

Climate change

Introduction

This activity is designed to take two lessons plus homework and possible extension tasks. It is suitable for ages 11–14 or 14–16.

The lesson plans and resources are flexible and give guidance on using Google to research information on climate change and carbon emissions. Pupils can use the Carbon Footprint Project tools to calculate their personal carbon footprint, then consider taking actions to reduce this figure. They can share their results on the Google UK Carbon Footprint Map.

Using these tools and activities, pupils gain a greater understanding of the issues surrounding climate change and can see how their own energy use compares with that of others.

The activity includes:

- Lesson 1: Researching climate change
- Activity sheet 1
- Activity sheet 2
- Activity sheet 3
- Activity sheet 4
- Lesson 2: The UK's carbon footprint
- Activity sheet 1

Aims

Pupils will have opportunities to develop the knowledge, skills and values below.

Knowledge:

- An understanding of climate change and carbon footprint
- An understanding of how carbon emissions may contribute to climate change
- An understanding of spatial patterns on the carbon map

Skills:

- Geographical and scientific enquiry skills
- Handling data
- Using ICT tools for a purpose
- Communication skills

Values:

- Becoming more informed citizens

Curriculum links

England

Subject	Key Stage 3	Key Stage 4
Geography	<p>Geographical enquiry and skills 1, 2</p> <p>Knowledge and understanding of:</p> <ul style="list-style-type: none"> Places 3 (interdependence, how and why places change) Patterns and processes 4 (environmental impacts) Environmental change and sustainable development 5 	<p>Geographical enquiry and skills</p> <p>Knowledge and understanding of places, patterns and processes and environmental change.</p> <p>The humanities entitlement involves students in exploring the environmental and temporal dimensions of human existence</p>
Science	<p>Sc1 Scientific enquiry</p> <p>Sc2 Life processes and living things: Living things in their environment 5</p>	<p>Sc1 Scientific enquiry</p> <p>Sc4 Physical processes: Energy resources and energy transfer 4</p>
ICT	<p>Finding things out 1</p> <p>Developing ideas and making things happen 2</p> <p>Exchanging and sharing information 3</p> <p>Breadth of study 5a, 5b</p>	<p>Sc1 Scientific enquiry</p> <p>Sc4 Physical processes: Energy resources and energy transfer 4</p>
Mathematics	<p>Ma4 Handling data</p>	<p>Ma2 Number and algebra: Calculations 3</p> <p>Ma4 Handling data</p>
Literacy	<p>En1 Speaking and listening: Speaking 1; Listening 2; Group discussion and interaction 3; Drama 4; Range of activities, contexts and purposes 7</p> <p>En2 Reading: Understanding texts 1; Printed and ICT-based information texts 4; Non-fiction and non-literary texts 9</p> <p>En3 Writing: Composition 1; Range of purposes, readers and range of forms of writing 8</p>	<p>En1 Speaking and listening: Speaking 1; Listening 2; Group discussion and interaction 3; Drama 4; Range of activities, contexts and purposes 7</p> <p>En2 Reading: Understanding texts 1; Printed and ICT-based information texts 4; Media and moving images texts 5; Non-fiction and non-literary texts 9</p> <p>En3 Writing: Composition 1; Range of purposes, readers and range of forms of writing</p>
Citizenship	<p>Knowledge and understanding about becoming informed citizens 1h, 1i</p> <p>Developing skills of enquiry and communication 2a, 2b, 2c</p> <p>Developing skills of participation and responsible action 3b, 3c</p>	<p>Knowledge and understanding about becoming informed citizens 1j</p> <p>Developing skills of enquiry and communication 2a, 2b, 2c</p> <p>Developing skills of participation and responsible action 3b, 3c</p>

Curriculum links

Scotland

Subject	Key Stage 3	Key Stage 4
Environmental Studies: Social subjects / Geography	<p>Knowledge and understanding: people and place</p> <ul style="list-style-type: none"> Physical environment: weather and climate Human–physical interactions: environmental issues and sustainability <p>Knowledge and understanding: people in society</p>	Covers elements from the 'Physical Environment' and 'International Issues' areas of study.
Environmental Studies: Society, Science and Technology / Science	<p>Knowledge and understanding: energy and forces</p> <p>Knowledge and understanding: living things and the processes of life</p> <p>Skills in science: investigating</p>	Covers elements from the 'Energy and its uses' unit
ICT / Technological studies	<p>Covers elements from the following strands:</p> <ul style="list-style-type: none"> creating and presenting searching and researching communicating and collaborating 	Energy: the study of existing energy sources, energy formulae and energy audits.
English	<p>Talking:</p> <ul style="list-style-type: none"> Talking in groups Talking about opinions Audience awareness <p>Reading:</p> <ul style="list-style-type: none"> Reading for information Awareness of genre <p>Writing:</p> <ul style="list-style-type: none"> Functional writing 	Covers elements from the Writing and Talking elements, as well as working with others in groups and learning to improve and redraft your own work.
Maths	Information handling	<p>Interpreting information</p> <p>Carrying out calculations</p>

Curriculum links

Wales

Subject	Key Stage 3	Key Stage 4
Geography	Geographical enquiry and skills 1, 2, 3, 7, 8, 9; Theme 8,10	Physical systems and environmental issues: <ul style="list-style-type: none"> Towards sustainable development of the environment Economic activities, global inequalities, places: <ul style="list-style-type: none"> Global citizenship and interdependence
Science	Scientific enquiry: The Nature of Science 2 Communication in Science 4 Physical processes: Energy resources 4	Scientific enquiry: The Nature of Science 2,3,4 Communication in Science 5 Physical processes: Energy resources 5
ICT	Communicating Handling information	Problem solving Manipulating data
English	Oracy: Range 1, 2 Reading: Range 7; Skills 10,11 Writing: Range 1,2,3,6; Skills 1,2,3	Oracy: Range 1 Reading: Range 1 Writing: Range 1,2,4; Skills 1.
Maths	Handling data	Handling data

Curriculum links

Northern Ireland

Subject	Key Stage 3	Key Stage 4
Environment and Society: Geography	<p>Developing knowledge, understanding and skills</p> <p>Developing pupils as contributors to society</p> <p>Developing pupils as contributors to the economy and environment: environmental stewardship</p>	<p>Atmosphere and human impact: global warming</p>
Science and technology: Science	<p>Developing knowledge, understanding and skills</p> <p>Developing pupils as contributors to society</p> <p>Developing pupils as contributors to the economy and environment</p>	<p>Human activity and health: monitoring change in the environment</p> <p>Chemical patterns and our environment</p> <p>Electricity, waves and communication</p>
Language and Literacy: English with Media education / Communication	<p>Developing knowledge, understanding and skills: talking, reading and writing</p> <p>Developing pupils as contributors to the economy and environment:</p>	<p>Communicating meaning, feelings and viewpoints</p> <p>Making oral and written summaries</p> <p>Participating in discussions and debates</p> <p>Interpreting, analysing and presenting information in oral, written and ICT formats</p>
Maths and numeracy: Mathematics / Using mathematics	<p>Developing knowledge, understanding and skills: handling data</p> <p>Developing pupils as contributors to the economy and environment: explore issues related to education for sustainable development</p>	<p>Interpreting and analysing a range of mathematical data.</p>
Learning for life and work: local and global citizenship	<p>Social responsibility</p> <p>Active participation</p>	<p>Identify and exercise their rights and social responsibilities in relation to local, national and global issues.</p>

Lesson 1: Researching climate change

Learning outcomes

- All pupils: will have an understanding of the greenhouse effect as a reason for climate change and will have used search techniques to find out information.
- Most pupils: will understand that carbon dioxide is the most important greenhouse gas and that a proportion of carbon emissions are generated by human activity
- Some pupils: will understand the concept of a carbon footprint and its contribution to climate change.

Resources

- Internet access
- Interactive whiteboard or display facility
- Activity sheets 1–3 on network or printed copies for pupils

- Activity sheet 4 on network or printed copies for pupils to complete as homework
- Google Earth installed (free to download at <http://earth.google.com/>)

Preparation

- Teachers should make sure that Google SafeSearch is set to Strict Filtering. To do this, click the Preferences link on the Google home page to the right of the search box, then click next to 'Use strict filtering'.
- Teachers will need to familiarise themselves with Google Earth: there are several pages of help and guidance pages on Google to help you find your way around it - <http://earth.google.com/support/>

Lesson plan 1

Overview

The lesson is an introduction to the concepts of climate change and the effect of carbon dioxide emissions. Pupils research these concepts using Google tools, evaluate their findings and join in class discussions. Teacher introduces the term 'carbon footprint' and pupils find out about the impact of their journey to school. Asking parents about their home and family's energy is an extension or homework activity leading to calculating their own carbon footprint.

Starter

Show a dramatic image on an interactive display, such as polar bears stranded on an ice floe or a devastating flood.

Key question: *Is our climate changing?*

Activities

1. Introduce and explain the concepts of climate change, the greenhouse effect and the role of carbon dioxide (CO₂) as a greenhouse gas.
2. Ask pupils to find out more about climate change, the greenhouse effect and CO₂. Model a search for a phrase in Google and show pupils how to discriminate the results if pupils need this support.
3. Pupils should carry out individual or paired research activities on Activity sheet 1 using Google Search to answer the questions. They are asked to evaluate their search results.
4. Lead a whole class discussion on pupils' findings. Encourage them to consider the different viewpoints regarding climate change and its causes. Pupils could be asked to debate the issues.
5. Pupils can complete Activity sheet 2 to consider the impact of climate change. They are asked to create a presentation about three places that have been affected by climate change. These could be presented to the rest of the class.
6. Introduce the concept of a 'carbon footprint' and generate class discussion. Pupils come up with ideas as to what contributes to their own carbon footprint.
7. Pupils can complete Activity sheet 3 to measure the distance of their journey to school using Google Maps and to consider their carbon footprint.
What is the length of their journey? What is their method of travel? What will affect their carbon footprint?

Homework

Introduce the UK Google Carbon Footprint Project. The project has tools to help pupils to calculate their carbon footprint, think about how to reduce carbon emissions and enable them to share their results with others.

Direct pupils to the Carbon Calculator at www.google.co.uk/carbonfootprint.

To calculate their carbon footprint, pupils need to answer a series of questions about their home and travel. Go through the main points and ask pupils to discuss the questions with their family at home. They can either fill in the calculator online at home or use a printout of Activity sheet 4 to note down their answers at home and then enter them online during the next lesson.

The screenshot shows the Google UK Carbon Footprint Project website. At the top, the Google logo is followed by the text 'The UK Carbon Footprint Project' and navigation links: 'Home', 'The map', 'The calculator', 'For schools', and 'About the project'. Below this is a green header bar. The main content area features a bold statement: 'The UK's carbon footprint is over 500* million tonnes of CO₂ per year. Individuals account for 45% of this. Find out how you can reduce your footprint.' This is followed by a paragraph explaining the calculator's purpose. Below the text is the heading 'How green can you be?' and three interactive buttons: 'Calculate my carbon footprint' (with a calculator icon), 'Choose my carbon-reducing Actions' (with a checkmark icon), and 'Put me on the UK Carbon Footprint Map' (with a CO₂ icon). Further down, there are instructions for getting started, including a 'Get started' button. At the bottom, there is a copyright notice '© 2007 Google' and a source attribution '*Source: Defra©'.

Lesson 2: The UK's carbon footprint

Learning outcomes

- All pupils: will have found the answers to calculate their own carbon footprint.
- Most pupils: will have worked out which actions they can take to reduce their carbon footprint and why it is important to do so and will have shared their data on the Google UK Carbon Footprint Map
- Some pupils: will have researched further into carbon offsetting and carbon trading between individual, companies and countries.

Resources

- Internet access
- Interactive whiteboard or display facility
- Activity sheet 1
- Completed Activity sheet 4 from lesson 1

Preparation

- Teachers should make sure that Google SafeSearch is set to Strict Filtering. To do this, click the Preferences link on the Google home page to the right of the search box, then click next to 'Use strict filtering'.

Lesson plan 2

Overview

This lesson builds on the research and homework carried out in Lesson 1. Pupils may have already calculated their carbon footprint at home or can do this in class using the answers they have noted down.

The calculator recommends personalised actions based on the answers to the questions. Pupils can say which actions they will take and calculate how much these will reduce their carbon footprint.

An additional part of the project is sharing their results on the Google map and seeing how their actions compare with others in the country. Extension tasks are suggested for you to set pupils based on their age and ability.

Key question: How can we reduce our own and our nation's carbon footprint?

Activities

There are several activities that may be included in the lesson depending on the work carried out previously.

- Pupils calculate their carbon footprint using the UK Google Carbon Footprint Calculator at www.google.co.uk/carbonfootprint. To calculate their footprint, pupils need to answer a series of questions on home and travel. These may already have been completed at home using Activity sheet 4 from lesson 1. There is the option of 'I don't know' for some questions if the information cannot be found easily. Younger pupils may need support in filling in the answers into the calculator.
- Brainstorm what actions pupils could take to reduce their carbon emissions.
- The calculator will recommend personalised actions to reduce their carbon footprint. Ask pupils to select which ones they will take or already take and click 'Recalculate my footprint' to see how much carbon their actions will save. They can print out the final screen or save their information to a Google account so that they can refer back to their list of actions later.

- Carry out the Thinking Skill card sorting activity on Activity sheet 1 with pupils. This may be done before or after the Google Carbon Footprint calculation. Please see the activity sheet for detailed instructions.
- Pupils can add themselves to the Google UK Carbon Footprint Map. This shows all the people taking part in the UK, their carbon footprint and what actions they will take.
- Discuss the concept of individual actions adding up to make a difference. Discuss how the map shows this. Do pupils feel they can make a difference through their actions?
- There is also climate change-related information on the map – ask pupils to look at the map layers and discuss what they show.
- Demonstrate the Google UK Carbon Footprint Discussion Group. The class could post a comment, for example, about what they pledge to do, or find other schools in the local area taking part and what they are doing.
- Pupils could also look at the other information on the iGoogle tab, for example carbon footprint news, statistics and Sky videos.

Extension tasks

1. Pupils could be asked to design an advert to encourage people to reduce their carbon footprint. They can use Google Images to research suitable graphics, remembering the key question and the audience.
2. Pupils find out about carbon offsetting and carbon trading using Google Search. They could research pros and cons and different opinions. They then present the research to the whole class.
3. Google Search could be used to investigate the ways that other countries are trying to reduce their national carbon footprint. This information could be marked onto Google Earth using a 'placemark'. See the Google Earth User Guide at <http://earth.google.com/support/> to help you get started. The 'Marking places on the Earth' section shows how to create a new placemark.