

A resource for teaching  
sustainable energy in Primary Schools

## Junior and Senior Infants



## A resource for teachers

This resource will help you bring the topic of sustainable energy into the classroom in the context of the Primary Science Curriculum and the Green-Schools programme. It will help children learn about energy in a real world way, exploring how and why as a society we need to develop new ways to meet our energy needs. This resource makes teaching energy engaging as children see it as relevant to their own lives and future well-being. As children learn about sustainability, they will develop behaviours that benefit them and wider society. Overall, the resource will help children gain an understanding of our current energy challenges and potential future solutions.

## How to use this resource?

There are five chapters in this booklet covering the topic of sustainable energy. Each chapter has the following structure:

- Aims
- Overview
- Working scientifically skills
- Primary Science curriculum link
- Resources
- Main body of lesson
- Extension

All chapters have supporting interactive whiteboard activities and PowerPoint slides (for those teachers who do not have access to an IWB) and photocopyable master sheets to help learning. These can be accessed and downloaded at [www.seai.ie/teaching-sustainability](http://www.seai.ie/teaching-sustainability)

## Other resources from SEAI for schools

- All teaching resources are on our website [www.seai.ie/teaching-sustainability](http://www.seai.ie/teaching-sustainability)
- If you would like hard copy resources e-mail [schools@seai.ie](mailto:schools@seai.ie)
- We can visit your school and run workshops for pupils and teachers. See [www.seai.ie/teaching-sustainability/primary-school/](http://www.seai.ie/teaching-sustainability/primary-school/) for more details and bookings.
- Your pupils can enter SEAI's One Good Idea competition to showcase their energy projects [www.seai.ie/onegoodidea](http://www.seai.ie/onegoodidea)
- The **e** icon is used in this booklet to identify lessons that involve pupils in saving energy at school, go to this website for resources [www.energyineducation.ie](http://www.energyineducation.ie)

## SEAI supporting Schools

SEAI works with the public, businesses, communities, schools and government to achieve a cleaner energy future. We run campaigns and initiatives to increase awareness on sustainable energy and change behaviours. Children are key to this sustainable energy transition.



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This programme was researched and developed by the School of STEM Education, Innovation and Global Studies and the Centre for the Advancement for STEM Teaching and Learning (CASTeL) in DCU Institute of Education.

## CONTENTS

### CHAPTER 1: Introducing Energy 2

Lesson 1 - Sources of energy 3

### CHAPTER 2: Energy in our Lives 5

Lesson 1 - What uses electricity? 6

### CHAPTER 3: Energy Long Ago 7

Lesson 1 - Cooking in the past and present 8

Lesson 2 - Melting chocolate 9

Lesson 3 - Whisking eggs 9

### CHAPTER 4: Energy Science 11

Lesson 1 - Discussing temperature 12

Lesson 2 - Recording temperature 13

### CHAPTER 5: Saving Energy 15

**e** Lesson 1 - Saving Energy 16

**e** Look for the this icon to find lessons that can be used to involve pupils in energy saving in school in conjunction with the Energy in Education programme. [www.energyineducation.ie](http://www.energyineducation.ie)

# CHAPTER 1: Introducing Energy

## Aims

The aims of this chapter are to promote discussion about energy and to find out children's ideas about energy and its sources.

## Overview of Chapter

In this chapter there are a number of IWB (interactive whiteboard) and PowerPoint activities that can be used to promote discussion about where: Guzzler gets his energy; Guzzler's car gets its energy; Guzzler's computer game gets its energy.

## Working Scientifically Skills

Through discussing and reflecting on the different scenarios in this chapter the children will be applying and developing the following working scientifically skills:

- Observing
- Predicting
- Analysing (Sorting and classifying)

## Primary Science Curriculum link

Strand unit: Myself



## Lesson 1 – Sources of energy

### Resources

IWB1 / PowerPoint 1: Guzzler needs food

IWB 2 / PowerPoint 2: Running out of fuel

IWB 3 / PowerPoint 3: Plugged in

### Activity type: Discussion

#### Scenario 1: Guzzler needs food

In the first scenario there are two scenes with Guzzler. In the first scene Guzzler has eaten his lunch and has lots of energy. In the second Guzzler does not want his dinner and as a result, has no energy.

Use **IWB 1, Guzzler needs food** activities.

If you do not have access to an IWB use **PowerPoint 1, Guzzler needs food**.

#### Questions to promote discussion

- 1 What is Guzzler eating for his lunch?
- 2 What was Guzzler able to do after he had eaten his lunch?
- 3 What exercise can you do after you have eaten your lunch?
- 4 How do you think Guzzler feels when he hasn't eaten his lunch?
- 5 If you didn't eat your lunch at lunchtime in school, how would you feel?
- 6 What does your lunch give you?
- 7 Where do you get your energy from?

#### Scenario 2: Running out of fuel

In this scenario Guzzler is going to visit his friend who lives a long distance away. Guzzler fills his car with petrol and when he is driving spends his time in the car looking at the lovely views of the countryside. All of a sudden Guzzler's car stops.

By observing the fuel gauge in the car and the expression on Guzzler's face, the children have to discuss why they think Guzzler's car has stopped moving.

**Recap on scenario 1:** Remember in the previous picture we saw Guzzler eating his dinner. He had lots of energy. Where do you think Guzzler got his energy from? What happened when he did not eat his dinner? Did he have much energy to play? Why not?

Use **IWB 2, Running out of fuel** activities.

If you do not have access to an IWB use **PowerPoint 2, Running out of fuel**.

### Questions to promote discussion

- 1 In which picture do you think Guzzler looks happiest?
- 2 What do you think has happened to Guzzler's car?
- 3 Why do you think Guzzler's car has stopped?
- 4 What does Guzzler need to do in order to get the car moving again? (*get petrol / energy*)

### Scenario 3: Plugged in

In the first 'Plugged in' picture Guzzler is playing with a computer game. However, in the second 'Plugged in' picture something has happened and Guzzler looks confused. The children have to think about why Guzzler's computer game has stopped working. Use **IWB 3, Plugged in** activities. If you do not have access to an IWB use **PowerPoint 3, Plugged in**.

### Questions to promote discussion

- 1 How does Guzzler look? How do you think he feels?
- 2 Why do you think Guzzler's game is not working?

Thinking about all three scenarios: what have we learned?



### Questions to promote discussion

- 1 When Guzzler had dinner what could he do?
- 2 When the car had petrol what could it do?
- 3 When the game was plugged in what could it do?
- 4 Did Guzzler, the car and the game all get energy from the same place?
- 5 Where did Guzzler get his energy from?
- 6 Where did the car get its energy from?
- 7 Where did the game get its energy from?

## Extension

### Resources

Activity from the book **Guzzler Investigates Energy: Food Energy (page 3)**

# CHAPTER 2: Energy in our Lives

## Aim

The aim of this chapter is to enable the children to understand how electrical energy is used in their everyday lives.

## Overview of Chapter

In this chapter the children discuss whether or not items that are found in their homes use electrical energy. IWB activities 4 and 5 and PowerPoints 4 and 5 provide illustrations of common items that are found in the kitchen and sitting room and are used to promote discussion about which appliances use and do not use electricity.

## Working Scientifically Skills

Through discussing and reflecting on the different scenarios in this chapter the children will be applying and developing the following working scientifically skills:

- Observing
- Predicting
- Analysing (Sorting and classifying)
- Recording and communicating

## Primary Science Curriculum link

Strand unit: Magnetism and electricity

## Lesson 1 – What uses electricity?

### Resources

IWB 4 / PowerPoint 4: Energy in the kitchen

IWB 5 / PowerPoint 5: Energy in the sitting room

PCMs 1 and 2: What uses electricity?

Scissors, crayons

### Activity type: Discuss and sort

Use **IWB activities 4 and 5** to help the children learn more about which kitchen and sitting room appliances require electricity to work.

If you do not have access to an IWB, use **PowerPoints 4 and 5**.

Make copies of **PCMs 1 and 2**. In pairs, the children can cut out the pictures of the different appliances and sort them into those that use electricity and those that do not.

With your children make a poster for your classroom of appliances that use electricity.





# CHAPTER 3: Energy Long Ago

## Aim

The aim of this chapter is to provide the children with opportunities to explore sources of energy that were used in the past for cooking.

## Overview of Chapter

The chapter begins with a whole class discussion on cooking methods that were used in the past. This is followed by an investigation on the melting of chocolate. The final activity in this chapter explores different sources of energy that are used in whisking eggs.

## Safety Note

Please note that some children may have particular food allergies. Activity 2 (melting chocolate) could be conducted as a teacher demonstration.

## Working Scientifically Skills

While engaging with the different activities in this chapter, the children will be applying and developing the following working scientifically skills:

- Observing
- Predicting
- Investigating
- Estimating and measuring
- Recording and communicating

## Primary Science Curriculum link

Strand unit: Heat; properties and characteristics of materials; materials and change

# Lesson 1 – Cooking in the past and present

## Resources

IWB 6 / PowerPoint 6: The story of cooking

## Activity type: Discussion

Use **IWB 6 activities** to learn about cooking in the past and present.

If you do not have an IWB use **PowerPoint 6** to discuss cooking in the past and present.

## Questions to promote discussion

### Scenario 1: Hunter gatherer

- 1 What do you see in **picture 1**?
- 2 What is Guzzler doing?
- 3 How is he cooking the food? What is he using?
- 4 Is he using electricity?
- 5 Where is he getting the energy to cook the food?
- 6 Does he have a shelter over the fire? Why?

### Scenario 2: Victorian

- 1 What do you see in **picture 2**?
- 2 Do you have a cooker like this in your house?
- 3 Does the cooker in the picture use electricity? Clue – where's the plug?
- 4 Where is Guzzler getting the energy to cook the food?

*Note: when this oven was made there was no electricity – it ran on coal.*

### Scenario 3: 1960's

- 1 What do you see in **picture 3**?
- 2 Does your kitchen look like this?
- 3 Does this cooker use electricity?

*Note: yes – it does use electricity.*

### Scenario 4: 21<sup>st</sup> Century

- 1 What do you see in **picture 4**?
- 2 Do you have a cooker like this in your house?
- 3 Does your kitchen look like this?
- 4 Do you think that this cooker uses electricity?

*Note: yes – it does use electricity.*

**Activity: IWB 6 / PowerPoint 6:** Children sequence the images from past to present.

## Lesson 2 – Melting chocolate

### Resources

Chocolate buttons (2 per child), 4 Saucers

**Teacher note:** In this investigation we use the melting of chocolate under different conditions to illustrate how energy (as heat) can change a material from a solid to a liquid.

### Activity type: Observation

Give each child a chocolate button or a square of chocolate. Allow them time to carefully observe their piece of chocolate. They must try to make as many observations as possible about their piece of chocolate. Encourage the children to use different senses when making observations. Record their observations.

If there are no allergies let the children eat their piece of chocolate after the activity!

### Activity type: Investigation

**Investigation question: “Where will the chocolate melt the quickest?”**

The children could then investigate in which location in the classroom a piece of chocolate will melt the quickest. Discuss with the children how they could find out where the chocolate will melt the quickest. One way to carry out this investigation is to leave a piece of chocolate on a saucer; on the teacher’s table; on the radiator; on a window sill under direct sunlight; and on the window ledge outside the classroom.

Before carrying out the investigation encourage the children to predict in which location they think the square of chocolate will melt the quickest/slowest. They must provide a reason for their predictions. When the chocolate has melted encourage the children to observe and discuss the changes that have occurred; e.g. it has melted, it is runny, it is not solid / hard, it is a liquid etc. Then discuss whether or not their predictions were correct .

## Lesson 3 – Whisking eggs

### Resources

Hand whisk, 2 eggs, clear bowls, electric mixer, kitchen paper, beaker, timer/stopwatch/clock

### Activity type: Observation

Begin this activity by showing the children an egg. Encourage them to carefully observe (look at) the egg. They must try to make as many observations about the egg as they can. Remind them that scientists don’t just use one sense when they are observing (looking at) things. Record their observations.

Separate the yolk from the white of the egg. Place the white into a clear bowl. Encourage the children to make observations about the raw egg white in the bowl. Record their observations.

## Activity type: Investigation

### Investigation question: “Which way is quicker to whisk an egg white?”

Show the children the hand whisk and the electric whisk. Ask them to predict which mixer they think will whisk the egg faster? Encourage them to give reasons for their predictions.

Ask the children to think about how they could find out which way will be quicker (whisk an egg using a hand and an electric whisk), and what they could use to measure how long it takes (timer/ stop watch / clock).

The teacher then whisks an egg using the hand whisk and the electric mixer and times how long it takes for each.

### Questions to promote discussion

- 1 Which way was quicker?
- 2 Why do you think the electric mixer was quicker than the hand whisk?
- 3 Did the hand-whisk have energy? Could it move on its own? Where did it get its energy from?
- 4 Where did the electric whisk get its energy?
- 5 Which way do you think was easier? Why?

## Extension

### Resources

Activities from the book **Guzzler Investigates Energy: Energy long ago and energy worldwide** (pages 11 - 16)



# CHAPTER 4: Energy Science

## Aim

The aim of this chapter is to examine temperature. It considers heat as a form of energy and provides children with the opportunity to learn about temperature as a measure of heat using a thermometer.

## Overview of Chapter

The children discuss the use of thermometers and in pairs carefully examine thermometers. They learn about how to use a thermometer to record the temperature. The extension activity considers how people kept food cool in the past.

## Working Scientifically Skills

While engaging with the different activities in this chapter the children are provided with opportunities to apply and develop the following working scientifically skills:

- Observing
- Predicting
- Investigating
- Estimating and measuring
- Recording and communicating
- Analysing (Sorting and classifying)

## Primary Science Curriculum link

Strand unit: Heat; properties and characteristics of materials; materials and change

## Lesson 1 – Discussing temperature

### Resources

IWB 7 / PowerPoint 7: Guzzler on the beach

IWB 8 / PowerPoint 8: Guzzler in the snow

IWB 9 / PowerPoint 9: The thermometer

Large classroom thermometer

### Activity type: Discussion

Use **IWB 7 and 8** to introduce the idea of temperature.

If you do not have access to an IWB, use **PowerPoints 7 and 8** to introduce the idea of temperature.

#### Questions to promote discussion (Guzzler on the beach)

- 1 Where is Guzzler?
- 2 How do you think he feels?
- 3 What is he wearing? Why do you think he is wearing these clothes?

#### Questions to promote discussion (Guzzler in the snow)

- 1 Where is Guzzler?
- 2 How do you think he feels?
- 3 What is he wearing? Why do you think he is wearing these clothes?
- 4 What is the difference between the two places?
- 5 How do we know one is hot and the other is cold?
- 6 Can anyone think of an instrument or a tool that we use to tell us what the temperature is? *Prompt: a thermometer*

### Activity type: Observation

In this part of the lesson, the children observe a thermometer.

Show the children a large thermometer and allow them time to observe it.

They discuss their observations of the thermometer with the aid of **IWB 9 / PowerPoint 9**.

#### Questions to promote discussion

- 1 Do you know what this is called?
- 2 What colour is the thermometer?
- 3 What is written on it?
- 4 What can you see inside it?
- 5 What colour is the material?
- 6 What else can you say about the thermometer?

### Activity type: Discussion

Discuss the uses of thermometers with the children

#### Questions to promote discussion

- 1 Do you know what a thermometer is used for?
- 2 Do you have a thermometer at home? Where?
- 3 Has your Mum or Dad ever used a thermometer when you were sick? What did they do?
- 4 Look at the thermometer. What colour is the liquid inside it? What do you think would happen if we put the thermometer in a cold place? How could we find out?
- 5 What do you think would happen if we put the thermometer in a hot place? How could we find out?

## Lesson 2 – Recording temperature

### Resources

2 large thermometers

IWB 10 / PowerPoint 10 / PCM 3: Recording temperature

### Activity type: Measure and record

**Teacher note:** Explain to the children that the thermometer is used to measure how hot something is. The hotter something is (the higher the temperature) the higher the liquid inside the thermometer moves up. The colder something is (the lower the temperature) the lower the liquid inside the thermometer falls down.

Place a large thermometer in a safe position in the classroom and another in a safe position outside the classroom. Over a week, take a daily reading of both thermometers at the same time of day. Record both temperatures on **IWB 10 / PowerPoint 10 / PCM 3**.

Each day discuss the temperatures that are recorded.

#### Questions to promote discussion

- 1 What temperature was it inside / outside today?
- 2 Was it hotter inside or outside?
- 3 How do we know?
- 4 What day was it coldest outside / inside? How do we know?
- 5 What day was it hottest inside / outside? How do we know?
- 6 If we did this investigation at different times of the year do you think we would get different results?
- 7 Do you think it would be hotter / colder outside / inside in winter, spring / summer, autumn?

## Extension

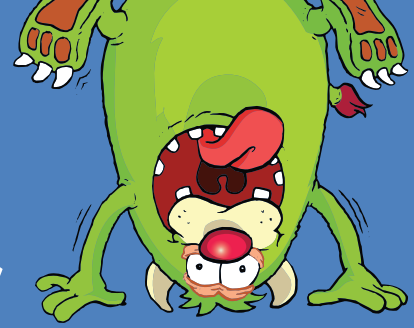
### Resources:

Activity from the book **Guzzler Investigates Energy: Insulation** (page 22).





# CHAPTER 5: Saving Energy



## Aim

The aim of this chapter is to raise awareness about the use of energy at home and in school. It challenges children to consider how they use energy at home and at school and encourages them to consider ways in which energy can be saved.

## Overview of Chapter

This chapter opens with a discussion on the uses of energy and the teacher reading Guzzler's Big Book on Energy with the children. Children are then asked to design posters about saving energy at home and at school. Alternatively, they could use SEAI's colouring-in resources.

When reading Guzzler's Big Book on Energy the children are also introduced to some of the topics (e.g. saving water) they will encounter in 1st and 2nd Class Programme.

## Working Scientifically Skills

While engaging with the different activities in this chapter the children are provided with opportunities to apply and develop the following working scientifically skill:

- Observing

## Primary Science Curriculum link

Strand unit: Caring for my locality and area

## Lesson 1 – Saving Energy ⓔ

### Resources

Guzzler's Big Book on Energy

### Activity type: Read and discuss

Hold a whole class discussion on how we use energy in our lives every day. Record children's responses. It can be useful to ask children to recall the uses of energy they have learned about in Chapters 1 – 3 of this programme. For example cooking, travelling and items that use electricity in the home.

### Questions to promote discussion

- 1 Before you came to school today did you use energy?
- 2 What did you use this energy for?
- 3 Have you used energy in school today? When?

Read **Guzzler's Big Book** with your class. As you read the Big Book point out the different activities where Guzzler and his friend Aoife use energy.

The children can make a whole class poster on uses and ways to save energy in the classroom. Use the class poster to encourage energy saving behaviours in your school as part of the **Energy in Education** Programme. Go to the website for videos and factsheets on saving energy in schools





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