

CHAPTER 2: Energy in our Lives

Aim

The aim of this chapter is for children to explore sources of renewable and non-renewable energy that are frequently used in our daily lives. They will also gain an understanding of our reliance on non-renewable sources of fuel.

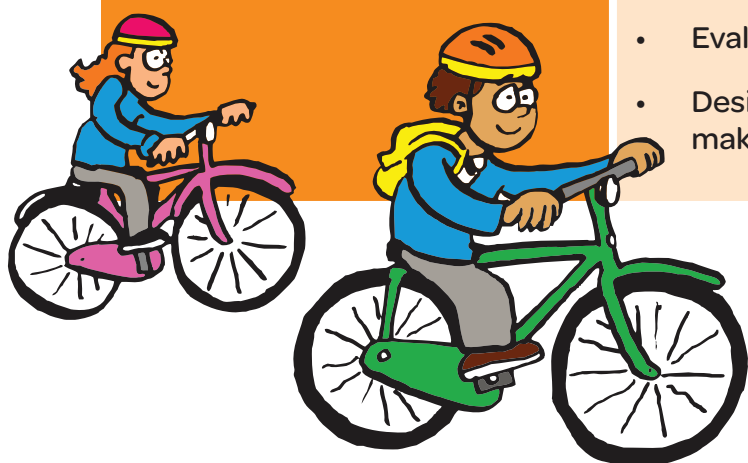
Overview of Chapter

The children are required to discuss the positive and negative aspects of using wind turbines and factors that affect their location and design. Children then design and make a model wind turbine. They will look at the extent to which fossil fuels are used in Ireland and abroad and learn how fossil fuels are created.

Working Scientifically Skills

Through discussion of, engagement with and reflection on the content in these lessons, children will be applying and developing the following working scientifically and designing and making skills:

- Analysing and classifying
- Exploring
- Planning
- Making
- Evaluating
- Designing and making: exploring, planning, making and evaluating



Lesson 1 – Exploring wind energy

Resources

IWB 2 / PowerPoint 2: Wind turbines

Activity type: Discuss and research

Use IWB2 / PowerPoint 2 to discuss different locations of wind turbines.

Questions to promote discussion

- 1 Examine the images. What do they tell you about wind energy?
- 2 In what kinds of locations do you find wind turbines?
- 3 Look at the locations where the different wind turbines are placed. Are they on their own, near buildings or on top of buildings?
- 4 Think about the people/buildings that might be affected by installing the wind turbines.
- 5 Look at the direction the wind turbines are facing. Why do you think they are facing in this direction? (*prevailing winds*).
- 6 Why do you think a mountain/farmland/sea is a good location for a wind farm?
- 7 Do you think there are any disadvantages to generating energy in this way? (*location of wind turbines, farm land, scenic spots, wildlife*).

Read the following piece from the Roscommon People:

<http://www.roscommonpeople.ie/itemdetail.asp?itemID=18000&menu=d18000>

Discuss the article with the children.

Questions to promote discussion

- 1 Why do you think the people opposed the wind farm?
- 2 How does this relate to the advantages and disadvantages of wind energy?
- 3 If you were a wind farm developer how would you incorporate people's concerns into your design?

Activity type: Design

In groups the children make a detailed drawing of an ideal location for a wind turbine in their local area. Encourage each group to discuss factors that need to be considered.

Lesson 2 – Design and make a wind turbine

Resources

IWB 2 / PowerPoint 2: Wind turbines

Some suggested materials to make wind turbines:

A sheet of paper/ card (to make blades of windmill if not using wood)

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Resources

A pencil, scissors, a ruler, digital camera (for children to record stages in the design and make process), panel pin hammer (available in any DIY store), nails (panel pins 25mm), coping saw (optional), pieces of wood (plywood/ white deal), dowelling, safety goggles

Teacher note: An alternative to this type of wind turbine is in the extension section of this lesson (using paper/card).

Activity type: Design and make

Teacher note: This lesson will take a number of days to complete. The design and make process involves four stages, it is important to follow these stages as outlined in the lesson below. Allow more time for the making phase and allow time after the planning phase to discuss the designs with the children.

Exploring

Discuss photographs of different wind turbines on **IWB 2 / PowerPoint 2**

- 1 How do the wind turbines work?
- 2 How do they use the wind?
- 3 What are they made from?
- 4 Where are they located?

The children could also search the web for different wind turbine designs.

Planning

In groups, children discuss criteria required to make a wind turbine for a chosen location. Record the children's ideas and then select 3 or 4 criteria that the children must adhere to when designing and making their wind turbines. All groups should also be aware of the location for which they are designing their turbine.

For example

- It must be at least 30 cm high.
- It must catch the wind.
- It must rotate freely.

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Show the children the materials that are available to make the wind turbines.

Safety note: Practice using the tools listed in the resource section. The level of practice and teacher input will depend on how experienced the children are at using the tools. Teach the children how to use the tools correctly and safely. Start slowly, introduce one tool at a time and use the correct terms for the tools. Consider the lengths of the pieces of the wood to make blades and think about how the wind turbine will balance.

Planning and making

In groups children discuss and draw a diagram of their wind turbine design. They then make their wind turbines. Children photograph the designs of each group at various stages in the design process. These photographs could be printed and used to present the design process on a wall chart and /or added to a school blog.

Evaluating

Provide each group with the opportunity to present their plans and finished wind turbines to the rest of the class. Encourage them to discuss their designs and whether or not their wind turbines met the criteria outlined at the beginning.

Questions to promote discussion

- 1 Did you follow your original design?
- 2 Did you encounter any difficulties?
- 3 How did you overcome these?
- 4 What do you like most about your wind turbine?
- 5 If you were to make another wind turbine is there anything you would do differently?

Extension

Design and make activity from the book **The Energy File: How to make a windmill (page 12)**

Lesson 3 – Where do we get our energy from?

Lesson link

1st and 2nd Class Programme Chapter 2 Lesson 1: Sources of energy and Lessons 2 and 3: Renewable and non-renewable energy (i) and (ii)

Resources

IWB 3 / PowerPoint 3: Energy sources
IWB 4 / PowerPoint 4: Energy sources – Graphs
PCMs 7 and 8: Energy sources – How much do we use?
PCMs 9 and 10: Energy sources – What types of energy do we use

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Teacher note: If the children have not discussed renewable and non-renewable sources previous to this please review the lessons above. A prior knowledge of percentages is also useful.

Activity Type: Discussion, interpreting graphs

Finding out children's ideas about energy

Use **IWB 3 activities**. If you do not have access to an IWB use **PowerPoint 3** to promote discussion on different sources of energy. The children could work in small groups to discuss different forms of energy.

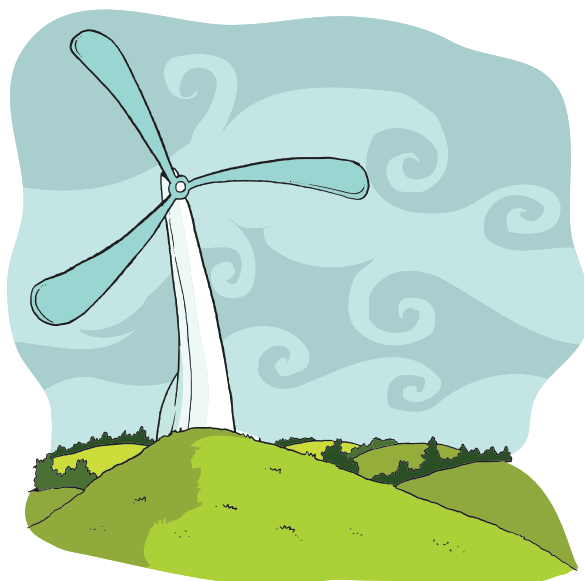
Questions to promote discussion

- 1 What do all of these things have in common? (*they are sources of energy*).
- 2 Which of these sources are renewable?
- 3 Which of these sources are non-renewable?
- 4 Can you explain what a renewable source of energy is?
- 5 Can you explain what a non-renewable source of energy is?
- 6 What advantages are there to using renewable/ non-renewable energy sources?
- 7 Do you use any renewable/ non-renewable sources of energy in your home?

The children could group the pictures on **IWB 3 / PowerPoint 3** into renewable and non-renewable sources of energy. Encourage the children to justify their choices.

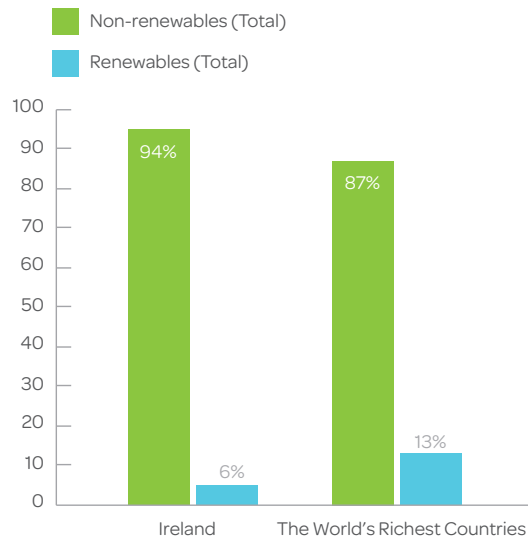
Teacher note: The graphs on **PCMs 7 and 9** show the different sources of energy we use in Ireland and in the world's richest countries. Children examine the graphs and answer the questions on **PCMs 8 and 10**

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PCM 7 Graph 1

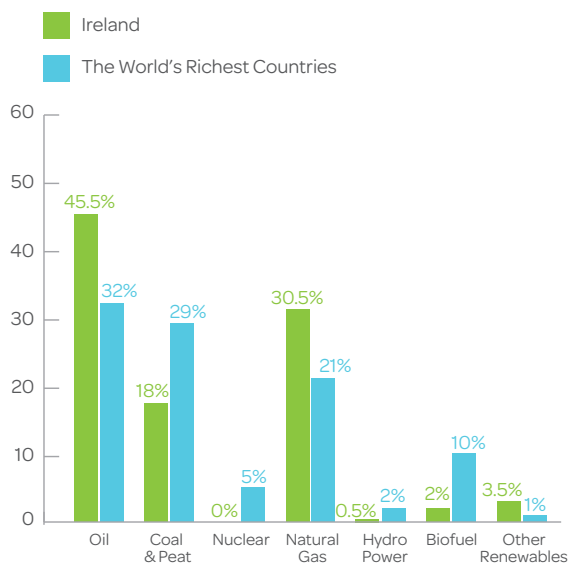
% of renewable and non-renewable sources of energy used in the world's richest countries and in Ireland

**PCM 8**

- 1 What source of energy is used most in Ireland and in the world's richest countries?
- 2 Can you name all the sources of non-renewable energy?
- 3 Can you name all the sources of renewable energy?

PCM 9 Graph 2

% breakdown of the sources of renewable and non-renewable energy used in the world's richest countries and in Ireland



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PCM 10

- 1 List the sources of energy that Ireland uses, starting from the one that is used most, to the one that is used least.
- 2 List the sources of energy that the world's richest countries use, starting from the one which is used most, to the one that is used least.
- 3 What sources of energy does Ireland use more of than the world's richest countries?
- 4 What types of energy do the world's richest countries use but Ireland does not?

IWB 4 / PowerPoint 4: Energy Sources can be used to promote whole class discussion.

Sources of information:

Ireland: http://www.seai.ie/Publications/Statistics_Publications/Renewable_Energy_in_Ireland

Please note that the "world's richest countries" relates to OECD countries only and has been simplified. www.iea.org/publications/freepublications/publication/KeyWorld2013_FINAL_WEB.pdf

Extension

Activities from the book **The Energy File: Energy in Ireland** (page 44) and **Energy Worldwide** (page 52)

Lesson 4 – What makes renewable and non-renewable sources of energy different?

Lesson link

3rd and 4th Class Programme Chapter 3 Lesson 2: Introducing climate change

Resources

Access to computers and internet

PCM 11: Energy web quest research template

PCM 12: Energy web quest 2

Activity type: Web quest

This lesson is a web quest. The purpose is to familiarise children with the use of computers for self-guided research. Go to www.seai.ie/Schools/Primary_Schools/Exploring_Our_Energy_Primary_Programme/Fifth-and-Sixth-Class/Webquest for a step by step guide to carrying out your web quest.

Extension activity

After you have completed the web quest some of your class may wish to complete SEAI's **Renewable Energy Lesson plan** which can be downloaded from www.seai.ie/Schools/Primary_Schools/Resources_Available/