Factsheet

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Winery saves following solar panel install

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Why consider solar?

Solar photovoltaic (PV) cells are a great way to reduce your electricity costs and decrease fossil fuels emissions. The technology uses semiconductor materials to convert the sun's radiant energy into electricity. Solar electricity generation is free, essentially shifting your electricity supply from an operating cost to a capital investment. Once the investment has paid for itself, the ongoing savings benefit your bottom line. By going solar, you can insulate your business against rising electricity prices and protect the environment, making your operations more sustainable on both fronts. The recent advances in battery technology are also making solar more attractive, as electricity generated using PV does not need to be used straight away.

This fact sheet looks through the benefits and considerations around converting to solar electricity, demonstrated through the recent experience of one Australian wine company.

Solar system specifications

De Bortoli Wines (Griffith, NSW)
Crush: 100,000 tones
System size: 960 panels (Hanwha Q Cells) with 230kW output
Solar panel area: 1603m²
Battery storage: none
Solar irradiance: 1,880 kWh/m²
CO_2 Reduction: 297 tonnes p.a.

De Bortoli Solar PV install

De Bortoli Wines is the 6th largest winery in Australia, crushing around 100,000 tonnes per annum. In 2013, they installed a 230kW solar PV system. The system generates around 365 MWh p.a. which accounts for 5.5 per cent of their total electricity, saving the winery thousands of dollars each year.

The installation was part of a larger upgrade which also included a 200kW solar thermal (hot water) installation, new bottling plant, and a filtration upgrade.

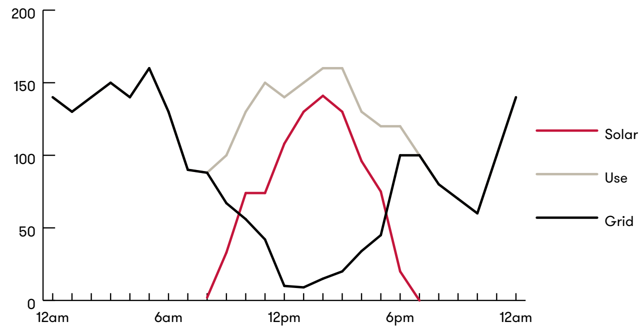
How did they begin the process?

Unlike domestic systems, commercial solar PV systems are not an off the shelf solution and involve understanding site usage (load analysis), output specification, connection to the grid as well as system design. For the De Bortoli project, many considerations were taken into account during the design stage. Nine solar PV systems were scoped considering their rate of return on investment, proven performance in Australian conditions, and the reputation of the product and supplying company.

The system was selected based on its rate of return, proven performance in Australian conditions and reputation of the product

CO_2 emissions in perspective

CO_2 emission reduction of 297 tonnes p.a. = Electricity for 61 homes = 72 cars off the road = 7,600 trees planted



What is load analysis?

Load analysis summarises electricity usage (load) over an average 24 hour period. The solar PV system should be sized to meet most of this load, without exporting too much to the grid, as in most cases, feed-in tariffs are set at zero for commercial installations.

In De Bortoli's case, three separate loads were identified – two refrigeration plants and the general cellar. Separate solar PV systems were designed to meet the needs of each of the three loads and sized so that the annual electricity export to the grid would be less than 5 per cent.

De Bortoli had to also modify the timing of their electricity use. Previously, they tried to maximise the amount of cheaper off peak power (night) used, but following the install of the solar PV system, many operations were shifted back to daytime to ensure the full capacity of free solar generation was used first.

To maximise a solar PV system, the priority order of power use should be:

1. Day time solar generation
2. Night time off-peak power
3. Day time on-peak power

Grid connection

Most solar systems still rely on a connection to the grid. The rules for connecting a solar system back to the grid vary so you need to check with your local electricity supplier to get the right information for your situation.

Solar panel orientation

Interception of light (and electricity generation) is strongly influenced by the orientation and tilt angle of the panels. In the southern hemisphere, the panels are best faced north and tilted to maximise PV efficiency. Most solar PV systems are fixed, but more expensive systems that track the sun are also available, though not frequently used.

The De Bortoli PV panels were installed following the natural 10° slant of the existing site roof. Mounting the PV panels to frames to increase tilt angle would have improved solar capture performance; however, the added weight from the required frames, as well as the strain from wind against the backs of the lifted panels would have required a mechanical upgrade to the roof and the additional cost was not justified by the performance gain.

System performance

In the first year, the De Bortoli system generated 365 MWh, exceeding the anticipated output. This accounted for approximately 5.5 per cent of the site's total electricity usage. Only 1 per cent of electricity generated was transported back to the grid, indicating that the system was not oversized. The performance ratio of the solar PV system has been 82 per cent to date, just above the industry standard of 80 per cent.

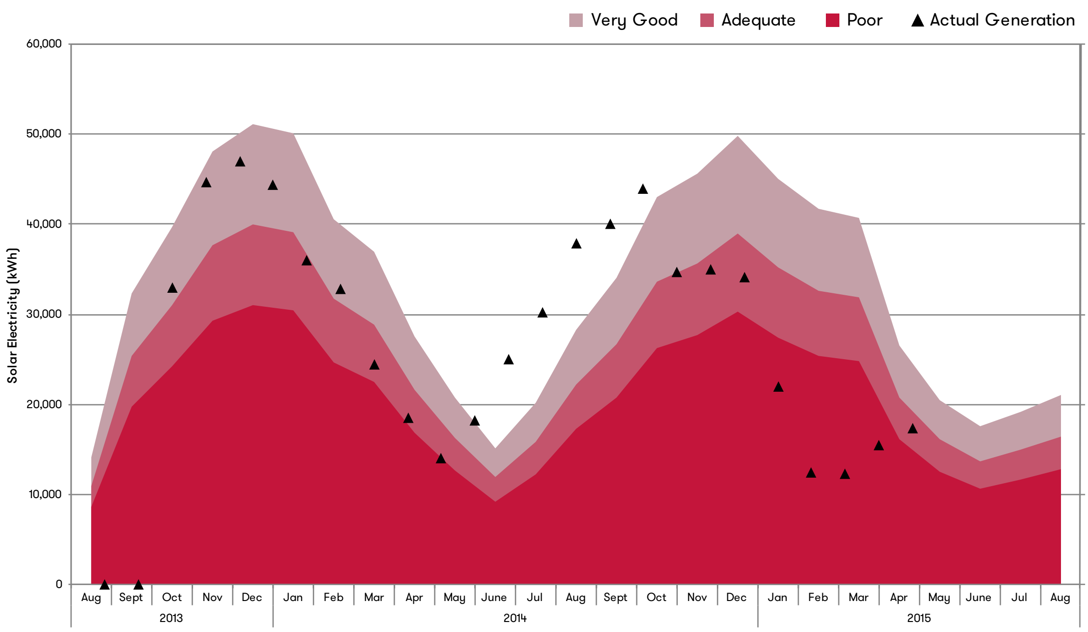


Figure 1: Solar PV performance over 23 months. The shaded areas indicate performance zones. Very good: 90–115 per cent; adequate: 70–90 per cent; poor: 0–70 per cent of rated performance.

What influences payback period of a solar PV system?

There are four main factors that influence payback period – purchase and installation cost, system output/efficiency, local electricity prices and electricity consumption.

The cost of a solar PV system depends largely on the number and type of panels used. Indicative commercial solar PV system prices (December 2015) are provided in Table 1.

The electricity output varies based on local solar irradiation (climate), panel orientation, tilt angle and shading; each one affecting system efficiency.

Payback can often be achieved inside six years.

Solar Choice has a useful online return on investment (ROI) calculator which can give a quick estimate of the return on investment that you may achieve in your own situation – www.solarchoice.net.au/blog/solar-power-system-payback-calculator.

City	10kW	30kW	50kW	100kW
Adelaide, SA	$13k	$36k	$68k	$121k
Brisbane, QLD	$13k	$40k	$63k	$117k
Canberra, ACT	$13k	$43k	$64k	$110k
Melbourne, VIC	$13k	$38k	$55k	$118k
Sydney, NSW	$13k	$43k	$64k	$123k
Perth, WA	$14k	$42k	$71k	$143k

Table 1: Average solar system costs in Australia in December 2015. Shows installed system cost, including incentives but does not include all fees and charges (e.g. system modelling and design, ground mounting brackets, grid connection fees, etc). Source: Solar Choice (www.solarchoice.net.au).

Payback can often be achieved inside six years

More information

Solar Choice has information on solar PV selection and suppliers – www.solarchoice.net.au

The Clean Energy Council has a useful guide for businesses looking to install solar – www.solaraccreditation.com.au/consumers/purchasing-your-solar-pv-system/solar-pv-guide-for-businesses.html

Alternatively, contact the AWRI Helpdesk for advice and to discuss your situation on (08) 8313 6600 or helpdesk@awri.com.au

Figure 2: De Bortoli Solar PV south side array.

Figure 3: De Bortoli Solar PV B6 building array.

Wine Australia for Australian Wine

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