

Issue Brief for Congress

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Global Climate Change

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CONTENTS

SUMMARY

MOST RECENT DEVELOPMENTS

BACKGROUND AND ANALYSIS

Global Climate Change: Science and Policy

- Greenhouse Gases: Sources and Trends

- The Policy Context

 - Clinton Administration Policies

 - Bush Administration Policies

International Action

- U.N. Framework Convention on Climate Change (UNFCCC)

 - COP-1, The Berlin Mandate

 - COP-2, Geneva, Switzerland

 - COP-3, The Kyoto Protocol on Climate Change

 - COP-4, Buenos Aires

 - COP-5, Bonn, Germany

 - COP-6, The Hague, Netherlands

 - COP-6 "bis," Bonn, Germany

 - COP-7, Marrakech, Morocco

Congressional Interest and Activities

LEGISLATION

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 (CO₂) 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 un-managed 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 decisionmakers?

Fossil-fuel combustion is the primary source of CO₂ 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 green-house gases by stabilizing their emissions at 1990 levels by the year 2000. The 1997 Kyoto Protocol to the UNFCCC goes further and, if it were to enter into force, would commit the 38 major industrialized nations to specified, legally binding emissions reductions.

In March 2001, the Bush Administration rejected the Kyoto Protocol and chose to act only as observers, declining to participate in discussions at international negotiations on the Protocol. In July 2001, major political agreements were reached, led by the European Union (EU), and parties agreed to seek ratification and entry into force without the United States. Other parties continue to express hope that the United States will rejoin international efforts to reduce greenhouse gas emissions. In May 2002, the European Union and member states ratified the Protocol. Some 101 nations had ratified as of December 20, 2003.

President Bush concluded a cabinet-level climate policy review with an announcement 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 and other voluntary measures plus increased climate research funding were announced February 14, 2002.

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), other parties to the UNFCCC finalized their agreement on rules for implementation of the Protocol in the October-November 2001 Conference of the Parties (COP) in Marrakech, Morocco. As of December 20, 2003, 101 countries had ratified the Protocol. These nations represent 37% of the 1990 emissions baseline, with 55% being the amount of emissions that must be accounted for by industrialized 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.

During 2002, the U.S. Congress considered a number of climate-related legislative proposals, including H.R. 4, the Omnibus Energy bill passed by both chambers, which included a number of those proposals. However, the 107th Congress adjourned without agreement in the conference committee on H.R. 4. U.S. climate policy was articulated by President Bush in a statement on February 14, 2002, in which he highlighted voluntary efforts to reduce the climate intensity of U.S. industry (greenhouse gases per unit of production), and included several measures to increase research on climate change and move toward better methods of recording voluntary changes undertaken by industry.

BACKGROUND AND ANALYSIS

Global Climate Change: Science and Policy

A large number of scientists believe that human activities, which have increased atmospheric concentrations of carbon dioxide (CO₂) 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 (CO₂) that, along with increasing concentrations of other trace gases such as chlorofluorocarbons-CFCs, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆), 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 (CO₂), methane (CH₄), nitrous oxide (N₂O), and chlorofluorocarbons (CFCs). Historically, CO₂ 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 CO₂. 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 (SF₆), 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 CO₂ is enormous — some 800 billion tons. Ice cores and other proxy climate data, which also indicate CO₂ 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 CO₂ 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 CO₂ 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 CO₂ are now about 32% higher than they were some 150 years ago. Some scientists believe that a large amount of CO₂ 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 CO₂ alone may account for as much as a 60% increase in global mean temperatures of 0.9°F, since 1850. For more information on the science of global climate change, visit the CRS Electronic Briefing Book: *Global Climate Change* web site. [<http://www.congress.gov/brbk/html/ebgcc1.shtml>].

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 20th 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-CO₂ 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-CO₂ greenhouse gases have relatively short atmospheric lifetimes compared with CO₂; 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 CO₂ 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 CO₂. Hansen also noted that modest gains from reducing CO₂ and non-CO₂ 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

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 CO₂. 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 CO₂. 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, the Bush Administration indicated its opposition to the Kyoto Protocol, and created widespread concern among the EU nations by essentially rejecting it, citing lack of developing country participation and possible harm to the U.S. economy, especially in light of acute energy problems that were evident in the first half of 2001. This followed extensive press attention to, first, statements by the EPA Administrator that—pursuant to campaign statements 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. President Bush also outlined a U.S. Climate Change Research Initiative, and the National Climate Change technology Initiative. (See CRS report RL30452, *Climate Change: Federal Research, Technology, and Related Programs*) 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.

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—by August/September 2002, the date of the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa.

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 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 over-all greenhouse gas emissions rather than reductions.

(For full description of this announcement, see:
[<http://www.whitehouse.gov/news/releases/2002/02/climatechange.html>].)

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). The United States had played a leading role in shaping the outcomes of the three years of negotiations that led to this treaty. 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 July 12, 2002, 75 countries had ratified, including 21 of the Annex B countries with binding obligations under the Protocol. These 21 nations represent 36% 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 2-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. (See CRS Report RL30452. *Climate Change: Federal Research, Technology, and Related Programs*.)

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 2-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 5th 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. 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.

As noted above, the number of countries that had ratified as of December 20, 2002, was 101, including 28 countries (plus the European Union) of those with binding emissions reductions obligations. [The European Union and its member countries ratified the Protocol on May 31, 2002.] These 28 countries represent some 43.9% of the 1990 emissions baseline. Thus, additional Annex B countries representing an additional 5.1% of the 1990 baseline would be needed to allow the Protocol to enter into force.

COP-8: New Delhi, India

COP-8, held October 23 - November 1, 2002, dealt with a number of procedural decisions such as methodological issues, guidelines for non-Annex I national communications, “good practices” in policies and measures, and others. Divisions between developed and developing countries continued in negotiations dealing with more difficult and substantive issues, preventing, for example, a call for broadening commitments of developing countries. Instead, some major developing countries prevailed in focusing more on adaptation to climate change. A Delhi Declaration was adopted that reaffirmed development goals and poverty eradication and reaffirmed the common but differentiated responsibilities of developed and developing countries.

Congressional Interest and Activities

A number of hearings were held in the 107th Congress, focusing primarily on scientific findings and on climate provisions in both appropriations and energy legislation. Relevant legislation is summarized below.

LEGISLATION in the 107th Congress

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*, and go beyond simply referencing climate/emissions side benefits. For additional information on climate-relevant energy legislation not included in the list below, see CRS Issue Brief IB10041, *Renewable Energy: Tax Credit, Budget and Electricity Production Issues*; CRS Issue Brief IB10020, *Energy Efficiency: Budget, Oil Conservation, and Electricity Conservation Issues*; and CRS Report RL31044, *Renewable Energy Legislation in the 107th Congress*.

P.L. 107-228 H.R. 1646

Authorizes appropriations for the Department of State for fiscal years 2002 and 2003, and for other purposes. Section 745 of this bill expressed a “Sense of Congress Relating to Global Warming,” which stated the sense of Congress that the United States should demonstrate international leadership in mitigating global warming threats...” (Passed the House on May 16, 2001, and referred to the Senate Committee on Foreign Relations on May 17, 2001.) The Senate Committee on Foreign Relations approved a similar “Sense of the Congress” resolution as an amendment to its State Department authorization bill, S. 1401. H.R. 1646 was reported out of conference on September 23, 2002 (H.Rept. 107-671). The conference committee dropped the sense of congress resolution on global warming, in an effort to eliminate this and other potential sources of controversy. Signed into law September 30, 2002.

H.R. 4

This comprehensive energy bill contained language on many energy topics, including fossil and renewable energy supply, energy efficiency, and research and development. The Senate-passed version contained three titles directly related to greenhouse gases and climate change. Title X would require the development of a national climate change strategy. It would establish a National Office of Climate Change Response in the Executive Office of the President to oversee the strategy. It would also establish an Office of Climate Change Technology within the Department of Energy to develop new greenhouse gas mitigation technologies and provide support and data for the strategy. Title XI would establish and national greenhouse gas database, and Title XIII would authorize funding for climate change research and development. (Passed April 25, 2002 in lieu of S. 517).

The House-passed version of H.R. 4 does not contain language directly related to climate change. (Passed August 2, 2001). On June 28, 2002, the Conference Committee

convened to reconcile the two versions, but the 107th Congress adjourned without reaching agreement on a final version.

H.R. 1335 (Allen)

Reduces emissions of mercury, carbon dioxide, nitrogen oxides, and sulfur dioxide from fossil fuel-fired electric utility generating units operating in the United States, and for other purposes. For carbon dioxide, the bill sets a total yearly tonnage cap and requires EPA to promulgate performance standards to attain the standard. (Introduced April 3, 2001.)

H.R. 2646 (Combest)

A bill, commonly referred to as the “Farm Bill,” to provide for the continuation of agricultural programs through FY2011. The House version of this bill would authorize \$15 million total for carbon cycle research. The Senate version would authorize \$25 million annually for FY2002 through FY2006 for carbon sequestration research, and \$20 million annually for a carbon sequestration demonstration program. (Conferees met March 19, 2002.)

H.R. 2782 (McKinney)

Requires U.S. nationals with more than 20 employees in a foreign country to implement a corporate code of conduct which requires adherence to international human rights standards, labor standards, and environmental standards, including standards related to climate change mitigation. (Introduced August 24, 2001.)

H.Con.Res. 83

The 2001 Senate Budget Resolution, passed in the nature of a substitute for language in H.Con.Res. 83, included S.Amdt. 249, sponsored by Sen. John Kerry, to restore funding for programs related to global climate change to the funding level of \$4.5 billion over 10 years, primarily for existing programs. Among the purposes identified by the amendment were “....to provide increased funding to ensure adequate U.S. participation in negotiations...pursuant to the Senate-ratified U.N. Framework Convention on Climate Change...” and other purposes. (Passed by the Senate April 6, 2001. See Congressional Record p. S3641.)

H.Res. 117 (Lee, Barbara)

Expressing the sense of Congress that the United States should develop, promote, and implement policies to reduce emissions of fossil fuel generated carbon dioxide. (Introduced April 4, 2001.)

S. 388 and S. 389 (Murkowski)

A bill to protect the energy and security of the United States and decrease America’s dependency on foreign oil sources to 50% by the year 2011 by enhancing the use of renewable energy resources conserving energy resources, improving energy efficiencies, and increasing domestic energy supplies; improve environmental quality by reducing emissions of air pollutants and greenhouse gases; and for other purposes. (Committee hearings held May 24, 2001 through July 26, 2001. S.Rept. 107-144.)

S. 517 (Bingaman) as amended by Senate Amendment 2917 (Daschle)

The National Laboratories Partnership Improvement Act of 2001. The bill establishes new programs for cooperative research and government-industry partnerships with the national laboratories. (Currently being considered by the Senate.) S.Amdt. 2917: This

amendment in the nature of a substitute would insert the Energy Policy Act of 2002 into S. 517. This comprehensive energy bill contains language on many energy topics, including fossil and renewable energy supply, energy efficiency, and research and development. Further, the bill contains three titles directly related to greenhouse gases and climate change. Title X would require the development of a national climate change strategy. It would establish a National Office of Climate Change Response in the Executive Office of the President to oversee the strategy. It would also establish an Office of Climate Change Technology within the Department of Energy to develop new greenhouse gas mitigation technologies and provide support and data for the strategy. Title XI would establish a national greenhouse gas database, and Title XIII would authorize funding for climate change research and development. (Currently being considered by the Senate.) The House energy bill, H.R. 4, does not contain language directly related to climate change. (Passed House, August 2, 2001.)

S. 556 (Jeffords)

The Clean Power Act of 2001. The bill would require the Administrator of the Environmental Protection Agency (EPA) to promulgate regulations to reduce emissions, including greenhouse gas emissions, from power plants. The bill would require reductions of aggregate greenhouse gas emissions to 1990 levels. (Subcommittee hearings held January 29, 2002.)

S. 597 (Bingaman)

The Comprehensive and Balanced Energy Policy Act of 2001. Includes Title I: Integration of energy policy and climate change policy, and establishes a National commission on Energy and Climate Change. (Committee markup held August 2, 2001.)

S. 769 (Brownback)

A bill to establish a carbon sequestration program and an implementing panel within the Department of Commerce to enhance international conservation, to promote the role of carbon sequestration, and to reward and encourage voluntary, pro-active environmental efforts on the issue of global climate change. (Introduced April 24, 2001.)

S. 785 (Brownback)

A bill to amend the Food Security Act of 1985 to require the Secretary of Agriculture to establish a carbon sequestration program. (Introduced April 26, 2001.)

S. 820 (Wyden)

The "Forest Resources for the Environment and the Economy Act" would amend the Energy Policy Act of 1992 to assess opportunities to increase carbon storage on national forests derived from the public domain and to facilitate voluntary and accurate reporting of forest projects that reduce atmospheric carbon dioxide concentrations, and for other purposes. (Committee hearings held on July 24, 2001.)

S. 1008 (Byrd)

A bill to amend the Energy Policy Act of 1992 to develop the U.S. Climate Change Response Strategy, with the goals of stabilizing greenhouse gas concentrations in the atmosphere, minimizing adverse short-term and long-term economic and social impacts, aligning the Strategy with U.S. energy policy, promoting sound national environmental policy, establishing a research and development program that focuses on bold technological

breakthroughs that contribute significantly toward greenhouse gas stabilization, establishing a National Office of Climate change Response within the Executive Office of the President, and for other purposes. Similar language was incorporated in S.Amdt 2917 to S. 517. (Reported favorably by the Senate Committee on Governmental Affairs on August 2, 2001. S.Rept. 107-99.)

S. 1131 (Leahy)

The Clean Power Modernization Act of 2001. The bill contains several provisions on power plant efficiency and modernization. It would also limit power plant emissions, including carbon dioxide emissions. Specifically, the bill would set specific carbon dioxide emissions rates for power plants based on operating fuel. (Introduced May 28, 2001.)

S. 1255 (Wyden)

The “Carbon Sequestration and Reporting Act” would, among other provisions, amend the Energy Policy Act to provide for the establishment of the Carbon Advisory Council, which would advise on reporting guidelines for greenhouse gas sequestration from soil carbon and forest management actions and their potential effects and effectiveness. (Introduced July 26, 2001.)

S. 1293 (Craig)

A bill to amend the Internal Revenue Code to provide incentives for the voluntary reduction, avoidance, and sequestration of greenhouse gas emissions and to advance global climate science and technology development and deployment. (Introduced August 1, 2001.)

S. 1294 (Murkowski)

To establish a new national policy designed to manage the risk of potential climate change, ensure long-term energy security, and to strengthen provisions in the Energy Policy Act of 1992 and the Federal Nonnuclear Energy Research and Development Act of 1974 with respect to potential climate change. (Introduced August 1, 2001.)

S. 1401 (Biden)

A bill to authorize appropriations for the Department of State for fiscal years 2002 and 2003, and for other purposes. Section 778 of this bill expresses a “Sense of Congress Relating to Global Warming,” which states the sense of Congress that the United States should demonstrate international leadership in mitigating global warming threats by taking responsible action to achieve meaningful reductions in greenhouse gas emissions from all sectors, and by “participating in international negotiations...with the objective of securing United States’ participation in a revised Kyoto Protocol or other future binding climate change agreements.” (Introduced August 1, 2001, reported by Senate Foreign Relations Committee September 4, 2001. S.Rept. 107-60.) The House approved a similar “Sense of the Congress” resolution in its State Department authorization bill, H.R. 1646.

S. 1716 (Kerry)

The Global Climate Change Act of 2001 provides for establishment of a number of new government entities, including: (1) a National Office of Climate Change Action and an integrated program office for the global change research program within the Office of Science and Technology Policy; (2) an interagency climate change action task force to develop a national strategy for, among other things, substantially reducing U.S. Greenhouse gas emissions and promoting energy efficiency research and development; and (3) a Science

and Technology Assessment Service in the legislative branch. (Introduced November 15, 2001.)

S. 1766 (Daschle)

The Energy Policy Act of 2002, a comprehensive energy bill, includes provisions for increased domestic fossil and renewable energy supply, energy conservation, and research and development, among other provisions. Language from this bill was inserted into S.Amdt. 2917 to S. 517. (Placed on the Senate legislative calendar December 6, 2001.)

S. 1781 (McCain)

The Emissions Reductions Incentive Act of 2001. The bill would require the Secretary of Commerce to establish a voluntary system for industrial greenhouse gas trading. (Introduced December 6, 2001.)

S. 1870 (Corzine)

The National Greenhouse Gas Emissions Inventory and Registry Act of 2001. The bill would require the Administrator of EPA to develop a mandatory greenhouse gas emissions registry and publish an annual greenhouse gas inventory. (Introduced December 20, 2001.)