

A1: SOURCES OF ENERGY

Overview

These activities present an opportunity for teachers to introduce the concepts of **primary** and **secondary energy sources** to their students. The idea is for teachers to draw on what their students already know about energy, and then elaborate on that knowledge. By asking the right questions, teachers encourage their students to think about energy and to participate in the discussion. Some good lead-in questions might be: Where do plants get their energy from? So what is their energy source? Is this a **primary energy source**? What other **primary energy sources** are there? Can anyone suggest what a **secondary energy source** is? What are some examples of **secondary energy sources**?

Suggested approaches:

- Introduce some key terms such as **primary energy**, **secondary energy**, and **photosynthesis**. Establish what the students understand by these terms. Arrange the students into small groups and let them brainstorm about the theme of energy – What is it? Where does it come from? Can it be measured? Is there a connection between energy and food? After 6 – 8 minutes let each group summarise their results in poster form for reference afterwards.
- Some student groups may already have encountered the terms **primary** and **secondary energy sources** in another subject area. Ask them to tell you what they have learnt so that you can build on this. Have the students compile individual posters under the headings **What I know about energy sources** and **What I don't know about energy sources**. These can be revisited later.

NOTE:

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A1 ACTIVITY 1: PRIMARY AND SECONDARY ENERGY SOURCES

Background

The principle of the **Conservation of Energy** states that the total energy of a system cannot be created or destroyed, but can be transformed into different forms as well as being transferred from one object to another.

While energy from our nearest star, the Sun, enters and leaves our planet, the quantity of matter available on Earth is limited. Once used up, it cannot be replaced within a human timeframe. For this reason the Earth is considered an almost closed system.

The first step in this investigation is for the students to clarify what they understand by energy and its role in our lives. The next step centres on the role of the Sun as THE source of energy. Students explore what exactly is meant by a primary energy source and by a secondary energy source. Students are given a list of energy sources and challenged to classify them as primary and secondary, and to explain why some primary forms of energy are not included in the list (for example, it is difficult, if not impossible, to convert sound or lightning energies into useable secondary energy sources).

Equipment required – per group:

- A3-size sheets plus markers
- A list of the following questions (one per group)
 - ① *Question 1 – What is the group's understanding of energy?*
 - ② *Question 2 – Why is the Sun important to us on Earth?*
 - ③ *Question 3 – What is the group's understanding of primary energy sources?*
 - ④ *Question 4 – What is the group's understanding of secondary energy sources?*

TWO SELF-REFLECTION EXERCISES (FOR HOMEWORK OR REVISION)

- ✓ A1.1 Worksheet A: How can we categorise energy sources?
 - ✓ A1.1 Worksheet B: About energy sources
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What to do:

1. Each group should appoint a recording secretary and a chairperson to present their findings to the rest of the class – the form of presentation (oral or poster) can be decided by each group.
2. Having agreed on a time for the discussion session (i.e. 15 minutes) each group should present their findings to the class.

SOME SUGGESTED LEARNING OUTCOMES:

- ① *Question 1 – What is the group's understanding of energy?*
 - Energy is the ability to do work, e.g. move something.
- ② *Question 2 – Why is the Sun important to us on Earth?*
 - The Sun is THE original source of energy ... all existing energy on earth emanates from it ... nothing we do on Earth can increase this available energy (fossilised sunlight) ... this is the principle of the **Conservation of Energy**.
- ③ *Question 3 – What is the group's understanding of primary energy sources?*
 - Primary energy sources are those directly derived from the Sun, but the energy does not always take a form that is of use to us.
- ④ *Question 4 – What is the group's understanding of secondary energy sources?*
 - Energy is not always available in a form that is of use to us. Human intervention is required to transform the primary sources into energy sources that enable us to run our cars, heat and light our homes, run our music players, and charge our batteries. These forms of energy are secondary energy sources.

A1.1 Worksheet A: How can we categorise energy sources?

ENERGY SOURCE	PRIMARY	SECONDARY
Coal		
Hydro		
Nuclear		
Oil		
Rivers		
Solar		
Wood		
Wind		
Uranium		
Sun		
Geothermal		
Biomass		
Natural gas		
Radioactive minerals		
Electricity		

Challenge: Select a primary energy source not listed above and give a possible reason for its omission.

A1.1 Worksheet B: About energy sources

1. What is energy?
2. List the consequences of the Sun 'shutting down'!
3. a. List as many forms of energy as you can.
b. From this list pick the ones you consider most useful.
4. Can you say why these are useful?
5. What do the following have in common: Wind, Coal, Biomass, Natural gas?
6. What do the following have in common: Uranium, Coal?
7. What do the following have in common: Solar panels, Geothermal power, Electricity?
8. What do the following symbols represent?



a



b



c



d



e



f



g

(See www.seai.ie/technologies)

9. How many differences can you find between primary sources of energy and secondary sources of energy?