ADDY Solar & Electric

The Evolution of Solar:

Which System Is Right For You?

The Evolution Of The Solar System

There are a couple different solar systems on the market, and it's time you know which is which. Choosing the right solar system actually has a drastic impact on your life and energy bill, so making an informed decision is really important. Unfortunately, the world of solar electricity can seem confusing with all the lingo and mechanics. That's why we decided to break it down for you. Which system does Addy Solar like to work with and why? Here is a breakdown of the three different kinds of systems, how they work, and our recommendation for the one that will work best for you.

TYPE 1: TRADITIONAL STRING SYSTEM

Traditional String systems are the older, more traditional system in the solar industry. A decade ago, they were the only type of system we had, and their weaknesses were the reason that solar had such a slow start in the early 2000's. With traditional string inverters, solar panels are strung together in series. Because of the way they are strung in series, if there is shading on one panel in that series it brings down the output of the other solar panels in that string to the output of the one being shaded. This greatly affects the system production, especially over time. The other issue to think about with this is that solar panel cells degrade at different rates. If the cells on one solar panel degrade at a faster rate than the others in that string, it will bring down the production for that entire string. For their inefficiency, string systems have generally become the cheapest option available for going solar.

Now, with recent codes such as the Rapid Shutdown Code, these traditional systems have lost the ability to conform to newer laws. The Rapid Shutdown Code is in effect for fire safety purposes. It basically says that the wires coming from the solar panels going to the inverter need to be de-energized when the inverter is shutdown. With the traditional string inverter (without an added rapid shutdown kit), the wires would stay live when the inverter was shutdown. This would bring great concern in the event of a fire, and for that reason the code is driving out the traditional string from the market.

Solar's evolution is outdating the Traditional String system and pointing the customer to some other options.

TYPE TWO: MICRO INVERTER SYSTEM

The micro inverter system answers one of the most important questions in the solar industry: how do we not lose as much solar efficiency when shade comes on a panel? The Micro puts an inverter on each panel to make the DC to AC switch happen on the actual panel. Since there is a micro-inverter at each panel, if one is shaded it does not decrease the output of another panel that is not shaded. So with the traditional string system, when one lost efficiency, they all lost efficiency. With the micro inverter, each panel operates with its own inverter to make each panel essentially its own system. The weakness to this system? Peak shaving! The microinverter at the time of this writing has not been able to keep up with the higher efficiencies that panels are achieving and therefore limits the output of each individual panel. For example, the highest microinverter power output of the main microinverter manufacturer is 295VA. All new solar panels are at least 300 watts and some are as high as 365 watts. If the panel is getting enough direct sunlight and has the ability to output more than 295 watts, the microinverter will limit it to only put out 295 watts at any given time.

So if one system doesn't work well with new codes, and the other system limits the solar panel production, then what system accomplishes both?

TYPE THREE: FIXED VOLTAGE SYSTEM

In the latest evolution of solar technology, designers have made some significant adjustments to change the efficiency of solar energy. The first was stringing panels together in series. The second was connecting a micro-inverter to each panel. While having an inverter at each panel did increase the individual efficiency of each panel during shaded conditions, it did not create a sustainable solution. The capacitors that are in an inverter are made up of liquid properties that are sensitive to heat. With the micro-inverter systems, the most sensitive part of the system (inverters include liquid components) are now connected to the hottest part of the system,the panels.

With the Fixed voltage system, you get the best of both worlds without the downsides. So what makes the optimizer different or better than the microinverter? One, the optimizers allow for maximum power from each individual panel and do not clip the power output. And two, the optimizer is made up of only solid state components and do not have liquid based capacitors inside them. So solar design moved the inverter away from the hot panels and back into the shade where they belong.

The Fixed voltage system uses a single inverter (which can be installed in an ideal location) which communicates with an optimizer to help each panel run efficiently and at its highest potential. The optimizer is a solid-state component, and it optimizes the efficiency of each panel output. These optimizers allow the systems to operate at their full capacity and wattage. Before the optimizer, the (micro) inverters did not allow the panels to operate at their full capacity. The inverters shaved the peak power off the panels, and that needed to change. With the higher wattage optimizers, the solar panel can now operate to its full KW capacity.

Below are two different production curves. Notice how the graph on the left is flat at the top. That is the peak shaving we discussed, the one that shaves the leak on the micro inverter system. The other (right) is a full curve with no shaving. That is the Fixed voltage system.