

Renewable and non-renewable energies

Lesson Map: <http://esriaustralia.com.au/education/SpatialActivity72>

Engage

What are renewable and non-renewable energies?

- Click on the map URL above to open this lesson's Story Map, titled *Renewable and non-renewable energy sources*. Scroll down to begin.
- Read the section titled *Environmental resources on planet Earth*.
- ? What are some of the ways you and your family members have used energy in the last 24 hours? *[Answers will vary but may include the following: refrigerating food, heating water for showers, playing PlayStation, washing clothes, etc.]*
- Scroll down and read the section titled *Types of energies*. Instruct students to write down the definition of a *renewable energy* and a *non-renewable energy*.
- Scroll down to the section titled *Activity: Categorising energy sources*. Follow the instructions outlined under the heading.
- ? As the class – as a whole or independently – progress through the slideshow of energy sources, instruct the students to categorise the different types of energy sources.

Renewable-continuous	Renewable-manageable	Non-renewable
<ul style="list-style-type: none"> - Solar power - Tidal power - Wind energy 	<ul style="list-style-type: none"> - Hydroelectricity - Tree logging 	<ul style="list-style-type: none"> - Natural gas - Nuclear power - Coal and oil

Explore

What happens if we don't use some renewable resources sustainably?

- Scroll down and read the section titled *Sustainability*. Take notes if required and stop

Download student worksheet [here](#).

Time
40 minutes

Activity

Investigate Earth's renewable and non-renewable resources.

Learning Outcome

Students will be able to:

- Define the terms 'renewable' and 'non-renewable'
- Examine timescales for the regeneration of resources
- Compare renewable and non-renewable energy sources, including how they are used in human society
- Evaluate the advantages and disadvantages of renewable and non-renewable sources of energy

ACARA Curriculum Link

[Year 7 Science: Earth and space sciences](#)

[ACSSU116 | ACSIS132 | ACSIS133](#)

Teacher Feedback:

To share your feedback on this, or any Spatial Activity, please contact education@esriaustralia.com.au

to discuss as necessary.

- ? How else do we use wood? *[Answers will vary but may include: to create paper and cardboard, to create tools and utensils, to create hygiene products such as tissues, etc.]*
- Explore the two map sliders that display satellite imagery of the Amazon Rainforest between 2000 and 2008. Move the map slider by clicking and dragging the slider to the left and the right. You can also zoom in – or out – for a closer look. Click the ‘Home’ icon to return to the original view.
- ? What has happened to the rainforest between 2000 and 2008? *[The rainforest has experienced deforestation that has extended significantly further into the rainforest as time has passed.]*
- ? Hypothesise as to what some of the consequences will be for the rainforest if this pattern continues. *[If deforestation continues at its current rate, it may mean that the rainforest is unable to recover. As a result, habitats will be damaged and ultimately destroyed, resulting in the suffering and possible extinction of plant and animal species.]*
- Scroll down and read the section titled *Facts about deforestation*. Take notes if required and stop to discuss as necessary.
- View the short video on deforestation by National Geographic. Discuss as necessary.

Explain

What are the advantages and disadvantages of using fossil fuels as an energy source?

- Scroll down and read the section titled *Fossil Fuels*. Take notes if required and stop to discuss as necessary.
- ? List two other ways you use coal, oil and natural gas for energy? *[Answers may vary. Coal: household and commercial electricity; Oil: petrol for transport; Gas: for cooking or fuel for cars.]*
- ? What are two advantages and two disadvantages to using fossil fuels as an energy source? If required, visit the National Geographic webpage to research the answer. *[See table below for appropriate answers]*

Advantages	Disadvantages
<p><i>Coal:</i></p> <ul style="list-style-type: none"> • <i>Reliable source of energy that can be relied upon regardless of weather or time of day.</i> <p><i>Oil:</i></p> <ul style="list-style-type: none"> • <i>It is inexpensive to extract from the Earth</i> • <i>Reliable and dependable source of energy and money for communities</i> • <i>In the form of gasoline, it provides a portable source of energy that gives us power to drive places</i> • <i>Petroleum is an ingredient in many items we depend on</i> <p><i>Natural gas:</i></p> <ul style="list-style-type: none"> • <i>Relatively inexpensive to extract</i> • <i>It is a 'cleaner' fossil fuel compared to oil or coal</i> 	<p><i>Coal:</i></p> <ul style="list-style-type: none"> • <i>Mining coal is one of the most dangerous jobs in the world</i> • <i>Coal miners are exposed to toxic dust, cave-ins and explosions at work</i> • <i>Coal releases toxic gases and pollutants into atmosphere when burned</i> <p><i>Oil:</i></p> <ul style="list-style-type: none"> • <i>Harmful to the environment, releasing hazardous gases and fumes into air we breathe</i> • <i>Extracting oil brings the possibility of oil spills with it, which can result in environmental disasters</i> <p><i>Natural gas:</i></p> <ul style="list-style-type: none"> • <i>Can cause environmental problems such as mini earthquakes</i> • <i>Gas can contaminate sources of water if it enters underground water aquifers – contaminating water supplies</i> <p><i>All:</i></p> <ul style="list-style-type: none"> • <i>Resources will eventually run out</i>

Extend

Do we need to think twice about using renewable energies?

- ➔ Scroll down and read the section titled *Renewables (continuous) energies*. Take notes if required and stop to discuss as necessary.
- ? Consider what you know about the sun and wind. What problems may humans have if they rely solely on solar or wind energy? *[Although the sun and winds will always be a source of energy, they can be unreliable. These sources of energy can be*

disrupted as the sun can be blocked by cloudy and stormy weather, meaning solar panels will not be effective in collecting its energy. Likewise, winds do not always blow; if there are no strong winds in an area where a wind farm is located, then the wind turbines will stand still and won't generate any electricity or power.]

- ➔ Continue to read through this section. Read the part about solar farms and the extra factors we must consider when looking towards solar energy as a solution.
- ➔ Look carefully at the map. At first glance, it appears to be satellite imagery of farmlands, which is partially correct. However, on closer inspection, you will notice that a significant amount of land has been taken up by a solar farm. Explore the map further by panning the extent and by changing the zoom to gain a closer look.
- ? EXTENSION ACTIVITY: Access and read the article titled *Why renewables can't save Earth*. As you read through the article, make notes – in the form of a T-chart – that presents advantages and disadvantages of renewable energy sources and nuclear energy.

Advantages of renewables	Disadvantages of renewables	Advantages of nuclear	Disadvantages of nuclear
<ul style="list-style-type: none"> - can store extra energy gathered in batteries for use on a 'cloudy day' - solar panels and wind turbines are coming down in cost 	<ul style="list-style-type: none"> - solar and wind farms require huge amounts of land and this sometimes leads to land clearance and habitat destruction - these farms also require transmission lines to transport energy to communities - solar and wind energy can be intermittent (sun doesn't always shine; wind doesn't always blow) - wind turbines are responsible for the deaths of endangered birds – like eagles, hawks etc. - solar panels only have a lifespan of 20-25 years – no safe way of disposing of this electronic waste 	<ul style="list-style-type: none"> - a source of reliable and cheap electricity - nuclear plants emit no air pollution in the form of smoke - requires significantly less land than solar farms to produce the same amount of energy - produces far less waste compared to solar and wind (e.g. a single coke can's worth of uranium provides all of the energy an Australian would need over their whole lifestyle) 	<ul style="list-style-type: none"> - can result in large accidents and explosions i.e. Chernobyl & Fukushima - unpopular due to its association with nuclear weaponry

- ➔ Scroll down and read the section titled *Revisiting how we use renewable and non-renewable energies*. No new information is included in this section however, it is

important to read as a closing summary.

Next Steps:

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