RENEWABLE VERSUS NON-RENEWABLE ENERGY SOURCES

PLANNING A SUSTAINABLE FUTURE FOR NEW ZEALAND

Activity 1

Identify Natural Energy Sources and their uses

Natural energy sources exist in the environment and can be transformed into more easily useable energy sources such as electricity and petrol, both of which are essential to our lives and modern society. Electricity can be generated from a wide range of natural (primary) energy sources, whereas petrol is separated and refined from crude oil.

In Table 1:

1. a) **List** as many natural energy sources as you can e.g. *Coal*.
   b) **State** the main type of energy contained in it e.g. *Chemical potential energy*.
2. **State** what the major modern energy use, or uses, are for this natural energy source e.g. Coal is widely used in power stations to make electricity by first heating water into steam, the steam spins a turbine, which spins a generator to make **electricity**. The **heat** from burning coal is also used for heating buildings etc.
3. **Identify** any other uses of this natural resource. Coal is also used in the process of making **steel**, and it also once was used in **steam engines** to power trains.

Table 1: Identify Natural Energy Sources and their uses

Natural energy sources	Type of energy	Modern energy uses	Other uses
Coal	*Chemical potential energy*	Electricity, heating	Steel production, historical transport (steam engines)

Activity 2

Identify <u>effects</u> of using Natural Energy Sources on the environment

Using available natural resources to generate electrical energy generally has a number of effects. Renewable resources are continually replenished so that they do not run out as humans use them. Non-renewable resources are finite, and will eventually run out sooner or later – they are either not renewed at all, or replenished very slowly. Many resources emit some kind of material pollution that affects the environment.

In Table 2:

1. a) After discussing your list of resources in Table 1 with others you, please add some other resources that you hadn't thought of.

   b) Decide whether the energy resource you have identified is ***renewable*** or ***non-renewable***.

2. Does this resource emit much of the main global warming gas CO_2 (carbon dioxide – acts like a blanket in the atmosphere to trap the sun's heat)?
3. What other pollutants does it emit that have a proven negative effect on the environment?

Table 2: Renewable or non-renewable? What other effects are there?

Resources used	Renewable	Non-renewable	Emits CO_2?	Other pollutants emitted?
Coal	×	✓	✓ (a lot)	soot, carbon monoxide, sulfur dioxide, nitrous oxides, mercury, ash

Question:

Rank each natural resource identified from **most sustainable** to **least sustainable**.

..... *(most sustainable)*

.....

.....

.....

.....

.....

.....

.....

.....

..... *(least sustainable)*

Activity 3

How "sustainable" are the different types of energy resources?

Card-Sheet: Cut sheet into individual cards for use in Activity 3

You are given a total of 36 cards (see last page) with 32 words written on each card as well as 4 blank cards that you can customise. Arrange the cards in different ways based on the following categories.

Categorise energy sources and their effects and characteristics in different ways. You should be able to justify your decisions.

1. Sort the cards into two contrasting basic categories in the following ways:
   b) Renewable/non-renewable
   c) Polluting/non-polluting
   d) Greenhouse gas emitting/non-gas emitting
   e) Electricity generating/other uses
   f) More sustainable and less sustainable

Activity 4

How can NZ meet its renewable energy targets?

Research the ways in which New Zealand currently generates its electricity and then come up with a plan for generating 90% electricity from renewable sources by the year 2025 (current NZ policy).

Using the tables below, gather and organise information relating to this goal. From this you will create a poster that communicates this information in a visual way.

Poster research

Tables 4 and 5 in the Student Activity Worksheets provide a framework for students to gather and organise information relating to this goal.

Table 4: How NZ currently generates electricity:

- What are the current ways of generating electricity in NZ and what are their relative percentages? List one positive and/or negative of each.

Table 5: How NZ could generate electricity to meet targets in 2025:

- What other options are available for generating electricity? What percentage should these be of the total? List one positive and/or negative of each.

Table 4: How NZ currently generates electricity

Energy source for generating electricity	Current percentage	Positives	Negatives

Table 5: How NZ could generate electricity to meet targets in 2025

Future energy source	Suggested percentage	Positives	Negatives

Consider how this will affect NZ's overall carbon footprint and whether it will help meet international commitments to controlling global warming/climate change?

Notes:

Cards: Cut into individual cards for use in Activity 3

carbon dioxide (emits)	geothermal	Short term	solar
carbon dioxide (absorbs)	global	non-renewable	sustainable
global warming	greenhouse gases	nuclear fission	tidal
coal	heat	oil, gas	long-term
climate change	hydro	photovoltaic	unsustainable
electricity	infinite/ unlimited	polluting	uranium
finite/ limited	biomass	renewable	wind
fossil fuels	New Zealand	replenished	wood/biomass