



ELECTRICAL & DATA

FOOTBALL FACILITIES

SOLAR POWER GUIDE



INFRASTRUCTURE

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This Guide has been developed to assist Local Council Authorities, consultants, building designers, developers, clubs and zones to plan and deliver successful solar facility projects.



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INTRODUCTION

Electricity bills are typically one of the largest expenses for a community sporting organisation however this cost can be offset with a solar system and suitable storage.

Clubs use most of their power consumption during the evening (field lighting) although the energy is collected from the panels throughout the day.

Installing a suitable solar system with storage can heavily reduce the electricity cost for a facility.

Solar Energy benefits include:

- Significant financial savings (reduced electricity bills)
- Environmentally friendly
- Protection from Electricity Price Rises
- Affordability (rebates and financial assistance available)
- Government incentives (Federal Government & State Based)
- Accessibility and low maintenance
- Extended warranties and long product lifespans



SOLAR PHOTOVOLTAIC (PV)

How Solar PV Works

Solar photovoltaic (PV) panels are generally fitted on the roof in a northerly direction and at an angle to maximise the amount of sunlight that hits the panels.

Solar PV panels on the roof of homes and businesses generate clean electricity by converting the energy in sunlight. This conversion takes place within modules of specially fabricated materials that make up the solar panels. It is a relatively simple process that requires no moving parts. In most cases, solar panels are connected to the mains power supply through a device called an inverter.

Grid-Connected Solar PV Systems

Solar PV systems that are connected to the grid operate by transforming the electricity generated by the solar system (which is direct current (DC)) into alternating current (AC) electricity using an inverter, so that the power generated is compatible with the grid and ordinary business needs. Businesses with solar PV systems use solar power first before sourcing electricity from the grid.

When the panels are not producing enough power to meet load requirements the balance is drawn from the grid. This would be the case at night or on an overcast day. According to Australian Safety Standards, if the grid is down, for example during a blackout, the inverter will shut down and the solar system will not produce any energy. For systems with a battery backup, the inverter regulates the charge of batteries. The electricity stored in the batteries can be used at night or during blackouts.

Average Daily Production of a Solar PV System

The power output of a solar PV system depends on its efficiency, size and location. Appendix 1 (pg.13) shows the average daily production of some common grid-connected systems throughout Australia.



Solar PV System Design

The wattage of each solar panel specifies its maximum output over an hour (the electricity your solar PV system generates is measured in kilowatt hours). So, if you have four 250 W panels (making a total of 1 kW of panels), then the maximum output these panels can generate is 1 kW over an hour.

However, panels will never run at 100 per cent efficiency. Losses occur through cabling and at the inverter and will be affected by factors such as location, climate, time of year and the angle of the panels. A well-designed system will minimise these losses to give you the best possible output for your system.

The Clean Energy Council and Solar PV Quality

As the peak body for renewable energy in Australia, the Clean Energy Council (CEC) has an important role to play in ensuring the quality, safety and reliability of the country's solar PV industry.

[Clean Energy Council Website](#)

Angle of Solar Panels

Solar PV panels produce the most power when they are pointed directly at the sun. In Australia, solar modules should face north for optimum electricity production. The orientation of the panels will often have a greater effect on annual energy production than the angle they are tilted at.

However, a minimum tilt of 10° is recommended to ensure self-cleaning by rainfall.

For grid-connected solar PV power systems, the solar panels should be positioned at the angle of latitude to maximise the amount of energy produced annually.

If your roof's slope is not ideal, your accredited designer can create an appropriate mounting frame to correct the orientation and elevation of your panel. Failing this, the designer can advise you on the difference in energy output for different tilt and orientation.



The Effect of Shade and Dirt on Solar Panel Output

Ideally, solar PV panels should be in full sun from at least 9am to 3pm. They should not be placed in shaded areas and should be kept free from dust and dirt.

Even a small amount of shade can have a large impact on the output of a panel as it will change the flow of electricity through the panel. You need to make sure your solar panels are located away from shade created by things like trees, roof ventilators or antennas. Shading or dirt on just one of the cells in a solar panel causes a loss of power from many cells, not just the one that is covered.

Do I Need to Obtain Any Building or Council Permits?

As every building is unique you may or may not be required to obtain building and planning approval through your local council. We recommend that you seek advice from your local planning body as early as possible.

Factors to consider include:

- ✓ State building codes and regulations
- ✓ Whether your property is within a conservation or heritage overlay
- ✓ The classification of your building under the Australian Building Code (class 2-9 buildings may be subject to different approval requirements)
- ✓ The size and position of your solar PV system
- ✓ The total weight of your panels at any one point of attachment to the building
- ✓ The design of your system
- ✓ Structural integrity of your building
- ✓ Whether additional electrical or building work is required to accommodate the solar system

At the very least, your CEC (Clean Energy Council) accredited designer will need to complete a building survey to ensure the panels will not compromise the solar system.



What if I Don't Own My Building? Are There Other Options?

A common barrier to businesses installing solar PV systems is building ownership. As solar PV systems are long-term investments and involve making amendments to the building, it can be difficult for tenants to secure landlord permission and long-term finance arrangements.

If you are unable to install solar PV panels on your building but wish to source part of your business's electricity from renewable sources, then you should explore Green Power options via greenpower.gov.au

The amount of money your club will save on power bills by going solar is affected by a number of factors, including:

- **Your energy consumption and the size of your solar power system** – if you use more power than your system is capable of producing, your savings will be reduced. This can be avoided by choosing the right-sized system for your needs.
- **Your feed-in tariff** – this is the amount your electricity retailer pays you for any excess power your solar panels generate.
- **Your usage patterns** – solar panels can only generate electricity while the sun is shining. This means that clubs that use a lot of power during the day may attract greater savings than those that consume most of their power at night. However, you will still receive a feed-in tariff for any excess electricity you generate during the day.
- **Where you live** – some areas of Australia receive a lot more sunlight than others, so a solar PV system in Brisbane will usually generate more power than one in Hobart.

Businesses have a couple of other things to take into account, including the tax implications of any revenue received from feed-in tariffs.

What is a Solar Feed-In-Tariff?

A feed-in-tariff is the amount your electricity retailer pays you for any electricity your solar PV system generates that you don't use, and is instead fed back into the grid.

Is Solar Power Safe?

The Australian solar industry is well regulated and safe. Solar panels and inverters sold in this country must comply with a range of standards that maximise safety and reliability. The Clean Energy Council maintains a list of currently approved [solar panel modules](#) and [inverters](#).

The Clean Energy Council's [Solar Accreditation scheme](#) ensures that the people who design and install solar PV systems are across all the latest safety requirements. Accredited installers are qualified electricians who have undergone additional training and assessment in the installation of solar PV systems. Systems must be installed by a Clean Energy Council accredited installer to be eligible for small-scale technology certificates (STCs).

Initiatives such as the Clean Energy Council's [Approved Solar Retailer](#) scheme are also ensuring that the Australian solar PV sector stays safe and reliable. To keep your system running safely and effectively for many years, you will need to maintain it correctly. See our [after installing solar PV](#) section for details on inspecting, maintaining and upgrading your system.

Do Solar Panels Work at Night or During Cloudy Weather?

Solar panels do not generate power at night. Once the sun goes down, your clubhouse will start to draw power from the main grid as usual, or batteries if you have them installed.

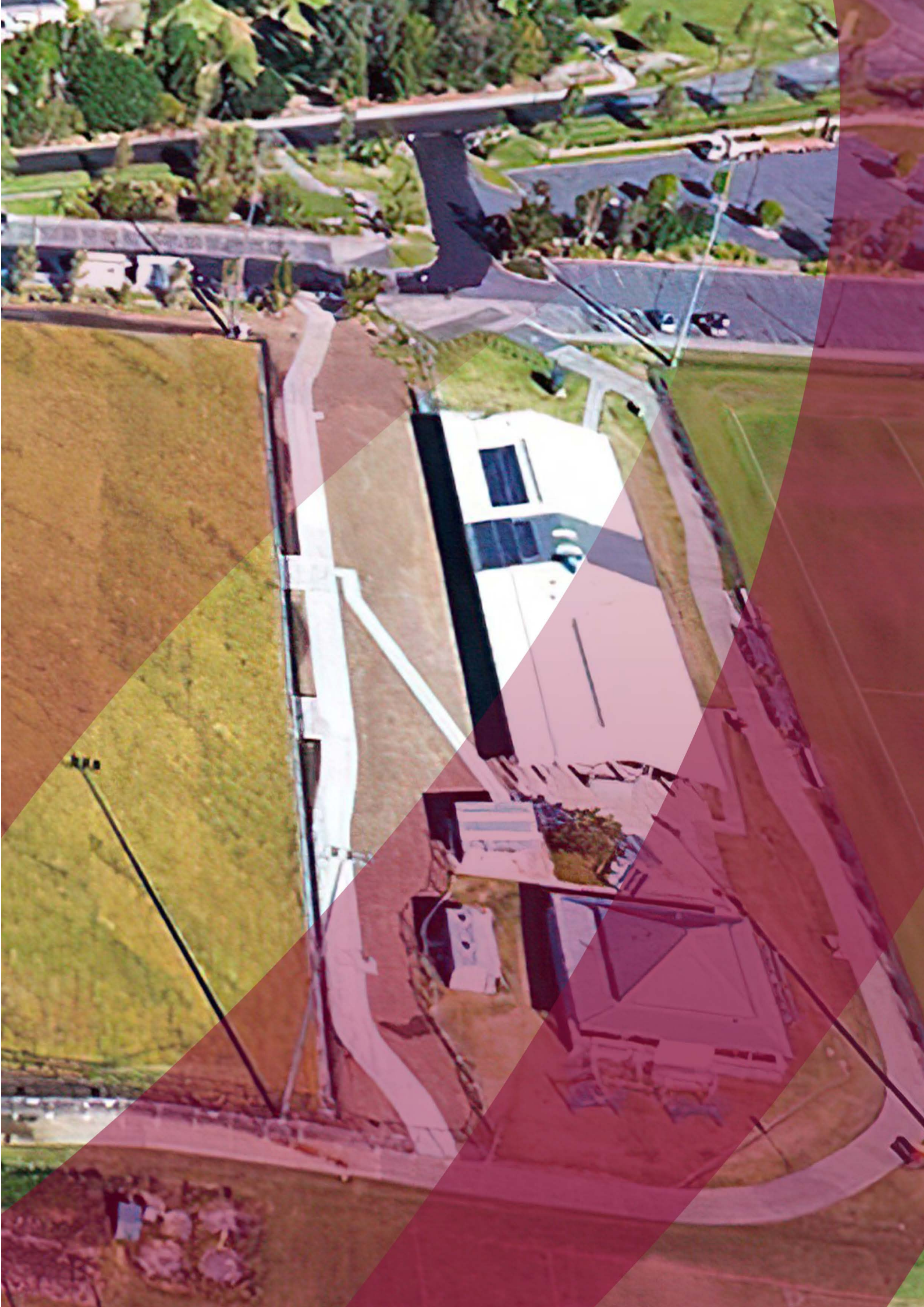
Solar panels still work on a cloudy day; however they will not generate as much electricity as when the weather is clear and sunny.

What Should I do if My Solar PV System Stops Working?

If your solar PV system is still under warranty, you should contact the retailer you purchased your system from to arrange repairs. If you bought from a Clean Energy Council [Approved Solar Retailer](#), you can rest assured that every part of your system is covered under warranty for at least five years.

If your system is out of warranty, you should contact your retailer or an [accredited solar installer](#). However, you may be responsible for the cost of any repairs. For more information on what to do if your system stops working, refer to [solar PV warranties, complaints and disputes](#).

[Guide's to installing Solar PV for business and Industry](#)



Small Scale Grid Connection Process for Queensland

In Queensland, a network connection application must be lodged and approved before you go ahead with installation.

For regional Ergon Energy customers, a technical assessment may need to be carried out, no matter what size system you are installing. This could considerably extend the process. Make sure you make an application early.

1. Network connection application lodged

For Energex customers: network connection applications lodged online for systems less than 5 kW are approved almost straight away. Allow at least 5 weeks for systems over 5 kW and longer if it is over 30 kW.

By electing to expedite the connection application process, you will not need to sign to accept the offer. However, you will need to wait for confirmation from Energex before the installation can go ahead.

2. System installed and paperwork lodged

Installer completes [EWR](#) form (Energex) / [Form A](#) (Ergon) at the time of installation and lodges with the distributor. This should be done within 5 working days.

3. Service order request made from distributor to electricity retailer

Distributor sends a copy of EWR / Form A to electricity retailer nominated on the EWR / Form A. This instigates a Business-to-Business (B2B) Service Order Request from retailer to distributor for meter installation. This usually takes a couple of days to be generated by the retailer.

4. Meter installed

Once distributor has connection application, EWR and B2B, they will carry out the meter change and complete safety inspection. For Energex customers, this is carried out within 10 working days. For Ergon, it may take up to 8 weeks.

5. System switched on

After the new meter has been installed, your distributor will notify your electricity retailer and you will see changes on your next bill. You will need to contact your installer to confirm the system is ready to be switched on.

Solar PV Checklist

Prior to undertaking a Solar PV project, ensure your club has completed the following:

1. Have you performed due diligence checks on your installer/supplier?

- Have you checked their track record, backers and complaints forums?
- Do they have CEC Accreditation and current electrical licences?
- Are they members of the industry association?
- Are they signatories to the Solar PV Retailer Code of Conduct?
- Have you checked ASIC to ensure they are legitimate and currently registered?

2. The quotation and contract

- Is it professional and sufficiently detailed?
- Are the prices typical of industry benchmarks?
- What is explicitly included and excluded?
- If comparing quotations, am I comparing like for like?
- Are all obligations, responsibilities and liabilities clear?

3. The financial calculations

- Have they provided a detailed analysis of load and generation?
- Are the returns consistent with CEC guidelines?
- If financed, have you had independent tax, depreciation advice?
- What if any performance guarantees are provided?
- Have you considered alternative methods of finance?

4. The products and services

- Have you been offered quality products that are well backed in case of warranty support?
- Have you reviewed the warranty terms and conditions?
- What written service obligations have been included?
- Has system monitoring been included to allow ongoing performance checks and who is responsible?
- Are the products listed by the CEC as approved for use in Australia?
- Do you understand the limitations to support and service that are offered?

5. The grid connection and approvals

- Has your DNSP been contacted and approved connection? Are there connection costs and limitations?
- Has your retailer been contacted and agreed in writing any tariff impacts and/or export tariffs?
- Do you require building approvals and if so have they been sought and approved?
- Have metering and connection costs been calculated and agreed?

6. Information and support

- Have you received a detailed final contract including all relevant approvals?
- Do you understand exactly what products, services, support and maintenance you are getting and from whom?
- Have you been advised who or where to go to if you are unsatisfied?
- Have you received training on system operation and a detailed operations manual?
- During installation, did you monitor the general performance, behaviour and installation quality of the installers?
- Is the system performing as expected?

This checklist is an extract from the Clean Energy Council Guide to Installing Solar PV for Business and Industry.

KEY CONTACTS

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SOLAR PV PACKAGES

Available by request through T2 Electrical. Contact Nathan to learn more.

APPENDIX & FURTHER READING

Appendix 1: Average Daily Production

City	1 kW system	1.5 kW system	2.0 kW system	3.0 kW system	4.0 kW system
Adelaide	4.2 kWh	6.3 kWh	8.4 kWh	12.6 kWh	16.8 kWh
Alice Springs	5.0 kWh	7.5 kWh	10.0 kWh	15.0 kWh	20.0 kWh
Brisbane	4.2 kWh	6.3 kWh	8.4 kWh	12.6 kWh	16.8 kWh
Cairns	4.2 kWh	6.3 kWh	8.4 kWh	12.6 kWh	16.8 kWh
Canberra	4.3 kWh	6.45 kWh	8.6 kWh	12.9 kWh	17.2 kWh
Darwin	4.4 kWh	6.6 kWh	8.8 kWh	13.2 kWh	17.6 kWh
Hobart	3.5 kWh	5.25 kWh	7.0 kWh	10.5 kWh	14.0 kWh
Melbourne	3.6 kWh	5.4 kWh	7.2 kWh	10.8 kWh	14.4 kWh
Perth	4.4 kWh	6.6 kWh	8.8 kWh	13.2 kWh	17.6 kWh
Sydney	3.9 kWh	5.85 kWh	7.8 kWh	11.7 kWh	15.6 kWh

The rated output is that achieved in perfect laboratory conditions. The Clean Energy Council design summary software takes these de-ratings into account when predicting averages for any given system.

Panels generate more electricity in summer than in winter. The table above reflects the electricity generated averaged across the whole year.

A typical Australian clubhouse consumes around 18 kilowatt hours (kWh) of electricity per day. This means that a 1-2 kW system could displace 25-40 per cent of your average electricity bill.



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