

# CRS Issue Brief for Congress

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## **Global Climate Change**

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## Global Climate Change

### SUMMARY

There is concern that human activities are affecting the heat/energy-exchange balance between Earth, the atmosphere, and space, and inducing global climate change, often termed “global warming.” Human activities, particularly the burning of fossil fuels, have increased atmospheric carbon dioxide (CO<sub>2</sub>) and other trace greenhouse gases. If these gases continue to accumulate in the atmosphere at current rates, most scientists believe global warming would occur through intensification of Earth’s natural heat-trapping “greenhouse effect.” Possible impacts might be seen as both positive and negative, depending on regional or national variations.

A warmer climate would probably have far-reaching effects on agriculture and forestry, managed and unmanaged ecosystems, including natural habitats, human health, water resources, and sea level, depending on climate responses. Although causal relationships between projected long-range global climate trends and record-setting warmth and severe weather events of the past two decades have not been firmly established, attention has been focused on possible extremes of climate change and the need for better understanding of climate processes to improve climate model forecasts.

The basic policy question remains: Given scientific uncertainties about the magnitude, timing, rate, and regional consequences of potential climatic change, what are the appropriate responses for U.S. and world decision makers?

Fossil-fuel combustion is the primary source of CO<sub>2</sub> emissions, and also emits other “greenhouse” gases. Because the U.S. economy is so dependent upon energy, and so much of U.S. energy is derived from fossil

fuels, reducing these emissions poses major challenges and controversy.

The 1992 United Nations Framework Convention on Climate Change (UNFCCC), which the United States has ratified, called for a “non-binding” voluntary aim for industrialized countries to control atmospheric concentrations of greenhouse gases by stabilizing their emissions at 1990 levels by the year 2000. The 1997 Kyoto Protocol to the UNFCCC goes further and, if it enters into force, will commit major industrialized nations that have ratified it to specified, legally binding emissions reductions.

In all, some 126 nations had ratified the Protocol as of October 5, 2004. On October 27 the Russian Parliament completed its approval process for the Protocol. Following President Putin’s signature of the approval legislation, Russia will deposit its instruments of ratification, and within 90 days the Kyoto Protocol will enter into force. The European Union plans to begin emissions trading under the Protocol in January 2005.

In March 2001, the Bush Administration rejected the Kyoto Protocol, and thus the United States will not be party to it as it enters into force. President Bush concluded a cabinet-level climate policy review with an announcement in 2002 of a “new approach” for the United States based on reducing the greenhouse gas intensity (greenhouse gas emissions per unit of GDP) of the U.S. economy.

This report briefly reviews the status of climate science, international negotiations, and congressional activity focused specifically on climate change.



## **MOST RECENT DEVELOPMENTS**

Following President Bush's decision in 2001 to withdraw the United States from participation in the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), congressional attention to climate change has focused largely on domestic action in the energy arena, as well as registering and monitoring greenhouse gas emissions. A number of climate-related provisions were included in the Senate energy bill, but were not accepted by the conference committee. The energy bill conference report, without climate provisions, was approved by the House of Representatives on November 18, 2003, but failed on November 21 to obtain votes for cloture in the Senate. S. 139, a bill to provide a greenhouse gas cap and trade system in the United States, was considered by the Senate on October 30 and failed to pass by a vote of 43-55.

As of October 5, 2004, 126 countries had ratified the Kyoto Protocol, which outlines specified reductions in greenhouse gas emissions for the developed countries that ratify it. The nations that have ratified so far represent 44.2% of the 1990 emissions baseline, with 55% being the amount that must be accounted for by industrialized countries that have ratified in order for the Protocol to enter into force. Ratification by Russia would cause the Kyoto Protocol to enter into force, and as of October 27 the Russian Parliament had completed its approval of the Protocol. Following Russian President Putin's signature, and Russia's deposit of its instruments of ratification, the Protocol will enter into force within 90 days.

## **BACKGROUND AND ANALYSIS**

### **Global Climate Change Science**

A large number of scientists believe that human activities, which have increased atmospheric concentrations of carbon dioxide (CO<sub>2</sub>) by one-third over the past 100 years, may be leading to an increase in global average temperatures. However, the science of "global warming" is not without challengers, who argue that scientific proof is incomplete or contradictory, and that there remain many uncertainties about the nature and direction of Earth's climate. Nevertheless, concern is growing that human activities, such as the burning of fossil fuels, industrial production, deforestation, and certain land-use practices are increasing atmospheric concentrations of carbon dioxide (CO<sub>2</sub>) that, along with increasing concentrations of other trace gases such as chlorofluorocarbons-CFCs, methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF<sub>6</sub>), may be leading to changes in the chemical composition and physical dynamics of Earth's atmosphere, including how heat/energy is distributed between the land, ocean, atmosphere and space.

### **Greenhouse Gases: Sources and Trends**

Scientists have found that the four most important variable greenhouse gases, whose atmospheric concentrations can be influenced by human activities, are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and chlorofluorocarbons (CFCs). Historically, CO<sub>2</sub> has

been the most important, but over the past several decades other gases have assumed increasing significance and, collectively, are projected to contribute about as much to potential global warming over the next 60 years as CO<sub>2</sub>. The 1997 U.N. Kyoto Protocol on Climate Change, if it were to become a treaty in force, would also regulate three other trace gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>), whose limited concentrations in the atmosphere are anticipated to grow over the long-term. Sulfate aerosols, a byproduct of air pollution, and other natural phenomena, are also viewed as important for their transient and regional “climate cooling” effects in Earth’s atmosphere.

The amount of carbon cycling from naturally occurring processes each year through the biosphere as CO<sub>2</sub> is enormous — some 800 billion tons. Ice cores and other proxy climate data, which also indicate CO<sub>2</sub> concentrations in the atmosphere, have shown, in general, a relatively stable global climate, at least over the past 10,000 years. As such, many scientists suggest that the amount of CO<sub>2</sub> generated by natural processes is about equal to the amounts absorbed and sequestered by natural processes. However, human activity since the Industrial Revolution (c.a. 1850), and primarily in the form of burning fossil fuels, is now generating some additional 24 billion tons of CO<sub>2</sub> per year. Available evidence shows that about half this amount is absorbed by natural processes on land and in the ocean, and that atmospheric concentrations of CO<sub>2</sub> are now about 35% higher than they were some 150 years ago. Some scientists believe that a large amount of CO<sub>2</sub> may be stored in northern latitude soils and in temperate and tropical forests, suggesting a greater importance of the role of natural resources management and land-use practices in these regions, including burning of biomass and deforestation. Scientists estimate that anthropogenic emissions of CO<sub>2</sub> alone may account for as much as a 60% increase in global mean temperatures of 0.9°F, since 1850.

The most recent projections of state-of-the-art computer models of the Earth’s climate (global climate models — GCMs) have projected a globally averaged warming ranging from almost 3 to 10.7degrees F over the next 100 years, if greenhouse gases continue to accumulate in the atmosphere at the current rate. Climate scientists believe that such a warming could shift temperature zones, rainfall patterns, and agricultural belts and, under certain scenarios, and cause sea level to rise. They further predict that global warming could have far-reaching effects — some positive, some negative depending how it may be experienced in a given region — on natural resources; ecosystems; food and fiber production; energy supply, use, and distribution; transportation; land use; water supply and control; and human health.

Some skeptics of the global warming theory have called into question the reliability of the computer climate models and their output used to make projections of future warming that supported Kyoto Protocol negotiations. They also challenge some scientists’ assertions that recent episodic weather events may seem more extreme in nature, and that this may be indicative of long-term climate change.

Evidence of natural variability of climate is large enough that even the record-setting warmth at the end of the 20<sup>th</sup> century does not allow a vast majority of knowledgeable scientists to state beyond a reasonable doubt that weather extremes experienced over the past two decades are attributable to “global warming,” at least at the present time. However, the warming trend at the surface appears to be continuing. In some cases, causal relationships between seasonal and inter annual climate changes and present-day severe weather events are beginning to be recognized and even predicted, because of an improved ability to observe

the *El Nino* and *La Nina* phenomena. This notwithstanding, singular extreme weather events have focused public attention on possible outcomes of potential long-term climate change and a need for a better understanding of regional climates on decadal to century time scales.

National Oceanic and Atmospheric Administration's (NOAA) researchers reported that the 12 warmest years (globally averaged) since historical records have been kept occurred in the past two decades, with 1990 and 1998 among the warmest. At least some of this warming, they concluded, is human-induced. On the other hand, satellite instruments — which, through indirect methods, measure the average temperature of the atmosphere in a deep column above the surface — for the past 20 years are hard pressed to demonstrate any positive trends. A report issued in January 2000 by the U.S. National Research Council's Board on Atmospheric Sciences and Climate, *Reconciling Observations of Global Temperature Change*, attempted to resolve apparent disparities between temperature data measured at the surface and those from satellites. Skeptics claim that disparate trends invalidate the output of general circulation models (GCMs), many of which demonstrate homogenous warming throughout all the levels of the Earth's atmosphere. Panel scientists concluded that there may be a systematic disconnect between the upper and near surface atmosphere and cited physical processes which may have an unique impact on the upper atmosphere that are not currently accounted for in GCMs. In addition, they acknowledged that only long-term, systematic monitoring of the upper atmosphere could resolve the differences in temperature trends.

The Intergovernmental Panel on Climate Change (IPCC), jointly established in 1988 by the United Nations World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP), reported in its Second Assessment (1996) that “. . . [such] a change is unlikely to be entirely natural in origin . . . [and that] the balance of evidence, from changes in global mean surface air temperature and from changes in geographical, seasonal, and vertical patterns of atmospheric temperature, suggests a discernible human influence on global climate.” And now, the latest report (January 2001), the Intergovernmental Panel's Third Assessment, concluded that a firmer association between human activities and climate seems to have emerged. That was news, because reservations about the source of the past century's warming and whether it bore a human fingerprint are often cited in policy debates, usually in support of deferring actions aimed at mitigating possible global warming. In addition, the IPCC reported a higher range of potential warming — roughly between 2.7 and just under 11 degrees Fahrenheit over the next 100 years.

As background, a November 2000 national assessment report, *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change*, released under the auspices of the U.S. Global Research Program received criticism from many of those who were involved in its early review. Critics claimed that many of the model-projected impacts of possible future climate changes were overstated and unsubstantiated. The National Assessment Synthesis Team (NAST), with overall authority for the report, countered that much of the criticism it had received did not take into account the time scales upon which the report was based; the report targeted the effects of climate toward the middle of this century to the end of the next. Also, seemingly contradictory outcomes were produced by the two climate models selected for making the climate projections, casting some lingering doubt on the overall value and utility of the results for decision makers at the local, regional, and national levels. Various regional and resource-

focused assessments are now available at the USGCRP website, [<http://www.nacc.usgcrp.gov>]. A final synthesis report by the NAST, of the same title and consisting of an overview of all of the regional and sectoral studies, was released in December 2000.

In August 2000, NASA scientist James Hansen suggested that climate change benefits could be achieved through near-term regulation of non-CO<sub>2</sub> greenhouse gases. He proposed that reducing emissions of halocarbons (refrigerants), methane, nitrogen oxides, and carbon-black aerosols (soot) could have the effect of reducing ozone (smog), in the troposphere, which itself is a greenhouse gas. Non-CO<sub>2</sub> greenhouse gases have relatively short atmospheric lifetimes compared with CO<sub>2</sub>; however, most have a much larger global warming potential (gwp). This would suggest that controlling emissions of these greenhouse gases could reduce the rate and overall amount of climate warming from greenhouse gases, leaving only that expected from long-term CO<sub>2</sub> emissions whose full effects would not be realized for another 75-100 years hence. Nevertheless, Hansen emphasized that any actions to reduce emissions of these gases would need to be taken concomitantly with long-term strategies to reduce CO<sub>2</sub>. Hansen also noted that modest gains from reducing CO<sub>2</sub> and non-CO<sub>2</sub> emissions in the near-term could be achieved primarily through cleaner energy production.

On June 6, 2001, a Committee on the Science of Climate Change of the U.S. National Research Council (NRC) released a report, *Climate Change Science: An Analysis of Some Key Questions*, stating that global warming could well have serious societal and ecological impacts by the end of this century. Commissioned by the Bush White House and prepared by 11 of the nation's leading climate scientists, the report summarized the current state of knowledge on climate change and confirmed that the climatic changes observed during the past several decades were most likely due to human activities. The committee members warned, however, that they could not rule out the possibility that the climate's natural variability could be responsible for a significant portion of that trend. The authors agreed that human-induced warming and sea level rise were expected to continue through the 21st century and beyond, but they emphasized that current predictions of the magnitude and rate of future warming "should be regarded as tentative and subject to future adjustments (either upward or downward)." The NRC report generally concurred with the latest conclusions of the Intergovernmental Panel on Climate Change, which found that the Earth warmed by about 1 degree Fahrenheit during the 20th century, and that most of the warming of the past 50 years was probably due to increases in greenhouse gas concentrations in the atmosphere. The full report, *Climate Change Science: An Analysis of Some Key Questions*, is available online at [<http://books.nap.edu/html/climatechange/>] or may be downloaded as a PDF file at [<http://books.nap.edu/html/climatechange/climatechange.pdf>].

President Bush made a speech on global climate change from the Rose Garden on June 11, 2001, following release of the NRC report and completion of a cabinet-level review of climate change options. In that speech, timed just before his trip to Europe to meet with leaders there, the President acknowledged that the world has warmed and that greenhouse gases have increased, largely due to human activity, but emphasized that the magnitude and rate of future warming are unknown.

## The Policy Context

Since the conclusion of the United Nations Framework Convention on Climate Change in 1992, U.S. climate policy has been evolving through several different stages, first under the Clinton Administration, and then under a very different approach under the Bush Administration. This history is reviewed briefly below. (For more information on U.S. Climate Policy and how it has developed, see CRS Report RL31931, *Climate Change: Federal Laws and Policies Related to Greenhouse Gas Reductions*.)

**Clinton Administration Policies.** Taking office the year after the UNFCCC was completed, the Clinton Administration presided over early U.S. efforts to deal internationally with climate change, and to participate in formulation of the Kyoto Protocol to the UNFCCC. On October 19, 1993, President Clinton released his *Climate Change Action Plan* (CCAP), which proposed voluntary domestic measures to attain greenhouse gas emissions stabilization as outlined by the UNFCCC, to stabilize U.S. emissions at 1990 levels by the year 2000. The CCAP called for comprehensive voluntary measures by industry, utilities and other large-scale energy users. CCAP stressed energy-efficiency upgrades through new building codes in residential and commercial sectors, and other improvements in energy generating or using technologies. Large-scale tree planting and forest reserves were encouraged to enhance sequestration of carbon dioxide and to conserve energy. Other aspects of the plan addressed mitigation of greenhouse gases other than CO<sub>2</sub>. The CCAP avoided mandatory command and control measures.

On November 12, 1998, President Clinton instructed a representative to sign the Kyoto Protocol to “lock-in” U.S. interests achieved during negotiations. This act drew protest by some in Congress. Some Members claimed Clinton action was in violation of the June 1997 Byrd/Hagel Resolution (S.Res.98) that required an economic analysis of legally binding emission reductions on the United States, as well as binding obligations for all UNFCCC parties, including developing countries. The President announced he would continue to pursue “meaningful” commitments from key developing countries before he would send the treaty to the Senate for advice and consent.

The Clinton Administration released an economic analysis (July 1998), prepared by the Council of Economic Advisors, that concluded that with emissions trading among the Annex B/Annex I countries, and participation of key developing countries in the “Clean Development Mechanism” — which grants the latter business-as-usual emissions rates through 2012 — the costs of implementing the Kyoto Protocol could be reduced as much as 60% from many estimates. Other economic analyses, however, prepared by the Congressional Budget Office and the DOE Energy Information Administration (EIA), and others, demonstrated a potentially large declines in GDP from implementing the Protocol.

On November 11, 2000, President Clinton issued a statement on “Meeting the Challenge of Global Warming” in response to the results of the report: *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change* (see [[http://www.gcrio.org/National Assessment/](http://www.gcrio.org/National_Assessment/)]). In his statement, President Clinton said he would promulgate new regulations for U.S. electric power plants, imposing emissions caps on sulphur, nitrogen oxides, mercury, and CO<sub>2</sub>. He also called for establishment of a domestic emissions trading program and promised a continued U.S. leadership role in climate change to set an example for other industrialized countries.

President Clinton announced he would take such steps as necessary to keep the United States on target for meeting Kyoto Protocol goals, if certain concessions were made regarding international adoption of flexible mechanisms such as emissions trading, the clean development mechanism (CDM), credit for carbon sinks, and accountable, legally-binding, compliance mechanisms.

**Bush Administration Policies.** Soon after taking office, the Bush Administration had asked for a delay in resumption of the collapsed COP-6 negotiations (see COP-6 discussion below), in order to allow time for consideration of its approach and policies. Talks were accordingly scheduled for the second half of July. However, in late March 2001, the Bush Administration rejected the Kyoto Protocol — causing widespread concern among the EU nations — citing lack of developing country participation and possible harm to the U.S. economy. This followed extensive press attention to, first, statements by the EPA Administrator that — pursuant to a campaign statement by then-candidate George W. Bush — carbon dioxide would be included in a multi-pollutant regulatory effort; and then a repudiation of that position and clarification by President Bush and Administration spokespersons that carbon dioxide would not be regulated.

President Bush made a policy statement in mid-June of 2001, resulting from a continuing cabinet-level review of climate change options, in which he outlined the U.S. approach as rejecting the Kyoto Protocol and favoring voluntary actions, increased scientific research, and market mechanisms. This preceded his trip to Europe for meetings with European heads of state, which ended with statements that Europe and the United States “agree to disagree” on climate change approaches. President Bush also outlined a Climate Change Research Initiative (CCRI) and a National Climate Change Technology Initiative (NCCTI), along with a new Cabinet-level Committee on Climate Change Science and Technology Integration to oversee their implementation. The CCRI focuses on short-term, policy-relevant objectives of climate change science. An existing U.S. Global Change Research Program (USGCRP) supports long-term, fundamental, scientific research objectives. Both the new CCRI and the existing USGCRP were combined for the first time into the Climate Change Science Program (CCSP) in the FY2004 budget. The FY2004 funding estimate includes \$2.0 billion (CCRI + USGCRP) for research managed by the CCSP and some \$1.2 billion for technology research and development in the NCCTI. Although the total funding estimate for CCSP in FY2004 is up about 13% over the FY2003 actual level, that portion of the funding allocated to the embedded CCRI is up about 310% from \$41 million in FY2003 to an estimated \$168 million in FY2004. (For more information on climate research and technology, see CRS Report RL32147, *Climate Change: Federal Research and Technology and Related Programs*) The FY2005 budget request proposed a total spending level of \$1.958 billion for research managed by the CCSP, an amount \$43 million or 2.2% below the FY2004 funding estimate of \$2.0 billion. Although the FY2005 CCSP request was down 2.2%, that portion of the funding allocated to the embedded CCRI, once again, was up \$70 million or 42% from the \$168 million FY2004 estimate to a proposed \$238 million for FY2005. Some \$2.0 billion was proposed in the FY2005 budget for technology research and development in the NCCTI, an amount \$0.8 billion or 67% above the FY2004 funding estimate of \$1.2 billion.

An issue of continuing concern for Congress is the extent to which such large increases as those enjoyed by the CCRI in the current fiscal year and, albeit to a somewhat lesser extent, in the FY2005 proposed budget represent new money versus how much is

attributable to the reclassification of ongoing research programs. The Administration released a new *Climate Change Science Program Strategic Plan* on July 24, 2003. The plan includes five major research goals and dozens of specific research targets and papers with deadlines. The plan does not give budget details. The National Research Council of the National Academy of Sciences conducted an independent review of the *Strategic Plan* and in April 2004 published its overall assessment in a 51-page report, *Implementing Climate and Global Change Research: A Review of the Final U.S. Climate Change Science Program Strategic Plan*.<sup>1</sup> To complement the *CCSP Strategic Plan*, the Department of Energy, on December 2, 2003, released two long awaited reports from the U.S. Climate Change Technology Program that present a portfolio of federal R&D investments in climate change technology development, and highlight President Bush's initiatives in technology and international cooperation. The reports are titled, respectively, *Technology Options for the Near and Long Term*, and *Research and Current Activities*.

The Europeans then announced their intentions to proceed with ratification of the Kyoto Protocol, while President Bush indicated the United States will continue to participate in negotiations of the UNFCCC parties in order to pursue its own objectives. When talks resumed among UNFCCC parties at "COP-6 resumed" in mid-July in Bonn, Germany, and continued in the fall in Marrakech, Morocco at COP-7, the United States delegation did not make new proposals and declined to participate in negotiations on issues of the Kyoto Protocol. Agreement among the other parties was also found on the remaining Protocol issues at COP-7, and they announced that they would seek ratification of the Kyoto Protocol, and its entry into force — even without the participation of the United States.

On February 14, 2002, apparently concluding the cabinet-level review of climate change underway since early 2001, President Bush announced a U.S. policy for climate change: a "new approach for meeting the long-term challenge of climate change." The centerpiece of this announcement was the plan to reduce greenhouse gas intensity of the U.S. economy by 18% over the next 10 years. Greenhouse gas intensity measures the ratio of greenhouse gas emissions to economic output, and has been declining in the United States over the past several years. The Administration stated that the goal, to be met through voluntary action, is to achieve efficiency improvements that would reduce the 183 metric tons of emissions per million dollars of gross domestic product (GDP) to 151 in 2012. The plan notes that "if, in 2012, we find that we are not on track toward meeting our goal, and sound science justifies further policy action, the United States will respond with additional measures that may include a broad, market-based program" and other incentives and voluntary measures to accelerate technology development.

In addition, the plan directs the Secretary of Energy in consultation with other key agencies, to "substantially improve the emission reduction registry" to upgrade the voluntary emission reduction program under section 1605(b) of the 1992 Energy Policy Act, to bring about enhanced measurement accuracy, reliability, and verifiability. Other measures include providing for protected, transferable emission reduction credits, increased funding of \$700 million in total climate-related spending, and a new management structure to coordinate

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<sup>1</sup> U.S. National Research Council, Committee to Review the U.S. Climate Change Science Program Strategic Plan, *Implementing Climate and Global Change Research: A Review of the Final U.S. Climate Change Science Program Strategic Plan* (Washington, The National Academies Press, 2004), 51 pp., viewed online at [<http://www.nap.edu/books/0309088658/html/>].

climate change and technology research. Domestic policies such as tax incentives for renewable energy and new technology, development of fuel-efficient vehicles and cleaner fuels, and carbon sequestration were also proposed, along with several international bilateral initiatives and relatively modest increases in foreign assistance.

Some observers praised the plan for taking a practical, conservative approach to government action and for relying on voluntary measures. Critics observed that voluntary approaches by themselves have not historically often been effective, and noted that the reductions in energy intensity are very little different from current trends and would allow for significant increases in overall greenhouse gas emissions rather than reductions.

The Administration continues to encourage voluntary action rather than mandatory requirements. On February 12, 2003, the Administration detailed a set of voluntary agreements by various industry groups under an umbrella initiative titled Climate VISION (Voluntary, Innovative Sector Initiatives: Opportunities Now). These initiatives by sectoral groups involve actions to reduce greenhouse gas emissions and improve energy efficiency. (For full description of this announcement, see [<http://www.whitehouse.gov/news/releases/2002/02/climatechange.html>].)

A February 27, 2003, fact sheet issued by the U.S. State Department titled “United States Global Climate Change Policy” detailed a number of FY2004 budget proposals in support of international climate activities. These include a number of efforts to assist developing countries, including \$155 million for climate-related assistance to developing countries by the U.S. Agency for International Development (USAID); \$70 million for the Global Environment Facility (GEF) for activities to better measure and reduce emissions and invest in clean and renewable energy; and partial funding for climate observation systems. Multilateral partnerships outlined include contributions to carbon sequestration research and development, and an international partnership to advance fusion energy. Bilateral partnerships include those with 17 countries, including the European Union, India, China, Australia and others. (For details, see [<http://www.state.gov/g/oes/rls/fs/2003/18055.htm>].)

## **International Action**

The United States was involved in negotiations and international scientific research on climate change prior to ratifying the 1992 U.N. Framework Convention on Climate Change (UNFCCC). This included passage of a National Climate Program Act of 1978 (P.L. 95-367). These activities are discussed in CRS Report RL30522, *Global Climate Change: A Survey of Scientific Research and Policy Reports*, in which early aspects of the scientific debate and a chronology of U.S. government involvement in climate change policy prior to 1992 are featured.

### **U.N. Framework Convention on Climate Change (UNFCCC)**

The United Nations Framework Convention on Climate Change (UNFCCC) was opened for signature at the 1992 United Nations Conference on Environment and Development (UNCED) conference in Rio de Janeiro (known by its popular title, the Earth Summit). On June 12, 1992, the United States, along with 153 other nations, signed the

UNFCCC, that upon ratification committed signatories' governments to a voluntary "non-binding aim" to reduce atmospheric concentrations of greenhouse gases with the goal of "preventing dangerous anthropogenic interference with Earth's climate system." These actions were aimed primarily at industrialized countries, with the intention of stabilizing their emissions of greenhouse gases at 1990 levels by the year 2000; and other responsibilities would be incumbent upon all UNFCCC parties. The parties agreed in general that they would recognize "common but differentiated responsibilities," with greater responsibility for reducing greenhouse gas emissions in the near term on the part of developed/industrialized countries, which were listed and identified in Annex I of the UNFCCC and thereafter referred to as "Annex I" countries.

On September 8, 1992, then-President Bush transmitted the UNFCCC for advice and consent of the U.S. Senate to ratification. The Foreign Relations Committee approved the treaty and reported it (Senate Exec. Rept. 102-55) October 1, 1992. The Senate consented to ratification on October 7, 1992, with a two-thirds majority vote. President Bush signed the instrument of ratification October 13, 1992, and deposited it with the U.N. Secretary General. According to terms of the UNFCCC, having received over 50 countries' instruments of ratification, it entered into force March 24, 1994.

Since the UNFCCC entered into force, the parties have been meeting annually in conferences of the parties (COP) to assess progress in dealing with climate change, and beginning in the mid-1990's, to negotiate the Kyoto Protocol to establish legally binding obligations for developed countries to reduce their greenhouse gas emissions. After completion of the Protocol in 1997, COP meetings focused on formulating the operational rules that would prevail as nations attempted to meet their obligations to reduce emissions. These rules were essentially agreed upon at COP-7 (see below) in 2001. As of November 26, 2003, 120 countries had ratified, representing 44.2% of the 1990 emissions baseline, with 55% being the amount of emissions that must be accounted for by Annex B countries that have ratified in order for the Protocol to enter into force. Most parties to the UNFCCC continue to express hope that the United States will re-engage in international efforts to reduce greenhouse gas emissions.

## **COP-1, The Berlin Mandate**

The UNFCCC Conference of Parties met for the first time in Berlin, Germany in the spring of 1995, and voiced concerns about the adequacy of countries' abilities to meet commitments under the Convention. These were expressed in a U.N. ministerial declaration known as the "Berlin Mandate," which established a two-year Analytical and Assessment Phase (AAP), to negotiate a "comprehensive menu of actions" for countries to pick from and choose future options to address climate change which for them, individually, made the best economic and environmental sense. The Berlin Mandate exempted non-Annex I countries from additional binding obligations, in keeping with the principle of "common but differentiated responsibilities" established in the UNFCCC — even though, collectively, the larger, newly industrializing countries were expected to be the world's largest emitters of greenhouse gas emissions 15 years hence.

## **COP-2, Geneva, Switzerland**

The Second Conference of Parties to the UNFCCC (COP-2) met in July 1996 in Geneva, Switzerland. Its Ministerial Declaration was adopted July 18, 1996, and reflected a U.S. position statement presented by Timothy Wirth, former Under Secretary for Global Affairs for the U.S. State Department at that meeting, which (1) accepted the scientific findings on climate change proffered by the Intergovernmental Panel on Climate Change (IPCC) in its second assessment (1995); (2) rejected uniform “harmonized policies” in favor of flexibility; and (3) called for “legally binding mid-term targets.”

## **COP-3, The Kyoto Protocol on Climate Change**

The Kyoto Protocol to the United Nations Framework Convention on Climate Change was adopted by COP-3, in December 1997 in Kyoto, Japan, after intensive — and tense — negotiations. Most industrialized nations and some central European economies in transition (all defined as Annex B countries) agreed to legally binding reductions in greenhouse gas emissions of an average of 6%-8% below 1990 levels between the years 2008-2012, defined as the first emissions budget period. The United States would be required to reduce its total emissions an average of 7% below 1990 levels. (For more details, see CRS Report RL30692: *Global Climate Change: The Kyoto Protocol*.) The Protocol provides that it will enter into force when it has been ratified by 55 countries, accounting for 55% of developed country emissions in 1990. In 1997, prior to the completion of the Kyoto Protocol, the U.S. Senate passed S.Res.98, which urged the President not to agree to a treaty that did not include binding commitments for developing countries, or that would cause harm to the U.S. economy. As noted above, although President Clinton did sign the Protocol in 1998, it was never submitted by the Clinton Administration to the Senate because it would not have met the conditions of S.Res. 98.

The Clinton Administration initiated funding efforts to address climate change; in the FY2001 budget request funding was included for a Climate Change Technology Initiative (CCTI) first introduced in his FY1999 budget. Somewhat reduced funding for the climate technology initiatives was received in previous years.

## **COP-4, Buenos Aires**

COP-4 took place in Buenos Aires in November 1998. It had been expected that the remaining issues unresolved in Kyoto would be finalized at this meeting. However, the complexity and difficulty of finding agreement on these issues proved insurmountable, and instead the parties adopted a two-year “Plan of Action” to advance efforts and to devise mechanisms for implementing the Kyoto Protocol, to be completed by 2000.

## **COP-5, Bonn, Germany**

The 5<sup>th</sup> Conference of Parties to the U.N. Framework Convention on Climate Change met in Bonn, Germany, between October 25 and November 4, 1998. It was primarily a technical meeting, and did not reach major conclusions.

## **COP-6, The Hague, Netherlands**

When COP-6 convened November 13-25, 2000, in The Hague, Netherlands, discussions evolved rapidly into a high-level negotiation over the major political issues. These included major controversy over the United States' proposal to allow credit for carbon "sinks" in forests and agricultural lands, satisfying a major proportion of the U.S. emissions reductions in this way; disagreements over consequences for non-compliance by countries that did not meet their emission reduction targets; and difficulties in resolving how developing countries could obtain financial assistance to deal with adverse effects of climate change and meet their obligations to plan for measuring and possibly reducing greenhouse gas emissions. In the final hours of COP-6, despite some compromises agreed between the United States and some EU countries, notably the United Kingdom, the EU countries as a whole, led by Denmark and Germany, rejected the compromise positions, and the talks in The Hague collapsed. Jan Pronk, the President of COP-6, suspended COP-6 without agreement, with the expectation that negotiations would later resume. It was later announced that the COP-6 meetings (termed "COP-6 bis") would be resumed in Bonn, Germany, in the second half of July. The next regularly scheduled meeting of the parties to the UNFCCC - COP-7 - had been set for Marrakech, Morocco, in October-November, 2001. (For more detailed discussion of COP-6 issues, see CRS Report RL30692, *Global Climate Change: The Kyoto Protocol*.)

## **COP-6 "bis," Bonn, Germany**

When the COP-6 negotiations resumed July 16-27, 2001, in Bonn, Germany, little progress had been made on resolving the differences that had produced an impasse in The Hague. However, this meeting took place after President George Bush had become the U.S. President, and had rejected the Kyoto Protocol in March; as a result the United States delegation to this meeting declined to participate in the negotiations related to the Protocol, and chose to act as observers at that meeting. As the other parties negotiated the key issues, agreement was reached on most of the major political issues, to the surprise of most observers given the low level of expectations that preceded the meeting. The agreements included:

- (1) Mechanisms — the "flexibility" mechanisms which the United States had strongly favored as the Protocol was initially put together, including emissions trading; joint implementation; and the Clean Development Mechanism (CDM), which provides funding from developed countries for emissions reduction activities in developing countries, with credit for the donor countries. One of the key elements of this agreement was that there would be no quantitative limit on the credit a country could claim from use of these mechanisms, but that domestic action must constitute a significant element of the efforts of each Annex B country to meet their targets.
- (2) Carbon sinks — credit was agreed to for broad activities that absorb carbon from the atmosphere or store it, including forest and cropland management, and revegetation, with no over-all cap on the amount of credit that a country could claim for sinks activities. In the case of forest management, an Appendix Z establishes country-specific caps for each Annex I country, for example, a cap of 13 million tons could be credited to Japan (which represents about 4% of its base-year emissions). For cropland

management, countries could receive credit only for carbon sequestration increases above 1990 levels.

- (3) Compliance — final action on compliance procedures and mechanisms that would address non-compliance with Protocol provisions was deferred to COP-7, but included broad outlines of consequences for failing to meet emissions targets that would include a requirement to “make up” shortfalls at 1.3 tons to 1, suspension of the right to sell credits for surplus emissions reductions; and a required compliance action plan for those not meeting their targets.
- (4) Financing — three new funds were agreed upon to provide assistance for needs associated with climate change; a least-developed-country fund to support National Adaptation Programs of Action; and a Kyoto Protocol adaptation fund supported by a CDM levy and voluntary contributions.

A number of operational details attendant upon these decisions remained to be negotiated and agreed upon, and these were the major issues of the COP-7 meeting that followed.

## **COP-7, Marrakech, Morocco**

At the COP-7 meeting in Marrakech, Morocco October 29-November 10, 2001, negotiators in effect completed the work of the Buenos Aires Plan of Action, finalizing most of the operational details and setting the stage for nations to ratify the Protocol. The United States delegation continued to act as observers, declining to participate in active negotiations. Other parties continued to express their hope that the United States would re-engage in the process at some point, but indicated their intention to seek ratification of the requisite number of countries to bring the Protocol into force (55 countries representing 55% of developed country emissions of carbon dioxide in 1990). A target date for bringing the Protocol into force was put forward — the August-September 2002 World Summit on Sustainable Development (WSSD) to be held in Johannesburg, South Africa — but this target was not met. The main decisions at COP-7 included operational rules for international emissions trading among parties to the Protocol and for the CDM and joint implementation; a compliance regime that outlines consequences for failure to meet emissions targets but defers to the parties to the Protocol after it is in force to decide whether these consequences are legally binding; accounting procedures for the flexibility mechanisms; and a decision to consider at COP-8 how to achieve to a review of the adequacy of commitments that might move toward discussions of future developing country commitments. When COP-8 was held in 2002, few major decisions were made, and developing country commitments were not significantly addressed.

## **COP-8 (New Delhi, India, 2002) and COP-9 (Milan, Italy, 2003)**

At these two meetings of the conference of parties to the UNFCCC, attempts were made to consider next steps after the 2008-2012 commitment period, but these attempts encountered resistance from developing countries and some other parties. The announced reluctance of Russia at the Milan COP-9 to undertake ratification of the Kyoto Protocol called into question whether or when the Protocol might enter into force. Without U.S. participation, the required 55% of baseline emissions of parties would not be achieved if

Russia does not ratify. These meetings centered on largely technical issues, and avoided major substantive declarations. However, in late May 2004, Russia was widely reported to have agreed to try to ratify the Kyoto Protocol in the near future, as part of the concessions made in negotiations with the EU on Russia's entry into the World Trade Organization. The next meeting of the parties will be December 6-17, 2004, in Buenos Aires, Argentina.

## Congressional Interest and Activities

Congressional bills in the 108<sup>th</sup> Congress on comprehensive energy legislation did not originally include explicit climate provisions, but just before the August 2003 recess, the Senate passed its energy bill, H.R. 6, after substituting the language of H.R. 4 as passed the Senate in the 107<sup>th</sup> Congress — which did include climate-related language. However, the conference report on H.R. 6 did not include the climate-related language. “Multi-pollutant” bills have been introduced in the 108<sup>th</sup> Congress to regulate the emissions of sulfur dioxide, nitrogen oxides, mercury, and carbon dioxide. For more information on multi-pollutant legislation, see CRS Report RL31779, *Air Quality: Multi-Pollutant Legislation in the 108<sup>th</sup> Congress*. For a more detailed overview and comparison of climate change legislation, see CRS Report RL32055, *Climate Change Legislation in the 108<sup>th</sup> Congress*.

## LEGISLATION

A number of bills on energy issues are relevant to climate change, especially those with provisions encouraging or authorizing energy efficiency and alternative energy sources, but are not included in this list unless they directly deal with climate change, *per se*, or go beyond simply referencing climate/emissions side benefits. For a wide-ranging comparison of climate change legislation in several categories, see CRS Report RL32055, *Climate Change Legislation in the 108<sup>th</sup> Congress*. For additional information on climate-relevant energy legislation not included in the list below, see the Legislation section of CRS Issue Brief IB10041, *Renewable Energy: Tax Credit, Budget and Electricity Production Issues*; and the Legislation section of CRS Issue Brief IB10020, *Energy Efficiency: Budget, Oil Conservation, and Electricity Conservation Issues*. Bills listed below include only those focused specifically on climate change, *per se*, or greenhouse gas reductions.

### House Bills

#### **H.R. 1245 (Olver)**

Amends the Clean Air Act to establish an inventory, registry and information system of U.S. greenhouse gas emissions to inform the public and private sectors concerning greenhouse gas emissions and to encourage voluntary emissions reductions. Introduced March 12, 2003.

#### **H.R. 1578 (Udall)**

The Global Change Research and Data Management Act of 2002 would require an interagency committee to ensure cooperation and coordination of federal research activities on global change processes; a Global Change Research Program; a National Global Change Research Plan; and an interagency climate and other global change data management

working group. Introduced April 2, 2003. A motion to report this measure was defeated in committee on May 1, 2003.

**H.R. 1950 (Hyde)**

Authorization bill for the Department of State for fiscal years 2004 and 2005. Includes in Section 730 a “Sense of the Congress on Climate Change,” that states “...the United States should demonstrate international leadership and responsibility in reducing the health, environmental, and economic risks posed by climate change.” Actions urged by this section include taking responsible action to reduce greenhouse gas emissions, and participating in international negotiations with the objective of obtaining U.S. participation in a future binding climate change treaty while protecting U.S. economic interests and including developing countries. Introduced May 5, 2003; reported to the House on May 8, 2003, by the Committee on International Relations (H.Rept. 108-105, Part I). Passed by the House July 16, 2003.

**H.R. 2042 (Waxman)**

Amends the Clean Air Act to reduce emissions, including carbon dioxide, from electric powerplants, and for other purposes. Introduced May 8, 2003.

**H.R. 3093 (Bass)**

The “Clean Air Planning Act of 2003” amends the Clean Air Act to require integrated air quality planning for the electricity generating sector. It would establish pollutant tonnage limitations for sulphur dioxide, nitrogen oxides, mercury, and carbon dioxide, and would authorize establishment of trading systems for credits in nitrogen oxide, mercury, and carbon dioxide, among other provisions. Introduced September 16, 2003.

**H.R. 4067 (Gilchrest)**

To provide for a program of scientific research on abrupt climate change, to accelerate the reduction of greenhouse gas emissions in the United States by establishing a market-driven system of greenhouse gas tradeable allowances that will limit greenhouse gas emissions in the United States, reduce dependence upon foreign oil, and ensure benefits to consumers from the trading in such allowances, and for other purposes. Introduced March 30, 2004. Referred to Committee on Science and Committee on Energy and Commerce.

**Senate Bills**

**H.R. 6 (Tauzin)**

After H.R. 6, which contains no climate-related provisions, was referred to the Senate following passage by the House, it was passed by the Senate on July 31, 2003, with language from the Senate-passed H.R. 4 from the 107<sup>th</sup> Congress in the nature of a substitute. Climate-related language is therefore included in the Senate-passed version of H.R. 6. However, the conference report on H.R. 6, which was approved by the House on November 18, 2003, did not include the climate-related language. H.R. 6 failed to obtain a cloture vote in the Senate, and has not yet passed in that body. (For further discussion of the climate provisions of this bill, see CRS Report RL32033, *Omnibus Energy Legislation: Side-by-side Comparison of Non-Tax Provisions.*)

**S. 17 (Daschle)**

Establishes a mandatory greenhouse gas database. In addition, it establishes a commission to help implement the UNFCCC. Authorizes \$2 billion annually in grants to state and local governments to reduce greenhouse gas emissions. It does not mandate emissions reductions. Introduced January 7, 2003.

**S. 139 (Lieberman)**

Requires any entity that emits more than 10,000 metric tons of greenhouse gases (carbon dioxide equivalent) to reduce emissions to year 2000 levels by 2010, and 1990 levels by 2016. Allows: tradeable credits for reductions beyond those required, reductions from non-covered entities, increases in carbon sequestration, increases in passenger vehicle fuel economy, and emissions reductions in other countries. Introduced January 9, 2003. Considered by the Senate October 30, 2003, and failed to pass on a vote of 43-55. It was then rereferred to the Senate Committee on Environment and Public Works by unanimous consent.

**S. 194 (Corzine)**

Establishes mandatory greenhouse gas registries, but does not require emission reductions. Introduced January 17, 2003.

**S. 366 (Jeffords)**

The Clean Power Act of 2003 amends the Clean Air Act to require the Administrator of the Environmental Protection Agency to promulgate regulations to achieve specified reductions in emissions of sulfur dioxide, nitrogen oxide, carbon dioxide and mercury from certain electric generation facilities by January 1, 2009. Introduced February 12, 2003.

**S. 843 (Carper)**

Amends the Clean Air Act to establish a national uniform multiple air pollutant regulatory program, including for carbon dioxide, for the electricity generating sector. Introduced April 9, 2003.

**S. 925 (Lugar)**

State Department authorization bill for FY2004. Includes in Section 813 a "Sense of the Congress on Climate Change" that is nearly identical to the provisions of Section 730 of H.R. 1950, described above. Ordered reported by the Committee on Foreign Relations on April 9, 2003 (S.Rept. 108-39). The measure did not come to a vote in the Senate.

**S. 1164 (Collins)**

The Abrupt Climate Change Research Act of 2003 would provide for the development and coordination of a comprehensive and integrated U.S. research program that assists the people of the United States and the world to understand, assess and predict human-induced and natural processes of abrupt climate change. Introduced June 2, 2003. Ordered reported by the Committee on Commerce, Science, and Transportation on March 9, 2004 (S. Rept. 108-263). Placed on the Senate Legislative Calendar under general orders, May 13, 2004, calendar no. 514.