



## SESSION 5 – Energy

VIEW THE SLIDES in 'SLIDE SHOW' mode – and then all the links will work!!

Please do send us photos of your children enjoying this club!

(Resources required – Print-outs of crossword puzzle – attached at end of notes)

### Slide 2 – Challenge Review

Did you enjoy playing snakes and ladders this week? Do you think it was a helpful way of thinking about climate change actions?

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### Slide 3 – What do you think of when you hear the word 'energy'?

As you may have already learnt in science – as Einstein said – 'Energy cannot be created or destroyed, it can only be changed from one form to another.'

What do you think of when you hear the word 'energy'?

Running, jumping, dancing, breathing ... yes and we get this energy from converting the food that we eat into energy in our muscles.

Explosions in a science lab or in space?

Trees and plants convert the sun's energy into energy to grow – photosynthesis.

We use energy to provide electricity – to enable us to switch on our lights, play our music

We burn fuel to provide the energy to enable us to drive cars, buses, trains, planes.

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### Slide 4 – How do we use energy in our daily lives?

We burn fossil fuels to produce heat energy – which is used to

- power steam engines and create electricity,
- feed combustion engines in our cars and vehicles
- heat our homes and showers /baths via our boilers at home
- cook food – via heated saucepans on a gas hob.

But remember it is the burning of fossil fuels that is a major cause of climate change.



WATCH THE VIDEO – (click the link on the slide in 'slide show' mode)

European Commission video about energy – and notice all the different uses of energy in our homes – just under 4 minutes

<https://www.youtube.com/watch?v=1-g73ty9v04>

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### Slide 5 – Let's have a think about Renewables vs non-renewable sources of energy



Can you think of some differences between Non-renewable sources of energy and Renewable sources of energy?

#### NON-RENEWABLE ENERGY SOURCES

- Fossil fuels - oil, coal and gas
- Formed from the remains of plants and animals that died millions of years ago and cannot be replaced
- Releases carbon dioxide – a greenhouse gas – when burnt
- Fossil fuel energy is very efficient, and often convenient.

#### RENEWABLE ENERGY SOURCES

- Solar, hydropower, wind, geothermal
- Will never run out
- Can be 'intermittent' – (eg the wind doesn't blow all the time!)
- Often requires large areas of land – and not visually attractive

Fossil fuels are increasingly becoming less attractive as energy sources for creating electricity – why do you think this is?

Renewable energy sources don't create carbon emissions.

AND

- Fossil fuels are becoming harder to access – you need to mine deeper into the earth, or in more inaccessible places
- As our planet's population grows, and as nations become more developed there is a greater demand for energy and electricity – so new ways of creating it – often more cheaply – are being explored.
- The impact of burning fossil fuels on the health of our planet (and people's health as a result of air pollution) is becoming more and more obvious
- Businesses are less inclined to invest in fossil fuel extraction – they don't want to be seen to be going against the need to combat climate change
- These factors mean that more countries are increasingly using renewable energy sources.

In 2020 the UK had a total coal-free period lasting 67 days!

Renewable energy made up 47% of the UK's electricity generation in the first three months of 2020 – up from 33% in 2018 – Exciting progress is being made!

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Slide 6 – Solar energy – Do you know of any solar energy projects near you?

Have you seen any solar panels on roofs around you? Or solar panels in fields?

Let's look at some of these solar farms around the world.

The SolarAid charity works to combat poverty AND climate change by providing access to solar lights in remote areas of Africa – particularly Malawi and Zambia

The lights are safe, clean, affordable and use renewable energy rather than burning fossil fuels.



The solar lights can give several hours of light every evening so families can work, learn and feel safe after dark.



WATCH THE VIDEO – (click the link on the slide in 'slide show' mode)

SolarAid video of an 11 year old Tanzanian boy, and his new solar light – 3 minutes

[https://youtu.be/UNvTX0\\_L3m0](https://youtu.be/UNvTX0_L3m0)

A Moroccan thermosolar farm in the Sahara Desert – has mirrors that cover roughly 1.4 million square metres. The \$9 billion solar power plant is expected to generate 580 megawatts (MW), enough electricity to power over a million homes.

A UK firm's solar power breakthrough could make world's most efficient panels by 2021. They could generate a third more electricity per panel than traditional solar panels – by using a thin layer of a crystal material called perovskite.

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Slide 7 – What do you think are the advantages and disadvantages of off-shore wind turbines?

There are exciting new offshore wind turbine projects in the UK

What do YOU think are the advantages and disadvantages of having offshore wind farms – ie in the sea?

Chat to the classmate sitting next to you and have a quick think

Advantages –

- Wind speeds can be steadier and faster
- Wide open spaces without planning restrictions – or houses, roads,
- If they can't be seen from the coast then no issues with 'aesthetics' – what they look like. Many people dislike the idea of having a wind farm sited near their home, on land, because it will spoil their views.
- Transport of sections – towers, blades etc – can be more easily managed by sea than by road.

Disadvantages –

- Can be difficult to construct in waters of over 60 metres deep
  - Can be expensive to install
  - Can be difficult to maintain
  - Need to transfer the electricity back to the mainland where it is needed
  - Effects on marine animal and bird life not yet fully understood
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Slide 8 – What are fossil fuels used for – aside from creating electricity?

What else are fossil fuels used for?

Transport – petrol / diesel



Heating – via gas or oil boilers

Cooking – gas, or firewood

## TRANSPORT

In November 2020 the UK government announced it's 'Green Industrial Revolution' in a 10 point plan. Included within this was a ban on sales of internal combustion engine (ICE) cars and vans by 2030, with hybrid cars and vans allowed to be sold until 2035.

Would you like to drive an electric car?

Yes

- Less carbon emissions – as petrol / diesel is not being burned in the engine – so none directly from the exhaust
- Less air pollution – which affects human health

No

- Carbon emissions may still happen – in creation of electricity (until all electricity is created with Renewables) and in manufacturing vehicles
- How are we going to charge the cars - will need an infrastructure of charging points.
- Some of the components of batteries need to be mined from the ground – so we are causing more environmental destruction. (Electric vehicles are powered by lithium-ion batteries. Mining lithium and manufacturing these batteries is water-intensive and contributes to air, soil, and water pollution.)

The UK government and many governments around the world have decided however that on balance it is better to move to electric vehicles – it will substantially reduce our carbon emissions, and ease urban air pollution issues.

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Slide 9 - What fuel do YOU use in your home for cooking?

## COOKING

What fuel do you use in your home for cooking?

Gas, electric?

Fossil fuels are used all round the world. In the global south, – developing countries – like Sub-Saharan Africa, many households still cook on open fires – burning fossil fuels.

Clean cook stoves projects are helping reduce carbon emissions (they are more efficient and use much less fuel)

Can you think of some of the other advantages of the new cook stoves?

- Some of the stoves replace the traditional fuels – firewood, dung, or coal – with new biofuels – such as made of agricultural waste and sawdust.
- Prevent families from inhaling harmful smoke, improving their health
- Increase families disposable income, as they spend less on cooking energy, positively impacting their livelihood
- Reducing deforestation (less firewood needed) and helping preserve natural habitats.



(HEATING – incase anyone asks!)

80% of the gas used in our homes is for space heating, only 20% relates to water heating and cooking

The UK is working on how to reduce our heating related carbon emissions (UK Ten Point – includes commitments to alternative ways to reduce the carbon emissions related to heating our homes. Aims – a) develop a town heated entirely by hydrogen by the end of the decade.

- b) There is also a commitment to improve energy efficiency of our homes,
- and a target to install 600,000 heat pumps every year by 2028.

(The success of heat policy will depend on consumer preferences, technological constraints and energy efficiency. These make the widespread decarbonisation of heating a major challenge.)

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Slide 10 – Cross word puzzle – focusing on ENERGY!

Answers –

1 – Type of engine normally used in cars – combustion

2 – Coal, oil and gas are this type of fuel – fossil

3 – A source of energy that will never run out – renewable

4 – Home appliance used to heat water – boiler

5 – Giant windmills used to create electricity – turbine

6 – A necessary use of energy within the home – cooking

7 – Carbon emissions in our atmosphere act like this – greenhouse

8 – A renewable form of energy from the sun – solar

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Slide 11 – Challenge for the week!

Can you find three ways to reduce your fossil fuel 'energy' use this week?

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Take-away points from this session:

- We burn fossil fuels to produce heat energy which in turn is used to produce electricity, make vehicles move, heat our homes and water, and cook our food.
- Renewable energy sources – solar, wind, geothermal and hydro-power do not produce carbon emissions. There are pros and cons of all energy sources.
- Renewable energy made up 47% of the UK's electricity generation in the first three months of 2020.



## Down

1. Type of engine normally used in cars
4. Home appliance used to heat water
6. A necessary use of energy within the home
8. A renewable form of energy from the sun

## Across

2. Coal, oil and gas are this type of fuel
3. A source of energy that will never run out.
5. Giant windmills used to create electricity
7. Carbon emissions in our atmosphere act like this

