



**A GLOSSARY OF
CLIMATE CHANGE**

VALERIE VAZ MP

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Foreword

As information and ideas grow so too does the vocabulary and concepts that all of us have to contend with. Since my election in May 2010, I became more aware of the widespread use of these terms of art – familiar to the experts but maybe not everyone. I believe it is important for people be informed about the way society is changing and the decisions being taken about the future of our environment. More importantly to be empowered to join in and understand the debate.

Climate Change is a complex subject. Scientific terms, new policies and proposals, organisational structures and economic schemes can be complicated and fast-changing. They are often abbreviated to shorter but sometimes mysterious acronyms. In an attempt to demystify the debate on climate change I thought it would be helpful to compile a glossary of some of the common terms in use today. This is not an attempt to take sides in the debate but only to define the terms.

I have tried to extend the net to look for these terms of art as widely as possible but invariably there may be some definitions that have eluded the search. Where the terms appear in the definition in bold these are the terms that are defined in the glossary.

All errors and omissions are mine. Anyone can contact me with additional words, comments or corrections by email: valerie.vaz.mp@parliament.uk or via my website www.valerievazmp.co.uk. In keeping with modern times, the Glossary can also be found as an e-book on my website.

I hope this will be your guide and find a place on your desk, to consult, browse and enjoy. I will endeavour to update it.



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GLOSSARY

Adaptation

A

Adaptation	In this context, action that helps deal with the effects of climate change - for example building barriers to protect against rising sea levels, or growing more crops that are capable of surviving high temperatures and drought.
Adaptation Fund	A United Nations fund for projects that help developing countries cope with the negative effects of climate change . It is funded by a share of the proceeds from programmes such as the Clean Development Mechanism .
Afforestation	The planting of new trees on lands that historically have not contained forests.
Albedo	The fraction of solar radiation reflected by a surface. Snow-covered surfaces have a high albedo; vegetation covered surfaces and oceans have a low albedo. The Earth's albedo varies because of varying cloud, snow, ice and vegetation levels.
Alliance of Small Island States (AOSIS)	A group of 42 island and coastal states, mostly in the Pacific and Caribbean. Members are likely to be hit hard by global warming . The very existence of low-lying islands such as the Maldives is threatened by rising sea levels.
Annex I Countries	Industrialised countries and countries in transition to a market economy that made a commitment to reduce their emissions of greenhouse gas under the Kyoto Protocol . They

Assigned Amount Unit

agreed that their combined emissions, averaged out over five years from 2008 to 2012, should be 5.2% below 1990 levels.

Annex II Countries

Industrialised countries which have a special obligation to provide financial and technical support to **developing countries** under the **Kyoto Protocol** agreement. The group is a sub-section of **Annex I countries**, excluding countries with economies in transition (EIT).

Anthropogenic Climate Change

Climate change that is caused by human activity.

AOSIS

See: Alliance of Small Island States (AOSIS).

AR4

The Fourth Assessment Report, produced by the **Intergovernmental Panel on Climate Change (IPCC)** in 2007. The report assessed the worldwide **climate change** situation and concluded that it was at least 90% likely that the increase of the global average temperature since the mid-20th Century is mainly due to human activity.

Assigned Amount Unit (AAU)

A **permit** that allows the holder to emit one **metric tonne of carbon dioxide equivalent**. Under the **Kyoto Protocol** agreement, each **Annex I Country** is given an assigned amount of AAUs, which may be exchanged in an **emissions trading scheme/carbon market**.

Atmosphere

Atmosphere

The envelope of gases surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1% **volume mixing ratio**) and oxygen (20.9%), together with a number of **trace gases** such as argon, helium, **carbon dioxide** and **ozone**. The atmosphere also contains around 1% **water vapour** as well as clouds and **atmospheric aerosols**.

Atmospheric Aerosols

Microscopic particles in the lower **atmosphere**. As they reflect sunlight back into space they generally have a cooling effect on the planet and can mask **global warming**. They play a key role in cloud formation, fog, precipitation and **ozone depletion**.

Auctioning

An **emissions trading** method by which **permits** for **greenhouse gas emissions** are distributed to companies based upon willingness to pay. Supporters claim that it provides governments with revenue and gives price signals to the developing market for permits. It is an alternative method to **grandfathering**.

B

- Bali Action Plan** A plan drawn up at the **United Nations Climate Change Conference** in Bali (December 2007), as part of the **Bali Roadmap**. The action plan established a working group to define a long-term global goal for reduction of **emissions of greenhouse gas** through **mitigation, adaptation, finance and technology**.
- Bali Roadmap** A plan drawn up at the **United Nations Climate Change Conference** in Bali (December 2007) to pave the way for an agreement at the 2009 **United Nations Climate Change Conference** in Copenhagen. The plan looked at how to reduce **emissions of greenhouse gas** after the expiry of the **Kyoto Protocol** in 2012. It set deadlines for two working groups: one to work on the **Bali Action Plan** and another to discuss proposed **emission** reductions by **Annex I Countries** after 2012.
- Baseline Year** The year against which targeted decreases of **emissions** are measured. The **Kyoto Protocol** uses a baseline year of 1990. Some countries prefer to use later baselines, for example the United States uses 2005 as a baseline for **climate change** legislation.
- Berlin Mandate** A ruling that was adopted at the **First Conference of the Parties (COP-1)/United Nations Climate Change Conference** in 1995. It concluded that more needed to be done about **climate change** and launched the discussions that led to the

Berlin Mandate

adoption of the **Kyoto Protocol**.

Biofuel

A fuel made from **renewable** biological sources including: maize, sugar cane and some forms of waste.

Biogeochemical Cycle

The movement of chemicals that is essential to life (such as carbon, nitrogen, oxygen and phosphorus) through the **climate system** (including the earth, water and atmosphere).

Biomass

Total quantity or mass of all living organisms in a given area at a given time.

Biosphere

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

Black Carbon

The soot that results from the incomplete burning of **fossil fuels, biofuels** and **biomass**. It is a powerful climate-warming substance. Unlike **greenhouse gases** which trap **infrared radiation** that is already in the Earth's atmosphere, these soot particles absorb all wavelengths of **solar radiation** and then re-emit the energy as **infrared radiation**.

Borehole

Any exploratory hole drilled into the earth or ice to gather **geophysical data**. Climate researchers often drill boreholes to collect **ice core** samples which can be used to study the make-up of the **atmosphere** in earlier years.

C

- Cap and Trade** An **emissions trading scheme** whereby businesses or countries can buy or sell **permits** to emit **greenhouse gases** via an exchange. The total amount of permits cannot exceed the limit - or cap - imposed by the authorities.
- Carbon Budget** A cap on **emissions of greenhouse gases** over a given period of time, introduced in the UK under the ***Climate Change Act 2008***.
- Carbon Capture and Storage (CCS)** The collection and transport of concentrated **carbon dioxide** gas from large sources such as power plants. The gases are then stored in deep underground reservoirs. *See also: **geological sequestration***.
- Carbon Credit** A generic term for a permit that allows a country or company to emit a certain amount of **carbon dioxide**. A credit usually represents 1 **metric tonne of carbon dioxide** (or **carbon dioxide equivalent**). These can be traded under **emissions trading schemes/carbon markets**.
- Carbon Cycle** The carbon cycle is usually thought of as four or five main reservoirs of carbon linked together. The reservoirs include: 1 - the **atmosphere**; 2 - the **terrestrial biosphere**; 3 – oceans; 4 - sediments (including **fossil fuels**); and 5 – the Earth’s interior. Carbon moves between these reservoirs because of various chemical, physical, geological and biological processes. For example volcanic eruptions, burning of **fossil fuels** and the

Carbon Cycle

respiration of plants and animals.

Carbon Dioxide (CO₂)

A gas found in the Earth's **atmosphere**. It occurs naturally from the **respiration** of plants and animals, the decay of animal and plant matter, erupting volcanoes and combustion. It is also a by-product of human activities such as **burning fossil fuels**. It is the most prevalent **greenhouse gas** produced by human activity.

Carbon Dioxide (CO₂) Equivalent

A measure of the warming effect of **greenhouse gases**. Six greenhouse gases (**carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons** and **sulphur hexafluoride**) are limited by the **Kyoto Protocol**. The overall warming effect of this cocktail of gases is often expressed in terms of the amount of **carbon dioxide** that would cause the same amount of warming.

Carbon Dioxide (CO₂) Fertilization

Increased growth of plants as a result of increased concentration of **carbon dioxide** in the **atmosphere**. Certain types of plant are more sensitive to changes in atmospheric **carbon dioxide** concentration.

Carbon Emissions Reduction Target (CERT)

The target requires all UK domestic energy suppliers with more than 50,000 customers to reduce the amount of **carbon dioxide** emitted by householders, for example by promoting low carbon energy solutions. The primary aim of CERT is to contribute to the UK's legally binding targets under the **Kyoto Protocol** and the **Climate Change Act 2008**.

Carbon Offsetting

Carbon Floor Price	A UK policy which states that polluters must pay a minimum amount of money for the right to pollute. This is likely to take the form of a tax on greenhouse gas production payable to HM Treasury. It is expected to replace the Climate Change Levy - a tax on energy use.
Carbon Footprint	The amount of carbon emitted by an individual or organisation in a given period of time or during the manufacture of a certain product.
Carbon Intensity	The amount of carbon emitted by a country per unit of Gross Domestic Product (GDP) .
Carbon Leakage	The problem whereby industries/companies that release pollutants choose to relocate to countries with weaker controls on emissions .
Carbon Market	A market for trading carbon credits or permits . <i>See also: Emissions Trading.</i>
Carbon Neutral	A process is carbon neutral when there is no net release of carbon dioxide . For example, growing biomass takes carbon dioxide out of the atmosphere and burning it releases the gas again. The process is carbon neutral if the amounts taken out and released are identical. A company or country can also become carbon neutral by means of carbon offsetting .
Carbon Offsetting	A method of compensating for emissions of carbon dioxide through efforts to take carbon dioxide out of the atmosphere. It often involves X paying Y to reduce their emissions equivalent to those produced by X.

Carbon Sequestration

Carbon Sequestration	The process of storing carbon. This can happen naturally. For example as plants turn carbon dioxide into biomass (wood, leaves, etc.). It can also refer to carbon capture and storage which stores carbon dioxide produced by industry.
Carbon Sink	Any process, activity or mechanism that removes carbon from the atmosphere . The biggest carbon sinks are the world's oceans and forests, which absorb large amounts of carbon dioxide from the Earth's atmosphere .
Carbon Tax	A form of carbon pricing. It is the fee levied on the carbon content of fuels.
Carbon Trust	A form of carbon pricing. It is the fee levied on the carbon content of fuels.
CBD	<i>See: Convention on Biological Diversity.</i>
CDM	<i>See: Clean Development Mechanism.</i>
Certified Emission Reduction (CER)	A permit or carbon credit issued under the United Nations' Clean Development Mechanism . CER credits can be bought or earned by participating in emissions reduction programmes in developing countries , for example installing low carbon technologies or planting forests. Each CER allows the holder to emit the equivalent of one metric tonne of carbon dioxide .
Centre for Climate Change Economics & Policy (CCCEP)	Established in 2008 to further action on climate change in public and private bodies through research. It receives funding from the UK Economic & Social Research Council.

CFCs

See: Chlorofluorocarbons.

Chlorofluorocarbons

A family of gases that have contributed to damage to the **ozone layer** and are also potent **greenhouse gases**. Emissions of CFCs around the industrialised world are being phased out following the 1989 **Montreal Protocol** - an international control agreement. CFCs are not regulated by the **Kyoto Protocol** because they are already covered by the **Montreal Protocol**.

Clean Coal Technology

Technology that enables coal to be burned without emitting **carbon dioxide**. The **carbon dioxide** can be removed either before or after burning. Clean coal technology is unlikely to be widely available for at least a decade.

Clean Development Mechanism (CDM)

A United Nations programme under Article 12 of the **Kyoto Protocol** agreement. It enables **industrialised countries** or companies to earn **carbon credits** by investing in programmes to reduce emissions of **greenhouse gas** in developing countries. These credits can be used in **carbon offsetting**.

Climate

The prevailing weather conditions of an area – often measured in terms of temperature, precipitation and wind. Climate statistics include average measurements and the extent to which these vary over a given time. Climate in a wider sense is the state of the **climate system**.

Climate Change

A pattern of change affecting global or regional **climate**. This is measured, for example, by changes in average temperature and rainfall or in the frequency of extreme weather conditions.

Climate Change

Variation may be caused by both natural processes and human activity. **Global warming** is one aspect of climate change.

Climate Change Act 2008 (UK)

This Act set legally binding targets to reduce emissions of **carbon dioxide** by 26% – 32% by 2020 and at least 60% by 2050. It introduced new legally binding five-year '**carbon budgets**' (set at least 15 years ahead) to demonstrate how the UK is working towards its key targets. It also created the **Committee on Climate Change** to provide independent advice and guidance to government.

Climate Change Levy

A tax on certain commodities for lighting, heating and power. It is payable by industry, commerce, agriculture, public administration and other services. Revenue is recycled back to business through a cut in employers' national insurance contributions and support for **energy efficiency** and **low carbon technologies**.

Climate Feedback

In the **climate system** the result of an initial process can trigger changes in a second process that in turn influences the initial process. A positive feedback reinforces the original process and a negative feedback reduces it. The melting of Arctic ice is an example of a positive feedback process. As the ice on the surface of the Arctic Ocean melts away, there is a smaller area of white ice to reflect the Sun's heat back into space and more open, dark water to absorb it. The less ice there is the more the water heats up and the faster the remaining ice melts.

See also: **Feedback loop**.

Climate Lag	The delay that occurs in climate change as a result of a factor that changes only very slowly. For example, the effects of releasing more carbon dioxide into the atmosphere may not be known for some time because a large portion of carbon dioxide is dissolved in the ocean and only released to the atmosphere many years later.
Climate Model	A mathematical way of showing the interactions of the atmosphere , oceans, land surface and ice. Models can range from relatively simple to comprehensive and complex.
Climate Sensitivity	A measure of the strength of climate feedback at a particular time. This demonstrates the sensitivity of the climate to changes in radiation and other factors.
Climate System (or Earth System)	The five physical components of the Earth that are responsible for the climate : atmosphere (air); hydrosphere (water); cryosphere (ice); lithosphere (rock); and biosphere (living organisms).
CMS	The Convention on the Conservation of Migratory Species of Wild Animals: an international agreement under the United Nations Environment Programme concerned with the protection of wildlife and habitats overseen by the Conference of Parties .

CO₂

CO₂

See: **carbon dioxide**.

Coalbed Methane (CBM)

Methane gas contained underground in coal seams, also referred to as virgin coalbed methane or coal seam gas.

Coal Mine Methane

A kind of **coalbed methane** that is released from coal seams during the process of coal mining.

Co-Benefit

The multiple benefits of policies that are put in place at the same time. Many policies designed to reduce emissions of **greenhouse gas** also have other aims. For example, objectives of development, sustainability and equity. The term 'co-impact' is used to cover both positive and negative outcomes.

Commitment Period

The time frame given to parties of the **Kyoto Protocol** to meet their emission reduction commitments. During the first commitment period from 2008 to 2012, **industrialised countries** are required collectively to reduce emissions to 5% below 1990 levels.

Committee on Climate Change

An independent body established under the **Climate Change Act 2008** to advise the UK Government on **emissions** targets and to report to Parliament on progress in reducing emissions of **greenhouse gases**.

Community Energy Saving Programme (CESP)

A policy which targets households in low-income areas across Great Britain to improve **energy efficiency** and reduce fuel bills. The programme is delivered through partnerships between local government, community groups and energy companies.

Countries in Transition

Concentration	The amount of a chemical in a certain volume or weight of air, water, soil, or other medium. Concentration is often measured in parts per billion or parts per million .
Conference of the Parties (COP)	The supreme body of the United Nations Framework Convention on Climate change (UNFCCC) . It represents more than 180 nations and consists of environment ministers who meet once a year at the United Nations Climate Change Conference to discuss developments in the convention. The first meeting was held in Berlin, Germany in 1995. The COP's role is to review new scientific findings and the effectiveness of national climate change programmes.
Convention on Biological Diversity	An international agreement signed at the 1992 Earth Summit in Rio de Janeiro, Brazil. It covers many aspects of biological diversity including wildlife conservation, sustainable use of natural resources and the sharing of benefits arising from the use of genetic resources.
Countries in Transition	When the Kyoto Protocol was adopted in 1997 these countries were on the path from a Communist planned economy to a market economy. They include ex-Soviet bloc states, for example Russia and many Eastern European countries. Many would now be classed as market economies. They are grouped with industrialised countries in Annex I of the Kyoto Protocol . They have emission reduction commitments to be met in the 2008-2012 commitment period . They are excluded from Annex II and do not pay for costs of developing countries .

CRC Energy Efficiency Scheme

CRC Energy Efficiency Scheme (formerly the Carbon Reduction Commitment)

A compulsory scheme to improve **energy efficiency** and cut **carbon dioxide** emissions in large UK public and private sector organisations. These organisations are responsible for around 10% of the UK's **emissions** of carbon **dioxide**.

Cryosphere

One of the components of the **Earth System**. The cryosphere is frozen water in the form of snow, permanently frozen ground (permafrost), floating ice and glaciers. Changes in the volume of the cryosphere cause changes in ocean sea level which directly impact the **atmosphere** and **biosphere**.

CSD

*See: **United Nations Commission on Sustainable Development**.*

C40 Cities

A network of cities committed to addressing Climate Change through shared knowledge and sustainable action.

D

Dangerous Climate Change

Severe **climate change** that will have a negative effect on societies, economies and the environment. The phrase was introduced by the 1992 **United Nations Framework Convention on Climate Change (UNFCCC)** which aims to prevent dangerous human interference with the **climate system**.

DECC

See: **Department for Energy and Climate Change**.

Deforestation

The permanent removal of standing forests. This can lead to significant **carbon dioxide** emissions.

Department for Energy and Climate Change (DECC)

The UK Government Department responsible for energy and **climate change** policy.

Desertification

Degradation of dry areas resulting from various factors including climate variation and human activities. Examples of degradation include soil erosion, loss of nutrients in the soil and long term loss of vegetation. This can lead to reduced biological and economic productivity. *See also:* **UNCCD (United Nations Convention to Combat Desertification)**.

Developing Countries

Broadly these are countries with low levels of material well-being. This may be measured by various statistics including **Gross Domestic Product (GDP)**, levels of education, life expectancy and other indicators. There is no single definitive definition of a developing country

Developing Countries

and the use of the term has been criticised for implying that developing countries are inferior.

Double Dividend

The idea that environmental taxes can reduce both pollution (the first dividend) and the overall economic costs of the tax system, as the money from environmental taxes may be used instead of other taxes that can slow economic growth (the second dividend).

E

Earth Summit	Another name for the United Nations Conference on Environment and Development , held in Rio de Janeiro, Brazil from 3 to 14 June 1992.
Earth System	<i>See: Climate System.</i>
Eccentricity	The degree to which the Earth's orbit around the Sun departs from a perfect circle.
Ecosystem	A biological community including living organisms and their environments interacting through exchanges of nutrients and energy.
<i>El Niño</i> – Southern Oscillation (ENSO)	A warm water current that periodically flows along the coast of Ecuador and Peru. It is associated with a change in pressure and circulation in the Indian and Pacific Oceans known as the Southern Oscillation. <i>El Niño</i> translates as 'the boy child' - it was so-called by Peruvian fishermen referring to the 'Christ Child', as the event was usually observed around Christmas. During an <i>El Niño</i> event, the prevailing trade winds weaken and warm surface waters near Indonesia flow over the cold waters off Peru current. This has a great impact on the wind, sea surface temperature and precipitation in the Pacific region and many other parts of the world. The opposite of an <i>El Niño</i> event is called <i>La Niña</i> .

Emission(s)

Emission(s)	The release of a substance into the atmosphere . In relation to climate change this is usually a gas.
Emission Reduction Unit (ERU)	An emissions trading unit equal to 1 metric tonne of carbon dioxide equivalent . ERUs are generated for reductions or removals of emissions within Joint Implementation projects.
Emissions Factor	A measure of emissions per unit of activity. For example, grammes of carbon dioxide emitted per barrel of fossil fuel consumed.
Emissions Leakage	The problem created when emissions reduction in one location may be countered by increased emissions in unregulated locations. This can arise in the short term, as reduction in emissions in some places reduces energy demand, thus affecting world prices and increasing emissions elsewhere. It can also arise in the longer term. For example when industries relocate to avoid emissions controls. <i>See also:</i> carbon leakage .
Emissions Taxes	Taxes on air or water emissions usually on a per-tonne basis. Emission taxes provide incentives for firms and households to reduce emissions and therefore control pollution.

Emissions Trading

An alternative to emissions regulation based on economic incentives. Firms that emit a particular **pollutant** are given **permits** to release a specified number of tonnes of the **pollutant**. The government issues only a limited number of permits. The owners of the permits may keep them and release the pollutants or reduce their **emissions** and sell the permits. The fact that the permits have value and can be sold or traded gives the owner an incentive to reduce their **emissions**. *See also: carbon trading; carbon credits; emissions trading scheme.*

Emissions Trading Scheme (ETS)

A scheme set up to allow the trading of **permits** between businesses and/or countries, as part of a **cap and trade** approach to limiting **greenhouse gas** emissions. The best-developed example is the **European Union Emissions Trading Scheme** launched in 2005. *See also: Cap and trade.*

Energy Company Obligation (ECO)

Part of the **Green Deal**, the ECO aims to create a new obligation on UK energy companies from the end of 2012. It plans to amend the **Carbon Emissions Reduction Target (CERT)** and the **Community Energy Saving Programme (CESP)** and will focus particularly on householders and properties that need help to achieve financial savings through **energy efficiency**.

Energy Efficiency

The ratio of energy input to useful output. Measures to improve energy efficiency include insulation to reduce the energy required to heat a property and the use of compact fluorescent light bulbs which use less energy than traditional bulbs.

Energy Intensity

Energy Intensity

A measure of the efficiency of a country's energy use measured as the amount of power consumed for every dollar of economic output (**Gross Domestic Product**).

Enhanced Greenhouse Effect

The concept that the natural **greenhouse effect** has been increased by human activities. Increased concentrations of **greenhouse gases** caused by human activities (e.g. burning **fossil fuels**) cause more **infrared** radiation to be trapped in the Earth's **atmosphere** having a warming effect on the **climate**. *See also:* **anthropogenic climate change**.

EU Bubble

The 'bubble' refers to the idea that **emissions** reductions anywhere within a specific defined area count toward the wider area's targets. A target is set for Europe as a whole rather than individual member states. Reductions would not have to be shared equally by all member countries. This has been quite controversial in international **climate change** negotiations.

European Union Burden-sharing Agreement

A 1998 political agreement to help the European Union achieve its emission reduction targets under the **Kyoto Protocol**. The agreement divided the burden of reductions unequally amongst member states taking into account national conditions including existing emissions, the opportunity for reducing them and levels of economic development. *See also:* **EU Bubble**.

European Union Emissions Trading Scheme (EU ETS)

Launched in 2005, this is the largest international **emissions trading scheme**.

Environmental Defence Fund

Evapotranspiration

The combined process of the evaporation of water from the Earth's surface into the **atmosphere** and transpiration of water into the **atmosphere** from the stems, leaves, roots and flowers of vegetation.

Environmental Defence Fund

A non-profit environmental advocacy group founded by Dennis Puleston in 1974, which seeks to ensure reliable, affordable and clean energy for its 29 member countries.

F

Feedback Loop

In the context of **climate change**, rising temperatures can change the environment in ways that affect the rate of warming. These feedback loops can be positive (adding to the rate of warming), or negative (reducing it). *See also: climate feedback.*

Feed-in Tariffs (FITs)

A government scheme introduced in 2010 under powers in the Energy Act 2008. FITs are designed to encourage the adoption of low-carbon, small-scale electricity generation by businesses, communities and individuals who were not previously part of the electricity generation market. The scheme guarantees a payment from an electricity provider in exchange for electricity generated, alongside a payment for unused surplus.

Flexible Mechanism

Practices and tools that help countries and companies meet **emission** reduction targets by paying others to reduce emissions for them. The mechanism in widest use is **emissions trading schemes** where companies or countries buy and sell **permits** to pollute. The **Kyoto Protocol** establishes two flexible mechanisms enabling rich countries to fund **emission** reduction projects in **developing countries – Joint Implementation (JI)** and the **Clean Development Mechanism (CDM)**.

Fluorocarbons

Chemical compounds of carbon and fluorine that often contain other elements such as hydrogen, chlorine, or bromine. Common fluorocarbons

include **chlorofluorocarbons (CFCs)**, **hydrochlorofluorocarbons (HCFCs)**, **hydrofluorocarbons (HFCs)** and **perfluorocarbons (PFCs)**.

Forcing Mechanism

A process that alters the energy balance of the **climate system** by changing the balance between incoming radiation from the Sun and outgoing infrared radiation from Earth. These processes include volcanic eruptions and the **enhanced greenhouse effect**. *See also: radiative forcing.*

Fossil Fuels

Natural resources, such as coal, oil and natural gas, which contain **hydrocarbons**. These fuels are formed in the Earth over millions of years as dead plant and animal material decompose under certain conditions. Fossil fuels produce **carbon dioxide** when they are burned to provide heat and power. They are seen as **non-renewable energy** resources because they are used far more quickly than they can be naturally replaced.

Fracking

Hydraulic fracturing. A method for extracting **natural gas** by drilling into a rock layer and pumping water at high pressure. This creates narrow fractures that allow the gas to flow into the wellbore and be captured. This accelerates the extraction of natural gas. Possible links to water contamination make it a controversial method.

Fuel Cycle

Fuel Cycle

The total life of a fuel in all its uses and forms. For example, the fuel cycle of coal includes the following stages: extraction from the ground; transportation; combustion/burning to produce power, air emissions, and the removal, transportation and disposal of ash.

Fuel Poverty

Usually defined as the need to spend more than 10% of household income to achieve a 'satisfactory heating regime'. The UK **Department for Energy and Climate Change** defines this as 21°C in the main living areas and 18°C in other areas. Whether a household is in fuel poverty therefore depends on several factors, including the **energy efficiency** of the property, the cost of fuel and the household income. Currently, 5.5m households in the UK are classified as fuel poor.

G

- G77** A group of 130 countries, including India, Brazil, most African countries, the **Alliance of Small Island States (AOSIS)** and the Gulf states. It forms the main **negotiating bloc** for developing countries and is often allied with China (G77+China).
- GDP** *See: Gross Domestic Product.*
- General Circulation Model (GCM)** A three-dimensional computer model of the global **climate system** which can be used to simulate **anthropogenic climate change**. GCMs represent the effects of factors including atmospheric **water vapour**; **greenhouse gas** concentrations; clouds; annual and daily heating by the sun; ocean temperatures and ice boundaries. The most recent GCMs include global representations of the atmosphere, oceans and land surface.
- General Equilibrium Theory** In the context of **climate change**, the theory that the various parts of an economic system are interrelated and the ultimate outcome of an action may be very different from its intended effect.
- Geo-engineering** Large-scale mechanisms designed to tackle **climate change** by removing **carbon dioxide** from the air or limiting the **solar radiation** reaching the planet. Although large-scale geo-engineering is still being developed as an idea, supporters claim that it may eventually become essential if the

Geo-engineering

world wants to avoid the worst effects of **climate change**. Critics claim that geo-engineering is unrealistic and may distract from reducing **emissions**. Potential projects range from tree planting and the use of pale-covered roofing materials, to cloud-whitening and space mirrors.

Geographic Information Systems (GIS)

Systems of computer hardware, software, data and personnel designed to capture, store, update, manipulate, analyse and display geographically referenced information. GIS allows researchers to view different kinds of data at the same time as layers on a grid. By associating data with points on a map, GIS can illustrate patterns and trends that might otherwise be hidden. For example, a researcher could map different health indicators at and around a specific toxic waste site.

Geological Sequestration

The injection of **carbon dioxide** into underground rock formations. When **carbon dioxide** is injected into declining oil fields it can help to recover more of the oil. *See also: carbon capture and storage.*

Geophysical Data

Information about the physical aspects of the Earth's surface, interior and atmosphere, for example rock formations, magnetic fields, oceans, volcanoes and climate.

Geosphere

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

Glacier	An accumulation of snowfall over many years resulting in a mass of ice at least 0.1 km ² in area and which moves in response to gravity. A glacier may end on land or in water. Glacier ice is the largest reservoir of fresh water on Earth and second only to the oceans as the largest reservoir of total water. Glaciers are found on every continent except Australia.
Global Average Temperature	The mean surface temperature of the Earth measured from three main sources: satellites, surface temperature observation stations (of which there are over 3000), and sea surface temperature measurements, from merchant ships, naval ships and data buoys.
Global Dimming	An observed widespread reduction in sunlight at the Earth's surface. It is most likely caused by an interaction between sunlight and atmospheric aerosols produced by human activities. In some regions, such as Europe, clean air regulations mean that dimming no longer occurs.
Global Energy Budget	The balance between the Earth's incoming and outgoing energy. The current global climate system must adjust to rising greenhouse gas levels and in the long term, the Earth must get rid of energy at the same rate at which it receives energy from the sun.
Global Warming	The steady rise in global average temperature in recent decades, which experts believe is largely caused by artificial greenhouse gas emissions. 2015 is the warmest year on record (according to the UK Met Office), and many experts suggest the long-term trend will continue upwards.

Global Warming

Global warming is one aspect of **climate change**.

Global Warming Potential (GWP)

A measure of a **greenhouse gas**' ability to absorb heat and warm the atmosphere over a given time period. It is measured relative to **carbon dioxide** which has a GWP of 1.0. For example, **methane** has a GWP of 25 over 100 years (the timescale used in the **Kyoto Protocol**). Gases are removed from the atmosphere at different rates.

Grandfathering

An **emissions trading** method under which **permits** for **greenhouse gas** emissions are allocated to companies according to their historical emissions. Its supporters argue that it would be simple to administer. Some critics argue that it would disadvantage new companies and reward firms with high historical emissions. It is an alternative method to **auctioning**.

Greenhouse Effect

The insulating effect of certain gases in the **atmosphere** which allow heat from the sun to warm the earth and then prevent some of that heat escaping.

Greenhouse Gases (GHGs)

Gases that trap heat and warm the Earth's surface. The **Kyoto Protocol** restricts emissions of six **greenhouse gases**: natural gases (**carbon dioxide**, **nitrous oxide** and **methane**) and industrial gases (**perfluorocarbons**, **hydrofluorocarbons** and **sulphur hexafluoride**).

Green Deal

Part of the UK Energy Bill 2011. Key elements of the Green Deal include: reforming electricity markets and tackling **fuel poverty**; creating a new system of loans for **energy efficiency** improvements to properties; and phasing out the

existing **Warm Front** scheme.

Green Investment Bank UK (GIB)	An institution established in 2012 by the UK Government with the intention of securing investment for private green initiatives and promoting the green economy. The Bank plays a key role in investment of a target £330bn in the UK's green economy by 2020. On 3 March 2016 the UK Government launched the process to move the Green Investment Bank into the private sector.
Gross Domestic Product (GDP)	The total value of goods and services produced in one country over a set period. It is commonly seen as a representation of the size of the economy.
GWP	<i>See: Global Warming Potential.</i>
G7 (Group of Seven)	Established in 1976, a meeting of finance ministers from a group of seven industrialized nations: Canada, France, Germany, Italy Japan, United Kingdom, United States.
G8 (Group of Eight)	Annual meeting of the leaders of G7 Countries, with the addition of Russia.
G20 (Group of Twenty)	Group of finance ministers and central bank governors from 19 countries with addition of the European Union. The G20 economies comprise of two-thirds of the world population and 80 per cent of world trade.

H

H₂O

The chemical symbol for water.

Halocarbons

Chemical compounds containing carbon and either chlorine, bromine or fluorine. In the **atmosphere**, they can act as powerful **greenhouse gases**. The halocarbons containing chlorine and bromine are also involved in depletion of the **ozone layer**.

Hockey Stick

The name given to a graph published in 1998, which plotted the average temperature in the northern hemisphere over the last 1,000 years. The line is roughly flat but bends sharply upwards during the last 100 years. The graph has been used as evidence to support the idea that **global warming** is an human caused phenomenon. However some scientists have challenged the data and methods used to estimate historical temperatures. (The graph is also known as MBH98, after its creators Michael E. Mann, Raymond S. Bradley and Malcolm K. Hughes.)

Hot Air

Refers to the concern that some governments will be able to easily meet their targets for **greenhouse gas** emissions under the **Kyoto Protocol** and could flood the market with **carbon credits**. This could reduce the incentive for other countries to reduce their own **emissions**.

Hydrocarbons

Chemical substances containing only hydrogen and carbon. **Fossil fuels** are made up of hydrocarbons.

Hydrosphere

Hydrochloro- fluorocarbons (HCFCs)

Chemical compounds containing hydrogen, fluorine, chlorine and carbon. These **greenhouse gases** are **ozone depleting substances**. They are less damaging to **stratospheric ozone** than are **chlorofluorocarbons (CFCs)**. They have been introduced as temporary replacements for **CFCs**.

Hydrofluorocarbons (HFCs)

Chemical compounds containing only hydrogen, fluorine and carbon. They were introduced as alternatives to **ozone depleting substances**. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly damage the **ozone layer** but are powerful **greenhouse gases** with **global warming potential**.

Hydrologic Cycle

The cycle of water involving the evaporation and transport of **water vapour**, condensation, cloud formation, precipitation (rain/snow/hail) and the flow of water from continents to oceans. It is a major factor in determining **climate** as it affects surface vegetation, clouds, snow and ice and soil moisture. This cycle is also responsible for about a quarter of the transportation of heat from the equator towards the poles.

Hydrosphere

The component of the **climate system** made up of liquid water on the Earth's surface and under the ground, including oceans, seas, rivers, fresh water lakes, underground water.

I

Ice Core

A cylinder of ice removed from a **glacier** or an ice sheet by drilling a **borehole**. The ice can be used to study **climate** patterns of the past. The deeper the section of the cylinder, the older the preserved ice. Scientists can study the air trapped in the ice and estimate the percentage of **carbon dioxide** and other gases in the **atmosphere** at a given time.

Industrialised countries

The term cannot be clearly defined but usually refers to a country with a market economy and a relatively high level of development. Other terms include developed country and more economically developed country.

Infrared Radiation

Radiation emitted by the Earth's surface, the **atmosphere** and the clouds. It is sometimes known as 'terrestrial' or 'long-wave' radiation. Infrared radiation has wavelengths which are longer than those of the red color in the visible part of the spectrum. The difference in wavelength is because of the difference in temperature between the Sun and the Earth's atmosphere.

Intergovernmental Panel on Climate Change (IPCC)

A scientific body established by the **United Nations Environment Programme** and the **World Meteorological Organization**. It examines the most recent scientific, technical and socio-economic work relevant to **climate change** but does not carry out its own research. The IPCC was presented with the Nobel Peace

Prize in 2007.

**Inuit Circumpolar
Council**

Non-governmental multinational representative organization of the Inuit people living in the Arctic regions of Alaska, Canada, Greenland and Chukotka, Russia.

IPCC

See: Intergovernmental Panel on Climate Change.

J

Joint Implementation (JI)

An agreement between two parties whereby a party struggling to meet its **emissions** reductions targets under the **Kyoto Protocol** can earn **Emission Reduction Units** from another party's reduction or removal of **emissions**. Joint Implementation projects are a way of fulfilling **Kyoto Protocol** agreements while also encouraging foreign investment and **technology transfer**.

JUSSCANNZ

Acronym describing Japan, the US, Switzerland, Canada, Australia, Norway and New Zealand. Together, these countries form the **negotiating bloc** for the **industrialised countries** outside the European Union. Their representatives meet periodically to discuss **climate change**.

K

Kyoto Mechanisms

Three procedures established under the **Kyoto Protocol** to make it cheaper and less costly to reduce **greenhouse gas** emissions; they are the **Clean Development Mechanism, Emissions Trading** and **Joint Implementation**.

Kyoto Protocol

An international agreement attached to the **UN Framework Convention on Climate Change**. It sets legally binding commitments on **emissions of greenhouse gas**. **Industrialised countries** agreed to reduce their combined emissions to 5.2% below 1990 levels during the five-year period 2008-2012. The protocol was agreed at a 1997 UN conference in Kyoto, Japan but did not legally come into force until 2005.

L

Landfill

Land waste disposal site in which waste is generally spread in thin layers, compacted and covered with a fresh layer of soil each day.

Land Use, Land-Use Change and Forestry (LULUCF)

LULUCF activities provide a method of **carbon offsetting** either by increasing the removal of **greenhouse gases** from the **atmosphere** (i.e. by planting trees or managing forests) or by reducing emissions (i.e. by reducing **deforestation** and the associated burning of wood).

Least Developed Countries (LDCs)

A group of countries identified by the United Nations as the poorest and weakest in the world, based on measures of gross national income per person; human assets and economic vulnerability. The current list includes 48 countries - 33 in Africa, 14 in Asia, 1 in Latin America and the Caribbean.

Lithosphere

The rocky outermost part of the Earth, including the crust and upper part of the mantle.

Longwave Radiation

Radiation emitted in wavelengths greater than 4 micrometers. For example the radiation emitted from the Earth and **atmosphere**.

Low Carbon Technologies

Low Carbon Technologies

Technologies that enable production of power with lower carbon **emissions** than traditional methods of power generation. Examples include **renewable energy** resources such as wind and solar power, as well as **carbon capture and storage**. This reduces the amount of carbon released into the **atmosphere**.

Major Economies Forum on Energy and Climate

M

Major Economies Forum on Energy and Climate (MEF)

A forum established in 2009 by US President Barack Obama, to discuss the agreement to be negotiated at the 2009 **United Nations Climate Change Conference** in Copenhagen. The members of the forum (Australia, Brazil, Canada, China, the European Union, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, South Africa, South Korea, the UK and the US) account for 80% of **greenhouse gas** emissions. The forum is a modification of the Major Economies Meeting started by former President George W. Bush which was seen by some countries as an attempt to undermine United Nations negotiations.

Marine Biosphere

The oceans and the organisms living within them.

Mesosphere

The region of the atmosphere above the **stratosphere**. It stretches from the stratopause (the upper boundary of the stratosphere) at about 50 km above the Earth to the mesopause at 85–95 km. In the mesosphere temperature drops as height increases because there is less **ozone** to absorb **ultraviolet radiation** from the sun.

Methane (CH₄)

The second most important artificial greenhouse gas (after **carbon dioxide**). Sources include both the natural world (wetlands, termites, wildfires) and human activity (agriculture, waste dumps, and leaks from coal mining).

The Met Office

The UK's national **weather** service formed in 1854 as the Meteorological Office and now operating as a Trading Fund within the UK Department for Business, Innovation and Skills. Its headquarters are in Exeter. It provides a public weather information service and works with international partners to research **climate change**.

Metric Ton (US), Metric Tonne (UK)

Common international measurement for the quantity of **greenhouse gas emissions**. A metric tonne is equal to 2205 lbs or 1.1 short tons.

Millennium Development Goals

Part of the UN Millennium Declaration adopted by world leaders in 2000. The goals are: eradicate extreme hunger and poverty, achieve universal primary education, promote gender equality and empower women, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability and develop a global partnership for development.

Mitigation

In this context, an action that will reduce man-made **climate change**. This includes actions to reduce **greenhouse gas** emissions or absorb **greenhouse gases** in the **atmosphere**.

Montreal Protocol (on Substances that Deplete the Ozone Layer)

International agreement that entered into force in January 1989 to phase out the use of **ozone-depleting substances** such as methyl chloroform, carbon tetrachloride and **CFCs**.

Mount Pinatubo

Mount Pinatubo

A volcano in the Philippine Islands. The 1991 eruption of Mount Pinatubo ejected enough **atmospheric aerosols** to block some of the incoming **solar radiation** from reaching Earth's **atmosphere**. This effectively cooled the planet between 1992 and 1994 masking the **global warming** that had been occurring for most of the 1980s and 1990s.

N

Nairobi Work Programme (on Impacts, Vulnerability and Adaptation to Climate Change)

A five year programme (2005-2010) under the **United Nations Framework on Climate Change**. It aims to assist all parties, in particular **developing countries**, to improve their understanding and assessment of **climate change** and to make informed decisions about **adaptation** on a sound scientific, technical and socio-economic basis.

Natural Gas

Underground deposits of gases consisting of 50-90% methane (CH₄) and small amounts of heavier hydrocarbon compounds in gas form, such as propane (C₃H₈) and butane (C₄H₁₀).

Natural Greenhouse Effect

The effect of the natural level of **greenhouse gases** in our **atmosphere** which keeps the planet about 30°C warmer than it would otherwise be. This is essential for life as we know it. **Water vapour** is the most important component of the natural **greenhouse effect**.

Negotiating Bloc

A group of countries which align with each other in international negotiations often because they have certain characteristics or interests in common.

New Generation Biofuels

See: Second Generation Biofuels.

Nitrogen Oxides

Nitrogen Oxides (NO_x)	Gases consisting of one molecule of nitrogen and varying numbers of oxygen molecules. Nitrogen oxides are produced from vehicle exhaust emissions and from power stations. In the atmosphere they can contribute to the formation of photochemical ozone (smog). They can reduce visibility and affect people's health and are considered pollutants .
Nitrous Oxide (N₂O)	A powerful greenhouse gas with a global warming potential 296 times that of carbon dioxide . Major sources include commercial and organic fertilizers, burning fossil fuels , nitric acid production and burning biomass .
Non-Annex I Countries	The group of developing countries that have signed the Kyoto Protocol . They do not have binding targets for reducing emissions .
Non-Methane Volatile Organic Compounds (NMVOCs)	Organic compounds , other than methane , that evaporate readily and take part in atmospheric photochemical reactions. Examples include solvents and exhaust fumes.
Non-renewable Energy	Energy from resources that cannot be replaced as quickly as they are being used. Most fossil fuels are non-renewable.

O

Ocean Acidification

The increased acidity of the ocean caused by **carbon dioxide** dissolving in seawater. The ocean absorbs about a quarter of artificial **carbon dioxide** from the **atmosphere**, which helps to reduce adverse **climate change** effects. When the **carbon dioxide** dissolves in seawater, carbonic acid is formed. Ocean acidification can make it difficult for marine organisms to build their shells and skeletal structures and can kill coral reefs. Carbon emissions in the industrial era have already lowered the **pH** of seawater by 0.1.

Organic Compound

Most solids, liquids or gases that contain carbon are known as organic compounds.

Oxidise

To chemically change a substance by combining it with oxygen.

Ozone (O₃)

Ozone is a gas made up of three oxygen atoms. Near to the Earth's surface, in the **troposphere**, it is created both naturally and as a result of human activities (**photochemical ozone**, or smog). In high concentrations it acts as a **greenhouse gas** and can be harmful to many living organisms. Higher up, in the **stratosphere**, ozone is created by the interaction between oxygen and **ultraviolet radiation** from the sun. It creates a shield (**ozone layer**) which protects the Earth from **ultraviolet radiation**.

Ozone Depleting Substances

Ozone Depleting Substances (ODS)

A family of artificial compounds that includes **chlorofluorocarbons (CFCs)**, bromofluorocarbons (halons), methyl chloroform, carbon tetrachloride, methyl bromide and **hydrochlorofluorocarbons (HCFCs)**. These compounds reduce levels of **stratospheric ozone** allowing more **ultraviolet radiation** to reach the Earth's surface.

Ozone Layer

The layer of **ozone** that begins approximately 15 km above Earth and thins to almost nothing at about 50 km. The ozone layer shields the Earth from harmful **ultraviolet radiation** from the sun. The highest natural concentration of **ozone** (approximately 10 **parts per million** by volume) is in the **stratosphere**, approximately 25 km above Earth. The concentration changes throughout the year. Natural events such as volcanoes and solar flares can produce changes in ozone concentration but man-made changes are of the greatest concern.

Ozone Precursors

Chemical compounds, such as carbon monoxide, **methane**, **Non-Methane Volatile Organic Compounds (NMVOCs)** and **nitrogen oxides** which react with other chemical compounds in the presence of sunlight to form **ozone**. This mainly occurs close to the Earth's surface in the **troposphere**.

P

- Paris Agreement** The result of the 2015 21st **United Nations Conference of Parties**, which commits 196 countries to work together to limit global warming to no more than 2°C above pre-industrial levels, with a stretch goal of keeping below 1.5°C.
- Particulate Matter (PM)** Very small pieces of solid or liquid matter such as particles of soot, dust, fumes, mists or **atmospheric aerosols**. The physical characteristics of these particles and the ways in which they combine with other particles are part of the **feedback loop** mechanisms of the **atmosphere**.
- Parts Per Billion (ppb)** A measure of concentration: the number of parts of a chemical found in one billion parts of a particular gas, liquid or solid mixture.
- Parts Per Million (ppm)** A measure of concentration: the number of parts of a chemical found in one million parts of a particular gas, liquid or solid mixture. The **Intergovernmental Panel on Climate Change (IPCC)** suggested in 2007 that the world should aim to stabilise **greenhouse gas** levels at 450 parts per million **carbon dioxide equivalent** in order to avoid **dangerous climate change**. Some scientists, argue that the safe upper limit is 350 parts per million. Current levels of **carbon dioxide** alone are about 380 parts per million.

Per-Capita Emissions

Per-Capita Emissions The total amount of **greenhouse gas** emitted by a country per unit of population (i.e. per person).

Perfluorocarbons (PFCs) A group of artificial chemicals made up of carbon and fluorine only. These chemicals (predominantly Tetrafluoromethane (CF₄) and Hexafluoroethane (C₂F₆)) were introduced along with **hydrofluorocarbons** as alternatives to **ozone depleting substances**. PFCs are emitted as by-products of industrial processes and are used in manufacturing. They do not harm the **stratospheric ozone layer** but they are powerful **greenhouse gases**: Tetrafluoromethane has a **global warming potential** of 5,700 and Hexafluoroethane has a global warming potential of 11,900.

Permanence The measure of the long-term success of biological **carbon sequestration**. Projects can use soils and **biomass** to store atmospheric **carbon dioxide** for marked **carbon offsetting** benefits. Such storage is vulnerable to natural disturbances (such as fire) or intentional actions that may cancel out the benefit by releasing the **carbon dioxide**.

Permits Permits are issued to countries and/or companies to allow them to produce a certain amount of **carbon dioxide** (or equivalent). They may be traded under **emissions trading schemes/carbon markets**. *See also: Carbon Credits.*

Precautionary Principle

pH	A measure of how acid or alkaline a substance is. Water is neutral and has a pH of 7. A substance with a pH less than 7 is acidic; a substance with a pH higher than 7 is alkaline.
Photochemical Ozone	Also known as smog, this is a combination of sun, nitrogen dioxide and Non-Methane Volatile Organic Compounds (NMVOCs) .
Photosynthesis	The process by which plants take carbon dioxide from the air (or bicarbonate in water) to build carbohydrates, releasing oxygen in the process.
Photovoltaic Solar Panels	Photovoltaic panels are a specific type of solar panel which converts solar radiation directly into electricity. Typical examples of devices powered by photovoltaic cells include: solar powered calculators, water pumps and some radio/telephone networks in developing countries . These devices only need a small amount of electrical power to work and photovoltaic cells are often used as a backup to conventional energy.
Pollutant	A substance that pollutes. For example waste material that can contaminate water, soil or the atmosphere .
Precautionary Principle	In the context of the United Nations Framework Convention on Climate Change (UNFCCC) , the idea that action to avoid large-scale, irreversible damage from climate change is warranted, even though the risks of climate change are not yet fully understood. It promotes the long-term safeguarding of the world's climate system in the face of uncertainty about the impacts and the

Precautionary Principle

short-term costs of **mitigation**.

Precession

The comparatively slow change in the axis of orbit of satellites orbiting the Earth caused by the bulge of the Earth at the equator which distorts the Earth's field of gravity.

Pre-Industrial Levels of Carbon Dioxide

The levels of **carbon dioxide** in the **atmosphere** before the start of the Industrial Revolution estimated to be about 280 **parts per million**. The current level is around 380 parts per million.

R

Radiation	Energy transfer in the form of waves or particles which release energy when absorbed by an object. Examples include solar radiation (emitted by the sun) and radio waves.
Radiative Forcing	Broadly, this is a direct measure of the amount that the Earth's energy budget is out of balance. It is the difference between the amount of energy flowing into the Earth from solar radiation and the amount of energy being reflected or radiated back into space. If there is a positive difference, the Earth is absorbing heat and warming up. It is measured in watts per square meter of surface and the IPCC measure it against a baseline year of 1750, (before the Industrial Revolution).
REDD – (Reducing Emissions from Deforestation and Forest Degradation)	An international effort to create a financial value for the carbon stored in forests. The programme offers incentives for developing countries to reduce emissions from forested lands and invest in low-carbon sustainable development projects. "REDD+" goes further and includes conservation, forest management and reforestation .
Reforestation	Planting of forests on lands that were previously forested but were converted to some other use.
Renewable Energy	Energy that is created from sources that can be replenished in a short period of time. The five renewable sources used most often are: biomass (such as wood and biogas), hydropower (from the

Renewable Energy

movement of water), geothermal (heat from within the earth), wind power and solar power (from **solar radiation**).

Renewable Heat Incentive (RHI) Scheme

A programme related to the **Green Deal** in the UK. The scheme aims to make it more appealing for households and companies to install heating systems that use **renewable energy** sources.

Residence Time

The average time spent in one place or system by an individual atom or molecule. When talking about **greenhouse gases**, residence time usually refers to how long a particular molecule remains in the **atmosphere**.

Respiration

The process whereby living organisms convert **organic compounds** to **carbon dioxide** releasing energy and consuming oxygen.

S

Second Generation Biofuels

A new technology which seeks to turn waste products such as wood, plastic bags and even human sewage into transport fuels. Fuels could also potentially be produced from agricultural wastes such as straw, as well as farmed energy crops such as willow.

Sink

Any process, activity or mechanism which removes a **greenhouse gas**, an **aerosol** (or a substance which could react with another substance to form a greenhouse gas or aerosol) from the **atmosphere**.

SF₆

See: **Sulphur hexafluoride**.

Smart Meters

Digital devices that record the amount of electricity or gas used and transmit this information to utility providers. Smart meters allow flexible rates to be charged depending on time of use. They are designed to improve energy efficiency.

Soil Carbon

Carbon stored in the soil is an important part of the **carbon cycle**. The amount of carbon in the soil depends on past and present **climate**, plant cover and productivity.

Solar Panels

Panels which absorb energy from the sun (solar radiation) to produce **renewable energy** for commercial and residential applications. They can be used to produce heat for use and storage for example by heating water. *See also:*

Solar Panels

Photovoltaic solar panels, which convert the energy into electricity which can be used or stored.

Solar Radiation

Energy emitted by the Sun. Solar radiation has a distinctive range of wavelengths determined by the temperature of the Sun. These include **infrared radiation**, visible light and **ultraviolet radiation**.

Solar Radiation Management (SRM)

A form of **geo-engineering** which aims to reduce the amount of sunlight reaching the Earth, through real and proposed projects such as making changes to the atmosphere, increasing the reflectivity of the Earth's surface or installing mirrors in space.

Spill-Over Effects

Effects experienced in **developing countries** as a result of actions taken by **industrialised countries** to cut **greenhouse gas** emissions. For example, reducing the use of **fossil fuels** - such as oil - in **industrialised countries** could reduce the demand for oil and thus decrease international oil prices leading to more use of oil (and therefore greater emissions) in **developing countries**.

Stratosphere

Region of the **atmosphere** between the **troposphere** and **mesosphere**. It begins approximately 8-15 km above the Earth and ends approximately 50 km above the Earth. The stratosphere contains the **ozone layer** and the temperature in the upper stratosphere generally increases with height because **ozone** heats up as it absorbs **ultraviolet radiation** from the Sun.

Subsidiary Body for Scientific and Technological Advice

Stratospheric Ozone	Ozone found in the stratosphere – this is sometimes known as ‘good ozone’ as it protects the Earth from harmful ultraviolet radiation from the Sun. <i>See also: ozone layer.</i>
Streamflow	The volume of water that moves over a designated point over a fixed period of time. It is often measured as cubic feet per second (ft ³ /sec).
Stern Review	A report on the economics of climate change led by Lord Nicholas Stern, a former World Bank economist. It was published in the UK on 30 October 2006 and concluded that the cost of dealing with the consequences of climate change in the future would be higher than the costs of tackling the problem now.
Subsidiary Body for Implementation (SBI)	Assists the Conference of Parties (COP) in the assessment and review of the effective implementation of the United Nations Framework Convention on Climate Change (UNFCC) . It is open to participation by all parties and made up of government representatives who are experts on climate change . It reports regularly to the COP on all aspects of its work.
Subsidiary Body for Scientific and Technological Advice (SBSTA)	Body that provides the Conference of Parties (COP) and its other subsidiary bodies with information and advice on scientific and technological matters relating to the United Nations Framework Convention on Climate Change (UNFCC) . It is comprised of government representatives with relevant expertise and reports to the COP .

Sulphate Aerosols

Sulphate Aerosols

Particles of compounds of sulphur formed by the interaction of **sulphur dioxide** and sulphur trioxide with other compounds in the **atmosphere**. Sulphate aerosols are released from the burning of **fossil fuels** and the eruption of volcanoes. A recent theory suggests that sulphate aerosols may lower the Earth's temperature by reflecting away **solar radiation**.

Sulphur Dioxide (SO₂)

A form of air pollution that is a gas. It results from the burning of fuels that contain sulphur. Burning coal produces a large amount of sulphur dioxide.

Sulphur Hexafluoride (SF₆)

A colourless gas that can be dissolved in alcohol and ether and is slightly soluble in water. It is a very powerful **greenhouse gas** used primarily in electrical and electronic systems. According to the **Intergovernmental Panel on Climate Change (IPCC)**'s Third Assessment Report, its **global warming potential** is 22,200.

Supplementarity

The process when parties of the **Kyoto Protocol** use domestic energy policies and other methods to reduce **greenhouse gas** emissions, in addition to **flexibility mechanisms** such as **emissions trading**.

T

- Technology Transfer** The sharing of technological advances between different countries. For example, **industrialised countries** could share up-to-date **renewable energy** technologies with **developing countries**, in an effort to lower **greenhouse gas** emissions on a global scale.
- Terrestrial Biosphere** The part of the Earth covered by land.
- Thermohaline Circulation** Large-scale circulation in the ocean caused by differences in temperature and salt concentration. In the North Atlantic this involves warm surface water flowing northward and cold deep water flowing southward resulting in an overall transport of heat towards the North Pole. The surface water then sinks in certain regions located in high latitudes.
- Tipping Point** A threshold for change, which, when reached, sets off a process that is difficult to reverse. Some scientists claim that policy makers must halve global **carbon dioxide emissions** over the next 50 years or risk triggering changes that could be irreversible.
- Trace Gas** Any one of the less common gases found in the Earth's **atmosphere**. Nitrogen, oxygen and argon make up more than 99% of the Earth's atmosphere. Other gases, such as **carbon dioxide**, water vapour, methane, **nitrogen oxides**, **ozone** and ammonia are considered trace

Trace Gas

gases. Although relatively unimportant in terms of their absolute volume they have significant effects on **weather** and **climate**.

Troposphere

The lowest part of the atmosphere from the Earth's surface to about 10 km in altitude in mid-latitudes (ranging from 9 km near the poles to 16 km in the tropics on average). Clouds and **weather** phenomena occur within it. In the troposphere temperature generally decreases with height.

Twenty- Twenty- Twenty (20-20-20)

A pledge by the European Union to reach three targets by 2020: (a) a 20% reduction in **greenhouse gas emissions** from 1990 levels; (b) an increase in the use of **renewable energy** to 20% of all energy consumed; and (c) a 20% increase in **energy efficiency**. The EU says it will reduce emissions by 30%, by 2020, if other **industrialised countries** also pledge tough action.

U

Ultraviolet A (UVA)

Ultraviolet radiation with a relatively long wavelength, also known as long wave, or black light. UVA activates melanin pigments in human skin, which can cause short term tanning. It also penetrates deeper into the skin and can cause premature aging effects. There are indications that UVA can contribute to the development of skin cancers.

Ultraviolet B (UVB)

Ultraviolet radiation with a medium wavelength. UVB can trigger the production of new melanin and lead to darker and more long-term tanning – the body’s defence against further UV damage. Higher doses can cause sunburn and increase cancer risk.

Ultraviolet Radiation (UV)

Electromagnetic radiation with wavelengths shorter than visible light but longer than x-rays. Although ultraviolet radiation makes up only about 5% of the total energy given out by the Sun, it is the major energy source for the **stratosphere** and **mesosphere** and is important for the Earth’s energy balance and chemical composition. Most ultraviolet radiation from the sun is blocked by Earth’s **atmosphere** (for example by the **ozone layer**) but some reaches the Earth to aid in plant **photosynthesis** and help humans to produce vitamin D. Too much ultraviolet radiation can burn the skin, cause skin cancer and cataracts and damage vegetation. *See also: **Ultraviolet A; Ultraviolet B***

UN

UN	<i>See: United Nations.</i>
UNCCD	<i>See: United Nations Convention to Combat Desertification.</i>
UNCED	United Nations Conference on Environment and Development; <i>see Earth Summit.</i>
UNCTAD	<i>See: United Nations Conference on Trade and Development.</i>
UNDP	<i>See: United Nations Development Programme.</i>
UNECE	<i>See: United Nations Economic Commission for Europe.</i>
UNEP	<i>See: United Nations Environment Program.</i>
UNFCCC	<i>See: The United Nations Framework Convention on Climate Change.</i>
United Nations	International organization formed after the end of the Second World War. It operates in the fields of international law, peace and security, development, human rights and humanitarian affairs. It has 193 member states.
United Nations Clean Development Mechanism	<i>See: Clean Development Mechanism (CDM).</i>
United Nations Climate Change Conference	Annual international meeting of the Conference of the Parties under the United Nations Framework Convention on Climate Change. The first meeting of the Conference of the Parties was held in Berlin in 1995. The 21 st meeting of the

United Nations Economic Commission for Europe

Conference of Parties took place in Paris in 2015 in which the **Paris Agreement** was agreed upon.

United Nations Commission on Sustainable Development

Established in 1992 to ensure that issues raised at the **Earth Summit** are followed up.

United Nations Conference on Environment and Development

See: Earth Summit.

United Nations Conference on Trade and Development

Established in 1954, the UNCTAD promotes the integration of developing countries into the world economy, through research, technical assistance and international discussion.

United Nations Convention to Combat Desertification

Adopted in 1994, an international agreement to tackle problems associated with desertification.

United Nations Development Programme

The United Nations international network for measuring and facilitating international development, focusing on tackling challenges of: democratic governance; poverty reduction; crisis prevention & recovery; environment & energy; and HIV/AIDS.

United Nations Economic Commission for Europe

An organisation within the UN which aims to promote pan-European economic integration.

United Nations Environment Programme

United Nations Environment Programme

United Nations organisation which aims to lead on environmental issues and to encourage and enable nations to improve their quality of life without compromising that of future generations.

United Nations Framework Convention on Climate Change

One of a series of international agreements on global environmental issues adopted at the 1992 **Earth Summit** in Rio de Janeiro. The UNFCCC aims to prevent 'dangerous' human interference with the **climate system**. It entered into force on 21 March 1994 and has been agreed by 192 countries.

V

Volume Mixing Ratio

The concentration of a certain substance, for example a gas in the atmosphere. It is calculated as the ratio of the density of the gas to the total density of the atmosphere.

W

Warm Front

A scheme that provides heating and insulation improvements to UK households on certain income-related benefits living in properties that are poorly insulated and/or do not have a working central heating system. Qualifying households can get improvements worth up to £3,500. It is due to be phased out by the coalition government and replaced with measures outlined in the **Green Deal**.

Water Vapour

The most abundant **greenhouse gas**, it is the water present in the **atmosphere** in the form of gas. Water vapour is an important part of the **natural greenhouse effect**. Although humans are not significantly increasing its concentration, it contributes to the **enhanced greenhouse effect** because the warming influence of **greenhouse gases** leads to a positive water vapour **feedback loop**. Water vapour also plays an important role in regulating the temperature of the planet because clouds form when excess water vapour in the atmosphere condenses to form ice and water droplets.

World Climate Conference (WCC)

A series of meetings of the **World Meteorological Association** to discuss global **climate** issues.

World Meteorological Association

Weather

The atmospheric condition at any given time or place. It is measured in terms of wind, temperature, humidity, atmospheric pressure, cloudiness and precipitation.

World Meteorological Association

A specialised agency of the **United Nations** concerned with 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.

Sources

BBC Science and Environment

<http://www.bbc.co.uk/news/science-environment-11833685>

Committee on Climate Change (UK)

<http://www.theccc.org.uk>

Massachusetts Institute of Technology (MIT)

<http://web.mit.edu/>

Pew Center on Global Climate Change

http://www.pewclimate.org/global-warming-basics/full_glossary

Reuters

<http://www.reuters.com/>

UK Department of Energy and Climate Change

<http://www.decc.gov.uk/>

UK Department for Business, Innovation and Skills

<http://www.bis.gov.uk/>

United Nations Framework Convention on Climate Change

http://unfccc.int/essential_background/glossary/items/3666.php

United States Environmental Protection Agency

<http://www.epa.gov/climatechange/glossary.html>

World Health Organisation

<http://www.who.int>

Notes

