form is usually updated by the IRS in late January or early February, so you will need to wait until then to download it.

The **NYS Solar Energy System Equipment Credit** can be found [here](#). As above, submitted in April the year after system installation. It will also be updated in January or February.

The **NYS Historic Homeownership Rehabilitation Credit** can be found [here](#). Only certain homes in historic regions qualify for this credit. We would have discussed your eligibility during the sales process. As above, submitted in April the year after system installation. It will also be updated in January or February. You should receive a letter from the NYS parks within a couple months of your system installation referencing your project completion that lists your project number and approved expenditure amount. Please make sure to keep it for your records as Brooklyn SolarWorks does not receive a copy.

The **New York City Property Tax Abatement** is claimed on your behalf by Brooklyn SolarWorks during the permitting process. Building permits signed off by March 15th will have their property tax abatements initiated the following July. You should see a reduction on your property tax bill under a line item called 'Solar' or 'Solar Elec Generating System Abatem'. The credit is split up over four years and into four quarters, so there will be 16 total line item reductions. You can find your property tax records by searching for your address [here](#). Be aware, the search function is finicky. Numbered streets should be entered as '6 street' not '6th street'.