

STAGE 3 UNIT 4 SCIENCE

What is included?

- PowerPoint with over 480 slides
- Student workbook and assessment tasks
- PDF for easy printing
- Teaching notes under each slide

Stage 3–Unit 4 SCIENCE



Knowledge of our world and beyond inspires sustainable solutions

Aligned to the NSW Sample units for Science 2025.

COMPLETE UNIT-16 LESSONS +4 OPTIONAL ACTIVITIES

STAGE 3 UNIT 4 SCIENCE

What is included?

- Quick links to units.
- Sections for each lesson included in the PowerPoint presentation.
- Self Assessment tasks.

Lesson 1: 1-3 Renewable and non-renewable

Duration: 40 minutes

A **renewable resource** is a resource that cannot be exhausted. It can be restored in a human lifetime

A **non-renewable resource** is a resource that becomes depleted or takes longer than a human life span to be restored

Watch [Non-renewable Energy Sources - Types of Energy for Kids \(3:00\)](#) (from 0:00-1:50).



1. What are the 4 types of non-renewable energy sources explained in the video?
2. What does non-renewable mean?
3. Why are these resources non-renewable?

Renewable and non-renewable resources

Renewable resource	Non-renewable resource
A resource that can be naturally restored within a human lifetime.	A resource that becomes depleted or takes longer than a human lifetime to be restored.
	

How quickly is the resource naturally replaced?

Lesson 1: 4 Renewable and non-renewable

Think, pair, share

Think-pair-share a response to this question

'One interesting fact I learnt about non-renewable energy sources from the video was ...'.

Note: Hydropower, tidal power and wave power all use moving water to spin a turbine to create electricity. However, they differ in how the water moves and what causes the movement.

Hydropower uses the force of moving water to create electricity, usually from a dam.

Tidal power is the energy which can be harvested from the tides in the ocean through the use of large underwater turbines placed in areas of high tidal movement.

Wave power a renewable energy created by converting the mechanical energy of ocean waves to electrical energy.

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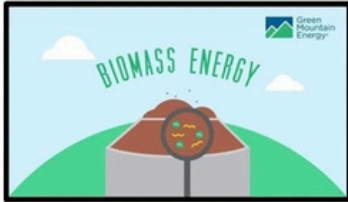
Lesson 1: 8-9

Renewable and non-renewable

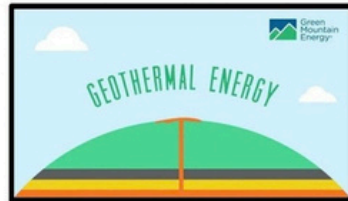
Watch [Renewable Energy 101: How Does Biomass Energy Work?](#) (1:30).



Watch [Renewable Energy 101: How Does Geothermal Energy Work?](#) (1:00).



Why is biomass considered renewable?



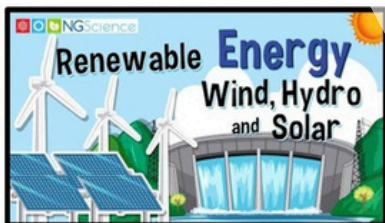
Why is geothermal power considered renewable?

Note: the information in this video relates to geothermal power in the United States. In Australia geothermal also accounts for a tiny fraction of energy utilised.

Lesson 1: 5-7

Renewable and non-renewable

Watch [Renewable Energy - Wind, Hydro and Solar](#) (7:16) (from 1:59-6:40).



1. What are the 3 main energy sources explained in the video?
2. What were the 3 energy sources involving water named in the video?
3. Why are these sources considered renewable?

There are 2 more types of renewable energy sources that students will explore that are not covered in the previous video, biomass and geothermal. Watch the videos on the following slides.

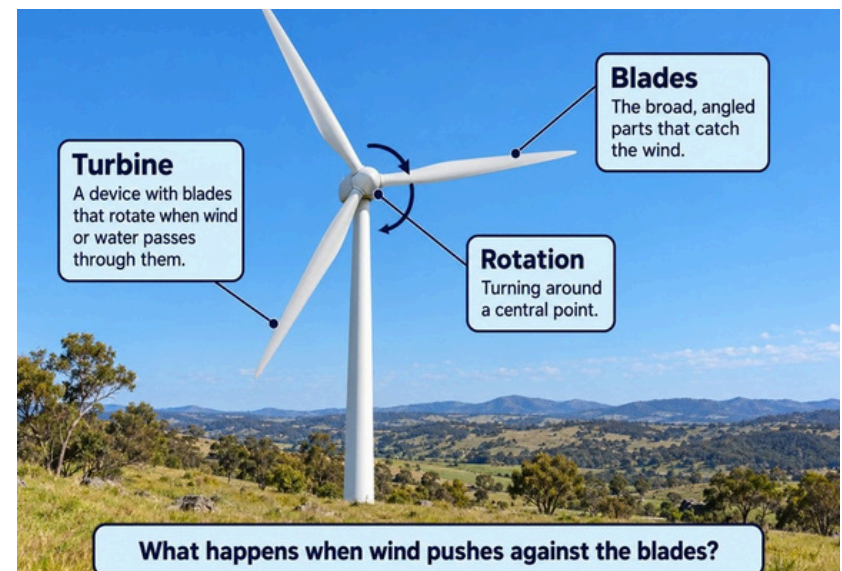
Lesson 2: 14-16

Wind power

1. What is the natural resource used to generate wind power? -Students respond chorally.
2. Will wind ever run out? - Students vote thumbs up for yes or thumbs down for no.
3. Is wind power a renewable or non-renewable energy source? Why? - Students vote using thumbs up for renewable or thumbs down for non-renewable, then cold-call one to 2 students to explain why.

In a wind farm, large turbine blades are turned by wind in the same way as the model, but on a much larger scale.

The spinning blades use wind to drive a generator, converting wind energy into electricity.

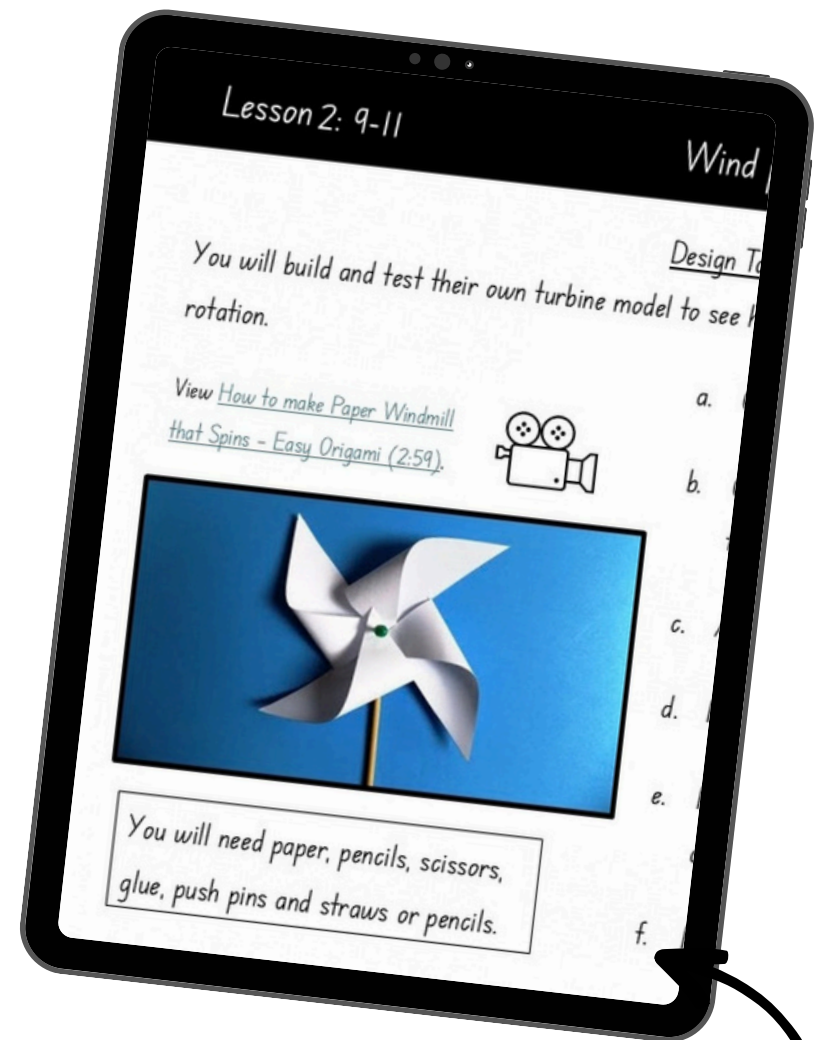


How you can use it:

All lessons are planned to be 60 minutes long.

There are 16 weeks of units plus 4 additional extension units.

20 hours of teaching time

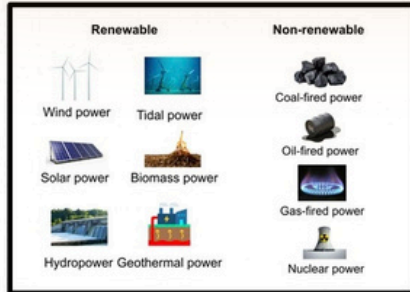


This unit aligns with the new NSW syllabus documents.
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STAGE 3 UNIT 4 SCIENCE

Lesson 1: 13-12

Renewable and non-renewable



These are the energy sources that we will be exploring throughout the unit.

Energy sources are classified as renewable or non-renewable based on how quickly they are naturally replenished compared with how quickly they are used. Renewable resources are replaced at a similar rate to, or faster than, their use, whereas non-renewable resources form so slowly that they cannot be replaced within human timescales.

Complete the following sentence on your individual whiteboards:

'The main difference between renewable and non-renewable energy sources is ...'

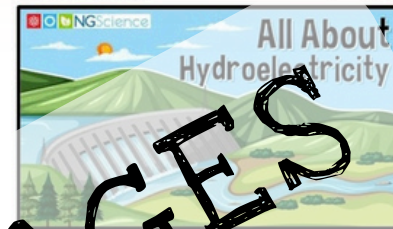


Sharp materials need adult supervision.

Lesson 3: 5-7

Hydro power

View [All About Hydroelectricity](#) (1:55)
(from 0:00-1:12).



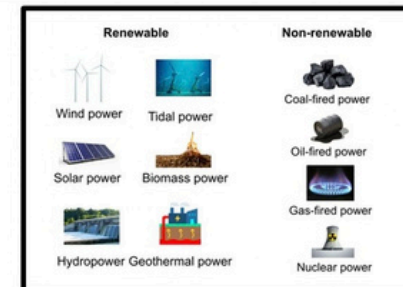
Kinetic energy is the energy that an object has because of its motion. When moving water flows over turbine blades, it transfers its kinetic energy to the blades, causing them to rotate. This rotation drives a generator to produce electricity.

Hydropower is energy produced by the movement of water

In pairs or small groups, you will build a model water turbine that will convert the kinetic energy of moving water into rotation. This is the same process that happens inside a real-world **hydropower** station.

Lesson 1: 13-12

Renewable and non-renewable



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Complete the following sentence on your individual whiteboards:

'The main difference between renewable and non-renewable energy sources is ...'

STAGE 3 UNIT 4 SCIENCE

Put the coal-energy chain in order

1 → 2 → 3 → 4

5 → 6 → 7

Word bank

coal	combustion	heat	steam	turbine rotates	generator	electricity
------	------------	------	-------	-----------------	-----------	-------------

Remember: the arrows show the order.

EXIT TICKET: WHEN DOES SOLAR POWER WORK BEST?

Use evidence from your investigation to explain the conditions solar power requires to operate.

Solar panels generate the most electricity when ...

In our investigation, the bulb turned on when ...

This happened because ...

WORD BANK

sunlight full sun shade cloud cover uncovered electricity

I used evidence from the investigation:

☐ Yes ☐ Not yet

Investigation question

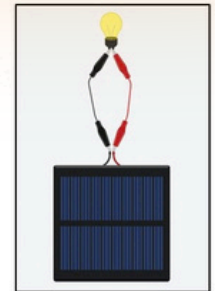
How much sunlight is required to power a light bulb using a solar panel?

Equipment

Solar panel, crocodile clips, 1.5V light bulb, thick cardboard.

Method

- Place the solar panel on a flat surface in the location being tested.
- Cover the whole solar panel with thick cardboard.
- Connect the crocodile clips to the solar panel and to the light bulb, to create a complete circuit.
- Uncover fractions of the solar panel until the bulb lights up. Start with one quarter, then one half, then three quarters and finally uncover the entire panel.
- Record the proportion of the panel uncovered when the bulb turned on (one quarter, one half, three-quarters or one whole) in the table below.
- Repeat the investigation in each location.



Lesson 11: 4-6

Presenting Ideas

You will enter the information for each part of the template into the appropriate section, as in the example. Read and consider information from research carried out by peers in Lessons 7, 8 and 9. Use relevant information to complete their page template.

Allocate each pair of students an energy source from the following list as the focus of their page. Ensure a range of renewable and non-renewable energy sources are completed. Allocate different energy sources than students previously focused on.

Coal-fired power
Natural gas-fired power
Oil-fired power
Nuclear power
Hydropower
Solar power
Wind power
Biomass power
Geothermal power

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A NEW ENERGY SOURCE

Coal-fired power Natural gas-fired power Oil-fired power

Nuclear power Hydropower Solar power

Wind power Biomass power Geothermal power

Learn from your peers' research.

GATHER THE BEST INFORMATION

- 1 Read all the evidence
- 2 Choose relevant facts
- 3 Summarise in your own words

RESOURCE 17 - RESOURCES USED

Resource	Not used	Used a little	Used a lot
Land	No land is needed.	Some land is needed.	A large area of land is needed.
Water	Water is not needed.	Some water is needed.	A lot of water is needed.
Flowing water	Flowing water is not used.	Some flowing water is used.	Flowing water is the main energy source.
Coal	Coal is not used.	A small amount used.	Coal is the main fuel source.
Oil	Oil is not used.	A small amount used.	Oil is the main fuel source.
Natural gas	Natural gas is not used.	A small amount used.	Natural gas is the main fuel source.
Uranium	Uranium is not used.	A small amount used.	Uranium is the main fuel source.
Plant material (biomass)	Plant material is not used.	Some plant material is used.	Plant material is the main fuel source.
Sunlight	Sunlight is not used.	Some sunlight is used.	Sunlight is the main energy source.

RESOURCE 20 - ENVIRONMENTAL RESEARCH

Part 1 - research questions

Energy source:

How does the energy source impact the atmosphere?

Releases greenhouse gases (CO₂).

How does the energy source impact the land it is built on and around it?

Needs a large area of land. Can change natural habitats.

Uses a lot of water for cooling. Warmer water can harm fish.

How does the energy source impact waterways, like streams, rivers and lakes?

Uses a lot of water for cooling. Warmer water can harm fish.

How does the energy source impact wildlife?

Releases greenhouse gases. Can harm waterways and wildlife.

What is the main advantage of your energy source?

Reliable and produces a large amount of energy.

What is the main disadvantage of your energy source?

Pollution and uses a lot of land and water.

Acknowledge an information source used.

Resource 17 and Resource 20.

Part 2 - research summary

Coal impacts the atmosphere in a **negative** way by releasing greenhouse gases, using a lot of land and water and can harm aquatic life. It creates waste such as carbon dioxide and other air pollutants. The waste created impacts the environment by contributing to climate change. Wildlife can be affected by habitat loss and pollution.

Part 3 - report to the New Town Council

What are some advantages of the energy source?

- Reliable and produces a large amount of energy.

What are some disadvantages of the energy source?

- Pollution and uses a lot of land and water.

Coal and the environment

Coal burning releases carbon dioxide (CO₂) and other pollutants into the air. This affects air quality.

Coal power stations use large amounts of water for cooling. This can make rivers and lakes hotter, which may harm fish and other aquatic life.

Mining and transport

Lesson 13: 1-5 A Virtual Solar Farm

Duration: 40 minutes

Turn and Talk

- Where does the energy collected in solar panels come from?
- What makes solar power a renewable energy source?

SOLAR POWER

Where does the energy collected by solar panels come from?

The Sun

Why is solar power renewable?

Sunlight is continuously replenished and will not run out.

The aim in *Eco Detectives* for this lesson is to fully charge the battery block using solar panels in the Drylands biome.

A **biome** in *Minecraft* refers to a geographical area that has a particular climate and includes plants and animals that have adapted to live there.

Name:

Date:

Self Assessment

I can describe net zero.

I can identify renewable energy sources.

EXIT TICKET NET ZERO

Name: _____ Date: _____

Net zero means ...

Think about greenhouse gases added to the atmosphere and the amount removed or avoided.

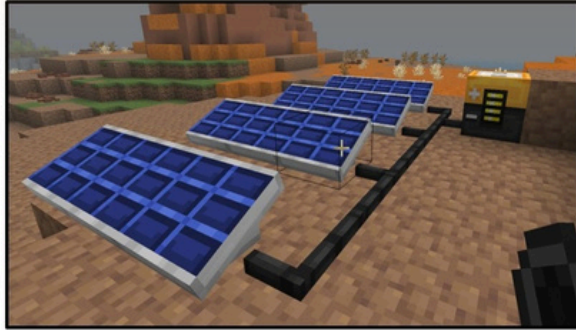


Rate how you felt about this activity.

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Lesson 13: 6-8

A Virtual Solar Farm



You can design your solar farms as you wish, however an example of a working solar farm is displayed on **Resource 29 – Minecraft solar farm** if you wish to copy it.

Hint: add wires at the end and ensure they connect directly to the solar panels and the battery.
If solar panels are placed next to each other, they do not need wires.

Lesson 14: 1-3

A Cleaner Atmosphere

Duration: 40 minutes

There are actions humans can take to reduce greenhouse gases in the atmosphere and make it cleaner. These include adding more plant life and using recycling stations. Professor Deanna explained that her factory was implementing these as carbon offsets.

A **carbon offset** is a measure which compensates for greenhouse gases produced

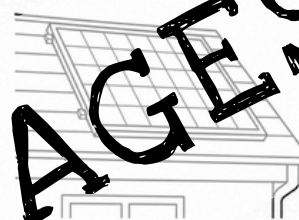
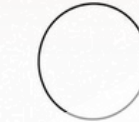


WILL: How Does Recycling Help the Environment? December 1 The Great Wall 2020

EXIT TICKET

WHEN CAN'T A SOLAR PANEL COLLECT SUNLIGHT?

Name: _____ Date: _____



List four things that could stop or reduce sunlight reaching a solar panel.

1. _____
2. _____
3. _____
4. _____

Solar power is still renewable because ...

JOIN YOUR PARTNER'S WORLD

- 1** Open Minecraft Education.
- 2** Select Play.
- 3** Select Join World.
- 4** Copy the host's Join Code and select Confirm.

! Check every symbol carefully before confirming.

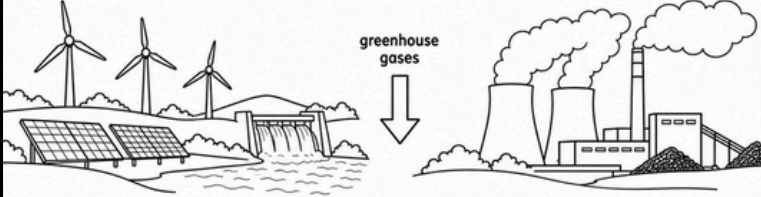
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What is included?

- Video links
- Created for use with the IWB.
- Suggested teaching prep for each lesson.
- Outcomes and indicators included for each lesson.

EXIT TICKET
RENEWABLE ENERGY AND GREENHOUSE GASES

Name: _____ Date: _____



Explain how using renewable energy sources can reduce greenhouse gases in the atmosphere.

Using renewable energy sources can reduce greenhouse gases because ...

When we use more renewable energy, ...

CLEANER ATMOSPHERE TASKS



- ☐ Add at least 10 recycling stations and 10 compost bins.
- ☐ Create rooftop gardens and spaces.
- ☐ Add trees and plants across the city.
- ☐ Build solar farms and solar panels.
- ☐ Use goggles if you need ideas.

IMPORTANT: Open the City tab and select Rate your City actions

Minecraft control tips

Figure 6 - Minecraft control tips



Source: Eco Detectives Unite - Race to Zero.
Created by Ruben Nammensma using Minecraft Education.

Additional controls

Click E on your keyboard to find all the blocks you will need. Type the name of the block into the search bar if you can't find it (such as 'battery' or 'solar panel'). Then drag it into your item bar for use.

You can also find these in the handbook under 'Useful Blocks'.



Teaching Notes

Lesson 15: 1-3

A Virtual Wind Farm

Duration: 45 minutes

Revise why wind power is considered a renewable energy source. Wind power is one example of using a renewable resource to create electrical energy. Wind turns the turbine blades, which spin a generator inside the turbine. The generator converts this movement into electrical energy.

In this lesson, you will create a virtual wind farm in the Mountain biome of their Eco Detectives Unite! world. This challenge will be achieved with a partner.



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