













This manual is designed for introducing the HSBC Eco-Schools Climate Initiative.

The booklet is divided into six sections:

Section 1 - provides information regarding the HSBC Eco-Schools Climate Initiative and the HSBC Eco-Code Climate Competition.

Section 2 - introduces the topic of climate change, the greenhouse effect and the scientific evidence for climate change. It looks at the causes, both natural and anthropogenic. It also examines curriculum links that can be made through the programme.

Section 3 - introduces the likely impacts of climate change, evidence for climate change and global responses towards climate change.

Section 4 - looks specifically at actions that can be taken both at school and in the home to tackle climate change. It takes an in-depth look at the link between climate change and the themes of litter & waste, energy, water, transport, biodiversity, global citizenship and healthy living.

Section 5 - demonstrates how to conduct a climate change environmental review through the use of a carbon calculator and an action checklist.

Section 6 - provides a number of resources for use by teachers including a table outlining the Eco-Schools seven-step process, useful links, climate change terminology and a bibliography.



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# SECTION 1

Provides information regarding the HSBC Eco-Schools Climate Initiative and the HSBC Eco-Code Climate Competition.





#### 1 HSBC Eco-Schools Climate Initiative

#### 1.1 HSBC Eco-Schools and FEE

The Foundation for Environmental Education (FEE) is a non-governmental and non-profit organisation aiming to promote sustainable development through environmental education (formal school education, training of staff and general awareness-raising).

FEE is mainly active through its five environmental education programmes: Blue Flag, Eco-Schools, Young Reporters for the Environment, Learning about Forests and Green Key. Visit www.fee-international.org for more information.

Eco-Schools is a programme for environmental management and certification, designed to implement sustainable development education in schools by encouraging young people to take an active role in how their school can be run for the benefit of the environment. Eco-Schools is a programme of the Foundation for Environmental Education. Visit www. eco-schools.org for more information.

HSBC Holdings plc serves over 100 million customers worldwide through around 9,500 offices in 85 countries and territories in Europe, the Asia-Pacific region, the Americas, the Middle East and Africa. With assets of some US\$2,546 billion at 04 August 2008, HSBC is one of the world's largest banking and financial services organisations.

HSBC is marketed worldwide as 'The world's local bank'. Visit www.hsbc.com for more information.

#### 1.2 HSBC Eco-Schools Climate Initiative

"This programme will be the largest international environmental education programme of its kind and about which HSBC and FEE are very excited. It aims to impact positively on young people around the world through the delivery of the Eco-Schools Programme and the engagement of HSBC employees."

Simon Martin, Group Head of Sustainability, HSBC Holdings plc.

Jan Eriksen, President of the Foundation for Environmental Education (FEE), said:

"Tackling climate change is one of the biggest challenges our generation faces. By educating and supporting our children to take action, Eco-Schools is making a difference now and for the future. The Eco-Schools awards scheme is the world's largest environmental education programme for children. It enables schools to enhance their local surroundings, save money and reduce their carbon footprint. The efforts of children, staff and volunteers in Eco-Schools are recognised internationally by the United Nations Environment Programme (UNEP). The Green Flag is a symbol of FEE."

HSBC and the Eco-Schools International Programme are implementing a new initiative that aims to empower students as active contributors in reducing carbon emissions.

Using the Eco-Schools Programme seven-step process, Eco-Schools will target climate change, through teachers training and materials devised for this project.

Eco-Schools will be encouraged to share their practices through the HSBC Eco-Schools Climate Initiative website, so that Eco-Schools facing similar challenges can benefit from the experience of others.



Eco-Schools involved in the project will also be invited to participate in the HSBC Eco-Code Climate Competition.

HSBC employees will be given the chance to volunteer for the HSBC Eco-Schools Climate Initiative in their country.

The initiative's main focus area will be climate change and work will be carried out according to the Eco-Schools seven-step process and other Eco-Schools criteria.

Schools can also choose to work on more specific areas of climate change, linking the main theme with others such as:

- · litter & waste
- water
- energy
- transport
- food
- biodiversity

#### How to be a Part of This Initiative

Eco-Schools interested in being a part of this initiative should contact their national operators.

The participating Eco-Schools will register on the website, where an online map will present best practice.

Participant Eco-Schools will be able to exchange information on the website; non-participants will also be able to benefit from their experience.

Visit www.eco-schools.org for more information about the HSBC Eco-Schools Climate Initiative (in several languages):

#### 1.3 HSBC Eco-Code Climate Competition

As part of the initiative, Eco-Schools are invited to take part in the HSBC Eco-Code Climate Competition, on the theme "Climate Change".

Eco-Schools are invited to showcase their work on climate change through Eco-Code posters.

The competition consists of two categories:

- students aged 5 to 12
- students aged 13 to 18

Each contest will consist of two rounds - a national competition and an international competition.

#### **Awards**

In the national contest, the 1st, 2nd and 3rd places will be awarded prizes to be defined by each Eco-School's national delegation.

The international winners will be awarded the following:

- 1st prize \$1,000
- 2nd prize \$750
- 3rd prize \$500

The winning entries will be announced in the Eco-Schools Climate Change Initiative, international Eco-Schools website & newsletter and the FEE annual report.

#### How to Participate in the Competition

In order to participate in the competition, schools must be a part of the HSBC Eco-Schools Climate Initiative and be registered in the Eco-Schools programme.

Eco-Schools interested in being a part of this initiative should contact their national operators.



### 1.4 Project Participants

The table below lists the contacts from each of the 18 countries that are participating in the Initiative.

COUNTRIES	ECO-SCHOOLS DELEGATION OFFICE	PROJECT COORDINATOR	EMAIL ADDRESS	PHONE
Brazil	Instituto Ambiental Ratones	Marinez Scherer	ecoescolas@iarbrasil.org.br	00 55 48 99811645/30255033
China	CEEC, MEP China - Center for Environmental Education & Communications of Ministry of Environmental Protection of China	Yang Ke	yangke09@gmail.com	00 86 10 84364281 ext 82
France	FEEE France	Romain Bouillon	romain.bouillon@f3e.org	00 33 1 45 49 40 50
Ireland	An Taisce – The National Trust for Ireland	Anthony Purcell	greenschools@antaisce.org	00 353 1 4002216
Japan	FEE Japan	Yukiko Tsuburaya	es@feejapan.org	00 81 3 5212 1178
Jordan	JREDS - The Royal Marine Conservation Society of Jordan	Ala'a Rezeq	a.rezeq@orange.jo	00 962 6 5676173/ 5676183
Kazakhstan	EcoObraz NGO	Mariya Zhirkova	ecoschools@ecoobraz.kz ecoobraz@ecoobraz.kz	00 7 7212 91 10 79 00 7 777 1072734
Malta	Nature Trust	Paul Pace	paul.j.pace@um.edu.mt	00 356 2131 3150
New Zealand	FEE-NZ	Robert Acton	rob.acton@blueflag.org.nz	00 64 4 920 7640
Northern Ireland	TIDY Northern Ireland	Naomi Foss	naomi.foss@eco-schoolsni.org	00 44 (0) 28 9073 6920
Poland	Polish Environmental Partnership Foundation	Malgorzata Luszczek	malgorzata.luszczek@fpds.pl	00 48-12 430 24 43
Russia	Keep St Petersburg Tidy	Olga Madison	greenflag_russia@yahoo.com	00 7812 2696490
Slovakia	Spirala	Eva Stroffekova	stroffekova@changenet.sk	00 421 0917 433 671
South Africa	WESSA - Wildlife and Environment Society of South Africa	Bridget Ringdahl	bridget@wessa.co.za	00 27 33 330 3931 ext 145
United Arab Emirates	Emirate Wildlife Society (EWS)	Rashmi De Roy	rderoy@ewswwf.ae	00 971 2 6347117
USA	NWF - National Wildlife Federation	Elizabeth Soper	soper@nwf.org	00 1 802 552 4328 (phone) 00 1 802 272 0968 (mobile)
UK/England	Keep Britain Tidy	Clare Baird	clare.baird@keepbritaintidy.org	01963 371570
UK/Wales	Keep Wales Tidy	Rheinallt Williams	Rheinallt.Williams@keepwalestidy.org	00 44 7595 711 563

# SECTION 2

Introduces the topic of climate change, the greenhouse effect and the scientific evidence for climate change. It looks at the causes, both natural and anthropogenic. It also examines curriculum links that can be made through the programme.





#### 2 Introduction

#### 2.1 Climate Change and Eco-Schools

There are seven elements to the Eco-Schools Programme: Eco-Committee, environmental review, action plan, monitoring & evaluation, curriculum work, informing & involving the wider community and Eco-Code.

This manual aims to provide a general introduction to the subject of climate change and to contribute particularly to the environmental review, action plan, and monitoring and evaluation stages of the programme in relation to the theme.

Eco-Schools themes cover many different aspects of the environment. HSBC and the Eco-Schools International Coordination would like to involve a large number of countries from the Eco-Schools International Programme network, and support students in implementing activities to combat climate change.

Climate change is now an international Eco-Schools theme supported by the Eco-Schools International Coordination through the HSBC Eco-Schools Climate Initiative.

Climate change was chosen as an international theme because:

- the subject slots easily into the curriculum of both primary and secondary schools
- implementing simple tips can lead to large reductions in carbon dioxide emissions generated at school and at home
- it is widely regarded as the foremost environmental, social and economic challenge of our time
- climate change links to all other themes in Eco-Schools and by developing an understanding of climate change we will begin to understand the relationship between all the themes, as well as developing the ability to tackle the problem of climate change in a holistic manner
- climate change is a global environmental issue that Eco-Schools International Coordination aims to combat, through supporting schools in their efforts to minimise CO<sub>2</sub> emissions.



Climate change is not a subject that can be studied in isolation because it is an issue that will impact on all sectors of society. It is also a topic that ties together the themes of litter & waste, energy, water, transport, biodiversity, global citizenship and healthy living.

Implementing the theme of climate change will highlight the importance of the work carried out in relation to the other Eco-Schools themes by enabling students to evaluate the impact of their efforts in terms of the global challenge of climate change.

Successful implementation of the climate change theme will involve establishing the seven steps of the programme and then evaluating the progress made in reducing the school's climate impact. The activity ideas described in the manual are just a starting point; you will develop many interesting and innovative ideas of your own.



#### **Further Information**

Further information and examples of activities for the school that are outside the remit of this manual can be obtained from a variety of sources.

More information about the HSBC Eco-Schools Climate Initiative is available at www.eco-schools.org, as well as in Section 6 of this manual.

#### 2.2 Climate Change Curriculum Links

#### Social Studies

Promote personal development and well-being.

Develop citizenship and a sense of personal and social responsibility.

Promote communication, co-operation and working with others

Encourage media awareness.

Register your school and your climate change activities at the HSBC Eco-Schools Climate Initiative website.

Contact Eco-Schools that are implementing the HSBC Eco-Schools Climate Initiative and share with them, or work with them, in specific climate change activities.

#### **Science**

Encourage responsibility for the environment and promote sustainable development.

Develop a scientific approach to problem-solving.

Promote the communication of ideas, report writing and presentational skills.

Look at the potential impact of climate change on ecosystems and species globally and nationally.

Investigate the science of climate change and the greenhouse effect.

Investigate the different climate change impacts of the countries participating in the HSBC Eco-Schools Climate Initiative.

#### Languages

Use climate change as a source of topics for essays, poetry and other writing.

Promote communication skills, public speaking, debates.

Provide many activities involving speaking and writing.

Discuss climate change activities with Eco-Schools in other languages.

#### **Maths**

Devise real life situations for mathematical analysis (for example, calculation of CO<sub>2</sub> equivalent emissions).

Use charts and graphs.

Compare and analyse your school calculation of CO<sub>2</sub> emissions with Eco-Schools from other regions or other countries.

#### History

Examine change in climate over time.

Relate to the industrial revolution and changes in lifestyle and society.

#### Art

Create posters/murals/fashion items to aid environmental awareness.

Use waste materials in the creation of art in class.

Create an Eco-Code and participate in the HSBC Eco-Code Climate Competition.



#### Geography

Develop a critical understanding of environmental issues at local and global level.

Study human and natural environments, examining climate change in relation to land use and sustainable management of resources.

Promote the communication of ideas, report writing and presentational skills.

Develop a critical understanding of environmental issues relating to climate change at global, regional and local level.

Share climate change best practice with Eco-Schools from other countries.

### Did You Know...?

"Most of the warming that has occurred over the last 50 years is very likely to have been caused by human activities."

#### Source:

http://ec.europa.eu/environment/climat/home\_ en.htm

#### 2.3 Climate Change

Climate change is now widely acknowledged as the biggest challenge facing our global environment and the human species today. It is the change in global and regional weather patterns over time.

Due to their global and holistic nature, the consequences of climate change will be profound and far-reaching and will impact on every aspect of life on earth. Among the potential impacts of climate change are: changes in rainfall patterns, sea level rises, an increase in droughts, habitat and biodiversity loss, heat stress, the number and intensity of extreme weather events, decline in farming productivity, changes in infectious disease patterns and changes in the timing and nature of the seasons.

Through daily efforts to reduce their environmental impact, participants in the Eco-Schools International Programme through the HSBC Eco-Schools Climate Initiative can lead a united battle against climate change. Indeed many of the measures being undertaken under the themes of litter & waste, water, energy and transport are already having a positive impact.

#### 2.4 The Earth's Atmosphere, Climate and Weather

The Earth's atmosphere is an envelope of gases surrounding the planet. The atmosphere consists of about 78% nitrogen and 21% oxygen, with the remaining 1% composed of trace gases such as argon (0.93%) and greenhouse gases including: carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide and ozone. The atmosphere also contains a variable amount of water vapour, clouds and aerosols. The composition of the atmosphere plays an important role in determining the global climate. The term weather refers to the atmospheric conditions such as temperature, precipitation and wind in a particular place over a short period of time. The climate of an area is the average, and variations in, weather over long periods of time. Regional climate is dependent on factors such as latitude, altitude, proportion of land to water, proximity to mountains and ocean circulation. Climates are categorised according to temperature, as well as rainfall and wind patterns.



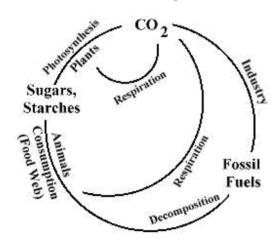
#### 2.5 The Carbon Cycle

The carbon cycle is the means by which carbon atoms are exchanged between living things, the ground, the oceans, and the skies; or biosphere, geosphere, hydrosphere and atmosphere, respectively. At the surface of the Earth, carbon is continuously engaging in a dynamic exchange of consumption and production. This active exchange is referred to as the carbon cycle.

The atmosphere contains approximately 750 gigatons of carbon, mostly in the form of carbon dioxide (CO<sub>2</sub>). At the consumption end of the carbon cycle, carbon is continuously being used up by plants in the process of photosynthesis which uses carbon dioxide to create carbohydrates, as well as being absorbed by the colder parts of the oceans.

At the production end of the carbon cycle, atmospheric carbon is continuously being created by the following processes: respiration of plants and animals and their decay, the burning of fossil fuels, limestone reactions, the release of carbon dioxide by warm areas of the ocean and volcanic eruptions. The actions of humans, such as the burning of fossil fuels, have meant that there is now more carbon being produced than being absorbed, leading to the formation of the 'greenhouse effect'.

# Carbon Cycle



Source: www.starsandseas.com/SAS%20Ecology/SAS%20chemcycles/cycle\_carbon.htm

#### 2.6 The Greenhouse Effect

The Earth's surface temperature is determined by a continuous supply of energy from the sun, the amount of energy emitted from the planet's surface and the action of greenhouse gases in the Earth's atmosphere.

Of the Sun's energy reaching the Earth in the form of visible radiation:

- about 30% is reflected back into space by clouds, dust and bright coloured surfaces, particularly ice at the Poles
- 20% is absorbed in the atmosphere, predominantly by clouds and water vapour
- almost 50% of the radiation which passes through the atmosphere is absorbed by the Earth's oceans and land.

The Earth, being much cooler than the Sun, emits far less energy, most of it in the form of infrared radiation (heat). Much of this heat is absorbed and re-radiated by gases in the atmosphere. Nitrogen and oxygen are the gases that constitute the greater part of the atmosphere and do not absorb heat to any significant extent. However, some of the gases present in lesser amounts, termed greenhouse gases, absorb energy far out of proportion to their small presence. This leads to the warming of the Earth's surface. The heat that is absorbed and re-radiated by these greenhouse gases raises the Earth's temperature to its current average of 15°C.

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!



### Did You Know...?

The greenhouse effect is very important. Without the greenhouse effect, the Earth would not be warm enough for humans to live. But if the greenhouse effect becomes stronger, it could make the Earth warmer than usual. Even just a little extra warming may cause problems for humans, plants and animals.

### Did You Know...?

'Climate change' means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

#### Source:

United Nations Framework Convention on Climate Change http://unfccc.int/resource/docs/convkp/conveng.pdf

#### 2.7 History of Climate Change

It must be remembered that the climate of the Earth has been changing consistently over its 5-billion-year history. Such changes in climate usually occur very slowly over many thousands of years. They happened primarily as a result of the effects the Sun, land, oceans and atmosphere have on each other. Over the past 2.5 million years the Earth's climate has shifted between warm and cold periods, known as glacials and interglacials respectively. During glacial periods, ice sheets spread from the Poles to cover large parts of the Earth's surface. The most recent glacial period (commonly referred to as the ice-age) took place between 30,000 and 14,000 years ago.

The current warm period began about 8,000 years ago. Even though agriculture had begun in the Fertile Crescent about 2000 years earlier, the increased temperature, CO<sub>2</sub> levels and climatic stability of this period enabled humans to grow crops and domesticate animals over an unprecedented geographical area. The development of agriculture marked the beginnings of human civilisation and the human impact on the climate.

Climate change is a significant change in climatic and weather patterns over time and will have varying impacts on regional and global scales. Such change has historically occurred naturally. However, the term climate change is now generally used to refer to changes in our climate which result from the build-up of greenhouse gases in the atmosphere, leading to an increase in global temperature and widespread adverse environmental impacts.



# Project 90 x 2030 in South Africa

Project 90 x 2030 was established as a national project of the Goedgedacht Trust in July 2007.

The project challenges South Africans to change both the way they live and the way they relate to the environment.

The aim of the initiative is to encourage the people of South Africa to contribute to the reduction of greenhouse gas emissions through lifestyle changes by 90% by the year 2030.

To accomplish the objective of modifying lifestyles to reduce climate change, the 90 x 2030 project supplies useful information to South African citizens through a website and a monthly newsletter. This information covers energy efficiency, renewable energy development, reducing emissions from transport, waste management and water conservation.

Designated 90  $\times$  2030 clubs have been formed across South Africa. These are community-based clubs focused on reducing carbon emissions in households.

To help South Africans to reduce their impact on climate change, the project encourages citizens to:

- · make effective changes to their own lifestyles
- · encourage others to modify their lifestyles
- convince law-makers and policy-makers to put in place instruments to dramatically reduce South Africa's greenhouse gas emissions

Source

www.90x2030.org.za



#### 2.8 Causes of Climate Change

#### **Natural Causes**

Climate change has always occurred as a result of natural processes such as plate tectonics, volcanic activity and interactions between land, oceans and the atmosphere, as well as variations in sunlight intensity.

#### **Plate tectonics**

This affects the climate by shaping and repositioning the continents and through mountain formation and the definition of ocean currents. They generally serve to define the physical appearance of the Earth.

#### **Solar Variation**

As the Sun ages, it is gradually becoming brighter and emitting more energy. However, on a shorter timescale the intensity of the Sun's energy output varies according to cycles. Variations in solar intensity are thought to have been instrumental in triggering the Little Ice Age, a period of cooling of the Northern Hemisphere experienced between the 16th and 19th centuries.

#### **Orbital Variations**

Variations in the Earth's position relative to the Sun are the primary natural force shaping climate change. Changes in both the Earth's orbit around the Sun and the angle of its rotational axis occur according to fixed cycles which interact to influence the Earth's climate. By determining when, and how much sunlight reaches both hemispheres, these cycles influence the severity of the seasons and can trigger extreme changes in global temperatures.



#### **Volcanism**

Volcanoes can discharge enormous quantities of ash, soot, particles and gases into the atmosphere. A single major volcanic eruption (such as Mount Pinatubo in the Philippines in 1991) can release enough material into the atmosphere to cool the entire planet by 1°C for over a year.



Over longer time-scales the world's volcanoes have a warming effect on the climate by releasing between 100 and 300 million tons of carbon per year, this is, however, less than 10% of the amount released through the burning of fossil fuels.

#### **Human Activity (Anthropogenic Causes)**

In more recent years, rising levels of greenhouse gases in the atmosphere have been identified by scientists as the primary cause of global warming. The average surface air temperature of the Earth has increased by almost 0.8°C over the last century and is predicted to rise by a further 3 to 6°C over the next hundred years. The rate of this change is such that many of the world's ecosystems will be unable to adapt. Indeed many species, particularly in tropical and polar regions, are already undergoing rapid decline.

A wide range of gases known as greenhouse gases contribute to global warming and climate change. The four most important of these are carbon dioxide ( $CO_2$ ), methane (CH4), nitrous oxide ( $N_2O$ ) and water vapour. The concentration of these gases remained relatively stable prior to the industrial revolution, but as a result of human activity has increased dramatically since that time.

The principal anthropogenic causes are: fossil fuel consumption, certain industrial processes, land-use change and waste disposal activities.

#### **Carbon Dioxide Emissions**

Carbon dioxide  $(CO_2)$  is the most important greenhouse gas in terms of its overall impact on the Earth's climate systems, being responsible for over half the greenhouse effect since pre-industrial times. A natural part of the atmosphere, carbon dioxide is produced when fossil fuels such as coal, natural gas and oil are burned, when people and plants breathe and when plants decompose.

Although CO<sub>2</sub> levels have varied hugely over the last 600 million years, the concentration had remained relatively stable for centuries, at around 270-280ppm (parts per million).

## Did You Know...?

"Most of the warming that has occurred over the last 50 years is very likely to have been caused by human activities."

#### Source:

http://ec.europa.eu/environment/climat/home\_en.htm



#### **Fossil Fuel Use**

Fossil fuels are fuels formed in the ground from the remains of dead plants and animals. It takes millions of years to form fossil fuels. Oil, natural gas and coal are the three primary types of fossil fuel.

Fossil fuels are the primary source of energy used for transport, heating and electricity generation. When we burn fossil fuels we release carbon (in the form of CO<sub>2</sub>) into the atmosphere. Since the mid 19th century, combustion of fossil fuels has increased as a result of the industrialisation and development of nations.

However, the accelerated burning of fossils fuels associated with industrialisation has contributed to a rapid increase in atmospheric  $\mathrm{CO}_2$  to its present concentration of 380 ppm, its highest concentration for over 800,000 years.

Fossil fuels are the primary source of energy used for transport, heating and electricity generation.

When we burn fossil fuels we release carbon (in the form of CO<sub>2</sub>) drawn from the atmosphere by plants millions of years ago. Activities such as deforestation, cement manufacture and changes in land use also play a major role in this increase.

#### **Land Use Changes**

Changes in land use is the second largest source of greenhouse gas emissions. For thousands of years we have been cutting down trees both to use the wood for fuel and construction and to develop land for agriculture.

Forests are home to approximately two thirds of all plant and animal species found on land and play a vital role in regulating our climate. Land uses such as forests and oceans act as carbon sinks. Trees and plants take in carbon dioxide as they grow, thus reducing the amount of  ${\rm CO_2}$  in the atmosphere.

Forests store carbon in trees, vegetation and soil in the form of decaying plant matter. Deforestation through logging and burning results in the release of this stored carbon in the form of CO<sub>2</sub>.

The loss of forest cover also reduces the planet's ability to absorb CO<sub>2</sub> which contributes to an increased atmospheric concentration of the gas.

#### **Cement Manufacture**

The manufacture of cement produces enormous quantities of  $\mathrm{CO}_2$ . For every ton of cement an equivalent quantity of  $\mathrm{CO}_2$  is produced, when quarrying and transport are taken into account. This is because the chemical process involved in the production of cement involves turning limestone (calcium carbonate) into calcium oxide and carbon dioxide. The cement industry alone is responsible for 5% of global emissions of  $\mathrm{CO}_2$ .

# **SECTION 3**

Introduces the likely impacts of climate change, evidence for climate change and global responses towards climate change.





#### 3. Impact of Climate Change

Climate change is now widely acknowledged as the greatest environmental, social and economic challenge facing mankind. Due to the global nature of climate change, the consequences will be profound and far-reaching and will impact on every aspect of life on earth. The severity and nature of the effects of climate change vary greatly according to geographical location.

While average global surface air temperature has increased by 0.74°C over the last 100 years, the geographical distribution of this increase is not uniform. Temperature is increasing more rapidly at high northern latitudes, with parts of Alaska already having experienced an increase of 3.5°C. The 11 years from 1995 to 2006 ranked among the 12 hottest years since records began in 1850.

in 1998 forest fires resulting from prolonged drought led to the loss of 5 million hectares of rainforest on the island of Borneo – an area almost the size of the Netherlands.

- coral reef bleaching: increased ocean temperatures are causing widespread and rapid decline of coral ecosystems.
- climate change is having a severe impact on global biodiversity. Many species and habitats are threatened with extinction as a result of rising temperature and mchanging rainfall patterns. The golden toad became extinct in 1989, having been first identified only 23 years earlier. Its extinction was among the first to be attributed directly to climate change.

#### 3.1 Global Impact of Climate Change

Some of the impacts of increasing temperature are changes in rainfall patterns, increased frequency of droughts, more frequent and severe storms and extreme weather events, loss of polar sea ice, glacial retreat, rising sea levels and habitat loss.

Impacts already observed include the following:

- the area of Arctic Sea ice has decreased by 20% since 1950 and the thickness of the ice above the water has decreased by about 40%
- glaciers around the world are shrinking rapidly, contributing to rising sea levels and threatening alpine and arctic ecosystems
- sea levels have increased by between 12 and 22cm and are projected to rise by a further 40cm this century, threatening coastal communities and low-lying states
- there were three times as many weather-related natural atastrophes in the world during the last decade than in the 1960s. In 2003 more than 40,000 Europeans died in unprecedented heatwaves attributed to climate change





#### 3.2 Potential Future Impact

Current climate models predict global warming of between 1.4 and 5.8°C by the year 2100. The greatest increases will be experienced at the Poles where many species are already undergoing rapid decline.

Changes in rainfall patterns, soil degradation, desertification and deterioration of water resources are expected to contribute to a decline in agricultural productivity. Many of the world's poorest regions such as sub-Saharan Africa and South-East Asia are expected to face the greatest threats to food security.

Global warming will impact directly on human health through increased frequency of extreme weather events. More intense and frequent rainfall is expected to bring about increased urban flooding and flooding along rivers and within flood plains.

Tropical cyclones, typhoons and hurricanes are expected to increase in frequency and severity due to increasing ocean temperatures and may extend into regions where they are currently extremely rare.

Global warming is also expected to increase the range of many infectious diseases. As a result of increasing winter temperatures, the spread of mosquito-borne diseases such as malaria from tropical to temperate regions is expected.

#### 3.3 Evidence for Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP). The role of the IPCC is to assess the latest scientific research in relation to climate change, predict the possible impacts and provide an objective source of information for policy-makers around the world.

#### According to the IPCC

"Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and a rising global average sea level".

In order to support the existence of climate change, scientists compare current climates with climates of the past. Information on current climatic conditions is gathered using weather stations, balloons, buoys and satellites. These instruments provide detailed information about changes in weather patterns, temperature, atmospheric make-up and sea level.

Some of the more immediate effects of climate change are noted through the changes in distribution and habitats of many plant and animal species. Although detailed records from weather stations will not exist over large periods of time, there are other ways to collect evidence about climate changes in the past.

Climatic conditions of the past are determined from historical records, and over longer periods by studying the timing of recurring natural phenomena and various climate records stored in ice sheets, tree rings, and sediments from around the world.

#### **Phenology**

Phenology is the study of the timing of recurring natural phenomena, such as the date of emergence of flowers & leaves, dates of egg-laying by certain bird species and the date of leaf colouring & fall in deciduous trees. Evidence from recent observational studies in the UK indicate that spring is now arriving about two weeks earlier than 30-50 years ago, and autumn about a week later.

#### **Pollen Analysis**

Also known as palynology, this is the study of how different plant species may have lived in an area in the past, by looking at pollen samples preserved in bogs or fossilised in sediment. Changes in pollen found at different levels in the bog may indicate changes in climate over time.



#### Tree Ring Analysis (Dendrochronology)

This is the study of tree rings. Tree rings provide information on changing climatic conditions over time, with changes in the size of rings indicating changes in temperature and rainfall over a given period.

#### **Ice Cores**

Ice cores are cylinders of ice drilled from ice sheets and glaciers from the world's polar and mountainous regions.

This ice, which formed through compression of fallen snow over thousands of years, contains air bubbles, dust and pollen which provide a snapshot of atmospheric conditions over the period.

Through examination of air bubbles at different depths (the deeper the ice, the older it is), scientists are able to accurately measure the concentration of greenhouse gases, temperature and rainfall at different periods of time. As a result of ice coring projects carried out on the ice caps of Greenland and Antarctica, scientists have been able to reconstruct the Earth's climate over the last 800,000 years.

## Nature Trust Malta – FEE Malta

All countries are likely to be affected by climate change, with individual economies being affected in different ways. Malta is a densely populated island located in the Mediterranean Sea. Tourism is a large industry sector in Malta, accounting for approximately 25% of Malta's economy. Scientists believe Malta faces a number of challenges related to climate change including: rising sea levels, coastal flooding, escalating temperatures, drought and coastal erosion. Other impacts of climate change include threats to health, energy, water supply, infrastructure and sanitation, all of which could have a knock-on effect on the tourism sector.

However, the Nature Trust Malta/FEE Malta is using the power of environmental education to combat climate change. The organisation has a very active Education Committee that organises educational events both at the Nature Trust's Environmental Centre at Wied Ghollieqa and in other ecologically important areas. Thousands of schoolchildren have visited the nature reserve to learn about the biodiversity of the area as well as to gain valuable knowledge of many important environmental issues including waste management, energy conservation and animal awareness.

Through effective environmental education Malta will be able to protect its natural landscapes and secure its tourism industry.

Source::

http://www.naturetrustmalta.org





#### 3.4 Global Responses to Climate Change

#### Introduction

Climate change is a global problem. The harmful effects of human actions such as higher levels of pollution and increased sea levels are transboundary issues, and therefore the actions of one country can greatly affect the climate of another. As a result, nations have begun to respond to the problem of climate change through the formulation of international agreements and plans of action to reduce the detrimental effects of climate change.

#### **Aarhus Convention**

On 25 June 2008, in the Danish city of Aarhus, the United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters, usually known as the Aarhus Convention, was signed. The 'three pillars' of the Aarhus Convention grant the public rights regarding access to information, public participation and access to justice in governmental decision-making processes on matters concerning the local, national and transboundary environment.

By granting everyone "access to environmental information", citizens can find out information about the state of the environment, policies or measures taken regarding the environment and the state of human health and safety where this can be affected by the state of the environment.

Through granting public citizens the right to "public participation in decision-making", arrangements must now be made by public authorities to enable the public and environmental non-governmental organisations to comment on any proposals or plans that may affect the environment.

These comments and observations must be taken into account in decision-making and information must be provided on the final decision and the reason for it. The right to challenge public decisions regarding the environment is granted through the "access to justice" pillar.

#### **Kyoto Protocol**

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCC). The major feature of the Kyoto Protocol is that it sets binding targets for participant countries for reducing greenhouse gas emissions. These reduction targets are based on 1990 emission levels and are to be achieved in the five-year period 2008-2012.



The Protocol takes into account that developed countries are principally responsible for the current high levels of greenhouse gas (GHG) emissions in the atmosphere as a result of more than 150 years of industrial activity and therefore places a heavier burden on developed nations to reduce their GHG emissions.

The Protocol sets out that participant countries (Annex B countries) must meet their targets primarily through national measures. However, the Kyoto Protocol also offers them additional means of meeting their target through emissions trading, clean development mechanisms and joint implementation.

#### **Emissions Trading**

Emissions trading is a cap-and-trade market mechanism that allows emitters (countries, companies or facilities) to buy emissions from or, sell emissions to, other emitters..

Cap-and-trade basically means that total emissions are limited or 'capped' so that each country or company involved receives an equal amount of permits.



#### **Clean Development Mechanisms**

The Clean Development Mechanism (CDM) is an arrangement under the Kyoto Protocol allowing industrialised countries, with a greenhouse gas reduction commitment, to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries. The mechanism stimulates sustainable development and emission reductions, while giving industrialised countries some flexibility in how they meet their emission reduction or limitation targets.

#### Joint Implementation

The mechanism known as 'Joint Implementation' (JI), allows a country with an emission reduction commitment under the Kyoto Protocol to earn emission reduction units (ERUs) from an emission-reduction or emission removal project in another Annex B party, each equivalent to one tonne of CO<sub>2</sub>, which can be counted towards meeting its Kyoto target.

Joint Implementation offers parties a flexible and cost-efficient means of fulfilling a part of their Kyoto commitments, while the host party benefits from foreign investment.

A Joint Implementation project must provide a reduction in emissions by sources, or an enhancement of removals by sinks. Projects must have the approval of the host party and participants have to be authorised to participate in the project.

#### Natura 2000

Natura 2000 is an ecological network of protected areas in the European Union. In May 1992, the EU adopted legislation designed to protect threatened habitats and species across Europe. This legislation is called the Habitats Directive and complements the Birds Directive. These two Directives are the basis of the Natura 2000 network.

The Birds Directive requires the establishment of Special Protection Areas (SPAs) for birds. The Habitats Directive similarly requires Special Areas of Conservation (SACs) to be designated for other species and for habitats. Together SPAs and SACs make up the Natura 2000 network of protected areas.

#### **National Policies and Initiatives**

As well as international responses to climate change, many countries have also formulated national policies to combat climate change. As countries differ greatly in both the amount they contribute to climate change and the effects of it on their environment, national policies allow countries to decide on their actions in response to the changes and also individual climate types.

An example of a national initiative aimed at reducing the effects of climate change is the Rural Environment Protection Scheme (REPS) in Ireland.



# Tatra National Park in Slovakia

Tatra National Park is a designated Natura 2000 site. It is the oldest national park in Slovakia, founded in 1949. Tatra National Park spreads over 741 square kilometres, covering the Tatras mountain range.

The tallest and best-known parts of this mountain range are the High Tatras, the tallest peak being Gerlach, spiking to a summit at 2.655 metres above sea level.

There is a vast amount of fauna that lives in Tatra National Park. Species include the chamois mountain goats, lynx, red deer, bears and wild boar.

Tatra National Park is also home to thousands of flora species including 900 species of algae, 1,000 species of lichens and 1,300 species of plants. Many of these are on the list of endangered species. Some of the mountain species living in Tatra National Park today have been there since the glacial period.

As the park is a National Park, it offers protection to the huge amount of flora and fauna that live there by conserving their natural habitat.

Source:

www.tanap.org

# Ireland: Rural Environmental Protection Scheme

Agriculture is a very important industry in Ireland. The contribution of agriculture to the Irish economy, at 3% of GDP, is twice that of the EU average.

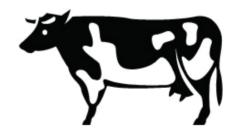
The Rural Environment Protection Scheme (REPS) is a scheme designed to reward farmers for farming in an environmentally friendly manner. The scheme is designed to establish sustainable farming practices and production methods which conserve the landscape, protect wildlife habitats and endangered species of flora and fauna, and produce food in an environmentally sensitive manner.

Farmers who participate in the REPS scheme must conduct their farming activities for a five-year period in accordance with an agri-environmental plan. Participants must also comply with a number of measures including the requirement to: protect and maintain all watercourses and wells, retain wildlife habitats, maintain farm and field boundaries, protect features of historical and/or archaeological interest and maintain & improve the visual appearance of the farm & farmyard and become familiar with environmentally friendly farming practices.

From:

www.agriculture.gov.ie





# SECTION 4

Looks specifically at actions that can be taken both at school and in the home to tackle climate change. It takes an in-depth look at the link between climate change and the themes of litter & waste, energy, water, transport, biodiversity, global citizenship and healthy living.



#### **SECTION 4**

#### 4 How to Make a Difference

#### 4.1 Analyse the Problem

Before you even start to think about the solution it helps to find out more about the problem. The first step is to identify the main sources of CO<sub>2</sub> emissions in the school. Waste management practices, energy and water usage all generate CO<sub>2</sub> emissions.

Use the climate change and the carbon calculator in Section 5 to analyse the sources of emissions and identify where reductions can be made. It will also be useful to determine the level of awareness in the school regarding climate change and later identify if this has improved.

#### 4.2 Devise an Action Plan

Once you understand the problem you can think of ways to solve it. Try to involve as many people as possible. Have a brainstorming session where everybody comes up with lots of ideas, however crazy they may seem. Your action plan should identify quantifiable targets and goals and detail how you are going to achieve them.

#### 4.3 Measuring Success

You can plan from the beginning how you will measure the success of your action plan. This will involve comparing the amount of  $CO_2$  emissions generated and reductions achieved over time. Adjustments to your action plan may then be made if necessary.

#### 4.4 Monitoring

Monitoring is a necessary and useful tool here. Keeping a constant eye on your waste, energy and water consumption is the most effective way of evaluating the success of your action plan. By doing this, any problem will be highlighted, and more importantly your success will be clear.

#### 4.5 Establish an Eco-Schools Committee

The development of an effective committee is the most important driving force for successfully implementing the programme.

You will need the help and support of students and teaching and non-teaching staff, and it is important that all groups are represented on the committee. You can also invite an HSBC volunteer to be part of the committee and to support your activities. Remember, the committee should be student-led.

At this stage it is important to decide on your general aims and objectives. They should be realistic and achievable. Success increases confidence and encourages further success.

The activity ideas described in this manual are just a starting point — it is quite probable that you will develop some interesting and innovative ideas of your own.

#### 4.6 Environmental Review

This review involves estimating the climate impact of your school. The primary tool used is a carbon calculator. By inputting data collected through implementation of the other themes you can calculate the  ${\rm CO_2}$  emissions produced each year as a result of waste management activities, energy and water consumption and school transport. Using the emissions profile generated, you can then go on to tackle your school's emissions theme by theme.

#### 4.7 Action Plan

Once the environmental review has been carried out, it is important to carefully design your action plan, taking into account the results of your review and audit. The action plan should comprise identified targets and goals with a breakdown and description of the actions to be implemented, by whom and by when. A sample climate change action plan is provided on the next page.



#### Sample action plan for climate change environmental activities that can be implemented in Eco-Schools:

**Goal 1:** to ensure the entire school is fully aware of the HSBC Eco-Schools Climate Change Initiative and to encourage full participation in the programme in the first four months of project year

Tull participation in the programme in the first four months of project year						
Action	Person/Group Responsible	Time frame				
Introduce the topic of climate change to all classes.	Eco-Schools Committee	By the middle to end of the 1st month of the project year				
Carry out a climate change art competition in each class. This could be a preparation for the HSBC Eco-Code Climate Competition.	Class teachers	Early in the 2 <sup>nd</sup> month of the project year				
Display winning entries of the competition with the results of the climate change review on the Eco-Schools notice board.	Eco-Schools Committee	Before the end of the 2 <sup>nd</sup> month of the project year				
Inform parents of aims and efforts of climate change programme through a newsletter. Include results of review and details of 'Low Carbon Day' proposal.	Eco-Schools Committee in co-operation with newsletter team	By 1 <sup>st</sup> week of the 4 <sup>th</sup> month of the project year				
Organise a 'Low Carbon Day' during the second term for whole school participation and awareness-raising.  Inform the school of plans using the intercom, school assemblies, posters in classrooms and the Eco-Schools notice board. Write an article and publish it on the HSBC Eco-Schools Climate Initiative website – use the news area and the case studies database area.	Eco-Schools Coordinator, Eco-Schools Committee and Headteacher	In the 5 <sup>th</sup> and 6 <sup>th</sup> month of the project year				
Carry out 'Low Carbon Day'.	All pupils	In the 7 <sup>th</sup> month of the project year				



Goal 2: to reduce total combined  $CO_2$  emissions from energy, waste and water consumption by 10% within six months of HSBC Eco-Schools Climate Initiative implementation using the Eco-Schools process

Action	Person/Group Responsible	Time frame
Review the 'What You Can Do' actions in the litter & waste, energy and water themes and identify possible areas for action.  If you need support, ask your national operator.	Eco-Schools Committee	In the 1 <sup>st</sup> week of the 2 <sup>nd</sup> month of the project year
Compare current emissions and waste to those of previous years and display results.  (You may need to estimate the emissions from other years. If this is not possible, define a different goal where you will start to make measurement this year.)	Eco-Schools Committee	In the 2 <sup>nd</sup> week of the 2 <sup>nd</sup> month of the project year
Have a zero waste month. Make a huge effort to minimise waste and associated CO <sub>2</sub> emissions.	All pupils	In the middle of the 2 <sup>nd</sup> month and middle of the 3 <sup>rd</sup> month of the project year
Publicise results of zero waste month on the Eco-Schools noticeboard.	Eco-Schools Committee	By the end of the 3 <sup>rd</sup> month after the start of the project year



#### 4.8 Litter & Waste and Climate Change

Reducing, reusing and recycling waste plays a vital part in reducing our greenhouse gas emissions.

Waste management activities cause carbon dioxide emissions. In fact the products we use are responsible for the production of  $CO_2$  at each stage of their life-cycle from raw material extraction, right through to final treatment or disposal.

The manufacture of materials such as paper, cardboard, glass, plastics and the aluminium found in drink cans consume natural resources and energy and are responsible for a large proportion of our CO<sub>2</sub> emissions.

'Reduce, reuse, recycle' is our mantra for the litter & waste theme, but also plays a vital part in reducing our CO<sub>2</sub> production. By reducing, reusing and recycling we cut down on the need for new raw materials, preserving valuable resources and saving the energy consumed in their extraction, manufacture and transportation. Saving energy also leads to a reduction in CO<sub>2</sub> production.

#### What You Can Do

Reduce and reuse: By reducing our consumption of materials such as paper, cardboard and plastic bottles we can eliminate all of the CO<sub>2</sub> produced throughout their life-cycle. Re-using eliminates all CO<sub>2</sub> emissions apart from those associated with initial production.

Recycle: Recycling cuts down on the need for new raw materials, preserving valuable resources and saving the energy consumed in their initial extraction, transportation and refinement, resulting in substantial CO<sub>2</sub> reductions.

Compost: Composting of garden and kitchen waste produces CO<sub>2</sub>, but prevents the production of methane which is 21 times more powerful as a greenhouse gas.

Buy green: Buying recycled products or items that are durable and can be easily repaired or reused reduces CO<sub>2</sub> production. Purchasing only what we need also helps.

#### Calculate your waste-related CO, emissions

Use a carbon calculator to estimate your school's wasterelated carbon emissions. You can download a carbon calculator from the Irish Eco-Schools website available at:

www.greenschoolsireland.org

You can also check for other carbon calculators that can be used in your country. Examples of websites with carbon calculators are listed in Section 5, or you can use the one in Section 5.

### Did You Know...?

Recycling one aluminium can saves 95% of the energy needed to produce a new one - 90g of CO<sub>2</sub> emissions are produced per kg of aluminium. This is because recycling aluminium does not involve the extraction, refining and much of the transportation involved in production from virgin materials. By removing these stages from the production cycle, massive energy and CO<sub>2</sub> savings are made possible. Recycling aluminium also avoids the potential environmental damage associated with the mining of bauxite for its manufacture. Similarly, recycling a glass bottle saves 20% of the energy needed to make a new one - about 30g per kg - but reusing the bottle saves even more.

A list of useful websites related to litter & waste is provided in Section 6.



# Clean up the World Campaign

The Clean up the World campaign originated in Sydney, Australia in 1993 and is held in partnership with the United Nations Environment Programme (UNEP). The campaign brings together businesses, community groups, schools, governments and individuals to undertake activities to improve water quality, clean up local streets, parks, waterways and forests and educate children about the environment.

The campaign involves an estimated 35 million volunteers in over 100 countries each year, uniting them towards the common goal of cleaning up, fixing up and conserving our environment. Members are encouraged to focus on creating greener cities and communities by looking at their streets, parks, waterways and roadways and deciding how they can reduce the impact of waste within their community.

Every year 150 countries celebrate with a Clean up the World campaign. The campaign aims to protect the environment from pollution by guiding people towards positive behaviour and attitudes regarding the environment. The campaign also promotes the reusing and recycling of solid waste such as paper and glass. The campaign has enhanced partnerships between NGOs, government bodies and the private sector.

#### Source:

www.cleanuptheworld.org



#### 4.9 Energy and Climate Change

Whether it is in the home or at school, when we talk about energy we are mostly talking about heating, lighting and electrical appliances.

#### Fossil Fuels and Climate Change

The energy produced when we burn fossil fuels such as coal, natural gas and oil comes from carbon and hydrogen. When we burn these fossil fuels we release carbon (in the form of CO<sub>2</sub>) drawn from the atmosphere by plants millions of years ago. Fossil fuels such as coal, natural gas and oil are composed almost entirely of hydrogen and carbon. When we burn fossil fuels we produce energy and release the carbon they contain.

Black coal is almost entirely carbon; a ton of coal when burned produces 3.7 tonnes of  $CO_2$ . Oil is less carbon-rich than coal, containing two hydrogen atoms for every atom of carbon, and so produces less  $CO_2$  and more heat when burned. Natural gas (methane) is the least carbon-rich of the fossil fuels, containing just one atom of carbon for every hydrogen atoms.

#### Types of Renewable Energy

#### **Wind Energy**

Since ancient times, people have been harnessing energy from the wind. As long as 5,000 years ago, the ancient Egyptians were using wind to sail ships on the Nile River. Later, people built windmills to grind grain and pump water. Some of these windmills still exist. Holland is famous for them.

Like the old-fashioned windmills, today's wind turbines use blades to collect the wind's kinetic energy. Wind flows over the blades, causing them to turn.

The blades are connected to a drive shift that turns an electric generator to produce electricity.



#### **Solar Energy**

The Sun is amazing. Without it, none of us would exist, and there would be no life on Earth.

Without sunlight, plants could not make food, so there would be nothing for us to eat. And without sunlight plants could not make oxygen, and no animals could breathe. The Sun produces nearly all the heat on the planet, makes the wind blow and the ocean currents flow and controls the weather too.

People have been using solar energy for years. We can use the Sun's energy for a number of different things. First, to heat things: our houses, the water in our houses, the food in a solar cooker and so on. This is called solar thermal energy. The second is to turn the Sun's light directly into electricity, using solar panels. This is called photovoltaics.

#### Hydropower

Hydropower is power that comes from the force or energy of moving water, which can be harnessed for useful purposes. Before the widespread availability of electricity, hydropower was used for irrigation and to operate machinery such as watermills and textile machines. There are many different types of hydropower including tidal power and wave power.

#### **Biomass Energy**

Biomass is the oldest form of energy. For thousands of years people have burned wood to use for heat and for cooking. In fact, wood was the biggest energy provider in the world until the mid-1800s.

Biomass is any organic matter that can be used as an energy source. Organic means anything that is alive or was alive a short time ago. Organic materials are renewable energy sources like trees, plants and animal waste.

#### **Geothermal Energy**

Geothermal energy is heat that is generated 4,000 miles deep inside the Earth's core. The centre of the Earth is called the iron core. The Earth is made up of several layers including the crust, mantle, outer core and iron core.

Geothermal energy was first used by people centuries ago.

There are many hot springs around the world that are heated by the Earth's core and ancient people used them for bathing. Geothermal energy is also a renewable energy source. The Earth continually produces rain for water and magma for producing heat. Deep inside the Earth, the water and rock absorb the heat from the magma and we can dig wells and pump out the heated water or steam. This heated water can be used for generating electricity and heating.

#### **Advantages of Renewable Energy**

Carbon dioxide emissions from burning fossil fuels are a significant contributor to global warming and climate change. Renewable energy, compared to fossil fuels, has either no associated carbon dioxide emissions or at worst is carbon dioxide neutral.

Renewable energy sources such as water, solar power and wind, are infinite and will not run out, unlike fossil fuels such as coal and gas which are not renewable.

By diversifying the type of energy sources nations use, energy supply will become more secure, and countries will become increasingly self-sufficient, which in turn will reduce  ${\rm CO_2}$  emissions generated by the import/export industry.



# **Electric Cars in Japan**

A major source of global greenhouse emissions is the use of vehicles that run off petrol and diesel. As a response to this issue, car manufacturers have begun to develop electric vehicles (EVs), which use electricity as a fuel source and therefore do not emit any harmful emissions into the atmosphere. Japan has been at the forefront of this development, with the full-scale sale of electric vehicles since 2009. Instead of petrol stations, electric cars require charging facilities where vehicles are plugged in to recharge their batteries. Charging facilities for EVs are being developed throughout Japan to cater for this new type of environmentally friendly vehicle.

As well as developing charging stations, Japanese property development companies have started to sell EV-accessible houses. The houses are equipped with charging sockets in their parking garages. These sockets can be operated from inside the house and can be preset in order to facilitate the overnight charging of vehicles. This is even more environmentally friendly than charging the vehicles in the daytime.

Source:

www.env.go.jp/en/



# Solar Power Plants in the Mojave Desert, California, USA

The Mojave Desert occupies a large portion of southeastern California in the United States. The desert is named after the Mojave tribe of Native Americans and it occupies over 22,000 square miles.

There are several solar power plants currently operating in the Mojave Desert, all of which supply power to the electricity grid. The solar power plants in the Mojave Desert that were built in the 1980s are known as Solar Energy Generating Systems (SEGS). Together, these plants have a combined capacity of 354 megawatts.

There are also plans to build the largest solar power plant in the world in the Mojave Desert. The Mojave Solar Park is planned to be built by 2011 and will deliver 553 MW of solar power when fully operational. This is enough to provide power to 400,000 homes in northern and central California.

The Mojave Desert receives some of the best solar radiation in the United States, making this location very suitable for solar power plants. The desert receives up to twice the sunlight received in other regions of the country. This wealth of solar energy means that solar power plants are an attractive alternative to traditional power plants, which burn polluting fossil fuels such as oil and coal.

Source:

www.environmentcalifornia.org/





#### What You Can Do

Small changes can make a big difference. We can reduce our energy-related CO<sub>2</sub> emissions through energy-saving measures both at school and at home.

Turn off lights and appliances when they are not needed.

Use energy-efficient light bulbs and appliances; over its lifetime just one CFL bulb can reduce your lighting costs by up to \$60 and avoid 400kg of CO<sub>2</sub> emissions.

Turning down the thermostat by even 1°C can reduce your heating bill by up to 10% and results in massive CO<sub>2</sub> savings.

Buying renewable energy from your supplier may also be an option available to you. Purchasing electricity generated from renewable energy sources reduces CO<sub>2</sub> emissions and provides funds for further investment in renewable energy generation.

Each of these small steps will help you reduce your CO<sub>2</sub> emissions and save money. Other methods of saving energy may require a greater initial investment, but should save money over the long term. These include the use of solar panels, geothermal heating, double glazing, improved insulation and wood-chip boilers.

#### Calculate your energy-related CO, emissions

Use a carbon calculator to estimate your school's energy-related carbon emissions. You can use the one in Section 5, or you can download one from the Irish Eco-Schools website www.greenschoolsireland.org or check for other calculators that can be used in your country at the websites listed in Section 6.

The number of kWh of electricity consumed can be worked out by looking at past bills. Similarly, the quantity of gas or oil consumed can be worked out by looking at bills. What kind of changes can be seen in energy consumption during different months of the year? Why?

If you have a record of the electricity and heating usage prior to joining the Eco-Schools Programme you can compare present and past usage levels to determine the  $\mathrm{CO}_2$  savings you have made through implementation of the Energy theme.

If some or all of your electricity comes from a renewable energy source, such as hydro, wind or solar power, then this is exempt from your calculation.

A list of useful websites related to energy is provided in Section 6.

#### 4.10 Water and Climate Change

Water is a necessary resource and a sufficient supply of clean water is essential to the health of both people and the environment.

Water has an important role to play in climate change. It covers more than 70% of the Earth's surface and water vapour, which acts as a greenhouse gas, makes up a significant proportion of the Earth's atmosphere.

The availability of water is highly sensitive to changes in climate, and varies throughout the world. While some countries may take a plentiful supply of clean water for granted, many people around the world do not have access to such a resource. Changes in temperature and rainfall patterns brought about by climate change will worsen the plight of many of the world's poorest people currently living in arid and semi-arid regions.

Global sea-level rises attributed to climate change will threaten coastal communities around the world, particularly in low-lying island states. It is predicted that global sea levels will rise by about 50cm by the end of the century, predominantly due to warming and the expansion of the world's oceans.

## Did You Know...?

Bangladesh heads the list of countries most at risk of flooding. Increasing glacial melt from the Himalayan ranges as a result of rising global temperatures is set to swell the Ganges and Brahmaputra rivers and their hundreds of tributaries, flooding 30 - 70% of the country each year as the water makes its way to the Bay of Bengal in the south, where the coast is also vulnerable to flooding from rising sea levels.

Source:

World Bank 2009



It is difficult to calculate the effect of water consumption on  $\mathrm{CO}_2$  emissions, as there are different sources of water. However, most schools will get their water from a public water supply. This water needs to be treated and pumped to the school, with energy being consumed at each step. As for the energy theme, increased awareness and simple changes in habit can help lessen the amount of water we use, reducing our carbon footprint.

#### What You Can Do

We can reduce our water-related CO<sub>2</sub> emissions both at school and at home through water-saving measures, such as:

- place a water-saving device in the toilet cistern
- when washing your hands and face put the plug in the basin as this uses less water than a running tap
- · get leaking taps fixed
- have a shower instead of a bath
- use rainwater barrels to collect rainwater which can be used to water flowerbeds and school gardens
- hold a water awareness campaign in the school to inform everyone of the importance of conserving water
- place signage above taps to remind students and teachers not to waste water
- monitor water usage regularly to identify any unexplained increase in usage – it could be a leak.

Calculate your water-related CO<sub>2</sub> emissions

Use a carbon calculator to estimate your school's waterrelated carbon emissions.

What you are trying to gauge is the number of litres of water consumed by the school. Most schools should have a water meter that can provide this information. Any schools that do not yet have a meter can estimate water consumption.

### Did You Know...?

To estimate water consumption all you need to do is work out how much water is coming out of the tap. Put a large bowl in the sink and turn on the tap for five seconds. Then switch off the tap and measure the amount of water using a measuring jug. Multiply by 12 to give you the amount of water flowing in one minute.

Time how long you run the tap each time you use water and work out how much water you use in a day. For every time you flush the toilet add on an extra 9 litres.

Source:

**Dublin City Council 2009** 

A list of useful websites related to water is provided in Section 6.



# Rainwater Harvesting in Gansu, China

Gansu is a large province located in the northwest of China. It is one of the driest areas of the country, with annual precipitation of only approximately 333mm. Low rainfall, together with high evaporation rates, has meant that this area suffers from water scarcity issues such as frequent droughts, low agriculture yield levels, land degradation and environmental deterioration.

Before 1995 and the introduction of rainwater harvesting to the area, the people of Gansu suffered many of the adverse effects of water scarcity. In the past there were up to 3 million local people that had no access to safe drinking water. The women and children of the province would have to travel for several hours to collect clean water. Some people used to have to share their water sources with their animals, running the risk of contracting disease.

The shortage of water in the area had a direct impact on the low yield from agriculture. Without adequate water resources, farmers could not make a good living for their families.

Between 1988 and 1992, the Gansu Research Institute for Water Conservancy (GRIWAC) conducted a project on rainwater harvesting (RWH). Different types of RWH systems were tried and tested to find the most efficient and effective type.

Domestic households in the area then began using RWH, as well as farmers. With water available, farmers were able to grow enough crops to increase their incomes. The RWH system has developed greatly in the region and has played a vital role in the social and economic development of the area. RWH can provide reliable, clean and cheap water.

Source: www.iwahq.org



#### 4.11 Transport and Climate Change

The transport sector contributes greatly to  $\mathrm{CO}_2$  emissions. Emissions from this section have increased significantly with the growth in private car use, accounting for the majority of this increase. About 2.5kg of  $\mathrm{CO}_2$  is released for every litre of fuel burned in a car engine. The most effective way of tackling this is to use the car less often. By walking, cycling or taking the bus we can reduce our transport-related emissions.

Air transport is one of the fastest growing sources of greenhouse gas emissions. Aviation is particularly problematic in terms of its climate impact. In addition to carbon dioxide, aircraft emit nitric oxides, sulphate & soot particles and water vapour in the form of condensation trails, all of which contribute to climate change. A molecule of greenhouse gas is several times more powerful when emitted at altitude than at lower levels. A survey could give information on the distances and types of transport involved (car, bus, bike, walking) in teachers and students getting to school.

### Did You Know...?

The average person walks the equivalent of three and a half time around the earth in a lifetime.

#### What You Can Do

- cycle or walk: where possible avoid using the car for short trips. Walking and cycling are good for the environment and your health
- use public transport where possible: many trips can be taken by bus or train
- investigate whether car-pooling or 'park and stride' are possible in your area
- consider holiday destinations closer to home or travel by train or boat where possible to reduce the number of flights you take



• For car drivers, ensuring the tyres are at the correct pressure and avoiding driving too fast, improve fuel efficiency. If the car is to be replaced, the fuel economy of the new car could be taken into account. For further information, ideas and tips check out the transport section of the Eco-Schools Ireland's website: www.greenschoolsireland.org.

A list of useful websites related to transport is provided in Section 6.

# Bikeability: A Cycling Initiative in England

In order to encourage cycling as an alternative mode of transport to private vehicles, Cycling England launched a national programme for cycle training called Bikeability. There are three levels to the Bikeability programme, designed to give the next generation the skills and confidence to ride their bikes on today's roads.

With each level, participants learn how to deal with complex road situations and equip themselves with the ability to handle a wide range of traffic conditions and road layouts.

The programme is intended to help young people gain the benefits associated with cycling, (including better health and fitness), reduce private vehicle utilisation and decrease carbon dioxide emissions. The Bikeability programme sets out the skills needed for cyclists to be competent and confident when using their bikes for all sorts of journeys.

As Bikeability training can only be delivered by instructors accredited to the National Standards, participants receive quality training to the right standard, giving them the skills and confidence to cycle safely and well, and play a major role in improving the environment.

Source: www.bikeability.org.uk



#### 4.12 Biodiversity and Climate Change

Biodiversity refers to the variety of plant and animal life found in an ecosystem. Biodiversity is a measure of the level of health of an ecosystem, with healthy ecosystems having greater variety and variation in plant and animal life than unhealthy ones. Ecosystems provide much that is crucial to human survival. This includes food, fuel & energy, fodder for animals, medicines, clean water, clean air, flood & storm control, seed dispersal, pest & disease control, soil formation and maintenance. Large habitats can also act as carbon sinks. A carbon sink is a type of 'reservoir' which naturally absorbs some of the carbon dioxide emitted into the atmosphere.

There is pressure on biodiversity from human activity. Increases in world population have led to an increased demand for resources, which in turn has led to the removal or overexploitation of many habitats including woodlands and oceans.

There are also many threats to biodiversity from climate change. Habitats may be lost through the increased occurrence of natural disasters such as hurricanes and earthquakes. Rising sea-levels will mean the loss of coastal and low-lying habitats. Rising temperatures may also lead to increased levels of invasive species, threatening the survival of native species.

#### What You Can Do

- create a survey to discover if students think their own environment is important to them and why they think it is important
- map and make a list of biodiversity in the school including potted plants, insects and hedgerows. This will be your baseline survey, against which you can easily identify any increases in biodiversity levels within the school and its environs.
- investigate your local area and the types of habitat that surround your school. Are any of these special areas of interest or protected in any way? For example, are you near any special protected areas or special areas of conservation?
   You can use the internet to investigate if your school is located near any protected habitats.



- discover what birds visit your school grounds. You can use online resources or books to identify what birds are commonly found in your locality. You can then compile images of these birds on a chart which you can mark sightings on
- if your outdoor area is concrete, carry out a lichen survey
- go on a nature trail and see how many species you can identify
- increase overall levels of biodiversity within the school by planting trees & shrubs, potted plants and flowerboxes
- if possible, create a school garden where you can plant trees & shrubs and even grow your own vegetables
- · build an insect hotel

A list of useful websites related to biodiversity is provided in Section 6.

# Russia: Save Amur Tigers Campaign with the Wildlife Conservation Society

There are only approximately 330 - 370 adult Amur tigers (also known as Siberian tigers) left in the wild, with 95% of these animals in the Russian Far East. The Wildlife Conservation Society (WCS) has been conducting research since 1992 that is aimed at collecting as much scientific information as possible about Amur tigers to help the Society to formulate effective and efficient conservation.

Through radio-tracking more than 60 tigers since 1992, WCS specialists have studied their social structure, land use patterns, food habits, reproduction, mortality and relationships with other species, including humans.

The main threats to the survival of the Amur tiger are poaching, habitat loss and illegal hunting of ungulates, which are the tiger's main prey. The development of roads is another threat to tigers, as they increase access to tiger habitats and make them easier to poach.

In order to continue protecting the Amur tiger from extinction, the WCS is undertaking a number of actions. The Society has developed a training programme for the next generation of tiger conservationists in order to ensure the tigers are protected in the future. The WCS is also working with local communities and encouraging them to invest in tiger conservation through the development of economic incentives.

From:

www.wcs.org





## **Brazil: The Amazon Rainforest**

The Amazon Rainforest is a tropical rainforest, with Brazil home to 60% of it. Rainforests act as a rich habitat for a huge amount of flora and fauna. A single hectare can contain over 750 types of trees and over 1,500 species of plants.

As well as being a valuable habitat, rainforests serve another important environmental purpose. These ecosystems act as carbon sinks.

The tropical forests of Brazil are home to the most diverse ecosystems on Earth. Deforestation results in the destruction of these ecosystems and a massive loss of biodiversity.

In recent times, targeted action has been taken to preserve the Amazon rainforest including reforestation and the development of sustainable forest management plans.

Environmental education can teach the next generation the lessons not learned in the past, that rainforests are worth saving. With this information, children will be more aware of the impacts of their actions and will be capable of making informed, sustainable decisions.



### 4.13 Global Citizenship and Climate Change

The current rate at which the global population is using the world's resources is unsustainable. This exploitation has led to the scarcity of vital resources in many areas of the world which continues to deny many people their basic rights as human beings, including access to food and clean water. Educating people about global citizenship, including global problems and the threats of climate change, will hopefully encourage a sense of responsibility to care about the planet and to develop a common respect with those who share it.

By becoming aware of our roles and responsibilities as global citizens, we will become familiar with the ideas of sustainable development, interdependence, social justice and diversity. Global citizenship encourages value and respect for the environment, a commitment to sustainable development and the belief that people can make a difference through their actions.

## Did You Know...?

Fairtrade is an organised social movement and market-based approach that aims to help producers in developing countries and promote sustainability. The movement supports the payment of a 'fair price' as well as social and environmental standards in areas related to the production of a wide variety of goods. It focuses in particular on exports from developing countries to developed countries, including handicrafts, coffee, cocoa, sugar, tea, bananas, honey, cotton, wine, fresh fruit, chocolate and flowers.

Fairtrade's strategic intent is to work with producers and workers in developing countries in order to help them move towards economic self-sufficiency and stability. It also aims to allow them to become greater stakeholders in their own organisations.

From:

www.fairtrade.net



## Did You Know...?

Sustainable development is usually defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

#### What You Can Do

- discuss 'Sustainable Development' what does it mean to different people?
- organise a fund-raising day for an aid project you are interested in and find out how the funding will be used for carbon off-setting. You could plant a (native) tree to offset some of the carbon the school emits, which helps reduce climate change problems for developing countries
- try to ensure that as many school purchases as possible are Fairtrade products and ethically sourced
- create a 'suppliers list' for the school to try to ensure that all suppliers are as environmentally friendly as possible.
   Schools can visit www.fairtrade.net for information on buying Fairtrade products.

A list of useful websites related to global citizenship is provided in Section 6.

# Wales – the first Fairtrade nation

In June 2008, Wales became the first Fairtrade nation in the world.

In 2006, the Wales Fairtrade Forum and the First Minister set targets for Wales to become a Fairtrade nation. The Wales Fairtrade Forum consists of Oxfam, Christian Aid, the Catholic Agency for Overseas Development, Traidcraft and local Fairtrade groups.

The targets included a requirement that 100% of local authorities should have active Fairtrade groups working towards Fairtrade status, as well as increasing the amount of Fairtrade purchases Welsh citizens make annually, and increasing the number of Welsh citizens who are aware of Fairtrade.

Wales now has 58 Fairtrade towns, and all 22 local authorities are Fairtrade. In less than a year 380 schools have committed to learning about Fairtrade and using Fairtrade products.

Becoming a Fairtrade nation is a long-term commitment and Wales will be assessed every two years, to ensure continuous improvements are being made regarding Fairtrade practices.

Source:

www.fairtradewales.com





## 4.14 Healthy Living and Climate Change

The state of our health is directly related not just to our longterm physical well-being but also to our general happiness, confidence and outlook on life. Healthy living involves each of us considering our actions and what effect they will have on our planet and its natural processes.

Healthy living means caring for the environment, it also relates to taking care of all living things including plants, animals and, of course, ourselves. By being aware and educating ourselves about healthy living, and the threat of climate change, we will be able to make sustainable decisions in our daily lives.

Healthy living includes ensuring we eat a balanced diet and getting enough exercise. One of the most effective ways to reduce climate change through healthy living is to buy and use organic products. Organic food refers to food grown without the use of chemical fertilisers or pesticides. Animals will usually be raised free range and fed a natural diet. By eating organic products, we reduce the amount of chemicals that we ingest, as well as reducing the amount of pollutants released into the atmosphere. Organic agriculture can bring environmental benefits by increasing farmland wildlife and improving soil quality while reducing energy use, carbon emissions, pesticides and nitrate pollution.

By choosing organic food, consumers send the message to food growers and manufacturers that organic practices are important.

## Did You Know...?

Eating lots of different coloured fruits and vegetables each day gives your body the variety of nutrients and vitamins it needs to stay healthy. What colours will you eat today?

#### What You Can Do

We can improve our health by following a few simple actions:

- buy locally grown food.
- check out farm stands for locally grown produce and ask your grocery store what produce they carry from local growers. Doing this will reduce the pollution created during transport of items that are not sourced locally
- have a 'waste-free' lunch. Use reusable lunchboxes, drink bottles and stainless steel cutlery
- encourage walking, cycling and buses as a means of travelling to school to increase exercise levels
- encourage participation in after-school activities
- publicise the importance of getting five fruit or vegetable portions every day
- encourage healthy snacks, such as fruit, as an alternative to chocolate and crisps
- use biodegradable non-toxic cleaning fluids, which reduce the amount of harmful chemicals being emitted into the atmosphere as well as the waste packaging being sent to landfill.

A list of useful websites related to healthy living is provided in Section 6.

## Did You Know...?

Biodegradable matter is all organic material and other artificial material that can be broken down by air, water and bacteria. A biodegradable product has the ability to break down relatively quickly into the raw materials of the natural environment.

# SECTION 5

Demonstrates how to conduct a climate change environmental review through the use of a carbon calculator and an action checklist.



SECTION 5



#### 5. Environmental Review

The environmental review for climate change seeks to identify the climate impact of activities carried out under the Eco-Schools themes of litter & waste, energy, water and transport. This is achieved through the use of a carbon calculator.

The carbon calculator is used to 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 or car) and water consumption. Our calculator will convert the recorded values, be it for energy, waste, transport or water, into a final figure for CO<sub>2</sub> emissions.

By calculating this figure, it should be easier to make changes that will reduce the impact that the school is having on climate change. In some cases, estimated values will need to be entered.

However, the main aim should be to get a value of CO<sub>2</sub> that you can work on reducing in future years, and compare with other schools around the country.

The following data will be required:

- the amount of waste (kg) going to landfill
- the amount of waste (kg) (e.g. paper and plastic) being recycled per year (if it is not possible to determine the exact weights, they can be estimated by measuring the weight of one bin, and multiplying by the number of bins filled in the school year)
- the number of kWh of electricity consumed. This can be found by looking at past bills
- the quantity of gas or oil consumed can be found by looking at bills
- the number of litres of water consumed by the school. Most schools should have a water meter that can provide this information
- the distance travelled by students and staff to school
- the mode of transport used.

#### 5.1 How to Use a Carbon Calculator

#### The Web Version

Input the required data into the space provided.

The calculator will automatically calculate the amount of CO<sub>2</sub> emissions.

#### The Text Version

Input the required data into the space provided.

Multiply the inputted data by the conversion factor to calculate the amount of CO<sub>2</sub> emissions.



## Monitoring Progress and Comparison with Past Performance

If you have records detailing your school's energy consumption, waste production, transport and water consumption in previous years, you can compare present and past  $\mathrm{CO}_2$  emission levels to determine the  $\mathrm{CO}_2$  savings you have made through implementation of your Eco-Schools Programme.

## **Interpreting the Results**

Through use of the carbon calculator you will be able to identify the breakdown of your school's CO<sub>2</sub> emissions.

While CO<sub>2</sub> emissions can be looked at as an overall value per year or month, it is easy to convert this figure to CO<sub>2</sub> per student in school and/or per m² of school buildings. In this way it will be easier to make comparisons between different schools, or between different years in the same school where changes in student numbers or school size has taken place.

By comparing these to the benchmark school carbon footprint outlined below, you can establish the areas in which  ${\rm CO_2}$  emission reductions should be tackled.

## 5.2 Example of a Carbon Calculator

Below is an example of a carbon calculator that was developed for Green Schools Ireland by An Taisce. The aim of the carbon calculator is to estimate the school's total  ${\rm CO_2}$  emissions, per environmental area first, and then for the total emissions per year. However, depending on the country, the conversion factors may be different, and your school may have different activities from the ones indicated in the example below.

Adapt the carbon calculator before you start your estimate, or see the alternative calculators in Section 6.



## Litter & Waste

	List of Activities	Y = Quantity (kg/year)	Z = Conversion factor	Y x Z = X  X = Total  Emissions per year (kg CO <sub>2</sub> )
1.	Waste going to landfill		1.5	
2.	Waste for recycling		0.3	
3.	Compost (carbon neutral)		0 (carbon neutral)	
A	A Grand total CO <sub>2</sub> emissions from litter & waste from school			

## Energy

	List of Activities	Y = Quantity (kWh/year) - activity 1 and 2 Or (therms/year) - activity 3 Or (litres/year) - activity 4)	Z = conversion factor	Y x Z = X  X = Total emissions per year (kg CO <sub>2</sub> )
1.	Electricity (kilowatt-hours)		0.6	
2	Natural gas (kilowatt- hours) Or		0.19	
3.	Natural gas (therms)		5.5	
4.	Oil (litres)		2.69	
В	Grand total CO <sub>2</sub> emissions from energy consumption			

Note: If some or all of your electricity comes from a renewable energy source, such as hydro power or solar power, this is exempt from your calculation.



## **Transport**

	List of Activities (Total for all staff and students)	Y = Distance (miles/ year)	Z = Conversion factor	Y x Z = X  X = Total emissions per year (kg CO <sub>2</sub> )
1.	Miles travelled by petrol car		0.36	
2.	Miles travelled by diesel car		0.28	
3.	Miles travelled by bus		0.03	
4.	Miles travelled by train		0.01	
5.	Miles travelled by bike/foot		0	
С	Grand total CO <sub>2</sub> emissions from transport to a			

## Water

	Activity	Y = Volume (litres/year)	Z = Conversion factor	Y x Z = X  X = Total emissions per year (kg CO <sub>2</sub> )
1.	Total water consumption		0.001	
D	Grand total CO <sub>2</sub> emissions from v			



	Carbon emissions per year final indicators	Equation to be used
E	Total CO <sub>2</sub> emissions per year from the school (kg CO <sub>2</sub> /year)	A + B + C + D
F	Total CO <sub>2</sub> emissions per person (kg CO <sub>2</sub> /person/year)	E total number of staff and students
G	Total CO <sub>2</sub> emissions per year from the school per m <sup>2</sup> of school building(s) (kg CO <sub>2</sub> /m <sup>2</sup> /year)	Etotal m²



## **5.3 Climate Change Action Checklist**

Once you have calculated your school's  $\rm CO_2$  emissions you can identify areas for action. Below is a checklist you can use outlining some steps that can be taken under the different themes to reduce your school's climate impact.

You may find the need to adapt the checklist. You can check for more information in Section 6 from this manual, at the HSBC Eco-Schools Climate Initiative website or with your national operator.

As for reviews carried out for the other Eco-Schools themes, each question in the checklist can be answered 'Yes' or 'No'. 'No' indicates that improvement is possible. Subsequently, areas can be highlighted for action and targets for improvement can be set and monitored.

The checklist will raise many issues and indicate a wide choice of areas that may require attention.

Each participant school will be asked to register the climate change activities that they are developing in their schools on the HSBC Eco-Schools Climate Initiative website. This registration is made with the support of the national operator.





Example of an action checklist.

You may need to make some changes to the list of activites according to the needs of your school, region or country.

Litter & Waste	Yes/No	Action Notes
We avoid excess packaging with our lunches		
We photocopy/print on both sides of paper		
Notes are written on scrap paper		
Paper is used on both sides		
We recycle paper		
We recycle plastic		
We recycle cardboard		
We recycle used ink-jet cartridges (if applicable)		
We use a compost bin/wormery		

Energy	Yes/No	Action Notes
We turn off lights when not in use		
Lights nearest to windows switched off if daylight is adequate		
We turn off electrical equipment fully when not in use		
We close the windows when weather is cold		
The fins behind radiators are kept clean		
We use 'energy-saving' bulbs		
We use rechargeable batteries when possible		
The boiler is serviced annually		
There is proper insulation on the hot water cylinders		
We keep a record of our gas/electricity/fuel bills		
We turn the heating off when it is warm		
There are thermostats on each radiator		

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Water	Yes/No	Action Notes
We collect rainwater for reuse		
We fix leaking taps		
The toilet cisterns have dual flush or a water-saving device		

Transport	Yes/No	Action Notes
We walk/cycle/take public transport whenever possible		

Biodiversity	Yes/No	Action Notes
We have increased our level of knowledge about biodiversity		
We have increased the level of biodiversity in the school		

Global Citizenship	Yes/No	Action Notes
We buy as many Fairtrade products as possible		
We have planted a native tree		
We have learned about different cultures and traditions		

Healthy Living	Yes/No	Action Notes
We eat healthy snacks		
We exercise every day		
We have waste-free lunches		

## SECTION 6

Provides a number of resources for use by teachers including a table outlining the Eco-Schools seven-step process, useful links, climate change terminology and a bibliography.





## 6. Appendices

## 6.1 Seven-Step Process Table

The table below outlines the seven-step process to help implement the theme of combating climate change

Eco-Schools Steps	Description	Activities
STEP 1: Establishment of the Eco-Schools Committee	As the core of the Eco-Schools process, the committee organises and directs the school activities. It consists of the stakeholders of the school, namely pupils, teachers, caretakers, parents and possibly representatives of the local authority.	The students will discuss possible climate change activities/actions or develop those already in progress. Schools decide what they can do in order to improve upon their changes.
STEP 2: Environmental Review	Work commences with a review or assessment of the environmental impact of the school. Pupils are involved in this work, ranging from assessing the level of litter on school grounds to checking infrastructure for inefficiencies.	The environmental review should be performed by students.
STEP 3: Action Plan	The information from the review is used to identify priority areas and create an action plan, setting achievable and realistic targets and deadlines to improve environmental performance on specific issues.	The environmental action plan is produced.
STEP 4: Monitoring and Evaluation	This process ensures that progress towards targets is followed, that any necessary changes are made to the action plan and that achievement is acknowledged. It further ensures that environmental education and care is an on-going process in the school.	Monitoring of the climate change projects.



STEP 5: Curriculum Work	Classroom study of themes such as energy, water and waste are undertaken by most students. The whole school should be involved in practical initiatives such as saving water, recycling materials and preventing litter. Efforts should be made to integrate environmental education throughout all curriculum areas.	Teachers will be primarily responsible for incorporating climate change topics into the school curriculum.
STEP 6: Informing and Involving the Wider Community	This directly brings Local Agenda 21(http://www.un.org/esa/dsd/agenda21) into schools as parents, local authorities, businesses and the wider community are involved in the Eco-Schools process. Schools are encouraged to make ties with external organisations in order to benefit from their experience and expertise.	Informing and involving the wider community about the climate change activities and the project. All the school will be involved in the climate change actions.
STEP 7: Eco-Code	Each school produces its own 'Eco-Code', a statement of values and objectives, outlining what the students are striving to achieve.	The Eco-Code will represent climate change issues and can be presented at the Eco-Code Climate Competition.
The Green Flag International Award and the International Eco-Schools Certificate	This is an eco-label of high school performance in the Eco-Schools programme - it is awarded by FEE through national operators.	



## 6.2 Useful Links

## General Links

Blue Flag International Programme / FEE – Foundation for Environmental Education	http://www.blueflag.org	The Blue Flag is a voluntary eco-label awarded to over 3,300 beaches and marinas in 39 countries and works towards sustainable development at beaches/marinas through strict criteria dealing with water quality, environmental education and information, environmental management and safety and other services. Blue Flag is a Programme of FEE.
Climate Alliance	www.climatealliance.org	Partnership between European local authorities and indigenous rainforest peoples with the goal of protecting the Earth's atmosphere.
International Eco- Schools Programme / FEE – Foundation for Environmental Education	http://www.eco-schools.org	Eco-Schools is a programme for environmental management and certification, designed to implement sustainable development education in schools by encouraging children and youth to take an active role in how their school can be run for the benefit of the environment. Eco-Schools is a Programme of FEE.
Food and Agricultural Organization of the United Nations (FAO)	http://www.fao.org/climatechange/ home/en/	From global impact assessments to national and local action, FAO promotes adaptation and mitigation in agriculture, fishery, forestry and other sectors as an integral part of development.
Forskning.se	http://www.forskning.se/theplanet/	Forskning.se is a nationwide website that provides information on research and research findings in Sweden.
Foundation for Environmental Education (FEE)	http://www.fee-international.org/	Foundation for Environmental Education (FEE) is a non-governmental and non-profit organisation aiming to promote sustainable development through environmental education.
Green Key International Programme / FEE  - Foundation for Environmental Education	http://www.green-key.org	The Green Key® is a worldwide available eco-label awarded to leisure orgnaisations such as hotels, youth hostels, conference and holiday centres, campsites, holiday houses and leisure facilities. Green Key is a programme of FEE.
HSBC	http://www.hsbc.com/1/2/ sustainability/community	The HSBC Climate Partnership aims to respond to the urgent threat of climate change worldwide.
Intergovernmental Panel on Climate Change (IPCC)	http://www.ipcc.ch/	The IPCC is the leading body for the assessment of climate change, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO).
Learning About Forests International Programme / FEE – Foundation for Environmental Education	http://www.leaf-international.org	The Learning About Forests Programme aims to encourage school classes and teachers to use forests for educational activities. LEAF is a programme of FEE.



The Global Environment Facility (GEF)	http://www.gefweb.org/	The Global Environment Facility (GEF) is a global partnership among 178 countries, international institutions, non-governmental organisations (NGOs) and the private sector to address global environmental issues.
United Nations (UN)	http://www.un.org/climatechange/	The United Nations is an international organisation founded in 1945 after the Second World War by 51 countries committed to maintaining international peace and security, developing friendly relations among nations and promoting social progress, better living standards and human rights.
United Nations Commission on Sustainable Development (UNCSD)	http://www.un.org/esa/sustdev/ sdissues/climate_change/climate_ change.htm	The Division for Sustainable Development (DSD) provides leadership and is an authoritative source of expertise within the United Nations system on sustainable development.
United Nations Development Programme and climate change (UNDP)	http://www.undp.org/ climatechange/	UNDP is committed to supporting developing countries in responding to climate change concerns as part of their overall sustainable development efforts.
United Nations Educational, Scientific and Cultural Organisation (UNESCO)	http://www.unesco.org	UNESCO promotes international co-operation among its 193 Member States and six Associate Members in the fields of education, science, culture and communication.
United Nations Environment Programme (UNEP)	http://www.unep.org/climatechange/	UNEP aims to provide leadership and encourage partnership in caring for the environment by inspiring, informing and enabling nations and peoples to improve their quality of life without compromising that of future generations.
United Nations Framework Convention on Climate Change	http://unfccc.int/2860.php	Over a decade ago, most countries joined an international treaty - the United Nations Framework Convention on Climate Change (UNFCCC) - to begin to consider what can be done to reduce global warming and to cope with what
World Bank and climate change	http://web.worldbank.org/	The World Bank is a vital source of financial and technical assistance to developing countries around the world.
World Meteorological Organisation (WMO)	http://www.wmo.int/pages/themes/ climate/index_en.html	The WMO is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.
World Wide Fund for a Living Planet (WWF)	http://www.panda.org	WWF aim to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.
Young Reporters for the Environment International Programme	http://www.youngreporters.org	Young Reporters for the Environment (YRE) is a programme of the Foundation for Environmental Education designed for secondary school pupils and teachers.



## **Carbon Calculator Links**

PEES Project	www.pees-project.eu/index. php?option=com_docman&task=doc_ download&gid=160&Itemid=40 http://www.swea.co.uk/FEEDU/ SchoolEnergyDiariesDescription.pdf	An energy-saving calculator developed under the PEES Project (IEE).
Carbon Zero	http://www.carbonzero.co.nz/calculators/ school_emissions_calc.asp	A carbon calculator designed for schools created for Carbon Zero, a programme based on over a decade of research on climate change, greenhouse gas measurement and carbon monitoring in New Zealand.
Dott (Designs of the time) is a ten-year programme of design innovation	http://www.dott07.com/flash/dott_1024. htm	Dott 07 was about changing the way we live through design. Carbon calculator aimed at schools developed for the 'Design of the Times' project.
Energy Saving Secrets	http://www.energysavingsecrets.co.uk/	Useful website with lots of information. There are lots of tips and hints.
EPA Victoria School Calculator	http://www.epa.vic.gov.au/ ecologicalfootprint/calculators/school/Page2. asp	Carbon calculator designed for schools created by the Australian Environmental Protection Agency.
Global Footprint Network	http://www.footprintnetwork.org/en/index. php/GFN/page/calculators/	How much land area does it take to support your lifestyle? Quiz to find out your ecological footprint, discover your biggest areas of resource consumption and learn what you can do to tread more lightly on the earth.
Learning and Teaching Scotland	http://www.ltscotland.org.uk/ sustainabledevelopment/findresources/ globalfootprint/	Calculator developed in collaboration with WWF to help schools understand the environmental effect they are having on the planet.
Local Footprints Project - a joint project between WWF Scotland and the Sustainable Scotland Network (SSN),	http://www.scotlandsfootprint.org/schools/ schools.php	Training service to help schools measure their footprint, devise measures to reduce it in liaison with local authority departments and use the Schools' Global Footprint across the curriculum.
United States Environmental Protection Agency (EPA)	http://www.epa.gov/climatechange/wycd/ calculator/ind_calculator.html	Carbon calculator to help individuals (and households) reduce greenhouse gas emissions and take action.



## Litter & Waste Links

Everyday Health	http://www.everydayhealth.com/green- health/daily-living/tips/tips-for-a-waste-less- school-year.aspx	A useful list of tips to reduce waste in schools.
Lincolnshire County Council	http://children.recycleforlincolnshire.org.uk/ upload/public/attachments/1/3_rs_tips_v2.pdf	Provides tips to reduce the amount of waste a school sends to landfill.
United States EPA	http://www.epa.gov/waste/education/toolkit. htm	Provides a list of useful tools to help reduce waste in schools.

## **Energy Links**

Sustainable Energy Ireland	http://www.sei.ie/Schools/Primary_Schools/ Energy_Info/	Site providing information about energy, energy games and tips to reduce energy usage.
Sustainable Living Tasmania	http://www.up2meforkids.com.au/popup2. php?Do=ContentView&pageno=151	Site providing tips for conserving energy in schools.
Wisconsin Department of Natural Resources	http://www.dnr.state.wi.us/org/caer/ce/eek/ teacher/globaltip.htm	Provides tips for saving energy and reducing greenhouse gas emissions.

## **Water Links**

Dublin City Council	http://www.dublincity.ie/ SiteCollectionDocuments/Water%20for%20 free.pdf	Useful site that provides information on rainwater harvesting.
Sustainable Living Tasmania	http://www.up2meforkids.com.au/popup6. php?Do=ContentView&pageno=174	Tips on how to conserve water.
Water - Use it Wisely	http://www.wateruseitwisely.com/kids/index.	Site with tips for conserving water and games.



## **Transport Links**

Department of Transport	www.hedgehogs.gov.uk	Interactive site on traffic safety
Green Schools Ireland	http://www.greenschoolsireland.org/Index.aspx?Site_ ID=1&Item_ID=24	Useful site with information and tips on how to encourage sustainable transport.
New Plymouth District Council	http://www.newplymouthnz.com/ LivinginNewPlymouth/SustainableDistrict/ SustainableTransport/IdeasandResourcesforSchools. htm	Site with useful information about the different types of sustainable transport.

## **Biodiversity Links**

California Integrated Waste Management Board	http://www.ciwmb.ca.gov/Schools/Gardens/	Information about setting up a school garden.
Chiltern District Council	http://www.chiltern.gov.uk/site/scripts/documents_ info.php?documentID=248&pageNumber=3	Site with information on lichens and how to conduct a lichen survey.
Dublin.ie	http://www.dublin.ie/environment/biodiversity/ best-plants.htm	Site with information on the best plants to encourage biodiversity.
Landcare Research	http://www.landcareresearch.co.nz/research/ biocons/gardenbird/activities.asp	Tips and hints for carrying out a bird survey.
Rumbalara EEC	http://www.rumbalara.eec.education.nsw.gov.au/ semp/Biodiv%20Final%20Feb08.pdf	Provides useful tips on how to conduct a biodiversity audit.
Sustainable Living Tasmania	http://www.up2meforkids.com.au/popup3. php?Do=ContentView&pageno=115	Site with information about biodiversity, useful links and educational games.
British Lichen Society	www.thebls.org.uk/content/projects/bacg.doc	Useful information about how to conduct a lichen survey.
Ulster Wildlife Trust	http://www.ulsterwildlifetrust.org/ OneStopCMS/Core/CrawlerResourceServer. aspx?resource=1DDB167F-AA18-4FF6-84CE-DB0F2 1572D03&mode=link&guid=d3ddae728068483e81 697ef268041f1e	Site with information on how to create an insect hotel.



United States Botanic Garden	http://www.schoolgardenwizard.org/	Provides lesson plans and activities for planning and growing a school garden.
Wild About Manchester	http://www.wildaboutmanchester.info/biodiversity. PDF	Information about increasing biodiversity in schools; provides a template of a biodiversity audit.

## **Global Citizenship Links**

Fairtrade	www.fairtrade.net	Official Fairtrade website with information on Fairtrade initiatives and products.
Fairtrade Schools	http://www.fairtradeschools.org.uk/	Gives guidance on introducing Fairtrade into school life for teachers and other education providers.
Oxfam	http://www.oxfam.org.uk/education/gc/files/ education_for_global_citizenship_a_guide_for_ schools.pdf	Oxfam's guide to the how, why and what of education for global citizenship.
UNESCO	http://www.unesco.org/education/tlsf/	Resources for teaching about sustainable development.

## **Healthy Living Links**

Living Healthy Schools	http://www.livinghealthyschools.com/	Site with advice and hints on how to encourage heathy living in schools.
Waste-Free Lunches	http://www.wastefreelunches.org/	A site with tips on how to create a waste-free lunch.



### 6.3 Climate Change Terminology

#### Afforestation

Afforestation is the process of establishing a forest on land that is not a forest, or has not been a forest for a long time, by planting trees or their seeds.

## **Alternative Energy**

Energy derived from non-traditional sources (e.g. solar, hydroelectric, wind).

### **Anthropogenic**

Made by people or resulting from human activities. Usually used in the context of emissions that are produced as a result of human activities.

## **Atmosphere**

The gaseous envelope surrounding the Earth.

#### **Biomass**

Materials that are biological in origin, including organic material (both living and dead) from above and below ground, for example trees, crops, grasses, tree litter, roots, animals and animal waste.

#### **Biosphere**

The part of the Earth system comprising all ecosystems and living organisms, in the atmosphere, on land or in the oceans including derived dead organic matter.

#### **Carbon Dioxide**

A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, land use changes and other industrial processes.

#### Climate

Encompasses the temperatures, humidity, rainfall, atmospheric particle count and numerous other meteorogical factors in a given region.

#### **Climate Change**

Refers to any significant change in measures of climate (such as temperature, precipitation or wind) lasting for an extended period (decades or longer).

#### Deforestation

Practices or processes that result in the conversion of forested lands for non-forest uses. Often cited as one of the major causes of the enhanced greenhouse effect for two reasons: 1) the burning or decomposition of the wood releases carbon dioxide and 2) trees that once removed carbon dioxide from the atmosphere in the process of photosynthesis are no longer present.

#### Desertification

Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.

#### **Ecosystem**

Natural unit that consists of living and non-living parts which interact to form a stable system.

#### **Emissions**

The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere.

#### Geosphere

The soils, sediments and rock layers of the Earth's crust, both continental and beneath the ocean floors.

#### **Global Warming**

Average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns.

#### Intergovernmental Panel on Climate Change (IPCC)

The IPCC was established jointly by the United Nations Environment Programme and the World Meteorological Organisation in 1988. The IPCC draws upon hundreds of the world's expert scientists as authors and thousands as expert reviewers. Leading experts on climate change and environmental, social and economic sciences from some 60 nations have helped the IPCC to prepare periodic assessments of the scientific underpinnings for understanding global climate change and its consequences.



## **Ozone Layer**

A layer in Earth's atmosphere which contains relatively high concentrations of ozone and shields the Earth from harmful ultraviolet radiation from the Sun.

## **Photosynthesis**

The process by which plants take  $CO_2$  from the air to build carbohydrates, releasing  $O_2$  in the process.

## Recycling

Collecting and reprocessing a resource so it can be used again.

#### Reforestation

Planting of forests on lands that have previously contained forests but that have been converted to some other use.

#### Sink

A natural or man-made reservoir that accumulates and stores some carbon-containing chemical compound for an indefinite period.

## United Nations Framework Convention on Climate Change (UNFCCC)

Convention setting an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.

#### Wastewater

Water that has been used and contains dissolved or suspended waste materials.



## 6.4 Bibliography

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For more information please visit the website: www.eco-schools.org







