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SOLAR RADIATION METER (ORJA)

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Solar Panel Tilt Angle Calculator

<https://footprinthero.com/solar-panel-tilt-angle-calculator>



<https://solarcalculator.com.au/solar-panel-angle/>

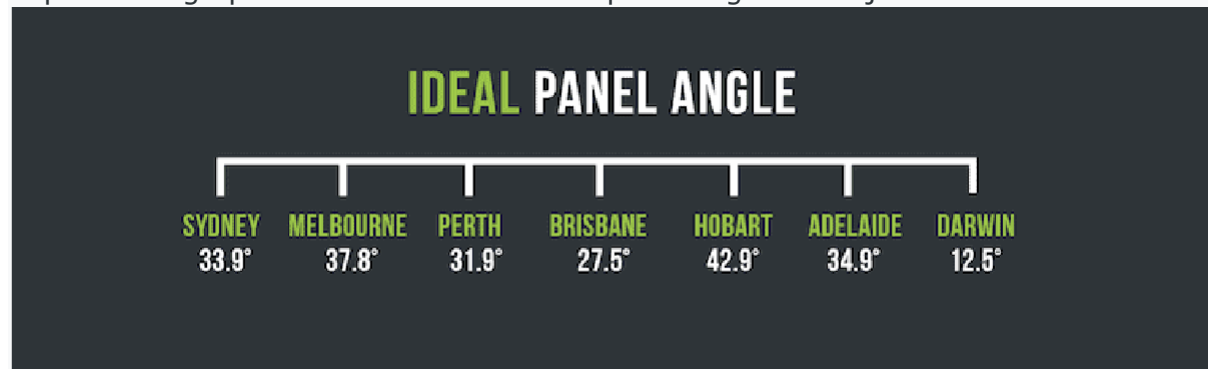


SOLAR PANEL ANGLE AFFECTS PERFORMANCE

The angle and orientation of your roof, along with the location of your property, will have an impact on how much solar power your panels can generate. Solar panels generate maximum power when they are **positioned perpendicular to the sun**, so that the sun's rays hit the panels on a 90° angle. In Australia, and the southern hemisphere, [rooftops that face the north sun perform best](#) and generate the most energy. However, to accurately calculate solar power, the rooftop orientation and angle of the roof need to be combined to measure the [solar output potential of the panels](#), at the property location.

Optimum angle for solar panels

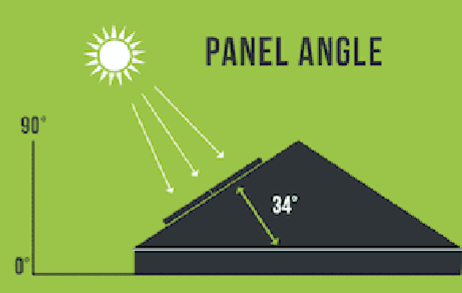
The ideal angle for solar panels in Australia is usually **equal to the latitude angle of the location of the property**. This means that for best results, the roof pitch of your property should ideally be equal to the latitude angle, with the panels mounted at the same angle as the roof. For example, if you reside in Sydney, a roof pitch of 34° would be considered ideal, as this is equal to the latitude angle (33.86°) of the NSW capital. The graphic below shows the ideal panel angle for major Australian cities:



OPTIMUM PANEL ANGLE

For maximum year round solar exposure, the ideal panel angle is equal to the **LATITUDE ANGLE** of your location.

PANEL ANGLE



Optimum angle differs during winter months

The ideal angle for your solar panels can vary depending on your solar objectives. For example, if you are seeking to maximise solar generation during winter months, be it for an [off grid system](#) or higher energy consumption levels, you would ideally want to angle your panels at a greater tilt for **maximum exposure to the low winter sun**. The general rule of thumb is that panels angled at the latitude angle, plus 15°, is best to maximise winter sun exposure.

In reality though, your panels will more than likely be positioned at the angle of your rooftop, unless your roof is dead flat, as the cost to mount the panels at the optimum angle usually outweighs the benefits associated with additional solar generation. The angle of most rooftops varies depending on the architecture of the house, and city, in question. For example, in Melbourne, most houses have a roof pitch of 23° or 28°, depending on the style of architecture. Ideally, solar panels would be positioned at an angle of 38° in Melbourne, equal to the latitude angle of the city (37.81°).

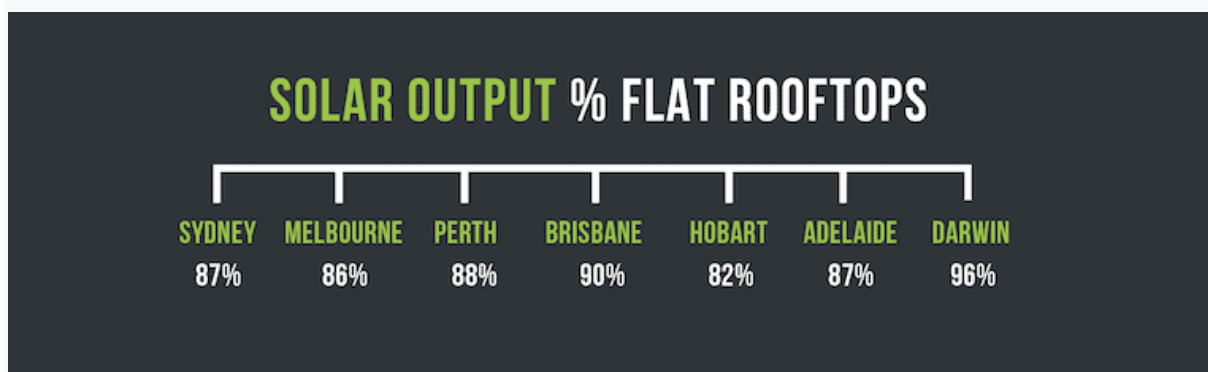
Solar output losses when the panel angle is not ideal

So what percentage of solar energy do you lose from not having panels mounted at the optimum angle? Well, it depends based on the orientation and angle of the panels! Generally, if your roof pitch is anywhere between 10° – 15° either side of the latitude angle, you will only lose between 1 – 1.5% of the maximum solar output possible at your location. To use the Melbourne example again, with a northern orientation, a roof pitch of 23° would deliver around 98.5%, and a pitch of 28° around 99% of the maximum possible solar generation at that location.

The [Clean Energy Council](#) has supplied data that provides output percentages for the combination of orientation at various plane angles for the major Australian cities. You can view this data [here](#).

However, the flatter the rooftop is, the greater the loss of solar exposure. If we take the example of Melbourne; if the rooftop was perfectly flat, or horizontal, the panels would only generate 86% as compared to the 100% if the panels were mounted at latitude angle. In this instance, the direction the roof faces is irrelevant, as the roof is horizontal.

The situation differs again for a city like Brisbane, where the latitude angle is 27.46° . A flat roof in Brisbane will operate at 90% of its optimum capacity for the location. In terms of Australia, the further north you go, the lower the latitude angle. The effect of flat rooftops is less and less of an issue. The table below shows the solar generation percentages for flat rooftops for major Australian cities:



What if my roof is flat?

If you do have a flat rooftop, do not despair, usually a mounting device is installed so as to deflect rainwater and allow the rain to clean the panels. Dust and grime will

reduce the generation capacity of your solar panels, so this is an important consideration in the design and install process. The added benefit is that the panels will then be angled, likely at around 10°, which will expose them to more sun and allow them to generate more energy. If you choose to go ahead and [receive solar quotes from our certified installers](#), they will talk you through the installation process for flat rooftops.

Solar radiation data on horizontal surfaces

Interestingly, the majority of solar radiation data recorded in Australia is based on a horizontal surface, or if you like, a flat roof. For the purposes of **calculating solar power output at a specific location**, we start by using solar exposure figures recorded by the Bureau of Meteorology at your location, which are recorded on horizontal surfaces. We then extrapolate the data supplied by the Clean Energy Council on generation loss of panels due to their orientation and tilt; then we apply the necessary [panel efficiency deratings](#). All of this data is utilised to provide an [accurate measurement of solar power](#) based on the location, roof tilt and orientation that you input into the calculator.

<https://footprinthero.com/solar-panel-tilt-angle-calculator>

Solar Panel Tilt Angle Calculator

- [Alex Beale](#)
- Updated January 12, 2022
- [Solar Calculators](#)

Use our solar panel tilt angle calculator to find the best angle for your solar panels.

Solar Panel Tilt Angle Calculator

Address, City, or Zip Code

or Use Your Current Location

Tip: Also check out our [solar panel azimuth direction calculator](#) to find the best direction to face your solar panels.

Best Solar Panel Angle by Zip Code

Here is a list of the best solar panel angles for 50 of the most populated zip codes in the US.

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