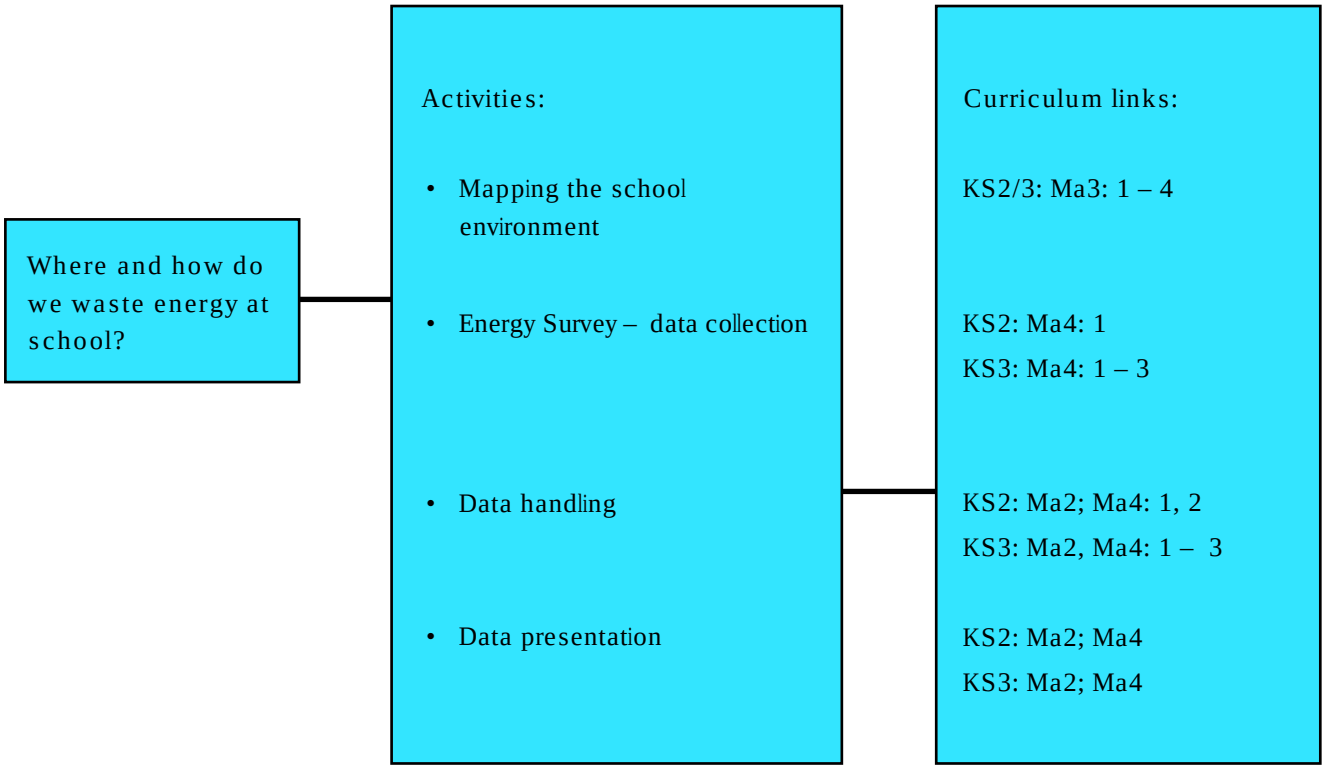
Energy within the Maths curriculum



The Maths activities use an energy survey of all or part of the school buildings as their starting point. Mapping the classroom, corridor or area provides useful practice in geometric and measurement skills and sets the scene for discovering where energy could be lost from the building. (There is no need to map the school grounds outside the building.)

The mapping data provides opportunities for pupils to explore averages and other simple statistics, and to see if there are relationships within their data. For example, can they link the number of windows in a classroom to its area?

From this, pupils can survey their environment using the survey sheet provided or your own. Pupils' data can then be combined in a spreadsheet in groups or as a class, and sources of energy loss noted on their maps of the school, to identify patterns of where energy is lost within the classroom and the school.

This can be combined with a survey of patterns of use of the building, for example how many people go through a doorway at break time, and links between energy loss and use can be established. (The more traffic through a door, the more heat lost outside, for example.)

Pupils have opportunities to use a variety of measures including distance, area, volume, number and time.

The activities can be combined with Science work on energy loss. Considerable scope exists for ICT support using spreadsheets, charts and other ways to record and present their data. For example, a temperature probe and data logger could monitor temperature in a classroom 24 hours a day, and this can be linked to when the room is used, and when the heating is on. Pupils can identify when the room is heated unnecessarily, or if it is cold when occupied.

Drawing software can be used to produce 'professional' maps of the school's built environment that can support learning in Geography as well as in Maths and Science.

Mapping the school

Get pupils to produce a map of your classroom, year area or corridor. This could be a sketch, or a scale map. Pupils need to think about:

- How they will measure the lengths and widths of the room.
- What scale they will use for their map so that it fits on a sheet of paper.

Pupils should add detail to their map by including any:

- Doors
- Windows
- Sinks and taps
- Heaters or radiators
- Lights
- Applicances (e.g. cookers, computers)
- Extractor fans
- Badly-fitting windows and doors (draughts)
- Automatic door-closers (working and used)
- Automatic door-closers (broken/not used)

Using coloured pens and a simple key will allow pupils to see where a door or window is found, for example.

Pupils can calculate the following:

- What is the area of their classroom? Can they calculate this at once, or do they need to break the area into smaller areas, for example a number of adjoining rectangles?
- What is the perimeter of the classroom?
- By measuring the height of the classroom, what is its volume?

These questions can also be used to allow pupils to estimate their answers before making the calculation, and to compare how well their estimate matched the real answer.

If pupils have mapped a number of classrooms or areas around the school, they can use the map and data to explore the following. Pupils will need to combine their data in a table, for example on the blackboard.

- What is the average area of a classroom? What about perimeter and volume?
- What is the most common number (modal class) of:
  - Doors
  - Windows
  - Heaters
  - Lights

  ...in a classroom?
- Which classroom has the most and least windows, heaters or lights?
- How do these features compare to the size (area) of the classroom? Is there a relationship?

Using the School Energy Survey data

Pupils can use their survey data as the starting point for a range of Maths investigations, individually or in groups. They could:

- Combine class data for one room into one class table and explore the variation in their measurements, finding the average for questions 9, 16 and 17
- Find percentages or fractions using questions 1 and 2, 10 and 12, 14 and 15, 23 and 24, 25 and 26. Decide if it is sensible to deal with, for example, “3/8th of a radiator” or “0.7629886% of a window?”
- Compare different rooms by combining and comparing data in a spreadsheet and finding relations and averages, for example, average temperature in a classroom.
- Use tables, spreadsheets, charts and graphs to present their data.
- Relate the time rooms are illuminated and heated to the times they are in use. Is energy being wasted at any time? For example, is it reaching target temperature long before lessons start, or heated over the weekend?
- Measure and record hot water temperature across the school. Does it vary in relation to the distance from the school boiler? Does the time needed for cold water to run before becoming hot also show a relationship?
- Explore how much each area of the school is used. Does the energy use for heat and light reflect this, or does it need to be controlled more closely? The target values for light levels (in lux) and temperature (°C) for different types of room are appended.

Extension ideas

Pupils can survey school use during the day, by completing a ‘human traffic survey’ at key points. This could measure how many pupils use each:

- Entrance
- Corridor
- Classroom
- Non-teaching area, such as the hall, canteen or library
- ...and this could be extended to see how use varies during the school day.

Results can be presented using tables or charts. Pupils could combine chart data with their maps to graphically portray the amount and times of use. Pupils can relate this use to the number of pupils in the school or school year.

- What percentage of pupils use each entrance?
- How does amount of use vary during the day?
- How does this compare to where energy is lost?

Pupils could represent flows by constructing a Sankey diagram.

Pupils can relate all their results to the energy used by the school.

Pupils (under supervision) can read the school's electricity and gas meters at regular points during the day and week.

- What is the average number of units used in a day or week?
- What does this cost the school?
- How does energy consumption vary, and why?
- What about over a longer period, such as a term or school year?

Appendix

Room type	Target temperature (°C)
Corridors and staircases	15
Dining rooms	18
Classrooms	18
Assembly/multi-purpose halls	14 - 18
Gymnasia and sports halls	14
Changing rooms and showers	18 - 21
Offices, staff room	18
Medical inspection room	21
Toilets and cloakrooms	15
Storage areas	<15

Room type	Target lighting level (lux)	Room Type	Target lighting level (lux)
Entrance hall	150	Offices	300 – 500
Circulation areas	50 – 200	Circulation areas for plant growth	500 – 3,000
Lounges	50 – 200	Corridors and staircases	150
Lifts	100	Lift entrances	200
Dining room (servery)	300	Dining room (tables)	50 – 200
Classrooms	300	Classroom where visually demanding work is carried out	300
Toilets	150	Cloakrooms	100

School Energy Survey

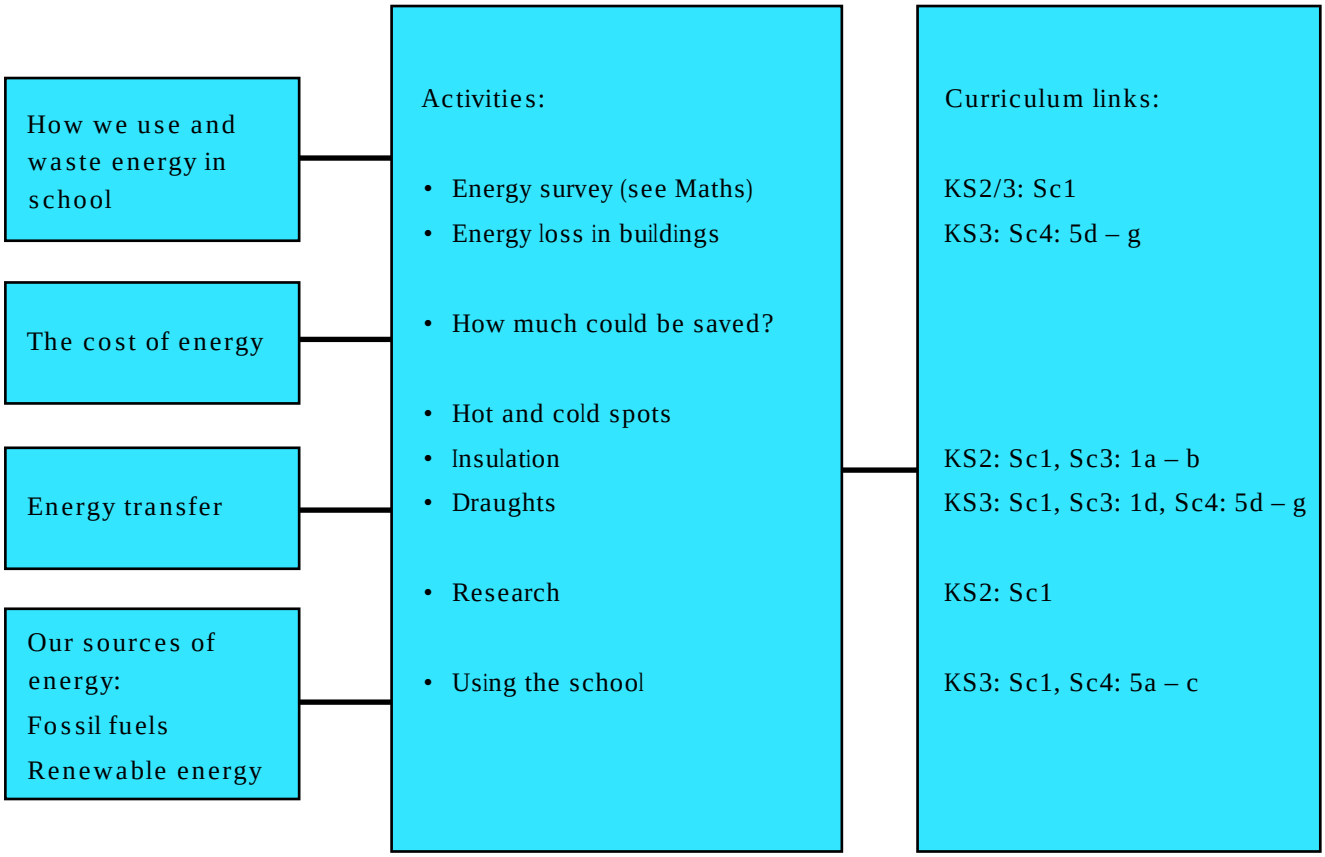
Name: _____ Class: _____ Room surveyed: _____

Read the survey before you complete it. Think about each thing you need to measure. What equipment will you use? What units will you use to measure in?

	Insulation	
1	How many windows are there?	
2	How many windows are open?	
3	Are the windows double-glazed?	Yes/No/Some
4	Are the windows and doors draught-proofed?	Yes/No/Some
5	Do the windows have curtains?	Yes/No/Some
6	Are the curtains drawn at night?	Yes/No/Some
7	Is the classroom roof or ceiling insulated?	Yes/No
8	Is the door left open?	Yes/No/Sometimes
	Heating	
9	What is the temperature in the classroom?	
10	How many heaters or radiators are there?	
11	Do the heaters have controllers or thermostats?	
	Do the thermostats work? Are they correctly set? Are they being correctly used?	Yes/No/Some
12	How many heaters are blocked by furniture?	
13	When do the heaters come on and off?	On: Off:
	Hot water	
14	How many sinks are there?	
15	How many have plugs?	
16	How much water needs to come out before it is hot?	
17	What is the temperature of the hot water?	
18	Are the hot water pipes insulated?	Yes/No/Some
	Lighting	
19	How many lights are there?	
20	When do they come on and off?	
21	Are they left on when the room is empty?	Yes/No/Some
22	Are they left on when they are not needed?	Yes/No/Some
	Classroom use	
23	What is the maximum number of pupils that can be seated in the classroom?	
24	How many pupils are there in your class?	
25	How many lessons are there in one day?	
26	How many lessons is the classroom used in one day?	

- What other questions could you ask about things that might waste energy? Think about things you find in a classroom, such as TVs, videos and PCs, for example.
- What about the flooring? How could this save or waste energy?

Energy within the Science curriculum



The starting point for exploring energy within the school environment can be the School Energy Survey in the Maths section. This can be extended to include the issues pupils must explore when planning an investigation, such as ensuring accuracy and fair comparisons; and the best way to present results. Pupils can consider the survey as a whole, or ask these questions for each survey question in turn. The exercise can relate the skills pupils learn in Sc1 to other areas of the curriculum, demonstrating the relevance of a taking a 'scientific' approach to answering an everyday question or problem.

The energy loss identified can be related to the school's energy bill if this information can be disclosed. Pupils can estimate the cost of energy losses in different ways – this gives a real-life context to their work in Science and across the curriculum.

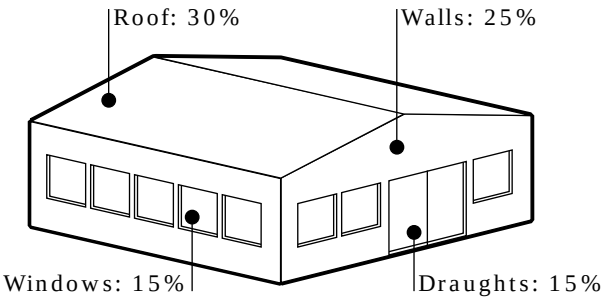
Pupils can design their own draught meter. This gets them thinking about how each 'aspect' of a draught can be measured, such as the speed, area and volume of the air moving. Pupils can explore the insulating properties of materials and how they can be used in real life within the school.

From these two experiments, older pupils can explore how heat is transferred and dissipated by conduction, convection and radiation, and extend their thoughts on stopping energy waste.

Finally, the context of School*Energy* can be explored and applied more widely: how fossil fuels are a finite and polluting resource, and how renewable energy could be used at a local level in their school. (The Geography materials include a useful diagram of energy sources.)

Energy loss in school

1 Imagine this simple building is your school. Look at where heat energy is lost:



- The rest of the heat is lost through the floor. What percentage of heat is lost this way?
- How might the heat energy be lost in each case?
- How could you reduce the heat energy being lost?
- What changes could you make to the building, and how you use it?
- Make a list of all the things you could do for each way that heat energy is lost.

2 Now find out how much your school spends on heating each year. Imagine all of the heat is lost.

- How much money is lost in each way?
- How could you best show this in a chart or graph?

If you reduce the temperature to which the school is heated by just 1°C, you could save up to 10% of your heating bill.

- How much money could you save?

3 Think of your Science lab or classroom.

- How do you think most heat energy is lost?
- List all the ways you could reduce energy wastage.
- How could you tell others about using energy wisely in your classroom?

4 Make some materials to encourage your friends to save energy in your Science lab or classroom. How can you make them attractive and noticeable?

Hot and cold spots

Heat energy is lost from your classroom when it moves from where there is a lot of heat energy, to where there is little heat energy. These are sometimes called 'hot' and 'cold' spots.

1 Think of the room you are in. How could you find the hot and cold spots?

2 Make a simple investigation to 'map' the temperature in your room.

- How many measurements might you have to make?
- How can you make sure your measurements are accurate?
- How could you present your results in an interesting way?

Draughts often make us feel cold, and carry heat energy away from where it is needed. In this way, heat energy is taken to where it is not required and so can be thought of as wasted, or 'dissipated'.

3 Design a way to measure draughts.

- What things do you need to measure?
- What items could you use to make you own 'draught meter'?

You could choose from: Tissue paper, sticks, thread, ruler, stopwatch, protractor, polystyrene balls or anything else you can find.

- Use your draught meter to measure the draughts in your room. Where do they come from?
- How did you make your measurements accurate and comparisons of different draughts fair?
- How could you improve your draught meter?

Heat is often lost because there is not enough insulation.

4 What does insulation mean?

5 Design an experiment to find out what materials are the best insulators. You will do this by finding out how long each material will keep an ice cube frozen, or keep water warm.

- What equipment will you need?
- What materials will you test?
- How can you make sure your tests are fair?
- How could you present your results?

6 Think about the results of your experiment.

- What materials were the best and worst insulators?
- Think about the properties of the materials – how they feel, how they are made. Why are some better insulators than others?
- Where should insulation be placed in or around a room to be most effective?

Finding and saving energy

We need to reduce the amount of energy we use. This is because most of the energy we use comes from 'fossil fuels'.

1 Name the three main types of fossil fuel.

2 Make a poster to explain fossil fuels to others. Your poster should explain one or more of:

- How fossil fuels were formed
- When they were formed, and how long it took
- How we get fossil fuels
- All the ways we use fossil fuels for energy at school and at home
- The uses factories make of coal, oil, etc, both as a fuel and as a raw material
- How long we have been using fossil fuels
- How long our supplies of fossil fuels will last
- What burning fossil fuels does to our environment.

Luckily, there are other sources of energy, called 'renewable energy' sources.

3 Name some renewable energy sources and compare your list with the class. Write down any you missed out.

In one way or another, almost all the energy we have on earth comes from the sun. This energy is changed into other forms, including renewable energy and fossil fuels.

4 Think of one sort of fossil fuel or renewable energy. How did that energy originally come from the sun?

- You could describe this using a diagram with words.
- Why not combine all your diagrams into one big poster that shows all the different sources of energy and whether/how they come from the sun?

We can use renewable energy in many ways. The big companies that generate electricity could use only renewable energy one day. But we can also use renewable energy locally.

5 Think about your school, and where it is located. How could you adapt your school to use renewable energy for heat and light?

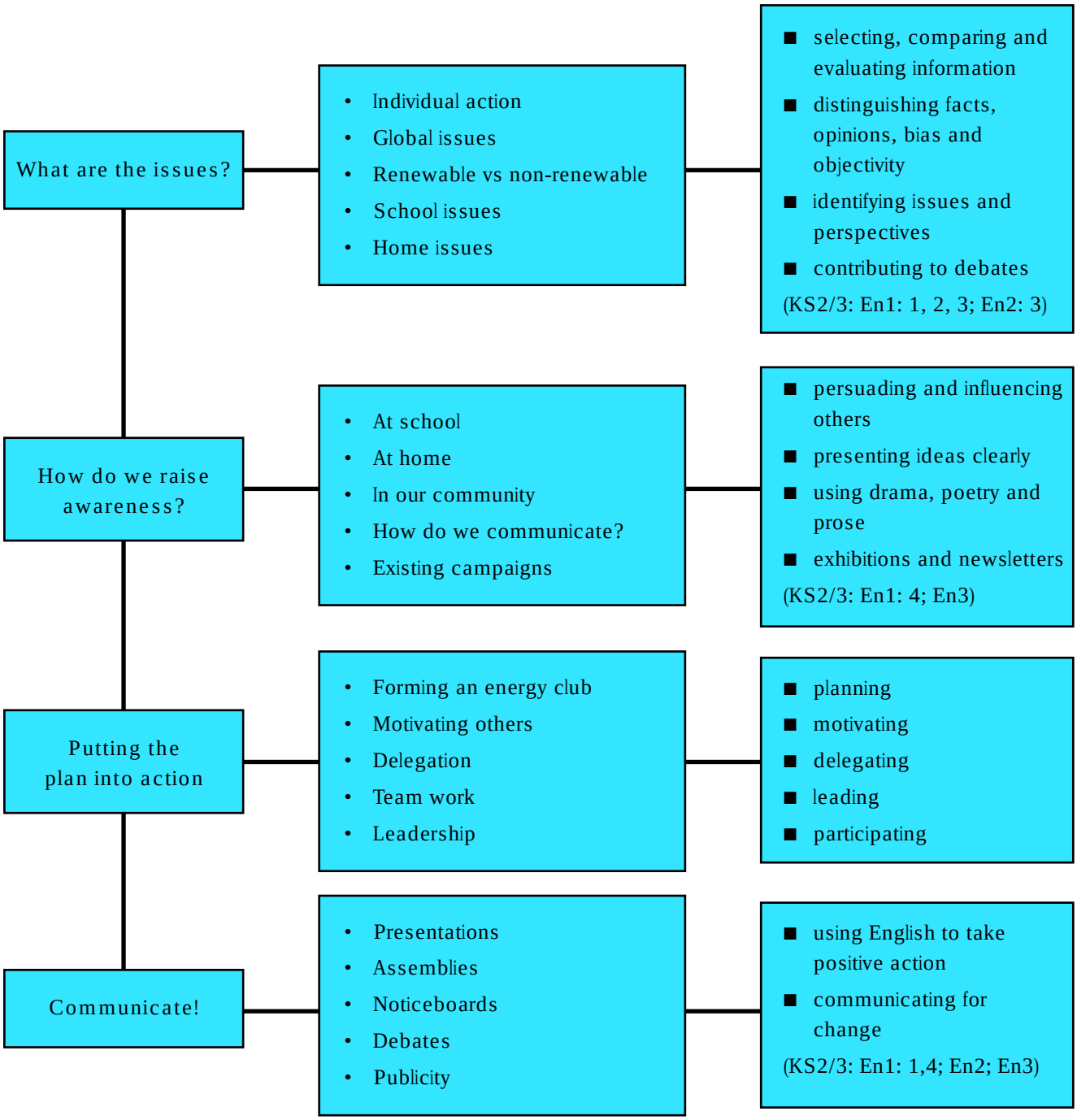
- Draw a map or sketch of your school
- Think of what forms of renewable energy you could use.
- What devices or machines could capture this energy and make it useable?
- Draw how these could be added to your school buildings or grounds.
- How else could you use renewable energy at school?

6 Why not design a 'school of the future' that uses only renewable energy?

You'll need to consider...

- Sources of energy
- Storage of energy (e.g. daytime to night-time, summer to winter)
- Energy efficiency

Energy within the English curriculum



Many elements of the English curriculum can be supported by School*Energy* activities as detailed in the model above. The activities work well in support of those taking place in other subjects. For example, the local and global issues raised in Geography and Citizenship can form the vehicle for delivering the activities as a formal or informal cross-curricular project.

Alternatively, all the activities suggested above or in the activities that follow can be used without specific reference to other subject work. Pupils can research the background material required during study or homework time. The activities can also lead into other subjects, for example Art and Design, for producing posters and artwork designed to convey energy saving messages.

Creative Writing about Energy and Energy Saving

Get your pupils to choose one of the activities below:

- Imagine you are a newspaper reporter for your local paper. Write an article about one of the following:
  - How much energy is wasted by local businesses, and how they could save energy
  - How a power station will need to be built locally unless we use less energy, and how this will affect the local environment.
- Write a letter to your local council or MP. Ask them what they are doing to promote energy saving and make suggestions about how energy could be saved.
- Imagine you live in the year 2100, when oil and gas have run out, there is little coal left and all energy comes from 'renewable' sources such as solar, wind or wave, gravity, geothermal and tidal power. Imagine if energy were 'rationed'. Write about what life is like, imagining a typical day.

Role Play and Drama ideas

- The Headteacher calculates that the school energy bill for last year was £_____ (find out how much from your Headteacher). S/he holds a staff meeting to discuss ways of saving energy. Get your pupils to role-play this situation. Someone could act as the maths teacher who has calculated how much energy can be saved and what the monetary savings could be spent on. Another person could be the science teacher who thinks of ways of fitting renewable energy into the school e.g. solar, wind. What ideas would other teachers think of? What might the Caretaker or Governors say? Would some teachers think the Headteacher was wasting their time? Pupils should try and keep the meeting fast moving and explore the reasons for needing to save energy.
- Pupils should imagine that they have just heard on the news that supplies of oil and gas will run out within a year. They can either:
  - role play their reaction as a family, businessman or politician, or
  - role play life in a world where every possible bit of energy must be used wisely and only 'renewable' energy from such sources as the sun, wind and waves can be used.
- A drama presentation in Assembly could serve as a catalyst for promoting energy saving within the school, presented as a news bulletin, poetry, or 'rap'. This could present the findings from an energy survey of the school (in Maths and Science) and recommendations for saving energy in school.

An Energy Saving Campaign

Why not start an energy saving campaign club in your school? You could show people how energy is wasted in school and how to save energy by using it wisely.

Know your facts!

- As with any campaign, it's important that you understand the subject you are talking about. How? Do your research!
- Your data from a school survey will give you useful background information. This can help you to make decisions about helping to use energy more efficiently.
- You could do more research in the school library, your local public library, or on the Internet.

What next?

- You need to form a team or club. Why? Because you can't do it all on your own. There will be a lot to do! Everyone has different strengths and weaknesses. Some people might be good organisers, some good designers; some may be good at giving talks. Together, you make a good team.
- Hold a meeting for your campaign team. There are several things you need to discuss:
  - Who are we aiming our campaign at? Parents? Teachers? Pupils? Other people who work in school? Or all of them?
  - How does each group use energy? How could they use less energy without being uncomfortable, reducing their facilities or making things unsafe?
  - Why are we doing this? To help the environment? To save money? Both?
  - Are we being realistic? Whatever you want to make the main messages of your campaign, you need to be realistic. No-one's likely to fit solar panels next week as a result of your campaign. But, you can persuade people to put a plug in the sink when washing their hands, for example. Think of simple things we can all do to save energy, and some that only certain people can also do, such as kitchen staff.
  - Information is a powerful thing. How can you use the school survey data to encourage people to save energy?
  - Why not collect newspaper cuttings on energy themes from national and local newspapers? This might give you some ideas for your campaign.

Remember to tell people about the benefits of saving energy. If people don't have a good reason to do something, they won't do it!

How can we communicate our messages?

There are many things you could do:

- An assembly to launch the club and campaign – you could do a role play or drama
- A newsletter for teachers and pupils
- Posters and stickers for around school
- Meetings with staff and pupils

What else could you do?

How can we make it all work?

You need to write down exactly what needs to be done. Decide who will do each thing, and by when. Some tasks may involve the whole club, others may just need one person. For anything to be a success, you need to work as a team and help each other.

The important thing is to be clear on who will do what.

And then – go ahead and save energy!

Notes and Ideas

Energy within the Geography curriculum

	Activities:	Curriculum links:
How do we use energy?	• A day in my life • A day in a developing country	KS2: 1c, 1d, 3a, 3f, 4b KS3: 1c, 1e, 3a, 4b, 6a, 6i
Where does our energy come from?	• It won't last forever • Fossil fuel sources and reserves • Renewable energy	KS2: 3g, 4a, 5a, 6e KS3: 3e, 4a, 5e, 6g, 6i, 6k
How long will it last?	• Becoming sustainable • Renewable energy in the UK	KS2: 5a, 5b, 6e KS3: 3e, 5a, 5b, 6d, 6j, 6k
Sustainable development	• Reseaching renewable energy in the UK	KS2: 1, 2 KS3: 1, 2
What steps are we taking?	• Life in the future: – environment – climate – society – technology	KS2: 3e, 5b, 6d KS3: 3d, 5b, 6g, 6i, 6j, 6k
What will the effects be?		

The activities guide pupils through a process of considering their own energy use and then placing this in a broader context. Empathic thinking helps them to consider what life is like for the 4.8 billion people, the vast majority of the world's population, who share 20% of it's energy resources.

Using a newspaper article as a starting point, pupils then consider the implications for the globe due to our energy use. The effects, changes required and solutions can be considered in terms of:

- Environment – how is the global (or a local) ecosystem affected by energy use?
- Climate – how this will change due to energy use and the consequences of this?
- Society – how will a lack of energy resources affect society in the future?
- Technology – how can this be developed to reduce our impact on the globe? What stops us from moving to renewable technologies?

This leads to the opportunity to discuss the need to move to a sustainable lifestyle. What are the implications for us, and how must our lifestyles change? Pupils can research efforts in the UK to move to renewable sources of energy and consider life in the future, using renewable energy sources but living with the consequences of 300 years of fossil fuel use.

A day in my life

1 Imagine an average school day. Write down everything you do during the day, in a column. In another column, write down how it requires energy. Think carefully – sometimes it's not obvious that energy is needed. For example:

Wake up – electricity for clock radio

Shower – electricity for hot water and pump

Breakfast – gas to cook food and heat water for washing dishes

Go to school – fuel for car or bus

Use PC in ICT – electricity for power

...keep going until you've covered everything you do until going to bed!

2 How else does your school use energy that you have not written down already?

Are there any things you do that do NOT need energy? Probably very few – even reading a book outside needs energy, to make the book and transport it to the bookshop, even reading the book requires energy!

3 Now imagine you live in a developing country where useful forms of energy are scarce. Imagine you have no electricity in school, for light, heating, cooling or for running computers. Write down what your day might be like.

4 How could YOU help to solve the problem?

- Write down some ways in which you could save energy and consume less.
- How could you encourage your family and friends to do the same?

Things to think about

- The sun provides enough energy in one hour to meet the world's energy needs for a year
- 20% of the world's population use 80% of the energy
- The technology exists to cut energy use in the average home by 95%
- Oil reserves are likely to run out in approximately 40 years, gas in 60 years and coal in 230 years.

IT WON'T LAST FOREVER

AT A MEETING YESTERDAY OF THE WORLD'S LEADERS, young people were asked to help people to save energy. A spokesman said, 'Our use of energy, especially in developed countries, cannot carry on. Oil and gas will run out within our lifetimes. We use so much energy that most people in the world will never be able to use any. Using so much energy damages the environment. We need to change our lifestyles.'

'Burning fuels has caused acid rain that is threatening lakes and forests in northern Europe. The gases produced by shops, homes, schools, cars and industries are adding to the 'greenhouse effect' making the earth warm up. This is causing droughts and floods across the globe'.

Leaders hope that young people can help solve the earth's problem by:

- Helping to find new ways to save energy and reduce waste, by consuming less
- Showing adults that being happy does not need to involve using lots of energy
- Helping everyone have access to energy, not just 'rich' countries
- Helping find ways to stop and mend the environmental damage caused by energy use

5 'Renewable' energy sources are naturally replenished.

- Look at the picture showing forms of energy. Write down some forms of renewable energy. What technology can we use to get power from them?
- Can you find examples of renewable energy being used in this country? Near your school or home? What impacts do they have on the environment?
- Think of how renewable energy could be used in other countries.

6 Using maps from your library or the Internet, find out where we obtain our gas, oil and coal.

- How do they get to where we use them?
- How does this damage the environment?

7 Our energy use in the future needs to be 'sustainable'. This means that:

  – We do not use more resources than can be replaced naturally

  – We do not cause damage to the environment

  – We do not take so much of a resource that others cannot use it.

- What do you think this means for how you use energy?
- How might this affect your lifestyle?
- How might these changes alter your local area?
- What should the more developed countries do to show others what can be done?

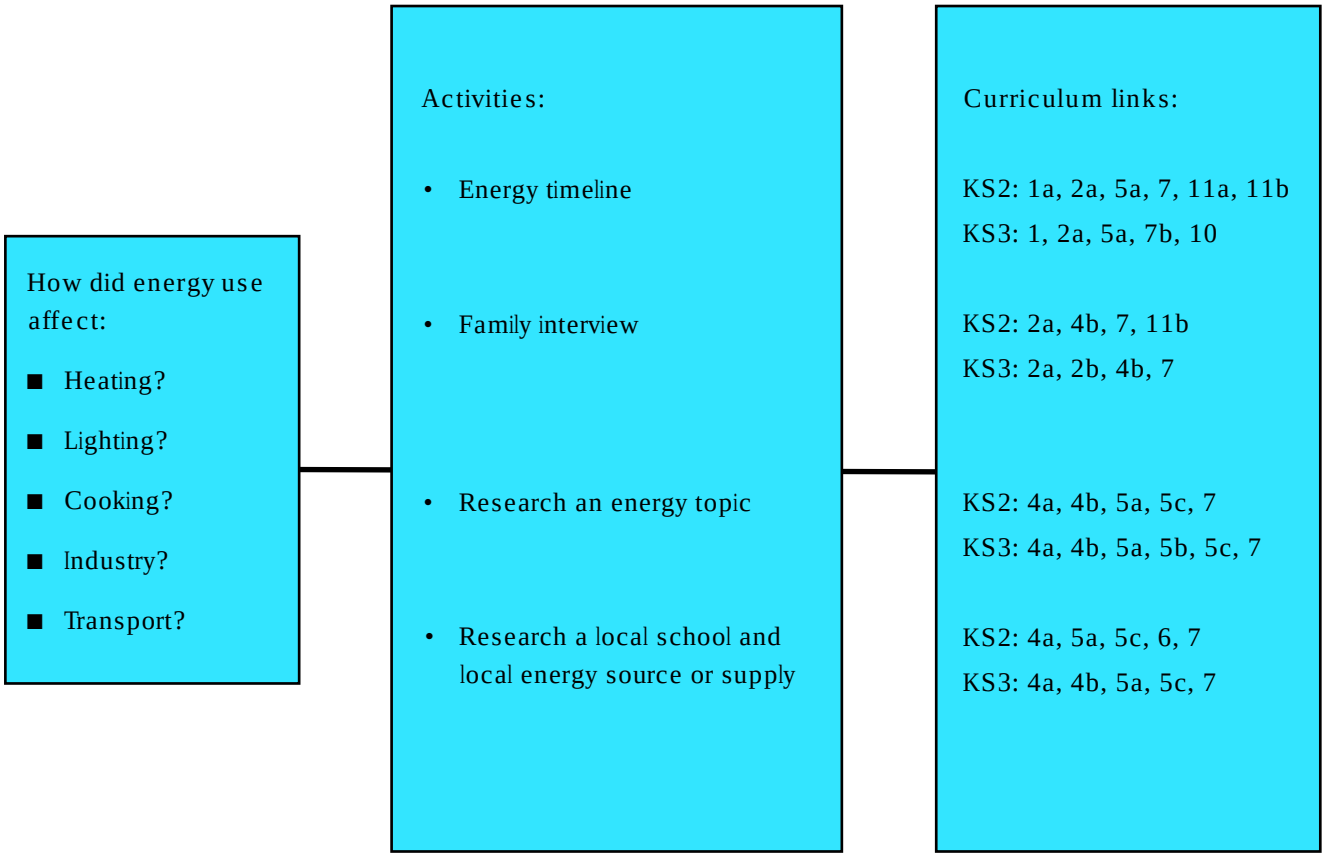
8 Use your school library and the Internet to research what is being done to develop renewable energy sources. Can you find newspaper or online articles about the subject?

- How are we encouraged to save energy?
- How are we learning to use renewable energy instead of fossil fuels?
- How much renewable energy do we use?
- How much will we use in 10 years time?

9 Using what you know about the world's energy resources, now think about life in the future:

- How will our climate and environment be affected by the fossil fuels we have used?
- How might this affect our lives?
- How might we use energy in the future?
- Can you find other predictions of how energy could be used and saved in the future?

Energy within the History curriculum



Energy plays an important role in history, especially since the time of the industrial revolution. The activities that follow allow pupils to discover how our understanding of energy, and use of technology to harness it, has played a central role in our development. For example, the impact of steam power on industry and transport had huge and rapid effects on the lives of the population. The first activity looks at energy through the ages. This leads to the opportunity to explore some aspects in depth, for example the impact of local energy supplies on residents of your area as gaslights, electricity and central heating were introduced.

Extension ideas

Pupils could also:

- Research a local industry, such as a manufacturer, or a major sector. How has the source and type of energy available changed how they manufacture and transport their goods?
- Investigate the role of energy from coal in the industrial revolution. How did the supply of energy from coal have such a dramatic effect? What was this energy used to do? What were the benefits and drawbacks for Britain and for individuals?
- Research how energy will affect how we manufacture and transport goods in the future – what new technologies might we use, and how? How would this affect our energy supply and its effect on the environment?

Energy though the ages

Energy has always been important for mankind. Around 1 million years ago we learned how to use fire and began to burn wood and other plants. For tens of thousands of years, we have used animals' power to provide energy for ploughing, transport and to work machines.

The real 'leaps forward' have been in how we have used technology to provide ourselves with energy for heat, light and power.

- The timeline below is wrong. Can you match the events to the correct dates? (9 events happened in the 1800s and 7 in the 1900s)
- Find out the order in which we discovered new ways to gather and use energy in the 1800s and 1900s.
- Can you find the exact date of each invention or discovery?

Date		Invention or discovery
1	4000 BC	A Natural gas discovered (Europe)
2	1200 BC	B Solar power (France)
3	1000 BC	C Geothermal energy (Italy)
4	500 BC	D Steam engine invented (UK)
5	200 BC	E Windmills (Middle East)
6	50 BC	F Static electricity discovered (Greece)
7	350 AD	G Petrol distilled from oil (America)
8	600 AD	H Gas cookers (Europe)
9	1100 AD	I Gas lights use coal gas (UK)
10	1300 AD	J Hand-dug oil wells (China)
11	1600 AD	K Surface coal burned for heat (China)
12	1700 AD	L Electricity to homes becomes common
13	1800 AD	M Electric light (America/UK)
14	1900 AD	N Nuclear energy (America)
		O Steam locomotive invented (UK)
		P Windmills and watermills (Europe and China)
		Q Candles (Romans)
		R Sails provide power for boats (Polynesia)
		S Hydroelectric power (Europe)
		T Coal gas to homes becomes common
		U Steam boats invented (UK)
		V Solar cells (electric) America
		W Oils wells drilled (North America)
		X Coal found in Netherlands and UK
		Y Watermills (Mediterranean)
		Z Coal brought to Europe by Marco Polo
		AA Oil lamps use vegetable oil (Mediterranean)
		BB Car invented, using internal combustion engine (Germany)

Choose two inventions or discoveries from different ages.

- How did they change people's lives?
- Were all the changes positive, or did some changes cause problems as well as improvements?

Using energy in the past

Even in the past century, there have been huge changes in how we use energy.

1 Interview a member or your family, or someone you know, who is in one of the age bands below.

40 – 50 years old	50+	60+	70+	80+

- How did they use energy for heat, light, cooking, transport, domestic appliances and entertainment?
- Was energy available to everyone, or did some families go without?
- Ask them about how they used energy at work, in offices or factories.

  As a class, group together your answers from each age band.
- What do you think life must have been like for each 'age'? How does it differ from today? Would you have liked to live then?

2 Pick a topic from the list below and find out how things have changed over the centuries.

Lighting	Cooking	Manufacturing	Heating	Transport	Supply	Storage of food

- How has energy changed our lives in each case?
- Where did the energy we used come from?

3 The design of buildings has changed considerably, even in the last fifty years.

- How has this improved energy efficiency?

  Find some photographs of old schools and homes. Compare them to your home and school today.
- What differences can you see in how we used energy now and then?
- How did this influence what life in school was like?

4 What changes can you find in your local area?

- Can you find the site of an old gasworks? When did it open? When did it close? Can you find out why?
- If you live near a source of coal or oil, how has this changed over the years? How did it affect the lives of local people?

Timeline answers:

1 AA	2 R	3 K	4 F	5 Y	6 Q
7 J	8 E	9 P	10 Z	11 X	12 D
13 U, I, O, W, G, M, B, S, H	14 BB, C, T, L, N, V, A				

Using **ICT** to enhance School*Energy* curriculum activities

The following ideas are far from exhaustive, but offer examples of how ICT can be integrated into your participation in School*Energy*. References refer to the ICT curriculum topics that can add value to each subject's activities.

Maths (KS2: 1b, 1c, 5a; KS3: 1c, 2a, 3b, 5a)

- Using spreadsheets to record and analyse data
- Creating graphs and charts from data
- Using drawing software to produce school maps for the energy survey
- Creating slide presentations of survey results

English (KS2: 2a, 3a, 3b; KS3: 3b, 3c)

- Creative writing
- Desktop publishing of articles, newsletters, posters, stickers etc.
- Creating an energy saving website for the school
- Research using CD-ROM encyclopaedias and the Internet
- Creating multimedia presentations

Science (KS2: 2b, 2c, 5a; KS3: 2b, 2c, 5a)

- Data logging using digital sensors over an extended time period
- Using charts to compare trends in data sets (e.g. energy use against average outside temperature)
- Recording, analysing and presenting data

Geography (KS2: 1a, 1b, 1c, 3a, 3b, 5a; KS3: 1a, 1b, 3a, 3b)

- Research using CD-ROM encyclopaedias and the Internet
- Drawing maps of energy usage and sources
- Desktop publishing

History (KS2: 1a, 1b, 1c, 3a, 3b, 5b; KS3: 1a, 1b, 1c, 3b, 3c)

- Research, as above
- Publishing, as above
- Empathic writing

Your ICT Club could also support an Energy Saving Club by exploring how technology can be used to save energy, through design, control and monitoring.