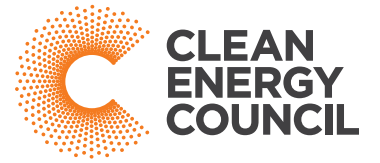


# GUIDE TO INSTALLING A HOUSEHOLD BATTERY STORAGE SYSTEM



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# WHY INVEST IN A HOUSEHOLD BATTERY STORAGE SYSTEM?

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**Battery storage allows you to store electricity generated by solar panels during the day for use later, like at night when the sun has stopped shining. While batteries were first produced in the 1800s, the types of battery storage systems that can store solar power and provide electricity to households are fairly new.**

Battery storage is an exciting new technology, but there are many things to consider before you invest in a system for your home.

Installing a battery storage system\* can provide a number of benefits when used in conjunction with an existing or new solar panel system.



\* The overall system that is constructed for your home or business is called a 'battery energy storage system'. For the purpose of this guide, we have used the term 'battery storage system'.



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## **A BATTERY STORAGE SYSTEM CAN:**

**Help reduce your reliance on electricity from the grid**

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**Maximise the energy from your solar panels by allowing you to capture the solar energy that would normally be sent to the grid and save it for your own usage later in the day**

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**Offset the increased cost of power used during peak times, such as during the evening**

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**Save money by storing energy from the grid overnight when prices are low to use during peak times when prices are high (depending on your power agreement)**

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**Provide electricity to your home during power outages (depending on your system)**

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**Reduce your exposure to future electricity price rises**

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**Support the grid during periods of high stress. The owner can be paid for the amount of support/energy given**

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**Be part of a micro-grid**

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# BATTERY BASICS

The significant reduction in the cost of battery storage systems in recent years means that installing a battery is fast becoming a viable option for many Australian households. But what exactly are battery storage systems, and how do they work to power your home? This section covers all the basics you need to know.



# HOW DO BATTERIES WORK?

Battery storage uses a chemical process to store electrical energy, which can then be used at a later time. For example, a solar-powered torch stores electrochemical energy during the daylight hours that can be used to provide light at night.

In practice, battery storage systems can operate in a number of different ways. It is important to discuss your needs with your Clean Energy Council Accredited Designer when choosing a system.

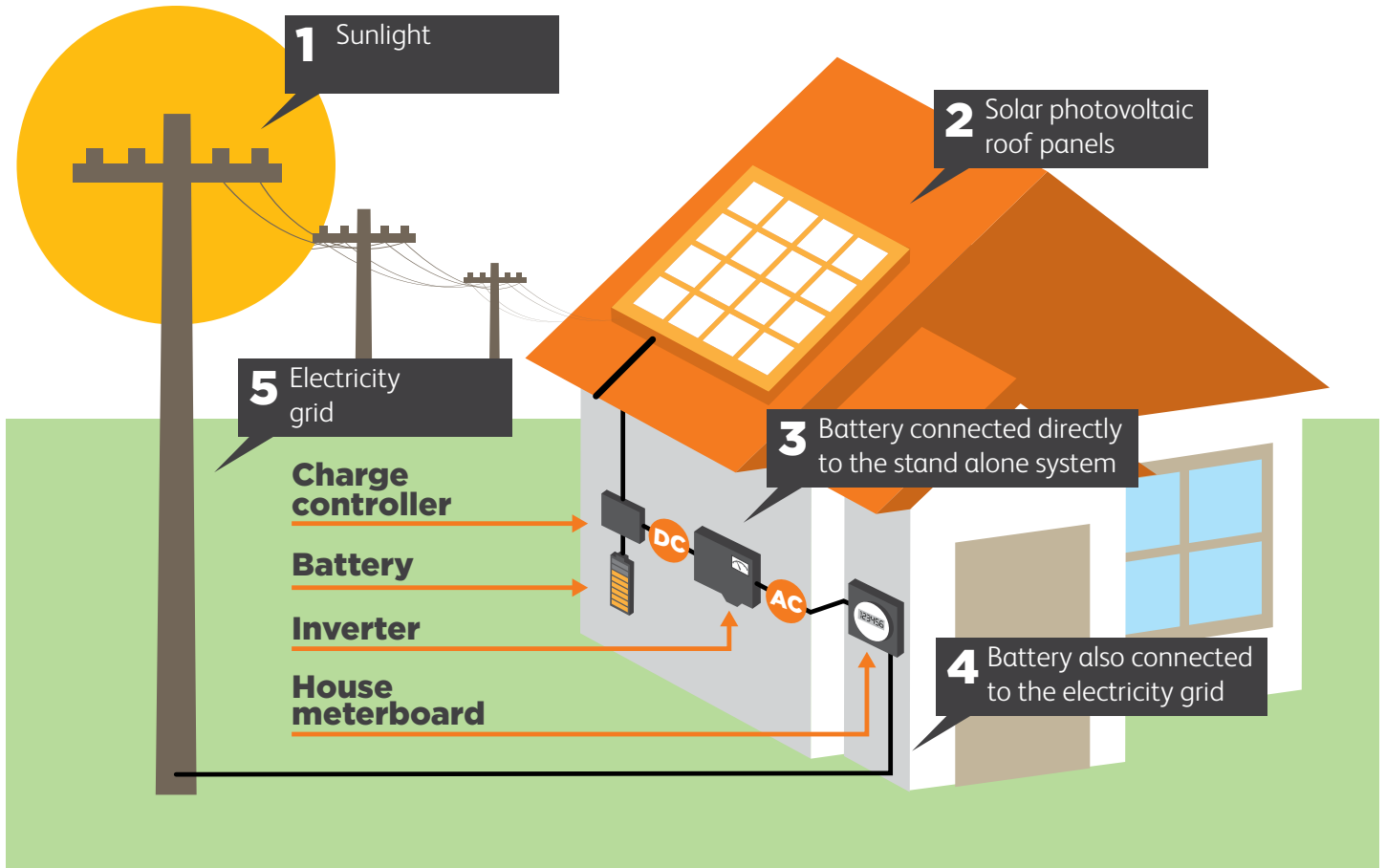
A battery storage system connects to a house in two main ways – DC (direct current) coupled or AC (alternating current) coupled.

A DC-coupled battery storage system is integrated into your solar system. These systems generally have a single inverter that converts the DC electricity to AC to supply your house, or feed back into the grid.

An AC-coupled system is separate to your solar system. It connects directly to your house wiring via its own dedicated bi-directional battery inverter, using local AC electricity to charge the battery and then discharge it directly to your house.

Each system has its own benefits. It is best to discuss the different options with your system designer.

## A house with solar panels and a DC-coupled battery storage system



# THE THREE MOST COMMON WAYS TO PURCHASE A BATTERY STORAGE SYSTEM

When purchasing a battery storage system it is important to discuss your needs with a system designer. They will help you choose the best way to set up your system. The most common ways to purchase a system are shown as follows.

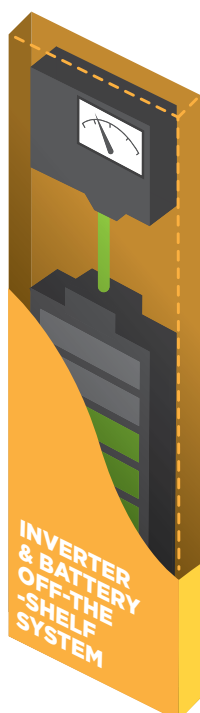
OFF-THE-SHELF SYSTEM	Advantages	Disadvantages
These systems are typically all-in-one systems that require little customisation to be installed.	One manufacturer One warranty	Predefined energy and power limits
SEMI-CUSTOMISED SYSTEM	Advantages	Disadvantages
Your designer may select various components (such as the inverter) and connects this to an off-the-shelf battery system to make your battery storage system.	Customisable Flexible energy and power limits can be set	Extra layer of complexity More than one manufacturer More than one warranty
FULLY-CUSTOMISED SYSTEM	Advantages	Disadvantages
A system where the installer makes the battery system from individual battery cells or modules on site and connects it to an inverter to make the battery storage system.	Most designer flexibility of all solutions Customisable energy and power limits	Multiple warranty considerations

## OFF-THE-SHELF SYSTEM (Manufacturer BESS\*)

“All-in-one” system - requires little customisation before installation.

Predefined energy and power limits

User has to deal with a single manufacturer and a single warranty



## SEMI - CUSTOMISED SYSTEM (Manufacturer battery system)

More customisable. The designer selects components such as the inverter and connects them to an off-the-shelf battery

Flexible energy and power limits

More complex. More than one manufacturer, more than one warranty

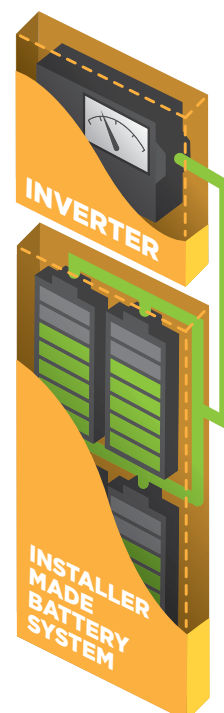


## FULLY CUSTOMISED SYSTEM (Installer constructed BESS)

Most customisable. The designer makes the battery system and connects them to an inverter to make the storage system

Customisable energy and power limits

Most complex. Multiple warranty considerations



\*BESS - battery energy storage system



# WHAT DIFFERENT TYPES OF BATTERIES ARE AVAILABLE?

<b>LITHIUM-ION BATTERIES</b>	<b>Advantages</b> (compared to lead-acid batteries)	<b>Disadvantages</b> (compared to lead-acid batteries)
<p>Lithium-ion batteries are becoming a popular choice for use with household solar panels, and may become the main technology used in the future. Lithium-ion technology has been used for many years in portable devices, including in laptops and mobile phones. Due to falling costs and increased production, they can now be manufactured in larger sizes and are well-suited to storing solar power.</p>	<ul style="list-style-type: none"> <li>Higher capacity and storage</li> <li>Lighter weight and higher voltage</li> <li>Smaller space and environmental footprint</li> <li>Reduced maintenance due to inbuilt battery management systems</li> <li>Longer cycle life and greater depth of discharge</li> </ul>	<ul style="list-style-type: none"> <li>Cost</li> <li>Possible limitation in operating temperature range</li> <li>Limited recycling programs in Australia</li> <li>Less well-known technology</li> </ul>
<b>LEAD-ACID BATTERIES</b>	<b>Advantages</b> (compared to lithium-ion batteries)	<b>Disadvantages</b> (compared to lithium-ion batteries)
<p>The technology behind lead-acid battery storage is similar to that of a car battery. Lead-acid batteries are commonly used with solar panels in remote rural homes, where connection to the grid is prohibitively expensive. Thanks to advances in technology, systems well-suited to solar power storage are readily available in the form of low-maintenance sealed lead-acid batteries.</p>	<ul style="list-style-type: none"> <li>Well-understood technology</li> <li>Relatively cheap</li> <li>Easy to acquire</li> <li>Readily recyclable and have commercial value</li> </ul>	<ul style="list-style-type: none"> <li>Require regular (albeit simple) checks and maintenance</li> <li>Limited depth of discharge (i.e. a lower proportion of the energy stored can be used)</li> <li>Requirement for external venting, which restricts installation locations</li> </ul>

## OTHER TECHNOLOGY TYPES

Other technology types include nickel-cadmium, nickel-metal hydride and flow batteries, but these are less common. If you are interested in these types of technologies, the manufacturer or a Clean Energy Council Accredited Designer will provide you with more detailed information.

# HOW MUCH DO BATTERIES COST?

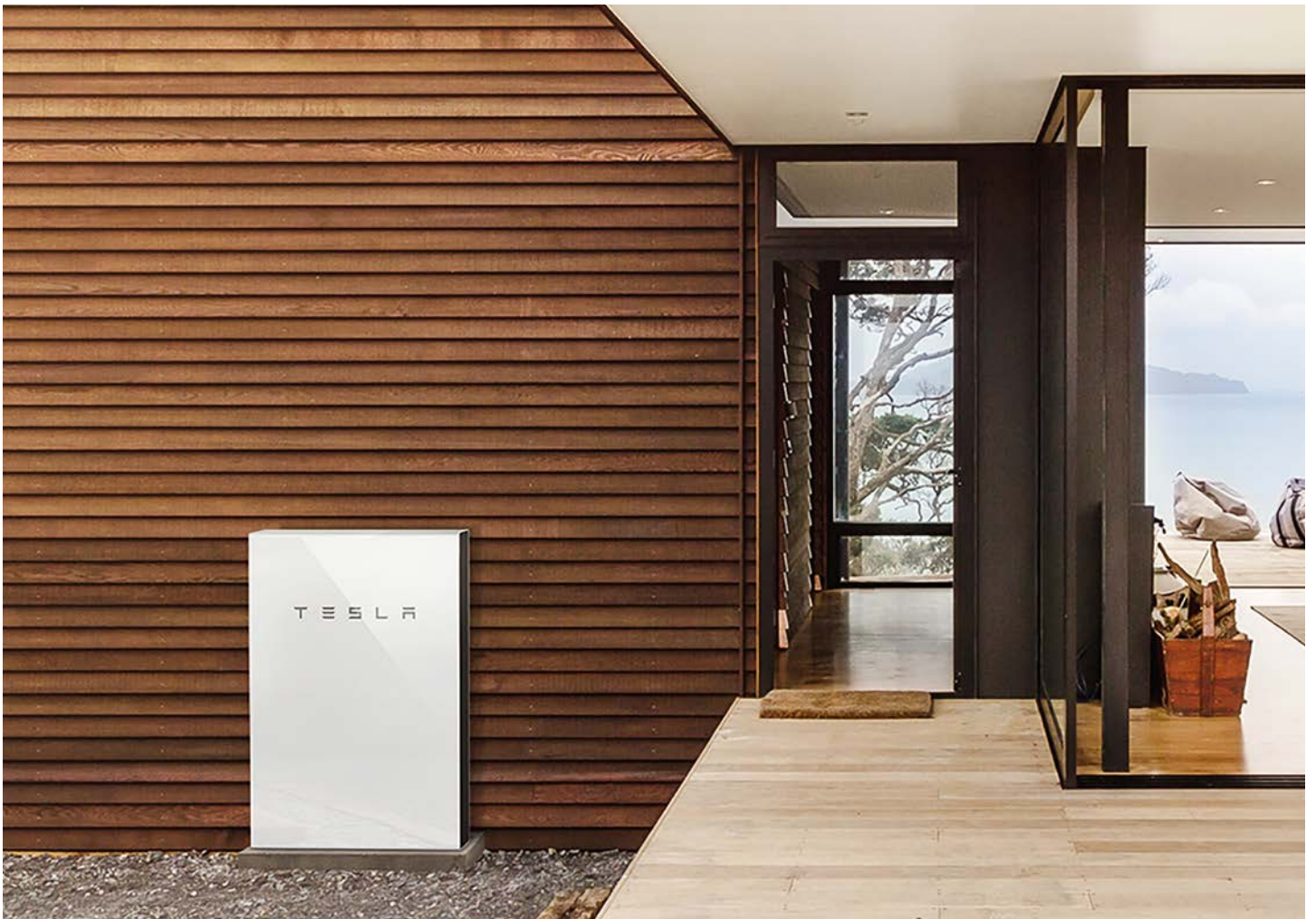
While the price of battery storage systems is falling rapidly, the cost to install a household system is still significant. The fully installed costs of a system are likely to be around \$1000 – \$2000 per kWh.

## ESTIMATED LITHIUM-ION BATTERY STORAGE SYSTEM PRICE

System size	Estimated price range
5 kWh	\$5000 - \$10,000
10 kWh	\$10,000 - \$20,000

Some providers may offer leasing arrangements or payment plans, but make sure you check the details and ask for the total costs of any plan.

Once installed, the cost of running a battery storage system is minimal. It's important to have a maintenance plan in place to ensure your battery is running safely and efficiently, so speak to your retailer about any ongoing maintenance costs.



# BATTERIES: FREQUENTLY ASKED QUESTIONS

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## WHAT DOES BATTERY CAPACITY MEAN?

Typically battery capacity is expressed in kilowatt hours (kWh), similar to the way your electricity is charged on your bill. Some battery manufacturers express their capacity in ampere hours (Ah). If this is the case, speak with your designer to get this converted to kWh.

The battery capacity quoted by the manufacturer is an 'ideal' number that is useful for comparing batteries. Some manufacturers promote their battery capacity based on the total capacity, for example 10 kWh. But all battery storage systems have what is called depth of discharge (DoD). This is how much of the total capacity can be used.

The majority of battery storage systems cannot have 100 per cent of the total energy drawn out of the battery. DoD is expressed as a percentage of the total capacity. If a 10 kWh battery has a DoD of 80 per cent, it will provide 8 kWh of usable energy. It is important to compare batteries based on their usable energy, not on the total capacity.

Lithium-ion battery systems typically have a depth of discharge of 80 per cent and above.

Lead-acid battery systems typically have a depth of discharge of 30–50 per cent.

## HOW BIG ARE BATTERY STORAGE SYSTEMS?

A number of battery storage solutions are available. They come in a range of sizes (typically between the size of a split system air conditioner and a fridge) based on the technology that they use and the amount of energy they store. Lead-acid batteries tend to be physically larger than lithium batteries.

## WHERE CAN I INSTALL A BATTERY STORAGE SYSTEM?

Some battery storage systems can be wall mounted, others are floor standing and some are best located inside, while others should be installed outside. You may also choose to install multiple batteries to increase your storage capacity, in which case you will need extra storage space.

Lead-acid batteries tend to be physically larger than lithium batteries and are usually installed outside or in a utility room (e.g. garage or basement) as they vent hydrogen when charged. Some batteries (usually lithium batteries) are designed to be wall mounted inside a utility room, which helps control their temperature.

If your battery is designed to be installed outside, it will come with a weatherproof enclosure, though you will still need to find a suitable place to install it. This will need to include access for electrical wiring, consider flooding/splashing of the enclosure, preferably be out of direct sunlight and not be adjacent to heat or ignition sources.

Batteries cannot be installed in a habitable room, such as a living room or bedroom. However, if you want to install a battery in a non-habitable room, such as a garage, you may need to consider ventilation.

These are all factors to consider when you talk to a Clean Energy Council Accredited Designer.

# BATTERIES: FREQUENTLY ASKED QUESTIONS

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## WHAT CONSIDERATIONS SHOULD I BE AWARE OF WHEN INSTALLING A BATTERY STORAGE SYSTEM?

The cabinet or housing of the battery should be built to comply with the standards and building codes applicable in the relevant jurisdiction. For example, in the Australian Capital Territory, the battery enclosure must comply with fire and building regulations. Your Clean Energy Council Accredited Designer will be aware of these requirements.

## WHAT HAPPENS IF I MOVE HOUSE?

It is possible for a storage system to be moved if you change residence, in the same way that solar panels can be moved. However, if the product standards change and your battery storage system no longer meets the new standard, you won't be able to reinstall it. Therefore, while it is technically possible to move your battery storage system to a new residence, you should check before you move that you will be able to reinstall the system. If the system is to be moved, it must be carefully uninstalled and reinstalled by an accredited installer.

## DO BATTERIES MAKE NOISE?

Batteries themselves do not make much noise, but the systems attached to them – like the inverter – may make some noise. You may hear the cooling fans and an electronic 'buzz' from the circuits, but it should be fairly similar to a regular solar inverter.

## HOW LONG DO BATTERIES LAST?

Product warranties on battery storage systems vary widely and are generally anywhere from 2 to 10 years. While a battery storage system will often last longer than its warranty, its ability to store energy will gradually reduce over time with use.

As well as the product warranty, the retailer you purchase the product through should offer a retailer warranty. Warranties offered by retailers vary, including how they define the life of the battery. Some retailers offer a warranty as an 'energy throughput' figure, which means that they guarantee their batteries will store and deliver a given amount of energy, no matter how quickly that limit is reached. Energy throughput for lithium-ion batteries ranges from 4000 to 6000 cycles (charges/ discharges of the battery) at 80 per cent discharge rate, meaning an expected life of more than 10 years for high-performing systems (if cycled once per day). Some battery retailers offer a warranty guaranteeing either an energy throughput or a lifetime in years, usually based on whichever limit is reached first.

## WILL THE BATTERY CHANGE THE PERFORMANCE OF MY APPLIANCES?

Once your battery storage system is installed, your household electrical appliances will continue to operate as normal.

If you are looking to go completely off the grid, you will need to consider how much power your appliances use and should speak to a Clean Energy Council stand-alone system Accredited Designer to design a system to meet your needs.

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## WILL MY BATTERY WORK IN A BLACKOUT?

Not all battery storage systems provide backup power. Some will work during a blackout, and some may operate following a brief power outage. If you need your battery storage system to operate during a blackout, make sure you discuss this with your system designer and choose an appropriate product. If you want an uninterrupted supply of electricity, you'll need to install an uninterruptible power supply (UPS) battery storage system. As UPS battery storage systems are typically larger and more complex to install, they will cost more than other systems.

If your battery is charged during a blackout, it may be able to supply power to your home. However, you might not be able to run as many appliances as normal, depending on the rating of your battery storage system. You may also want to conserve power for important appliances like your fridge.

Some battery storage systems can power your whole house in a blackout, or some may have a power point that you can plug appliances into. Alternatively, your installer may need to wire specific appliances so you can use them in a blackout. It's important to discuss your needs with your designer to make sure your system meets all of your needs.

Some systems may have a slight disruption in power (usually a couple of seconds) between the blackout occurring and the battery 'kicking in' to supply power. Appliances with clocks or on a timer (e.g. washing machines or dishwashers) may need resetting after a blackout.

If you are looking to go completely off the grid, make sure you speak to a Clean Energy Council stand-alone system Accredited Designer. Stand-alone or off-grid systems are typically more complex than standard household systems and present some different considerations.

## SHOULD I GET BATTERY STORAGE IF I AM ON A FEED-IN TARIFF?

One important consideration when adding a battery storage system to an existing solar panel system is the impact this may have on your existing solar feed-in tariff.

The feed-in tariffs offered differ from state to state, and from retailer to retailer. In some states, the government regulates a minimum rate, while in other states it is up to you to negotiate a deal with your electricity retailer. It is worth shopping around to find out which electricity retailers offer better rates for solar customers.

A Clean Energy Council Accredited Designer will be able to calculate your potential savings as part of their load analysis. Many factors – including the size of your system, how much electricity you export and the feed-in tariff amount – will impact on how much money you save. Your system designer should consider all the relevant factors when providing you with an estimate. The actual savings you make may also vary depending on the electricity retailer you are with.

If you have a choice of feed-in tariff, choose the one that minimises your total energy cost. A Clean Energy Council Accredited Designer will be able to help you calculate what is best for you.

**You can also contact the relevant state government departments for more details on feed-in tariffs in your state.**

- **ACT:** Environment, Planning and Sustainable Development Directorate, 13 22 81
- **NSW:** Division of Resources and Energy, 1300 736 122
- **NT:** Department of the Chief Minister, (08) 8999 5511
- **QLD:** Department of Energy and Water Supply, 13 43 87
- **SA:** Department of State Development, (08) 8226 3821
- **TAS:** Department of State Growth, 1300 135 513
- **VIC:** Department of Environment, Land, Water and Planning, 136 186
- **WA:** Public Utilities Office, (08) 6551 2777

# DO YOUR RESEARCH

Battery storage can be a great way to get the most out of your new or existing rooftop solar power system.

Different battery storage systems suit different needs, so it's important to do your research and seek advice on what's best for you.



# CHOOSING THE RIGHT SYSTEM FOR YOU

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Your system designer will help you choose a system appropriate for your requirements. This will depend on your energy use and tariff, the time of use, the size of your solar panel system and what you want from the system.

## **Some questions to think about and discuss with your designer when choosing a system include:**

- What is the total installed cost of the battery storage system versus the expected output over its lifetime?
- What can you afford?
- What system best suits your tariff structure?
- Do you have an appropriate space to install the battery?
- Can the battery store and supply enough energy for your needs?
- Is the supplier a reputable company that can deliver on any potential warranty claims?
- Do you have any safety concerns?
- Can the battery be recycled?

## **In addition, questions to think about when choosing the right size battery include:**

- What do you want to use the battery for (e.g. backup for blackouts, saving money)?
- How much energy do you use between battery charges (both now and in the future)?
- How much power do you need to run your appliances?
- How much excess energy do you generate from your solar panels each day?

As long as you stay connected to the electricity grid, you can continue to use your appliances to suit your lifestyle. Your energy needs will be met through the combination of grid electricity and your solar and battery storage system.

# WHAT FEATURES SHOULD I LOOK FOR IN A BATTERY STORAGE SYSTEM?

# HOW MUCH POWER DO YOU NEED FROM YOUR SYSTEM?

The key features to look at when comparing battery storage systems are:

- How do I know what the system is doing (i.e. what is the user interface?)?
- How is it intended to be used (e.g. some systems are only intended for providing backup power while others can only charge from your solar panels and not from the electricity grid)?
- How much energy can it store?
- How fast can it store and supply energy?
- What are the maintenance and safety considerations of the system and technology?
- How big is it and where does it need to be installed?

Your designer will help you understand the differences between systems and choose a system that is appropriate for your requirements.

Additional features you might want to discuss with your designer include:

- What is the battery storage system's operating temperature range (some systems cannot charge in cold weather or may not operate on very hot days)?
- Can the battery storage system be recycled?
- How long will the battery storage system last, and what is the product warranty period?
- Would it be simple to add more batteries to the system down the track if your needs change?
- Is it an 'all-in-one' device or are there multiple components that must also be installed, including any programming to ensure compatibility?
- Does the battery storage system only work with a specific inverter or is it compatible with multiple brands?
- What is the efficiency of the system (how much of the stored energy can be used)?

When thinking about what you need from your battery storage system, there are two key concepts to understand:

- power – how fast energy can be supplied (kilowatts, or kW)
- energy – how much energy is stored by the system (kilowatt hours, or kWh).

Check your electricity bill for information about your existing energy use. A 'typical' house may use around 18 kWh of energy per day with a maximum power consumption of 4.5–15 kW, although this can vary significantly.

As long as you stay connected to the grid, your battery storage system does not need to provide for all of your needs.

Most battery storage systems currently on the market have a power rating of 2–5 kW, and an energy rating of 2–10 kWh. Multiple systems can be used to scale this up if necessary.

Your peak power demand will depend on how many and which of your appliances are used at the same time. Typical maximum power requirements of some high power appliances are:

<b>Air-conditioner</b>	2 – 5+ kW
<b>Water heater</b>	3 kW
<b>Clothes dryer</b>	2.4 kW
<b>Electric kettle</b>	2.4 kW
<b>Hair dryer</b>	1 – 2 kW
<b>Dishwasher</b>	1.5 kW
<b>Washing machine</b>	1.5 kW
<b>Microwave oven</b>	1.5 kW
<b>Plasma TV</b>	0.8 kW
<b>LED/LCD TV</b>	0.2 kW

As a general rule of thumb, any appliance that cools or heats will need more power than other appliances.

## EXAMPLE:

For a battery storage system to run a 2.4 kW clothes dryer for two hours, a battery storage system with a minimum power rating of 2.4 kW and energy rating of 4.8 kWh is required.



# DO YOU WANT TO GO COMPLETELY 'OFF-GRID'?

If you would like to disconnect from the grid completely and supply your entire household with your own clean power, there are a number of very important factors to consider.

Your solar system will need to be large enough to meet your power needs and your battery will need to be able to cover your requirements at all times, including peak periods. In most cases, this means that you will need very large solar and battery storage systems.

Large systems can present extra challenges, including their physical size, town planning regulations and grid connection requirements. Off-grid systems are more complex to design and install, so speak to a Clean Energy Council Accredited Designer/ Installer with experience working with these systems.

You should also plan for a back-up if something goes wrong.

To find a qualified designer and installer, visit the Clean Energy Council website and search for someone with 'stand-alone' accreditation [solaraccreditation.com.au/consumers/find-an-installer.html](http://solaraccreditation.com.au/consumers/find-an-installer.html)



# FIND A RETAILER

It's important to shop around before buying your battery storage system. Talk to different retailers of battery storage systems about options and obtain quotes, and if possible speak to people in your area who have had solar and storage installed. Unfortunately, if the offer sounds too good to be true, it probably is.

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# WHO'S WHO IN THE MARKET?



The main parties involved in the sale and installation of battery storage systems are the retailer, designer and installer. Sometimes these roles are filled by one individual, which may be the case with small retailer businesses run by a qualified designer/installer. However, two or three entities can be involved with medium to large companies that subcontract out their designs and/or installations.

## CHOOSE A CLEAN ENERGY COUNCIL APPROVED SOLAR RETAILER

The Clean Energy Council Solar Retailer Code of Conduct helps consumers choose a retailer that has committed to offer a high level of quality and service. Selecting an Approved Solar Retailer is one way to ensure that you will be dealing with a company that prides itself on being an industry leader.

Make sure you select an Approved Solar Retailer that sells battery energy storage systems as some of these retailers may only sell solar PV.

### Approved Solar Retailers:

- provide a five-year whole of system warranty
- use ethical sales practices
- only use Clean Energy Council Accredited Installers
- meet the very high standards of the Code of Conduct.

The Solar Retailer Code of Conduct has been authorised by the Australian Competition and Consumer Commission.

To see which companies have signed on to the code, visit [approvedsolarretailer.com.au](http://approvedsolarretailer.com.au).

## IS YOUR DESIGNER AND INSTALLER CLEAN ENERGY COUNCIL-ACCREDITED?

Choosing an Approved Solar Retailer ensures that your designer and installer will be Clean Energy Council-accredited.

The designer and installer could be the same person, or you could speak first to a designer who will design a system based on your needs, then a separate installer who will complete the physical installation and connection work.

The safety of your solar and battery storage system is paramount, so only work with properly trained and accredited designers and installers. Your designer/installer should have appropriate accreditation and experience in battery design and installation.

### Here is what to look for:

The Clean Energy Council accredits individuals for the design and installation of battery storage systems. This is different to the accreditation for solar design and installation. Someone who is accredited by the Clean Energy Council to design and/or install battery storage systems will hold either:

- grid-connect and stand-alone accreditation
- grid-connect accreditation and battery storage endorsement.

You can search for a designer/installer at [solaraccreditation.com.au/consumers/find-an-installer.html](http://solaraccreditation.com.au/consumers/find-an-installer.html)

The Clean Energy Council has a Guide to Installing Solar for Households that contains some useful information on purchasing solar: [solaraccreditation.com.au/guideforhouseholds](http://solaraccreditation.com.au/guideforhouseholds).

### RETAILER

an entity that sells battery storage systems to customers



### ACCREDITED DESIGNER

a person who is accredited by the Clean Energy Council to design a battery storage system



### ACCREDITED INSTALLER

a person who is accredited by the Clean Energy Council to install battery storage systems



# INSTALL YOUR SYSTEM

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The first thing to do when having a battery storage system installed is to ask to see the installer's Clean Energy Council Accredited Installer card. This shows that the installer is qualified to install your battery storage system.

The installation process for a battery storage system is usually very straightforward and only takes around 1–2 days (unless you are having a large system installed, in which case it could take a few days longer).

If you are installing solar panels or upgrading your existing system, you could reduce overall equipment and labour costs by installing batteries and solar at the same time. However, if you're not sure whether you need a battery storage system now or in the near future, you can still add it down the track. Let your solar installer know that you may want to add storage in the future so that this can be planned for during installation.

Make sure that you receive all the necessary paperwork during installation. Documentation will be important if you ever need to make a warranty or insurance claim. You should also receive a system user manual when your system is installed, and make sure you ask any questions before your installer leaves.

Your installer may need to switch off the power to your house at some stage, but this period should be brief. If your electricity meter or meter box needs upgrading, your power may need to be off for longer.

The installation process shouldn't pose any risks to your other appliances, provided everything is done safely.

Clean Energy Council Accredited Installers are required to have public liability insurance, but to avoid any insurance issues during the installation period, check that your installer has adequate insurance before they start work.

It is also worth contacting your home insurance provider before installation commences to make sure that your new battery storage system is covered by your policy.

### **CONNECTING TO THE GRID**

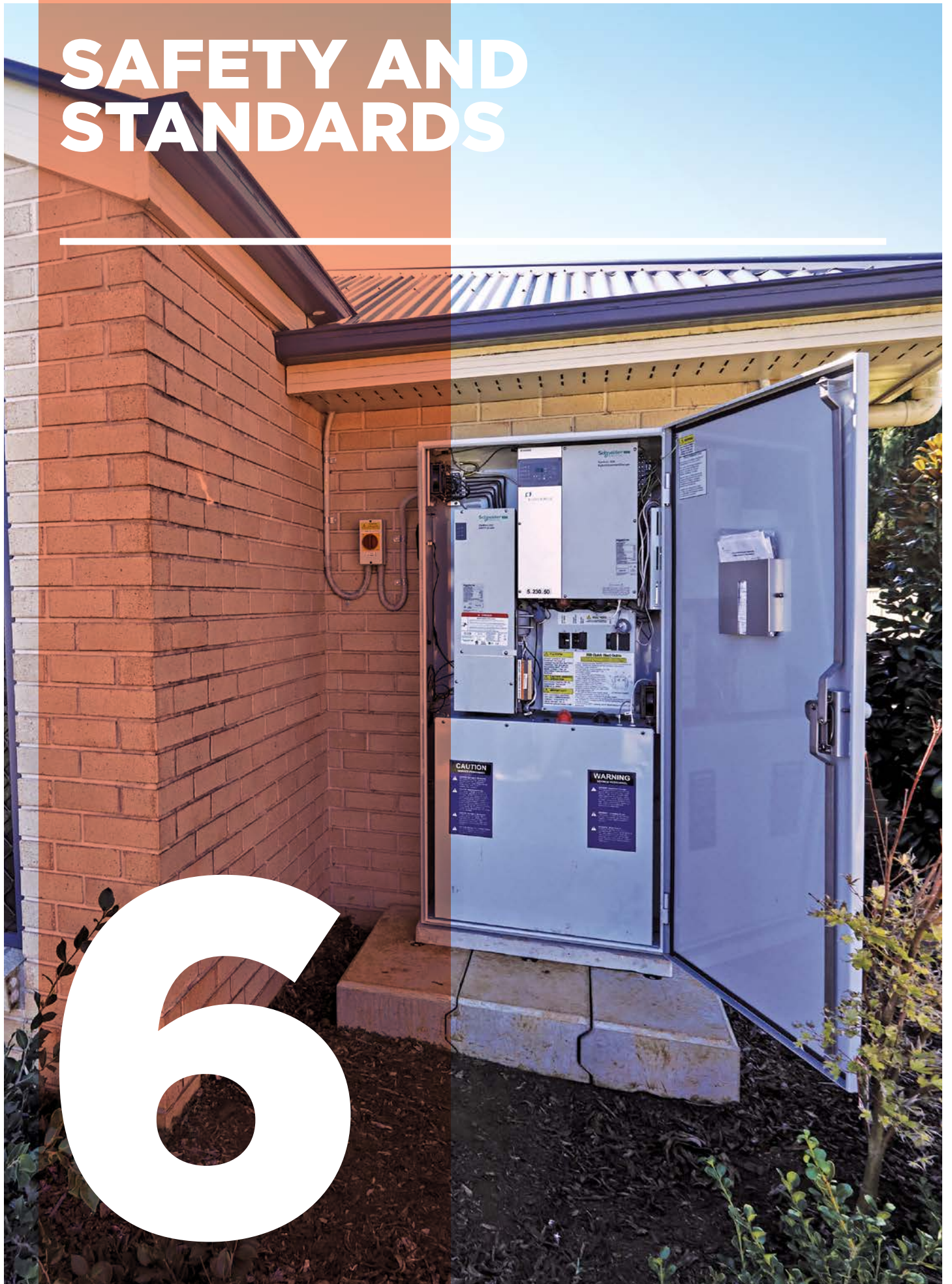
Your solar or battery storage system supplier will usually arrange connection to the network on your behalf, including preparing and submitting all relevant documentation required from the electricity retailer and/or distributor for meter installation and connection to the network.

It is important, however, to be aware of the process involved, who to contact to follow up on progress, and to ensure that everything gets done on time.

Check with your installer what documents you will receive for the battery storage system.

# SAFETY AND STANDARDS

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Battery storage systems do have some safety risks, just like your solar panels or any other major piece of electrical equipment. Provided your system is installed to all relevant Australian Standards and used and maintained properly, battery storage is safe, but it's important to be aware of the risks so you can manage them safely.

#### **The main safety hazards to be aware of are:**

- The general hazards of electrical wiring, just like other wiring in your house.
- Chemical, fire or explosion hazards. For a battery storage system, these are similar to the risks associated with bottled gas or a natural gas service. For this reason, don't smoke around your battery storage system and check with your installer whether your system vents gases.
- Possible escape of non-flammable gases when charging or discharging lithium batteries. This may cause a risk of inhaling noxious gas similar to a natural gas leak if there is no ventilation.
- Chemical leakages similar to those from the corrosive fluid of a car battery or household chemical cleaning products.

Like any other major electricity appliance, if you have small children or curious pets, keep them away from your battery storage system and don't store any items on top of your batteries or wiring.

Your battery storage system may heat up slightly (like a laptop battery), but shouldn't become hot to touch. Also, as with all electrical equipment, battery storage systems emit some level of electromagnetic radiation, within safe limits.

If an incident occurs with your battery storage system, in the case of fire or an explosion call 000 immediately. For minor incidents, such as a fault alarm or a malfunction, the system should be serviced by your Clean Energy Council Accredited Installer.

#### **SAFETY STANDARDS FOR LITHIUM BATTERIES**

In December 2017, Standards Australia published a new standard for the safety of lithium batteries in residential and commercial applications – known as AS IEC 62619.

The standard requires testing under a range of extreme conditions, such as dropping the battery from a height, smashing it, firing a nail into it, overheating it, overcharging it and short circuiting the terminals. Batteries need to demonstrate they can withstand these extreme conditions without causing hazards such as fire, explosion, leakage, venting of flammable gases or rupture of the casing.

The standard also requires the manufacturer to provide important safety information for end users.

When buying a lithium battery, ask the retailer to verify that it has been tested to the new standard.

# MAINTAINING AND ENJOYING YOUR SYSTEM

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# MAINTENANCE

Your battery storage system installer will set up your system and show you how it all works after installation, including different operating modes.

Your system may have settings that you can adjust. For example, you may wish to set your battery to only charge at certain times of the day and discharge at other times to coincide with how you use energy or to get the most out of your electricity tariffs. Not all battery storage systems have the same functions, so it's important to choose one upfront that suits your needs.

Some minor upkeep and maintenance is important to keep your battery running efficiently and safely. Different battery storage systems have different requirements, but most battery maintenance is not difficult or onerous. The maintenance should be performed by a Clean Energy Council Accredited Installer. In addition, it is a good idea to carry out visual checks at least once a month to keep your system in top condition. If you notice something is not right, call your accredited installer or battery storage system retailer.

You will need to understand how to interpret critical system health information and recognise when your storage system needs attention. Your installer should also give you a logbook or table to record the system's critical measurements.

When doing maintenance on the system, the accredited installer can provide you with feedback on the system's performance and help you to understand your usage and the system's limitations. If there is an internal failure in an individual battery cell, that cell can begin to perform poorly long before the system as a whole has a problem. Again, this is something that the installer can identify during maintenance of the system.

The lifetime of a battery is strongly dependent on how the system is used. Poor or heavy usage may mean the product does not last as long as the manufacturer's specifications. The lifetime also depends on ambient temperatures. All battery types should be checked during extreme hot or cold weather to see whether they are still performing as required. Batteries can be discharged over a large temperature range (-20°C to 60°C), but the charge temperature should be limited for best results.

Your electricity consumption may also change over time, which can alter the long-term performance and life of the battery storage system. Check with your accredited installer when the maintenance is undertaken in case your consumption has changed significantly (e.g. if more people are living at your property or you have purchased new appliances).

If you are unsure of anything about your battery storage system, please contact your accredited installer, who will be able to assist you.

# SYSTEM MONITORING

It is important to keep an eye on how your battery storage system is operating.

**Different manufacturers have different ways for you to do this:**

- Some systems have a display on the battery storage system itself, with indicators such as operating mode and battery state of charge.
- Some systems support a remote display option that can be installed inside your house, known as an in-home-display. These systems are often combined with other information about your home energy use – such as air-conditioning usage, solar generation and tariff information.
- Some systems can connect to the internet and allow you to view information from your computer, smartphone or tablet, even when you're not at home. Check whether your system has inbuilt WiFi or if you need a new data point installed.

In addition to monitoring systems provided by your battery storage system manufacturer, there are a number of third-party home energy monitoring solutions available.

**TIP:** To get the most out of your solar and battery storage system, you may choose to reduce the amount of electricity you use in the evenings or overnight so you only use solar or solar-charged battery power. For example, you could run your washing machine or dishwasher during the day when your solar panels are generating power.

Following the installation of your battery storage system, safety inspections may be carried out by the relevant electrical authority.

Depending on which state you live in, these inspections may be mandatory or may occur on a random audit basis. In some states, your installer is responsible for organising the inspection of your system. The inspection may need to be carried out before the system can be connected to the grid.

When purchasing your battery storage system, ask your retailer whether they have a battery recycling program in place. Batteries contain harmful and dangerous materials such as acid, lithium and heavy metals (e.g. cadmium, cobalt and lead). As such, batteries need to be safely managed throughout their life cycle and at end-of-life. This includes handling, collection, storage, transport and processing.

When you need to replace a battery, the old batteries should be disposed of at a battery recycling station or other suitable site (look for Australian battery recycling initiatives in your local area or contact your local council).

Batteries that require disposal must be stored safely in a cool, dry place out of the reach of children and with any exposed terminals taped up.

More information on battery recycling can be found at [batteryrecycling.org.au](http://batteryrecycling.org.au) and [envirostream.com.au](http://envirostream.com.au), Australia's first lithium-ion battery recycler.

## VICTORIA

As of 1 July 2019, the Victorian Government banned e-waste from entering landfill.

E-waste is defined by the Victorian Government as 'any end-of-life equipment which is dependent on electric currents or electromagnetic fields in order to work properly'.

Simply put, e-waste is 'anything with a plug, battery or power cord that is no longer wanted or useful'. This includes solar panels, solar battery systems and inverters.

## BATTERY STEWARDSHIP

The Clean Energy Council has taken a leading role in establishing a body to oversee the implementation of a battery stewardship scheme.

The Battery Stewardship Council (BSC) was formed in early 2019, combining government and industry bodies that had undertaken important background work on understanding the markets and the barriers to recycling that need to be addressed in a stewardship scheme.

The Clean Energy Council is currently working with the BSC on the design of an industry-led stewardship scheme.

For more information on the BSC, please visit [bsc.org.au](http://bsc.org.au)

# WHAT IF SOMETHING GOES WRONG?

## WARRANTIES

If you have an issue with your battery storage system while it is still under warranty, you should first contact the retailer to have the product repaired or replaced. If that fails, you can contact the importer or manufacturer. Contact details should be provided on the warranty documentation. In addition to any contractual warranty, you have additional rights under the Australian Consumer Law, and the relevant state sale of goods legislation.

The Australian Competition and Consumer Commission website has further information on warranties, consumer guarantees and your rights to remedies: [accg.gov.au/consumers](http://accg.gov.au/consumers).

## WORKMANSHIP COMPLAINTS

The benefit of using a Clean Energy Council Accredited Designer/Installer is that the Clean Energy Council can resolve complaints involving workmanship issues that breach the Accreditation Guidelines or relevant Australian Standards by a Clean Energy Council Accredited Designer/Installer. This only applies to individual tradespeople who hold Clean Energy Council accreditation and does not extend to retailers (sales companies). Complaints can be registered online at [solaraccreditation.com.au/consumers/solar-pv-warranties-complaints-and-disputes.html](http://solaraccreditation.com.au/consumers/solar-pv-warranties-complaints-and-disputes.html)

## RETAILER COMPLAINTS

If you have a complaint against a company identifying itself as a Clean Energy Council Approved Solar Retailer, you should first contact the company directly.

If you are not satisfied with the response from the company, you should contact your relevant consumer protection organisation. You can also register your complaint with the Clean Energy Council, which will investigate breaches of the code.

This may result in the retailer having its approval revoked.

For more information on dealing with complaints about Clean Energy Council Approved Retailers, please visit [approvedsolarretailer.com.au](http://approvedsolarretailer.com.au)

## COMMERCIAL COMPLAINTS

If you have a complaint on a commercial matter – including warranties, payments and contractual issues – you should contact the relevant Fair Trading or Consumer Affairs office in your state or territory.

- **ACT:** Fair Trading, (02) 6207 3000
- **NSW:** Fair Trading, 13 32 20
- **NT:** Consumer Affairs, 1800 019 319
- **QLD:** Office of Fair Trading, 13 74 68
- **SA:** Consumer and Business Services, 13 18 82
- **TAS:** Consumer Affairs and Fair Trading, 1300 654 499
- **VIC:** Consumer Affairs, 1300 558 181
- **WA:** Consumer Protection, 1300 304 054

## WHAT SHOULD I DO IF THE COMPANY HAS GONE OUT OF BUSINESS?

If the retailer has become insolvent and you are unable to contact the manufacturer, you can lodge a complaint with the retailer's administrators. You can find out if a company has become insolvent via the Australian Securities and Investments Commission (ASIC) website or by phoning 1300 300 630. Your local fair trading or consumer affairs office may also have information about the appointment of external administrators for insolvent companies.

Likewise, if the manufacturer has gone into administration, you can lodge a complaint with the company's administrators. As a consumer, you may become an unsecured creditor.

If the external administrator fails to deal with your queries or complaints, you can also lodge a complaint with ASIC on 1300 300 630.

## ELECTRICAL SAFETY

If you have a concern about the safety and technical compliance of your battery storage system, you can contact the electrical authority in your state or territory.

- **ACT:** Planning, (02) 6207 1923
- **NSW:** Fair Trading, 13 32 20
- **NT:** NT WorkSafe, 1800 019 115
- **QLD:** Electrical Safety Office, 1300 362 128
- **SA:** Office of the Technical Regulator, (08) 8226 5518
- **TAS:** Department of Justice, 1300 135 513
- **VIC:** Energy Safe Victoria, (03) 9203 9700
- **WA:** Energy Safety, (08) 6251 1900

# GLOSSARY AND DEFINITIONS

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- **Accredited Designer**  
a person who is accredited by the Clean Energy Council to design a solar PV system. To design a battery storage system, they must also be a Battery Endorsed Designer in addition to being an Accredited Designer.
- **Accredited Installer**  
a person who is accredited by the Clean Energy Council to install solar PV systems. To install a battery storage system, they must also be a Battery Endorsed Installer in addition to being an Accredited Installer.
- **Approved Solar Retailer**  
a solar retailer that has signed on to the Clean Energy Council Solar Retailer Code of Conduct.
- **Battery Endorsed Designer**  
a person who is endorsed by the Clean Energy Council to design battery storage systems.
- **Battery Endorsed Installer**  
a person who is accredited by the Clean Energy Council to install battery storage systems.
- **Battery energy storage system**  
the overall system that is constructed for your home or business is called a 'battery energy storage system'. For the purpose of this guide, we have used the term 'battery storage system'.
- **Depth of discharge (DoD)**  
how much of the total capacity of a battery can be used, expressed as a percentage of the total capacity. For example, a 10 kWh battery with a DoD of 80 per cent will provide 8 kWh of usable energy.
- **Electricity retailer**  
an entity that delivers and sells electricity directly to the customer.
- **Inverter**  
a device that changes the solar DC (direct current) power into AC (alternating current) power suitable for your household appliances and to be fed back to the grid.
- **Kilowatt hour (kWh)**  
a standard unit of electrical energy that indicates the amount of energy that a battery can store.
- **Photovoltaic (PV)**  
direct conversion of light into electricity.
- **PV array**  
an interconnected system of PV modules.
- **PV module**  
(also PV panel or solar panel) uses sunlight to generate DC power.
- **UPS**  
uninterruptible power supply/uninterruptible power system.
- **Retailer**  
retail businesses that sell battery storage systems. This includes companies that sell systems to residential and small business consumers, and those selling to medium- and large-scale business consumers.
- **System**  
the battery storage system. Refers to all the equipment and components required to make it work.

# BATTERY STORAGE SYSTEM CHECKLIST

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- Know what type of battery storage system (i.e. battery chemistry, power and energy size) you are having installed. Different battery types have different requirements.
- Use a Clean Energy Council Accredited Designer/Installer with the 'battery storage endorsement' to design and install your system.
- Understand what you will be using your battery for and the amount of energy available for your use (this is usually less than the manufacturer's rated total amount of energy labelled on the batteries).
- Monitor your system regularly (at least once a month) and ensure that you:
  - have an appropriate battery monitoring system in place
  - have a log book and a visual and audible alarm
  - know what to check for when doing a visual check or taking meter readings.
- As batteries do not perform well with sudden changes in ambient temperature, they must be appropriately housed with adequate airflow. On extremely hot or cold days, you may need to do additional monitoring. Ensure that you have a system in place to remind you to do this.
- Ensure your batteries are not accessible to children, are vermin proofed and are separate to the living areas of your house. Do not store items on top of or lean items against your batteries or enclosures because they could be a potential electrical fire risk. Consider installing signs to remind you of this.
- Ensure that your batteries have the correct safety and warning signs for the battery type, and that you know the correct procedures in case of emergency (e.g. emergency shutdown procedure and emergency action plan).
- Keep manufacturer, installer and warranty information to refer to as needed, and only use Accredited Installers to alter the system.
- Revisit your whole system periodically and replace or upgrade components as required. Your Accredited Installer should be the first point of contact for maintenance.





ENPHASE

