

Test and commission the system and explain the maintenance requirements

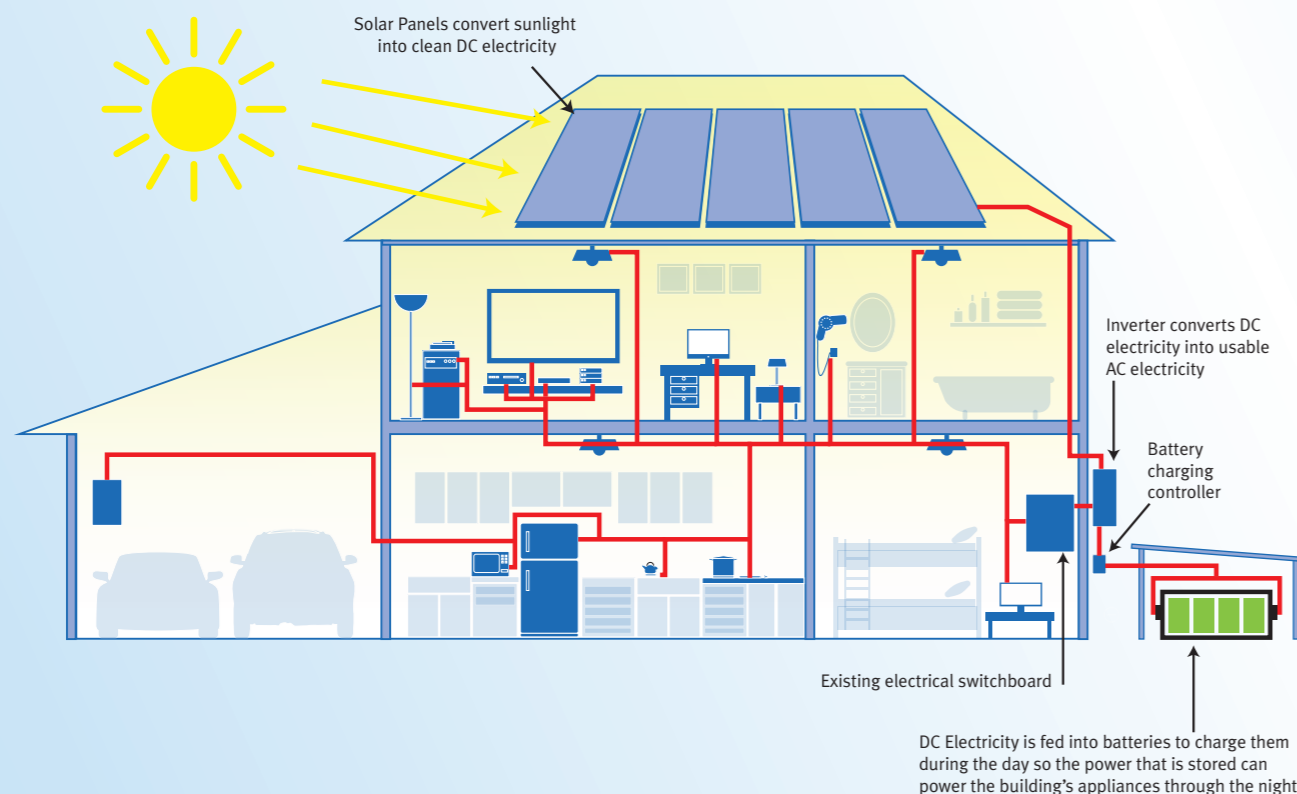
The BESS must be tested and commissioned in accordance with the manufacturer's instructions and relevant standards. You must also tell your customer the basic maintenance requirements to maximise its life and performance. They will need to:

- know how to safely operate, maintain and shutdown the system in an emergency
- understand various safety warnings and lights, specific to the BESS
- know which safety data sheets are required and where they should be located
- know what maintenance is required, when it should be scheduled and who should do it.

Are you ready to install a battery energy storage system (BESS)?

- Familiar with battery systems and the electrical components required in BESS.
- Know how to manage risks when installing BESS (such as battery chemistry, power and energy size) and doing electrical work.
- Familiar with national and local building codes applicable to the installation of battery storage systems.
- Know the Australian Standards relevant to batteries and grid/off-grid connected BESS.
- Have workers who are trained and competent in BESS installations.
- Can source equipment and components from a reputable supplier.
- Know what information to provide to customers.

For more information, visit electricalsafety.qld.gov.au or call **1300 362 128**.



Installing battery energy storage systems

Battery energy storage systems (BESS) for homes or small commercial buildings are a serious safety risk if incorrectly installed, potentially leading to electric shock, fire, flash burns, explosion or exposure to hazardous chemicals.

Any business installing a BESS must ensure the safety of their workers. The BESS must be safely installed and commissioned. In addition you will need to pass on information to your customer so they can continue to keep it safe and be able to safely shut it down.

ESO recommends that no battery parts of a BESS should be installed inside a home or building attached to a home. Instead, they should be installed in a suitable fire and weatherproof enclosure or other structure.

BESS types

Use the appropriate technology to suit your customer's battery energy storage system requirements. There are three main types:

- a pre-packaged battery module (enclosed factory connected batteries)

- a pre-packaged system (enclosed factory connected batteries with other components such as a charger control or inverter)
- a custom-made battery bank (individual batteries installed with other components and interconnected).

Your decision to use a specific BESS type will likely be influenced by factors such as price, available space and ease of installation and operation.

Select the right battery technology for your application

A range of battery technologies is available in Australia – the most common being lead-acid, lithium technologies, nickel-based, flow technologies and hybrid-ion technology.

Different battery technologies and chemistries have different performance capabilities, and different requirements for installation, operation and maintenance.

You will need to be aware of the chosen technology's hazards and know how to safely handle, install and operate the system. Hazards can result from overheating, over-charging and emissions from hazardous chemicals.



Design the system for the intended application

Several factors influence the overall design of the BESS, including your customer's required energy storage capacity, their budget and the battery technology and type. You should also consider the system's intended lifespan.

When designing a battery system, take into consideration your knowledge and experience, applicable standards, industry guidelines for best practice and the manufacturer's recommendations. You should also think about:

- the physical size required for the installation and necessary building modifications, which may need local council approval
- the type of electrical switching and protection devices, cable sizes, inverter size and the overall reliability and compatibility of the various electrical components in the system
- compatibility with an existing solar PV system or local electricity grid
- whether the system will export electricity to the local grid to maximise tariff returns
- a suitable emergency plan that the customer can manage.

You should source reliable BESS components that are suitable to Australia's climate and only purchase from businesses that have product expertise, aftersales service, warranty, replacement components and ready access to spare parts.

Control the electrical and chemical hazards

Electric shock

Battery cells have the potential to deliver a severe electrical shock when interconnected as battery banks. There will be 240 volt rated parts or other components that have hazardous voltages.

Arc flash

A battery has sufficient energy to cause an arc flash if it short circuits, or if a fault occurs. An arc flash can have temperatures above 12,000°C, capable of melting metal or causing fires and explosions. Generally higher battery energy storage capacities have a higher risk of arc flash.

Fire and explosion

Most lead-acid batteries generate hydrogen and oxygen gases when charging. Other battery types also emit flammable gases and need adequate ventilation to avoid an explosion or fire.

Lithium-ion batteries do not produce any exhaust gases during normal operation, but they can produce flammable gases if there is a fault.

Fire and explosions can also result from excessive temperatures (either under normal operating conditions or due to an overload), component failure, short circuit or loose connections.

Hazardous chemicals

Battery casings can degrade, or be damaged from a variety of impacts. They can also rupture as a result of excessive temperatures generated from a change in chemical reaction from over-charging. If a battery casing is ruptured, the fluid or gel (electrolyte) inside can leak, resulting in toxic fumes, burns, corrosion or explosions.

Suitability of the install location

A BESS should be installed outdoors in weatherproof enclosures away from any living areas, laundries and garages. The enclosure should restrict access by untrained people, children, pets or vermin.

Before you install a BESS, think about:

- any building codes applicable to batteries (national and local) and changes to floor loadings
- whether the location complies with the manufacturer's recommendations to protect the system from weather and extreme heat, light and temperature, which may reduce performance or the life span of the system
- how any electrolyte spills will be captured to avoid exposure to hazardous chemicals and damage to equipment or the environment
- using the correct fire-rated walls to avoid the spread of fire, should it occur
- allowing suitable access to the area during installation and maintenance work
- ways to achieve adequate ventilation
- protecting it from being hit by vehicles or other objects in the yard.

Install the BESS

To install a system, you will need to use safe work practices and comply with legislation, the wiring rules and other relevant standards.

Ensure your workers are competent to install BESS, and they follow the manufacturer's guideline and instructions. Other safety concerns during installation include:

- insulating live parts to prevent electric shock, including battery terminals, and other electrical connections
- knowing how to test, commission or de-commission the system as required
- ensuring there is sufficient clearance between items to prevent overheating
- ensuring shutdown switches are easily accessible
- placing signage and warnings to clearly identify equipment and shut-down procedures and the battery chemical being used (so it can be identified by emergency workers)
- being aware of the hazardous chemicals in batteries and taking precautions, including having the appropriate safety data sheets nearby.