

# CHAPTER 3: How Energy can Impact our Lives: A Story from the Past

## Aim

The aim of this chapter is to introduce children to the unit of power, the Watt.

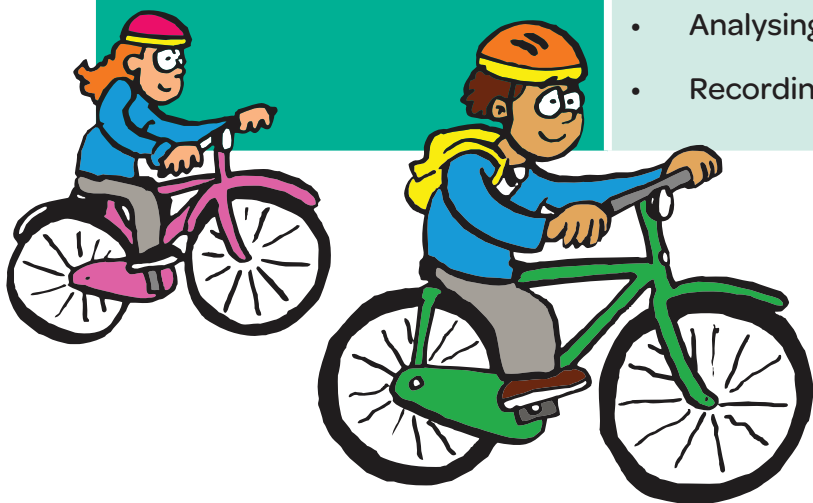
## Overview of Chapter

In these lessons children will explore how power is generated from energy sources, such as fossil fuels. The children will learn about the famous inventor James Watt and the unit of power, the Watt. These lessons link to History within the SESE curriculum and a prior knowledge of the Industrial Revolution may be useful.

## 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 skills:

- Observing
- Predicting
- Analysing and classifying
- Recording and communicating



## Lesson 1 – What made James Watt famous?

### Resources

PCM 13: The Story of James Watt

### Activity type: Sort and discuss

Divide the class into groups. Print out one copy of **PCM 13 The Story of James Watt** per group. Cut up each statement and put them into an envelope (not in order). Give each group an envelope. Ask the children to read through the statements in the envelopes and then see if they can discover how and why James Watt became famous.

The children report back to the whole class. Different opinions may emerge and these can be explored further.

## Lesson 2 – What's a Watt? Exploring steam power and electricity

### Resources

2 bulbs: 1 incandescent 40 or 60W bulb and 1 16W compact fluorescent light (CFL) bulb (per group), magnifying glasses, 2 kettles (the same size to ensure fair test), jug, magnifiers

**Safety note:** A boiling kettle is used in this lesson. Please be careful with steam and place the boiling kettle in an appropriate area of the classroom away from the children.

### Activity type: Teacher led investigation

This lesson introduces the idea of how steam can generate electricity and introduces the unit of electrical energy, the kilowatt hour. It is a precursor to Chapter 5, Saving Energy.

### Finding out children's ideas

- 1 What happens when you boil a kettle?
- 2 How do you know the water has boiled?
- 3 What comes out of the kettle once the water has boiled? (*steam*)
- 4 Do you know how steam is made?
- 5 Do you think a full kettle will boil quicker or slower than one that is half full?
- 6 How could we find out?

### Investigation question: "Will a kettle full of water boil faster than a kettle that is half full of water?"

Pour 500ml of water into one kettle and 250ml into a second. Ask the children to predict which kettle they think will boil first. Record their predictions and ask them to give a reason for their predictions. Switch on both kettles and allow to boil.

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**Teacher note:** If you do not have two kettles, this investigation can be done with one kettle. However, make sure you allow the kettle time to cool down before you pour in the second amount of water.

### Questions to promote discussion

- 1 Which kettle boiled quicker?
- 2 Why do you think this happened?
- 3 Which kettle do you think used more energy?
- 4 What have you learned from this investigation?
- 5 What did you see coming out of the kettle when the water was boiling?
- 6 Where did the steam go?
- 7 What do you think would happen if the steam hit a cold surface?

To illustrate condensation boil the kettle again and teacher can place a mirror or saucer over the spout of the kettle. Use a cloth/tea towel to hold mirror or saucer as they may get very hot. Encourage the children to carefully observe what happens to the steam.

### Activity type: Research

Using a range of sources the children research the answers to the following questions:

- 1 How was steam used in the past: to generate energy?
- 2 How is steam used today: to generate energy?
- 3 How might steam be used in the future: to generate energy?

### Activity type: Observation

Using magnifying glasses ask the children to carefully observe the different bulbs. Then encourage them to make a detailed drawing of one of the bulbs and list the different types of material from which the bulb is made.

Discuss their observations/ drawings with them. Draw their attention to the W sign on the bulbs. Ask the children if they know what the W stands for. (*Watt, named after James Watt*).

**Teacher note:** Explain to the children that the Watt is used to measure the amount of power a bulb uses, not how bright it is. Traditional incandescent light bulbs waste 90% of their electricity to produce heat, and use only 10% to produce light. The solution: energy efficient bulbs, which use fewer watts to give off the same amount of brightness. For example, a 16W CFL will give the same brightness as a 40W incandescent bulb and uses less energy.

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Ask the children to look at the bulbs again and answer the following questions.

- 1 How much electrical power do you think a 40/60/16 W bulb uses in one hour (*answer 40/60/16 Watts*)
- 2 Which bulb do you think is the most energy efficient? Why?
- 3 Which type of bulb do you think we should use in our homes?

**Teacher note:** Explain that the electricity meter in our homes or school measures the amount of electricity we use. This amount is given in Kilowatt hours (kWh) and we pay per kWh. Electricity companies sell electricity in kWh units. These units are equivalent to 1kW used for 1 hour.

To teach the children how to read their electricity meters, use SEAI's **Energy in Education – Student Energy Log Book**. This can be downloaded from: [www.energyineducation.ie/Energy\\_In\\_Education/Information\\_for\\_Schools/Resources\\_and\\_links/Student\\_Energy\\_Logbook\\_Primary.pdf](http://www.energyineducation.ie/Energy_In_Education/Information_for_Schools/Resources_and_links/Student_Energy_Logbook_Primary.pdf) Both the log book and a wall chart to record energy usage can be ordered from SEAI.

The children can learn about how to calculate energy bills by looking at the video **Measuring and saving energy at schools with Guzzler**. This can be viewed at [www.seai.ie/schools/primary\\_schools/resources\\_available](http://www.seai.ie/schools/primary_schools/resources_available)

## Extension

Lesson plan, **Renewable energy** [www.seai.ie/Schools/Primary\\_Schools/Resources\\_Available/Lessons\\_Plan/Renewable\\_Energy\\_Lesson\\_Plan.pdf](http://www.seai.ie/Schools/Primary_Schools/Resources_Available/Lessons_Plan/Renewable_Energy_Lesson_Plan.pdf)

Activity from the book, **The Energy File: How to build a water wheel (page 10)** can be used to introduce the concept of rate; you could test how much water is needed to make the water wheel turn 10 times and 20 times in one minute.

