

**How do they work?** Solar panels work from the photovoltaic principle; basically spectrums of light excite electrons in the solar cell (usually silicon) creating DC electricity which is converted to AC household power at the inverter.

**How long has solar power been around?** The photovoltaic effect was discovered in 1839, however until the 1950's there was no commercial application of the technology. In 1955 the space race was responsible for the development of commercial solar technology, powering the first space stations and is still used for space technology today.

**How reliable are they?** Solar modules are one of the most reliable energy conversion systems in the world, which is why they are often used for remote applications to save on maintenance.

**What sort of maintenance is required?** Provided they are manufactured to a high level of quality there should be no need for maintenance for many years, bar keeping the surface clean.

**What sort of lifetime do they have?** They should last at least 25 years if manufactured well.

**What are the warranties?** Sungrid modules have a manufacturer's warranty of 5 or 10 years, performance guarantee at 85% of rated output after 25 years and a product output guarantee of 0 - +5% of rated output. These are some of the highest warranties on the Australian market.

**What sorts of technologies are available, and which one's for me?** The three main technologies used in the market are Mono-crystalline, Poly-crystalline, and thin-film. All major technologies use silicon as the main ingredient, however some thin-film manufactures use other semi-conductors. The best technology for you depends on your property, and your own preferences.

- **Mono-crystalline** – It's made from purified silicon that is formed in a crystal ingot and cut into round wafers, giving it a distinctive look with white diamonds. It's the most efficient of all technologies, requiring less roof space than others. Efficiency is effected by heat and it has 2-3 bypass modules per modules which means if a number of cells are shaded, the diode will shut down half or third of the panel rather than effect the whole system.
- **Poly-crystalline** – A close cousin to mono-crystalline differing only from the way its manufactured, in a cast rather than individual crystal ingot. It shares all the same technical aspects such as heat tolerance and shading, however requires about 10% more roof space as they are slightly less efficient.
- **Thin-film** – CSG (crystallized silicon on glass) is the dominant technology in thin-film. It is basically using vaporized solar-grade silicon, made in the process before poly and mono-crystalline, and spraying it onto glass. It has a better heat tolerance and is not always badly affected by shading as more bypass diodes can be put in during manufacture. However it is much less efficient, requiring more than twice the roof-space of mono-crystalline and doesn't work as efficiently in direct light.

**What is their Environmental impact?** Solar modules are emissions free once they are manufactured. Energy payback on mono and poly-crystalline are about 2-3 years, and thin-film less. However, most thin-film modules use sulphur hexafluoride in cleaning (etching) which has a greenhouse effect 24,000 x more potent than CO<sub>2</sub>.

**What is their efficiency and what does it mean?** Solar modules have an efficiency of between 5-20%. The lower end is thin-film while the higher end is generally mono-crystalline. This refers to how much space is required for a given system size. It does not imply that a system with higher efficiency will produce more power over the year – a common misconception.

**What about Shading?** Shading effects output because by shading a couple of cells in series you are essentially lowering the voltage of that module which will drag down the voltage of the whole string. By-pass diodes are built into most modules to by-pass the effected area so the remainder of the system can continue to operate. While thin-film has more by-pass diodes and thus more shade tolerant, because it requires a much larger area it has to occupy much less attractive position for shading than others, which neutralizes this advantage or worsens it. If your property is too shaded for mono-crystalline, it is definitely too shaded for thin-film.

**What is the expected output?** In Perth an optimized system will produce about 4.5kWh per day per kW installed. So a 3kW North facing system would produce on average 13.5kWh per day; about 18 in the summer down to 9 in winter. A thin-film system may produce about 5% more at the start of its life given its heat tolerance.

**Does the output degrade?** Yes it does, but very slowly. Our modules have a performance guarantee of 90% of rated output after 12 years and 85% after 25 years. This means that in 2035 a 3kW system will be at least a 2.55kW system.

**Is the system exposed to corrosion?** The frames are anodized aluminium, which means they are coated with an anti-corrosive agent.

For more information please call Renewablelogic on 1300 39 10 77 or email your enquiries to [info@renewablelogic.com.au](mailto:info@renewablelogic.com.au).