

Congress of the United States

Washington, DC 20515

March 11, 2004

Are Humans Contributing to Global Climate Change: Carbon Dioxide

Dear Colleague:

The Earth's average surface air temperatures are increasing—most rapidly during the 20th century. Globally, average surface air temperatures increased by approximately one degree Fahrenheit during the 20th century. According to NOAA's director of the National Climatic Data Center, Thomas Karl, the current pace of temperature rise is consistent with a rate of 5.4 to 6.3 degrees Fahrenheit per century. By comparison, the world has warmed by 5 to 9 degrees Fahrenheit since the depths of the last ice age, 18,000 to 20,000 years ago. The Earth's surface air temperature is affected by the presence and amount of certain gases in the atmosphere in a phenomenon called the "Greenhouse Effect," caused by greenhouse gases like carbon dioxide (CO₂).

Human Contribution to Increases in Atmospheric CO₂

Carbon is present in all organic compounds, including the decomposed organic material we burn for fuel in the form of coal or oil. Through the burning of such organic material, we release carbon dioxide into the atmosphere. The US Environmental Protection Agency estimates that 98% of CO₂ emissions in the US are generated through the burning of fossil fuels to run cars and trucks, heat homes and businesses, and power factories. The US Department of Energy reports that since 1751 roughly 283 billion tons of carbon have been released to the atmosphere from the consumption of fossil fuels and cement production and that half of these emissions have occurred since the mid-1970s.

Scientific measurements from the Mauna Loa Observatory indicate an 18% increase in the mean annual CO₂ atmospheric concentration, from 316 parts per million by volume (ppmv) of dry air in 1959 to 373 ppmv in 2002. The 1997-98 increase in the annual growth rate of 2.87 ppmv represents the largest single yearly jump since the Mauna Loa record began in 1958.

The Mauna Loa CO₂ measurements constitute the longest continuous record of atmospheric CO₂ concentrations available in the world. The Mauna Loa site is considered one of the most favorable locations for measuring undisturbed air because possible local influences of vegetation or human activities on atmospheric CO₂ concentrations are minimal and any influences from volcanic vents may be excluded from the records. The methods and equipment used to obtain these measurements have remained essentially unchanged during the 45-year monitoring program.