

# **GLOBAL CLIMATE CHANGE**

## **GLOSSARY**

**Adaptation** - The adjustment of an organism or population to a new or altered environment. Also refers to conscious and unconscious decisions made by people to adjust to changes.

**Aerosol** - Particulate material, other than water or ice, suspended in the atmosphere. Aerosols are important for the condensation of water droplets, as participants in various chemical cycles and in influencing the radiation absorbed by the atmosphere, which in turn influences climate on the surface of the earth.

**Afforestation** - The act or process of establishing a forest, especially on land not previously forested.

**AGBM** - Ad Hoc Group on the Berlin Mandate. The working group which was established by the first sessions of the Conference of the Parties (COP-1) to develop a process to enable COP to strengthen the commitments to greenhouse gas reductions of developed countries through the adoption of a protocol or other legal instrument.

**Albedo** - The fraction of the total solar radiation incident on a body that is reflected by it.

**Alternate Energy** - Energy derived from non-fossil fuel sources.

**Anthropogenic Emissions** - Emissions of greenhouse gases caused by man's activities. Includes burning of fossil fuel use, deforestation and land-use changes.

**Atmosphere** - The envelope of gases surrounding the Earth and bound to it by the Earth's gravitational attraction.

**Banking** - Process of reducing emissions at a source to a level below what the law requires, saving the excess for later use in emissions trading. Currently applies only to sulfur emissions.

**Berlin Mandate** - Agreement reached by at the first Conference of the Parties that measures aimed at returning developed country greenhouse gas emissions to 1990 levels by the year 2000 are inadequate to achieve the objectives of the Framework Convention on Climate Change.

**Biofuel** - A fuel produced from dry organic matter or combustible oils produced by plants. Examples of biofuel include alcohols (from fermented sugar), wood and soybean oil. (see "Biomass").

**Biological Productivity** - The amount of organic matter, carbon, or energy content that is accumulated during a given time period.

**Biomass** - The total dry organic matter or stored energy content of living organisms. Biomass can be used for fuel directly by burning it (e.g. wood), indirectly by fermentation to an alcohol (e.g. sugar) or extraction of combustible oils (e.g. soybeans) (see "Biofuel").

**Biosphere** - The portion of Earth and its atmosphere that can support life. The part (reservoir) of the global carbon cycle that includes living organisms (plants and animals) and life-derived organic matter (litter, detritus). The terrestrial biosphere includes the living biota (plants and animals) and the litter and soil organic matter on land; the marine biosphere includes the biota and detritus in the oceans.

**Btu Tax** - Energy tax levied at a rate based on the Btu (British Thermal Unit) energy content of a fuel.

**CFCs** - See "chlorofluorocarbons."

**CO<sub>2</sub>** - See "carbon dioxide."

**Carbon Cycle** (sometimes Natural Carbon Cycle) - The natural physical, chemical, biological and geological processes by which CO<sub>2</sub> cycles between the atmosphere and the earth's crust, ocean and biosphere.

**Carbon Dioxide** - Non-toxic, naturally occurring gas. Also a byproduct of burning fossil fuels and biomass, as well as land-use changes and cement manufacturing. One of the "greenhouse gases" that affects the Earth's temperature.

**Carbon Dioxide Fertilization** - Enhancement of plant growth or yield as a result of an increase in the atmospheric concentration of CO<sub>2</sub>.

**Carbon Sinks** - Natural systems that absorb greenhouse gases from the atmosphere and store them. Trees, plants, and the oceans all absorb CO<sub>2</sub> and therefore are Carbon Sinks.

**Carbon Taxes** - Levies placed on fossil fuels. Like a BTU tax (see above) except the tax rate is based on the carbon content of the fuel.

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**"Cash-Out" Parking Program** - Program that encourages use of urban mass-transit by allowing employees who are provided free parking to receive the market-value equivalent in cash.

**Chlorofluorocarbons (CFCs)** - Greenhouse gases used for refrigeration, air conditioning, packaging, insulation, solvents or aerosol propellants. Because they are not destroyed in the lower atmosphere, they drift into the upper atmosphere, where, given suitable conditions, their chlorine components destroy ozone. These gases are being replaced by hydrofluorocarbons.

**Climate** - The statistical representation of the weather conditions for a specified area for a specified time interval, usually decades.

**Climate Change (Scientific definition)** - The long-term fluctuations in temperature, precipitation, wind, and all other aspects of the Earth's climate. Natural causes of climate change include changes in: solar-irradiance variations, earth's orbital parameters (eccentricity, precession, and inclination), lithosphere motions, volcanic activity, and natural changes in the abundance of greenhouse gases. It is usually not possible to attribute changes in climate to a specific cause.

**Climate Change (United Nations definition)** - A change in climate which can be attributed directly or indirectly to human activity, which occurs in addition to any changes occurring from natural causes. Currently, it is not possible to determine whether an observed climate change is due to human activities or due to natural causes. Non-scientists often confuse the two meanings of this term.

**Climate Change Action Plan** - President Clinton's policy response to his pledge to reduce U.S. greenhouse gas emissions to 1990 levels by the year 2000. The plan relies heavily on voluntary measures, including public-private partnerships, to reduce emissions.

**Climate Feedbacks** - Interaction between greenhouse gases and important climate mechanisms, such as vegetation, water vapor, ice cover, clouds, and the ocean. Such interactions can increase, decrease, or neutralize the warming produced by increased concentrations of greenhouse gases."

**Climate Models** - Large and complex computer programs used to mathematically simulate global climate. They are based on mathematical equations derived from our knowledge of the physics that govern the Earth-atmosphere system. (see "General Circulation Models").

**Climate Properties** - The properties that characterize the climate include temperatures (surface, air, water, land, and ice) motion (wind speed, ocean currents, vertical motion of air masses), humidity, cloudiness, ground water, air pressure and density, ocean salinity and the gaseous composition of dry air. Climate properties are interconnected by various physical processes such as precipitation, evaporation, infrared radiation, convection, advection, and turbulence.

**Climate Sensitivity** - Theoretical change in earth's average surface air temperature for a given change in greenhouse gas concentration. Does not refer to changes in any other climate properties.

**Climate Signal** - A statistically significant difference between a reference baseline and an observed or simulated climate change. No climate signals have yet been identified. (see "Climate Sensitivity").

**Climate System** - The five physical components (atmosphere, hydrosphere, cryosphere, lithosphere, and biosphere) that are responsible for the climate and its variations.

**Cloud** - A visible mass of condensed water vapor particles or ice suspended above the Earth's surface. Clouds may be classified by their visual appearance, height, or form.

**Cloud Feedback** - The interaction between clouds and surface air temperature in which a change in surface temperature could lead to a change in clouds or visa versa, which could then increase or decrease the initial temperature change. For example, an increase in surface air temperature could increase evaporation; which in turn might increase the extent of cloud cover. Increased cloud cover would reduce the solar radiation reaching the Earth's surface, thereby lowering the surface temperature.

**Cogeneration** - The use of waste heat from electric generation, such as exhaust from gas turbines, for industrial purposes. This electricity can then be sold to an electric utility.

**Cool Communities** - EPA Green Program which aims for communities and industry to reduce the energy used for air-conditioning by strategically planting shade trees and using light colored buildings.

**Conference of the Parties (COP)** - The final international deliberative body created by the Framework Convention on Climate Change (FCCC). The first COP meeting was held in Berlin in March, 1995. COP members are those countries that both signed and ratified the FCCC.

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**Cryosphere** - The portion of the climate system consisting of the world's ice masses and snow deposits, which includes the continental ice sheets, mountain glaciers, sea ice, surface snow cover, and lake and river ice.

**Deforestation** - The removal of forest stands by cutting and burning to provide land for agricultural purposes, residential or industrial building sites, roads, etc., or by harvesting the trees for building materials or fuel.

**Demand-Side Management** - Policies and programs designed to reduce consumer demand for electricity and other energy sources. Helps to reduce the need for constructing new power facilities.

**Desertification** - The progressive destruction or degradation of vegetative cover especially in arid or semiarid regions bordering existing deserts. Overgrazing of rangelands, large-scale cutting of forests and woodlands, drought, and burning of extensive areas all serve to destroy or degrade the land cover.

**Earth Summit** - See "United Nations Conference on Environment and Development."

**Ecosystem** - The interacting system of a biological community and its non living environmental surroundings.

**El Niño** - A natural and annual irregular variation of ocean current that from January to March which flows off the west coast of South America, carrying warm, low-salinity, nutrient-poor water to the south. The effects of this phenomenon are generally short-lived, and fishing is only slightly disrupted. Occasionally (in 1891, 1925, 1941, 1957 - 58, 1965, 1972 - 73, 1976, and 1982 - 83), the effects are major and prolonged. Under these conditions, sea surface temperatures rise along the coast of Peru and in the equatorial eastern Pacific Ocean and may remain high for more than a year. Some oceanographers and meteorologists consider only the major, prolonged events as El Niño phenomena rather than the annually occurring weaker and short-lived ones.

**Emissions** - Materials (gases, particles, vapors, chemical compounds, etc.) that come out of smokestacks, chimneys, and tailpipes.

**Emissions Trading** - Regulatory approach that allows reducing emissions below what the law requires and using the excess reductions to permit higher emissions at another source.

**Energy Star Computers** - EPA Green Program forging a voluntary partnership with computer manufacturers to

design more energy-efficient computers through a process that creates less air pollution.

**Environmental Protection Agency** - Executive branch agency that conducts pollution control activities as they are mandated by certain laws, including the Clean Air Act.

**FCCC Secretariat** - The United Nations administrative and clerical staff assigned the responsibility of conducting the affairs of the FCCC.

**Feedback Mechanisms** - A sequence of inter-actions in which the final interaction influences the original one. For example, a positive feedback would be an interaction that increases global temperature whereas a negative feedback would reduce global temperature.

**Forest Management** - Concerted efforts including maintaining healthy trees and replanting where trees are harvested to preserve timberlands and provide for "carbon sinks".

**Fossil Fuels** - Carbon-based fuels, including coal, oil and natural gas.

**FSM** - Full Supporting Material. A detailed report which is the basis for official United Nations documents, such as a Summary for Policymakers. In the case of the IPCC, FSMs are prepared by teams of scientists. These documents are then summarized through a negotiation process by government representatives (see SPM).

**Fuel Switching** - Policy designed to reduce CO<sub>2</sub> emissions by requiring electric utilities to switch from using coal to natural gas during summer months.

**General Circulation Models** - Large and complex computer programs that attempt to mathematically simulate global climate. They are based on mathematical equations derived from our knowledge of the physics that govern the Earth-atmosphere system. (see "Climate Models").

**Global Environment Facility (GEF)** - Joint program of the World Bank, the United Nations Development Program (UNDP), and the United Nations Environment Program. Serves as a clearing house for funding programs in developing countries and countries with economies in transition that support biodiversity and reductions in greenhouse gas emissions.

**Global Warming** - Theory that the temperature of the Earth is being increased due emissions of greenhouse gases from human activities, such as fossil fuel use, biomass burning, cement manufacture and land-use changes.

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**Golden Carrot** - EPA Green Program contest to develop a more efficient refrigerator. The winner received a "pot" of money to which the participants had contributed. Whirlpool won the contest, receiving the \$30 million prize.

**Green Buildings** - EPA Green Program that encourages efficiency in heating and air-conditioning ventilation systems.

**Green Lights** - EPA Green Program that encourages the greater use of energy-efficient lighting by industry. Through greater energy-efficiency, less electricity is used and emissions are diminished.

**Green Programs** - Voluntary programs designed by the Environmental Protection Agency to encourage industry to reduce greenhouse emissions through improved energy efficiency. See also "Cool Communities" "Energy Star Computers," "Golden Carrot," "Green Buildings" and "Green Lights."

**Greenhouse Effect** - Envelope of naturally occurring heat-retaining gases (water vapor, carbon dioxide, nitrous oxide, methane and ozone) that keeps the Earth about 60° F warmer than if these gases did not exist. (see "Greenhouse Gases").

**Greenhouse Gases** - Gases that retain heat in the Earth's atmosphere. These gases occur through both natural and man-made processes. Major greenhouse gases include water vapor, carbon dioxide, nitrous oxide, methane, ozone and CFCs. (see "Greenhouse Effect").

**HFCs** - See "hydrofluorocarbons"

**Heat Island Effect** - Localized warming produced in cities due to the density of infrastructure, such as pavement, buildings, and roads. This effect can influence readings obtained from nearby weather stations.

**Hydrofluorocarbons** - Greenhouse gas produced commercially as a substitute for Chlorofluorocarbons.

**Hydrologic Cycle** - The process of evaporation, vertical and horizontal movement of vapor, condensation, precipitation, and the flow of water from continents to oceans. It is a major factor in determining climate through its influence on surface vegetation, the clouds, snow and ice, and soil moisture.

**Hydrosphere** - The aqueous envelope of the Earth, including the oceans, freshwater lakes, rivers, saline lakes and inland seas, soil moisture, ground waters, and atmospheric water vapor.

**Impact Models** - Computer programs used to estimate the impact of a specific climate change on natural, social or economic systems.

**Interagency Climate Change Mitigation Group** - Clinton Administration policy mechanism established in the spring of 1993 to provide input into the Climate Change Action Plan.

**Intergovernmental Negotiating Committee (INC)** - Committee consisting of more than 150 nations that have signed the Framework Convention on Climate Change treaty which was negotiated at the Rio Summit. The treaty has been ratified by approximately 120 countries. The Conference of the Parties (COP) superseded the INC at the COP-1 meeting in Berlin in March 1995.

**Intergovernmental Panel on Climate Change (IPCC)** - Panel established by the World Meteorological Organization and the U.N. Environment Program. It prepares reports on the science of climate change, its potential environmental, economic and social impacts and possible national and international responses to such changes and provides advice the COP.

**International Energy Agency** - Organization formed in 1973 by the major oil-consuming nations, including the United States, to manage future oil supply shortfalls and prevent oil-exporting nations from using oil as a political weapon.

**Ionosphere** - Rarefied, ionized region of the Earth's atmosphere, between approximately 60 and 400 km.

**IPCC Working Group I** - Working Group established by the Intergovernmental Panel on Climate Change to assess the available information on the science of climate change, in particular that arising from human activities.

**IPCC Working Group II** - Working Group established by the Intergovernmental Panel on Climate Change to assess the current state of knowledge concerning the impacts of climate change on physical and ecological systems, human health, and socio-economic sectors. Working Group II was also asked to review available information on the technical and economic feasibility of a range of potential adaptation and mitigation strategies.

**IPCC Working Group III** - Working group established by the Intergovernmental Panel on Climate Change to conduct technical assessments of the socio-economic dimensions of impacts, adaptation and mitigation of climate change over both the short and the long term at the regional and global levels.

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**Joint Implementation** - Concept proposed by the U.N. Climate Convention that would recognize a given party for actions taken to reduce greenhouse gas emissions in another country. This proposal stems from the fact that it is typically cheaper to reduce emissions in developing countries than in industrialized countries, with the same net emission reductions being achieved on a global basis. Now referred to as "Action Implemented Jointly."

**Land-Based Readings** - Readings of the Earth's temperature taken at stations on the Earth's surface. These readings are subject to distortion by the location of the stations, many of which are located near urban areas where temperatures are typically higher ("Heat Island Effect") or on isolated islands in the oceans that do not accurately consider the temperatures of the large areas of surrounding water.

**Least-Cost Planning** - Method used by utilities in meeting increases in demand of electricity through energy conservation and other methods which cost less than increases in additional generating capacity.

**Lithosphere** - The component of the Earth's surface comprising the rock, soil, and sediments. It is a relatively passive component of the climate system, and its physical characteristics are treated as fixed elements in the determination of climate.

**Little Ice Age** - A cold period that lasted from about A.D. 1550 to about A.D. 1850 in Europe, North America, and Asia. This period was marked by rapid expansion of mountain glaciers, especially in the Alps, Norway, Ireland, and Alaska. There were three periods of maximum coldness, beginning about 1650, about 1770, and 1850, each followed by warming trends.

**Mesosphere** - Region of the atmosphere between approximately 50 and 85 km. Temperatures in this region range between 0 and -60 C.

**MMTCE (Million metric tons of carbon equivalent)** - Standardized measurement of greenhouse gases used to compare emission levels.

**Methane** - A greenhouse gas with a relatively short atmospheric lifetime of  $10 \pm 2$  years. The primary sources of methane are landfills, coal mines, natural gas systems and livestock.

**Methane Recovery** - Method by which methane emissions are captured and then reduced either through cost-effective management methods or through power generation.

**Ministerial Meeting** - An official meeting of cabinet ministers from many countries, for example United Nations Meetings of Environmental Ministers. When such meetings are held, "Ministerial Declarations" on key issues are often prepared and release to the public.

**Montreal Protocol** - The international agreement, which entered into force on January 1, 1989, to phase out the use of many ozone depleting compounds such as CFCs, methyl chloroform, carbon tetrachloride and many others.

**Mount Pinatubo** - A volcano located in the Philippines which erupted in 1991, emitting millions of tons of dust, ash and sulfur that combined with water vapor to form sun-blocking droplets of sulfuric acid. These aerosols reflected solar radiation, lowering temperatures on Earth.

**National Action Plan (NAP) for Global Climate Change** - Plan for reducing greenhouse gas emissions to 1990 levels which countries are required to submit to the Conference of the Parties as a condition of participating in the U.N. Framework Convention on Climate Change (FCCC).

**"No Regrets"** - A strategy to identify and pursue measures that will reduce the threat of climate change yet also make sense in their own right.

**OECD/IEA** - The Organizations for Economic Co-operation and Development and the International Energy Agency.

**Ozone** - A gas made up of three atoms of oxygen. In the stratosphere, it occurs naturally and reduces the penetration of the sun's ultra-violet rays and subsequent harmful effects. In the troposphere, it is produced by an interaction between sunlight and organic compounds. Ozone is an effective greenhouse gas.

**PAMs (Policies and Measures)** - Policies are actions that can be taken by a government, often in conjunction with groups within its own countries as well as with other countries, to accelerate the use of successful measures. Measures are technologies, processes and practices which, if employed, would reduce greenhouse gas emissions below anticipated future levels.

**Photosynthesis** - The manufacture by plants of carbohydrates and oxygen from carbon dioxide and water. Oxygen and water vapor are released in the process. Photosynthesis is dependent on favorable temperature and moisture conditions as well as on the atmospheric carbon dioxide concentration. Increased levels of carbon dioxide can increase net photosynthesis in many plants.

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**Plenary** - A meeting of the full membership of an organization, such as the Intergovernmental Panel on Climate Change or one of its working groups.

**Renewables** - Energy sources that are indefinitely sustainable, such as biomass, solar energy, geothermal heat, hydropower and wind.

**Reporting Framework (i.e., JI/AIJ)** - A standardized set of data collection procedures, analysis methodologies and reporting formats (i.e. tables, graphs and charts) for preparing official documents.

**Rio Summit** - See "U.N. Conference on Environment and Development."

**SAR** - The Second Assessment Report on Climate Change prepared by the Intergovernmental Panel on Climate Change.

**Satellite Readings** - Measures of the Earth's temperature taken from NOAA satellites orbiting the Earth. Because the readings from these satellites encompass the entire globe, they reflect the actual profile of Earth's temperature. Satellite data taken since they were launched in 1979 do not indicate any global warming trend.

**SBI (not SUBI)** - The Subsidiary Body for Implementation, established by the FCCC, will develop recommendations to assist the Conference of the Parties (COP) in assessing and reviewing the implementation of the Convention.

**SBSTA (not SUBSTA)** - The Subsidiary Body for Scientific and Technological Advice, established by the FCCC, will be the link between the policy-oriented needs of the Conference of the Parties, and the scientific, technical and technological assessments and information provided by various external groups, such as the Intergovernmental Panel on Climate Change.

**SSPM** - A Summary for Policymakers of a much more detailed report (see FSM) prepared for the United Nations. The contents of an SPM are negotiated on a line-by-line basis by government representatives.

**Stratosphere** - Region of the atmosphere between the troposphere and mesosphere, having a lower boundary of approximately 8 km at the poles to 18 km at the equator and an upper boundary of approximately 50 km. Depending upon latitude and season, the temperature in the lower stratosphere can increase, be isothermal, or even decrease with altitude, but the temperature in the upper stratosphere generally increases with height due to absorption of solar radiation by ozone.

**Surface Air Temperature** - The temperature of the air near the surface of the Earth, usually determined by a thermometer in an instrument shelter about 2 m above the ground. The true daily mean, obtained from a thermograph, is approximated by the average of 24 hourly readings and may differ by 1.0 degrees C from the average based on minimum and maximum readings. The true global average surface air temperature varies greatly according to the averaging method used. It is normally approximated as 15 degrees C.

**Technology Cooperation** - Aimed at helping developing countries expand their economies while minimizing greenhouse gas emissions. Relatively low-cost measure recognizing that developing nations will account for a majority of future emissions. It includes both "hard" (equipment and technology) and "soft" technology (software, management assistance, training).

**Thermosphere** - Outermost layer of the atmosphere, above the mesosphere. Temperatures in this region (about 400 miles above the earth's surface) may exceed 2000 degrees Fahrenheit.

**Title XVI** - Title of the National Energy Policy Act of 1992 that addresses global climate change. Among other things, this title provides for additional studies of greenhouse gases and an examination of the cost/benefits of further reductions. Most importantly, Section 1605 establishes a voluntary system for reporting emissions, emissions reductions, and benefits of "Carbon Sinks".

**Trace Gas** - A minor constituent of the atmosphere. The most important trace gases contributing to the greenhouse effect are water vapor, carbon dioxide, ozone, methane, ammonia, nitric acid, nitrous oxide, ethylene, sulfur dioxide, nitric oxide, dichlorofluoromethane or Freon 12, trichlorofluoromethane or Freon 11, methyl chloride, carbon monoxide, and carbon tetrachloride.

**Tropopause** - Boundary between the upper troposphere and the lower stratosphere that varies in altitude between approximately 8 km at the poles to 18 km at the equator. Temperatures range from -35 to -60 C in this region

**Troposphere** - Lowest atmospheric layer, between the surface and tropopause. Temperature ranges from the highest air temperature at the surface to -60 C at the tropopause. Climate models suggest that man-made greenhouse gases may increase surface air temperatures, an air layer generally taken as about 2 meters above the surface.

**U.N. Commission on Sustainable Development -** Commission consisting of representatives from 53 states whose purpose is to monitor progress made by governments and U.N. agencies in reaching their commitments to the Framework Convention on Climate Change. In addition, the Commission will oversee the implementation of Agenda 21, a blueprint for environmentally sustainable development for the 21st century.

**U.N. Conference on Environment and Development -** Summit held in Rio de Janeiro, Brazil, in June 1992 at which the U.N. Framework Convention on Climate Change was signed.

**U.N. Framework Convention on Climate Change (FCCC) -** Treaty signed at the 1992 Earth Summit with an ultimate objective to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [man-made] interference with the climate system." While no legally binding level of emissions is set, the treaty states the "aim of returning these emissions to the 1990 levels." Now ratified by more than the required 50 countries, the FCCC will become a permanent institution in March, 1995 (to be called the Conference of the Parties) working to achieve treaty goals.

**Upwelling -** The vertical motion of water in the ocean. Upwelling results when winds blowing nearly parallel to a continental coastline transport the light surface water away from the coast. Nutrient rich subsurface water of greater density, and lower temperature replaces the surface water, and exerts a considerable influence on the weather of coastal regions.

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