**Global Warming: An Overview**

By: Driscoll, Sally; Flynn. Points of View: Global Warming, 2011, p1-1, 1p;

Global warming refers to the increase in the earth's average temperature that occurs naturally or, as theorized in recent years, is induced by human activity. Most discussions on global warming today cite a correlation between an increase in global temperature and the increase in carbon dioxide, nitrous oxide, methane, and chlorofluorocarbons (CFCs) in the atmosphere. Human activity increases the amount of these gases in the atmosphere and, as a result of the greenhouse effect, increases the earth's temperature. As the earth's temperature rises, glaciers melt, ocean levels rise, and unusual weather patterns occur. Scientists warn of the loss of ecosystems and the endangerment of human lives and communities as a result of climate change.

The ozone layer also plays a critical role in global warming. The ozone layer refers to an upper layer of the earth's atmosphere containing a high concentration of ozone gas that absorbs ultraviolet radiation that is potentially harmful to humans. Scientists have made the case that CFCs, which were non-existent until the twentieth century, are responsible for depleting the ozone layer.

The National Academy of Scientists and other international groups agree that global warming is occurring. Scientists who disagree cite the discipline of climatology as being too new to be able to deliver accurate data. Others believe some data has been skewed to conform to popular opinion, or simply ignored.

Most scientists also agree that global warming is the result of human activity. Opponents argue that the correlation between higher levels of greenhouse gases and the earth's warming trend do not necessarily mean that greenhouse gases are causing the trend. Many see warmer temperatures as part of the normal fluctuations that occur over long periods of time. They also cite the ability of naturally-occurring volcanic eruptions to cause temporary changes in weather patterns and levels of gases in the atmosphere.

The body of research on global warming undertaken during the twentieth century has resulted in many governmental policies that affect individuals, business, and industry. Environmental regulations and their effect on businesses have increased the controversy surrounding global warming.

**Understanding the Discussion**

**Climatology:** Climatology is the scientific study of climate. Climatologists study the weather of a specific region over a given time period. The study of ancient weather conditions, paleoclimatology, examines the weather of past millennia by analyzing natural evidence that remains in soil, tree rings and ice cores. Historical climatology focuses on the weather conditions of human history, or the climate of the last few thousand years. A study of the number of hurricanes in a given region, over the past 100 years, would be an example of historical climatology.

**Environmental Regulation:** State and federal statutes intended to protect the environment, wildlife, land, prevent pollution, over-cutting of forests, save endangered species, conserve water, develop and follow general plans and prevent damaging practices.

**Fossil Fuels:** Depletable energy sources, such as oil, natural gas, and coal, which were formed organically millions of years ago.

**Greenhouse Effect:** The natural ability of the atmosphere to trap solar energy in amounts that provide temperatures adequate to sustain life. Currently the earth's average temperature is 59 degrees Fahrenheit (15 degrees Celsius). Increased levels of carbon dioxide, chlorofluorocarbons, methane, and nitrous oxide trap more energy as it radiates from the planet's surface, raising the global temperature of air and ocean water.

**Greenhouse Gases (GHGs):** With the exception of chlorofluorocarbons (CFCs), which are synthetic, greenhouse gases are naturally-occurring gases found in the atmosphere that can absorb electromagnetic radiation and, with the exception of ozone, are dispersed throughout the atmosphere. The gases include carbon dioxide, methane, water vapor, ozone, and nitrous oxide.

**Carbon Dioxide (CO2):** A gas that occurs naturally and is produced by the burning of fossil fuels (most notably in cars and other vehicles) and deforestation.

**Kyoto Protocol:** An agreement ratified by over 160 nations that have agreed to reduce carbon dioxide and other emissions. Named for Kyoto, Japan, where the agreement was signed in 1997.

**Ozone (O3):** A poisonous gas that occurs naturally in the stratosphere. It forms a thin layer approximately 10 to 25 miles above the earth's surface that helps to block ultraviolet radiation.

**Ozone-Depleting Substances:** Defined by the United States Environmental Protection Agency (EPA) as any chemical that breaks down under ultraviolet light and releases chlorine or bromine atoms. These include CFCs, halons, methyl bromide, carbon tetrachloride, and methyl chloroform.

**History**

The foundation of contemporary research on global warming was established in the nineteenth century. Scientists noted the ability of gases in the atmosphere to create a greenhouse effect, and discovered the correlation between the level of carbon dioxide and the earth's temperature. They also noted the increase in carbon dioxide during the Industrial Revolution.

The invention of Freon in the late 1920s played a significant role in the history of global warming. This colorless gas comprised of chlorofluorocarbons (CFCs) ended up cooling almost every refrigerator manufactured from the 1930s onward, and helped spark the air conditioning industry. In the late 1940s, it was found to make an excellent propellant for aerosol cans. Insecticides, hair spray, deodorants, and household cleaners were just some of the widely-used products containing CFCs.

In 1974, Dr. Mario Molina, a researcher in the chemistry department at the University of California, theorized that CFCs were destroying the ozone layer. After a few years of additional research by the National Academy of Sciences, the United States banned the use of CFCs in most aerosol cans.

Other scientific studies have shown a relationship between the use of fossil fuels and an increase in carbon dioxide. The number of automobiles on the road increased with the post-World War II population boom; in the 1950s, most cars were rather large and inefficient, and leaded gasoline was the norm. However, the smog that hung over cities was attributed mostly to industry. In 1963, the United States passed the first Clean Air Act, which set emissions standards for industry, but not for vehicles.

In 1965, geophysicist Roger Revelle, of the President's Science Advisory Committee Panel on Environmental Pollution, warned of the possibility of global warming from the accumulation of carbon dioxide and other greenhouse gases. During the next few decades, scientists from many disciplines, including biology, physics, meteorology, climatology, chemistry, and geology contributed research that demonstrated significant changes were taking place, and made dire predictions.

In response, the World Meteorological Organization and the United Nations Environment Program established the Intergovernmental Panel on Climate Change (IPCC) in 1988, to assess the data and identify options that might stop global warming. The IPCC became the most influential group on the issue.

In 1970, the United States Environmental Protection Agency (EPA) amended the Clean Air Act and set limits for vehicle emissions in response to data that showed vehicles were responsible for roughly 80 percent of the carbon dioxide in the atmosphere. The Clean Air Act was further amended in 1990 to address new environmental concerns such as toxic pollutants and acid deposition.

In 1992, representatives from 170 countries met in Rio de Janeiro at the UN Conference on Environment and Development, commonly referred to as the "Earth Summit." The goal of this meeting was to ensure that all industrial nations shared responsibility for global warming and other environmental issues. The 1992 Earth Summit produced a treaty called the Convention on Biological Diversity that specified conservation strategies, species protection, ecosystem oversight, environmental restoration, and economic incentives for environment-friendly policy and actions. The Convention on Biological Diversity requires each member government to develop a self-implemented strategy and plan of action for the conservation and sustainable use of biodiversity in their country.

Perhaps the most widely known global initiative is the Kyoto Protocol, which the United Nations Framework Convention on Climate Change (UNFCCC) took up in 1997. The United States, under the administration of President Bill Clinton, agreed to this treaty and to reduce greenhouse gas emissions by 7 percent. The US Senate blocked the ratification of the treaty and introduced the Hagel-Byrd Resolution, which stressed the importance of economic priorities and the belief that developing nations, including China and India, should also be required to participate in the Kyoto Protocol, which exempted developing nations because their per-capita emissions levels were considered low. Ultimately, the United States, the world's biggest emitter of greenhouse gases, supported but did not ratify the Kyoto Protocol. The Kyoto Protocol resulted in numerous associated environmental gains including the creation of the European Climate Change Program in 2000 and the development of a pro-climate alliance across all decision-making levels of the European Union system.

Environmental regulation focusing on ending global warming has been criticized by business interests for ignoring production processes, being expensive and excessive. Critics argue that environmental regulation has traditionally focused on "end-of-the pipe" solutions (such as emissions or waste control) rather than addressing the basic processes that created the initial environmental problem.

**Global Warming Today**

According to the EPA, the global temperature increased between 0.7 and 1.5 degrees Fahrenheit (0.4 to 0.8 degrees Celsius) during the twentieth century. There is speculation that global warming was related to the heat wave in Europe in 2003, which killed more than 25,000 people. Global warming has also been cited as a potential cause of severe hurricanes and other strong weather systems throughout the world. The IPCC predicts that in another hundred years, the earth could be 2 to 10 degrees Fahrenheit warmer.

In US politics, Democrats and the Green Party generally support legislation that they believe will curb global warming. This includes tighter emissions caps for industry, more fuel-economy in vehicles, and stronger government sponsorship for research and development of renewable energy sources. Republicans tend to oppose these efforts, citing economic concerns that include higher energy costs, a decrease in jobs, and the potential for an economic depression. However, some bi-partisan legislation has been passed in the US that aims to improve automobile efficiency.

In 2001, President George W. Bush withdrew the US from the Kyoto Protocol, and instead called for voluntary reductions in greenhouse gas emissions. Opponents of the president's actions included the Sierra Club, the World Wildlife Fund, the Union of Concerned Scientists, Greenpeace, and others. Some of these groups have joined forces with Massachusetts along with eleven other states and three major US cities in suing the EPA to uphold the federal Clean Air Act and require greenhouse gas emissions to be regulated.

Upon taking office, US President Barack Obama pledged to reduce carbon dioxide emissions by 80 percent by 2050, and promised to invest billions in the development of new energy sources and energy-saving technologies. However, he was unable to get a cap-and-trade bill through the Senate. By late 2010, President Obama stated that fossil fuel reform and carbon emissions regulations would likely be accomplished through a series of legislative acts as opposed to one large piece of legislation. Although the US never became a signatory to the Kyoto Protocol, American officials have agreed in principle to an outline of a successor agreement that is continuing to take shape as of February 2011.