

# IS IT ENVIRONMENTALLY FRIENDLY?

This activity enables the students to classify statements about renewable and non-renewable sources of energy.

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## INTENDED LEARNING OUTCOMES

Students will:

- identify natural resources
- understand the difference between renewable and non-renewable sources of energy
- understand that many sources of energy will eventually run out and the importance of converting to renewable forms of energy.

## WHAT YOU NEED

Activity 1: **Natural Resources Worksheet**

For guidance only, teachers have been provided with a complete worksheet.

Activity 2: **Statement Cards**

A copy of all statement cards for each pair of students. Cut out the statement cards and place the cards in envelopes.

## FOCUS

- What is a natural resource?
- Give examples of natural resources.
- What do you think a renewable resource is?
- Name some renewable resources.
- What do you think a non-renewable resource is?
- Name some non-renewable resources.

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## MANAGING THE ACTIVITIES

### Activity 1: Natural Resources Worksheet

Ask the students to fill out the Natural Resources Worksheet. In the first table, students will list as many natural resources as they can think of, and fill in their energy-related uses and other uses.

NATURAL RESOURCES	ENERGY-RELATED USES	OTHER USES
Solar energy	Electricity (PV cells), water heating	Natural lighting, drying
Wind	Electricity (wind turbines), windmills, propulsion, e.g., yachts	Drying
Hydro	Electricity (hydro dams), watermills	Drinking, washing, ...
Geothermal	Electricity (steam driven turbines), heating	Traditional cooking, bathing, ...
Tidal	Electricity (various types of tidal generators)	Surfing!
Wood	Heating, cooking	Building, planting trees as carbon sinks
Coal	Electricity (thermal power stations), heating, Steam driven locomotives, ships	
Natural gas	Electricity (thermal power stations), heating, cooking, water heating, transport (LPG)	Methanol production, other chemicals?
Oil	Transport, electricity (thermal power stations)	Petrochemical products
Uranium	Electricity (nuclear power stations), propulsion (ships, submarines)	Weapons

Students should have listed nearly all the natural resources as electricity producers. In the second table, students list the resources and complete the columns concerning their renewability and environmental impacts. They may need to do some research to complete all the gaps.

NATURAL RESOURCES	Renewable? Short-term (0-1yr)*	Renewable? Med-term (1-100yr)	Non-renewable?	Emits greenhouse gases?	Emits heat?	Other pollutants?
Solar energy	✓			X	Absorbed by solar panel	X
Wind	✓			X	X	X
Hydro	✓			Very small amounts	X	X
Geothermal		✓		Small amounts	✓	Smelly geothermal gases
Tidal	✓			X	X	X
Coal			✓	✓	✓	CO, SO <sub>2</sub> ..soot
Natural gas			✓	✓	✓	Some, less than coal
Oil			✓	✓	✓	Some, less than coal
Uranium			✓	X	✓	Used fuel rods still radioactive for centuries

\* "0" (zero) means the natural resource is continually renewed

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## Activity 2: Statement Cards

Working in pairs, the students place the statements into four categories of their choice based on their characteristics. The students are expected to justify their decisions and choice of grouping. There are four blank cards for the students to fill in.

Examples of categories include:

- Renewable resources
- Non-renewable resources
- What is the problem?
- What is being done about it?

## REFLECTION

- After the students have completed Activity 2, the students discuss why they placed the cards where they did.
- What differences were there between the different pairs?
- Would they now change any of their initial groupings?

Facilitate a class discussion. Here are some conversation starters:

- Make a case for petroleum being a renewable resource.
- What does finite mean?
- Is water a finite resource?
- What does the term “conserve” mean?
- Name a resource that we could conserve and explain how we could conserve it.
- What is the impact of time scales?
- What energy sources might be considered sustainable?

## EXTENSION

- The students could rank the statement cards in order of importance, which could lead to a discussion or debate.
- The students could create a poster that compares renewable and non-renewable resources.
- Within a set amount of time, the students could work in groups to design a wind turbine. The wind turbines could then be assessed in terms of how well they spin in front of a fan.

## SUPPORTING RESOURCES

Here are some websites and publications showing how to build a model wind turbine:

- Make an Anemometer (Energy Quest - California Energy Commission)  
An activity that shows students how to make an anemometer which is a device that tells you how fast the wind is blowing.  
<http://www.energyquest.ca.gov/projects/anemometer.html>
- Make Your Own Wind Winch (Solar Schools)  
[http://www.solarschools.net/facts\\_and\\_figures/activities/make\\_your\\_own\\_wind\\_winch.pdf](http://www.solarschools.net/facts_and_figures/activities/make_your_own_wind_winch.pdf)
- Ministry of Education. (2004). Book 54: Windmills and Waterwheels. Building Science Concepts. Wellington: Learning Media.

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## NATURAL RESOURCES WORKSHEET

List as many natural resources as you can think of in the table below, and fill in their energy-related uses and other uses.

NATURAL RESOURCES	ENERGY-RELATED USES	OTHER USES
Solar energy	Electricity (PV cells), water heating	Natural lighting, drying

List the resources in the table below, and complete the columns concerning their renewability and environmental impacts. You may need to do some research to complete all the gaps.

NATURAL RESOURCES	Renewable? Short-term (0-1yr)*	Renewable? Med-term (1-100yr)	Non-renewable?	Emits greenhouse gases?	Emits heat?	Other pollutants?
Solar energy	✓			X	Absorbed by solar panel	X

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## STATEMENT CARDS

Non-renewable resources	Oil	Wind power	Natural resources
Finite	Solar energy	Recycling	Electricity
Tidal power	Coal	Renewable resources	Geothermal energy
Waste	Consume	Conserve	New Zealand
Fossil fuels	Replenished	Infinite	Biodegradable
Environment	Petroleum	Wood	Hydroelectric power
Disposable	Uranium	Greenhouse gas emissions	Nuclear
Global	Climate change	Methane	Biogas/natural gas