



LG Solar

Considering Installing Solar Panels?

Here's Where You Start.

Saving money and doing something positive for the environment: these two reasons drive most homeowners to consider installing solar power. They've heard they can save money on their electric bills, and they know increasing the use of clean energy is a positive step for the planet.

It's not always easy to know where to begin. Some of the questions a homeowner might ask include:

- Does my town/city/utility support the use of solar panels?
- Is my home located in a good spot for a solar power array?
- Would I have to fix my roof first?
- How many solar panels would I need, and how much would an installation cost?
- After considering the expense of panels and installation, how much money will I really save over time?
- What type of solar panels would best suit my budget and needs?

The answers aren't simple, and they vary depending on the location of a home; whether the roof does need a repair before installing solar panels; federal, state and municipal programs and solar power incentives; and the rates and policies of local utilities. That's why it's important to contact a qualified, professional solar installer—or even to talk to more than one – to request a site visit, a quote for panels and installation, and a savings forecast with a timeline for those savings.





Finding the Answers to Your Initial Questions

Many potential solar customers first do some research online. You can find information on local, state, and federal solar incentives as well as the average time expected for a solar array to pay for itself in your area.

A professional solar installation company will send a sales representative who can explain the local, state, and federal incentives for installing solar panels in your area. In addition, he or she will understand your utility's policies and will explain how your solar array will provide electricity to the grid, possibly yielding credits from the utility toward your electric bill (unless you are installing an off-grid system with battery storage that will directly power your home).

After taking a look at your roof and the positioning of your home related to the sun and shaded areas, examining a recent utility bill to determine your average monthly power usage, and asking you what percentage of your bill you would like to offset with solar power, the installer will estimate the number of panels you will need. Often the installation company will send a professional roofer to determine if a roof repair would first be needed, and will take some time to design an array that would meet your needs before providing you with a final quote.

Once you receive the quote and learn how much your electricity bill will go down on an average monthly basis, you can factor in tax and other incentives to estimate how long it will take your array to pay for itself before you start experiencing significant savings.

What Factors Affect the Number of Panels You'll Need?

The question of how many panels you will need will be determined by your installer depending on a number of factors:

- What percentage of your electric bill do you hope to offset with solar energy?
- How much electricity do you use in an average month? (Consider potential future needs, such as electric car charging.)
- How much sun does your area receive? The National Renewable Energy Laboratory provides a handy map that tells how many kWh (Kilowatt hours) you can generate in one year from 1 kW of solar panels if they are situated in an ideal spot in your area. Find their maps here: www.nrel.gov/gis/solar.html. Your installer will adjust for expected losses from heat, wiring, etc.
- Does your state/utility offer Net Metering (credit on your electric bill based on the amount of electricity your panels feed into the grid)?
- Will your installation include battery storage?
- **What is the maximum power output and efficiency of the solar panels you will install?**

How many panels you need will depend largely on two main factors: power and production.

Solar Panel Efficiency Explained

When consumers evaluate solar panels, they often focus on the advertised maximum power (Pmax). This measurement represents a solar panel's theoretical power production under ideal sunlight and temperature conditions.¹ Think of it as the maximum amount of electricity a user can expect a solar panel to produce in an ideal solar environment.

In truth, a solar environment is never ideal every day. Regional differences, as well as seasonal and weather changes, limit the value of the Pmax measurement when trying to determine the expected long-term performance of a newly installed solar array.

It is important to consider the efficiency of a solar panel. Solar Panel efficiency can be defined as the "Ratio of Solar Panel Power and Size (W/m²); at Standard Testing Condition" (STC). Universally, STC is measured as 1,000W/m² of sunlight, temperature of 25 deg C, and air mass of 1.5.

Below is an example of efficiency calculations for 60 cell and 72 cell LG NeON® 2 panels:

**NeON® 2 60 Cell: STC Power Rating- 340W/0.34kW;
Length – 1.686m; Width – 1.016m**
• $0.34\text{kW} / (1.686 \times 1.016)\text{m}^2 = 0.34 / 1.7129\text{m}^2 = 19.8\%$ Efficient
• Panel Power (in kW) = 0.34
• Length (in meters) = 1.686
• Width (in meters) = 1.016

**NeON® 2 72 Cell: STC Power Rating- 405W/0.405kW;
Length – 2.024m; Width – 1.024m**
• $0.405\text{kW} / (2.024 \times 1.024)\text{m}^2 = 0.34 / 2.0725\text{m}^2 = 19.5\%$ Efficient
• Panel Power (in kW) = 0.405
• Length (in meters) = 2.024
• Width (in meters) = 1.024

Armed with the knowledge of a panel's efficiency rating, consumers can determine reasonable expectations of the performance of their installed solar systems in different sunlight conditions. Utilities and homeowners who want to maximize the amount of electricity generated by their solar systems should always choose high efficiency panels. High efficiency panels purchased at a good price represent the best value for solar customers. The added efficiency means fewer panels are required to generate the same amount of energy.


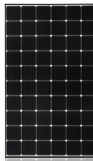

LG Solar and High Efficiency Panels

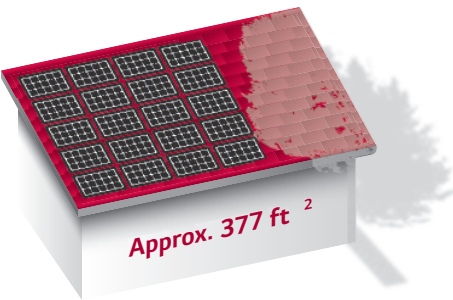
The efficiency rating of a solar panel varies by manufacturer and panel type. LG Solar's goal is to manufacture high efficiency panels that will provide LG customers with a solid return on their investment.

Product Model	Module Efficiency
LG NeON® 2 BiFacial	19.3% (425W) - 19.5% (430W)
LG NeON® 2	19.3% (330W) - 19.8% (340W)
LG NeON® R	21.1% (365W) - 21.4% (370W)

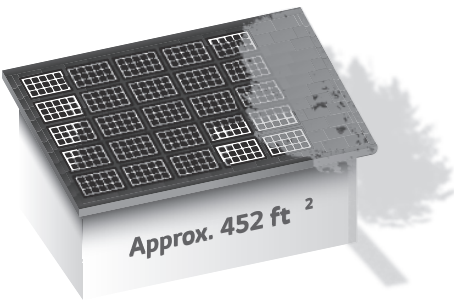
What this means is that LG Solar's panels produce more watts of electricity per watt of sunlight than solar panels with lower efficiency rates (most conventional panels on the market today).

LG Solar is constantly innovating new technologies that boost our solar products' output and efficiency.

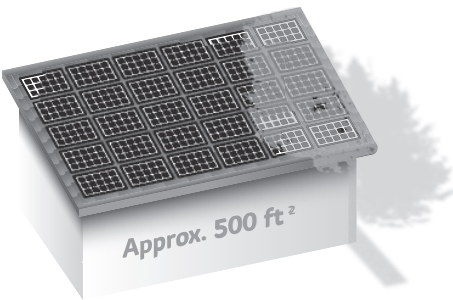
			
	LG NeON® 2 BiFacial	LG NeON® 2	LG NeON® R
Module efficiency	19.3%	19.3%	21.4%
Maximum power (Pmax)	425 W	330 W	370 W
Cell configuration	72 cells	60 cells	60 cells



21.4% LG NeON® R



18%* P-Mono PERC



15%* P-Multi PERC

*estimated average efficiency

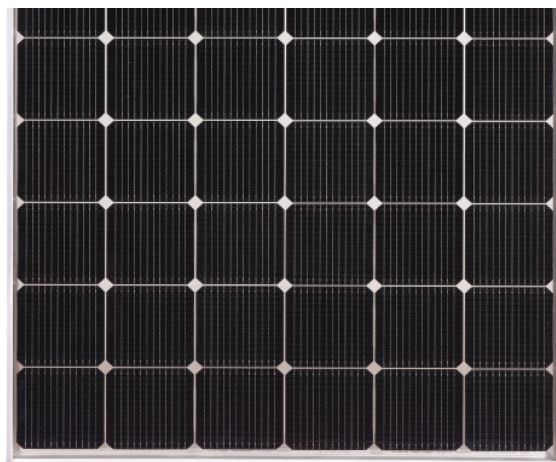
End Notes

1. <https://news.energysage.com/what-is-the-power-output-of-a-solar-panel/>

LG NeON® 2 BiFacial Panels and Double-sided Generation

LG Solar's 72 cell BiFacial solar panels are a commercial product designed to absorb irradiance from both the front and back sides of the cells thanks to a transparent back sheet. The dual faces of the cell allow for higher energy generation. The increased kWh/kW leads to a faster payback time and return on your investment.

The reactivity of the surface on which the panels are installed can help boost output and efficiency.

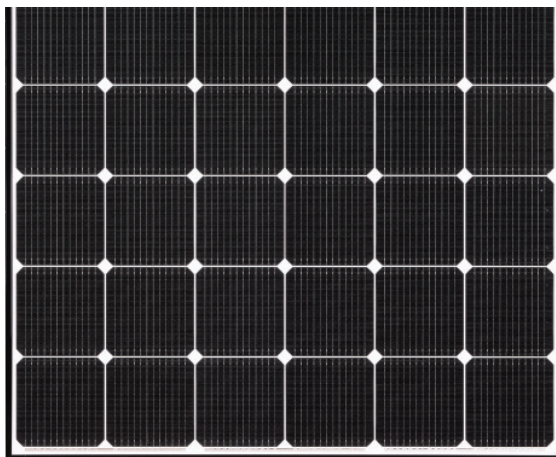


The NeON® 2 and Cello Technology™

The NeON® 2 is LG Solar's best-selling solar panel, thanks to its high efficiency rating along with high power output, outstanding durability, and aesthetically pleasing design. But how is its efficiency rating achieved?

LG Solar's NeON® 2 panels incorporate a technology called Cello (Cell connection with Electrically Low loss, Low stress and Optical absorption enhancement) Technology™. Cello Technology uses 12 circular wires in each cell instead of the usual busbars. The circular wires scatter light effectively, improving light absorption. Then, the 12 wires reduce the loss of electricity because of the increased number of pathways available to absorb electrons. These additional pathways for the free-flowing electrons translate to more electricity produced per absorbed watt of sunlight—and that means higher efficiency levels.

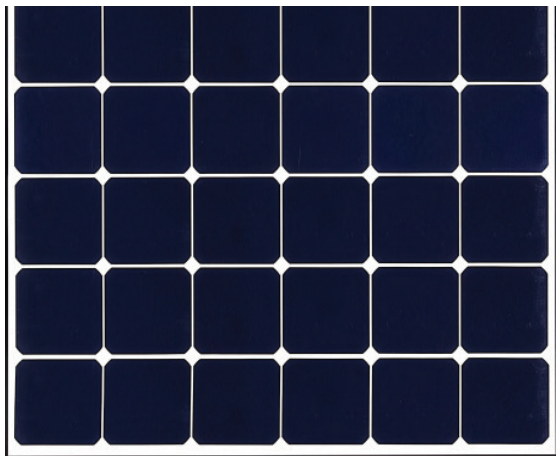
Also thanks to NeON's cell characteristics, the panels are highly efficient even in low-light conditions, such as mornings and evenings.



The NeON® R and Back Contact Technology™

The NeON® R is LG Solar's high-power luxury panel featuring up to 21.4% efficiency thanks to our newly developed Back Contact Technology. The advanced cell structure of the NeON® R locates all of the panel's electrodes on the back side, reducing power loss resulting from shading. This boosts the panels' capacity for light capture and overall efficiency.

As with the NeON® 2, the electrons absorbed by NeON® R panels are funneled into numerous pathways instead of the usual three to reduce power loss and increase power output.



Conclusion: Why Efficiency Matters

When homeowners consider their choice of solar panels, they look at a variety of features, from aesthetics and durability to maximum power output and warranty policies. Efficiency is one of the most important considerations. High efficiency panels produce more power in a smaller space over a variety of sunlight conditions. As a result, fewer panels are required to produce the same level of power output (which gives installers more flexibility when designing arrays for smaller roofs or in shaded areas).

Balancing the investment in the cost of solar panels with their efficiency rating and maximum power output, consumers gain both short-term and long-term benefits from purchasing high-efficiency solar panels. LG Solar's BiFacial, NeON[®] 2, and NeON[®] R panels provide solid options for arrays ranging from small rooftops to large commercial installations.

LG Solar

The Sun Loves LG

For more information visit: <http://lg.com/us/solar>