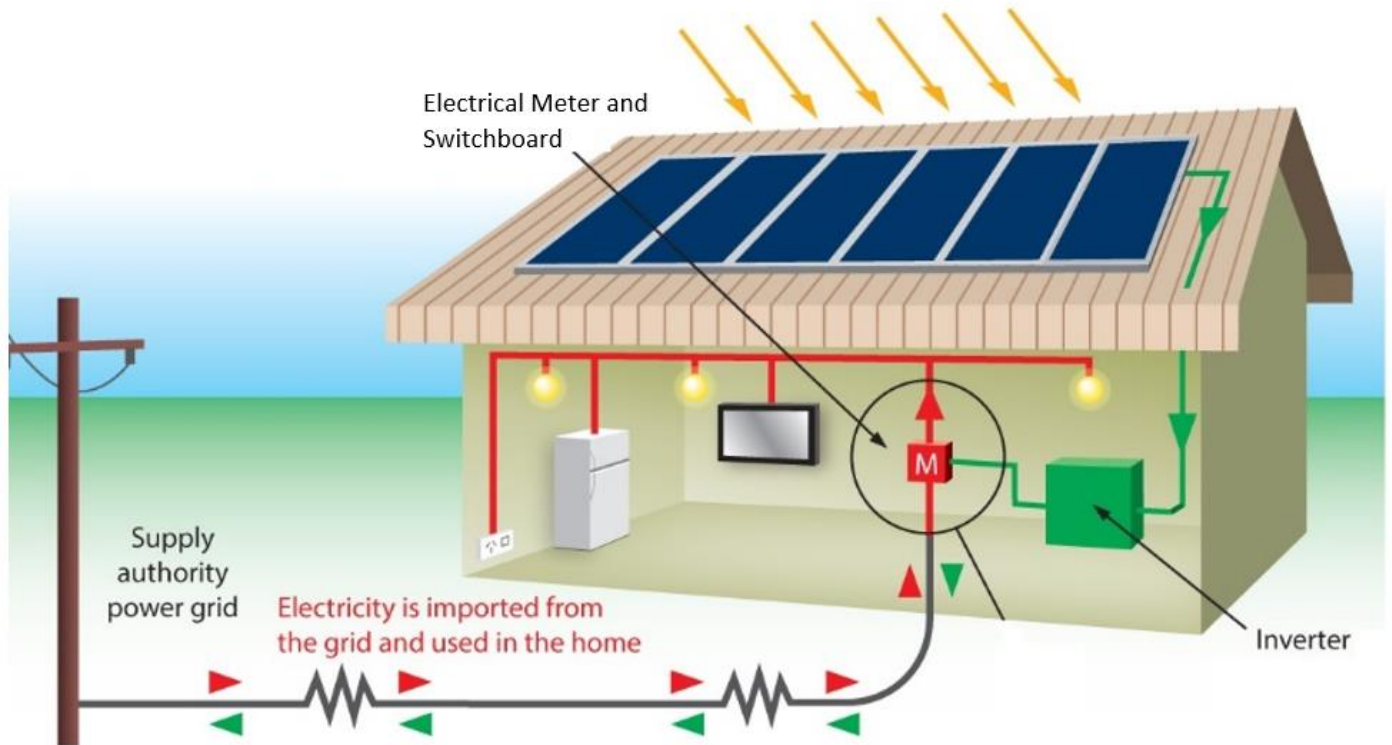


How solar power works

Power is generated from sunlight falling onto rooftop solar panels and is passed through an inverter that will match the voltage to your home and the local grid. The power is then consumed in the house by any appliances that are operating at the time, with any excess solar power sent to the grid in exchange for credit via your smart meter. If the solar generation does not meet all the needs of the home, the deficit of electricity is simply purchased from the electricity grid as normal. Solar panels are therefore best installed in an orientation that maximizes solar energy gain when appliances are being used. This can be facing towards north for energy all day, east for more energy in the mornings or west for long sunny afternoons.



... Solar power sizes for you

To choose a size of solar system it is important to be clear on what you would like the solar system to achieve. For those wanting fast financial paybacks smaller systems are sometimes preferred, whereas maximum environmental benefits are achieved with a larger solar power system. Most of our customers want a mixture of both these things. This chart serves as a guide only so please consult with one of our professional solar design staff to discuss your situation.

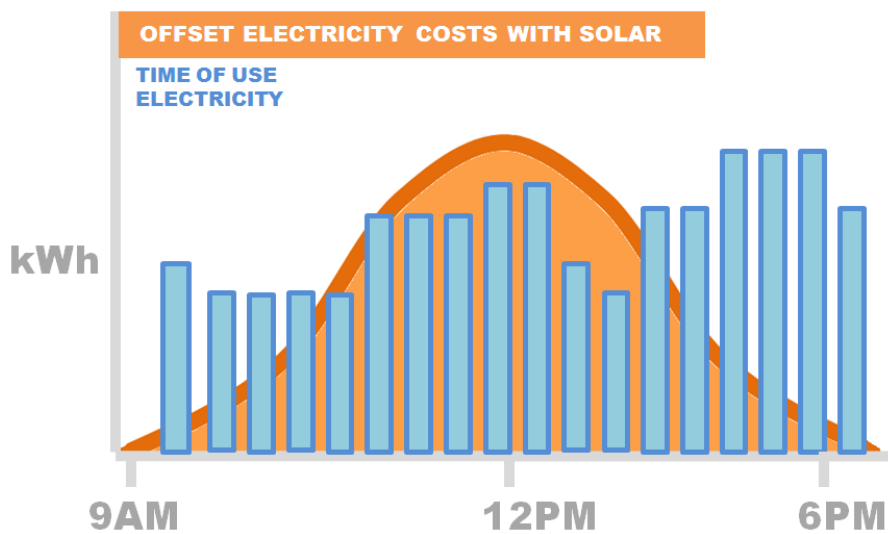
System Size	2 kW	3.5 kW	5 kW	10 kW
Suits No. Bedrooms	1-2 br	3 br	3-4 br	4+ br
Roof Space	14 m ²	24 m ²	34 m ²	68 m ²
Average Daily Energy	7.2 kWh	12.6 kWh	18 kWh	36 kWh
CO ₂ Savings Annual	3.9 t	6.8 t	9.6 t	19.3 t

Possible annual savings (savings increase every year with rising power prices)

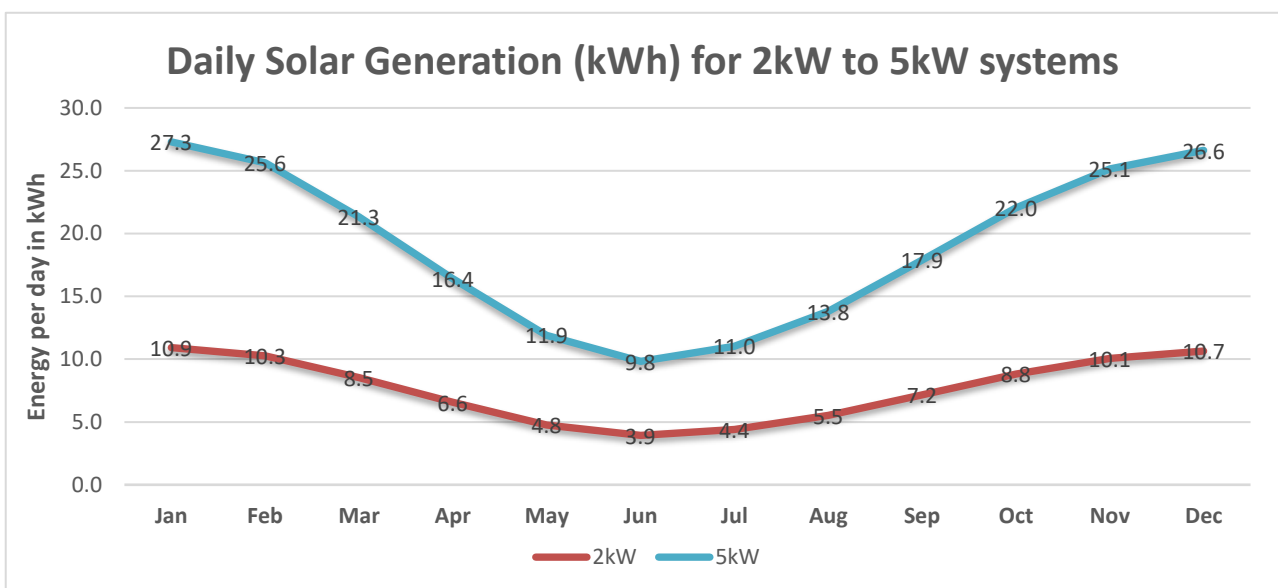
Heavy Power User	\$900	\$1500	\$2200	\$4300
Average Power User	\$700	\$1200	\$1700	\$3500

Solar power sizing

To explain how the financial savings work, the chart below shows an example of household energy consumption measured in blue and typical (North facing) solar energy production in orange. This shows that depending on the energy usage in the building and the size of the solar system installed, solar may not always be able to provide the energy required. This is not a bad thing, because any surplus energy will be automatically credited through the smart meter for a credit of 9.9 c/kWh (minimum) to help reduce the remaining energy bill. It is also important to note that this orange curve is based on a North facing solar system, so the peak is around 12 noon. Solar panels facing East and West can provide energy production in the morning and afternoon.



The chart below shows the average daily energy production of each popular sized solar system, showing the large variation available across the year. The more sunny days there are, the more energy is produced.



The average daily household energy consumption in Victoria is around 14 kWh per day.



Roof Pitch & Orientation

The economic and environmental performance of solar power systems is influenced by the direction the solar panels are installed. However, less so than people might think. While installing solar panels on a north facing roof provides the best annual solar generation, it is not always architecturally practical or aesthetically suitable to do so.

The chart below shows the percentage losses for solar systems with roof angles based in Melbourne. These losses are applied to all solar generation and financial savings estimates.

Although perfect solar performance is achieved by a roof pitch of 30 degrees and facing north (0% loss in the table below) it is clear that it is perfectly acceptable to face solar panels in other directions.

Installations incurring up to 20% loss are generally acceptable by solar designers if no other possibilities exist (marked below in green). These include almost all tile and tin roofs facing East, North East, North West, West & Flat (without tilt frames).

In some applications, the solar panels can be installed on tilt frames to modify the installation angle and therefore improve the performance, although with added cost.

Tilt frames are generally cost effective for tin & Klip-lok roofs with flat pitch or up to 10 degrees.

Tilt frames are generally not worth the extra cost if the roof is already over 10 degrees pitch. Our solar systems designers will customize an ideal solar array to your roof and energy needs.

	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	
north	0°	14.0%	10.5%	7.0%	4.7%	2.9%	1.2%	0.0%	0.0%	0.0%	1.2%	2.3%	4.7%	7.0%	10.5%	14.0%	18.4%	22.8%	28.1%	33.3%
	10°	14.0%	10.8%	7.6%	5.3%	2.9%	1.8%	0.6%	0.6%	1.8%	2.9%	5.3%	7.6%	11.1%	14.6%	19.0%	23.4%	28.4%	33.3%	33.3%
north-east	20°	14.0%	10.8%	7.6%	5.6%	3.5%	2.3%	1.2%	1.5%	1.8%	2.9%	4.1%	6.4%	8.8%	12.3%	15.8%	19.9%	24.0%	28.7%	33.3%
	30°	14.0%	11.1%	8.2%	6.4%	4.7%	3.8%	2.9%	3.2%	3.5%	4.7%	5.8%	8.2%	10.5%	13.7%	17.0%	21.1%	25.1%	29.5%	33.9%
north-east	40°	14.0%	11.7%	9.4%	7.6%	5.8%	4.7%	5.0%	5.3%	6.7%	8.2%	10.5%	12.9%	15.8%	18.7%	22.5%	26.3%	30.7%	35.1%	35.1%
	45°	14.0%	11.8%	9.6%	8.2%	6.7%	6.3%	5.8%	6.3%	6.7%	8.2%	9.6%	11.8%	14.0%	17.0%	19.9%	23.7%	27.5%	31.7%	36.0%
north-east	50°	14.0%	12.0%	9.9%	8.8%	7.6%	7.3%	7.0%	7.6%	8.2%	9.6%	11.1%	13.2%	15.2%	18.1%	21.1%	24.9%	28.7%	32.7%	36.8%
	60°	14.0%	12.6%	11.1%	10.2%	9.4%	9.4%	10.2%	11.1%	12.6%	14.0%	16.4%	18.7%	21.3%	24.0%	27.5%	31.0%	34.8%	38.6%	38.6%
east	70°	14.0%	13.2%	12.3%	11.7%	11.1%	11.7%	12.3%	13.2%	14.0%	15.8%	17.5%	19.9%	22.2%	24.9%	27.5%	30.7%	33.9%	37.4%	40.9%
	80°	14.0%	13.7%	13.5%	13.5%	13.5%	14.3%	15.2%	16.4%	17.5%	19.6%	21.6%	23.7%	25.7%	28.7%	31.6%	34.5%	37.4%	40.6%	43.9%
east	90°	14.0%	14.3%	14.6%	15.2%	15.8%	17.0%	18.1%	19.9%	21.6%	23.7%	25.7%	28.1%	30.4%	33.0%	35.7%	38.3%	40.9%	44.2%	47.4%
	100°	14.0%	14.9%	15.8%	17.0%	18.1%	19.9%	21.6%	23.7%	27.8%	29.8%	32.2%	34.5%	37.1%	39.8%	42.4%	45.0%	48.0%	50.9%	50.9%
south-east	110°	14.0%	15.2%	16.4%	18.4%	20.5%	22.5%	24.6%	26.9%	29.2%	31.9%	34.5%	36.8%	39.2%	41.8%	44.4%	47.1%	49.7%	52.3%	55.0%
	120°	14.0%	15.8%	17.5%	19.9%	22.2%	25.1%	28.1%	30.7%	33.3%	36.3%	39.2%	41.8%	44.4%	46.8%	49.1%	51.5%	53.8%	56.1%	58.5%
south-east	130°	14.0%	16.4%	18.7%	21.3%	24.0%	27.5%	31.0%	34.2%	37.4%	40.4%	43.3%	46.2%	49.1%	51.5%	53.8%	56.1%	58.5%	60.5%	62.6%
	135°	14.0%	16.5%	19.0%	21.9%	24.9%	28.5%	32.2%	35.7%	39.2%	42.3%	45.3%	48.2%	51.2%	53.5%	55.8%	58.0%	60.2%	62.3%	64.3%
south	140°	14.0%	16.7%	19.3%	22.5%	25.7%	29.5%	33.3%	37.1%	40.9%	44.2%	47.4%	50.3%	53.2%	55.6%	57.9%	59.9%	62.0%	64.0%	66.1%
	150°	14.0%	17.0%	19.9%	23.7%	27.5%	31.3%	35.1%	39.2%	43.3%	47.1%	50.9%	54.1%	57.3%	59.6%	62.0%	63.7%	65.0%	67.3%	69.0%
south	160°	14.0%	17.3%	20.5%	24.3%	28.1%	32.5%	36.8%	41.2%	45.6%	49.4%	53.2%	56.7%	60.2%	62.9%	65.5%	67.0%	68.4%	69.9%	71.3%
	170°	14.0%	17.3%	20.5%	24.6%	28.7%	33.0%	37.4%	41.8%	46.2%	50.3%	54.4%	57.9%	61.4%	64.3%	67.3%	69.0%	70.8%	71.6%	72.5%
south	180°	14.0%	17.3%	20.5%	24.6%	29.7%	33.9%	38.0%	42.1%	46.2%	50.3%	54.4%	57.9%	61.4%	64.3%	67.3%	69.3%	71.3%	72.2%	73.1%
	190°	14.0%	17.3%	20.5%	24.3%	28.1%	32.7%	37.4%	41.5%	45.6%	49.4%	53.2%	56.7%	60.2%	63.5%	66.7%	68.4%	70.2%	71.1%	71.9%
south-west	200°	14.0%	17.0%	19.9%	23.7%	27.5%	31.6%	35.7%	39.8%	43.9%	47.7%	51.5%	55.0%	58.5%	61.1%	63.7%	65.5%	67.3%	68.7%	70.2%
	210°	14.0%	16.7%	19.3%	22.8%	26.3%	30.1%	33.9%	37.7%	41.5%	45.0%	48.5%	51.8%	55.0%	57.6%	60.2%	62.0%	63.7%	65.5%	67.3%
south-west	220°	14.0%	16.4%	18.7%	21.6%	24.6%	28.1%	31.6%	34.8%	38.0%	41.5%	45.0%	47.7%	50.3%	52.9%	55.6%	57.6%	59.6%	61.7%	63.7%
	225°	14.0%	16.1%	18.1%	20.9%	23.7%	26.9%	30.1%	33.2%	36.3%	39.5%	42.7%	45.3%	48.0%	50.6%	53.2%	55.4%	57.6%	59.6%	61.7%
south-west	230°	14.0%	15.8%	17.5%	20.2%	22.8%	25.7%	28.7%	31.6%	34.5%	37.4%	40.4%	43.0%	45.6%	48.2%	50.9%	53.2%	55.6%	57.6%	59.6%
	240°	14.0%	15.5%	17.0%	18.7%	20.5%	22.8%	25.1%	27.8%	30.4%	33.0%	35.7%	38.3%	40.9%	43.3%	45.6%	48.2%	50.9%	53.2%	55.6%
west	250°	14.0%	14.9%	15.8%	17.0%	18.1%	20.2%	22.2%	24.3%	26.3%	28.7%	31.0%	33.3%	35.7%	38.3%	40.9%	43.6%	46.2%	48.8%	51.5%
	260°	14.0%	14.3%	14.6%	15.2%	15.8%	17.3%	18.7%	20.5%	22.2%	24.3%	26.3%	28.7%	31.0%	33.6%	36.3%	38.9%	41.5%	44.4%	47.4%
west	270°	14.0%	13.7%	13.5%	13.5%	13.5%	14.3%	15.2%	16.7%	18.1%	19.9%	21.6%	24.0%	26.3%	28.9%	31.6%	34.5%	37.4%	40.6%	43.9%
	280°	14.0%	13.2%	12.9%	12.0%	11.7%	12.0%	12.3%	13.5%	14.6%	16.1%	17.5%	19.9%	22.2%	24.9%	27.5%	30.4%	33.3%	37.1%	40.9%
north-west	290°	14.0%	12.6%	11.1%	10.2%	9.4%	9.4%	9.4%	10.2%	11.1%	12.6%	14.0%	16.1%	18.1%	21.1%	24.0%	27.2%	30.4%	34.2%	38.0%
	300°	14.0%	12.0%	9.9%	8.8%	7.6%	7.3%	7.0%	7.6%	8.2%	9.4%	10.5%	12.9%	15.2%	17.8%	20.5%	24.0%	27.5%	31.6%	35.7%
north-west	310°	14.0%	11.7%	9.4%	7.6%	5.8%	5.3%	4.7%	5.0%	5.3%	6.7%	8.2%	10.2%	12.3%	15.2%	18.1%	21.9%	25.7%	29.8%	33.9%
	315°	14.0%	11.4%	8.8%	7.0%	5.3%	4.5%	3.8%	3.9%	4.1%	5.4%	6.7%	8.9%	11.1%	14.2%	17.3%	21.1%	24.9%	29.1%	33.3%
north	320°	14.0%	11.1%	8.2%	6.4%	4.7%	3.8%	2.9%	2.9%	2.9%	4.1%	5.3%	7.6%	9.9%	13.2%	16.4%	20.2%	24.0%	28.4%	32.7%
	330°	14.0%	10.8%	7.6%	5.6%	3.5%	2.3%	1.2%	1.5%	1.8%	2.9%	4.1%	6.1%	8.2%	11.4%	14.6%	18.7%	22.8%	27.5%	32.2%
north	340°	14.0%	10.8%	7.6%	5.3%	2.9%	1.8%	0.6%	0.6%	0.6%	1.8%	2.9%	5.0%	7.0%	10.5%	14.0%	18.1%	22.2%	27.2%	32.2%
	350°	14.0%	10.5%	7.0%	4.7%	2.9%	1.2%	0.0%	0.0%	0.0%	1.2%	2.3%	4.7%	7.0%	10.2%	14.0%	17.8%	22.2%	27.5%	32.7%
north	360°	14.0%	10.5%	7.0%	4.7%	2.9%	1.2%	0.0%	0.0%	0.0%	1.2%	2.3%	4.7%	7.0%	10.5%	14.0%	18.4%	22.8%	28.1%	33.3%

Source is The Australian Solar Radiation Data Handbook



Office: 49 Lyons Street, Newstead VIC 3462 EnviroShop Stores: Newstead & Northcote

Phone: 5472 4160 newstead@enviroshop.com.au

Web: <https://enviroshop.com.au/pages/newstead> v3.10

Complete system pricing inc installation, inc GST & after STC rebates

Below shows approximate pricing for different system sizes and equipment types including standard tin roof installation. These prices should only be used as a rough guide. **[Additional Solar Vic rebates available]**

Equipment Type	2 kW	3.5 kW	5 kW	10 kW
Lowest Upfront Cost High Maintenance + Risk	EnviroGroup does not recommend lowest cost solar equipment for several reasons. The Environment Minister dubbed this "Landfill Solar".			
Global Standard Quality Budget conscious Good warranties	\$3790	\$5090	\$6990	\$12590 (3ph)
Installer Choice The Insider Knowledge	\$5390	\$6790	\$8790	\$15790 (3ph)
Advanced Technology Ultimate performance & warranty (including <u>Optimisers</u>)	\$6290	\$8490	\$10990	\$19890 (3ph)

Pricing additions applicable for double storey, tilt frames, difficult access and non-compliant switchboards.

Our choice of solar panels

As a solar investor it can be difficult to find reputable and independent comparisons of solar equipment. Our parent company EnviroGroup's solar system designers and engineers have spent over 15 years developing a thorough selection criteria to ensure that our products outperform and outlast many others on the market. This criteria has contributed to EnviroGroup being awarded many projects for large commercial installations for businesses, universities, schools and government buildings.

EnviroShop relies on a combination of installation experience (14 years; 10,000 systems and counting) and objective data to make its panel choices. Of course, your budget is important, too. We look for verifiable quality indicators, genuine performance data and that 'something extra' that differentiates a panel from its competitors in its category.

	Trina Global Quality	Winaico Installer Choice	SunPower Advanced Technology
Product Defect Warranty	10 years	15 years	25 years
Performance Warranty	25 years to 80.7%	25 years to 80.2%	25 years to 87%
Output per panel	310W	310W to 330W	360W to 400W
Installation experience	Nearly 20,000 installed by EnviroGroup. Council bulk programme approved	The overwhelming preference of our experienced installation team	Continuous presence in Australian for over a decade with 0.000027% failure rate!
Technology	Polycrystalline silicon, with low PID	New generation PERC, monocrystalline silicon	N-Type mono cells, copper backed, partly flexible.
Environmental Scorecard	"above average"	"above average"	Global winner, 98%
Something extra?	Transparent manufacturing process, regularly in the top 10 for global volume shipped (Source: PVTech)	Leading performer at Australia's only installed test site, Desert Knowledge. (Source: DKA Solar Centre)	Used on: NASA robots, solar powered aeroplanes (Solar Impulse 1 and 2), solar boats
Country	China	Taiwan	USA based; made in France, Mexico and China

Call EnviroShop for more detail or specific pricing for your home or business on 03 5472 4160



Our choice of inverters

The solar inverter, although perhaps a less ‘interesting’ component, is probably more important than the panels you select, mainly because an unreliable inverter can render the entire system inoperable.

Standard technical characteristics of an inverter include: efficiency, power output rating, DC input rating, MPPTs, start-up voltage, etc. Much of these are similar in the marketplace, but proven reliability is paramount.

Inverters are more likely to have an issue than any other component for your solar system, so it’s important to consider reliability based on age of company, recall history, country of manufacture and service support.

The following table shows the best inverter options available and why EnviroShop installs them.

	Delta Global Quality	Fronius Commercial Standard	Enphase Advanced Technology
Warranty	5 years, can extend to 10 yr	10 years	10 years
Country	Taiwan	Austria	USA based; made Mexico, China
Communications	Wi-Fi available	Wi-Fi standard	Wi-Fi standard
Installation experience	Extensive installation history by EnviroGroup and in industry		
Technology	Multi-tracker transformerless	Multi-tracker HF or TL, +/- optimisers	Micro-inverters
Something extra?	Constant presence in Australia since market beginning. Extremely low failure rate, excellent value	Fronius has been in business over 70 years, excellent support, family business, most popular inverter of its class in industry	Best microinverter manufacturer in the world, excellent support, best solar monitoring system, most efficient technology

Inverters, optimisers or microinverters?



Optimisers and Micro-inverters ...

If only one panel of you solar array is affected by shading, soiling or even damage, it will affect the entire system i.e. the panels are connected together in series and work as a team.

Optimisers and microinverters are different technologies that both have very similar purposes. They both isolate the effect of any shading or other impact to the affected panel only, leaving the rest of the system operating at full capacity!

Microinverters are not necessary for every roof. However for some roofs they are very necessary.

There are pros and cons for microinverters and optimisers, but generally microinverters are favoured because they have better monitoring (per panel monitoring is possible), require less components, mean that no inverter is installed at ground level and are considerably safer.

About EnviroShop

EnviroShop (and its parent EnviroGroup) has been in business for 15 years and installed over 10,000 systems across Victoria. EnviroGroup is an Australian-owned renewable energy company, focusing on design, supply and installation of residential and commercial scale solar PV and battery systems (grid-connected and off-grid).

EnviroGroup is a CEC Approved Solar Retailer and also is proud to be ISO accredited for Quality, Safety and Environment. EnviroGroup is preferred supplier for many organisations including several Councils and Corporations in the greater Melbourne area.



EnviroGroup is also known as EnviroShop, which are its retail stores providing a range of other products including, hot water systems, heating / cooling, insulation. LED lighting, EV charging and much more.



355 kW Solar PV System & Substation Upgrade (CEC WINNER – BEST COMMERCIAL INSTALLATION)



NASA robot in Greenland "GROVER" and Solar Impulse 2 plane – SunPower panels