

SOLAR PV

A PRACTICAL GUIDE

AT A GLANCE

Best suited to:

Any business with sufficient roof or ground area

Main benefit:

Lower fuel and grid electricity costs, and reduced exposure to price swings

Main barriers:

Payback period depends on your tariffs and usage

Good first step:

Understand your current and projected future energy use to inform system design



Image: Scion Wine



OVERVIEW

Solar photovoltaic (PV) systems convert sunlight into electricity, converted into a useable form by an on-site inverter. Solar systems can be grid-connected, hybrid (meaning both grid-connected and fitted with batteries), or fully off-grid, depending on location and need.

Because energy generation is directly linked to solar output, businesses wanting to match energy production and use may need to install a battery system to increase self-consumption and energy resilience. Energy management systems and monitoring software can help make the most of the energy generated.

Solar panels can be installed alongside commercial enterprises either on roof tops, on ground-mounted structures, or on unused land. In agricultural settings, farming can continue under larger solar systems – this is known as ‘agrivoltaics’. It can include the grazing of sheep or cattle, or the growing of certain crops (e.g. leafy greens, berries, some fruit trees, and vineyards).



SUITABLE BUSINESS TYPES

Rural and regional homes and businesses are ideal candidates for solar, typically installed on roof tops. The priority should be to size the system to maximise self-consumption while considering future power needs, such as electric vehicles. Adding a battery can enable the use of the energy at all times of the day and, when supported by an aggregating service, can support the selling of excess energy to produce additional income – particularly when energy can be exported during peak network demand periods.

Businesses that may particularly benefit from solar installation include:

- Mixed businesses where rooftop solar can offset general electricity use (e.g. workshops, refrigeration, water systems).
- Intensive farming operations (e.g. piggeries, poultry, dairies) with high and consistent daytime energy demand. Dairies will often require storage as their peak energy demand (e.g. milking) doesn’t align with peak solar generation.

- Irrigated cropping farms where there is a strong match between pumping requirements and daylight hours.

- Businesses operating out of or supporting remote homesteads, water pumping, or other infrastructure.



BENEFITS

There are a number of potential benefits in adding solar to business operations:

- Reduces electricity/diesel costs and exposure to price volatility.
- Works well with daytime business loads (especially cooling or irrigation).
- Low operating and maintenance costs once installed.
- Long lifespan of panels, typically 20–30 years.
- Can improve energy independence and resilience (especially with batteries).
- Reduces greenhouse gas emissions (financial incentives may be available to support this).
- Potential additional income from exporting excess energy (depending on network constraints and the local energy retailer).



CHALLENGES

Some of the challenges to consider include:

- Potential high upfront capital investment, especially if batteries are included.
- Solar output varies with weather and seasons. Systems need to be carefully designed to match energy needs over the long term.
- Energy export constraints and decreasing feed-in-tariffs can limit financial returns from any energy export.
- Dust and dirt can build up on panels in some environments, so maintenance may be required.
- Payback periods vary depending on usage patterns and tariffs, with the highest returns on systems that have high utilisation.



TECHNICAL CONSIDERATIONS

Efficiency considerations

Using energy as efficiently as possible will reduce the number of solar panels needed. Considerations for improving efficiency include:

- Implementing appropriate energy efficiency measures before deciding on the size of the solar system required.
- Aligning work-load profile with maximum solar generation (e.g. daytime versus nighttime demand).
- Integrating solar production with other electrified equipment such as appliances with variable speed drives or electric boilers to maximise use.

Grid connectivity

Solar systems that are not entirely off-grid need to integrate with the local network, which may impose some limitations on use. Things to consider include:

- Network constraints or grid export limits in the area that may be imposed by network service providers.
- What feed-in tariffs, if any, are available for exported solar.
- The best system size for your property, taking into account your self-consumption versus export opportunity, and the costs of grid connection.
- Any planning approvals required, particularly for large ground-mounted systems.



IMPLEMENTATION CONSIDERATIONS

Land or space considerations

The location of solar panels is important, with key considerations including:

- Ensuring sufficient, structurally suitable roof space or ground area is available. Rooftop solar systems typically require around 4–5m² per kilowatt (kW) installed. Ground mounting will typically require 2–3 hectares per megawatt (MW), noting it may be possible to continue commercial activities under the panels.

- Panel orientation. North-facing with minimal shading preferred, but east and west facing panels can change the generation profile to match energy needs.
- Panel exposure to dust, extreme heat, or livestock, which could require extra maintenance or cleaning, and could affect durability.

Suppliers or service providers

- Solar systems should be designed by accredited designers and installed by accredited professionals – for example, those certified through **Solar Accreditation Australia**.
- Appropriate solar equipment suppliers (panels, inverters, batteries) and electrical contractors will be needed, particularly if you are trying to maximise integration with other business systems.
- Energy consultants for system design and cost-benefit analysis can be an important resource. Farming businesses should seek consultants who also have experience with agriculture.
- It is important to know who your local energy utility or retailer is, so you can understand any grid connection restraints, as well as the tariffs available to you – including feed-in (export) tariffs.

Power interruptions

- A standard grid-connected solar system will automatically shut off during a power outage. This is needed for safety reasons, so the solar system doesn't send electricity back into the grid while crews are working on power lines. Islanding capability (i.e. allowing the system to disconnect from the grid and operate as a stand-alone system) is therefore important where power interruptions must be avoided. To enable this, a battery system (with a suitably designed inverter) can be installed to provide the storage, stable voltage, and frequency needed for the solar system to keep running.



DECISION FACTORS

When this option may make sense

If the primary driver for installing solar is to achieve a good return on investment or have the system pay back over time, under current feed-in tariffs, the system should be designed to utilise as much of the energy on-site as possible to minimise costs. The more electricity that is exported by a system at a low feed-in-tariff rate, the longer the payback period will be.

Solar is particularly suited to:

- High daytime electricity use (e.g. irrigation, cooling, processing) or flexible loads (e.g. pumping) to make the most of the solar hours during the day.
- High grid electricity prices.
- Suitable roof or land space available where panels can be co-located with other activities.
- Reliable grid access (for grid-connected systems).
- Businesses that want to generate their own energy in circumstances where grid connection is not viable.

When it may not be suitable**Factors that may reduce the effectiveness of a solar system include:**

- Land constraints (shading, poor orientation, no option for agrivoltaics).
- Short-term building occupation or land use uncertainty (e.g. lease arrangements).
- Significant grid export constraints with low self-consumption.
- Very low or highly seasonal electricity demand such as seasonal irrigators using high power pumps that are only used for a small number of days per year, particularly if electricity is not able to be exported to the grid or used elsewhere.

Key decision criteria

Some factors to consider when deciding whether solar systems are right for you:

- Future energy use (can the system be scaled, can a battery be added, will it support switching diesel to electric?).
- Whether the energy load profile matches, or could be made to match, solar generation.
- System size and self-consumption versus energy export potential (e.g. are export and feed-in-tariffs worth the larger system size).
- Grid connection constraints, any network limits on export, and any requirement for grid augmentation (transformer or network).
- Reliability needs (grid versus hybrid versus off-grid).
- Quality and reputation of suppliers/installers.
- Capital cost and expected payback period. System cost depends on size, panel brand, installation complexity (steep roof or difficult access), and any required extras. A simple rule of thumb: budget ~\$1,000 per kW installed for reasonable quality. Financial incentives may be available.

**CASE STUDY.****SCION WINE**

Scion Wine in Rutherglen, Victoria, has combined renewable energy with broader sustainability practices across its vineyard, winery, and cellar door operations. Scion has installed a 32 kW 3-phase solar photovoltaic system and used battery storage to help manage the higher-demand load from winemaking equipment. Government rebates significantly offset the solar system's upfront cost.

A solar-powered Tesla charging station is also available on-site for cellar door customers, which owner and winemaker Rowly Milhinch says demonstrates to customers their commitment to clean energy solutions.

To support broader sustainability efforts, Scion also undertakes biological management of the soil ecosystems, uses rainwater to run the winery and cellar door, hosts eight beehives in a dedicated area, and has invested in biodiversity enhancement, so it is now surrounded by 1,200 native trees.

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For more information: sustainablewinegrowing.com.au/case-studies/biodiversity-and-renewable-energy-scion/

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