

Pieces of the carbon pie

See below for the learning outcomes, what you will need to have ready, and where you can find out more.

Learners will have/be able to:

- Recognise and explain the main global contributors of carbon dioxide emissions into the atmosphere
- Apply logic and thinking skills in working out which activity fits which piece of pie
- Explain how a pie chart, using percentage values, can be used as a visual illustration, and be easier for some people to interpret

Outdoor/indoor space

Clipboard + 3.1A Carbon pie activity sheet
1 each

3.1B Pieces of the carbon pie
Completed pie chart diagram

Colouring pencils
Enough for everyone

Scissors & glue
Enough for everyone

Forestry Commission Scotland

*Forests and climate change:
a convenient truth* (15 minute film)
www.forestry.gov.uk/scotland

Learning and Teaching Scotland

Climate change
www.ltscotland.org.uk/exploringclimatechange

This activity looks at the global situation and which human activities are contributing most carbon dioxide to the atmosphere.

It builds on children's prior learning and ability to share and build on knowledge and understanding through discussion and forming questions. The use of a pie chart builds on numeracy skills, and the advantages of the visual interpretation of data.

Preparatory activity

Project some images of human activities across the globe – palm oil plantations, tropical rainforest felling, view of the prairies with tractors, small scale organic farms, cement works, oil refineries, cityscapes, Scottish/English/Welsh landscapes, trains/cars etc. Discuss what is going on and where carbon dioxide may be a by-product. Introduce some vocabulary – discuss what we mean by natural resources and products, and the difference between exploitation and intensive management/activity, and sustainable management/activity.



Activity 1

- 01 Organize the children into small groups and present each child with a copy of 3.1A *Pieces of the carbon pie*. How has it been constructed? Start at the 12 o'clock position and work clockwise first with the largest segments, then equal segments and then the smallest. Now look at the different activities contributing carbon dioxide to the global atmosphere. Each of these activities fits one of the segments of the pie.
- 02 Ask everyone to choose a different colour for each activity box, and shade them neatly, and then cut the boxes out. In their groups they should discuss and decide which activity they think is the largest contributor, which is the smallest contributor and to order the rest in between. For example what does *others* mean and where do they think this might fit? They need to give a reason for their final list. They should order their activity boxes in front of them.
- 03 Ask for the groups to give feedback with their reasoning; then, if necessary, you respond with is the correct order and discuss any surprises.
- 04 Ask the learners to shade in each piece of the pie chart with colours to match the relevant activity. Then stick the activity box onto the appropriate pie chart segment. You can discuss which way round is easiest to read, the effect of colour etc.

Look at a blown up version of the diagram 3.1B *Pieces of the carbon pie* – how does it differ. Which is clearer and why?

What does the pie chart tell them? That power production across the world is the biggest/most significant emitter of carbon dioxide into the global atmosphere (reinforce by explaining why) and that deforestation is a close second. Britain/Europe has already been deforested way back, so where is most of this activity going on today? (Tropical rainforests and sub-arctic taiga forests in Russia – again reinforce why).

Use fist of 5 to indicate whether they feel they have learnt a lot or a little.

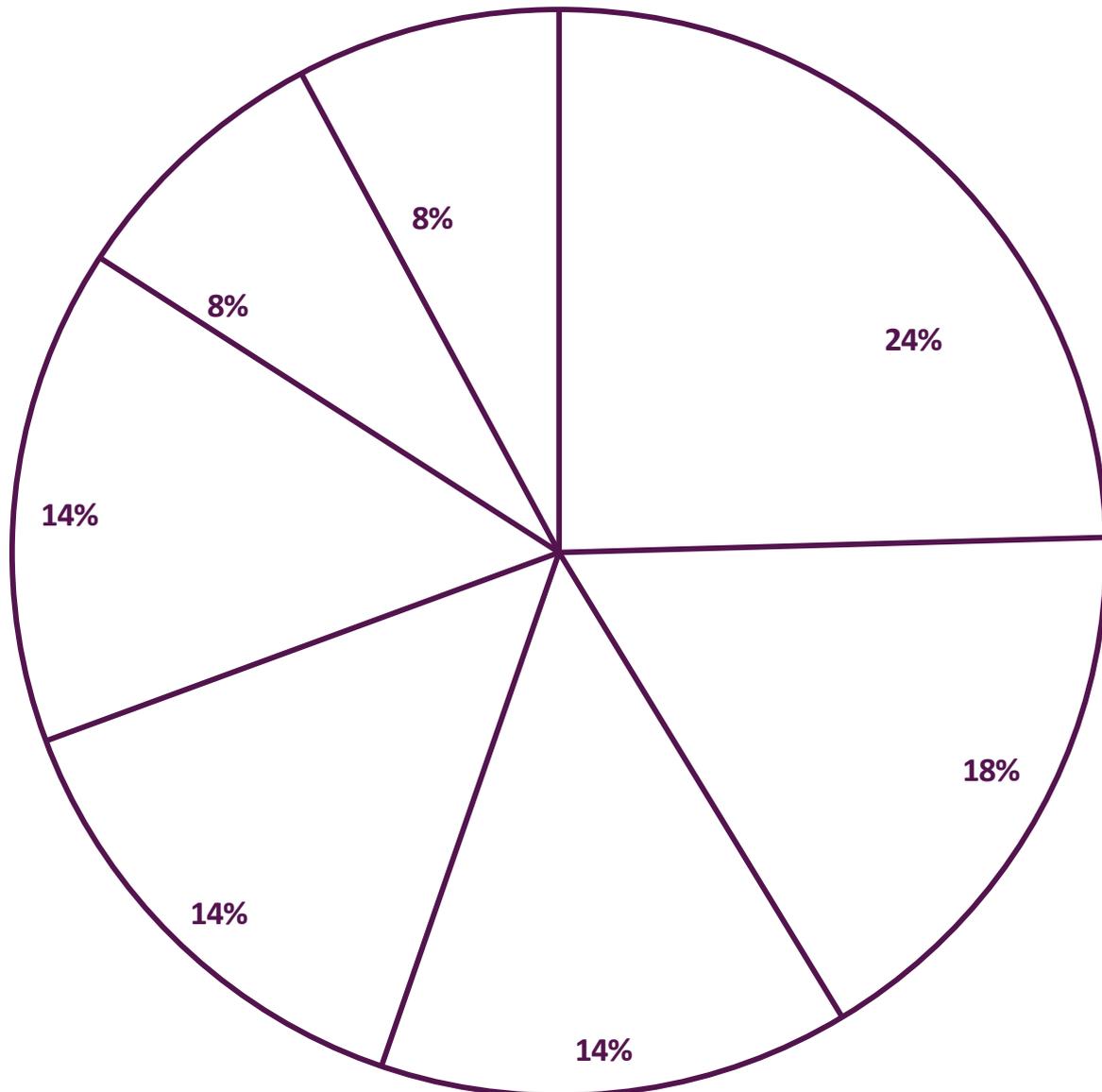
05

06

07

3.1A

Carbon pie activity sheet



- 1 Cut out the activity boxes and put them in the order you think matches the % of carbon dioxide emissions.
- 2 Shade in each segment a different colour, match with and shade activity box – glue onto segment.

✂

agriculture	deforestation
others	transport
industry	buildings
power	

3.1B

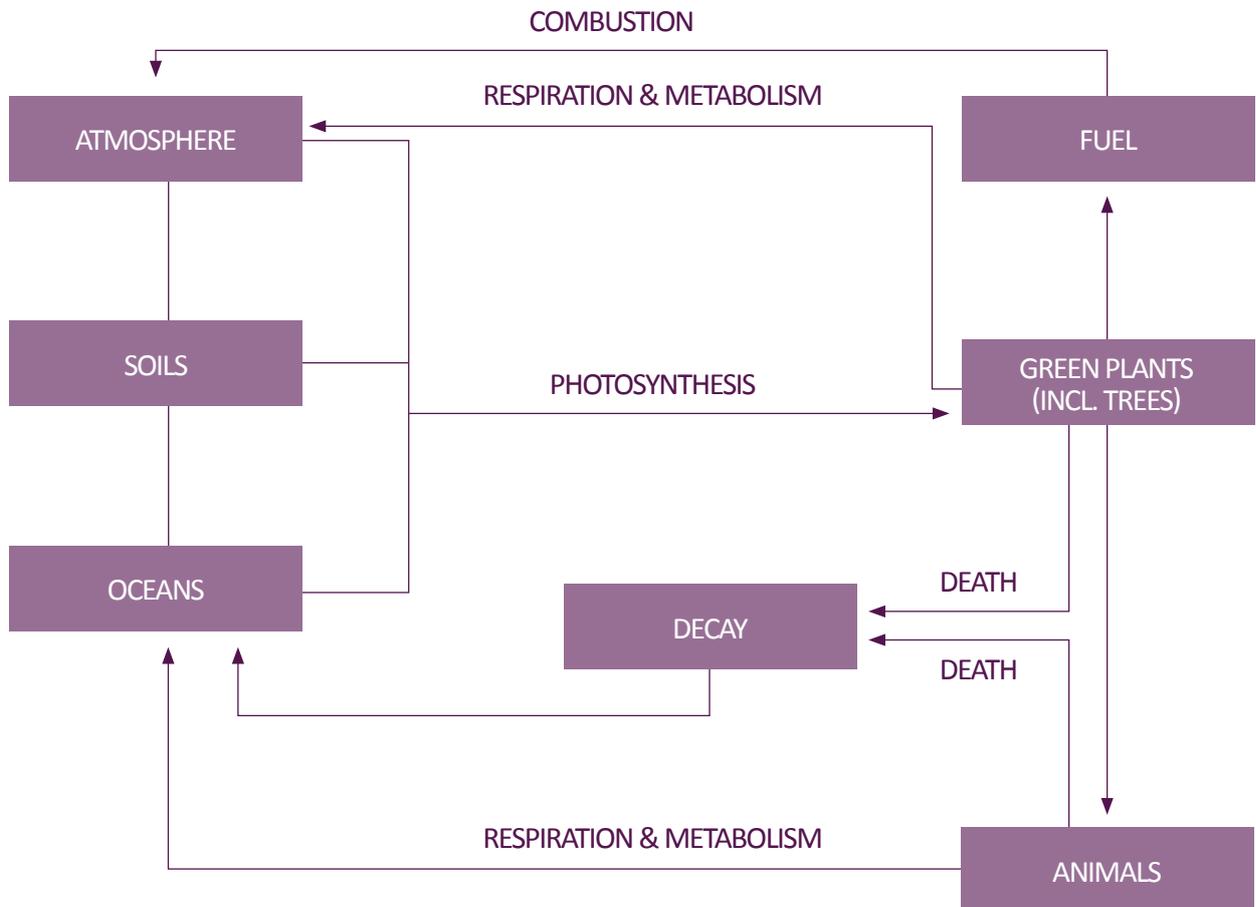
Pieces of the carbon pie



Pieces of the carbon pie

The carbon cycle

Carbon atoms are everywhere – in plants, animals, soil, air, water, rocks, the oceans and ocean sediments, and the earth’s interior – mantle and crust. Carbon doesn’t stay in one place – it cycles – not a random circulation, but following a particular pattern – a periodic cycle called the carbon cycle. Within the carbon cycle there is no creation or destruction of carbon – the process only involves the movement of carbon around a complete cycle in various compound forms.



Carbon pie ingredients

Throughout human occupation of the planet we have interfered with the carbon cycle – but only now that there are so many of us, has it become noticeable and significant. Here are the main activities which are influencing the carbon dioxide emissions into our atmosphere, and are a main contributor to an excessive greenhouse effect.

Power production

Most power on the planet is still produced by power stations burning fossil fuels – peat, coal, oil or natural gas. The majority of people on the planet still heat their homes, cook and drive their cars by burning wood, coal or oil by-products (petrol/paraffin).

Deforestation

Deforestation is when trees are removed without being replaced. This results in the trees' stored carbon being released back into the atmosphere as carbon dioxide, increasing the amount of greenhouse gases in the atmosphere. Deforestation is estimated to account for 18% of global carbon emissions caused by humans – this is more than transport.

Industry

Manufacturing and service industries all rely on power of some sort, and generally involve some kind of transportation. Mining/quarrying involve transporting raw materials to their manufacturing sites, and the products to their places for retail/storage.

The cement industry produces a significantly higher proportion of carbon dioxide as limestone (carbon rich) is heated to produce lime, a component of cement, releasing carbon dioxide. This is in addition to the machines powered by fossil fuels.

Agriculture

Modern agriculture depends on the use of large machinery and tractors for various tasks – transportation, ploughing, planting, spraying, irrigating and harvesting, milking cows, keeping chicken farms at the right temperature etc. These are all reliant on burning diesel fuel – derived from oil. Fertilisers involve large quantities of fuel and the transport of raw materials – releasing carbon dioxide that has been stored for millions of years. Burning modern agrofuels also releases carbon dioxide which has been stored for only a few years or less.

Transport

Most personal and commercial transportation depends on burning derivatives/by-products of oil – petroleum, diesel, LPG. This includes air, rail, car/lorry and bus travel. Total carbon dioxide emissions for train travel compared air travel are 0.04kg/km (train) and 0.69 (aircraft).

Buildings

Modern buildings require considerable amounts of cement, and transport of heavy materials such as glass and brick. When not well insulated and heated by burning fossil fuels – emissions of carbon dioxide as well as heat are high.