THE BEGINNER'S GUIDE TO SOLAR

S.m.a.r.t. energy answers

The Beginner's Guide to Solar

With the global concerns about climate change and the rising cost of electricity, we see more and more Australian's turning to solar. Going solar enables you to take control of your cost of living and reduces your reliance on electricity retailers and exposure to varying prices. It's no longer just a conscious decision but a smart economic one. However, as solar becomes more mainstream and grows in popularity, so do your options.

With the vast amount of companies and products available on the market, it can get confusing and overwhelming when deciding to invest in solar. What kind of system do you need? How many panels should you install? How do you pick the right provider? This guide has been created by Smart Energy Answers to provide you with an overview of solar so you can find the best solution for your needs.

Why Go Solar? Top 7 Benefits

More Australians are turning to solar to reduce their utility bills and their environmental impact. Not only is it becoming increasingly affordable to install solar for homeowners and businesses, but we're seeing more governments turning to renewable energy to reduce their dependence on fossil fuels. Whether your motivation to go solar is economic or environmental, there is no better time to make the switch!

01 Generous Government Subsidies

There are several rebates and incentives available, encouraging homeowners and businesses to go solar. These subsidies can cover a considerable portion of the cost of installing a solar power system. But keep in mind these incentives are being phased out. Make sure to take advantage of it now before it's too late!

02 Improve & Strengthen Corporate Image

People are increasingly acknowledging and rewarding businesses who operate responsibly. Businesses have the opportunity to use their green credentials to stay ahead of the competition, improve their image and potentially increase their revenue. More people are willing to purchase from companies that have strong ethical and sustainable business practices.

03 Reduce Your Energy Costs

Whether you are a homeowner or business, electricity can make up a large portion of your monthly bills. Installing a solar power system enables you to generate your own electricity rather than buying it from your electricity company. A system without batteries can have a payback period of 3 to 5 years. Including batteries to your system can further extend your payback period.

04 Sell Electricity Back To The Grid

Depending on the type of system you install, your excess electricity can be fed back to the grid to provide credits, further reducing your electricity costs. The revenue you receive will typically depend on your feed-in-tariff (FiT) arrangement, which can vary between states and electricity suppliers. You are usually paid per unit (kWh) of electricity that you can sell back to the grid. But it's another excellent way solar can help you save more.

05 Improve Your Property Value

A solar power system could give you a competitive advantage in the market. Increasingly studies are showing that installing a solar system on a home can increase your property value, and homebuyers are recognising that a home with solar will have lower electricity costs. Demand for these properties will also continue to grow and rent for these properties are typically higher.

06 Reduce Your Carbon Footprint

Installing solar makes a real difference in reducing a household's carbon footprint. Generating electricity from solar panels reduces your need to generate electricity from fossil fuels such as coal and gas, creating a cleaner energy mix.

07 Increase Your Energy Independence

Going solar enables you to take control of your cost of living. You have the capacity to create your own electricity, reducing your reliance on electricity retailers and exposure to varying prices and bill shock.

How Does Solar Work?

There are a multitude of components needed to install a solar system. Solar power systems have several key components, all of which combine to produce electricity, manage the flow of energy, and connect the system to your building. Here's an overview of the components of a solar power system and how it all works.

01 Solar Panels - Generates energy by converting sunlight into usable electricity.

Not all solar panels are created equal. Solar panels are exposed to different elements, i.e. wind, weather and temperature variations. Choosing quality products will ensure you have a long-lasting system that will provide you with high financial returns. While it may initially cost more to purchase quality panels, over the life of the system, you will have the best financial and environmental benefits.

There are three main types of panel technology: Monocrystalline, Polycrystalline and Thin-film. **Monocrystalline** cells are the most efficient and most reliable modules in the market; they are normally black and come with distinct diamond patterns between the cells. **Polycrystalline** panels have a lighter blue flaky appearance. The process to produce solar panels has improved to a stage where their efficiency and performance is similar to monocrystalline panels (but at a cheaper cost). **Thin-film** panels are an older technology made from thin layers of photovoltaic material. They are cheaper to produce, however, have lower efficiency and as such, takes up more roof space.

***Tip:** Monocrystalline panels offer higher space efficiency, perfect for those who have limited roof space and want to maximise electricity savings.

Reference: What Are Monocrystalline, Polycrystalline And Thin Film Solar Panels?

02 Inverters - Converts DC energy to AC energy which can be used to power your appliances.

Depending on how your system is set up, the electricity that is not used will be fed back into the grid or stored in your battery for later use. Inverter efficiency will directly impact the amount of time it takes for a system to pay for itself, so make sure to look at the efficiency before paying for a system. Here are two types of solar inverters explained:

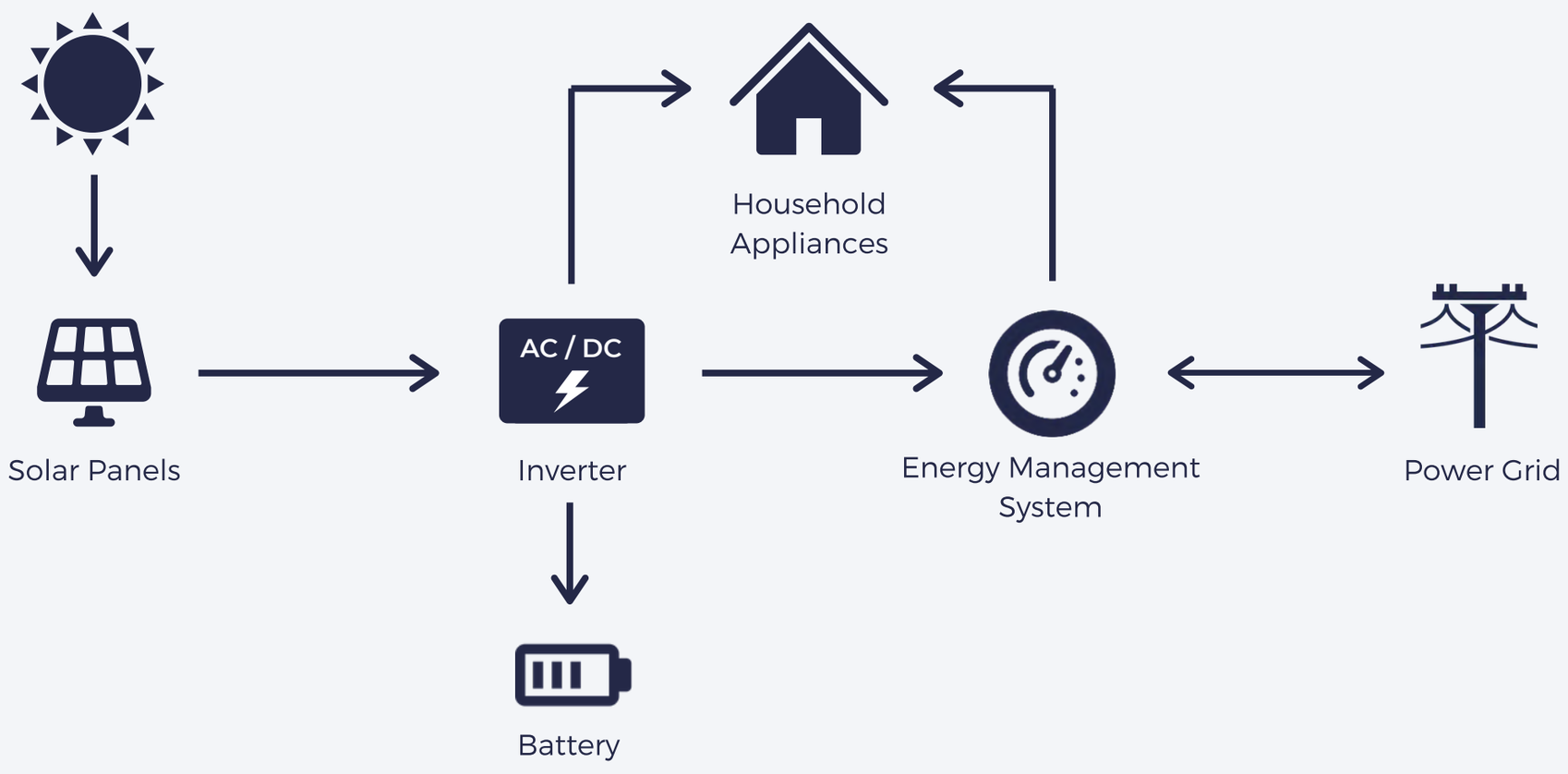
- **String inverters** are the most common type used in Australia. Electricity generated from the solar panels is fed into a central inverter via numerous wires. Generally more affordable but does not allow for battery integration, you will need to invest in a separate battery inverter.

- **Hybrid inverters** are basically a battery inverter and string inverter combined. While standard inverters feed excess energy back into the grid, hybrid inverters can channel that power into a battery for later use. They are cheaper than buying two separate inverters and are great value for money for those looking to add batteries in the future; however, it can be less efficient.

- **Micro inverters / Power Optimisers** are small controllers positioned at the back of each panel which allows individual panel optimisation and boosts up performances, especially in situations with shade issues and complex roof designs.

***Tip:** Power optimisers can be fitted to a string inverter to help you optimise your power output from a single panel and increase efficiency. Less expensive and more reliable than micro-inverters and a great option for shade issues and complex roof layouts.

Reference: Introduction To Solar And Hybrid Battery Inverters

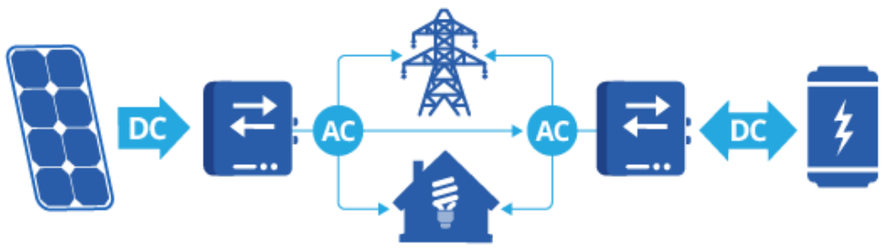


How Does Solar Work?...

03 Batteries - Stores excess electricity to use at night or on low-sunlight days.

Adding batteries to your system can help you maximise your solar panels and increase your energy independence. It enables you to store excess electricity for use at night or on cloudy days and offers short-term backup if there's a power outage. When it comes to how your system is wired together, there are two main options: DC and AC-coupled. DC electricity is what panels produce and what batteries hold in storage, while AC electricity is what's used on the grid and in most household devices. As most homes run on AC, an inverter is required to convert DC to appliance-friendly AC.

AC-Coupled System: These systems require two inverters, a standard grid-tied inverter and a battery inverter, but it can result in lower system efficiency as losses occur through each inverter. It's easier to install and more cost-effective as it can be retrofitted to existing solar installations.



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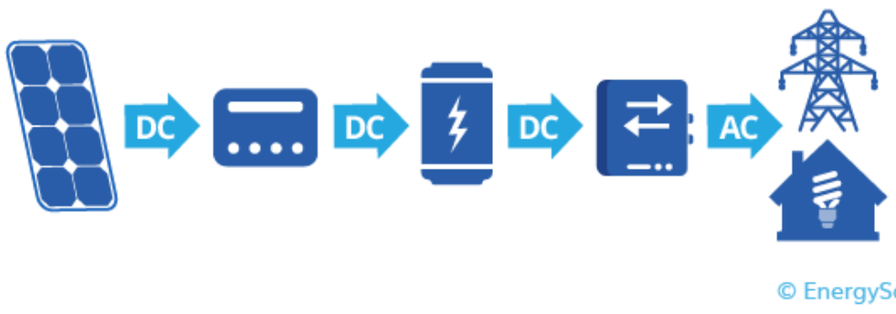
Example of AC-coupled system: DC electricity flows from solar panels to an inverter that transforms the energy to appliance-friendly AC. To store it in a battery for later use, it will need to flow through another inverter, transforming it back into DC.

DC-Coupled System: These systems can be more efficient as the energy is not inverted multiple times. However, it can be more complicated to install, which can increase your upfront cost and installation time - ideal for new on and off-grid system installations.



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Example of DC-coupled system: DC electricity flows from solar panels to a charge controller and feeds it directly into a battery. An inverter is used to transform DC into appliance-friendly AC. Any electricity produced will be inverted once, flowing from your batteries to your home or out to the grid.

Reference: Introduction To Solar And Hybrid Battery Inverters

04 Energy Management System (EMS) - Provides detailed information about your consumption patterns.

An EMS can help you get the most out of your solar power system. It enables you to monitor your consumption patterns and can provide an overview of the power generation of your system. Users can view their consumption patterns via a dashboard or remotely through an app.These devices can help you control the energy flow within your home or business - this could be as simple as switching devices on and off with an app. It also enables you to optimise when you're using big energy loads such as washing machines and air conditioning so you can time the use to get the best rates.

Reference: A quick guide to energy management systems

05 Power Grid - Excess energy generated gets pushed out to the grid.

If your solar panels generate more energy than you need, it will be sent to the public electricity grid, which can be used by other consumers on the grid. Once you reach this stage, your energy is then measured as well as calculated, and your retailer will pay you for the energy exported.

3 Types of Solar Systems

Many solar power systems in Australia are on-grid, which means they're connected to the public electricity grid. It enables you to power your home all year round even if your panels don't produce enough electricity. Here we explain the three main types of solar power systems.

On-Grid

This is the most common set up for homes and businesses in Australia. These systems are connected to the main power grid and linked to your energy supplier. If your system produces excess electricity, you can send this to the public grid, and the retailer will compensate you for the power exported. The payment is called feed-in-tariff (FiT) and varies from state to state and electricity supplier.

With this setup, you can power your home all year round, even if your panels don't produce enough electricity. You may still experience power outages when there's an issue at the grid, and this is due to all on-grid systems being powered down to reduce the risk of electrocution during repair periods.

***Tip:** In this setup, batteries are not required, however, it can be added at a later stage. The Tesla Powerwall is a popular battery system which can be easily retrofitted to existing systems.

Off-Grid

Off-Grid systems are usually used only in remote areas or for those that want to be completely independent from the grid. The benefit is that you won't be affected by power outages caused by the grid. Usually more complex and expensive than grid-connected systems as you will need a large battery to function. It must be designed appropriately to make sure you will be generating enough electricity and have enough battery capacity to meet your property's requirements. With these systems, it's essential to regularly check your energy usage and storage to ensure you keep your output below maximum levels or you could overload the system.

Hybrid Systems

These systems enable homeowners or businesses to have the best of both worlds by combining solar and battery storage. With this setup, you can store solar energy generated during the day and use it at night. If the stored electricity is depleted, the grid can be used as a backup. These systems can also charge the battery using cheap off-peak electricity. Most hybrid systems with battery storage can isolate from the grid and can continue to supply power during an outage.

Reference: Solar power options: Going on-grid or off-grid
Reference: How Solar Power Works - On-Grid, Off-Grid And Hybrid Systems

Government Rebates & Incentives

The potential to save money in the long run is a big incentive for getting solar systems. Beyond this, you could also be eligible for rebates, and other incentives that help make solar more affordable. Here are two main incentives available at the moment for solar installations:

01 Small-Scale Technology Certificates (STC)

The federal government provides financial incentives for people who invest in solar and does this through STCs. The number of STCs is based on the location and the amount of energy the system generates. Under this scheme, it can help individuals to reduce the cost of installing a system significantly. Installers generally sell the certificates on behalf of the customer and deduct the value from the installation cost.

***Tip:** To be eligible, your system must be less than 100kW in size, installed by a Clean Energy Council (CEC) accredited professional and the solar components must be approved for use in Australia by the CEC.

Reference: Small-scale systems eligible for certificates

02 Feed-In Tariffs (FiT)

One of the ways you can save money is through feed-in tariff (FiT). A FiT is a credit rebate that people receive for excess solar energy generated which is exported to the grid and paid by your electricity retailer. For each kilowatt-hour (kWh) of energy a household exports to the shared grid, you will receive a feed-in tariff between 7 to 22 cents per kWh. They are not paid out cash in hand but rather deducted from your bill. Prices will vary depending on your circumstances, the state you live in and your electricity retailer. The value of a FiT can be an important aspect to consider as it influences the economic outcome of owning a system.

***Tip:** Make sure to shop around between retailers to determine the best available FiT rate for you. Ask your solar provider what you could expect your self-consumption to export ratio could be and what economic outcome you could achieve. Alternatively, check out www.energymadeeasy.gov.au to compare plans from energy retailers and see how much FiT you can expect.

Installing Solar Power Systems

Shading & Performance

The electricity generated is impacted by the amount of sunlight your panels are exposed to. The more they are covered in shade, the less energy your system will generate. The effectiveness of your solar system is also dependent on where you live. If you get a decent amount of sun for most of the year, it's worth getting an assessment from a solar provider. They should be able to give you an idea of how much energy your system could produce and how much will be affected by shade.

***Tip:** Using micro-inverters or power optimisers on the panels, instead of on one string inverter can help with shade issues. Speak with your solar provider to see if this could be a potential solution for your solar system if you are concerned you have shade issues.

Solar System Size Guide

There are several factors to consider when deciding on the size of your solar system, i.e. your budget, roof space, consumption patterns and future plans. If you're looking to expand your system, consider purchasing a system with future expansion capability for batteries and electric vehicles to give you that flexibility.

It's not always easy to calculate the capacity you'll need for your solar panels, so while the below will give you a rough guide, it's still best to speak with a solar provider to get a proper assessment.

Tilting & Orientation

For the southern hemisphere, a north-facing roof is optimal for solar production. This will provide you with the absolute maximum of usable sunlight. Tilt frames will cost you a little extra, and the cost will depend on how many panels make up the system and how the installer prices the labour and parts required.

In most cases, the panels will likely be installed at whatever the angle of the roof happens to be tilted at unless it is completely flat, in which case the panels should be given a tilt. Flat installation is possible; however, the dust and debris are less likely to be washed off if the panel is not tilted.

Reference: What angle is optimum for solar panels i.e. can they be put flat on a roof?

Small Home

1-2 People

3 kW System

Av. production per day: 12 kWh

Medium Home

2-3 People

6.6 kW System

Av. production per day: 25 kWh

Large Home

4+ People

10 kW+ System

Av. production per day: 40 kWh

Choosing a Solar Company

Complaints about the solar industry have significantly increased over the last couple of years. According to CHOICE, 30% of solar owners reported having issues with their solar company. With the number of solar companies popping up and the vast amount of products available on the market, it can be overwhelming when considering investing in solar. Here we discuss the key things to look for before choosing a solar company.

01 Is the company well established?

It's generally safer to go with a well-established company that has a history operating in Australia. According to Fair Trading NSW, they've received several complaints about solar companies who have gone under leaving solar owners with worthless warranties and no recourse. To check the status of the company, you can do an ACN, ABN or business name search on the ASIC website or by calling 1300 300 630.

02 Do they have a good reputation?

Finding testimonials from real people can help you find a reputable company and can give you an idea about what they have to offer. You want to look for a solar company that's caring, knowledgeable and responsive. If you find the right company, they should be able to guide you through the different options. To find verified reviews from customers, visit www.productreview.com.au and www.solarquotes.com.au.

03 Does the offer suit your energy needs and budget?

Have realistic price expectations, with paying less, you might find poor quality equipment and installation work – meaning it may not work properly or can be dangerous. You often get what you paid for. Make sure the offer is tailored to suit your energy needs and house requirements. Avoid companies that sell you a one-size-fits-all approach or use high-pressure sales tactics. It's also important to have realistic price expectations, or you could end up with poor quality equipment or installation work. Make sure all the components (the panels, inverter and battery) are quoted clearly by make, size and model. Otherwise, they can be switched with cheaper parts.

04 Are they an Approved Solar Retailer?

The Clean Energy Council (CEC) Solar Retailer Code of Conduct is an industry code ensuring retailers adhere to ethical sales and marketing behaviours. It was designed to lift the bar higher than the regulations require to bring about a better standard of service within the industry. Once approved, businesses agree to follow a strict Code of Conduct for pre and post-sale activities, documents and business practices. Purchasing a solar power system can be a complicated process. By buying from an approved retailer, it can reduce your chances of being taken advantage of, providing you with the peace of mind that you're with a company you can trust. Some government rebates also require that a CEC approved company installs the system. While there are thousands of solar installers across Australia, only a small percentage are approved. Check the CEC website to verify if the supplier is approved.

Choosing a Solar Company...

Solar Sales Company vs Approved Solar Retailer & Installer

Solar PV is not a plug-and-play appliance but a complex electrical installation, a primary and worthwhile investment for your home or business. Purchasing well-known brand panels or inverters will not guarantee the quality of the installation. It's vital to purchase from approved installers to ensure your expected performance and savings over time and to avoid frequent issues. Issues which can occur due to poor quality installation work include the risk of leaks, exposed conduits, unsecured cabling, panels falling off the roof, voltage issues (causing appliance failures), and the risk of fire.

Purchasing from solar approved retailers can provide you with the peace of mind that there is an independent body overseeing what they do to ensure they follow the best practices set out by the Clean Energy Council (CEC). Make sure your approved solar retailer also has in-house electricians as well as installers supervising and executing your installation.

Solar Sales Company

- Sales volume-orientated company
- Packaged solar deals with limited-time special offers
- High pressure and deceptive sales tactics
- Low prices advertised with no information about the specifications of the product
- No internal installers or electricians with extras charged at install time
- No consistency with online reviews-mixed views of positive and negative consumer experience
- Unskilled labour and shortcuts on electrical and workmanship
- High risk of system failures and home issues over time

Approved Solar Retailer & Installer

- Customer-orientated company
- Individual assessment of energy needs and house requirements
- Tailored solution based on the initial consultation
- Accurate quotations provided after consultation and detailed overview of products
- In-house installation teams and full control of the delivery process
- Consistency with online reviews showing an overall positive consumer experience
- Adherence to the highest CEC standards with ongoing training
- Reputable warranties and performance guarantee

10 Questions to Ask Your Installer

01 Are you a Clean Energy Council (CEC) approved solar retailer?

02 Who is responsible for connecting our solar system to the electricity grid? Is it the installer or another subcontractor? When will this happen?

03 Who would I call if there is an issue with my solar power system after the installation?

04 How long have you been operating for?

05 If I were to go ahead, when will the installation start?

06 How much electricity will my system generate on average?

07 Are there any factors that could reduce the electricity output? For example, shading or roof direction.

08 How will the installer credit my solar rebate (STCs)?

09 Who will be servicing and maintaining my solar power system?

10 What will be the approximate solar electricity production in the best and worst months?

Need more information?

Smart Energy Answers is Australia's leading solar solutions provider. As a CEC Approved Solar Retailer, we're committed to providing customers with high-end products, tailored solutions, quality installations and outstanding customer service. Contact us on 1300 732 679 for more information and to discover how to get the best return for your investment.

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Smart Energy Answers is Australia's leading solar solutions provider based in Sydney. We have a combined 100 years experience in the solar industry and have completed over 5,000 residential and commercial installations. We're proud to have attained the highest accreditation level in Australia. As a CEC Approved Solar Retailer, we're committed to helping communities gain energy independence through the latest technologies and high-quality services.

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