



# Solar Power

# Consumer Guide

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## **WHY GO SOLAR?**

Solar power systems are collectively saving Australian households over a million dollars a day on their electricity bills

Aside from giving you the opportunity to generate your own electricity, a rooftop solar array addresses issues relating to the expense and inefficiency of distributing power over long distances and contributes to reining in wholesale electricity prices in Australia.

The electricity solar panels produce is also "clean" -an environmentally friendly way to generate power, unlike the use of coal or other fossil fuels.

Because they have no moving parts, solar modules are extremely reliable, with an expected life span of several decades. They are also self-cleaning, easy to install and require very little in the way of maintenance.

### **FACT:**

The average vehicle in Australia travels 15000km per annum, which is equivalent to 4.5 tons of carbon dioxide emissions annually a 3.5kW grid connected solar power system will avoid 4.5 tons of carbon dioxide created through coal fired power generation - so it's the equivalent of taking a car off the road each year



## **TYPES OF SOLAR POWER SYSTEMS**

The two main types of solar power systems are grid connect and off grid (standalone/remote power)

A grid connect installation ensures you have the electricity you need, whenever you need it- automatically and regardless of weather conditions.

With a grid connect system your property is still connected to the electricity grid for periods such as night time when solar electricity production is not possible.

An off grid solar power system is completely separated from mains power and is more expensive as it utilizes a battery bank for storing electricity generated by solar panels.

Off grid installations are most common in rural and outback areas of Australia where the mains grid isn't available, or prohibitively expensive to connect to.

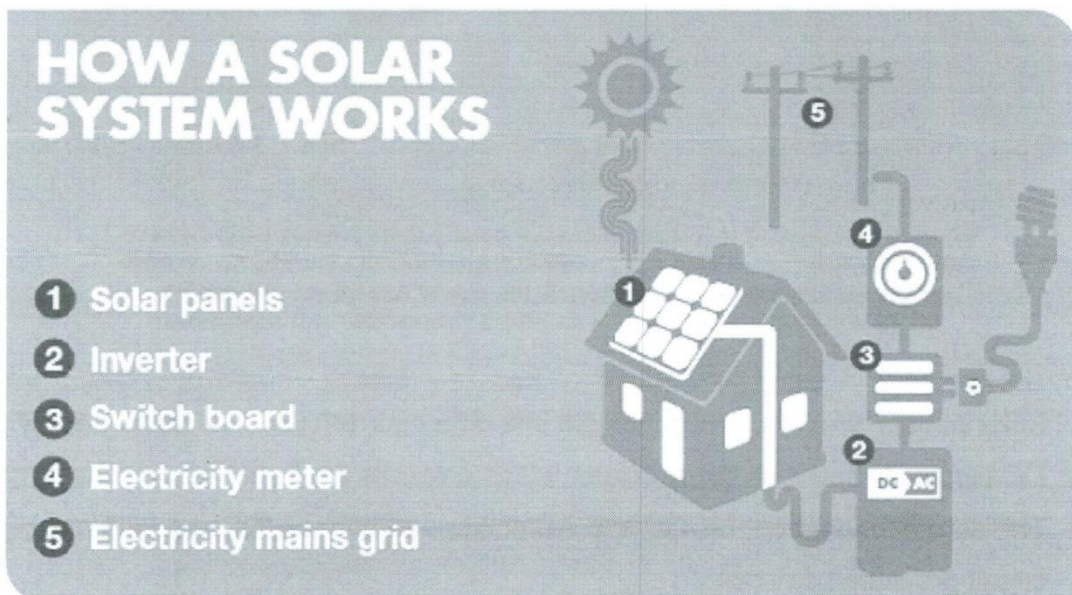
## HOW A GRID CONNECT SYSTEM WORKS

Most people in residential areas going solar invest in grid connect systems

Electricity from the solar panels is converted into supply suitable for domestic appliances via an inverter. Whenever the system produces more power than is being used, the surplus is fed into the mains grid.

Depending on your electricity provider and location, you could be paid a premium for every kilowatt hour of electricity your solar system feeds into the grid.

When your solar system isn't producing energy -for example, at night- the electricity is supplied by the mains power grid, as usual.



1. Solar panels directly convert sunlight into direct current (DC) electrical energy.
2. The inverter converts the solar DC power into 240V alternating current (AC) ready to be fed back into the grid or used in your home.
3. AC power from the inverter goes through the switch board for use in your home.
4. The meter records the energy sent to the grid from your solar system as well as the energy consumed from the grid.
5. Any surplus electricity being generated simply flows through into the mains grid for use elsewhere

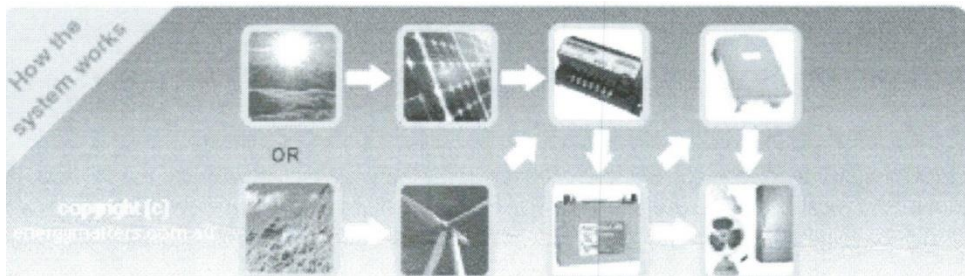
## HOW AN OFF-GRID SYSTEM WORKS

Off-grid systems are suitable for people in remote areas, where a connection to the mains power grid is not available or too expensive, or for light industrial precincts where energy security is essential.

These systems supply solar generated electricity through an inverter to a charge controller, which regulates the charging of batteries for energy storage.

These systems supply solar generated electricity through an inverter to a charge controller, which regulates the charging of batteries for energy storage.

Appliances can then be run off the electricity stored in the batteries.



Wind or sun applied to a wind turbine or solar panels creates a DC current. The current is routed through a solar regulator which controls the charge to the batteries. From the batteries, the power *can* be utilized directly for 12 volt appliances or via an inverter to power 240 volt appliances.

1. Solar panels directly convert sunlight into direct current (DC) electrical energy.
2. DC electricity flows via the regulator which prevents the batteries overcharging.
3. The control board controls DC and AC power and houses the switching and circuit protection devices.
4. The inverter changes the battery DC power into 240V alternating current (AC) ready to be used in the home.
5. The battery bank allows you to collect energy during the day and store it until you need to use it. These can be installed either inside the house or in an external battery shed.
6. A generator may be used as backup in cloudy or low wind conditions
7. As with solar PV, a wind turbine can be used to charge your batteries.

## SOLAR POWER SYSTEM COMPONENTS

The core components of a grid connect solar power system are the panels, inverter and mounting system. External to the system is the meter, which must also be compatible with the system.

## SOLAR PANELS

Solar panels come in different wattages and sizes. As a rough guide, each solar panel is approximately 1.7 metres long and 1 metre wide. A 3kW solar panel system requires around 24<sub>m</sub><sup>2</sup> of roof space and a 5kW solar panel system requires around 40<sub>m</sub><sup>2</sup>.

There are 3 main types of solar cells used in solar modules.

Monocrystalline silicon offers high efficiency and good heat tolerance characteristics in a small footprint. An example of a quality monocrystalline solar panel is the Daqo DQ190MFAa/b 250 watt module.

Polycrystalline (or multi-crystalline) silicon cell based solar panels are now the most popular choice in residential installs. Recent improvements in polycrystalline panel technology have resulted in the development of modules equal to or better than many monocrystalline brands in terms of size, efficiency and heat tolerance. One of the world's leading producers of quality polycrystalline panels is REC.

Amorphous (or thin-film) cells use the least amount of silicon. While some thin film panels are among the least efficient solar cells, Solar Frontier CIS solar panels offer the highest conversion efficiency of any mass-produced thin-film module.

Even within any of the above technologies, performance between brands will vary. For example, some will perform better than others on hot days. With heat being the enemy of a solar panel and Australia experiencing more than its share of hot conditions, being aware of the differences is important.

*What influences the cost of a solar panel?*

*The cost of a solar panel varies greatly and is determined in part by its output capacity (in watts), the physical size, the brand, the durability / longevity (or warranty period) and any certifications the solar panel might have. Choosing a solar panel on price alone is not wise, as it may not be suited to the area where you wish to install it, may not have the necessary certifications to qualify for government incentives, or provide the performance required to assist economic payback.*

## SOLAR INVERTERS

Solar panels produce low voltage DC electricity. The inverter converts this into the AC electricity needed to supply power for standard appliances.

The efficiency of an inverter is measured by how well it converts the DC electricity into AC electricity. This usually ranges from 95% to 97.5% for most models. Inverters are sized according to the power (watts) they can supply.

As is the case with solar panels, not all solar inverters are equal and inverter efficiency will have a direct impact on the amount of time it takes for a system to pay for itself

As is the case with solar panels, not all solar inverters are equal and inverter efficiency Obviously the more efficient the inverter the better- as less electricity will be wasted as heat during the conversion from DC to AC.



While the inverter efficiency claimed by a manufacturer may be high, in reality it may not be. The only way to be sure you're buying quality is if the inverter has real world examples of the performance of their equipment, validated by independent third party testing.

Industry leading solar inverters for grid connect systems in Australia are SMA and Aurora. Be cautious of generic type brands.

**NOTE:**

*It is important to ensure that your grid connect inverter complies with Australian Standards. This is required to be eligible for STCs and Solar Credits. Ask an accredited installer to provide proof that an inverter meets Australian standards*

**MOUNTING SYSTEMS**

The mounting system is a crucial component of a solar array as it will be subjected to major environmental stresses, such as wind. Unfortunately, some suppliers skimp on this item. Ensure you ask about certification and warranty periods.

**CABLES AND CONNECTORS**

The use of sub-standard connectors and cables can significantly impact on system performance and to fire and electrocution risk. Cabling should be certified to PV1-F and solar connectors to EN 50521 standards

**ELECTRICITY METERS**

If you don't have a solar capable meter, known as a bi-directional meter, you will need to get one when you install a solar system.

If your meter hasn't been updated in a while, it is most likely that you have a traditional accumulation meter (with a spinning disk) and will need to acquire a new meter.

This is because a traditional accumulation meter does not know how much electricity is consumed or surplus electricity is generated, whereas a solar capable meter provides half hourly readings.

If your meter has been upgraded recently, check that it is a smart meter and not just an interval bi-directional meter. Interval meters are very similar to smart meters, but the latter have a range of additional capabilities.

If you're unsure, it is best to check with a solar specialist whether you need to upgrade your meter.

**SOLAR PANEL INSTALLATION FACTORS**

An accredited solar installer will make sure that solar panels are positioned on your roof for maximum efficiency safety and correctly wired to the inverter.

In terms of panel installation, some considerations that need to be taken into account include orientation, tilting, shading and mounting.

**ORIENTATION**

As Australia is in the Southern Hemisphere, in some situations solar panels should be facing as close to true north as possible. However, northwest or west-northwest can be optimal if most of your power is consumed in the afternoon and if you live in a state where the feed in tariff incentive rate is less than the market rate for electricity.

## **TILTING**

Depending on your location, the angle of the solar panels should be between 20° and 32° for best performance (for Darwin 10° and 15°) on average over a year. For example, 22° is optimal for Perth. While tilting angle is an important factor, it is generally not as important as the orientation of the panels

## **SHADING**

PV panels should ideally be in full sun from at least 9am to 5pm. They should not be placed in shaded areas and should be kept free from dust and dirt. Shading from objects such as trees, roof ventilators or antennas will have a large impact on the output of a panel, as it changes the flow of electricity through the panel

## **MOUNTING**

The mounting system should be engineer certified for the area you are in. For example, if you live in a cyclone prone area, the mounting system and mounting brackets should be cyclone rated. Quality systems are wind certified - after all, you do not want your system to take off during a wild storm. The mounting system is a vital component of a system and some suppliers skimp on this item. Make sure you ask about wind certification, warranty arrangements and get copies of all relevant documents.

## **GRID CONNECT SOLAR POWER SYSTEM LIFESPAN**

Solar modules have been tested in the field showing small reductions in power output after 20 years, mostly because the glass surface becomes a bit dull and does not absorb as much light. Good solar panels usually carry an output warranty of 25 years. There are solar panels delivering power in Australia today that were installed more than 30 years ago. The electronic components such as inverters, being the most sensitive, should last at least 10 to 15 years before requiring refurbishing or replacement

## **HOW BIG A SOLAR POWER SYSTEM WILL YOU NEED?**

The size of the solar power system you should install depends on:

- The physical unshaded area available
- The amount of electricity you wish to generate
- What size system Power and Water have approved
- Your budget

Any size grid connect solar power system will reduce your yearly power consumption and your power bill.

*The bigger the system the larger the benefit.*

The output of a solar system depends on its rated capacity, how and where it is installed.

The most common household systems are 1.5 kilowatts, although some people choose to install systems of up to 10 kilowatts.

According to the Australian Bureau of Statistics, a typical Australian household consumes around 18 kilowatt hours (kWh) of electricity per day so a 1-2kW system should reduce your energy consumption by an average of 25-40%.

A 5 kW system could cover 100% of the energy consumption of a medium energy use an average household.

## **ENERGY EFFICIENCY**

*To make the most of solar power, the key is to implement simple energy efficiency strategies. It is easy to conserve energy by using appropriate lighting and efficient appliances, which can substantially reduce the size of the solar power system you'll need.*





## SOLAR REBATES

**NOTE:** in order to be eligible for solar schemes and credits an installer must be accredited by the Clean Energy Council

There are currently two major forms types of financial assistance offered for solar power systems in Australia

- Small-scale Technology Certificates (STCs)
- Feed-in tariff incentives

### STCs

One STC (which stands for "Small Technology Certificate", previously known as Renewable Energy Certificates) represents to one megawatt hour of electricity generated by your solar PV power system. The value of STCs change according to market conditions.

Many solar suppliers, including Quality Solar, make it easy for customers to extract the value of their STCs by providing a point of sale discount equal to the value of the STCs that the solar system is entitled to generate.

## **FEED IN TARIFFS**

A feed-in tariff is a rate paid or credited to a system owner for electricity fed back into the power grid from a designated renewable electricity generation source like a rooftop solar panel system or wind turbine. There are two different types of tariffs - gross and net.

A gross feed in tariff pays a rate for all electricity produced by a system that is fed back into the electricity grid, regardless of how much electricity is consumed by the household

A net feed in tariff only pays a rate for surplus energy created by the system that is fed back into the grid and takes into account the electricity consumed from the grid by the household.

Australia doesn't have a national program for feed in tariffs, only State run schemes. Most State schemes currently operating offer net feed in tariffs the Northern Territory has a gross feed in tariff.

Current feed in tariff rates and arrangements viewed [WWW.powerandwater.com.au](http://WWW.powerandwater.com.au)

## **CHOOSING A SOLAR INSTALLER**

As mentioned, in order to be eligible for government incentives, your system must be installed by a suitably qualified person.

The Clean Energy Council's accreditation scheme ensures designers and installers of solar PV power systems:

- Have undertaken the necessary training
- Follow industry best practice
- Adhere to Australian standards
- Regularly update their skills and product knowledge

An accredited designer/installer will provide you with a solar power system design and specification that includes consideration of your current electricity loads, the type of panels and inverter to be used and panel orientation.

*All of Quality Solar system designers and installers are accredited by the Clean Energy Council.*

## **QUOTATIONS AND CONTRACTS**

According to the Clean Energy Council's guidelines, a full system quotation should provide specifications, quantity, size, capacity and output for the major components, including:

- Solar panels
- Mounting system
- Inverter
- Any additional metering
- Data-logging devices if specified
- Travel and transport requirements
- Other equipment needed
- Any trench digging if required
- A system user manual.

The full quotation should also specify a total price, together with other relevant information. This final quotation document should form the basis of your contract with the designer / installer.

The final quotation and accompanying terms and conditions should also include:

- Average daily electricity output estimate in kilowatt hours
- An estimated annual production figure
- Estimated output during the most and least favourable months
- The responsibilities of the installer and customer, including payment obligations

Warranty and guarantee details, including compulsory information required by Australian Consumer Law

- Who is responsible for connecting the solar panel system to the mains grid
- The party responsible for meter changeover
- The party responsible for submitting documentation for feed in tariff incentives
- How STCs will be handled

**TIP:** Contact Quality Solar which can go some way in giving you an idea of the type of system, costs and financial benefits.



### **KNOW WHAT QUESTIONS TO ASK**

Solar is a substantial investment and it's important you arm yourself with all the facts.

Guides assist in helping you make the right decision, but there are also some questions you should ask.

## **QUESTIONS FOR YOUR INSTALLER**

1. Are they an accredited installer?
2. Ask them for their accreditation number.  
You can also check this at [www.solaraccreditation.com.au](http://www.solaraccreditation.com.au)
3. Ask how many systems the company or person doing the installation has installed.
4. Does the company have customers who can provide testimonials or feedback on the quality of their work??
5. Do the products they use meet Australian standards? You can confirm this on the Clean Energy Council website [www.solaraccreditation.com.au](http://www.solaraccreditation.com.au)

## **QUESTIONS FOR YOUR ELECTRICITY RETAILER**

1. Will I be moved to on and off peak power usage?
2. What will my on and off peak electricity tariff be?
3. Are there any other costs involved in being a solar customer? What feed in tariff do you offer?
4. How much is your retailer contribution over and above the State legislated minimum?
5. What do you offer to your solar customers over and above your offer to standard customers?

## **QUESTIONS FOR YOUR ELECTRICITY PROVIDER ABOUT THE METER CONNECTION**

1. Which distribution company will be changing my meter?
2. What kind of meter will I be changed to if I go solar?
3. How much will it cost?
4. How long will it take to change my meter over?

## **ADDITIONAL TIPS WHEN SHOPPING FOR SOLAR POWER**

### **RECOMMENDATIONS**

Ask friends, family, neighbors or colleagues who have had solar systems installed.

They'll be able to tell you about their experiences and perhaps alert you to any problems they experienced- ones that you'll be able to avoid.

### **REJECT GIMMICKS**

Everyone loves a bonus, but when too much emphasis is placed on a bonus rather than the core product-the solar power system itself- it should be cause for concern. Bear in mind that most gadgets and bonuses included with solar power packages have cost the vendor far less than the retail value they put upon them. Unless the bonus is directly related to the solar power system, you'll be better off forsaking the bonus and negotiating a cheaper price on the system.

## **HAVE REALISTIC PRICE EXPECTATIONS**

If you are paying substantially less than many other similar size systems quoted, you may be provided with poor quality equipment and/or poor installation work.

Quality equipment and installation isn't cheap and, like all other purchases, you often get what you pay for. Compare components and warranty periods and carry out checks into the company providing the installation.

While large, well established companies such as Quality Solar can pass on substantial savings due to increased buying power, other companies often reduce costs by cutting corners- to the customer's detriment.

## **SOLAR PANEL CERTIFICATIONS**

This applies to all solar panel purchases, but especially to the purchases that could attract a government incentive. The certification on solar panels indicates the type of testing that has been done on them. For instance, TUV IEC 61215 confirms that the solar panels have been tested by an independent laboratory and have met their advertised specifications. Other certification types are often self-assessed and so rely on the company being honest in what it claims.

## **MORE ON PANEL TYPES**

It used to be the case that if you had limited roof space you would need highly efficient (and very expensive) mono-crystalline solar panels. This has rapidly changed with advances in polycrystalline panel technology and some thin film technologies.

Even if you have ample roof space you may still want to consider panel sizes vs. output as filling up your roof with inefficient panels will affect your ability to add more panels at a later date, and does not maximise the power output of the space.

It's also important to bear in mind that regardless of claims, no solar panel technology will produce a significant amount of power in full shade and even partial shade may have a substantial impact.

Learn more about other related issues in the video "[Not All Solar Panels Are Equal](#)".

## **COMPARE ALL COMPONENTS**

Compare solar panels, inverters- everything. Package deals are a great way to save cash, but not all packages are created equal. For example, a company might use top quality solar panels, but skimp on inverter, cabling and mounting system quality in the hope that the panel brand name will dazzle you and you'll ignore the other components.

## **BEWARE OF HIDDEN COSTS**

A low advertised price mightn't be just due to low quality components. While it's not unusual for prices to vary based on the type of structure upon which a solar power system is placed, any extra costs should be clear and not buried in fine print.

## **GET A FEW SOLAR QUOTES**

It's always wise to gather a few solar quotes when making a major purchase as you will find that prices vary widely between providers. Don't be swayed by price only as inferior components can be used to reduce the up-front cost of the system- but they may wind up costing you more in the long run in terms of reliability and efficiency



## **AVOID HIGH PRESSURE SALES PEOPLE**

High pressure sales tactics are unfortunately common in the solar industry. Try not to make decisions on the spot ask the person to let you consider the offer. If it's as good as they claim it will still be a good deal tomorrow. Pressured decisions on the spot often turn out to be less advantageous in reflection.

Also ask the sales person whether they offer a cooling off period if you do sign there and then -this will give you time to carefully consider your purchase in a less high pressure environment. If you cancel your order within the cooling off period you should ensure that you get a full refund of your deposit.

## **INSTALLATION TIMELINES**

Solar fever sweeps the nation in waves and during these times providers can become backlogged. While you can expect a wait of up to a few months for a solar installer to perform your installation in some circumstances, this is something you should be made aware of by the system provider.

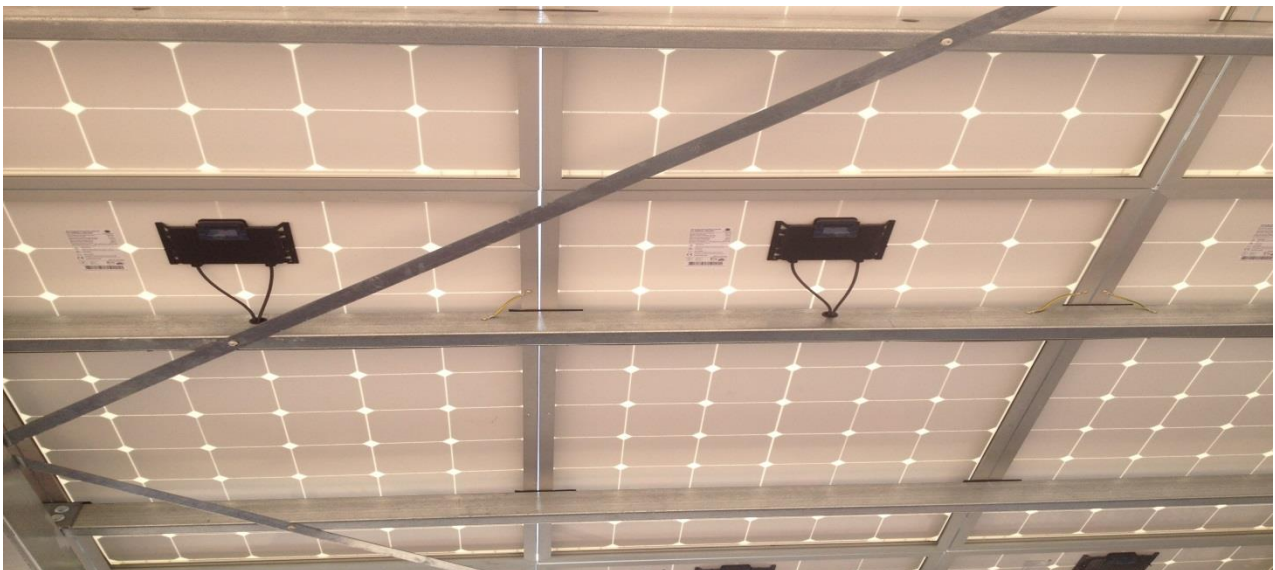
## **WARRANTIES AND GUARANTEES**

The durability or longevity of a solar panel is important for a number of reasons- for example, it can be an indicator of the manufacturer's confidence in its products. Reputable solar panels will have warranty a period of 25 years. Conergy, Yingli, Suntech, and Sanyo in fact all good panels offer a 25 year warranty period.

However, an important point to remember about any warranty is that it will often only be honored for as long as the company operates. It's another reason to select a well-known brand of solar panel rather than an obscure low-cost brand from a company that may disappear overnight. As you most likely won't be able to buy panels directly from the manufacturer, your selection of retailer is also important.

Choose a company that is a service agent for solar panel warranty work for the particular manufacturer you select. If you do strike a problem, the turnaround time to a resolution should be much faster.

Learn more about the potential issues and how to avoid them in Quality Solar's [consumers' guide to solar power - avoiding tricks and traps.](#)



What our clients have to say

A company is judged not so much by what they have to say about their own operations, but by what their clients say.

**PLEASE FEEL FREE TO FORWARD THIS CONSUMER GUIDE TO YOUR FAMILY, NEIGHBOURS AND COLLEAGUES**

**ABOUT QUALITY SOLAR NT**

This guide was prepared by **Quality Solar NT**, a locally owned and operated provider of renewable energy solutions for residential and commercial applications.

Quality Solar NT is committed to helping all Top Enders join the nation's rooftop revolution and to slash their electricity bills by offering high quality systems at low prices. We take great pride in making going solar simple for our customers.

We have a diverse network of accredited installers throughout Darwin and the rural area.

Our installers are trained to deliver to the most stringent Australian and international standards and have installed many hundreds of grid connect solar power systems.

Quality Solar NT Pty Ltd is an authorised supplier and warranty agent of a range of quality brands such as:

- Conergy, Suntech and Yingli, solar panels
- SMA, Aurora and Solarmax grid connect inverters

We understand that purchasing a renewable energy system can be a confusing process and a substantial financial commitment-. You can trust we will provide you with exactly what you need - nothing more or less.

We also offer Australia's most complete online resource for solar power at [www.qualitysolarnt.com.au](http://www.qualitysolarnt.com.au)

For the right advice from people truly passionate about solar and helping you save on your electricity costs, call the Quality Solar NT 0405 364 715

Using satellite imagery and advanced mapping tools, no matter where you are in the top end our team of friendly experts can advise you on the best system for your needs.

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