




<b>TOPIC: Peatland Basics</b>	P5-7
<b>DESC &amp; how to deliver</b> <b>This is the background lesson to support the suite of peatland themed lessons. It is useful to start with this lesson, which can also be a way of explaining climate change and greenhouses gases to pupils. This lesson also gives a basic overview of peat and peatlands.</b>	
<b>There are optional outdoor components in this lesson.</b>	
<b>Literacy, numeracy, health and wellbeing</b>	CfE links
<b>HWB 2-25A</b> ( <i>if outdoors</i> ).	SCN 2-04B, SCN 2-17A
<b>Learning Intentions: We are learning to identify causes of climate change.</b>  Success Criteria I can define climate change I can give examples of fossil fuels I can identify carbon, oxygen, and hydrogen by their scientific symbols I can identify objects and living things around me that are made from carbon I can link carbon to fossil fuels I can describe how greenhouse gases, such as carbon gases, warm the earth	
<b>Key words</b> <b>Fossil Fuels</b> <b>Carbon Dioxide</b> <b>Peatlands / Peat</b> <b>Coal, Gas, Oil</b>	Other – SDGs, UNCRC, Digital Skills  UNCRC 24, 29, 31 ( <i>if outdoors</i> ). <div> <div>7 AFFORDABLE AND CLEAN ENERGY </div> <div>13 CLIMATE ACTION </div> <div>15 LIFE ON LAND </div> </div>
<b>TEACHER NOTES</b>  To understand why climate change is happening, we need to know the following: <ul style="list-style-type: none"> <li>Greenhouse gases are gases which warm the planet by blocking the sun's energy from leaving the atmosphere and going into space. These include carbon dioxide, methane, water vapour, and nitrous oxide. They make up a small percentage of the overall gases in our atmosphere, but have increased by 50% since 1750 and the onset of the industrial age.</li> <li>This is because of the carbon cycle (the natural, slow cycle of carbon in different forms and in different places of the earth and it's atmosphere) carbon dioxide is breathed in by plants, which build their bodies out of carbon to grow. They are eaten by animals, which use that carbon to grow too. Eventually, these organisms die and their carbon gets broken down and returned to the soil by worms, fungi, etc, or it reacts with the oxygen in the air to become carbon dioxide.</li> <li>Over the Earth's long history, a lot of carbon has been stored as oil, gas, coal, and peat, because <i>instead</i> of being broken down, the dead animals and plants get squished under rocks or water – over a very long period of time, this eventually becomes a carbon rich store of fossil fuels. Peat is slightly different, as it only takes 1000 years to form 1 metre of carbon rich storage.</li> <li>What happens to carbon if there's no oxygen present? In this case, it becomes methane (carbon + 4 hydrogens). This happens during anaerobic digestion (an = without, aerobic = oxygen) in cows and sheep, which is why they produce lots of</li> </ul>	

methane. It also happens when we throw food waste in our landfill rather than compost, because there's little oxygen present but there is hydrogen present in once living matter. Methane is a much more powerful greenhouse gas than CO<sub>2</sub> – 25 times more powerful! Eventually it does break down and become CO<sub>2</sub>, but while as methane, it does more damage.

- Since the industrial revolution, humans have burnt huge amounts of this stored carbon, releasing it into the atmosphere as carbon dioxide in a short period of time, disrupting the natural carbon cycle.
- There are other ways that human activity increases greenhouse gases, including damaging our soil (which holds carbon in the form of decomposing plant and animal matter), creating nitrous oxide (by burning fuel in planes, or using artificial fertilisers), or damaging peatlands.
- The increased carbon dioxide, in particular, is the cause of climate change – as it blocks more of the sun's energy from leaving the earth and keeps us warm. We've increased by at least 1.1 degrees Celsius. In 2024, every month was 1.5 degrees Celsius above average (this is also because of natural phenomenon like el nino).
- A warmer earth disrupts our global weather systems, which is very complex and hard to predict. Some areas will even get colder and wetter, but on average the Earth is growing warmer, which causes more storms, more droughts, and more extreme rainfall in short periods of time.
- We can stop and even reverse climate change by reducing the amount of carbon dioxide and other greenhouse gases in the atmosphere. Climate action can focus on either (or both) reducing the amount of greenhouse gases our actions produce e.g. by changing to renewable energy, buying fewer clothes new (the fashion industry is one of the largest producers of greenhouse gases), driving less, flying less, etc, or taking in carbon dioxide from the atmosphere e.g. by planting more trees, restoring our soil (which holds carbon), protecting our peatlands, or technological advances such as carbon storage, though this is some way off being successful at large scale.

Peatlands come into this discussion because:

- Peatlands are a type of wetland, so dead plants don't fully decompose like they would in the compost or forest floor, for example. Instead, they get squished into peat – which grows at a rate of 1cm every 10 years. In some areas of D&G, our peatland is 8 or 9m deep; it has been forming since the last ice age! There are lots of peatlands in this county.
- They are a huge store of carbon as they are a carbon rich soil type – they cover 3% of the earth but store more carbon than all of our trees.
- They are currently degraded and releasing carbon – peatlands in Scotland could account for as much as 15% of our annual emissions (source: NatureScot)
- A degraded or unhealthy peatland could have many manmade drains, taking water away so it can be used for forestry or agriculture. It could have been ploughed and planted by coniferous plantations. It may have areas of bare peat, where the natural vegetation cannot survive because there's not enough water. It may also have areas where the water has been channelled and eroded away chunks of the peat soil.
- We can restore peatlands to a healthy state and cut those emissions *and* potentially make them healthy enough (i.e. waterlogged so the dead matter is squished into peat rather than decomposed) to store carbon again, therefore helping us reduce the amount of carbon dioxide in the atmosphere.
- Healthy peatlands do release some methane – but this is offset by the amount of carbon dioxide they take in and store.