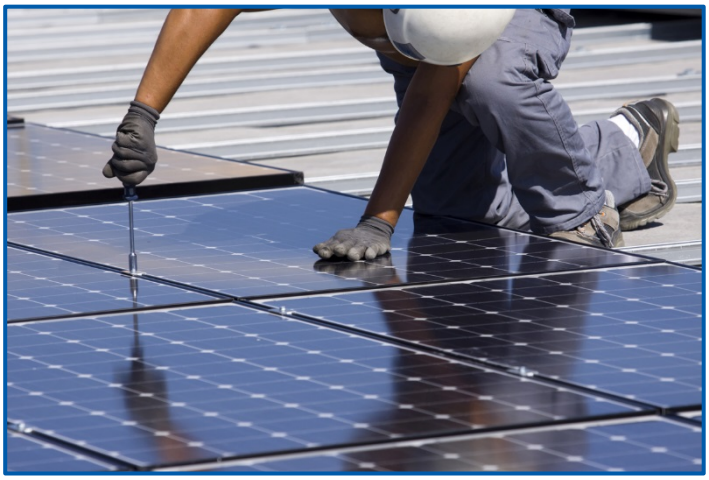
Workplace Health & Safety when installing solar systems

The rate of solar photovoltaic (PV) installations in Australia is booming. This is great news for businesses and installers but also means hectic schedules, pressure on install times and lots of inexperienced workers entering the industry.



While the PV industry has a good safety record to date, workers not properly prepared or trained to work with hazards such as electricity, or working at heights, working in ceiling spaces, or with energy storage (batteries), place themselves at risk of serious injury or death.

You and your workers' health and safety should be everyone's number one priority and never be compromised.

The best way to do this is to always have appropriate safety procedures and training in place before the start of each job and to create a workplace where anyone can raise a workplace safety issue or speak up if they have a safety concern.

Follow these tips before you start a job to make sure everyone goes home safely at the end of each day:

- Ensure only fully licensed electricians who have been inducted into an installer's safety program will be undertaking licensed work.
- Participate in the risk assessment of possible hazards at the start of each installation especially when working at heights, working in ceiling spaces and installing and commissioning energy storage (battery) systems.
- For any high-risk activities (e.g. working on or near exposed live parts) use a *Safe Work Method Statement* that has been developed in consultation with your workers and is easily understood and followed.

Qualifications and licencing

Make sure you and your workers only carry out work you are qualified and competent to do and that any electrical work is undertaken by an appropriately licensed and competent person.

The installation and maintenance of PV systems (including both grid and non-grid connected systems) and associated wiring systems which operate at a voltage greater than extra low voltage (exceeding 50 V a.c or 120 V ripple-free d.c) is classified as electrical work.

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This means PV solar may only be installed and maintained by an appropriate electrical licence holder.

The electrical risk associated with making incorrect connections, such as with panel-to-panel connectors, may result in serious shock or injury, or significant property damage.

A person without an electrical work licence is authorised to locate, mount or fix in place electrical equipment, including PV arrays, but cannot make or terminate electrical connections to the equipment or install supply conductors that will connect the equipment to a supply of electricity.

Working at heights and in ceiling spaces

Working at heights and near electricity presents major risks to workers on roofs and in ceiling spaces.

Before starting any work, turn off and isolate all electricity to the property at the main switchboard. Take steps to prevent the electricity from being turned back on while work is in progress (good options include a safety tag and lock out).

The risk of a fall from heights can be minimised by having fall prevention controls in place (e.g. edge protection or harness).

To prevent a person falling any distance, or where this is not practicable, use controls that arrest a person's fall (e.g. catch platform) preventing or minimising the risk of death or injury. Refer to your state or territory codes of practice and guidelines

You should always let someone know that you will be entering a ceiling and maintain contact with them until the work completed.

Complete a pre-work risk assessment of the roof cavity by looking around the ceiling space to identify any other hazards that may pose risks such as excessive heat, lack of ventilation, lack of lighting, dangerous vermin, sharp objects or asbestos-containing materials.

Even with the power off, avoid contact with electrical cables and equipment as some cables may still be live, such as consumer service lines and solar PV systems which have DC supply cables.

Any damaged electrical cables or equipment you identify will need to be repaired by a licensed electrical contractor. Your risk assessment may also indicate that these supplies need to be isolated and steps taken to guard against accidental re-energisation.

Energy storage

Energy storage systems (batteries) for homes or small commercial buildings are a serious safety risk if incorrectly installed.

Battery cells have the potential to deliver a severe electrical shock when interconnected as battery banks, reaching hazardous voltage levels.

There will also be 230/240 V a.c rated parts or other components such as energy regulators and inverters that have hazardous voltages.

To install a system, you and your workers must:

- be competent
- use safe work practices
- comply with legislation, wiring rules and other relevant standards, and
- follow the manufacturer's guidelines and instructions.

You also need to remember to pass on information to your customer so they can continue to keep the system safe and be able to shut it down safely.

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

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

A list of operational and installation hazards associated with battery systems is available in the Clean Energy Council's Battery Installation Guidelines for Accredited Installers (see section 6).
www.solaraccreditation.com.au/installers/compliance-and-standards/accreditation-guidelines.html.

Guidance can also be found at
www.worksafe.qld.gov.au/injury-prevention-safety/electricity/installing-battery-energy-storage-systems-bess.

Disclaimer: This is a guide only for PV installers. PV system installation and maintenance may have specific local requirements for safety – ensure you and your workers comply with all requirements of the State or Territory you will be working in. For more information on working safely refer to your state or territory Electrical Safety Regulator or Work Safe Organisation.

Guide to controlling high-risk hazards associated with solar PV systems

Hazard	Pathway of harm	Impact	Control recommendations
Working at heights	• Falling from roof top • Falling from ladder • Falling through ceiling space	• Trauma • Broken bones • Death	**Eliminate:** Install ground mounted solar systems
			Engineer: Install scaffolding around roof top with stair access. Roofer's kit, guard rails.
			PPE: Use fall restraint techniques
Working in ceiling spaces	• Contact with energised conductors • Exposure to poor air quality such as fiberglass, coal dust, lead dust and other harmful substances • Exposure to loose-fill asbestos • Exposure to extreme heat • Falling, trips • Vermin, snakes, spiders and insects	• Electric shocks, electrocution • Respiratory disease • Cancer • Mesothelioma, asbestosis • Exhaustion, fatigue, heat stress • Trauma, broken bones • Stings, bites and disease • Death • Skin irritation, rash, increased mucus production and watery eyes	**Eliminate:** Install ground mounted solar systems avoiding the need to work in a ceiling space
			Isolate: Turn off all electricity to the property at the main switchboard and take steps to prevent the electricity from being turned back on while work is in progress*
			PPE: Wearing appropriate, well maintained and correctly-fitted personal protective equipment when working in dusty ceiling spaces, including: • a respirator • a head covering and goggles, to avoid eye irritation • long-sleeved, loose-fitting clothing and gloves
Working with and installing electrical equipment	• Contact with energised conductors • Accidental short circuit	• Electric Shocks, electrocution • Arc flash, burns • Death	**Isolate:** Lockout Tagout. Test for de-energised (DEAD) Do not work energised
			Admin: Current LVR/CPR training **PPE:** Wear arc rated neck to wrist to ankle clothing with a minimum ATPV of 4cal^{m2}. Wear protective glasses and gloves
Working outdoors	• Exposure to the sun	• Sun burn, skin cancer • Exhaustion, fatigue, heat stress	**Eliminate:** Reorganising work schedules where possible so that outdoor tasks are done before 10 am and after 3 pm
			Substitute: Rotating tasks that involve direct sun exposure Increasing amount of shade available – use gazebos
			PPE: Slip on clothing, slop on SPF 30+ sunscreen, slap on a hat, slide on sunglasses. Drink plenty of water
Work involves, or is likely to involve, disturbing asbestos	• Inhalation of asbestos fibres	• Mesothelioma, asbestosis or cancer	**Eliminate:** Do not proceed with job until asbestos-containing material removed by licence contractors
			Substitute: Replace asbestos switchboard with new upgraded switchboard. Follow safe working procedures

This document was produced by the Clean Energy Regulator with the support of NECA, the Clean Energy Council, the Smart Energy Council, Energy Safe Victoria, Queensland's Electrical Safety Office and Master Electricians Australia.

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