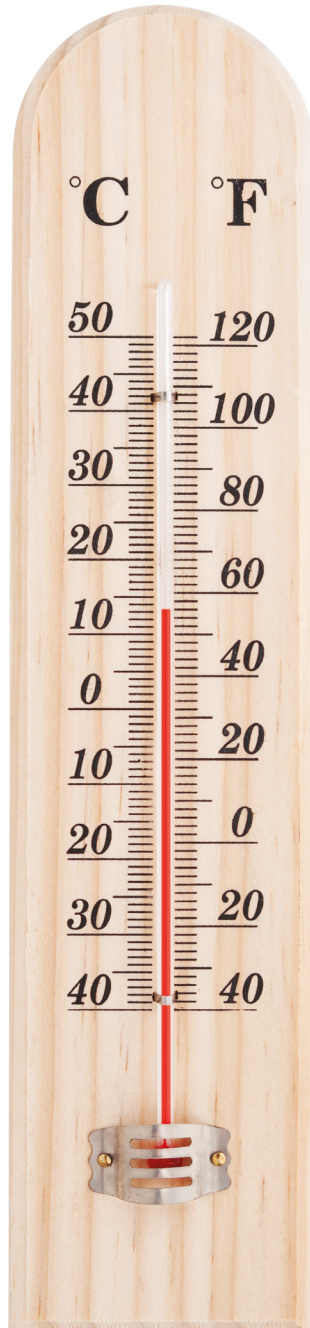


Eco-Schools Inspiration

Climate Change



Teaching
Resource



KEEP
NORTHERN
IRELAND
BEAUTIFUL



ECO-SCHOOLS



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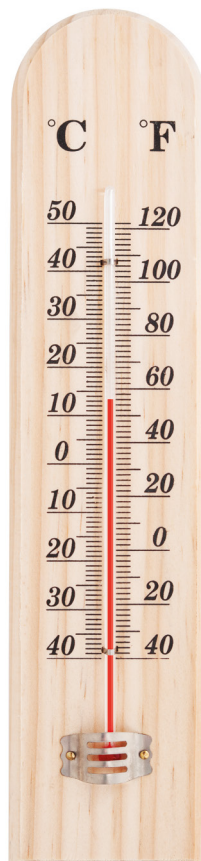
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“ CLIMATE CHANGE AND EXTREME WEATHER EVENTS CAN CAUSE SCHOOL CLOSURES, DAMAGE BUILDINGS, AFFECT THE HEALTH OF PUPILS AND STAFF, IMPACT ON THE LEARNING OF PUPILS AND DISRUPT SCHOOL ACTIVITIES. SCHOOLS MUST ADAPT TO MINIMISE THE IMPACTS OF CLIMATE CHANGE! ”

DR PATRICE CAIRNS, CLIMATE NI

Introduction: What is Climate Change?

The term 'Climate Change' is commonly used interchangeably with "global warming" and "the greenhouse effect". It refers to the build-up of man-made (greenhouse) gases in the atmosphere that trap the sun's heat, causing changes in weather patterns on a global scale. The effects include changes in rainfall patterns, sea level rise, potential droughts, habitat loss, and heat stress.

The climate of an area is the average and variations of weather over long periods of time. For example, rainforests are found in tropical climates, where the weather is constantly warm and there are high levels of rainfall. A Mediterranean climate will usually have warm dry summers, and mild and wet winters. Some countries have mostly hot dry weather, experiencing what is called an arid or semi-arid climate.

Northern Ireland has a temperate climate, with mild winters and summers, and rain throughout much of the year. However, even in a small country like ours, there can be distinct local variations in weather, in particular when looking at rainfall. Where do you think the wettest and driest areas in the country are located?

Climate Change Summit February 2013

Pupils from schools across Northern Ireland came together to hold an Eco-Schools Climate Change Summit at Parliament Buildings. On 14th February 2013, they shone a spotlight on the effects of climate change in Northern Ireland and across the globe. Young people in Northern Ireland are doing their part to tackle climate change through Eco-Schools projects including energy saving, reducing waste and developing school gardens. The event was a special occasion to address the issue of climate change and included schools presenting their findings on climate change issues in countries around the world through colourful presentations and innovative displays.

Greenhouse Effect

There is a blanket of gases surrounding the planet which helps keep the surface of the earth warm enough to sustain life. The gases in the atmosphere, including carbon dioxide, allow sunlight in but trap much of the heat. Were it not for this so-called 'greenhouse effect', we would live on a much colder planet: the average surface temperature of the Earth would be -18°C. The presence of greenhouse gases in the atmosphere raises the Earth's temperature by 33°C to its current surface average of 15°C.

[Click here to view Climate Change Video](#)





Why Worry?

So why are we so worried about Climate Change, if it is something that occurs naturally and has happened throughout the history of the Earth? What impacts are we having through our lifestyles, and can we influence the situation?

The vital difference between the current period of global warming compared to previous cycles of climate change is how quickly the rate of change is happening.

Operation Energy – Climate Change Lesson Plans and Resources

Eco Friendly Feet

This lesson will help pupils to consider ways in which they can reduce their carbon footprint. Pupils will also gain an understanding of how each of us contributes to climate change.

Planet Cool

In this lesson pupils will develop their understanding of climate change and the affect it has on the environment.

To access these and download for use in school visit www.operation-energy.com

Getting Started

Most of our emissions, CO₂ in particular, come from the burning of fossil fuels such as coal, gas and oil. Fossil fuels are used primarily for transport, heating and electricity generation. Every time we turn on the radio or television, light a fire, or drive to the shops, we are contributing to the increase of CO₂ in our atmosphere. Most of what we purchase will also lead to CO₂ emission in some way, either as a result of its manufacture and packaging, or transport of the item, or both. This includes the purchase of tropical fruits and vegetables, or fruit and vegetables bought out of season, which may have been transported large distances to reach your kitchen.



So any actions that reduce the amount of CO₂ that we produce can help to alleviate the impact of climate change. These can include reducing the amount of energy that we use for transport, heating our buildings, lighting our homes etc.

Climate Change is a global phenomenon so studying its effects at a local and international level is another way of raising awareness of the issue and changing people's behaviour towards improving their carbon footprint.

Climate Change, like the other topics within the Eco-Schools programme, needs to have an action plan developed after the environmental review. This action plan highlights what key actions should be taken and when to undertake them. It may also be an idea to contact your local council or some of the Eco-Schools partner organisations who may have some ideas on local projects that your school could take part in.





Case Study

School: <i>Glenlola Collegiate College</i>	Teacher: <i>Jacquie Milligan</i>
No. of pupils: <i>1100</i>	Eco-School status: <i>Green Flag</i>

Background Information

Q: Why did you choose Climate Change as an Eco-Schools topic? What was your Action Plan?

A:

- Marine issues are very topical at Glenlola Collegiate given the school's coastal location. The Climate Change topic is studied in many areas of the curriculum, so it provides an ideal opportunity for cross-curricular projects. The human effects on our immediate environment may be affecting species in a way that cannot be anticipated, with a knock-on effect on other populations of plants and animals.
- The pupils and teachers are interested in the impact of Climate Change on the marine environment, especially with an emphasis on sustainability of fish stocks. We have worked with staff from the Co-Op to develop novel recipes using sustainably sourced fish.
- Impact on tern population on the shores of Belfast Lough and the impact of Climate Change on the food supply of the terns. i.e. the migration of sand eels further north in response to warmer sea temperatures. This has led to our partnership with Sakumono Junior High School in Tema (near Accra), Ghana. Pupils have worked together to research how we can minimise the effects of Climate Change on our environment by encouraging communities to adopt more sustainable practices.

Q: How do you integrate Climate Change into the curriculum?

A:

- **Arts and Science:** Promoting biodiversity in Marine habitats by participation in a 'SciArt' project, working alongside students and staff from St Mary's Teacher Training College, Belfast. Year 10 pupils participated in a lobbying event at Stormont, organised by the Marine Task Force. The girls handed over a petition to the Environment Minister with the plea to 'Save Our Seas!'

- **Geography:** Reduce, Reuse, Recycle (clothes design/catwalk project).
- **Science:** Transport – reduction of emissions due to combustion of fossil fuels. School now has PV cells on the roof so that some of our electricity is supplied by solar power.
- **Science:** Year 9 Hydrogen car project.
- School participation in 'Cash for Clobber' fundraiser and also recycling of school uniforms, in association with our PTA.





Case Study

Q: How do you co-ordinate with other teachers to ensure a whole school approach?

A:

- **Assemblies** – pupils share information about projects they are involved with. The petition that was handed in to the Environment Minister was initiated at a school assembly.
- **Eco-Schools Noticeboard** – the Council, with representatives from each year group, posts information about school participation in different projects, including the results of pupils' research.
- **School Council** – the year group representatives ensure whole-school participation.



Q: How did you encourage pupil participation? How did they have ownership of the project?

A:

- All Eco-Schools projects are entirely student-led, with teachers involved as facilitators, where necessary. Pupils volunteer for various projects and organise their own activities, developing many transferable skills in the process. Managing such projects also increases pupils' independent learning and thinking skills beyond their work in the classroom.
- Participation in 2013 Eco-Schools Climate Change Summit at Stormont.
- Direct lobbying for a Northern Ireland Marine Bill at Stormont. Pupils from GCS have been among the first young people in N Ireland to be invited to address Stormont Committees, including the Environment Committee and Agricultural Committee.
- Pupils won the Impact 2012 Awards (organised by the Office of the First Minister and Deputy First Minister) for their work on highlighting environmental issues.
- Year 10 'Research Group' completed research into Seaweeds and designed new swatch cards for use by Ulster Wildlife Trust for their Shore Thing Project and by visiting students from the USA.





Case Study

During Implementation of Eco-Schools Inspiration case study

Q: How will pupils/whole school benefit from the Eco-Schools Inspiration project?

A:

- Participation in a research project on seaweeds and impact of Climate Change on marine species will develop the skills and subject knowledge of pupils involved.
- Results presented to school and also forwarded to the University of Southampton for inclusion in a national database. So pupil's fieldwork is contributing to the body of knowledge in the science community, through the assistance of Ulster Wildlife Trust.
- Field Trips will be undertaken by pupils from different year groups (Y10, 11, 13 and 14) who will all benefit from the Seaweed Identification Cards created as part of this Eco-Schools Inspiration project.
- Visits from experts from Ulster Wildlife Trust will improve knowledge of both pupils and staff and allow pupils to understand the relevance of scientific surveys in the real world. This also provides an opportunity for pupils to learn about different careers in environmental science by working alongside professional scientists.

Q: What is your overall aim and what actions are you going to take?

A:

- Research on native species of seaweed at a local coastal location, Groomsport.
- Production of ID cards/swatches for local seaweed species to be used for teaching GCSE and Advanced level Biology classes.

Q: How are you going to spend the £500 funding?

A:

- Fieldtrip to Groomsport for 14 year 10 students – cost of minibus.
- Design and print of ID cards – professional printing costs.



Q: Are you going to receive any support or resources from parents, staff or outside agencies?

A:

- Ulster Wildlife Trust.
- Keep Northern Ireland Beautiful – Eco-Schools.
- North Down Borough Council Biodiversity Officer.
- Department of the Environment.





Case Study

Reporting on impact of action(s)

Q: Did you encounter any problems and, if so, how did you overcome them?

A: There were no particular problems with the implementation of the Climate Change project. The only issue was identification of an appropriate time for the Y10 research group to visit Groomsport Beach for training in the use of keys. Senior staff in school were supportive of the project and permitted teaching staff to accompany pupils to the beach, providing cover for missed classes. Pupils travelled by school minibus to minimise costs.

Q: Is there any advice you could offer to schools undertaking the Climate Change topic? Do you have any useful suggestions for other teachers embarking on the topic?

A: Participation in the 'Shore Thing' species survey under the supervision and guidance of staff from Ulster Wildlife Trust is excellent preparation for a study of the local effects of Climate Change. It may also be useful to get in touch with your local Council Biodiversity Officer for information on your immediate environment and the aims of the Council regarding monitoring/reducing the effects of Climate Change.

Q: Has doing this topic driven other Eco-Schools ideas? What are your future plans regarding Eco-Schools?

A: We plan to extend the activity by using the species identification cards in A level Biology field work on the 'rocky shore'. This project will be carried out with pupils from Tallwood High School, our partner school in Virginia Beach, USA. The effect of Climate Change on native species will also be carried out around the Chesapeake Bay area.





Case Study

We can estimate the average production of carbon dioxide over time by a school through looking at energy consumption (electricity, oil, etc.), waste production (both for landfill and recyclables), travel (miles travelled by bus, car etc.), and water consumption. A carbon calculator will use conversion factors to convert the recorded values - be it for energy, waste, travel or water - into a final figure for CO₂ emissions. By calculating this figure, it should then be easier to try to make changes, specifically in the areas mentioned, in order to reduce the impact the school may be having on climate change.

To evaluate and measure progress made in the climate change topic please complete the sections below at the beginning of your work on the climate change topic before any actions were implemented and results obtained near the end of your work on the climate change topic.

Audit 1	Audit 2
Date 2011	Date _____

Litter & Waste

1. Waste going to landfill <u>32000</u> kg/year x 1.5 (conversion factor)	= <u>48000</u> kgCO ₂	= _____ kgCO ₂
2. Waste for recycling <u>20000</u> _____ kg/year x 0.3 (conversion factor)	= <u>6000</u> kgCO ₂	= _____ kgCO ₂
3. Compost (carbon neutral) _____ kg / year x 0 (carbon neutral)	= _____ kgCO ₂	= _____ kgCO ₂
Total CO₂ emissions from Waste	= <u>54000</u> kgCO ₂ /year	= _____ kgCO ₂ /year

Energy

1. Electricity (Kilowatt-hours) <u>484096</u> kWh / year x 0.6	= <u>290458</u> kgCO ₂	= _____ kgCO ₂
2. Natural Gas (Kilowatt-hours) <u>1070000</u> kWh / year x 0.19	= <u>204076</u> kgCO ₂	= _____ kgCO ₂
3. Natural Gas (therms) _____ therms / year x 5.5	= _____ kgCO ₂	= _____ kgCO ₂
4. Oil (litres) _____ litres / year x 2.69	= _____ kgCO ₂	= _____ kgCO ₂
Total CO ₂ emissions from energy consumption	= <u>494534</u> kgCO ₂ /year	= _____ kgCO ₂ /year

Transport (total for all staff and students)

1. Miles travelled by petrol car <u>10000</u> miles/year x 0.36	= <u>3600</u> kgCO ₂	= _____ kgCO ₂
2. Miles travelled by diesel car <u>15000</u> miles/year x 0.28	= <u>4200</u> kgCO ₂	= _____ kgCO ₂
3. Miles travelled by bus <u>20000</u> miles/year x 0.03	= <u>600</u> kgCO ₂	= _____ kgCO ₂
4. Miles travelled by train <u>10000</u> miles/year x 0.1	= <u>1000</u> kgCO ₂	= _____ kgCO ₂
5. Miles travelled by bike/foot <u>2000</u> miles/year x 0	= <u>0</u> kgCO ₂	= _____ kgCO ₂
Total CO ₂ emissions from transport to and from school	= <u>9400</u> kgCO ₂ /year	= _____ kgCO ₂ /year

Water

1. Total water consumption <u>11000000</u> litres / year x 0.001	= <u>11000</u> kgCO ₂ /year	= _____ kgCO ₂ /year
--	--	---------------------------------

TOTAL CO₂ PRODUCTION PER YEAR = Sum of above totals	= <u>568934</u> kgCO ₂ /year	= _____ kgCO ₂ /year
Total CO₂/number of staff & students	= <u>474</u> kgCO ₂ /person/year	= _____ kgCO ₂ /person/year
Total CO₂/m² of school building(s)	= <u>37.6</u> kgCO ₂ /m ² /year	= _____ kgCO ₂ /m ² /year



Curriculum Links and Skills

The Climate Change topic allows you to incorporate and promote **Thinking Skills & Personal Capabilities** and **Cross-Curricular Skills** into your lessons.

Lesson Suggested Learning Intentions

(taken from W.A.U. strands on Northern Ireland Curriculum website)

Strand 1: Interdependence

'How lifestyle choices can affect the health of themselves and others (S&T); about the effects that people's actions have on the natural environment (S&T) (G); to be aware of the changes in their local environment over time (H).'

Strand 2: Movement and Energy

'The advantages and disadvantages of renewable and non-renewable energy sources (G); about global energy issues (G); how human activities affect habitats and ecosystems (S&T) (G); about the impact of famine, floods etc. on the everyday lives of people in place (H) (G); the effects of natural disasters and / or extreme weather on places and people who live there (G).'

Strand 3: Place

'How weather affects the lives of people and animals here and elsewhere (G); how seasonal change affects the behaviour of animals and plants (S&T); that extreme weather affects the lives of people here and elsewhere (G); that weather can cause change over time (G); about the ways in which people may conserve and change the environment both locally and globally (G).'

Strand 4: Change Over Time

'How long or short term climatic changes are impacting on our environment (G) (S&T); about how changes in the climate have been brought about (G); that there are things we can do to prevent pollution and the production of waste (G).'

Managing Information

Example: Research Climate Change Impacts from different regions around the world, look at the impact of more powerful storms, flooding etc. How are these countries adapting to the pressures imposed by Climate Change.

Thinking, Problem-Solving and Decision-Making

Example: Complete a project on raising awareness of Climate Change to the school, promote behaviour that can reduce the amount of energy we use and CO₂ we produce.

Using ICT

Example: Watch a video clip on Climate Change. Have pupils make notes on specific themes in a Word document.

Using Mathematics

Example: Study the figures that have been compiled by scientists in support of Climate Change. Ascertain how they made these predictions and work out alternative scenarios

Being Creative

Example: Make a video or prezi presentation about Climate Change and its likely impacts.

Self-Management

Example: Review work undertaken on the Climate Change topic, ask if the awareness raising has been successful and what other projects could be undertaken to reduce CO₂ production.

Working with Others

Example: Organise a Climate Change action day in school. Ask Climate organisations to attend to raise awareness of Climate Change at your school.

Communication

Example: Make links with schools around the world to discuss the Climate Change topic. The international Eco-Schools connect website is a great way to find other Eco-schools around the world. Go to www.eco-schools-projects.org



Primary Activity Ideas

Language & Literacy

Writing

- Creating presentations on the Climate Change theme.
- Write a report on the impact of Climate Change and how we can change our behaviour to lessen our impact on the planet.
- Write an article on Climate Change and how it impacts on other countries.
- Creating poems such as a Climate Change acrostic.
- Write an outline plan for improving your school Carbon Footprint.
- Phonic work in the context of the theme of Climate Change.

Talking & Listening

- Discuss video clips related to Climate Change.
- Carry out interviews with staff of organisations who are involved in the environmental sector on how Climate Change is likely to affect us. E.g. the impact of Climate Change on wildlife.
- Participate in group and class discussions about Climate Change and what society can do about the issue.
- Share, respond to and evaluate ideas, arguments and points of view about Climate Change and use evidence collated to make decisions about the Climate Change Topic.

Reading

- Gathering articles about Climate Change.
- Finding out about the impacts of Climate Change on Third World Countries in books and online.
- Consider, interpret and discuss texts, exploring the ways in which language can be manipulated in order to affect the reader or engage attention such as scientific articles and reports. The great Climate Debate.
- Collect a range of reading material for display which focuses on the Climate Change Topic.

Mathematics & Numeracy

Number

- Apply knowledge of percentage calculations to problem solving e.g. how big could temperature rises be?
- Undertaking measurements of local climate.
- Use the four operations to solve more complex word problems and puzzles involving numbers and measures related to a Climate Change investigation.
- Solve numerical problems relating to Climate Change.

Measures

- Undertake monitoring of how people travel to school, how many make the journey using sustainable modes? The Translink Eco-Schools Travel Challenge will help with this.
- Monitor water use in the school.
- Monitor energy use in the school.
- Read and interpret simple graphs from the results and apply knowledge to solve related problems.

Shape & Space

- Investigate the shapes and sizes of icebergs, look at how ice forms and melts.

Handling Data

- Make graphs, diagrams and charts of data related to the Climate Change Topic e.g. energy use in the school.
- Discuss, plan, collect, organise and represent data related to the Climate Change Topic e.g. how people travel to school.
- Insert data about the schools energy use into a prepared relevant computer database and interrogate.
- Discuss examples of Climate Change data represented in newspapers, magazines and multimedia sources.
- Carry out a simple class/school survey on travel, energy or water use habits.



Primary Activity Ideas

The World Around Us

Geography

- Find out how Climate has changed in different countries and how this has impacted on people.
- Look at the impact of flooding around the globe.
- Investigate which countries are the biggest contributors to Climate Change. E.g. which countries produce the most Greenhouse gases?
- Measure local weather conditions and compare these to different regions around the globe.
- Use maps to investigate global environmental impacts.

History

- How have climates changed locally and globally over time?
- Look at the changes in transport and industry over time.
- Talk to parents and grandparents about changes to weather in their lifetime

Science & Technology

- Research renewable energy sources. Visit a local renewable energy site.
- Look at the impact of Climate Change on animals and plants. e.g. temperature dependency of native species of seaweed or the occurrence of new species.
- Investigate advances in transport technology.
- Make wind mills.
- Investigate energy conversion.
- Look at examples of flood defence.
- Technology. e.g. drought resistant strains of crops.

The Arts

Art & Design

- Make icebergs/igloos out of recycled materials.
- Design Climate Change posters and leaflets for use in promoting the Climate Change Topic.
- Draw maps of areas before and after flooding.

Music

- Create musical stories, pictures, patterns, conversations etc. based on a Climate theme or issue e.g. the sounds of the wind.
- Listen to music that has been influenced by the weather E.g. Vivaldi's Four Seasons.

Drama

- Explore a range of cultural and human issues impacted by Climate Change by using drama to begin to explore their own and others' feeling about issues, and by negotiating situations both in and out of role.
- Use the Climate Change Topic to develop a range of drama strategies including freeze frame, tableau, hot seating, thought tracking and conscience alley.

Physical Education

- Take part in cycle proficiency training.
- Taking part in walk and cycle to school events, such as the Translink Travel Challenge.

Religious Education

- Stewardship-Care for the planet, in particular the atmosphere and biosphere.

Personal Development & Mutual Understanding

- Develop care for their local environment through playing an active and meaningful part in the life of the community e.g. litter pick or gardening in the local area.
- Role play how others experience the effects of Climate Change. How would you feel if your home flooded?
- Understanding health and safety on site.
- Actively taking care of self and others.
- Applying findings on Climate Change to the wider community.



Post-Primary Activity Ideas

Environment & Society

Geography

- Investigate how humans have impacted on the planet over time.
- Study the climatic history of the planet.
- Study the different biomes and how these will be impacted upon by Climate Change.
- Study a local environmental issue and look at solutions from other countries e.g. the impact of renewable energy on our landscape.

History

- Do a project on the history of travel.
- Look at the impact of climate on historical events. The Big Freeze of 1962-63 in the UK or the Medieval Little Ice Age.

Religious Education

- Stewardship-Care for the planet, in particular the atmosphere and biosphere.

Learning for Life & Work

Local & Global Citizenship

- Actively engaging and participating in a local project/issue.
- Participating in an action project.
- Researching the local and global implications of lifestyle choices.

Education for Employability

- Research jobs in the environmental and renewable energy sectors.
- Invite representatives of the community to take part in lessons. These could include non-teaching staff, parents, former pupils, local role models, entrepreneurs and particularly employers.

Personal Development

- Managing own personal health and safety in field and lab, sharing ideas and working as a team.

Language & Literacy

English/Irish Medium with Media Education

- Carrying out an awareness raising campaign about the Climate Change Topic.
- Write a newspaper article about the measures and initiatives that your school has adopted to improve the school's carbon footprint

Modern Languages

- Making and maintaining links with other International Eco-Schools. Find out initiatives they have undertaken to reduce their impact on the environment. The international Eco-Schools connect website is a great way to find other Eco-schools around the world. Go to www.eco-schools-projects.org



Post-Primary Activity Ideas

The Arts

Art & Design

- Communicating graphically, producing engaging presentations e.g. posters.
- Have a school poster competition with the aim of designing posters to promote sustainable lifestyles and the Climate Change Topic.

Drama

- Use drama to begin to explore their own and others' feeling about issues, and by negotiating situations both in and out of role e.g. the impact of Climate Change on the Developing world.
- Use the Climate Change theme to develop a range of drama strategies.

Music

- Composing and performing music in response to Climate Change issues and in response to observations.

Science & Technology

- Investigate how energy is generated, visit a local power plant or use the internet to go on a virtual tour.
- Research renewable energy sources. Visit a local wind farm or renewable energy component manufacturer.
- Do a project on future transport modes. Investigate hydrogen as a power supply for vehicles.
- Study the Carbon and Water Cycles. Make posters and models on the Green House Effect.
- Invite a STEM ambassador to the school to discuss a topic related to Climate Change.

Mathematics

- Research the calculations used to make predictions on Climate Change. Discuss the predictions made by different organisations such as the IPCC, how robust are they?
- Solve numerical problems relating to energy use, peak oil and other Climate Change issues.
- The amount of carbon you personally produce in a year can be determined using a carbon calculator.

Physical Education

- Take part in responsible outdoor practical work.
- Encourage pupils to walk, cycle etc. to school.



Useful links

[Operation Energy](#)



[Trócaire KS3 Climate Change Lesson Plans/Poster](#)



[Trócaire Go Green, Go Global Teaching Resources](#)



www.trocaire.ie



www.translink.co.uk/ecoschools/



[Translink Travel Challenge](#)



[Eco-Schools delivery partners](#)



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