

BUYING GUIDE

Solar Power System



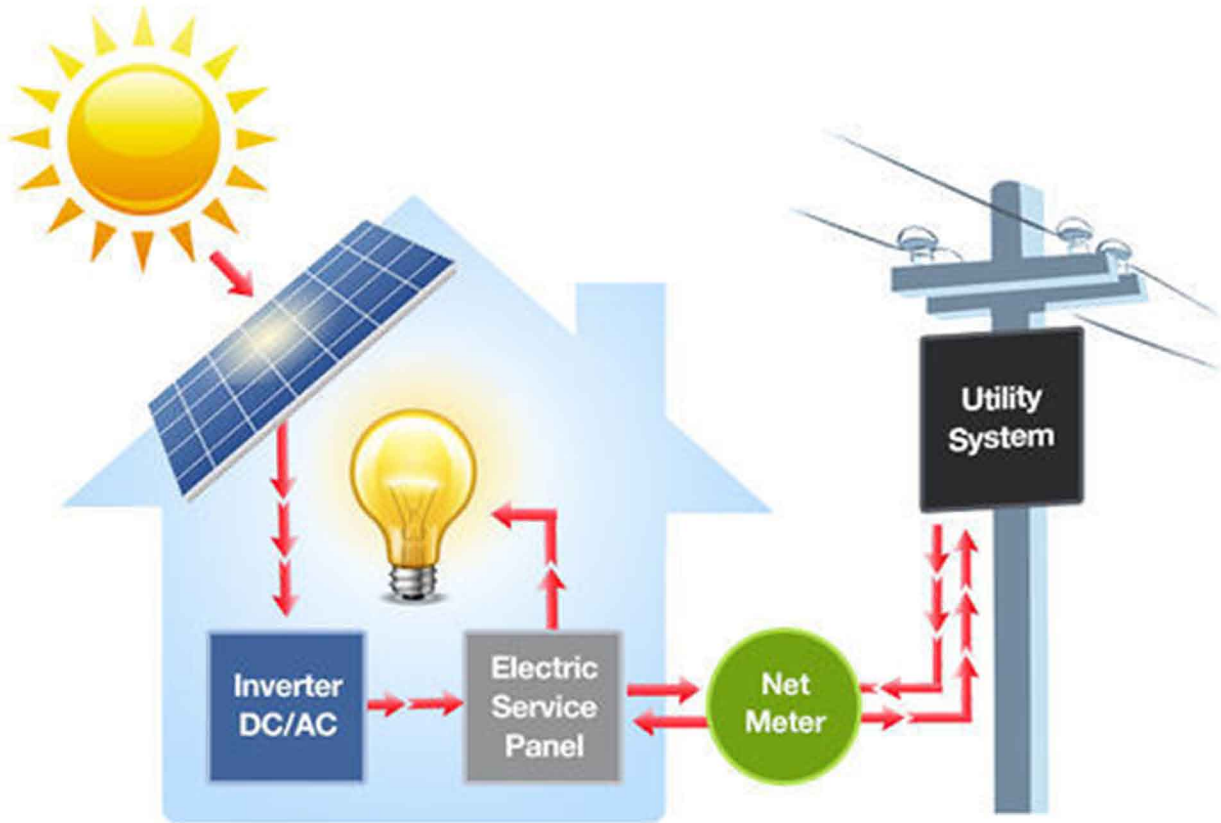
www.energis.com.au
1300 782 217

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What is a Solar Power System?

The system that produces electricity to power your home or business from the Sun's light energy. It is also called Solar Photovoltaic Systems. The panels used are made of Photovoltaic (PV) cells that convert sunlight directly into electricity.



TYPES OF SOLAR POWER SYSTEMS

01

Solar Grid Connected System or Grid-tie System

02

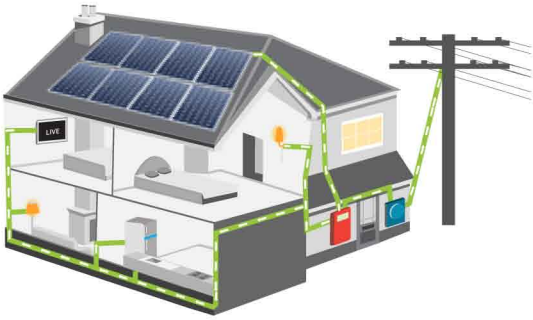
Solar Off-Grid System or Standalone System

03

Solar Hybrid System



How does a Solar Grid Connected System work?



Solar modules are mounted on your roof and convert energy from sunlight into direct current (DC). A device called an inverter then changes the DC into alternating current (AC). This can be used to power your household and appliances. A grid connected system can feed excess energy into the electricity network (grid), while a standalone system needs a battery to store excess energy.

Solar grid connected systems are the most common form of solar PV systems in Australia. It can save you the power you use during the day and you will get paid as per the feed-in tariff from the electricity company on the surplus power you send back to the grid. At night, or if solar energy produced is not sufficient, the power needed will be taken from the grid as usual.

Benefits of going Solar

There are 5 main reasons to go Solar



IMMEDIATE AND LONG TERM
REDUCTION OF YOUR ENERGY COSTS



MASSIVE REDUCTION IN
YOUR CARBON FOOTPRINT



INCREASE THE VALUE
OF YOUR HOME



GOVERNMENT REBATE TO
REDUCE THE COST OUTLAY



IT'S MAINTENANCE
FREE AND RELIABLE

What system do you need?

To find out what system you need use our calculator in the link below:

<http://energis.com.au/solar-savings-calculator>

or

Analyse your electricity bill and find out the peak usage in kWh per day. The rule of thumb is to divide the kWh per day by 4(4kWh/kW in Victoria) to get the system size you need.

For example, if your peak usage is 799.2kWh per month, then your average peak usage per day is 26.64kWh. The system you need is 26.64kWh/4, which is a 6.66kW system.

A 6.66kW system consists of 6.66kW of solar panels (normally 18 x 370W panels), a 5kW solar inverter, a racking system for mounting the panels, electrical switchgears for protection and other necessary components and labels.



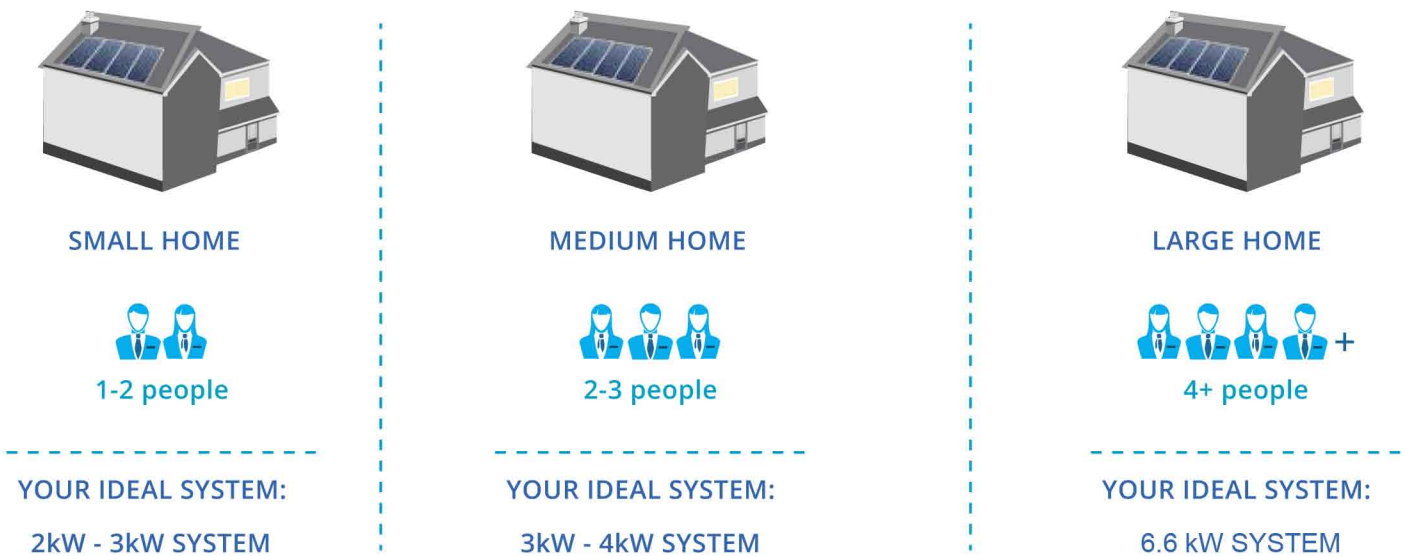
Get a performance estimate from our inhouse Clean Energy Council accredited design engineers to find out how much solar power a suitably sized system would produce in your area.

The above information can be used as an indicative guide, however there are a lot of factors to be considered when assessing the right sized solar system for a home.

Contact us to find out more!

Or

Simply identify the system you need from the below table:



**Disclaimer: This diagram is a guide only. Please call 1300 782 217 for an independent assessment & quote.*

How many solar panels can I fix on my roof?

The dimension of a solar panel with 66 cells is 1852×996. For a 20-panel system to be installed in two rows you need at least a 35m high and 10m wide space on your roof. Get the exact design from one of our experts.

Where can the panels go on my roof?

Solar panels work best when they are North facing, pointing directly at the sun, at the correct angle and are not blocked by trees or shading. East and West facing configurations can also be considered. The effectiveness of solar panels also depends on where you live and the weather. For example, in Melbourne the best way to fit the panels is facing true North at a 30-degree pitch.

Electricity Meter



New



Old

To install a Solar Power System, you need a bidirectional meter. If you still have the old meter, contact your electricity distributor, and get it changed to a bi-directional smart meter. You can contact us to find out whether you need to change your meter.

How does a Solar Off-Grid System or Standalone System work?



Solar panels produce DC electricity, which will be converted to AC by an Off-Grid inverter for powering the home and appliances. Unused power will be stored in a battery bank for later use. A fossil fuel generator can be used as a backup. Standalone power systems are installed in areas where power poles do not exist. EG: holiday homes, islands without electricity, remote areas etc.

How does a Hybrid System work?



A solar hybrid system is either a Grid connected system or an Off-Grid system with multiple power sources. i.e. A Solar Grid connected system with battery backup.

Solar panels produce DC electricity, which will be converted to AC by the solar inverter then consumed by the household. Excess electricity will be stored in a battery bank for later use, while the remainder will be sent back to the grid.

In addition to the battery bank, a wind power system and/or fossil fuel generator can be connected to the hybrid system.

Other Special Applications:

Export Control System

We can provide you with a solution if the electricity distributor does not allow you to install the system you need and you are approved for a smaller sized system. In the case that you do not want to export any power back to the grid, this kind of system can help you to achieve that.

Energy Management System

This is a computer-aided system to monitor and control energy usage to best tailor it to the owner's needs. This helps to reduce energy costs by understanding how the household consumes energy, and can reduce the length of ROI. It can also ensure the storage battery is charged at the ideal time.

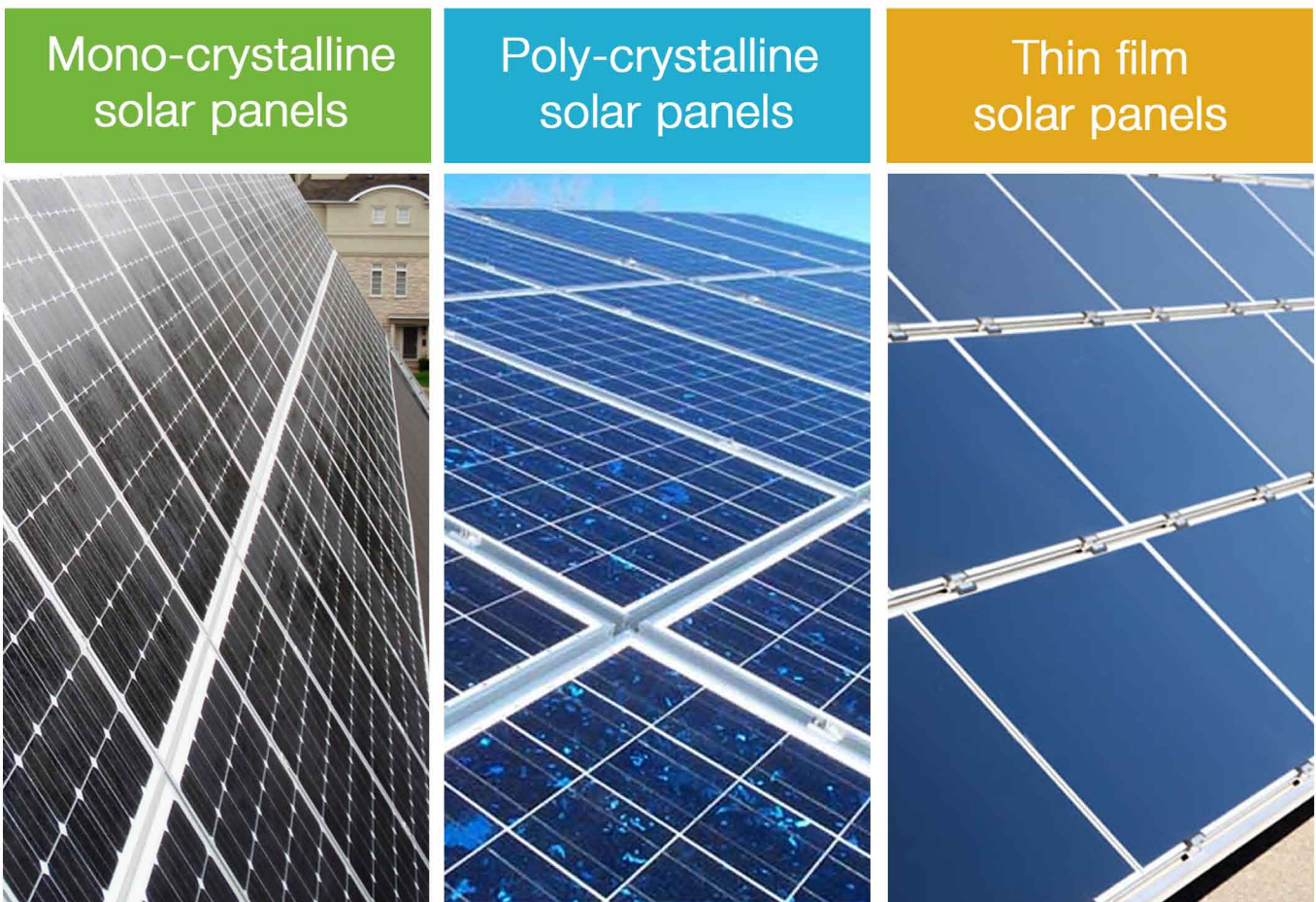
What is a solar panel?



A Solar panel (solar modules) is a flat panel designed to absorb the sun's rays as a source of energy for generating electricity. It produces DC electricity, which is like the electricity we get from batteries.

TYPE OF SOLAR PANELS

There are three main types of solar panels:



Mono-crystalline solar panels

Poly-crystalline solar panels

Thin film solar panels

- Single cell structure
- Dark black in colour
- Corner cells are usually missing due to the nature of production

- Multi-cell structure
- Light to dark blue in colour
- The differences in appearance is due to the manufacturing process

- Rugged and lightweight
- Flexible and adaptable to many surfaces
- More resistant to damage from hail, golf balls, rocks, etc. overseas to claim the warranty.

How to select a good solar panel?



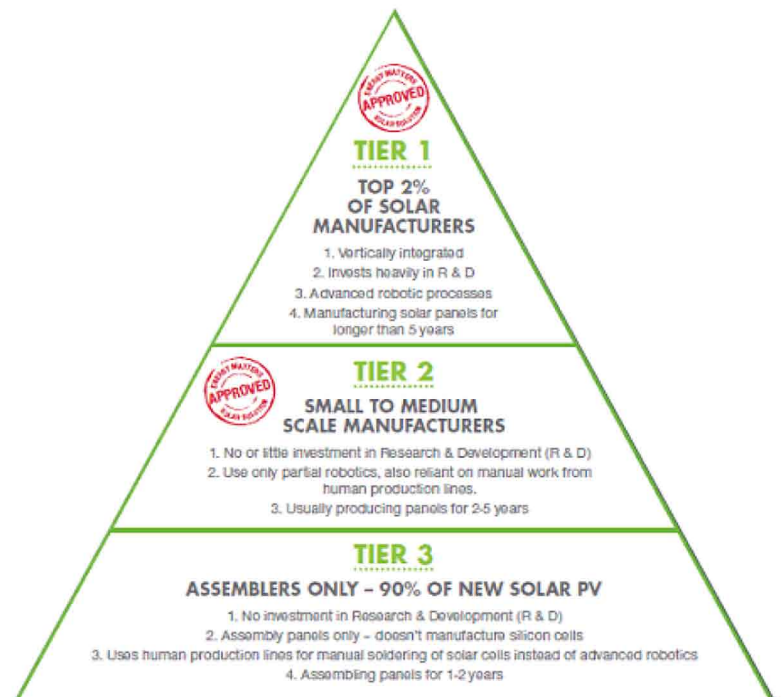
- Compare solar panels, inverters — everything! Care should be taken to select the solar panels, solar inverter, and a good installer.



The quality of solar panels is very important. Not all solar panels are created the same, however you will not be able know its quality just by checking it physically. Efficiency warranty of 25 years is given by almost all manufacturers. The point that should be noted is whether they will be around to honour the warranty after 15 or 20 years. Panels should be made by a reliable manufacturer who is financially sound and will be around for the life of the warranty.

Tier 1 manufacturers are highly reliable companies who manufacture high quality solar panels. Tier 1 companies are vertically integrated and manufacture the modules through a completely automated robotic process. They invest in research and development to improve their quality and technology regularly.

Tier 1 ranking has more to do with financial stability, however the very reason that a manufacturer earns the Tier 1 credibility is based on the number of large-scale projects that the manufacturer has engaged in where they have been funded by a bank as a viable long-term investment with a good ROI. A bank would not support a \$20M project if the product used was likely to fail in the short-term. Thus, inadvertently, a Tier 1 solar panel is a high-quality panel or should we say a solar panel that is designed to produce power for as long as the expected lifespan, which is around 25 years.



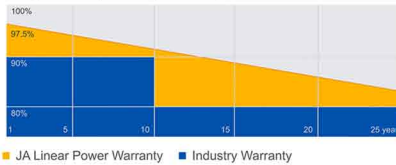
JA, LG, Trina Solar are just a few examples of Tier 1 manufacturers. All the panels Energis offer are Tier 1. The manufacturer should have a local office in Australia, so you do not have to send the solar panels

Technical comparison

• Linear performance warranty

Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty



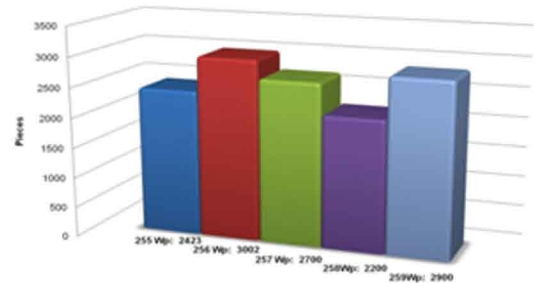
• Efficiency

The efficiency of the panels determines the conversion rate of the light energy to electrical energy by square metre of solar panels. As far as the customer is concerned you need less space on the roof to put the panels on if the efficiency is higher compared to panels with less efficiency.

• Positive tolerance

Many solar panel manufacturers use a plus/minus tolerance - normally shown in the panel specifications. For example, a 255W panel may be tested as low as 250W, but still sold as a 255W panel. Does that sound unfair? We think so, but it is "acceptable" if the manufacturer states, for example, a 0/ (-30/0) tolerance on their specification sheet.

Distribution of Flash Data for LG2SSSiC n • 13.000 Modules ø • 257,5 wp



- Why is this so important? Solar panels are wired together in "strings". The maximum power of each string is governed by the lowest performing panel. If just one of your solar panels is performing at 3% below its rated performance, this will drag down the performance of your entire system.

- For example, a new LG 255W Mono XTM solar panel is guaranteed to achieve over 255W when tested under industry standards. Just one of the many ways LG provide peace of mind and a secure investment.

- What does this mean for you? More power, day after day, year after year.

• Number of bypass diodes

Generally, the number of bypass diodes with a 60-cell solar panel is 3. For 60 cells solar module 1 diode is meant for 20 panels. This will help to safeguard the cells from getting damaged in the case of shading.

• IP 65/67 rating

The ingress protection should be at least IP 65/67 since the panels are meant to work outside in dust and rain.

• Construction

A quality construction is expected since the panels should work for at least the next 25 years.



Glass

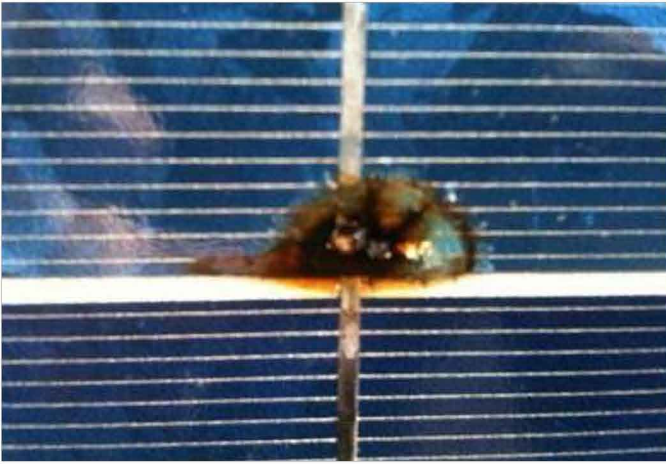
3.2mm, high transmission, low iron, tempered glass.

Frame

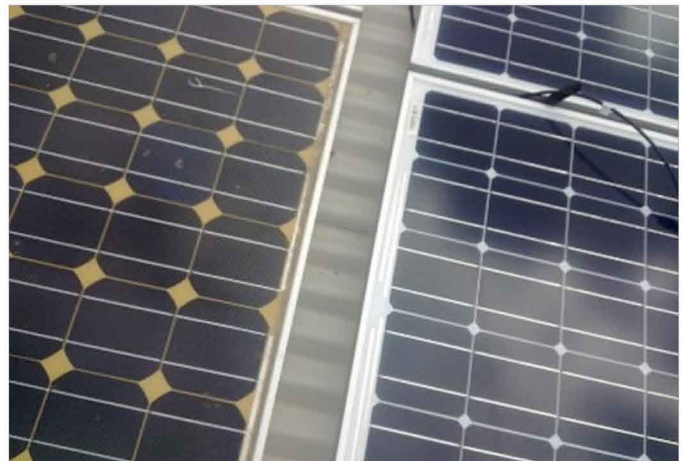
Anodised aluminium frame.

Bad Solar Panels

It is particularly important to choose the solar panels carefully, as bad quality panels won't last long. Refer to the pictures below for damaged panels.



Hot spots could lead to fire, but since our panels come with three diodes this cannot happen.



PV yellowing - This can reduce the efficiency of the panels as well

Solar Inverter



The DC electricity produced by the Solar Panels cannot be consumed in this form by the household. Most of the appliances we have in our homes run on AC electricity. The solar inverter converts the DC electricity generated by the solar panels to usable AC electricity.

The most important thing you need to consider for a solar inverter is reliability. Consider the best inverter on the market you can get. You don't want to purchase an inverter that shuts down regularly needing frequent maintenance. If the inverter fails you lose a lot of usable energy. We have brands like SMA, SolaX and ABB.

Some installers may advise you to initially install a smaller panel system with a big inverter and to upgrade it later. We advise you against this as:

- 1) By the time you install the new panels the efficiency of the existing panels would have reduced. The efficiency of the new panels also comes down to the performance of old panels. You also may not be able to source the same type of panels in the future. For example, if a panel is tested to produce 250W and it is installed in a series along with other panels producing 240W in total, you will only get 480W instead of 490W
- 2) There is another installation cost involved for a second installation
- 3) The voltage window does not allow to lay out the panels as you wish

Ask for CEC performance estimate which explains the maximum and minimum number of panels possible, or you can contact us.

Type of Inverters

There are two main types of inverters - string inverters and micro inverters.

A group of panels are connected to the string inverter. Every single panel is connected with one micro inverter in a micro inverter system.

- Choose a micro inverter system only if you have shading problem.

1. String Inverter



String inverters are normally one single inverter connected to all the panels. This is the most common system used. For example, a 6.6kW system with 370 W solar panels will have 18 panels and a single inverter. There are inverters with multiple MPPTs.

For example, a dual MPPT string inverter

The number of MPPTs needs to be two with an inverter only if the direction of the panels is different. If the inverter only has one MPPT and if the panels are put in two different directions, the productivity of the entire system goes down. It will be that of the set of panels exposed to less sunlight.

2. Micro Inverter



Micro Inverters are a single inverter under each panel. This is most commonly used in the shaded areas and if the panels go in multiple directions. This system will help you to track the productivity of each solar panel. For example; A 3kW system with 250W solar panels will have 12 panels and 12 micro inverters.

3. String inverter with DC optimiser



Some string inverters do not have integrated MPPT. So, DC optimisers are affixed to each individual solar panel in the array. They turn individual panels into smart modules by tracking their peak output and regulating their voltage before sending the power along to the central inverter.

This results into an optimised performance for every single panel regardless of sun orientation, shade, or even damage to one or more of the panels.

Other features of the Inverter

Monitoring

Monitoring is very important because it is the best way you can see the productivity of the system and can easily find out if there is a problem. It will be easier to connect it to your computer if the inverter uses Wi-Fi or Bluetooth. The inverters we provide are with wireless or wired connectivity.

Efficiency

The conversion efficiency is another factor to be considered. If the size of the panel is 250W and the inverter efficiency is 97.6% then the AC power, you get from the inverter is 244W. If the efficiency is 95% then power, you get out of the inverter is 237.5W. Here you will save 6.5W. When a 5kW system is installed, you save 130W if an inverter with 97.6% is installed compared to one with 95%. The inverters we install are with high efficiency (97.6%)

Number of phases

If you have three phases, it is better to install a 3phase inverter. However, if most of the appliances used during the day are connected to only one phase, a single-phase inverter will be sufficient, and it can be installed on that particular phase.

Mounting System

The mounting system must withstand the heat, wind, and rain during its life. To understand the quality of the mounting system used in the installation we use a Clenergy Racking System.



- Clean energy has its genesis in Australia and footprint across the world
- Strict ISO 9001 base quality control ensures optimum strength and long life for your installation.
- It withstands wind speeds up to 88 metres per second through its robust design and high-quality materials.
- Corrosion resistance is achieved through anodised structural grade aluminium and stainless-steel components.

Understand your Installer



Design and installation need to be done by a professional company. Only a Clean Energy Council accredited designer and installer should do the installation in Australia. All the systems we install are done by Clean Energy Council installers.

If the system is not designed properly your system will not work. At least factors like voltage of the panels, maximum and minimum temperature in the area have to be considered. If the voltage goes below the range input voltage of the minimum the inverter does not start. If the voltage goes above the maximum voltage at any point of time it will damage the inverter.

Why Energis?



We are CEC Approved Retailer

This accreditation is an indispensable qualification for a business installing Solar PV. Retailers with this accreditation are committed to quality and best practice



10 years' Experience

We have installed some of the biggest projects in Victoria. No job is too big or too small



100% Australian owned

We are proud to be 100% Australian owned. Aussie, Aussie, oi oi oi!



Tier 1 Quality

We only work with the most respected manufacturers and top-quality panel and inverter brands at the most affordable prices.

Tier 1 panels offer high-quality standards that have proven to be better and more bankable than the rest of the market. Our products come with locally backed warranties



Customer Focus

At Energis, the sole focus has always been the customer. We make sure to bring customers ease and affordability with a blend of top-quality products and customer service.



Servicing the whole of Victoria and beyond

With a lot of pride, we service the Metro, Gippsland, Geelong, Mildura, and Wodonga regions. Our extensive network allows us to deliver the Metro pricing to even the most remote areas

COMPARE ALL THE COMPONENTS AND ITS WARRANTIES

WARRANTY	Efficiency warranty of 25 years is given by almost all manufacturers. The thing, which has to be considered is whether the panel manufacturer is able to honour the warranty for the next 25 years.
SOLAR INVERTER WARRANTY	Standard warranty of the inverter is 5-7 years depending on the brand. However, there are options available to the customer to increase it up to 25 years.
INSTALLATION WARRANTY	Most of the consultants will not tell you anything about the install warranty. The install warranty is especially important, always look for at least 10 years' warranty on your installation. We give 10 years' warranty on the install, whereas most other companies give only one year. We also give a 5-years warranty on all other parts.
SOLAR PANEL WARRANTY	Standard product warranty is 10 years. However, the most important
COMPLETE SYSTEM WARRANTY	You get a 5-years full system warranty. Refer to our warranty terms and conditions to find out more.

References

Get some references and talk to a couple of existing customers if possible. If the installation company, you are speaking with has done some commercial projects they can generally be considered more reliable.

Background



Do some research on the company to find out if they have any bad history. We have an incredibly good reputation in the commercial and residential markets.

Complete Solution



Instead of just sizing your system as per your current usage, a good company will suggest other measures to reduce your consumption first and size up your system per the reduced usage. LED lighting is a solution provided by us to further reduce power consumption, thereby also reducing the amount of solar you may need. Contact us for an LED lighting solution for your home.

Our Product Partners



Check who the company partners with. If the brands are reputable and trustworthy then the company can be considered reliable as good brands deal with trustworthy companies.

Proper Proposal and Contract of Work



Get a proper proposal before deciding anything. Check the contract properly before signing it.

Are they getting the panels from the Manufacturer?



- Check where the installers are getting the panels from. They should get it from an authorised wholesaler or the manufacturer otherwise your warranty will not be valid.

We buy all our panels directly from the manufacturer therefore giving you assurance and the best price by cutting out the middleman

- Website
Check their websites for more information and product details.

Solar Rebates



Solar Rebates are financial incentives offered by the Government to promote solar energy in Australia. The three ways they currently exist are:

- Small-Scale Technology Certificates (STCs)
- Solar Victoria Rebate
- Feed in Tariff incentives

STCs

STCs (Small-scale Technology Certificates) were previously called RECs (Renewable Energy Certificate). The amount of incentive a customer is eligible for is calculated based on the amount of energy the solar system is expected to generate. The dollar amount of STC incentive can change according to the market conditions.

Normally the financial incentive is provided to the customer as a point-of-sale discount by Energis.

Solar Victoria Rebates

Eligible Victorians homeowners are offered the opportunity to apply for and receive the Solar Victoria Rebate. Eligible homeowners can also choose to take up an optional interest **free loan** for the same amount as the rebate. **Landlords** may also be eligible for a rebate to have solar installed at their investment property.

Eligible Victorians can also add a solar battery to their existing solar PV system.

How to know if I am eligible? How much rebate I will receive from the government?

Information about Solar Vic and the current rebate amounts go to: <https://www.solar.vic.gov.au>

Example Residential system cost after rebate and incentive

SI No	Products	Specification	Qty
1	Solar Modules	XXXXXXXXXX	20
2	Solar Inverters	XXXXXXX	1
3	Power Optimisers	XXXX	20
4	Smart Energy Meter	XXXXX	1
5	Current Transformer	XXXXX	1
6	Mounting System	As required	As required
Total Equipment Cost			\$10,372
Solar STC incentive (78 x \$37)			(\$2,886)
Solar Vic Rebate			(\$1850)
Solar Vic Loan			(\$1850)
Contract price (incl. GST)			\$3,786

As you can see from the above example, there are significant rebates and incentive that are available for an installation of a residential solar power system.

Feed in Tariff

A Feed in Tariff is a rate paid or credited to a system owner for electricity sent to the grid. The program is run by states who offer feed in credits through the electricity retailers.

Contact us to learn more about feed in tariff.

Beware of Gimmicks

This is the most important part. Make sure that you reject all gimmicks and get quality products, design and service.

- Have a realistic price expectation
- Avoid high pressure sales tactics

Good Vs Bad Installations

GOOD INSTALLATION



Panels are installed within the edge of the roof



Cables and conduit under the roof. Aligned panels



Any inter-array cables are hidden.



Trimmed rails



Bottom entries into the isolator

BAD INSTALLATION



Panels are over the edge



Cables are not done under the roof



Conduits hanging on the roof



Panels not aligned



Top entry into DC isolator



www.energis.com.au



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