

A crowd of people holding signs and flags

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*For Scientists*

Carbon Neutral

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# It’s part of CONNECT

In the race towards exam it can be easy to forget the other goals of science education - scientific literacy and STEM careers. You can work towards these missing goals using - CONNECT an EC-funded project which offers a new kind of resource. Called a **Science Action**, it’s aset of activities to integrate a real-life challenge into an existing topic. It ticks lots of boxes:

* Applies a science concept
* Teaches an enquiry skill
* Provides an authentic end of unit assessment
* Shows students how science affects their world
* Gets students interacting with a scientist or engineer (supplied by the project)
* Encourages students to talk about science with their family

As the STEM professional, you can play two main roles in a science action:

* Inspire students by showing them what professional scientists do
* Support students in learning scientific enquiry skills

## Overview of Carbon Neutral

The world is running out of time to protect the planet from the worst effects of climate change. The UK has committed to be carbon neutral by 2050. Everyone must play their part: individuals, households and businesses. In this activity students apply their knowledge of Earth’s atmosphere and global warming and learn the skill of consider different perspectives, as they help a café to become carbon neutral. First, they find out the different ways households and businesses emit carbon dioxide. Then they consider consequences to choose actions to reduce or offset emissions. Finally, they compete against each other to win the job of being the café’s carbon consultants by presenting their recommendations.

There are four different activities, which can be fitted around existing science lessons.

You can take part in any of these activities: CARE: The Challenge, KNOW 2: Game and DO: recommendations.

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| Activity | **Learning objective** | **What students do** | **Who can be involved** |
| CARE: The challenge | Care about the issue  Understand the scientific context | Explore what carbon neutral and carbon footprint mean.  Calculate their household’s carbon footprint and decide ways to reduce it.  Introduced to the challenge of helping a café become carbon neutral. | Teacher,  STEM professional  Family |
| KNOW 1: Carbon | Apply Earth’s atmosphere to a new context | Find out the different ways that businesses create CO2 emissions, with a worked example: ‘fast fashion’.  Apply this to help the café how their actions produce CO2 emissions. | Teacher |
| KNOW 2: Game | Learn the skill ‘consider different perspectives’. | Practise the skill of considering the economic, social and environmental consequences of an action, through a game.  Apply this to evaluate the actions the café can take to reduce their footprint. | Teacher  STEM professional |
| DO: Recommendations | Coordinate scientific knowledge and skill in a performance assessment. | Use carbon offsetting with their family.  Write a plan for the café on recommendations for being carbon neutral.  Compete against other teams to win the job. | Teacher  STEM professional  Family |

# The activities

## CARE: The Challenge

In this activity students are introduced to the challenge – to help a café to become carbon neutral.

You could talk to students about what is meant by carbon footprint and carbon neutral. You could do this face to face, record a short video or talk to the students remotely.

## KNOW 2: Game

In this activity, students practice a scientific enquiry skill: **Consider different perspectives.**

Students will have been taught this skill before, so in this activity they are practising the skill using a new context. They first play a game that helps them to make scientific decisions by considering the consequences of an action deciding if it is positive or negative. They also classify actions as economic, social or environmental. Students then use the skill to evaluate different actions the café could take to reduce their carbon emissions.

It is recommended that you view the resource for this activity: **06 LESSON Carbon neutral KNOW 2.**

There are several ways you can help students:

* Explaining how STEM professionals use the skill in their work
* Guiding students as they practise using the skill

The teacher’s lesson plan for this activity is shown below:

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| Stage/purpose | **Running notes** |
| **ENGAGE**  Introduce the task | Check student’s understanding about the links between deforestation, CO2 and climate change (4).  Introduce the challenge – to help the café to reduce its CO2 emissions. The question is set: ‘How can we decide which actions are best?’(5).  Show the objectives for the lesson (6). |
| **EXPLAIN**   Clarify the need for the new skill and where it fits | Explain that every action has different consequences (social, economic and environmental) (7) and you can weigh up them up to make a decision (8). This justifies the need to learn a new skill.  **The STEM professional can talk about how this skill is relevant to their work.** |
| **GUIDE** Coaching/support for students | Set the task: to play a game to practice making decisions (9).  The action the class will be using needs to be added to the box. You can decide in the lesson as a class or add it before the lesson. Some examples are: should... schools ban all junk food, homework be banned, mobile phones be banned in school, all 12-16 year olds have to do an hour a week litter picking on the streets, children go to school on Saturdays? Students are introduced to 'a game of consequences' which will help them to decide if an action is a good idea. They work in a group of 3 and follow the instructions on the slide and **SS2**. To make the game more competitive an extra option is to allow students only 20 seconds to come up with a consequence when filling the 2 and 3 boxes. If they fail to do this, they miss their turn. The player with the most cards on the board at the end is then the winner.  Spend some time going round each group asking them if they found that the action had more negative or positive consequences, examples of some of the consequences they came up with and if they are social, economic or environmental consequences. |
| **EMPOWER** Students make their decision | Still in their group, give each student a copy of **SS4**, **5** or **6** (10). They mimic what they did in the game and list possible consequences of each action, if they are positive or negative and if they are social, economic or environmental. They decide which action they think is best before feeding back to the group. **The STEM professional can help students to think about the consequences.**  Note: There is a homework activity that can be completed following this lesson – see the next section. |

## DO: Recommendations

In this activity, students work in groups to prepare and present their plan to the café owner outlining the recommendations for achieving carbon neutral. You may be asked to watch presentations (in person or remotely) or read a written outcome.

Table

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* Be the scientific audience
* Review the quality of the work
* Give praise and feedback to students
* Act as the café owner and choose which group’s recommendations you will follow.

You will be given an assessment checklist by the teacher. You can use this to give feedback on what was good and at least one thing they could improve.

# Presenting your work

You may be asked to talk to the class about your work. Here are some tips for keeping students engaged:

* Start with an interesting visual or question
* Communicate the information as a story
* Make it interactive and ask questions

And here’s some guidance to help you keep things simple:

* Use actual examples instead of abstract ideas
* Don’t use too much data
* Check the terminology you use with the teacher

