Hampshire County Council
Improvement and Advisory Service

HIAS MOODLE OPEN RESOURCE

Science: Biology, Chemistry and Physics

Sustainability

Richard Wilson
May 2025
Final version

Overview

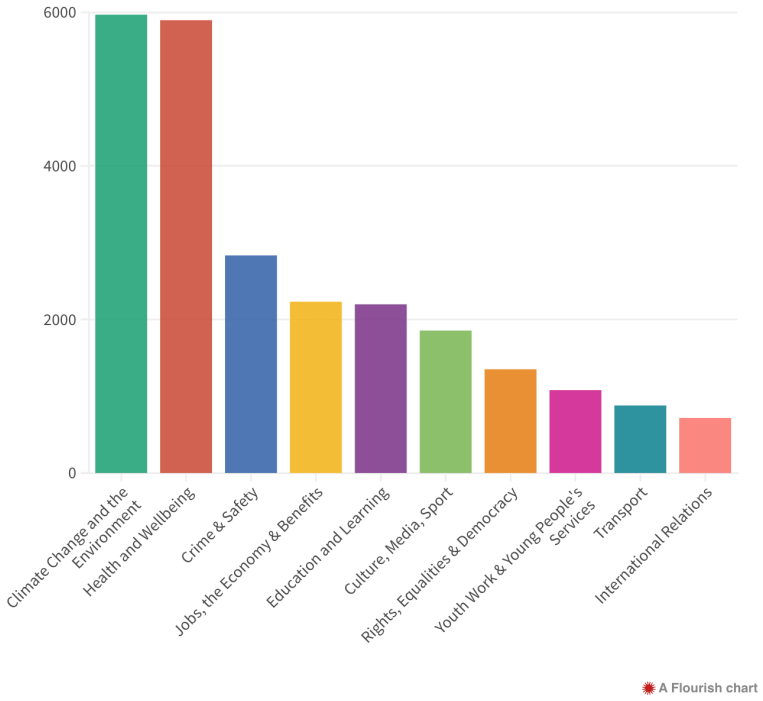
This document contains…
guidance to support further embedding climate education in the science curriculum from KS1 through to KS4. Information was drawn from a range of online resources including those produced by exam boards.

Points to consider when using this resource
It was created during May 2025 and all website links were active at this time. It is always recommended to quality assure any online sources you use in the classroom with your colleagues. Please do get in touch if any of the links need updating.

Sustainability in schools

In recent years, the growing concern over climate change has become a defining issue of our time. From unprecedented heatwaves and devastating wildfires to rising sea levels and severe storms, the impacts of a warming planet are becoming increasingly evident. The biggest ever standalone public opinion survey on climate change, the Peoples' Climate Vote 2024, shows 80 percent – or four out of five people globally want their governments to take stronger action to tackle the climate crisis. (Source: United Nations Development Programme).

This heightened awareness is not just confined to scientists and environmentalists; it has permeated all sectors, including the education sector. School leaders and our students are increasingly alert to the need to support and promote climate education and to mitigate the impact our school buildings and community have on our environment. Earlier this year Hampshire's young people voted climate change and the environment as their top concern. More than 25,000 young people across Hampshire took part in 'Make Your Mark', the UK's biggest youth consultation.



Source: [Hampshire Youth Parliament]

Curriculum for a changing climate

Teach the Future England in their campaign to reform the UK education system around *"climate justice, the natural world, and sustainability"*, clearly states that climate education should not be confined to the teaching of science and geography; teachers of all subjects have a duty to encourage young people to connect with the natural world. Indeed, the "Curriculum Change Project" promotes studying the complex ecological crisis and it's implications, through a range of subjects in a transdisciplinary way. Students should engage in creative and critical thinking and learn about ways in which different communities try to tackle climate change.

Embedding sustainability in the science curriculum: A guide for science teachers

Introduction

The 2022 Department for Education (DfE) Sustainability and Climate Change Strategy sets an ambitious vision for the UK to become the world's leading education sector in sustainability and climate change by 2030. This vision is underpinned by four strategic aims:

1. *"**Excellence in education and skills for a changing world**: Preparing all young people for a world impacted by climate change through learning and practical experience.*
2. ***Net zero**: Reducing direct and indirect emissions from education and care buildings, driving innovation to meet legislative targets, and providing opportunities for children and young people to engage practically in the transition to net zero.*
3. ***Resilience to climate change**: Adapting our education and care buildings and systems to prepare for the effects of climate change.*
4. ***A better environment for future generations**: Enhancing biodiversity, improving air quality, and increasing access to, and connection with, nature in and around education and care settings."*

Sustainability and climate change: a strategy for the education and children's services systems - GOV.UK
Open Government Licence

This guidance is not statutory but encourages schools to have a nominated sustainability lead and a climate action plan in place by 2025. The guidance breaks down the vision into five focus areas: Climate education, Green skills and careers, Educational estate and digital infrastructure, Operation and supply chains, and International collaboration.

Early Years

Developing understanding and language related to the Early Learning Goal:

- Understanding the World:

This area encourages children to explore and learn about the world around them, including nature, people, communities, and technology.

Children should have the opportunity to:

• *"Talk about the lives of the people around them and their roles in society;*

• *Know some similarities and differences between things in the past and now, drawing on their experiences and what has been read in class;*

• *Understand the past through settings, characters and events encountered in books read in class and storytelling."*

Sustainability and climate change: a strategy for the education and children's services systems - GOV.UK

Examples of activities may include using stories to explore changes in weather patterns, describing weather and changes in a week and recording using pictures on the wall, think and talk about the clothing that is suitable for the weather.

Key Stages 1 and 2: Building Foundations

At Key Stages 1 and 2, the focus is on building foundational knowledge and fostering a connection with the natural world. Here are some suggested activities:

1. **Nature Walks and Biodiversity Projects**: Engage students in exploring local biodiversity through nature walks and projects that document local flora and fauna. This can be tied to lessons on ecosystems and the importance of biodiversity.
    - **Reference**: RSPB Schools' Outreach
2. **Recycling and Waste Management**: Introduce concepts of recycling and waste management through classroom activities and school-wide initiatives. Students can learn about the impact of waste on the environment and the importance of recycling.
    - **Reference**: Eco-Schools Programme
3. **Weather and Climate**: Simple experiments and observations about weather patterns can help students understand the basics of climate and the differences between weather and climate.
    - **Reference**: Met Office Education Resources

Key Stage 3: Deepening Understanding

At Key Stage 3, students can begin to explore more complex concepts and the science behind climate change. Here are some activities:

1. **Climate Change Models**: Use interactive models and simulations to help students understand the greenhouse effect, carbon cycles, and the impact of human activities on climate change.
    - **Reference**: NASA Climate Kids
2. **Energy and Sustainability Projects**: Investigate renewable energy sources and their benefits. Students can design and build simple models of solar panels, wind turbines, or water wheels.
    - **Reference**: Practical Action Schools
3. **Field Trips and Citizen Science**: Organise field trips to local environmental centres or participate in citizen science projects that monitor local environmental conditions.
    - **Reference**: OPAL Explore Nature

“Climate Change and Sustainability in GCSE Science” Teaching Guide (AQA)

The "Climate Change and Sustainability in GCSE Science" teaching guide, developed by AQA in collaboration with the Royal Meteorological Society (RMetS), aims to support teachers in integrating sustainability and climate change topics into the GCSE Science curriculum. The guide emphasises the importance of teaching these topics in a holistic and interconnected manner across biology, chemistry, and physics.

Key sections and highlights:

1. **Introduction:**
    - The guide addresses the need for comprehensive climate change education, highlighting that many students feel they have not adequately learned about climate change in school.
    - It aims to help teachers link content across the three sciences to provide a cohesive understanding of climate change and sustainability.
2. **How to use the resource:**
    - The resource can be adapted to fit existing schemes of work or used to develop new modules focused on sustainability and climate change.
    - It includes suggestions for teaching activities, online resources, and cross-references to specification points in biology, chemistry, and physics.

3. **Specification map:**
    - The guide provides a detailed map of the GCSE Trilogy Combined Science specification, highlighting areas where sustainability and climate change content can be integrated.
    - It identifies key specification points in biology, chemistry, and physics that relate to sustainability and climate change.
4. **Teaching activities and resources:**
    - The guide suggests various activities and resources for each science subject, including research projects, debates, and practical experiments.
    - Examples include studying the impact of global climate change on evolution, investigating the role of biofuels, and exploring the effects of atmospheric pollutants.
5. **Linking content across sciences:**
    - The guide emphasises the importance of linking content across biology, chemistry, and physics to help students understand the interconnected nature of climate change.
    - It provides “big questions” to help bring ideas together in lessons and encourages teachers to co-plan and develop cross-disciplinary activities.
6. **Appendices:**
    - Appendix 1 provides a cross-reference of specification points for separate sciences and Synergy combined science.
    - Appendix 2, identified by the Royal Meteorological Society, highlights climate change content in the AQA GCSE Trilogy Combined Science specification and suggests how it can be taught in the context of climate change.

Examples of teaching activities:

- **Biology:**
    - Research how animals are evolving in response to climate change.
    - Investigate the impact of global climate change on extinction and biodiversity.
    - Discuss the role of plants in the carbon cycle and how climate change affects photosynthesis.
    - How may animals evolve over time if climate change continues?
- **Chemistry:**
    - Explore the properties of hydrocarbons and their role in global warming.
    - Study the composition and evolution of the Earth's atmosphere and the impact of human activities on greenhouse gas levels.
    - Conduct life cycle assessments to understand the environmental impact of products and processes.

- **Physics:**
  - Investigate the energy changes in systems and the impact of different energy resources on global climate change.
  - Study the properties of electromagnetic waves and their role in the greenhouse effect.
  - Analyse the environmental impact of using different energy resources and discuss the challenges of transitioning to renewable energy.

Conclusion

By integrating sustainability and climate change education across all key stages, we can prepare our students for a future where they are informed, engaged, and proactive in addressing the challenges of climate change. The resources and activities outlined above provide a starting point for embedding these crucial topics into the science curriculum, ensuring that our students are equipped with the knowledge and skills they need to thrive in a changing world.

For further details and resources, please refer to the DfE Sustainability and Climate Change Strategy.

HIAS resources

Don't forget to take a look on the HIAS Moodle pages for further guidance and lesson inspiration. There is a dedicated page called Climate Unity where you can find further links to resources as well as access all the previous Hampshire wide climate themed events for students such as the annual conference. Course: Course: Climate Unity

Science

Richard Wilson
Inspector/Adviser for Science
richard.wilson2@hants.gov.uk

For further details on the full range of services available please contact us using the following email:

htlcdev@hants.gov.uk

Upcoming Courses

Keep up-to-date with our learning opportunities for each subject through our Upcoming Course pages linked below. To browse the full catalogue of learning offers, visit our new Learning Zone. Full details of how to access the site to make a booking are provided here.

- English
- Maths
- Science
- Geography
- RE
- History
- Leadership
- Computing
- Art
- D&T
- Assessment
- Support Staff
- SEN
- TED
- MFL

Terms and conditions

Terms of licence

This file is for personal or classroom use only. By using it, you agree that you will not copy or reproduce this file except for your own personal, non-commercial use. HIAS have the right to modify the terms of this agreement at any time; the modification will be effective immediately and shall replace all prior agreements.

You are welcome to:

- download this resource
- save this resource on your computer
- print as many copies as you would like to use in your school
- amend this electronic resource so long as you acknowledge its source and do not share as your own work.

You may not:

- claim this resource as your own
- sell or in any way profit from this resource
- store or distribute this resource on any other website or another location where others are able to electronically retrieve it
- email this resource to anyone outside your school or transmit it in any other fashion.