ENERGY Heroes

Developing maths and science skills through an exploration of energy and climate change.

Local Action. Global Impact.

A resource that empowers the whole school community.

Energy Heroes

A teaching and learning resource pack to help schools and teachers deliver a series of activities designed to engage pupils, their families and the wider school community in learning about energy and climate change.

Lesson One – Energy Matters

Investigating energy use and types of energy through an exploration of pie charts.

Lesson Two – How Much?

Calculating the cost of running home appliances within the context of climate change and global warming.

Lesson Three – Day and Light

Calculating how much our lights cost and preparing to save energy at home.

Lesson Four – Evil Standby

Solving problems associated with the costs of leaving appliances on standby.

Lesson Five – Be A Saver!

Finding the mean and range of our data to tell a story about energy consumption.

Lesson Six – Magical Maths

Using a range of measures and numerical facts to describe what we have learnt about energy and climate change.

Lessons are supported and enhanced further by resources to deliver:

- Home and school challenges
- An **Energy Heroes** whole school assembly
- A pupil-led School Energy Audit
- A Community Engagement Event
- A pupil and adult Energy Quiz to assess learning the impact of this project
- An **Energy Heroes** press release.

ENERGY Heroes

Welcome to our resource, designed to inspire and create Energy Heroes!

Teaching children to be 'energy literate' supports them to develop lifelong skills that will help them to ***make informed choices***, now and in the future, about energy use and climate change. Energy awareness and literacy are key in tackling the problems of:

- energy efficiency
- fuel poverty
- climate change.

By educating our children we can create lasting behaviour change in energy conservation, in the same way that recycling has become a social norm in the last 20 years.

We know that children learn best when their learning is relevant and interactive and has a real context and purpose. We have seen that children also learn most effectively when they have to explain what they know to others (deep learning). **Energy Heroes** combines both of these powerful aspects of learning into a series of practical activities and events.

Aims for our Energy Heroes

Energy Heroes is designed to motivate children in **Year 5** by providing them with the opportunity to ***investigate and explore*** their own energy use and to ***find out for themselves*** about the importance and effects of ***wasting less*** energy and choosing renewable sources of energy. The programme helps children to ***develop new skills, understand why and know how*** to change some of their existing behaviours associated with energy use. Through this programme they will ***explore and evaluate*** the impact of these changes. We believe this will encourage and enthuse them to further share what they have learnt with other members of their school and community.

Our vision is to create a society where citizens ***habitually choose*** to waste less and save more, wherever there is a choice to do so. They will be motivated to do this having developed a clear understanding of the impact that particular behaviours and choices have on themselves, each other and the environment, now and in the future. (This is often referred to as ***Sustainable Development***.) Our programme is organised into a series of resources, events and activities, set out below, that enable schools to access the aims and realise the vision of **Energy Heroes**.

- ***Teaching and learning materials:*** six lessons, designed to meet the requirements of the 2014 National Curriculum – maths and science Y5.
- ***Teacher training:*** an event designed to build the capacity of teachers, school site managers and a partner organisation to deliver this programme.
- ***A whole-school assembly and Lesson One*** delivered by a specialist teacher for sustainability.
- ***A School Energy Audit*** led by the pupils and supported by one of our energy experts, resulting in a related Action Plan for the school.
- Tools for a ***community engagement event*** to include governors and local businesses, organised by the pupils with support from the **Energy Heroes** team.
- ***Evaluation, review and monitoring*** tools to support pupils, schools and partner organisations and to evaluate and record their progress.

'My Data'

Key to the successful delivery of this programme is the ***children's use of their own energy data. This will create a deeper connection to learning in the classroom, with firm links that will extend to homes and family life***. In order to establish these links, and to encourage and enable behaviour changes, ***Home Challenges*** are set each week. These aim to empower the pupils to persuade others – using their new knowledge and expertise – to use less energy. The Challenges include:

- *Completing a meter reading **Log Book**, the data from which is used to calculate energy consumption and develop data-handling skills in class*
- *Conducting a Home Energy Audit*
- *Taking part in an Energy Heroes Quiz before and after the project to measure progress*
- *Designing energy cost tags for appliances*
- *Making 'Evil Standby Characters'*
- *Composing an 'Energy Rap'*
- *Sharing information through leaflets and links to useful websites.*

Taking Inspiration from the 2014 Primary National Curriculum

Many of us become familiar with the programmes of study as we plan our lessons and develop teaching and learning sequences to support learning. If we look at some of the aims and other descriptions of purpose for the National Curriculum, we can identify direct connections to programmes such as **Energy Heroes** that are designed to make learning **'real and purposeful'**.

For example, in Numeracy and Mathematics:

Purpose of study

A high-quality mathematics education provides a ***foundation for understanding the world***.

Aims

[Pupils] should ***apply their mathematical knowledge to science and other subjects***.

Teachers should ***use every relevant subject*** to develop pupils' mathematical fluency.

Teachers should develop ***pupils' numeracy and mathematical reasoning*** in all subjects so that they understand and appreciate the importance of mathematics. Pupils should be taught to **apply arithmetic fluently to problems, understand and use measures**, make estimates and sense check their work.

Welcome

[Pupils] should also understand the cycle of **collecting, presenting and analysing data**.

And in Science:

Purpose of study

A high-quality science education provides the ***foundations for understanding the world***.

[Pupils] should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

Pupils should be equipped with the scientific knowledge required to understand the ***uses and implications*** of science, today and for the future.

Specific references to programmes of study in Year 5 are listed in each lesson plan. There is a focus throughout the project on ***working scientifically*** and ***using and applying*** learnt number facts relating to energy and climate change to develop ***problem-solving skills***.

Some Practical Points

In order to assess the impact of this programme, an ***Energy Heroes Quiz*** is provided for pupils and adults. This is to be completed at the start and at the end of the programme. It's ***really important*** that these are collected and sent back to us so that we can analyse and evaluate what has taken place. We will send you a report so that you can celebrate the achievements of your new **Energy Heroes**.

As pupils work through the activities, much of what they do will be needed in future lessons. So make sure there is an 'easy-access' system to Log Books and monitoring sheets each week.

The ***Home Challenges*** are an essential element of this programme. They help to build the confidence levels of your pupils as they witness changes and improvements at home as a direct result of their work around energy and climate change. Home Challenges are also often used as a resource in a lesson, so it's much easier for you and the pupils if pupils have completed them!

In order to collect data effectively for the pupils to use in the lessons, ***the programme needs to run over 5 or 6 weeks***, with one lesson delivered each week. A more intensive everyday approach won't allow for the necessary spread of data to be collected and won't allow pupils to complete the Home Challenges.

A Community Event

As part of this project we would like the children to share their knowledge and deepen their understanding of energy by inviting members of the community to an event. This could be run by the class involved in the project, or possibly the school's 'eco-club'. It could be a standalone event, or part of the school fair.

The event, in some cases, will be supported by one of our team.

Part of the programme will be building up to the event through pupils:

- Writing a letter inviting the Governors/PTA and parents to attend the event
- Writing to local businesses inviting them to make a pledge to save energy and to come and find out more at the event
- Making posters for local businesses to display
- Writing a press release about the energy event
- Writing to your MP asking how they are championing energy conservation and climate change mitigation.

At the event there are a variety of activities that the children could share with their community. These include:

- The children performing their 'Energy Rap'
- A pledge tree where people can make pledges about how they will save energy
- Poster displays about how to save energy
- A pie chart showing how we use energy in the UK
- A Switch and Save information stall
- Energy-saving device information
- Pupils (with clipboards) carrying out the Energy Heroes Quiz with attendees
- A prize draw for an in-home energy display meter
- A poster showing how eco-freindly the school is and what the Energy Audit top five actions are
- A 'Renewables pursuit' game, in which participants decide where to place the renewable energy installations
- An 'Energy bike' which participants pedal to light up the light
- A 'Know your home energy use' quiz board
- A 'Good energy' stand, with information about how you can buy renewable energy
- A 'Vision board', onto which visitors and pupils add their vision of a low-carbon future
- A 'Big foot, little foot' game in which participants match their carbon footprints to the sources.

Lesson Plan One – Energy Matters

Y5 Maths Learning Objectives	Y5 Science Learning Objective	Key aspects of other learning
Number – Fractions • Recognise the per cent symbol and understand that per cent relates to 'number of parts per hundred'. • Write percentages as a fraction with a denominator of 100. • Write percentages as decimals. • Complete information in tables.	**Working Scientifically** • Recording data using tables.	• To know that energy is made from a variety of sources and is used in a variety of ways. • To understand the terms renewable and non-renewable energy, and to be able to give examples of each. • To know that energy use in our home is varied. • To know how to monitor energy use.

Introduction – 10 minutes

Explain that all the learning that will take place over the next six lessons will explore data and other facts about energy with the aim of improving our problem-solving and data-handling skills, as well as helping us to understand where our energy comes from and how we use it.

Hand out the **Energy Heroes Quiz** and ask pupils to complete it independently. Explain that this questionnaire will be repeated at the end of the project to explore what they have learnt. A similar version of this questionnaire is also ready to go home! It must be given to parents to complete and returned next lesson.

Main Activities

A – 20 minutes	B – 15 minutes	C – 10 minutes
Use the **Exploring Pie Charts worksheet**. Recap the relationship between percentages, fractions and decimals. Look at the first pie chart and discuss how it is organised. Title? Units of measurement? Key? Segments? Now try to complete the missing data in the other pie charts based on what is known about percentages and some ideas about energy use.	Prepare pupils to complete **My Home Energy Audit** as their *Home Challenge* for this week. The data and information they collect here will be used next lesson. Explore row and column headings and how the table collects information. Explain and give examples of home appliances. Another challenge this week is to begin collecting readings from energy meters at school. Go through the energy **Log Book** and refer again to row and column headings. Explain that kWh describes the amount of energy used, so it is a unit of measurement. (The watt or kW is the unit of power.) Plan together a rota of pupils to read the school energy meter so that data can be recorded somewhere in class for all pupils to copy into their **Log Book**. You will need this data collection next lesson.	Pupils should be aware of the dangers and risks associated with electricity. Explore together 'Electrical safety in your home' from **www.switchedonkids.org.uk**.

Plenary – 5 minutes

Ask pupils to tell you what they know about where energy comes from. Share the **Endless Energy?** information sheet and begin to discuss what effects different forms of energy use might have on the environment. *What makes energy renewable?*

Home and School Challenges

- **My Home Energy Audit**
- **Pupil and Adult Energy Heroes Quizzes**
- **Energy meter readings at school:** collect, share and record in **Log Books** every day if possible.

Resources

- **Pupil and Adult Energy Heroes Quizzes**
- Worksheet – **Exploring Pie Charts**
- Worksheet – **My Home Energy Audit**
- Information Sheet **– Endless Energy?**
- Energy **Log Book**
- 'Electrical safety in your home' video – www.switchedonkids.org.uk
- Envelope containing **Energy Heroes Quiz for Adults**
- Selection of home appliances (hairdryer, radio, phone and charger etc.)