



# RENEWABLE ENERGY IN AUSTRALIA

## Solar energy

Solar energy is any energy that is created by the light or heat of the sun.

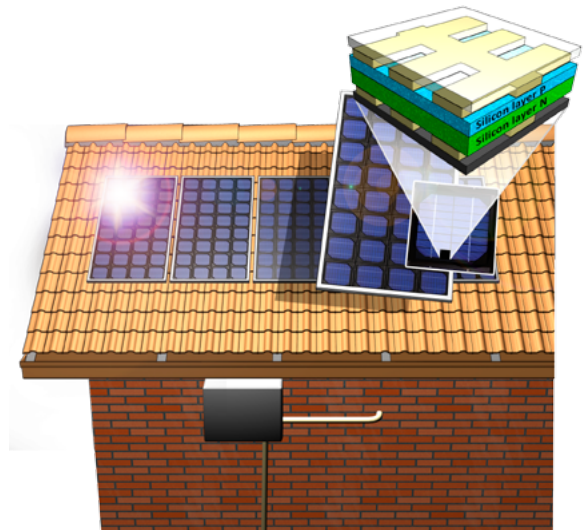
Australia is a very sunny country! In fact, we have the highest average amount of solar radiation of any continent in the world. Not surprisingly then, there is a lot of potential for solar power. Right now, more than two million Australian households have some type of solar system on their roof and solar thermal plants are being researched, planned or built around the country.

There are two main types of solar energy technologies:

1. Solar photovoltaic
2. Solar thermal

### Solar photovoltaic

Solar photovoltaic (PV) technology converts sunlight directly into electricity using photovoltaic cells. This could be the panels that you see on the rooftops of homes and businesses or as huge, megawatt scale power plants. The panels can also be used along with the mirrors mentioned in the 'Solar thermal' information.



The panels have several layers that work together to produce electricity. When the light from the sun hits the panels it causes electrons to flow between the P-type and N-type layers of silicon, creating a current that produces electricity. See page 3 for a diagram showing this process.

### Solar thermal

Solar thermal involves converting sunlight into thermal energy (heat). In the past this has mainly been used to heat spaces (such as our homes) or water (such as in a solar hot water system), but is now used for large-scale power generation.

Solar thermal technology harnesses the sun's light through a field of mirrors which reflect and concentrate it onto a focal point (a 'thermal receiver'). A tube containing liquid is fitted along the focal point. The sunlight heats the liquid, turning it into steam which is used to spin a turbine that powers a generator. The generator produces electricity which is transferred to the grid via a substation or stored and released as required (day or night). See page 4 for a diagram showing this process.



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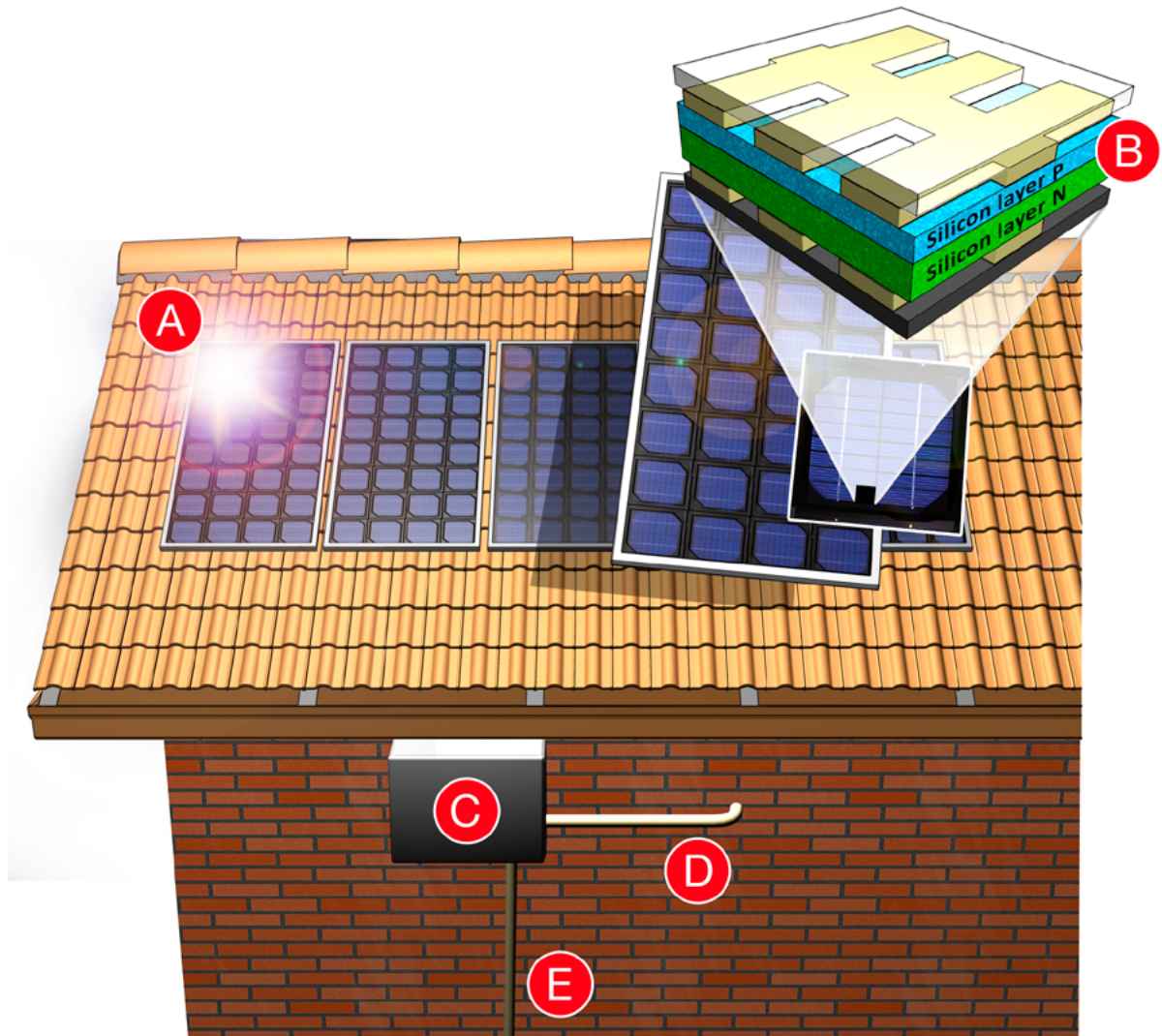
## Facts about solar energy

- Solar thermal technology can use a lot of water. Luckily, after it turns to steam and spins the turbine, it cools, turns back to water and recycles through the system again and again.
- Another form of solar thermal energy is known as 'passive thermal energy'. You don't need any fancy equipment to harness passive thermal energy. It simply involves using the heat from the sun to do things such as dry our clothes or warm us up in cold weather.
- The number of large-scale solar power plants is growing in Australia. In 2016 alone, seven new plants became operational, including plants in Moree (NSW), Barcaldine (Qld), Williamsdale (ACT) and the De Grussa Mine (WA).
- Solar power is a zero-emission electricity source and one megawatt hour (MWh) of solar-derived electricity prevents about one tonne of carbon dioxide (CO<sub>2</sub>) from being released into the atmosphere.
- Solar PV is like having a mini power station on your roof because it can supply power without being connected to an electricity grid. This makes it an excellent source of energy for remote areas.
- Need power at night? Solar PV panels can only generate electricity when the sun is shining, but excess power can be stored for use at night or on cloudy days.





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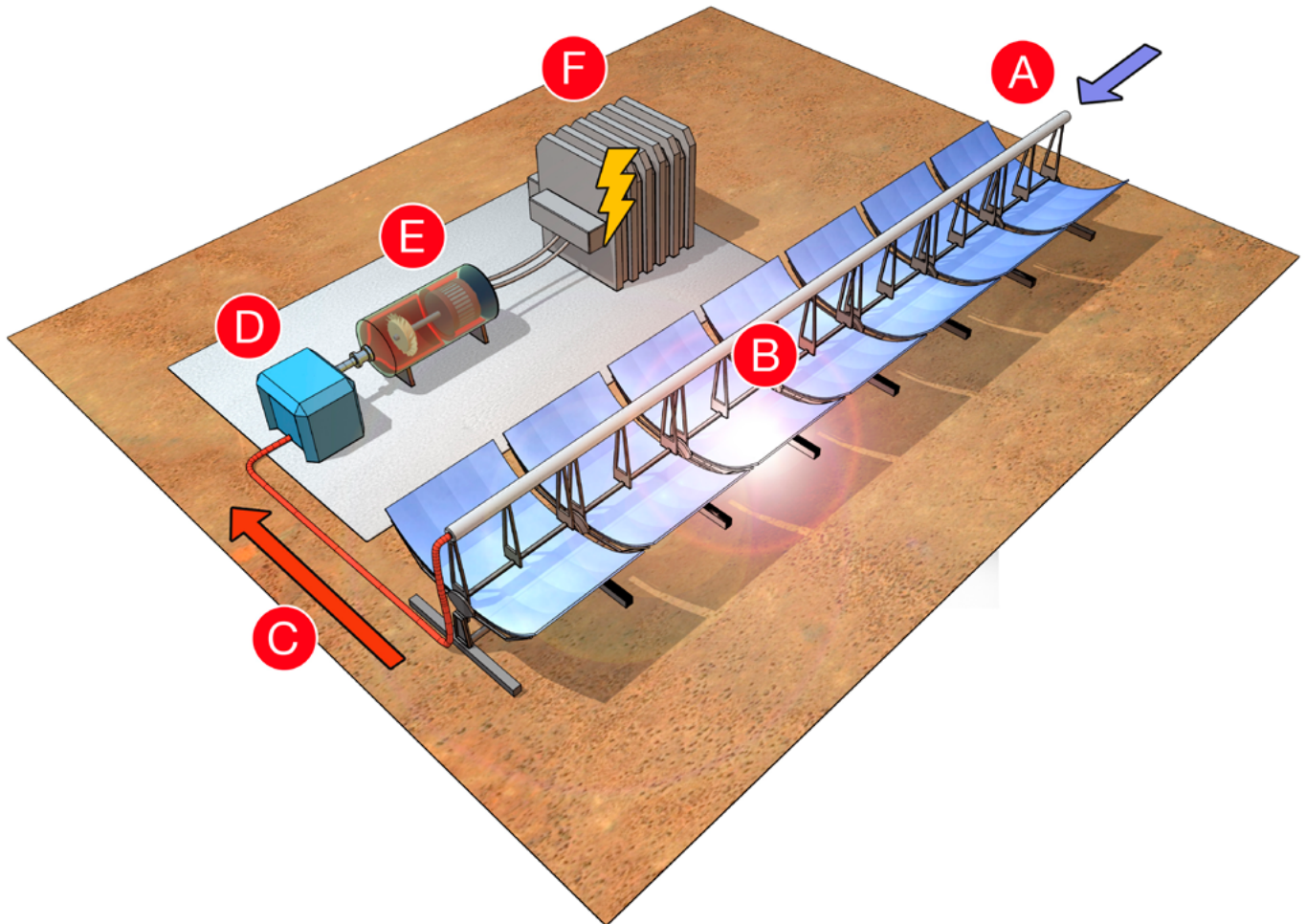
### Solar photovoltaic in action

- A. Light from the sun hits the panels.
- B. This causes electrons to flow between the P-type (positive) and N-type (negative) layers of silicon which creates a current.
- C. The current is converted to electricity.
- D. Converted electricity is used directly by the household.
- E. Excess electricity is fed into the electricity grid.





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## Solar thermal in action

- A. Liquid is fed into a long tube which passes over reflective mirrors.
- B. Sunlight reflects off the mirrors onto the tube and heats the liquid to a high temperature.
- C. The liquid is fed into a secondary heater.
- D. The hot liquid is converted to steam.
- E. The steam passes over a turbine attached to a generator. This creates electricity.
- F. The generated electricity is fed into the network via a substation.