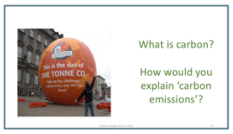
SESSION 6 – What is carbon?

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 blank carbon footprint – attached at end of these notes)



Slide 2 – Challenge Review

What three ways did you find to reduce your fossil fuel 'energy' usage?
Which do you think make the most impact on climate change?

Slide 3 - What is carbon? How would you explain 'carbon emissions'?

What is carbon?
Carbon is a 'non-metal' element.
Our human bodies are 18% carbon. The carbon in our bodies exists joined with atoms of other elements, such as hydrogen and oxygen.
All living organisms contain carbon compounds inside their cells. As fossil fuels were formed from the remains of dead organisms – they all contain carbon.

When the fossil fuels are burned, they release energy (that is used for example - to power steam turbines to make electricity, or in combustion engines to make vehicles move, but they also produce CARBON dioxide).

How would you explain 'carbon emissions'?
Carbon emissions is just another way of talking about emissions of Greenhouse gases.
('Greenhouse gases' – carbon dioxide, methane, nitrous oxide, chloro-fluorocarbons and water vapour.)
Carbon dioxide, is one of the biggest causes of man-made climate change, so that's why people normally talk about 'cutting their carbon emissions'.
In fact, in order to combat climate change we are also trying to cut down on emissions of the other greenhouse gases. Human activity is also releasing too much methane into our atmosphere.

Different greenhouse gases trap different amounts of heat in the atmosphere, a quantity known as their global warming potential. All other emissions (like methane) are measured in terms of their 'carbon equivalent' – hence why we just use the terminology 'carbon emissions'.

Slide 4 – What does the hockey stick graph tell you?

When you look at a graph like this you can think about the numbers but you can also think about the story the graph is telling.
You might not want to focus too much on the numbers, though it's probably helpful to know what some of the most important numbers talked about in climate change mean. But the story is a big one.
Let's look at the numbers first and then maybe you can tell me about the story…

On this slide – we are looking at PARTS PER MILLION, we'll be looking at TONNES on the next slide.
CARBON – PARTS PER MILLION - One of the 'carbon' numbers that you might hear about is the global levels (parts per million) of carbon in the atmosphere.
It is recorded daily in The Guardian newspaper (and elsewhere!) alongside the weather forecast.

Can you see the line on the graph hovers around 280ppm for a very long time – from 0 AD to maybe somewhere in the 1800s, then sky rockets – to around 415ppm now.

So what's the story? The hockey stick graph tell you levels of carbon in our atmosphere has dramatically risen since the mid-1800s – which was the beginning of the Industrial Revolution.
Levels of carbon in our atmosphere are currently at around 415ppm, which is ABOVE the target levels.

Look at the green triangles on the slide
Pre-industrial revolution – 280 ppm
TARGET – 350ppm
Nov 2020 – 415 ppm
(If you choose to look at the daily rates you will see that they fluctuate across the year – this is due to seasonal fluctuations – so it is best to compare by month for a previous year)

How is it measured?
The Mauna Loa observatory in Hawaii has been measuring the carbon in our atmosphere since 1958. Prior to 1958 is gained via analysis of ice cores. (The oldest ice cores show that carbon dioxide levels are higher now than at any time throughout 800,000 years)


WATCH THE VIDEO - (click the link on the slide in 'slide show' mode)
British Antarctic Survey team, explaining how they drill for ice cores. – less than 3 minutes
https://www.youtube.com/watch?v=VjTsj-fi-p0

(Each season's snowfall has slightly different properties – so the layers of ice can be read like the rings of a tree, to count the age of the ice. When ice is formed it holds bubbles of 'atmosphere' at the time – which can show how much dust, ash or pollen, as well as how much carbon dioxide was in the atmosphere in that particular year.)

Slide 5 - TONNES OF CARBON

Carbon emissions per person (2016 – latest World Bank data)
UK – 5.8 tonnes
America – 15.1 tonnes

Kenya – 0.4 tonnes. (Kenya is in Sub-Saharan Africa – which we have looked at already)

Can you think of some of the main reasons why these figures are so different?
Think back to the UNICEF video – the very different lives that children in Sub-saharan Africa live?
American carbon emissions per person might be higher because

- More electricity is created from coal (approx. 30%). The UK has substantially reduced its coal powered electricity, alongside increasing renewables, and gas powered electricity emits less carbon emissions than coal).
- People drive more, and use bigger cars.
- People tend to eat more meat.

Can you think of other ideas?

Can you remember talking about Climate Injustice in the last session?
'The richest half of the world's population is responsible for 90% of global carbon emissions'. Oxfam.
All the more reason why we, in the UK, need to be helping to reduce our carbon emissions and help combat climate change.

If you'd like to look up other countries here's the link.
https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?most_recent_year_desc=true

Slide 6 – What do we need to do to reduce our carbon emissions?

In order to combat climate change we are also trying to cut down on emissions of the other greenhouse gases as well as carbon dioxide from the burning of fossil fuels.
Human activity is also releasing too much methane into our atmosphere.

Global CARBON EMISSIONS (equivalents)	
Burning fossil fuels	62%
Deforestation and destruction of wetlands	11%
Agriculture - rice paddies, livestock; Waste - landfill	16%
Other	11%

So to reduce the 'carbon emissions' that are building the blanket in our atmosphere – we need to Reduce our home energy usage, cut our consumption levels, cut our food waste, reduce our waste going to landfill, reduce red meat consumption, fly less and drive less. As well as protecting our forests and wetlands (which we'll look at in Session 9 when we discuss Net Zero and carbon stores).

Statistics from Project Drawdown.

Slide 7 – What is a carbon footprint?

Has anyone heard the phrase 'carbon footprint'?
CARBON FOOTPRINT - carbon emissions resulting from an individual, organization, activity, event or product.

Or you could think of it like the impact you (or the organisation, activity etc) makes on the earth that you tread on.
Most things we do and everything we buy has a 'carbon footprint'.

What would you need to think about to understand the Carbon footprint of a Can of Coke?

INGREDIENTS, PROCESSIN, PACKAGING, TRANSPORTATION, STORAGE, RECYCLING WASTE
And that's for a simple can of coke …
When you delve deeply into carbon footprints you can keep going further and further!!
(For example - you could look at the carbon emissions related to the people who work in the factory, or the carbon emissions related to creating the factory in the first place, or the carbon emissions related to the marketing team or finance team that support the production of cans of coke… it goes on!)

Spend a few moments in groups looking into each of these topics?
Here are some suggestions – if you need some pointers
Ingredients (well the main ones!)

- carbonated water – energy expended to purify the water, carbon dioxide to make the bubbles, energy used to process of carbonating it, energy needed to purify the water,
- sugar – carbon emissions related to growing the sugar, transporting it, packaging it
- caffeine – carbon emission related to growing coffee beans, transporting them, processing them to produce caffeine

Processing

- energy used in factory - and energy used to create factory machinery

Packaging – aluminium can

- Energy used in mining aluminium, energy used to process the aluminium, energy required to line the can with plastic

Packaging – in boxes

- Cardboard boxes will have related carbon emissions due to felling of trees, and cardboard manufacturing process

Transportation

- Vehicle fuel carbon emissions, refrigeration carbon emissions

Storage / shop

- Refrigeration carbon emissions

Waste / recycling

- What about the energy needed to recycle the can?

(OPTIONAL – if you have time)


WATCH THE VIDEO - (click the link on the slide in 'slide show' mode)
LIFECYCLE OF A T-SHIRT – This 6 minute Ted-ed video clearly explains how a plain white T-shirt is made. It looks more generally at its environmental impact - including water usage, pesticide pollution.
https://ed.ted.com/lessons/the-life-cycle-of-a-t-shirt-angel-chang
https://www.youngclimatewarriors.org/post/life-cycle-of-a-t-shirt-a-ted-ed-video

Slide 8 - How can we reduce our consumption of 'stuff'?

In our society we have grown to love having new things, the latest fashionable items, joining in the latest craze, but do we really need them?

Let's have a think – in what ways do you think you could reduce your 'consumption' of 'stuff'?

- Could you make do with something you already have?
- Root around in the back of a cupboard – to find things you'd forgotten you had?
- Buy second-hand?
- Borrow from a friend?
- Share with friends or siblings?
- Upcycle items to turn them into something new?
- Opt for 'doing' something rather than 'buying' something?
- Make homemade presents?
- And if you need to buy 'new' – could you consider brands that are trying to reduce their carbon emissions – look for Organic? Fairtrade? Forestry Stewardship Council? Soil Association?

Slide 9 – Fill in YOUR carbon footprint.

What does your carbon footprint look like?
Here is a typical footprint ……..

1) On a rough piece of paper, or in groups discuss what you might have in your carbon footprint
2) Draw a picture of a foot – make it quite large – to fill an A4 page – and fill it in.
3) Compare your footprints to those of others.

Slide 10 – Challenge for the week!

Pin YOUR CARBON FOOTPRINTS up somewhere at school – and chat about it with your classmates.
Remember - 'Do I really need it?'

Take-away points from this session:

- Carbon dioxide, is one of the biggest causes of man-made climate change, so that's why people normally talk about 'cutting their carbon emissions'.
- Carbon in our atmosphere has 'sky rocketed' since the industrial revolution. We now have 415ppm, but we need to get back to a target of 350ppm (parts per million)
- In the UK each person is responsible for carbon emissions of nearly 6 tonnes, compared to America at 15 tonnes, and Kenya at 0.4tonnes. – 5.8 tonnes
- Reducing our 'carbon emissions', is not just about reducing the burning of fossil fuels, we also need to reduce other sources of 'carbon emissions' – eg landfill waste, agriculture, livestock.
- **'The richest half of the world's population is responsible for 90% of global carbon emissions'. Oxfam**
- Most things we do, and EVERYTHING we buy has a carbon footprint.