

CRS Report for Congress

Climate Change: Federal Expenditures

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Climate Change: Federal Expenditures

Summary

Research has been the cornerstone of the U.S. strategy to address global climate change. Funding has grown from a few million per year in the 1970s, to \$2.4 billion in FY1993, and to \$5.1 billion in FY2004, as reported by the Office of Management and Budget. After adjusting for inflation, the Government Accountability Office (GAO) reports the increase from FY1993 to FY2004 as 55%, from \$3.3 billion to \$5.1 billion. Federal expenditures for science and technology research, voluntary deployment programs, international assistance, and tax incentives received budget authority of \$5.8 billion in FY2006 and a budget request of \$6.5 billion in FY2007.

Climate-related expenditures are spread across more than a dozen agencies, although the Department of Energy (DOE) spends more than 44% of the total. The National Aeronautics and Space Administration (NASA), with budget authority of about \$1.15 billion in FY2006, is almost 20% of total expenditures, including tax incentives. Tax incentives are another 19% of the total climate-related expenditures.

Implementation is directed by the Cabinet-level Committee on Climate Change Science and Technology Integration. The strategy places management responsibility and accountability for the various programs in individual agencies. Specific programs are reported as many different initiatives in four major areas:

- The Climate Change Science Program (CCSP), including the Global Change Research Program (USGCRP) and the Climate Change Research Initiative (CCRI).
- The Climate Change Technology Program (CCTP), including the National Climate Change Technology Initiative (NCCTI) and included in the Advanced Energy Initiative (AEI).
- International Assistance, including the Asia-Pacific Partnership (APP).
- Tax Provisions that May Reduce Greenhouse Gas Emissions.

Key policy issues associated with federal climate change expenditures include the following:

- choosing priorities across science and technology research and development, programs to encourage mitigation of greenhouse gases, and adaptation to potential future climate change;
- articulating sufficiently measurable goals and milestones against which to track progress;
- improving clarity of reported funding, including changes in reporting rules over time, and evaluating effectiveness;
- maintaining stability of funding or preferential tax treatments and the relationship to programs' effectiveness; and
- balancing priorities within agencies of expenditures for climate change versus other spending priorities in a tight fiscal environment.

Contents

Interagency Objectives and Coordination	5
The Climate Change Science Program	6
The Climate Change Technology Program	9
International Climate Change Assistance	12
Tax Provisions	12
Policy Issues	13
Related CRS Reports	14
Appendix 1. Climate Change Technology Development and Deployment for the 21 st Century in the CCTP	15

List of Figures

Figure 1. Budget Authority for U.S. Global Change Research FY1989 to FY2007 Request (millions of dollars)	7
Figure 2. Evaluation of R&D Opportunities for the CCTP	11

List of Tables

Table 1. Funding for Major U.S. Climate Change Programs	3
Table 2. Funding for U.S. Climate Change Programs, by Agency (FY2003 to FY2007 Proposed, millions of dollars)	4
Table 3. History of U.S. Expenditures for Climate Change Science	8

Climate Change: Federal Expenditures

Concerted investment in science and technological research has been the cornerstone of the federal climate change strategy since the 1960s, in the interest of reducing scientific uncertainties and lowering costs of technology solutions. In 1971, a panel of the National Academy of Sciences¹ recommended that the United States increase its research into understanding the dynamics of climate and climate change by \$25 million² for the 10-year period of 1970-1979. Since then, the U.S. investment in climate change has increased to nearly \$6 billion dollars in FY2006 alone.³ The scope of federal activities has expanded beyond science to include technological research, international assistance, and financial incentives to mitigate greenhouse gases.

The U.S. climate-related programs also support the commitments of the United States as a Party to the United Nations Framework Convention on Climate Change (UN FCCC), ratified by the U.S. Senate in 1992. The objective of the UN FCCC is “the stabilization of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropogenic⁴ interference with the climate system ... within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.”⁵ A voluntary aim to reduce greenhouse gases to 1990 levels by 2000 was agreed, along with other reporting and cooperative provisions, but with no meaningful consequences for failing to meet the commitments.⁶

The U.S. climate-related programs, and their associated expenditures, are typically reported as many different initiatives in four major areas:

- The Climate Change Science Program (CCSP), including the Global Change Research Program (USGCRP) and the Climate Change Research Initiative (CCRI).

¹ National Research Council, *The Atmospheric Sciences and Man's Needs: Priorities for the Future* (Washington: National Academies Press, 1971).

² In 1970 dollars.

³ The White House, *Fiscal Year 2007 Report to Congress on Federal Climate Change Expenditures* (Washington, 2006), at [http://www.whitehouse.gov/omb/legislative/fy07_climate_change.pdf]

⁴ Human-related.

⁵ *United Nations Framework Convention on Climate Change* (Rio de Janeiro, 1992), [http://unfccc.int/essential_background/convention/background/items/2853.php]

⁶ For further information, see CRS Report RL33817 *Climate Change: the Kyoto Protocol and International Action*, by Susan R. Fletcher and Larry Parker.

- The Climate Change Technology Program (CCTP), including the National Climate Change Technology Initiative (NCCTI), and included within the Advanced Energy Initiative (AEI).
- International Assistance, including the Asia-Pacific Partnership (APP).
- Tax Provisions that May Reduce Greenhouse Gas Emissions.

Table 1 shows expenditures for each of these four areas from FY2003 budget to FY2007. The figure for tax provisions is the estimated loss of revenues for that year. Below the reporting level of these four major programs, expenditures occur in a variety of different initiatives that have been renamed or reconfigured over the past two decades, making them difficult to compare.⁷ In addition, there are federal programs and fiscal incentives that are not established primarily for the purpose of addressing climate change but that support the Administration's climate change goals; although some of these are reported in the climate change expenditures, such as energy efficiency and nuclear energy programs, others are not, such as programs to control tropospheric ozone or to conserve carbon in soils. In reports on these climate programs, the Government Accountability Office (GAO) investigated the Administration's reporting practices and recommended greater clarity and consistency of reporting federal expenditures on climate change. The subsequent report in 2006 from the Administration complied with most of those GAO recommendations, though consistent accounting remains unavailable for years before 2006.

The President's budget request for climate change in FY2007 is \$6.5 billion, after almost doubling from about \$3.3 billion in FY1993 (in constant 2005 dollars), as reported by the Office of Management and Budget and the GAO. The proposal for FY2007 is a 12% increase over the FY2006 enacted budget authority. The proposal would increase tax expenditures, as well as research on advanced energy technologies in the Department of Energy. **Table 2** provides climate expenditures for recent years by agency.

⁷ Government Accountability Office, *Climate Change: Greater Clarity and Consistency are Needed in Reporting Federal Climate Change Funding* (Washington, 2006), [<http://www.gao.gov/new.d061122t.pdf>].

Table 1. Funding for Major U.S. Climate Change Programs
(millions of dollars)

Major Climate Change Programs	Number of Agencies	Expenditures				
		FY2003	FY2004	FY2005	FY2006 (appropriated)	FY2007 ^a (requested)
Climate Change Science Program	11	1,766	1,996	1,864	1,709	1,715
Climate Change Technology Program	9	2,555	2,878	2,808	2,773	2,980
International Climate Change Assistance	3	270	260	234	241	220
Energy Tax Provisions That May Reduce Greenhouse Gas Emissions	n.a.	580	500	369	1,084	1,607
Total^b	13	5,171	5,634	5,269	5,794	6,508

Sources: The White House, *Federal Climate Change Expenditures Report to Congress FY2007* (April 2006); The White House, *Federal Climate Change Expenditures Report to Congress FY2005*.

- a. For FY2007, the federal government is operating under a continuing resolution (P.L. 109-383) through February 15, 2007.
- b. This total excludes a double-count of activities included in both the Climate Change Science Program and International Assistance.

**Table 2. Funding for U.S. Climate Change Programs, by Agency
(FY2003 to FY2007 Proposed, millions of dollars)**

Agency	FY2003 Actuals	FY2004 Actuals	FY2005 Actuals	FY2006 Actuals	FY2007 Proposed
TOTAL - Discretionary Funding Plus Tax Provisions	5,164	5,590	5,269	5,794	6,508
Department of Agriculture	104	116	110	109	95
Department of Commerce	156	144	146	168	182
Department of Defense	83	51	59	71	15
Department of Energy	2,214	2,519	2,469	2,537	2,838
Department of Health & Human Services	61	62	57	57	57
Department of the Interior	28	29	29	27	26
Department of the Treasury	56	52	44	38	32
Environmental Protection Agency	124	127	130	128	123
National Aeronautics & Space Administration	1,298	1,548	1,449	1,150	1,114
National Science Foundation	213	226	209	215	224
Smithsonian Institution	6	6	6	6	6
U.S. Agency for International Development	214	195	183	192	147
TOTAL - All Agencies, Discretionary Funding	4,584	5,090	4,900	4,710	4,901
Energy Tax Provisions That May Reduce Greenhouse Gases	580	500	369	1,084	1,607

Source: The White House, *Fiscal Year 2007 Report to Congress on Federal Climate Change Expenditures* (Washington, 2006).

Interagency Objectives and Coordination

In 2002, President George W. Bush announced a policy based on cutting the U.S. greenhouse gas intensity — the quantity of greenhouse gases emitted per unit of economic activity — by 18% through 2012. He included in the U.S. policy framework other goals more generally for global climate change aimed at

- reducing scientific uncertainties;
- advancing development and introduction of energy efficient, renewable, and other low- or non-emitting technologies; and
- improving standards for measuring and registering emissions reductions.

Although more specific targets are set for some climate-related programs, such as greenhouse gas reductions for several of the smaller voluntary partnerships, quantitative greenhouse gas, science, or technology targets have not been articulated for most of the climate-related expenditures.

The President's strategy established a new Cabinet-level Committee on Climate Change Science and Technology Integration to oversee the implementation of all programs across agencies. This committee meets approximately quarterly, but the principal program design and management occurs within each agency. The strategy, thus, puts accountability and leadership for the science and technology programs in each of the relevant agencies. Communication and coordination are facilitated through a series of inter-agency working groups that meet with varying frequencies.

Under the new Climate Change Science Program, the President established a Climate Change Research Initiative (CCRI) to focus on near-term science questions. It supplements the previously established U.S. Global Change Research Program (US GCRP), which emphasizes long-term science issues.

Similarly, the strategy established a Climate Change Technology Program (CCTP) to include a National Climate Change Technology Initiative (NCCTI) focused on near-term technological advance, in addition to existing clean energy research. In January 2006, President Bush announced the Advanced Energy Initiative (AEI), proposing a 22% increase in funding for clean energy research in DOE. Except for the State Department's participation in the Asia-Pacific Partnership, all the CCTP activities are included in the AEI. As stated earlier, the different initiatives have been redefined over time, and programs are often counted in more than one initiative. This makes tracking the content and evolution of specific programs or of expenditures difficult.

The remainder of this report briefly describes each of the four major program areas: science, technology, international assistance, and tax provisions. It then briefly identifies several policy issues related to federal expenditures on climate change.

The Climate Change Science Program

Significant advances have been made over the past two decades to collect observations of relevant Earth processes; to develop a variety of models to analyze and forecast economic, energy, atmospheric, ocean and land systems; and to understand the potential impacts of climate change on humans and ecosystems.

Congress established the Global Change Research Program (USGCRP) in the Global Change Research Act of 1990 (P.L.101-606), aimed at understanding and responding to global change. The Global Change Research Act requires a scientific assessment report to Congress at least every four years, as well as annual reports on activities and budget. As discussed below, the first and only national assessment complying with the Global Change Research Act was published in December 2000.

Under the current program framework, the Climate Change Science Program (CCSP) contains the Global Change Research Program (USGCRP), emphasizing long-term science research, and the Climate Change Research Initiative (CCRI), emphasizing science and support to decision-making over a five-year period (2003-2008). The overall strategy, the *Climate Change Science Program Strategic Plan*, was published in 2003 and is supported by ongoing reviews by the National Academy of Science. The CCSP Strategic Plan groups research into seven elements:

- atmospheric composition,
- climate variability and change,
- global water cycle,
- land use/land cover change,
- global carbon cycle,
- ecosystems, and
- human contributions and responses.

The CCSP Strategic Plan further lays out five goals, which do not correspond closely with the seven research elements. It plans to produce 21 “synthesis and assessment” (SAR) products, originally intended to be completed in 2007.⁸ The Administration intends these SAR products together to meet the four-year reporting requirement of the Global Change Research Act of 1990.

A National Academy of Science panel, convened at the request of the former director of the CCSP to consider how to measure progress for the program, noted that the CCSP Strategic Plan “does not contain measures of success, and program objectives are written too broadly for them to be inferred.”⁹ The panel concluded that metrics could be developed and used for the CCSP, but highlighted the considerable challenge and cost in identifying, producing, and using a set of metrics to measure progress for all elements of the CCSP. It also noted that “while some metrics can

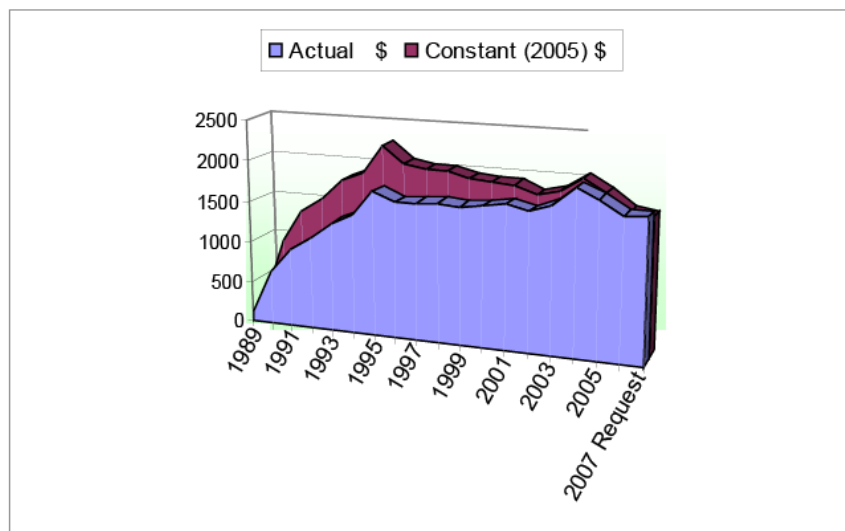
⁸ Additional information on the SARs, including their content and status, can be found at [<http://www.climatescience.gov/Library/sap/>].

⁹ National Research Council, *Thinking Strategically: The Appropriate Use of Metrics for the Climate Change Science Program*, 2005.

measure short-term impacts (e.g., CCSP payoffs scheduled to occur within two to four years), it may take decades to fully assess the substantial contributions to the global debate on climate change being made by the CCSP and its predecessor USGCRP.”¹⁰

For the research of the Climate Change Science Program¹¹ in FY2007, the President requested \$1.715 billion for 13 federal agencies through nine different appropriations bills. The FY2007 request is \$4 million (+0.4%) above the FY2006 funding estimate of \$1.706 billion. In constant dollars, the requested FY2007 funding for climate science research is 0.2% below the FY2006 funding estimate, 19% below FY2004 funding, and more than one-quarter less than the peak year of funding, FY1995. The history of U.S. funding for global change research is presented in **Figure 1** and **Table 3**. About half of the FY2005 science expenditures were for space-based observations in NASA’s budget.

Figure 1. Budget Authority for U.S. Global Change Research FY1989 to FY2007 Request (millions of dollars)



Source: Climate Change Science Program, at [<http://www.climatescience.gov/infosheets/highlight2/default.htm#funding>]; accessed Jan. 18, 2007.

¹⁰ Ibid. Executive Summary, p. 9.

¹¹ The new Climate Change Research Initiative (CRI) and existing USGCRP were combined for the first time into the Climate Change Science Program (CCSP) in the FY2004 budget.

The tightening fiscal environment of federal discretionary budgets is resulting in shifting of funds within several agencies from climate change to other priorities. For example, NASA's budget has declined by about 30% since FY2000.¹² The expenditures for FY2003 to the FY2007 budget request are shown in **Table 2**. NASA funds were higher in the period of FY2003-FY2005, associated with the Climate Change Science Strategic Plan, and were aimed at research on the natural carbon cycle, climate modeling, and the link between atmospheric chemistry and climate to help reduce uncertainties in the science highlighted by a National Academy of Sciences report¹³ requested by the President in 2001. More specifically, CCSP funding from FY2003 to FY2005 included several NASA elements in the Climate Change Research Initiative, including Interdisciplinary Science Teams, High-End Computing, Applications, and initial development of a new Aerosol Polarimetry Sensor (APS).

However, due to cost overruns in major missions of NASA, funds have shifted since FY2005 from programs that support climate change to other priorities, such as the Mission to Mars, resulting in a decline that is proposed to continue into FY2007 and beyond. In the President's request for FY2007, the 50% share of CCSP funding intended for NASA's satellite-based climate science fell to 47%, a proposed absolute decrease from \$914 million in FY2005 to \$881 million proposed for FY2007. The NAS panel expressed concern about potential gaps in time series of data and loss of synergies that may result by delays in climate data-gathering missions. NASA's FY2007 budget proposal would also reduce funds for Earth science research and analysis by more than 15% (including a retroactive cut to FY2006), imposing "the most severe impacts on the long-term strategy and capacity-building efforts in Earth science."¹⁴ The NAS panel further noted that cutting research and analysis of observations from missions already launched reduces the "return on investment" from the high front-end expenditures to acquire those satellite-based data.

Table 3. History of U.S. Expenditures for Climate Change Science

Fiscal Year	Actual \$	Constant (2005) \$
1989	134	209
1990	659	975
1991	954	1,355
1992	1,110	1,531
1993	1,326	1,775

¹² National Research Council, *An Assessment of Balance in NASA's Science Programs* (Washington: National Academies Press, 2006).

¹³ National Research Council, *Climate Change Science: An Analysis of Some Key Questions* (Washington: National Academies Press, 2001).

¹⁴ National Research Council, *An Assessment of Balance in NASA's Science Programs* (Washington: National Academies Press, 2006), p. 23.

Fiscal Year	Actual \$	Constant (2005) \$
1994	1,444	1,885
1995	1,760	2,234
1996	1,654	2,039
1997	1,656	1,995
1998	1,677	1,989
1999	1,657	1,925
2000	1,687	1,896
2001	1,728	1,886
2002	1,667	1,792
2003	1,766	1,857
2004	1,977	2,023
2005	1,865	1,865
2006 Estimate	1,709	1,674
2007 Request	1,715	1,643

Source: CCSP Annual Report to Congress, [<http://www.climate-science.gov/infosheets/highlight2/default.htm#funding>], accessed Jan. 18, 2007.

The first and only national assessment of climate change science and impacts, required by the Global Change Research Act of 1990, was published in December 2000. The Act mandates a subsequent report no later than 2004. The Government Accountability Office found in February 2005 that the Administration had failed to comply with the congressional requirement. The CCSP is due to produce 21 Synthesis and Assessment Reports on specific topics; the first was published in April 2006,¹⁵ whereas the remaining reports are due to be released through 2008. The Bush Administration argues that these will, in aggregate, comply with the requirement of the Global Change Research Act of 1990. Others disagree that this series of reports will suffice to meet the statutory requirement.

The Climate Change Technology Program

The U.S. Climate Change Technology Program (CCTP) is the technology component of the climate change strategy announced by President Bush in 2002, though many programs existed prior to establishment of the CCTP. Currently, the CCTP is composed of programs in 12 agencies. It addresses climate change and the potential for technological solutions over the next century. Its objective is to

¹⁵ Karl, Thomas R., Susan J. Hassol, Christopher D. Miller, and William L. Murray, eds., *Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences*, a Report by the Climate Change Science Program and the Subcommittee on Global Change Research (Washington, 2006).

accelerate the advances needed to facilitate the reduction and avoidance, as well as capture and storage, of man-made emissions of greenhouse gases (GHG). While the Strategic Plan sets many milestones for demonstrations of specific technologies, there are no specific targets or measures for greenhouse gas emissions or capture performance in the CCTP Strategic Plan,¹⁶ which was released in September 2006.

The six strategic goals outlined for the CCTP are to advance development of technologies that

- reduce emissions from energy end-use and infrastructure,
- reduce emissions from energy supply,
- capture and sequester carbon dioxide,
- reduce emissions of non-CO₂ greenhouse gases,
- improve capabilities to measure and monitor GHG emissions, and
- bolster basic scientific contributions to technology development.

Funding for the CCTP increased from \$845 million to \$2.87 billion (by 239%) from FY1993 to FY2004, according to GAO, or from \$1.18 billion (in 2005 dollars) to \$2.87 billion (by 183%) when the dollars are adjusted for inflation. In FY2006, DOE represented 87% (\$2.4 billion) of the enacted budget authority for the CCTP, with EPA and NASA each receiving about 4% of the total.

More than 60 programs in DOE, EPA, and USDA expend funds to support voluntary deployment of existing technologies; the programs include Energy Star, Climate Leaders, the Methane Partnership Initiatives, Value Added Producer Grants, and many others. From FY2003 to FY2004, the total funding for the CCTP rose, largely due to inclusion of a greater share of funding for DOE's Clean Coal Power Initiative than in prior years. While the clean coal program previously had focused on reduction of criteria and other pollutants, its focus was reported by the Office of Management and Budget to have shifted to improving efficiency, which would reduce greenhouse gas emissions per unit of electricity produced. On the other hand, the reported increase in the CCTP funding from FY2005 to the FY2007 request reflects less of the previously reported infrastructure funding in DOE's nuclear energy program. **Appendix 1** provides a table showing the technologies envisioned under the CCTP over the near-, medium-, and long-term.

CCTP's *Vision and Framework for Strategy and Planning*¹⁷ calls for the need to "periodically assess the adequacy of the multi-agency portfolio with respect to its ability to achieve, or make technical progress toward, CCTP strategic goal attainment; identify gaps, opportunities, and make recommendations." The CCTP contracted for a review of the R&D portfolio within the program, with a report issued in July 2006. The review panel concluded that, while the CCTP portfolio is strong

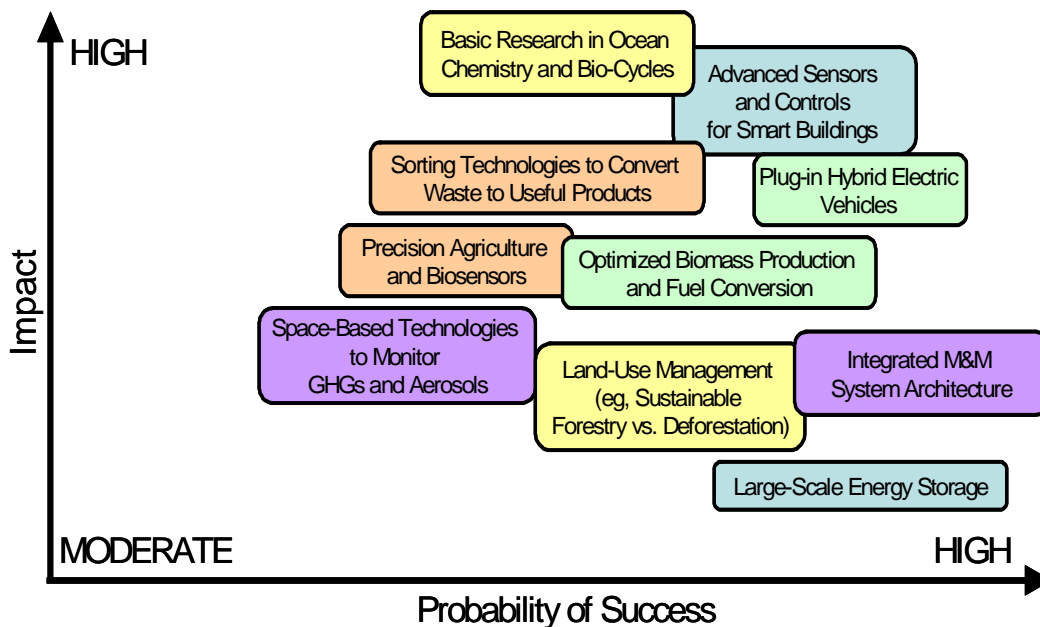
¹⁶ U.S. Climate Change Technology Program, *U.S. Climate Change Technology Program Strategic Plan* (Washington, 2006), [<http://www.climatetechnology.gov/stratplan/final/index.htm>]

¹⁷ U.S. Climate Change Technology Program, *U.S. Climate Change Technology Program: Vision and Framework for Strategy and Planning* (Washington, 2005), [<http://www.climatetechnology.gov/vision2005/index.htm>].

in near-term technology options, there is also a need to accelerate R&D on more mid- and long-term technology solutions to climate change over the next century. The review noted a number of gaps in the portfolio, particularly for the CCTP goals concerning non-CO₂ greenhouse gases and for measuring and monitoring greenhouse gases; the gaps are associated with a low level of funding for these areas. Other gaps were identified for exploratory research addressing novel and advanced concepts aimed at *breakthrough technologies* and research in the basic sciences and potentially enabling disciplines of materials, biology, physical sciences, computational sciences, and nanotechnology.

The review designed a conceptual framework to assist setting priorities for future CCTP R&D portfolios, as illustrated in **Figure 2**. It defines “Impact” as progress toward a particular CCTP strategic goal; “Probability of Success” is defined as the level of certainty that the technology would be successfully developed and achieve the specified impact. The concept appears, in this particular formulation, not to include the relative costs of the R&D to achieve the impact. The figure is illustrative and not intended by the review panel as a statement of prioritization among actual opportunities; it provides a conceptual example of how priorities among the large array of R&D opportunities might be evaluated for future expenditures.

Figure 2. Evaluation of R&D Opportunities for the CCTP



Source: Brown, Marilyn, Matt Antes, Charlotte Franchuk, Burton H. Koske, Gordon Michaels, Joan Pellegrino, et al., *Results of a Technical Review of the U.S. Climate Change Technology Program’s R&D Portfolio*, 2006, [http://www.ornl.gov/sci/eere/PDFs/CCTP_Wkshp_Rpt_6-28Final.pdf].

International Climate Change Assistance

The United States works with other nations and private enterprises to address climate change. In the FY2007 proposed budget, \$5 million for the Department of State (DOS) supports the United Nations Framework Convention on Climate Change (UN FCCC) and the Intergovernmental Panel on Climate Change (IPCC).

The United States Agency for International Development (US AID) was proposed to receive \$147 million for international climate change assistance, down almost one-quarter from the FY2006 budget authority of \$192 million. Almost \$24 million of that cut is requested by a reduction of expenditures for Afghanistan.

Beginning with the FY2007 budget request, the international assistance category includes \$52 million to support the Asia-Pacific Partnership on Clean Development and Climate (APP). Funds for the APP are included at \$30 million for the Department of State, \$15 million for the Department of Energy, \$5 million for the Department of Commerce, and \$2 million for the Environmental Protection Agency. Additional funds may be made available to the APP via the U.S. contribution to the Asian Development Bank, counted in Treasury's proposed budget. The initial set of projects under the APP's workplan emphasize sectoral assessments, capacity building, identifying best practices, and technology research and demonstration.¹⁸

The International Climate Change Assistance category proposal for FY2007 included \$56 million to support demonstration of innovative climate-related projects under the Global Environment Facility (GEF)¹⁹ or the Asian Development Bank, pending negotiation of reforms.

The United States also encourages countries to conserve tropical rain forests, thereby avoiding greenhouse gas emissions and protecting the removal by trees of carbon dioxide from the atmosphere. It does this by a *swap* of a country's debt for payment into conservation funds, authorized by the Tropical Forest Conservation Act (TFIP), anticipating a need for \$8 million in FY2007.²⁰

Tax Provisions

Tax provisions, often not for the explicit purpose of addressing climate change, may reduce greenhouse gas emissions by establishing incentives for incremental investments in technologies (e.g., wind energy) that emit less than the technologies they are thought to replace (e.g., fossil fuel combustion). In the federal

¹⁸ For more information, see CRS Report RL33817, *Climate Change: the Kyoto Protocol and International Action*, by Susan R. Fletcher and Larry Parker, for a brief summary of the APP.

¹⁹ For background on the GEF, see CRS Report RS21858, *Global Environment Facility (GEF): Overview*, by Susan R. Fletcher.

²⁰ For more information, see CRS Report RL31286, *Debt-for-Nature Initiatives and the Tropical Forest Conservation Act: Status and Implementation*, by Pervaze A. Sheikh.

expenditures report, the White House reports *tax expenditures*, which are the estimated loss of federal revenues that result from taxpayers taking advantage of these preferential tax treatments.

Tax expenditures are reported for 11 types of tax credits, deductions, and exclusions for a wide variety of energy efficiency and renewable energy investments. The estimated value of tax expenditures jumped from \$369 million in FY2005 to \$1,084 million in FY2006, as a result of the provisions of the Energy Policy Act of 2005 (P.L. 109-58), including its Title XIII, the Energy Tax Incentives Act of 2005. For FY2006, the largest of the tax expenditures — at about 40% of the total — is the set of *new technology credits* for solar, geothermal, wind, biomass, poultry waste, municipal solid waste energy, or certain hydropower installations. Another 20% of the estimated tax expenditures in FY2006 are for energy efficiency improvements to existing homes. Both of these provisions are projected to grow substantially for FY2007.

One policy issue related to the tax provisions is their continuity over periods of time that are consistent with planning and construction of large capital projects, such as commercial wind and other renewable energy installations. Because these take a number of years to execute, tax provisions may not be available for a sufficiently long period for investors to take advantage of them for entirely new facilities (as opposed to facilities that may already have been planned). On the other hand, the incentives are intended to stimulate deployment of new technologies rather than to support a market that may not become commercially viable.

Policy Issues

Members of Congress and others have expressed interest in the priorities and evaluation of federal climate change expenditures. Key issues include the following:

- Choosing priorities across different climate change opportunities, including science and technology research and development, programs to encourage mitigation of greenhouse gases, and adaptation to potential future climate change.
- Articulating measurable goals and milestones for climate change programs, and monitoring of achievements towards those goals.
- Improving clarity of reported funding, particularly regarding the comparability across years in definitions of various programs.
- Assuring coordination and accountability within the federal government of the dozens of identified climate change programs, and many others that are related to — or potentially conflicting with — goals that address climate change.
- Maintaining stability of funding or preferential tax treatments over a period that is consistent with planning and executing the targeted

projects. This is a concern with a number of federal research programs, such as recent shifts within NASA, as well as for investment tax incentives.

- Priority within several agencies of expenditures for climate change versus other priorities in a fiscally tightening environment, including the shifting of funds within NASA from observation satellites and research and analysis to larger space missions within the agency.

Related CRS Reports

CRS Report RL33588, *Renewable Energy: Tax Credit, Budget and Electricity Production Issues*, by Fred Sissine.

CRS Report RL33599, *Energy Efficiency: Budget, Oil Conservation, and Electricity Conservation Issues*, by Fred Sissine.

Appendix 1. Climate Change Technology Development and Deployment for the 21st Century in the CCTP

	Short Term 10-20 years	Midterm 20-40 years	Long Term 40-60 years
Goal 1: Energy End-Use and Infrastructure	<p>Hybrid and plug-in hybrid electric vehicles</p> <p>Engineered urban designs</p> <p>High-performance integrated homes</p> <p>High efficiency appliances</p> <p>High efficiency boilers and combustion systems</p>	<p>Fuel cell vehicles and hydrogen fuels</p> <p>Low emission aircraft</p> <p>Solid-state lighting</p> <p>Ultra-efficient HVACR</p> <p>“Smart” buildings</p> <p>Transformational technologies for energy-intensive industries</p> <p>Energy storage for load leveling</p>	<p>Widespread use of engineered urban designs and regional planning</p> <p>Energy managed communities</p> <p>Integration of industrial heat, power, process and techniques</p> <p>Superconducting transmission and equipment</p>
Goal 2: Energy Supply	<p>IGCC Commercialization</p> <p>Stationary hydrogen fuel cells</p> <p>Cost-competitive solar photovoltaics</p> <p>Demonstrations of cellulosic ethanol</p> <p>Distributed electric generation</p> <p>Advanced fission reactor and fuel cycle technology</p>	<p>FutureGen scale-up</p> <p>Hydrogen co-production from coal/biomass</p> <p>Low wind speed turbines</p> <p>Advanced biorefineries</p> <p>Community-scale solar</p> <p>Gen IV nuclear plants</p> <p>Fusion pilot plant demonstration</p>	<p>Zero-emission fossil energy</p> <p>Hydrogen and electric economy</p> <p>Widespread renewable energy</p> <p>Bio-inspired energy and fuels</p> <p>Widespread nuclear power</p> <p>Fusion power plants</p>

	Short Term 10-20 years	Midterm 20-40 years	Long Term 40-60 years
Goal 3: Capture, Storage, and Sequestration	CSLF and CRSP	Geologic storage proven safe	Track record of successful CO ₂ storage experience
	Pos combustion capture	CO ₂ transport infrastructure	Large-scale sequestration
	Oxy-fuel combustion	Soils uptake and land use	Carbon and CO ₂ based products and materials
	Enhanced hydrocarbon recovery	Ocean CO ₂ biological impacts addressed	Safe long-term ocean storage
Goal 4: Other Gases	Methane to Markets	Advanced landfill gas utilization	Integrated waste management system with automated sorting, processing and recycling
	Precision agriculture	Soil microbial processes	Zero-emission agriculture
	Advanced refrigeration technologies	Substitutes for SF ₆	Solid-state refrigeration/AC systems
Goal 5: Measure and Monitor	Low-cost sensors and communications	Large-scale, secure data storage system	Fully operational integrated MM systems architecture (sensors, indicators, data visualization and storage, models).
		Direct measurement to replace proxies and estimators	

Source: U.S. Climate Change Technology Program, *U.S. Climate Change Technology Program: Vision and Framework for Strategy and Planning* (Washington, 2005), [<http://www.climatechange.gov/vision2005/index.htm>].