

## Solar PV Panel Tips for Residents

### What should be done first?

**Before** installing a solar photovoltaic (PV) panel system, do an energy audit of your home to see if there are other ways to reduce energy use and become more efficient. Improving your home's energy efficiency can reduce the size of solar PV system needed, which will reduce the cost. See *Energy Efficiency Tips for Residents* fact sheet for more information.



### How do solar panel systems work?

Solar PV panel systems generate electricity during daylight hours. You can reduce your electricity bill by using this generated energy in your home at the time it's generated (i.e. during the day). If you are eligible for the Renewable Energy Buyback Scheme, you can also sell excess energy back to the grid, but at a much lower tariff than the consumption tariff. Refer to Synergy for more information: [www.synergy.net.au/Your-home/Solar](http://www.synergy.net.au/Your-home/Solar)

If electricity is used mainly at night, installing a solar system will not substantially reduce electricity costs.

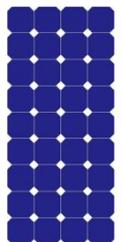
### What electricity is used during the day?

Obtain a 'load profile' from your electricity supplier, which is a graph showing electricity use over time. If this is not available, you can read the electricity meter at around 6 am (sun up) and 6 pm (sun down) over a number of typical days and average the usage. This will tell you how much electricity is being used during the day.

### What size system is required?

The amount of electricity needed will depend on what you want to get out of the solar PV system. A small system will be cheaper to install but may only cover part of your day time electricity use. A larger system could cover all of your day time electricity use but will be more expensive to install.

1 kW of solar panels will generate approximately 4 kW of electricity per day in Perth (coefficient of 4). This is an average and variation will occur due to location (latitude), the position and orientation of the system in regard to the sun and the seasons. You can calculate the best size of the system based on your needs by dividing the amount of energy required by the coefficient (for example, to generate 20 kW per day, a 5 kW system is optimal).



The size of the system may be restricted by factors such as the roof configuration and shading.

### Where does the system need to be positioned?

Solar panels are most efficient when they are pointed directly at the sun. In WA, this means they should generally face north. If you have a number of areas on the roof available, choose a position that will generate power when it is most needed. For example, if the busy time is in the late afternoon, choose a west facing roof; for peak morning use, choose an east facing roof. With some solar systems, panels can be placed on more than one roof area to optimise generation.

#### ❖ Is the roof the optimal angle for maximum energy generation?

Solar panels achieve maximum daily production when installed in a north-facing direction at an angle of approximately 22° and are not shaded in any way. On some roofs, solar panels may need to be installed on raised, tilted brackets rather than flat. This can increase the cost of installation.



❖ **Is the roof shaded at any time during the day?**

Shade can affect the output of a whole panel or entire system, not just the cells which are shaded. Check the roof at various times during the day to ensure that shaded areas from trees, power lines, aerials, vents, chimneys, satellite dishes or air conditioning systems have been identified.

**What sorts of panels are available?**

There are three main types of solar panels available, each with their own benefits. Monocrystalline solar panels are not necessarily 'better' or more efficient than polycrystalline or amorphous thin film, as efficiency depends on location and weather conditions. During the design and specification stage, your accredited designer/installer will help you choose which type is the best to suit your needs.

❖ **Monocrystalline**

Efficiency typically within the range of 135-170 Watts per m<sup>2</sup>; good performance in cooler conditions; previously the most commonly used technology in the world; excellent life span – usually come with a 25 year warranty.



❖ **Polycrystalline**

Efficiency typically within the range of 120-150 Watts per m<sup>2</sup>; generally marginally less expensive to produce than monocrystalline; slightly better performance in hotter conditions; excellent life span – usually come with a 25 year warranty.



❖ **Amorphous Thin Film**

Low conversion efficiency typically within the range of 60-80 Watts per m<sup>2</sup>; optimal efficiency in hot weather; requires 2-3 times more panels and surface area for same output as crystalline; expected lifespan is less than crystalline panels. These panels are ideal for inland Australia, where conditions are very hot and space is readily available.



**How do inverters work?**

The inverter converts Direct Current (DC) (produced by the solar panels), into Alternating Current (AC) (used by the electricity grid). The efficiency of the inverter directly affects the efficiency of the **solar system**, so higher efficiency is better. Inverters are usually smaller than a standard briefcase, and are situated close to your electrical switchboard. There are two main types of inverters:

❖ **String inverters**

This is the most common system design with multiple panels feeding into one inverter (in series). They are generally cheaper than micro-inverters and should last longer if installed out of the weather. The main disadvantage is that shading of one panel not only lowers the generation of that panel, but also all other panels connected to it. String inverters generally need around six panels in sequence together to work efficiently.

❖ **Micro-inverters**

Are designed so that each panel has its own inverter. This system is better where a roof has shading from trees, power lines or aerials because micro-inverters isolate the shaded panel so that it doesn't affect other panels. They are recommended in complicated roof situations where it is difficult to install six panels in sequence together.

Inverters installed directly under panels may experience extreme heat which will cause them to both electrically de-rate and shorten their working life. Inverters should be positioned to be in the roof space or on a wall.

**Will the meter or tariff change?**

The current meter may need to be changed when the solar system is installed (to a bi-directional or smart meter). This may add to the cost and could result in a change of tariff being applied to your home (for example, from standard rate to time of use).

Check with the installer and with the electricity supplier to confirm any charges which may be incurred.



## Are the solar panels, inverters and designer/installer accredited with the Clean Energy Council?

All panels and inverters should meet Australian Standards.

It is important to have the system designed and installed by an accredited individual. Ask to see their accreditation photo ID card and note their accreditation number.

This can be checked on the Clean Energy Council website: [www.solaraccreditation.com.au](http://www.solaraccreditation.com.au)



## Warranties

### ❖ What warranties does the system include?

A solar panel system is an asset and will last for at least 25 years. All solar systems installed in Australia should carry a 25 year performance warranty, which states that the panels should still be producing 80% of their original rated output after 25 years.

To enforce this warranty, make sure to have the original output of the system **provided in writing** from your provider. Additionally, panel material warranties and workmanship guarantees generally span 5-10 years, and your installer should provide an installation warranty of 2-5 years.

Solar panel systems require minimal maintenance due to having no moving parts. However, the inverter will need to be replaced during the life of the system. The average inverter warranty is 5 years. In most cases the inverter will last much longer, but this can't be guaranteed.

### ❖ Who is providing the warranties, the manufacturer or the importer?

The importer is responsible for the warranty in the absence of a manufacturer in Australia. However, if the importer changes their business name or sells their business, their warranty obligation towards you ceases. Therefore, it is important to obtain **written confirmation** of statements made by the installer, including all performance claims, guarantees and warranties.



### ❖ Is the manufacturer financially sound?

It is important to ensure that a reputable manufacturer is chosen who can support the lifetime warranty of the system. Check that the panels and inverters recommended are being manufactured by a known company with industry experience.

### ❖ Does the manufacturer have dedicated staff and product support in Australia?

Try calling the manufacturer to talk to them about the support they give, particularly here in Perth.

## Have you checked reviews regarding the panels, inverter, other hardware and installers?

Various sources such as Choice, Whirlpool Green Tech forum, solarquotes.com.au, Alternative Technology Association and bspq.com.au provide reviews of the system components.

Independent reviews and user forums can provide a good indication of how well the products work, how well suppliers and manufacturers treat their customers and how well the product has worked for others in similar situations.



## Obtaining quotes and negotiation on price

### ❖ Have at least 3 written quotes been obtained?

It is important to source more than one quote and to get any inclusions, specifications and performance guarantees in writing. If a cheaper price has been negotiated, make sure this is also in writing.



### ❖ What is the Renewable Energy Buyback Scheme?

In WA, the Renewable Energy Buyback Scheme is available to residential customers, not for profit organisations and educational institutions. The solar system must be between 500 watts and 5 kilowatts and be connected through a bi-directional meter. You must also obtain relevant approvals to connect to the grid.

See Synergy for more information: [www.synergy.net.au/Your-home/Solar](http://www.synergy.net.au/Your-home/Solar)

### ❖ Does the price include a discount from Small-scale Technology Certificates?

The Clean Energy Regulator administers the Renewable Energy Target's two schemes:

**Large-scale Renewable Energy Target (LRET)** encourages investment in renewable power stations to achieve 33,000 gigawatt hours of additional renewable electricity generation by 2020; and

**Small-scale Renewable Energy Scheme (SRES)** supports small-scale installations like household solar panels and solar hot water systems.

The SRES creates a financial incentive for individuals and small businesses to install eligible small-scale renewable energy systems such as solar panel systems by issuing Small-scale Technology Certificates (also known as Renewable Energy Certificates). The number of certificates issued is based on the expected output of the solar system over a 15 year period. One certificate is the equivalent of 1 megawatt-hour (MWh) of renewable energy.

The price of the certificates (or value of the incentive) fluctuates with demand and could also vary in line with changes to the overall scheme.

Installers usually assume the responsibility for obtaining the certificates as well as the risks associated with holding onto or selling them, meaning that those who purchase solar systems for their home or business receive an **up-front discount**. However, it is important to know if the discount is **locked in** from the time of deposit, and to ensure that all information regarding the scheme and the certificates is up to date prior to signing the contract as it can affect the overall cost.

More information can be found on the Clean Energy Regulator website: [www.cleanenergyregulator.gov.au/RET](http://www.cleanenergyregulator.gov.au/RET)

Data is available on the average prices of solar systems across Australia. Perth is now one of the cheapest cities in which to own solar.

#### Residential Solar System Price

Solar Choice: Average solar PV system prices - January 2017						
	1.5kW	2kW	3kW	4kW	5kW	10kW
Adelaide, SA	\$3,465	\$4,014	\$5,176	\$5,861	\$6,870	\$13,732
Brisbane, QLD	\$2,981	\$3,583	\$4,181	\$5,113	\$5,992	\$13,465
Canberra, ACT	\$4,382	\$4,781	\$5,981	\$7,131	\$8,181	\$13,925
Darwin, NT	\$6,527	\$7,293	\$8,670	\$10,518	\$12,485	\$21,743
Hobart, TAS	\$3,782	\$4,389	\$5,668	\$6,966	\$7,871	\$15,746
Melbourne, VIC	\$3,469	\$4,048	\$4,841	\$5,551	\$6,454	\$13,402
Sydney, NSW	\$3,145	\$3,650	\$4,474	\$5,327	\$5,868	\$13,431
Perth, WA	\$2,643	\$2,774	\$4,188	\$4,183	\$4,744	\$13,330
All	\$3,799	\$4,316	\$5,397	\$6,331	\$7,308	\$14,847

#### Commercial Solar System Price

Solar Choice: Average solar system prices - Jan 2017				
	10kW	30kW	50kW	100kW
Adelaide, SA	\$13,870	\$35,201	\$60,145	\$112,013
Brisbane, QLD	\$13,465	\$35,909	\$62,714	\$114,758
Canberra, ACT	\$13,925	\$36,290	\$59,430	\$111,923
Melbourne, VIC	\$13,402	\$37,486	\$62,761	\$119,774
Sydney, NSW	\$13,431	\$36,021	\$60,374	\$114,315
Perth, WA	\$13,330	\$34,368	\$65,261	\$121,155
All	\$13,984	\$36,626	\$62,337	\$116,742

Source: [www.solarchoice.net.au/blog/category/installation-advice/solar-system-prices-2/](http://www.solarchoice.net.au/blog/category/installation-advice/solar-system-prices-2/)

**Disclaimer:** Whilst every care has been taken to ensure that this information is accurate, current and free from error, neither EMRC, its member councils nor any of its officers provide any warranty nor accept any liability for any errors in the information provided. Independent inquiries should be made as to the appropriateness and suitability of the information for your particular circumstances.