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Glue on this side

# Energy costs and transfers

1	I can name different energy stores
2	I can state that energy is always conserved
3	I can describe several situations where energy is transferred
4	I can describe what work is and calculate work done using $\text{work} = \text{force} \times \text{distance}$
5	I can describe that power is the rate of energy transfer measured in Watts and I can calculate the energy transferred when given power and time

	Keyword	Definition
1	energy resource	Something with stored energy that can be released in a useful way.
2	fossil fuel	Non-renewable energy resources formed over millions of years from the remains of ancient plants or animals. Examples are coal, crude oil, and natural gas.
3	joule	The unit of energy, symbol J.
4	non-renewable	An energy resource that cannot be replaced and will be used up, such as coal, oil, or gas.
5	renewable	An energy resource that can be replaced and will run out. Examples are solar, wind, waves, geothermal, and biomass.
6	chemical energy store	Emptied during chemical reactions when energy is transferred to surroundings, for example when you burn a fuel.
7	dissipation (dissipated)	Becoming spread out wastefully.
8	gravitational potential energy store	Filled when an object is raised, for example when climbing a ladder.
9	kinetic energy store	Filled when an object speeds up, for example when a car accelerates.
10	law of conservation of energy	Energy cannot be created or destroyed, only transferred between stores.
11	thermal energy store	Filled when an object is warmed up, such as when you heat water in a kettle.

## Energy

- **Energy** is needed to make things happen
- It is measured in **joules** or **kilojoules**

- The **law of conservation of energy** says that energy cannot be created or destroyed, only transferred
- This means that the total energy before a change is always equal to the total energy after a change

Energy can be in different energy **stores**, including:

- **Chemical** – to do with food, fuels and batteries
- **Thermal** – to do with hot objects
- **Kinetic** – to do with moving objects
- **Gravitational potential** – to do with the position in a gravitational field
- **Elastic potential** – to do with changing shape, squashing and stretching

## Non-renewable energy

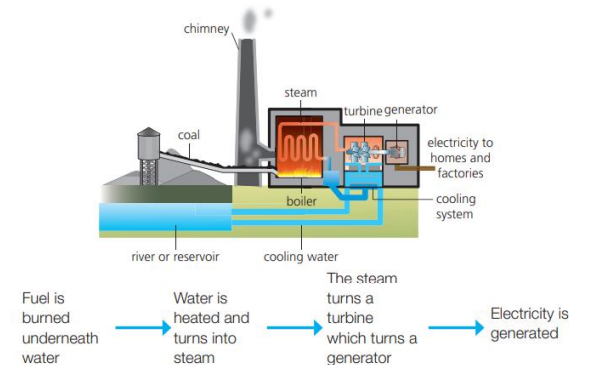
- **Non-renewable** energy cannot be replaced within your lifetime
- Non-renewable **energy resources** include coal, oil, natural gas and nuclear resources
- Coal, oil and natural gas are also known as **fossil fuels**, they release carbon dioxide when burned which contributes to global warming

## Food and energy

- Food has energy in a chemical energy store
- Different foods contain different amounts of energy
- Different activities require different amounts of energy
- Different people need different amounts of energy depending on what they do each day

## Power stations

Thermal power stations burn coal, oil and natural gas, which are all non-renewable energy resources



## Renewable energy

- **Renewable** energy can be replaced within your lifetime
- Renewable energy resources include wind, tidal, wave, biomass, solar, hydroelectric and geothermal
- Renewable energy resources do not produce much carbon dioxide, meaning that they have a smaller effect on global warming

Prior Knowledge From KS2:

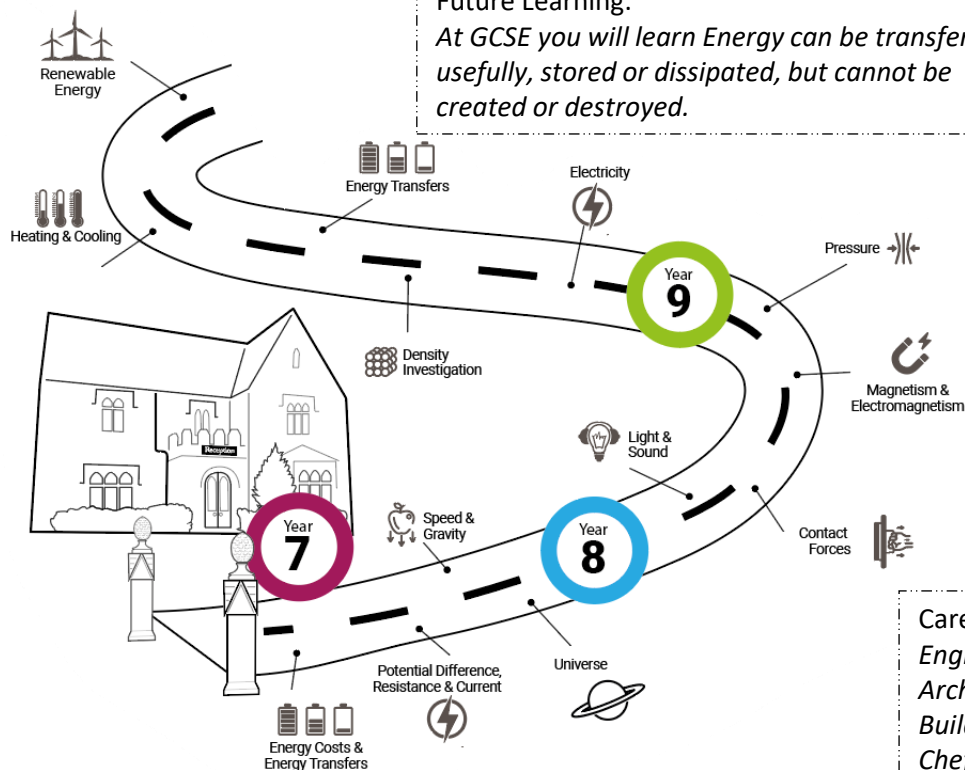
At KS2 you may have learnt that energy can be transferred and heat is an example of a form of energy and can be transferred. You may have also learnt some common conductors and insulators, and associate metals with being good conductors.

Why?

The concept of energy emerged in the 19th century. The idea was used to explain the work output of steam engines and then generalised to understand other heat engines.

Future Learning:

At GCSE you will learn Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed.



## Energy Costs and Energy Transfers Homework Grid

Complete some of the tasks below to reach a total of \_\_\_\_\_ points over this unit of work – Highlight the box once completed.

Topic	1 Point	2 Points	4 Points	6 Points	10 Points
<b>Food and Fuels</b> 	Explain in one paragraph where the energy we use to move comes from.	In your own words, define what a Calorie is.	Design a leaflet for your peers explaining where the energy our body needs comes from and what we use it for.	Write a short blog post explaining the importance of a balanced diet. Include information about how we can design meals that are balanced.	Write a short essay describing the reasons that people might need different amounts of energy in their diets. (Clue – think about how active people are, how old they are etc).
<b>Energy and Power</b> 	Explore your house, find as many appliances as you can and make a note of their energy efficiency status.	Write a tweet that describes what power is (140 characters)	In a short paragraph, describe the difference between energy and power.	Write a poem to explain how you calculate power. Use keywords Watts and Joules.	Heating appliances usually have a higher power rating than other appliances. Use your knowledge of energy transfer and power to explain this.
<b>Paying for Energy.</b> 	Find out the name of the energy supplier your household use.	Write down the units we use that show us how much energy we have used.	Write a short paragraph explaining how we calculate our energy usage. Include at least 3 ways by which we can reduce our energy bills.	Design a poster about where our energy supply comes from and how we pay for it. Your audience is KS2 so think carefully about the words you will use.	Design a worksheet that shows a students how to calculate their energy usage step by step. The final question should allow the student to calculate the energy usage of all appliances in a single room.
<b>Energy transfers and stores</b> 	From memory, write down as many of the 9 main energy stores as you can.	Write down examples of the 9 main energy stores.	Define the following terms, linking them to the key words of the topic: <b>Thermal Energy Store</b> <b>Chemical Energy Store</b> <b>Kinetic Energy Store</b> <b>Elastic Energy Store</b>	Choose a series of objects at home and draw diagrams to represent the types of energy transfers happening when they are used.	Design a game that you could play with a partner to help you remember the key points of the topic.
<b>Transferring energy</b> 	Write a tweet that describes what energy transfer is.	Survey your house and write down the names of objects that use conduction and convection to work..	As a short paragraph, explain how you can use people to show how energy is conducted in solids, liquids and gasses. (Think about the linking game)	Design a poster to explain to a primary school audience how conduction and convection happen. (Think carefully about the words you use).	Design an experiment to demonstrate the process of convection visually.
<b>Energy Resources</b> 	Write down the units we use for calculating energy.	Write down 2 non-renewable and 2 renewable resources.	Write a poem or rap describing what is different about renewable and non-renewable resources.	Write a 6 mark Question with a mark scheme about why renewable resources are good for the environment.	Design a leaflet for primary schools explaining renewable and non-renewable resources.