

Introductory Activities (Engage)

(5 minutes)

As a class group discuss how the sun is being used to produce energy. Identify a range of products that have been developed that rely on solar power. Ask students to share examples. (Toys, watches, hot water, cars etc.)

Collate student responses on a flip chart, poster or other medium.

Sun

- Provides light when it rises in the morning
- Provides heat
- Generates energy/electricity/power (solar panels or solar hot water)
- Helps plants grow
- Is the main source of energy in the water cycle

Lesson 1 (Explore)

(30 minutes)

What is solar energy?

The heat and light of the sun is used to produce solar energy. Consider how the rays of sunshine (solar energy) will heat up the inside of a house or car. The rays become trapped and the heat is maintained. Solar energy can be used either to produce electricity or to provide heat.

Materials	Quantity
Internet access for students	n/a
Activity sheet 1 – Solar hot water *see materials list.	1 each
Activity sheet 2 – Solar radiation *see materials list.	1 each
Flip chart or whiteboard	1
https://www.youtube.com/watch?v=UJ8XW9AgUrw	n/a
REF: Living through SA's Power Outage	1 each

How is solar energy converted into electricity?

Solar panels or photovoltaics (PV's) (broken down photo = light, voltaic = electricity) are used to convert sunlight to electricity and produce a DC (direct current), similar to a battery. An inverter converts the electricity into AC (alternating current) which is required to power appliances in homes.

PV's cells are made up of three layers. The top is called the *N type layer* and the bottom the *P type layer* with the area between known as the junction. The sunlight shines on the cells and excites the electrons to move around until it finds an empty space among the protons. A metal strip that connects each cell conducts the DC current and each cell also has an electrical field, this causes voltage. The voltage together with the current results in electricity. Watch the YouTube clip referenced above "How do solar cells work?" to help explain the movement of electrons.

Student Investigation

Ask students to prepare a PowerPoint presentation to respond to the following questions. They can be encouraged to include YouTube clips or similar to illustrate some of the information they find. Students may choose one or more question to research and work individually or in pairs or small groups.

1. Students investigate the different ways that solar power is used.
2. Students list pros and cons of using solar energy (including environmental, climate).
3. Students research and then draw how a cell in a solar panel works identifying the two layers and materials used to make the cell.
4. Solar power is a form of renewable energy. Hydro Tasmania uses solar panels as part of a renewable energy system on King and Flinders Island. Have students investigate why the islands don't just rely on solar power.
5. How much of Australia's electricity is sourced from solar energy?

Options for assessment and extension

	Option 1
Science – Science Understanding Group Activity (3 people)	Student experiment to show how the sun’s energy can be used to heat water. See Activity Sheet - Solar hot water
	Option 2
Science – Science Understanding Group Activity (4 people)	Students experiment with solar radiation and investigate how the angle of the sun can affect results. See Activity Sheet – Solar radiation
	Option 3
Science – Science Understanding Individual Activity	Elon Musk – Installation of solar panels and batteries in South Australia.

Elaborate and Review

As a class group review:

What is solar energy and how do we produce electricity from it?

What types of products use solar energy for power and are there some examples in the classroom or school?

Is solar energy renewable and environmentally friendly and can we rely on solar power only for our energy needs?

Option 3 – Energy Response in South Australia

1. Research the energy crisis that occurred in Adelaide in South Australia. (Point out to students that in their research they are scientists and should look for facts rather than stories sometimes made up by politicians for political gain.)
 - What happened? When did it happen and why did it happen? REF: *Living through South Australia’s Power Outage*.
 2. Who is Tesla and what was their response to the energy crisis?
 - What did Tesla invent that meant solar energy was an improved back up option for South Australia?
 - What are the benefits of using batteries in association with solar power?
 - Why didn’t South Australia choose hydropower?
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