

Combined science - Physics - Key Stage 4 - Energy

Non-renewable energy resources - worksheet

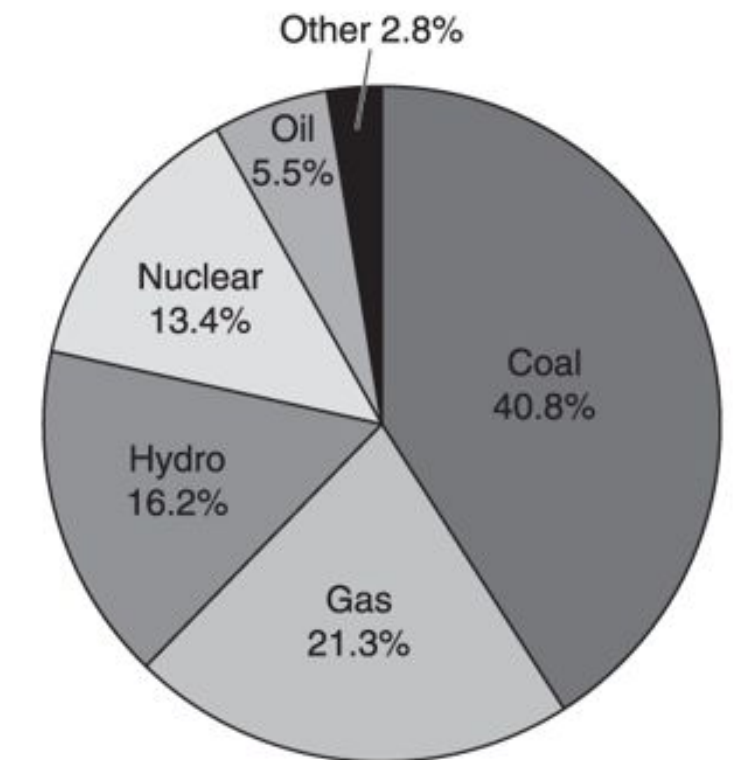
Dr Fishwick



Q1.

Look at the pie chart. It shows information about world electricity production in 2008.

Sources for world electricity production 2008



- i. Coal, oil and gas are fossil fuels.

Fossil fuels are non-renewable.

What percentage of world electricity production in 2008 came from burning fossil fuels?

answer%

[1]

- ii. Suggest some problems this may create for world electricity production in the next 30 years.

[2]



Q2.

a) Look at **Graph 1**. This bar chart shows how electricity was produced in different parts of the world.

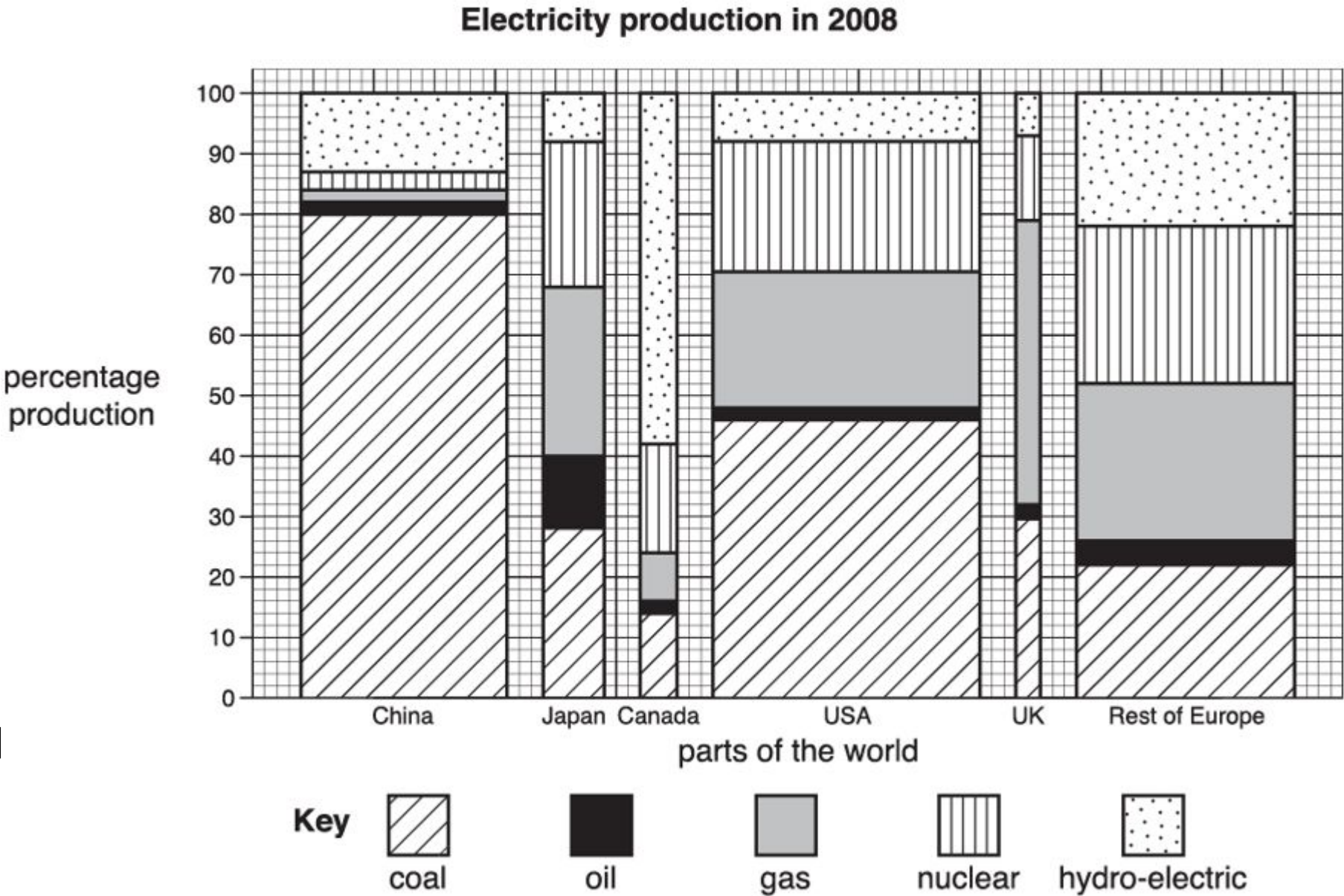
The **width** of each bar is a measure of the total amount of electricity produced in 2008

i. Look at the percentage of electricity produced from coal in each part of the world.

Put these parts of the world in the correct order. Put the highest first.

highest percentage from coal :
.....

lowest percentage from coal :



Q2.

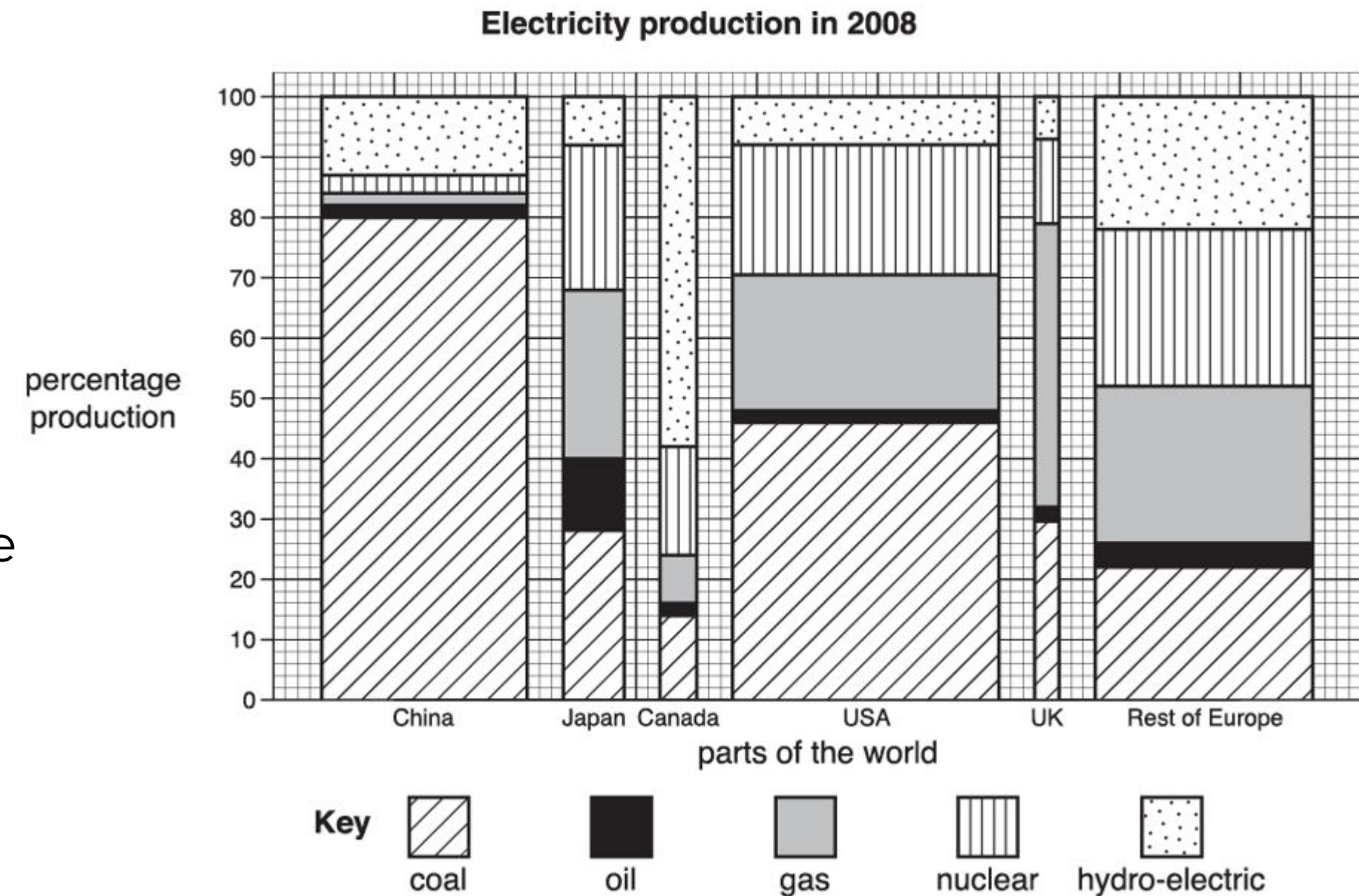
- a) Look at **Graph 1**. This bar chart shows how electricity was produced in different parts of the world.

The **width** of each bar is a measure of the total amount of electricity produced in 2008

- ii. China, USA and the rest of Europe generated the largest amounts of electricity in 2008.

Suggest why they need to produce the largest amounts of electricity. **[1]**

- iii. What other conclusions can you make from this bar chart about electricity production in different parts of the world? **[3]**

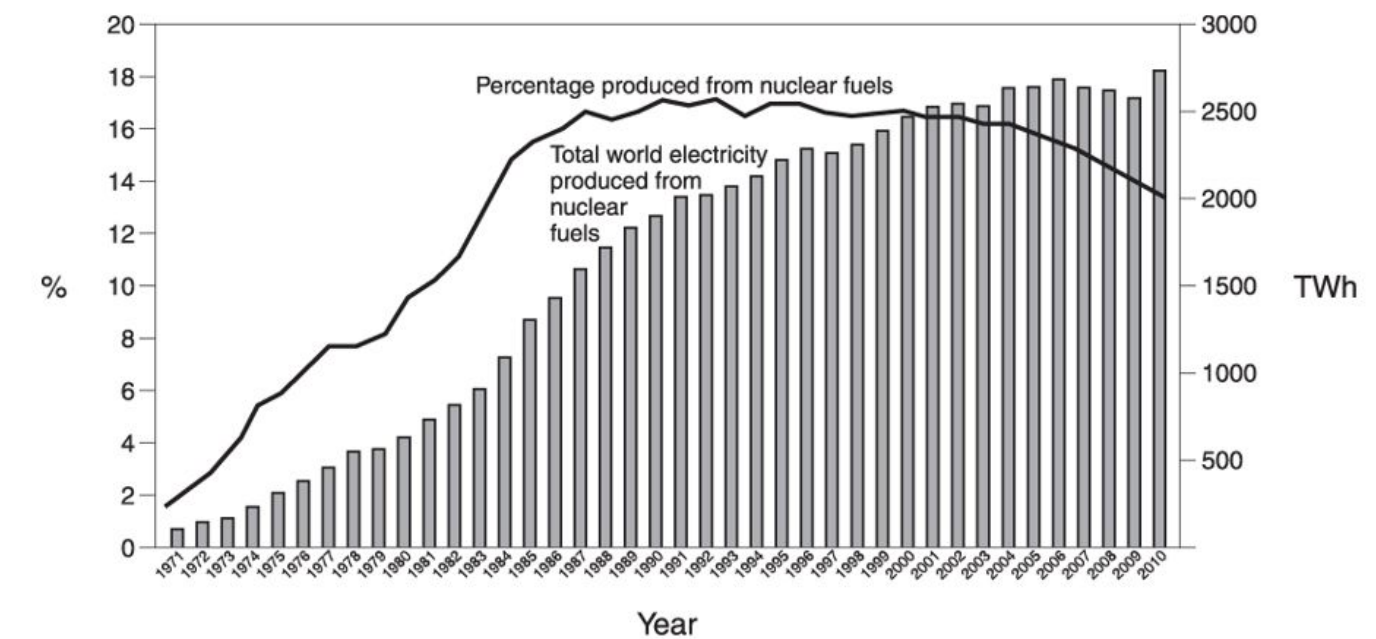


Q2.

b) The production of electricity from nuclear fuels changed between 1971 and 2010.

Look at **Graph 2**.

- The bars show the **total** world electricity produced from nuclear fuels (in TWh).
- The line shows the **percentage** of world electricity produced from nuclear fuels.



Graph 2

What conclusions can you make from **Graph 2**?

[2]

c) Using **Graphs 1** and **2**, suggest what problems may arise for electricity production during the next 30 years.

[2]



Answers



Question			Answer/Indicative content	Marks	Guidance
1		i	67.6 (%) (1)	1	allow 68(%) not 67(%)
		ii	any two from more carbon dioxide or greenhouse gases (1) increase global warming (1) idea of (fossil fuels) running out (1) (need to) use (more) nuclear (1) (need to) use (more) renewable resource / alternative resource / sustainable resource (1)	2	allow increased acid rain (1) ignore cause air pollution allow causes climate change (1) ignore fossil fuels are non-renewable allow examples of resources e.g. solar power (1) ignore references to cost
			Total	3	

Question			Answer/Indicative content	Marks	Guidance
2	a	i	<p>China</p> <p>USA</p> <p>UK</p> <p>Japan</p> <p>Rest of Europe</p> <p>Canada</p> <p>all correct (2)</p> <p>any three on the correct lines (1)</p>	2	<p>allow correct numbers i.e.</p> <p>80</p> <p>46</p> <p>30</p> <p>28</p> <p>22</p> <p>14 (all ± 1)</p> <p>all numbers correct (2)</p> <p>any three numbers on the correct lines (1)</p>
		ii	<p>idea that population is high(est) /</p> <p>more (heavy) industry (1)</p>	1	<p>ignore idea that they have large reserves of coal</p> <p>ignore they are larger countries</p> <p>ignore idea that population is increasing</p> <p>allow produce goods for other countries (1)</p> <p>ignore they are developed countries</p>



Question			Answer/Indicative content	Marks	Guidance
		iii	any three correct conclusions or comparisons within a country or between countries (3)	3	<p>Use ticks on this question</p> <p>ignore answers about coal which repeat the answers given in 16ai</p> <p>ignore incorrect statements</p> <p>Examples of correct conclusions or comparisons include:</p> <p>Canada uses highest proportion of hydroelectricity (1)</p> <p>Canada uses most hydroelectricity (1)</p> <p>Europe has highest proportion of nuclear (1)</p> <p>any correct ranking for any of the fuels (1)</p> <p>UK generates least electricity overall (1)</p> <p>USA generates greatest amount of electricity overall (1)</p>



Question			Answer/Indicative content	Marks	Guidance
	b		<p>any two from</p> <p>total or world electricity production is increasing (1)</p> <p>total or world electricity production decreased in 1997 or 2003 or 2007 or 2008 or 2009 (1)</p> <p>percentage increased and then decreased (1)</p> <p>percentage increased until 1992 / percentage highest in 1992 / percentage decreased from 1992 (1)</p>	2	<p>assume total or electricity or world or TWh refers to bar chart</p> <p>assume percentage refers to line graph</p> <p>not any incorrect year e.g. total decreased in 1997 and 2006 (0)</p> <p>allow percentage decreased after any year in the range of 1992 – 2004 (1)</p> <p>not any incorrect year e.g. percentage increased until 1990 (0)</p> <p>allow percentage increased quicker until 1987 (2)</p> <p>allow total world production must be increasing if total increasing but percentage decreasing (2)</p> <p>allow idea that if percentage of nuclear is decreasing then percentage of other fuels or methods is increasing (1)</p>



	c	<p>any two from</p> <p>idea that need to reduce dependency on fossil fuels (as they are running out) / idea of over-reliance on fossil fuels / idea that fossil fuels or named fossil fuel(s) are running out (1)</p> <p>increased use of nuclear (1)</p> <p>increased use of (named) renewables (1)</p>	2	<p>allow idea that as nuclear share is falling other resources will need to be used (1)</p> <p>allow non-renewable fuels will run out (1)</p> <p>allow nuclear fuel will become scarce or in high demand (1)</p> <p>but ignore nuclear fuel will run out</p> <p>allow increased use of nuclear will lead to increased problems of disposal of radioactive or nuclear waste (2)</p> <p>ignore increased use of alternatives</p>
		Total	9	



In lesson questions



Independent practice

1. How do fossil fuels form?
2. How do humans release the energy from fossil fuels?
3. Which energy store are fossil fuels an example of?
4. How long do fossil fuels take to form?
5. What does the term non-renewable mean?
6. When did the use of energy resources begin to increase?
7. What was the cause of this increase?



Independent practice

1. What are the three main uses of energy resources?
2. Name the three fossil fuels
3. State two advantages of fossil fuels
4. State two disadvantages of fossil fuels



Independent practice

1. State two advantages of nuclear power
2. State a disadvantage of nuclear power



Independent practice

1. State a problem of carbon dioxide emissions.
 - Carbon
2. State two ways to reduce the impact of carbon dioxide emissions.
3. State three problems with emissions of sulfur containing compounds.
4. What can be done to tackle this?



Answers



Review

1. How do fossil fuels form? **Ancient plants and animals that died and were buried**
2. How do humans release the energy from fossil fuels? **Combustion**
3. Which energy store are fossil fuels an example of? **Chemical store**
4. How long do fossil fuels take to form? **Millions of years**
5. What does the term non-renewable mean? **Resources that are used faster than they can be made.**
6. When did the use of energy resources begin to increase? **Around 200 years ago**
7. What was the cause of this increase? **Industrial revolution, development of electricity that can be transported around**



Review

1. What are the three main uses of energy resources? **Transport, heating, electricity generation**
2. Name the three fossil fuels **coal, oil, gas**
3. State two advantages of fossil fuels **Cheap, reliable, high energy density, easy to store**
4. State two disadvantages of fossil fuels **contribute to climate change, non-renewable**



Review

1. State two advantages of nuclear power **No CO₂ emissions during use, very high energy density, Large reserves**
2. State a disadvantage of nuclear power **Disaster could have significant environmental impact, Risk of terrorism, Radioactive waste, High decommissioning cost**



Review

1. State a problem of carbon dioxide emissions.
 - Carbon dioxide contributes **to global warming**
2. State two ways to reduce the impact of carbon dioxide emissions.
 - **Carbon capture**
 - **Use fewer fossil fuels**
 - **Use different energy resources**
3. State three problems with emissions of sulfur containing compounds.
 - **Acid rain which has these effects:**
 - i. **Damage to wildlife**
 - ii. **Breathing difficulties for people**
 - iii. **Damage to buildings**
 - iv. **Leaching of vital minerals from agricultural land**
4. What can be done to tackle this? **Reduce emissions, clean the emissions**

