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Climate Change: Federal Expenditures for Science and Technology

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Michael M. Simpson
Specialist in Life Sciences
Resources, Science, and Industry Division

John R. Justus
Specialist in Earth and Ocean Sciences
Resources, Science, and Industry Division

Climate Change:
Federal Expenditures for Science and Technology

Summary

For over 25 years there have been federal programs directly or indirectly related to climate change. This report identifies and discusses direct climate-focused scientific and research programs of the federal government, as well as an array of energy programs that relate indirectly to climate change. The U.S. Global Change Research Program in the George H. W. Bush Administration, and subsequently in the Clinton Administration, funded studies to improve scientific understanding of the processes that influence Earth's climate, including trends on global and regional scales. The Climate Change Technology Initiative (CCTI) was the Clinton Administration's package of research and development (R&D) to develop renewable energy sources and more efficient technologies, targeted tax credits (to encourage purchase and deployment of more efficient technologies), and voluntary information programs (so businesses and schools might be better informed when making purchasing and operating decisions involving energy use and emissions).

The CCTI was followed by the current Bush Administration's Climate Change Research Initiative (CCRI) and National Climate Change Technology Initiative (NCCTI), both overseen and coordinated by a cabinet-level Committee on Climate Change Science and Technology Integration. The CCRI and the extant U.S. Global Change Research Program (GCRP) were first combined into the Climate Change Science Program (CCSP) in the FY2004 budget. The CCRI focuses on short-term, policy-relevant objectives of climate change science. The GCRP focuses on long-term, fundamental scientific research objectives. The CCSP was accompanied in the FY2005 budget by the Climate Change Technology Program (CCTP).

Funding for CCSP amounted to $1.766 billion in FY2003, $1.975 billion in FY2004, and $1.913 billion in FY2005. For FY2006, $1.886 billion has been requested, a reduction of 1.4% relative to FY2005. Funding for climate change technologies amounted to $2.6 billion in FY2003, $2.87 billion in FY2004, and $2.99 billion in FY2005. For FY2006, $2.87 billion has been requested, a reduction of 4.0% relative to FY2005. Total funding for climate change scientific research and technologies amounted to $4.366 billion in FY2003, $4.845 billion in FY2004, and $4.903 billion in FY2005. For FY2006, $4.756 billion has been requested, a reduction of 3.0% relative to FY2005.

This report will be updated as events warrant.

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Background

For over 25 years there have been federal programs directly or indirectly related to climate change. Direct programs have focused largely on scientific research to improve the capability to understand climate systems and/or predict climatic change and variability. Energy use has been one major focus of efforts related to possible climate change because carbon dioxide, the major "greenhouse gas," is added to the atmosphere when fossil fuels are burned. All those efforts, which sought to reduce oil imports, manage electricity needs, and address environmental concerns including climate change, involve many parts of the government. Climate science efforts in various agencies have sought to expand scientific understanding of the dynamics of climate and its societal consequences as a basis for policy decisions that rely on improved predictions of future climate conditions and climate impact assessments. This report identifies and discusses direct climate-focused scientific and research programs of the federal government, as well as an array of energy programs that relate indirectly to climate change.[1]

The U.S. Global Change Research Program (GCRP), established in the George H. W. Bush Administration, funds studies to improve scientific understanding of the processes that influence Earth's climate, including trends on global and regional scales. The Climate Change Technology Initiative (CCTI) was the Clinton Administration's package of research and development (R&D) to develop renewable energy sources and more efficient technologies, targeted tax credits (to encourage purchase and deployment of more efficient technologies), and voluntary information programs (so businesses, state and local governments, schools, and others might be better informed when making purchasing and operating decisions involving energy use and emissions).

The CCTI was succeeded by the current Bush Administration's Climate Change Research Initiative (CCRI) and National Climate Change Technology Initiative (NCCTI), both overseen and coordinated by a cabinet-level Committee on Climate Change Science and Technology Integration. The CCRI and the extant U.S. Global Change Research Program were combined into the Climate Change Science Program (CCSP) in the FY2004 budget. The CCRI focuses on short-term, policy-relevant objectives of climate change science. The GCRP focuses on long-term, fundamental scientific research objectives. The CCSP was accompanied in the FY2005 budget

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[1] CRS Issue Brief IB89005, *Global Climate Change*, by John R. Justus and Susan R. Fletcher, reviews the status of climate science, international negotiations, and congressional activity focused specifically on climate change.

by the Climate Change Technology Program (CCTP). Past and current funding details, and brief program descriptions, follow.

Funding

The President's FY2006 budget requested $1.886 billion to sponsor scientific research directly managed by the CCSP. Included in the CCSP funds are $183 million for CCRI and $1.7 billion for GCRP. The FY2006 budget requested $2.87 billion for climate change technologies. Past and current total amounts for research and for technologies are shown in **Table 1**.

Table 1. Funding for Climate Change Research, Technologies: A Four-Year Comparison

($ millions)

	FY2003	FY2004	FY2005	FY2006 req.	$ Change, 2005 to 2006	% Change, 2005 to 2006
G. W. Bush Admin. Climate Change Science Program (CCSP;* scientific research)	1,766 (pre-CCSP)	1,975 (CCSP begins, = CCRI + GCRP)	1,913 (CCRI + GCRP)	1,886 (CCRI + GCRP)	-$27	-1.4%
Climate Change Research Initiative (CCRI)	41	168	221	183	-$38	-17.2%
Global Change Research Program (GCRP)	1,725	1,807	1,692	1,703	$11	0.6%
G. W. Bush Admin. Climate Change Technology Program (CCTP; technologies)	2,600	2,870	2,990	2,870	-$120	-4.0%
Total Science + Technology (CCSP + CCTP)	4,366	4,845	4,903	4,756	-$147	-3.0%

Sources: *Report to Congress on Federal Climate Change Expenditures*, June 11, 2001, at [http://epw.senate.gov/107th/FY03ClimateRept.htm]. *Federal Climate Change Expenditures Report to Congress*, March 2005, at [http://www.whitehouse.gov/omb/legislative/fy06_climate_change_rpt.pdf].

* The CCSP was made of components that existed before the CCSP name. The CCSP name began with the FY2004 budget.

Science and Technology Programs and Funding Levels by Agency

Climate change research and/or technology activities are or have been specified in the budgets of the following federal entities:

- Department of Agriculture (USDA)

- Department of Commerce — National Oceanic and Atmospheric Administration (DOC-NOAA) and National Institute of Standards and Technology (DOC-NIST)
- Department of Defense (DOD)
- Department of Energy (DOE)
- Department of Health and Human Services — National Institutes of Health (HHS-NIH)
- Department of Housing and Urban Development (HUD)
- Department of the Interior — United States Geological Survey (DOI-USGS)
- Department of State (DOS)
- Department of Transportation (DOT)
- Environmental Protection Agency (EPA)
- National Aeronautics and Space Administration (NASA)
- National Science Foundation (NSF)
- United States Agency for International Development (USAID)
- Smithsonian Institution (SI)

Funding by agency for climate change science programs is summarized in **Table 2**. Funding by agency for climate change technology programs is summarized in **Table 3**. Agencies in both tables are listed in order of decreasing levels of funds.

Table 2. Funding for Climate Change Science Program

($ millions)

Department/ Agency	FY2003	FY2004	FY2005	FY2006 req.	$ Change, 2005 to 2006	% Change, 2005 to 2006
NASA	1,147	1,321	1,264	1,162	-$102	-8%
NSF	203	215	198	197	-$1	-1%
DOC-NOAA	116	116	124	181	$57	46%
DOE	115	133	129	132	$3	2%
USDA	62	70	73	88	$15	21%
HHS-NIH	61	61	65	65	$0	0%
DOI-USGS	28	28	24	24	$0	0%
EPA	22	22	20	21	$1	5%
SI	6	6	6	6	$0	0%
USAID	6	6	6	6	$0	0%
DOT	—	1	3	3	$0	0%
DOS	0	1	1	1	$0	0%
Subtotal, CCRI (included in CCSP total)	**41**	**168**	**221**	**183**	**-$38**	**-17%**
Total, CCSP	**1,766**	**1,975**	**1,913**	**1,886**	**-$27**	**-1%**

Source: "Analytical Perspectives" of the Budget of the United States Government Fiscal Year 2006, p. 69.

Table 3. Bush Administration Climate Change Technology Program Funding by Agency

($ millions)

Department/ Agency	FY2003	FY2004	FY2005	FY2006 req.	$ Change, 2005 to 2006	% Change, 2005 to 2006
DOE	2,100	2,400	2,480	2,500	$20	0.8%
NASA	nd	230	208	130	-$78	-37.5%
EPA	100	110	109	110	$1	0.9%
DOD	80	50	79	60	-$19	-24.0%
USDA	40	50	50	40	-$10	-20.0%
DOC-NIST	40	30	30	7	-$23	-77.0%
NSF	9	10	10	10	$0	0%
DOI-USGS	1	1	2	2	$0	0%
DOT	nd	5	1	2	$1	100%
HUD	nd	nd	nd	nd	—	—
Total	2,370	2,890	2,969	2,860	-$109	-3.7%

Sources: *Briefing on Research and Development Funding in President's FY2004 Budget* Office of Science and Technology Policy January 30, 2003; *Federal Climate Change Expenditures Report to Congress*, May 2004; [http://www.climatetechnology/gov/library]; *Analytical Perspectives* of the Budget of the United States Government Fiscal Year 2006, p. 65; and Office of Management and Budget *Federal Climate Change Expenditures to Congress*, March 2005, at [http://www.cq.com/flatfiles/editorialFiles/budgetTracker/reference/docs/20050414omb-climate.pdf].

"nd" = no data available.

Climate-Related Programs by Agency[2]

Following are brief descriptions of climate related programs in each agency. The agencies are listed in order of decreasing funding levels. In general, funding levels within each agency have been fairly flat, with the few significant decreases or increases discussed in the text.

Department of Energy. The Department of Energy has long had science and technology programs relating to fossil fuel energy use, as well as other energy-related work relating to climate. The FY2006 request for DOE's science programs is up 2% to $132 million, relative to FY2005. The FY2006 funding level of $2.5 billion requested for DOE's technology programs is approximately equal to FY2005's level.

Funding for the DOE's efforts has been for the research, development, and deployment of more energy efficient and renewable technologies such as for:

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[2] All following budget information from Office of Management and Budget, *Federal Climate Change Expenditures Report to Congress, March 2005*, available at [http://www.cq.com/flatfiles/editorialFiles/budgetTracker/reference/docs/20050414omb-climate.pdf].

- Buildings: low-power sulfur lamps, advanced heat pumps, chillers and commercial refrigeration, fuel cells, insulation, energy conserving building materials, and advanced windows;

- Electricity: generation using alternatives to fossil fuels such as solar energy, biomass power, wind energy, geothermal power, hydropower, and optimized nuclear power;

- Industries: greater efficiency in industries such as aluminum, steel, mining, agriculture, chemicals, forest products, and petroleum;

- Transportation: researching, developing, and deploying more efficient technologies, such as advanced engines, hybrid systems, fuel cells and emission controls; these constituted the federal component of the Partnership for a New Generation of Vehicles (PNGV) which was a 10-year government/domestic auto industry partnership begun in the Clinton Administration in 1993 that aimed to produce by 2004 a prototype midsized family car with 80 miles per gallon gasoline efficiency and a two-thirds reduction in carbon emissions. Seven federal agencies were involved in the PNGV (Commerce, Defense, Energy, Transportation, EPA, National Aeronautics and Space Administration, and the National Science Foundation); the Bush Administration cancelled the PNGV program and began the Freedom CAR program which focuses on fuel cell vehicles and related infrastructure (for details, see CRS Report RS20852, *The Partnership for a New Generation of Vehicles: Status and Issues*; and CRS Report RS21442, *Hydrogen and Fuel Cell Vehicle R&D: FreedomCAR and the President's Hydrogen Fuel Initiative*, both by Brent D. Yacobucci.);

- Removal and Sequestration of Carbon: trying to find better ways to remove and sequester carbon from fossil and other fuels, via agricultural and other approaches (in conjunction with EPA, and in conjunction with USDA); and

- Management, Planning, Analysis and Outreach: governmental efforts (federal, state, and others) to conserve energy through more highly coordinated management, planning, analysis and outreach.[3]

As with the PNGV/FreedomCAR program, many of DOE's research and technology dollars have been spent in partnership with other federal entities such as EPA, with other governmental units, and with private sector entities.

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[3] From *Analysis of the Climate Change Technology Initiative, Research and Development Support* by the Energy Information Agency, U.S. Department of Energy, which can be found at [http://www.eia.doe.gov], and from *Our Changing Planet*, by the Climate Change Science Program, pp.131-133, which can be found at [http://www.climatescience.gov].

National Aeronautics and Space Administration. The FY2006 request for NASA's science programs is down 8% to $1,162 million, relative to FY2005. The FY2006 request for NASA's technology programs is down 38% to $130 million, relative to FY2005. The decrease in NASA's climate change science program number is due to changes in its budget for space observing platforms, and the decrease in NASA's technology program number is due to realignment within its Aeronautics Research areas, according to the *Federal Climate Change Expenditures Report to Congress, March 2005*.[4] NASA's Global Change Research Program, using satellites and other technologies, obtains and reports data on the global carbon cycle, water cycle, ecosystems, climate variability, atmospheric chemistry, and land cover/land use, to try to determine how the global earth system is changing, what the primary causes of change are, how the earth's systems respond to natural and human-induced changes, and how better to predict future changes in the planet's systems. NASA also is studying more efficient and cleaner aircraft engines and alternative aviation propulsion systems.

National Science Foundation. The FY2006 request for NSF's science programs is down 0.5% to $197 million, relative to FY2005. The FY2006 request of $11 million for NSF's technology programs is unchanged from FY2005. The National Science Foundation, an independent government agency, initiates and supports scientific and engineering research through grants, contracts, and fellowships with academic, nonprofit, and other institutions and organizations. Climate change research funded through NSF includes studies of carbon cycling, Antarctic ecosystems, climate modeling-analysis-prediction, sea-level changes, ecological diversity, water cycling, polar ozone depletion-ultraviolet radiation effects, greenhouse gas dynamics, solar influences, climate variability-predictability, human dimensions of global change, and other related topics.[5]

Department of Commerce — National Oceanic and Atmospheric Administration (NOAA), and National Institute of Standards and Technology (NIST). The bulk of DOC's climate change work has been and continues to be in the Department's National Oceanic and Atmospheric Administration. Much of DOC's climate change research has not been specifically identified as being a part of the CCSP or CCTP, but rather part of NOAA's generic mission. Among other things, research at NOAA has sought to determine "the impacts of climate variability and change on ecosystems; ... understand how radiative, chemical, and dynamical processes interact in the upper troposphere/lower stratosphere to affect climate; ... (and) study the effects of climate variability and change on health."[6] The FY2006 request for DOC-NOAA's science programs is up 46% to $181 million, relative to FY2005. The increase is principally for NOAA's climate-related general operations, research, and facilities. NOAA has responsibility

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[4] Climate Change Science Program, *Our Changing Planet*, pp. 144-146, which can be found at [http://www.climatescience.gov], and p. 11 of *Federal Climate Change Expenditures to Congress, March 2005*, available at [http://www.cq.com/flatfiles/editorialFiles/budget Tracker/reference/docs/20050414omb-climate.pdf].

[5] Climate Change Science Program, *Our Changing Planet*, pp. 147-148.

[6] Department of Commerce budget initiative, details of which can be found at [http://www.oarhq.noaa.gov].

for leading the implementation of CCSP. There are no DOC-NOAA climate-change technology programs.

There have been a few small programs at the DOC's National Institute of Standards and Technology which looked at climate change technology issues, such as supporting advances in instrument calibrations and measurement relevant to climate change. The FY2006 request for DOC-NIST's climate-change-related technology programs is $7 million, down 73% relative to FY2005. The decrease is principally due to the proposed termination of NIST's Advanced Technology Program, which aimed to foster public-private partnerships to help develop early-stage, innovative, high-risk technologies, according to the NIST website.[7]

Environmental Protection Agency. The FY2006 request for EPA's climate change science programs is up 5% to $21 million, relative to the level enacted for FY2005. The FY2006 request of $110 million for EPA's climate-change-related technology programs is up approximately 1% relative to FY2005's enacted level. Those programs are embedded in two main budget categories used in the Environmental Protection Agency budget presentation: Science and Technology (S&T, which includes R&D and technology development and diffusion efforts), and Environmental Programs and Management (EPM, which are the costs to run programs).

EPA has had six main climate change research and technology areas, briefly described below: buildings; transportation; industry; carbon removal; state and local governments; and international capacity building, partnerships, and cooperation. Some of these activities focus heavily on R&D, while others involve information dissemination and other activities.

- The "Buildings" component of EPA's climate change research and technology activities includes housing and commercial structures. EPA and others (including DOE) argue that efforts by individual and organizational consumers to secure the most energy efficient process or commodity are hampered by a lack of objective information on which to make comparisons (for details, see CRS Issue Brief IB10020 *Energy Efficiency: Budget, Oil Conservation, and Electricity Conservation Issues*, by Fred Sissine). Through the Agency's ENERGY STAR Program and ENERGY STAR Buildings and Green Lights Partnership, EPA evaluates and certifies energy-saving building-related products (including such items as televisions, appliances, residential lighting, and whole houses), and makes that information available so that consumers and businesses can choose energy-saving and pollution-reducing products more easily.

- "Transportation" activities of EPA include the following:

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[7] Climate Change Science Program, *Our Changing Planet*, pp. 125-127, and [http://www.atp.nist.gov/atp/charter.htm].

- expanded support for programs, such as the Best Workplaces for Commuters program, which provide information and incentives for commuters to consider transit, ridesharing, or other alternatives to driving;

- continued support of state and local efforts toward livable and healthy communities (e.g., through EPA's Smart Growth program, which collects and disseminates information useful in enhancing clean neighborhoods and transportation choices);

- continued funding and coordination activities in various partnerships, such as EPA's SmartWay Transport Partnership, which links hundreds of local governments, community organizations, and companies in order to produce knowledge that is designed to reduce vehicle miles traveled;

- contributions to the former Partnership for a New Generation of Vehicles and current Freedom CAR (government/domestic-auto-industry partnerships described previously under DOE).

- "Industry" efforts include working with industries (especially energy-intensive industries such as cement, chemicals, steel, petroleum, airlines, and food processing), commonly through technical assistance, to audit and identify greenhouse gas emission sources, and to help in formulating appropriate reduction goals and strategies, including removal of regulatory and other barriers. This includes working with ongoing privately funded energy efficiency programs at private companies.

- "Carbon Removal" efforts at EPA were planned in coordination with the Departments of Agriculture and Energy. The EPA-USDA-DOE funds for this activity are for studying ways to increase environmental storage of carbon, as well as the kinds and sizes of incentives that could be given to land owners and crop growers to increase the quantity of carbon stored on agricultural and forest lands, and at the same time improve soil quality, reduce soil erosion, and enhance other environmental and conservation goals.

- EPA works with "State and Local Governments" to help find ways to reduce energy use and pollution, sometimes by supporting existing state and local programs. The Cities for Climate Protection program, for example, involves more than 54 local governments in implementing building, transportation, waste, and renewable energy projects to eliminate about 3 million metric tons of carbon dioxide. A state-level example is New Jersey's state carbon bank program, established to help achieve New Jersey's greenhouse gas emissions reduction goal for the state of 3.5% below 1990 levels by the end of 2005.

- EPA and other agencies are working together, via "International Capacity Building, Partnerships, and Cooperation" programs, to

> research and develop ways to provide technical and other assistance to developing countries to aid in reducing their emissions. Developing countries currently emit more than half the global total of greenhouse gases, and such emissions are growing rapidly.[8]

Department of Agriculture. The FY2006 request for USDA's science programs is up 21% to $88 million, relative to FY2005. The increase is principally for the Cooperative State Research, Education, and Extension Service, which has as one goal to create and disseminate knowledge about changes in regional and global climate, and how food, fiber, and forestry production can be affected, according to its website.[9] The FY2006 request of $40 million for USDA's technology programs is down 20% relative to FY2005. The decrease is principally in the budget for the Rural Utilities Service's activities in pursuing options for eligible organizations, such as non-profit electric cooperatives, to develop renewable energy projects, such as photovoltaic and wind systems, according to its website.[10] Climate-change-related research includes efforts to improve measurements of carbon inventories at the national level, and to develop methods to manage crops, soils, and grazing systems to optimize agricultural productivity, resource conservation, and greenhouse gas emissions and carbon sequestration. Technology efforts include developing agriculture-centered technologies to better manage the carbon cycle, from sources to sequestration.[11]

Department of Health and Human Services — National Institutes of Health. The FY2006 request for HHS-NIH's science programs is unchanged at $65 million, relative to FY2005. There are no climate change technology programs at HHS-NIH. Within the Department of Health and Human Services, the National Institutes of Health conducts research identified as related to climate change, including study of the health effects of ultraviolet radiation and of chemical replacements for chlorinated fluorocarbons.[12]

Department of Defense. There are no separate climate-change science programs at the Department. The FY2006 request of $60 million for DOD's climate-change-related technology programs is down 24% relative to FY2005. The decreases in DOD's Climate Change Technology Program number is due to reductions in Research, Development, Test and Evaluation (RDT&E) activities by the Army (FY2006 request is $8 million less than enacted for FY2005), by the Navy ($4 million less than FY2005), by the Air Force ($1 million less), and by the Defense Advanced Research Projects Agency ($3 million less). DOD technology efforts focus on fuel cells, batteries, direct energy conversion systems such as photovoltaics

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[8] Climate Change Science Program, *Our Changing Planet*, pp. 141-143.

[9] [http://www.csrees.usda.gov/about/background.html].

[10] [http://www.usda.gov/rus/electric/renewables].

[11] Climate Change Science Program, *Our Changing Planet*, pp. 123-124.

[12] Ibid., pp. 134-135.

and thermoelectrics, and nanomaterials, all of which can relate to climate change issues.[13]

Department of the Interior — United States Geological Survey. The FY2006 request for DOI-USGS's climate-change-related science programs is unchanged at $24 million, relative to FY2005. The FY2006 request of $2 million for DOI-USGS' climate-change-related technology programs is unchanged relative to FY2005. The USGS, within the Department of the Interior, has conducted global change research including historical research on climate variability and change, and global carbon cycling through lakes, streams, wetlands, soils, sediments, and vegetation. The USGS also manages and disseminates satellite land-surface and ecosystem data which may be used in climate change activities.[14]

Smithsonian Institution. The FY2006 request for SI's climate-change-related science programs is $6 million, unchanged each year back to FY2003. There are no specific climate-change technology programs at SI. Global climate change research at the Smithsonian Institution attempts to understand more fully atmospheric processes, ecosystem dynamics, natural and human-induced environmental change on daily to decadal time scales, and longer-term climate metrics. The Smithsonian also serves as a repository of climate change findings.

United States Agency for International Development. The FY2006 request for USAID's climate change science programs is $6 million, a level unchanged since FY2003. There are no specific USAID technology programs. USAID has worked with foreign governments with the goal of reducing net greenhouse gas emissions and lowering vulnerability to the threats posed by climate change impacts, by studying ways to increase use of environmentally sound energy, forestry, and biodiversity conservation methods. Foreign governments receiving assistance on these concerns have included Brazil, the Philippines, and Russia.

Department of Transportation. The FY2006 request for DOT's climate change science programs is unchanged at $3 million, relative to FY2005. The FY2006 request of $2 million for DOT's climate technology programs is up 100% relative to FY2005. The increase is principally to expand National Highway Traffic Safety Administration (NHTSA) efforts to promote safe walking, bicycle, and other means of transportation, which may relate to climate change, according to the NHTSA website.[15] The Department of Transportation conducts research and analysis relating to greenhouse gas models for the surface transportation sector, greenhouse gas control strategies, and transportation and global climate change.

Department of State. Joined by various European Union environmental policy makers, the Department of State issued a joint statement on February 7, 2003 identifying six areas for possible cooperative research: carbon cycle research;

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[13] Climate Change Science Program, *Our Changing Planet*, pp. 128-130; and *Federal Climate Change Expenditures Report to Congress, March 2005*, p. 10.

[14] Climate Change Science Program, *Our Changing Planet*, pp. 136-138.

[15] [http://www.nhtsa.dot.gov/people/injury/pedbimot/bike/Safe-Routes-2002/toc.html].

aerosol-climate interactions; feedbacks, water vapor and thermohaline circulation; integrated observation systems and data; carbon capture and storage; and hydrogen technology and infrastructure. A government-industry partnership involving the Departments of State and Energy, and representatives from several countries, was announced on February 27, 2003 to design, build, and operate a large-scale engineering laboratory that was labeled "the world's first pollution-free, coal-fired power plant. The facility will cost an estimated $1,000 million over the next 10 years."[16] These engineering research activities continue. DOS also will support development of the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report.[17] The FY2006 request for DOS' science programs is $1 million, unchanged each year back to FY2004. There are no climate-change technology programs specified at DOS.[18]

Department of Housing and Urban Development. There had been efforts in HUD to increase the use of technologies to make houses more energy efficient. These efforts were part of the CCTI from FY1999 through FY2001. The FY2006 budget again contains no specific climate-related funds or programs for HUD.[19]

Conclusions

Possible climate change linked to "greenhouse gas" emissions has been addressed by various U.S. government policies since the early-1980s, with an emphasis on energy R&D and on climate research and services.[20] U.S. efforts in the George H. W. Bush and Clinton Administrations toward R&D in energy efficiency and renewable energy, and research into climate and global change were mandated by the Energy Policy Act of 1992, which implemented the United States' voluntary commitments under the 1992 United Nations Framework Convention on Climate Change, and by the Global Change Research Act of 1990. President Clinton's 1993 Climate Change Action Plan linked or created partnerships among various federal agencies, business, state and local governments, and other entities with the goal of reducing U.S. greenhouse gas emissions.

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[16] [http://usinfo.state.gov/gi/Archive/2003/Jun/04-247145.html].

[17] The United Nations Environment Programme and the World Meteorological Organization established the IPCC in 1988. A main activity of IPCC is to provide in regular intervals an assessment of the state of knowledge on climate change. These assessments serve as a decision support resource for policymaking related to climate change. See [http://www.ipcc.ch/about/about.htm].

[18] Climate Change Science Program, *Our Changing Planet*, p. 138.

[19] Ibid., p. 122.

[20] Climate services are activities relating to the collection, management, and dissemination of climate data and information.

The current Bush Administration has implemented a Climate Change Science Program, guided by a *Climate Change Science Program Strategic Plan*,[21] and a Climate Change Technology Program. The *Climate Change Science Program Strategic Plan*, released in July 2003, describes five major research goals: improve knowledge of past and present climates, improve understanding of climate change forces, reduce uncertainty in climate change projections, understand sensitivity and adaptability of ecosystems to climate change, and explore uses and limits of knowledge to manage risks and opportunities. The Climate Change Technology Program released two reports in December 2003 that presented a portfolio of federal R&D investments in climate change technology development, and highlighted President Bush's initiatives in technology and international cooperation. The reports were titled, respectively, *Technology Options for the Near and Long Term*,[22] and *Research and Current Activities*.[23] As a complement to the *Climate Change Science Program Strategic Plan*, the FY2006 budget justification anticipated the release, sometime in 2005, of a strategic plan to guide R&D in the Climate Change Technology Program; a draft for public comment was released in September 2005.[24]

Funding levels requested for both climate change scientific research and technologies for FY2006 are greater than the levels for FY2003, but less than the peak values for research in FY2004, and for technologies in FY2005

[21] [http://www.climatescience.gov/Library/stratplan2003/final/default.htm].

[22] [http://www.climatetechnology.gov/library/2003/tech-options.pdf].

[23] [http://www.climatetechnology.gov/library/2003/currentactivities/car24nov03.pdf].

[24] [http://www.climatetechnology.gov/stratplan/draft/CCTP-SratPlan-Sept-2005.pdf].