Cyfoeth Naturiol Cymru
Natural Resources Wales

Activity plan

How much peat is required to offset your carbon footprint?

Suggested time needed for activity

40 minutes to an hour

Location

Indoors or outdoors

Context

This activity highlights the important role peatlands have in absorbing carbon dioxide from the atmosphere through photosynthesis and storing it as carbon in the form of peat. Learners will calculate their estimated annual carbon footprint and will discover how many m^3 cubed of peat are required to offset it.

Natural Resources Wales' purpose is to pursue sustainable management of natural resources in all its work. This means looking after air, land, water, wildlife, plants and soil to improve Wales' well-being, and provide a better future for everyone.

Curriculum for Wales

Science and Technology	Mathematics and Numeracy	Humanities
• **What matters** Being curious and searching for answers is essential to understanding and predicting phenomena.	• **What matters** Geometry focuses on relationships involving shape, space and position, and measurement focuses on quantifying phenomena in the physical world.	• **What matters** Our natural world is diverse and dynamic, influenced by processes and human actions.
		• **What matters** Informed, self-aware citizens engage with the challenges and opportunities that face humanity and are able to take considered and ethical action.

Objectives

Learners will be able to:

- Understand that peatlands act as natural carbon sinks making them important in mitigating the effects of climate change.
- Calculate their estimated annual carbon footprint.
- Estimate how much accumulated peat is required to offset their annual carbon footprint.
- Calculate how long it will take for the required amount of peat to accumulate.
- Think about what they can do as an individual to help reduce their climate impact.

Suggested equipment and resources

- Activity plan - How to calculate your carbon footprint
- Worksheet - How to calculate your carbon footprint
- Resource cards - How to calculate your carbon footprint
- Worksheet – How much peat is required to offset your carbon footprint?
- Pencils/pens to record results
- Calculators
- Clipboards

Background and additional information

To ensure your learners have a basic understanding and the relevant vocabulary check, we suggest you try out the following activities and resources before completing this activity.

- Activity Plan – Sustainability glossary game
- Resource Cards – Sustainability glossary game
- Information note – How carbon sinks can turn into carbon emitters
- Information note - Peatlands

Suggestions to complete this activity

- To understand how much peat is required to offset your carbon footprint, your learners need to complete our How to calculate your carbon footprint activity. The activity plan, worksheet and resources cards can be found on our Sustainability webpage.
- You can spread out the footprint cards in a flat area. If necessary, weigh them down with stones or tie them to trees.
- Discuss what a carbon footprint is and how our everyday activities emit carbon. You can refer to our Information Note - Carbon. Explain that we can use peatlands to help visualise a carbon footprint by calculating how many metres cubed of peat would be needed to store and offset the same amount of carbon that your learners' actions have emitted in a year.
- Learners can work individually, in pairs or small groups. Footprints can be calculated based on the activities of one member of the group, a pair or an agreed average representative figure.
- Each learner or group will need a worksheet, clipboard and pencil.

Worksheet step 1 – Calculating annual carbon emissions

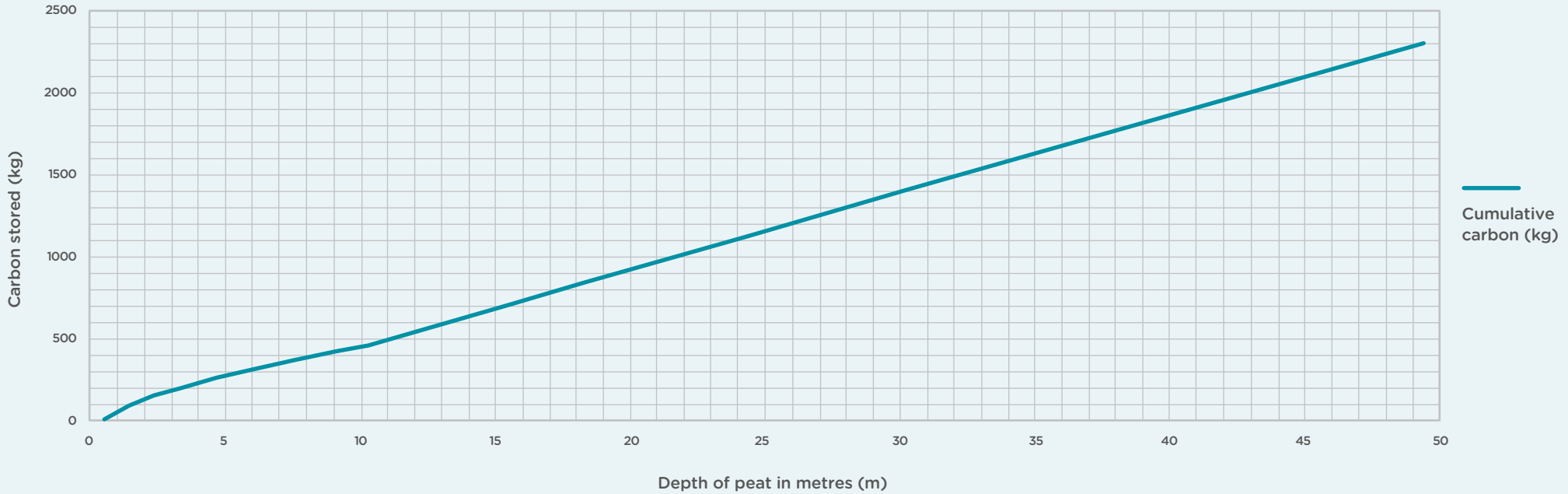
Learners can follow the step by step instructions on the Worksheet - How to calculate your carbon footprint to calculate their annual carbon footprint. You can run the activity as a relay race with learners locating and replacing the scattered carbon footprint resource cards to complete the missing values in the first column.

IMPORTANT NOTE

If you are completing this activity prior to or as part of a visit to carry out a peatland condition assessment, you only need to complete Step 1. Please stop here and refer to our Worksheet - Assessing peatland condition, depth, age and carbon content. If you complete this beforehand, make sure your learners take the figure they have calculated with them on the visit.

If you are completing this as part of a classroom exercise you can use the graph and calculations overleaf to estimate and imagine how much peat would be required to offset your learners' annual carbon footprint. Proceed to Step 2.

Carbon storing capacity of peat



Please Note: The amount of carbon stored in peat is related to peat composition, which has many variables such as its bulk density (the amount of peat dry matter per unit volume). To generate this graph, we have based the calculations on a scientific formula to 10m and then from 10m and deeper an average carbon storage figure has been used. Therefore, this graph isn't meant to be used as a scientific tool for mega depths of peat greater than 10m, but more as an educational tool to relate a carbon footprint to a volume of peat.

For more information see: Information note - Peatland: How carbon sinks can turn into carbon emitters.

Worksheet step 2 - Using the graph

- Once learners know their carbon emissions for the year, they can use the 'Carbon storing capacity of peat' graph provided to estimate the depth of peat it would take to store that amount of carbon.
- Learners can find their annual carbon total on the vertical 'y' axis entitled Carbon stored (kg) and mark a straight line across to the blue line on the graph. Then read down to the horizontal 'x' axis to find the depth of peat in metres required to offset their annual carbon footprint. This can then be visualised as a metre cubed column – see Figure 1.

Worksheet step 3 - Offsetting your carbon footprint

The worksheet, then takes your learners through the process of visualising the amount of peat required to offset their carbon footprint. If, for example, their annual carbon footprint is 1432.4kg reading from the graph they would need a m^3 column of peat that is 31.1m deep to offset their carbon emissions! Taking thousands of years to develop, most peatlands are nowhere near that deep. If the peatland at our imaginary site is only 4.8m deep they would actually need a 6.48m^2 area of peat to offset their annual carbon footprint– see Figure 2.

Ask your learners to imagine the surface area (m^2) and depth of peat that would be needed to absorb their carbon emissions over their lifetime. They can use Table 2 on the worksheet to calculate what that might be.

Representation of a m^3 column

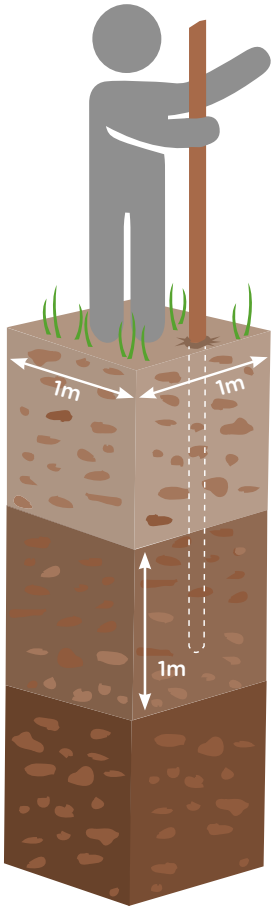


Figure 1

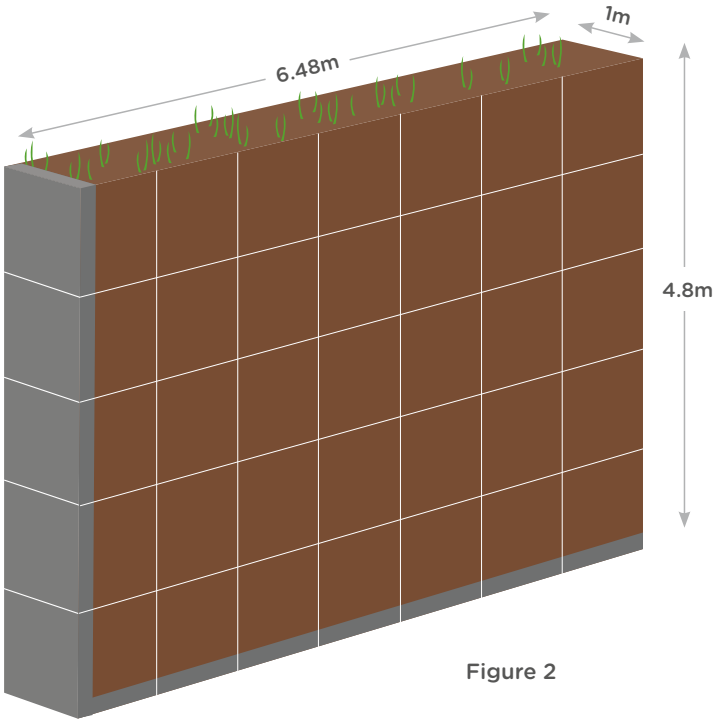


Figure 2

Worksheet step 4 – Questions

On average peat has a growth rate of 1mm of peat per year. With this information in mind the worksheet asks learners:

Question 1

How long would it take peat to accumulate to a depth of one metre?

1 metre = 1,000mm

1,000mm / 1mm growth rate per year = 1,000 years

It would take 1,000 years for a metre of peat to accumulate using the average peat growth rate of 1mm a year.

Question 2

How long would it take for peat to accumulate to a depth that is the equivalent to your height? To find out convert your height into millimetres.

Example: If your height is 1.6m, converting into millimetres = 1,600 mm

It would therefore take 1,600 years for peat to accumulate to a depth that is the equivalent to your height.

Question 3

How long would peat need to accumulate in order to offset your carbon footprint for a year?

Example: The depth required to offset your footprint = 10 metres

1 metre of peat accumulation = 1,000 years

10 metres of peat accumulation = 10,000 years

Question 4

If you live to be a grand old age of 90, how many metres depth of peat will be needed to absorb your carbon emissions over your lifetime?

Annual footprint = 10m depth of peat

10m x 90 years = 900 metres depth

Question 5

What can you do to reduce your carbon footprint?

You can ask your learners to list their ideas or try out our Activity plan – How can we live sustainably? and Resource cards - How can we live sustainably? to spark discussion.

Suggested key questions

- What is a carbon footprint?
- What might contribute to our carbon footprint?
- How can we reduce our settings' carbon footprint?
- Are we emitting more carbon than peatlands can lock up?

Adapting for different needs/abilities

- You could go through the worksheet step by step using yourself as an example.
- You could complete the worksheet as a group using an average for each of the activities.
- You could break down each stage of the worksheet and check results and understanding before moving onto the next stage.
- Learners could work through the activity independently.
- Learners could complete the worksheet without calculators.
- Learners could recalculate their carbon footprint imagining what their activity might be like in 10 years' time, 30 years and 50 years' time.

Suggestions for follow up activity/extension

- You could calculate the carbon footprint of a household, whole school, setting, etc.
- You could put an action plan in place to reduce the calculated carbon footprint.
- You could compare how much carbon is stored in trees compared to peat. Which is the most efficient natural carbon store? Check out our Activity plan - calculating the amount of carbon stored in a tree.
- If you haven't done so already, try our Activity plan - How can we live sustainably, to spark discussion.

Additional resources

You can increase your learners understanding and assist them to make sustainable life choices. Check out the following activities:

- Activity plan & Resource cards - Why are peatlands important?
- Activity Plan - Peatlands quiz

Also check out other resources on our Climate Change Emergency – There is no Planet B! webpage.

Learning in, learning about and learning for our natural environment.

Looking for more learning resources, information and data?

Visit **https://naturalresources.wales/learning**

Alternative format; large print or another language, please contact:
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