



Type of Solar PV Inverters

- string inverter PV systems
- micro inverter PV systems
- DC optimizer PV systems
- off grid/hybrid inverter battery PV systems

Which to choose?

After a thorough assessment of your location and analysis of your energy usage, Redshift Solar will recommend which type of PV system will suit you better. Of course, you will ultimately make the decision. To enable you in this process, we have prepared this information sheet to outline the choices that you will face. Your decision will likely be based around the different costs of system components, along with the expected output or system yield.

String Inverters

String inverters are usually less expensive than the other types. The latest string inverters have advanced built-in safety features for protection, while also using technology like MPPT to maximise the power production of the panels, kind of a “sweet spot” for the connected panels. String inverters now usually have bluetooth, wifi, and hardwired connections to allow for the latest types of monitoring and controls. These will need to be setup and programmed onto your PC, laptop, Ipads or mobile phone. We normally factor this programming into our quotes, but if you're interested in doing it yourself please let us know.

String inverter PV systems also have many hundred volts coming from the roof panels to the terminals inside, and converts this DC voltage to AC voltage which we can use inside our buildings

Some string inverter manufacturers have additional add-ons that can control hot water systems, and batteries.

Some drawbacks of string inverters are that they are susceptible to shutdowns, where no power is made if there are shading problems, and so aren't suited to these conditions. Another drawback is because of the cabling topology, where each panel is connected through the next panel, these systems can have the entire power of the system affected by just one panel whose light is shaded or if that panel has some obstruction.

String inverter systems will also shut down if the grid fails, mainly for safety reasons. However with a string system, hazardous voltages will be present all the way from the roof top panels, down the cabling, to the inverter terminals.

Microinverters

- Micro inverters, such as ENPHASE, will produce more power (watts) in a period of time than their *string inverter system* cousins.

Each microinverter is connected to a solar panel, and will create a small amount of output power in 230V AC. When combined together with a number of other Microinverters on a common "trunk" cable, they gradually add up to a selected amount of usable power. The trunk cable can be connected straight into your Main Switchboard for consumption in your building with no other components required. Since each microinverter is converting a single solar panel power, the stress and voltages involved are small and even the heat produced inside a unit is kept to a minimum. An advantage with microinverters is they have the ability to be monitored remotely over the internet. You, and us the installer, can be notified of any changes to the system production, as well as any maintenance issues.

Microinverters must be commissioned and programmed by the installer, and then can be handed over to you. It's best to have a good internet connection available onsite to avail of the advanced reporting and monitoring features of this type of solar PV system, or advise us if not and we can engineer a GSM communications service if you wish to use this.

Enphase systems have additional batteries that can be added and controlled via their software.

Just like the string inverter systems, microinverters also require the grid to produce power, and will shut down for safety if the grid fails. However, when an Enphase microinverter system shuts down, there is zero volts (0v) present anywhere in the cabling all the way down to the Main Switchboard. This is a very safe system for emergency services or maintenance personnel.

DC Optimizers

A DC optimizer system such as Solaredge, is almost a type of hybrid of both string inverter systems and microinverter systems.

Each solar panel has its own DC optimizer installed under it just like a microinverter system. Each DC optimizer can communicate with the others in the system and the inverter on the wall beside the Main Switchboard. The DC optimizers feed power into a common trunk cable which sends down DC voltage and current to the inverter on the wall. If a panel were to be shaded, the other DC optimizers will contribute to the shortfall in the common trunk cable and the system will only be down on power of the affected panel, so each panel in this type of system also operates at maximum even if there is some shading.

A Solaredge system also can be monitored and maintained via the internet, after the installer commissions and programs the system, when we can then hand it over to you.

Solaredge systems have additional add-ons for controlling hot water systems, batteries, air conditioners and more.

Some DC optimizer systems can operate dedicated back-up loads during a black-out/grid failure if connected to a ESS (energy storage system) battery. They can also be programmed to

reduce power imported from the grid at peak times by programming the inverter and battery to release stored energy during peak demand times. You can also program the battery to be charged from the grid during off-peak ToU (time of use) tariff.

When a DC optimizer system is shut down for maintenance or by emergency services, the rooftop DC optimizers under the panels cut the supply for safety.

Off grid/ hybrid inverters

An off grid solar system when designed and engineered correctly, can function indefinitely using only the sun to provide usable power.

Usually only needed in rural settings where grid stability is poor or it just doesn't exist. It requires many large amp-hour battery cells, large cabling systems, large fault protection and isolators. Resulting in an expensive investment initially, but with correctly selected batteries and capacities and regular maintenance, will provide years of reliable service with no more to pay.

In off grid battery storage systems using rooftop solar panels, we need 2 inverters. The string inverter, charges the battery with the power from the solar PV panels, while another "grid" inverter manages the battery bank charging and discharging.

These systems require extensive programming and each job is completely individual. If you wish to have one of these systems, please let us know so we can assist.