

Appendix A

Federal Research, Development, Demonstration and Deployment Investment Portfolio for Fiscal Years 2004 and 2005, with Budget Request Information for Fiscal Year 2006, U.S. Climate Change Technology Program

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In order for the U.S. Climate Change Technology Program (CCTP) to carry out its mission, it is necessary to assess on a periodic and continuing basis the adequacy of Federal investments in the CCTP-relevant research portfolio and make recommendations. A first step in this regard is to compile an inventory, or baseline, of all the Federal research, development, demonstration and deployment (R&D) activities among the participating agencies relevant to the vision, mission and goals of the CCTP. This baseline, and subsequent years of data, can be used to identify and track trends and other changes in the portfolio.

The CCTP, OMB and other agencies agreed upon a set of classification criteria to identify R&D activities that would be included as part of the CCTP. These criteria are provided on page A-2.

The baseline information for the Federal R&D budget shown here are for Appropriations for Fiscal Years 2004 and 2005, and for the Administration's Budget Request for 2006. For each year, respectively, the participating Federal agencies submitted budget data for R&D activities that met the CCTP/OMB criteria. Table A-1 is a summary table for all participating agencies.

This baseline activity and resulting portfolio contributes to the requirement for the Office of Management and Budget (OMB) to report annually on Federal climate change expenditures. The multi-agency R&D baseline for CCTP constitutes the technology component of OMB's Federal Climate Change Expenditures Report to Congress.¹

¹ *Federal Climate Change Expenditures Report to Congress*, March 2005. This report is an account of Federal spending for climate change programs and activities, both domestic and international. The report is provided annually, as required by Section 559(b) of Public Law 107-115, Foreign Operations, Export Financing, and Related Programs Appropriations Act, 2002.

A.1 Climate Change Technology Program Classification Criteria

Research, development, and deployment activities² classified as part of the Climate Change Technology Program (CCTP) must be activities funded via discretionary accounts that are relevant to providing opportunities for:

- Current and future reductions in or avoidances of emissions of greenhouse gases,³
- Greenhouse gas capture and/or long-term storage, including biological uptake and storage;
- Conversion of greenhouse gases to beneficial use in ways that avoid emissions to the atmosphere;
- Monitoring and/or measurement of GHG emissions, inventories and fluxes in a variety of settings;
- Technologies that improve or displace other GHG emitting technologies, such that the result would be reduced GHG emissions compared to technologies they displace;
- Technologies that could enable or facilitate the development, deployment and use of other GHG-emissions reduction technologies;
- Technologies that alter, substitute for, or otherwise replace processes, materials, and/or feedstocks, resulting in lower net emission of GHGs;
- Technologies that mitigate the effects of climate change, enhance adaptation or resilience to climate change impacts, or potentially counterbalance the likelihood of human-induced climate change;
- Basic research activities undertaken explicitly to address a technical barrier to progress of one of the above climate change technologies, and
- Greenhouse gas emission reductions resulting from clear improvements in management practices or purchasing decisions.

² In this context, “research, development, demonstration, and deployment activities” is defined as: applied research; technology development and demonstration, including prototypes, scale-ups, and full-scale plants; technical activities in support of research objectives, including instrumentation, observation and monitoring equipment and systems; research and other activities undertaken in support of technology deployment, including research on codes and standards, safety, regulation, and on understanding factors affecting commercialization and deployment; supporting basic research addressing technical barriers to progress; activities associated with program direction; and related activities such as voluntary partnerships, technical assistance/capacity building, and technology demonstration programs that directly reduce greenhouse gas emissions in the near and long term.

³ Greenhouse gases (GHGs) are gases in the Earth’s atmosphere that vary in concentration and may contribute to long-term climate change. The most important GHG that arises from human activities is carbon dioxide (CO₂), resulting mainly from the oxidation of carbon-containing fuels, materials or feedstocks; cement manufacture; or other chemical or industrial processes. Other GHGs include methane from landfills, mining, agricultural production, and natural gas systems; nitrous oxide (N₂O) from industrial and agricultural activities; fluorine-containing halogenated substances (e.g., HFCs, PFCs); sulfur hexafluoride (SF₆); and other GHGs from industrial sources. Gases falling under the purview of the Montreal Protocol are excluded from this definition of GHGs.

A.2 Climate Change Technology Program Example Activities

Specific examples of climate change technology activities include, but are not limited to:

- Electricity production technologies and associated fuel cycles with significantly reduced, little, or no net GHG emissions;
- High-quality fuels or other high-energy density and transportable carriers of energy with significantly reduced, little, or no net GHG emissions;
- Feedstocks, resources or material inputs to economic activities, which may be produced through processes or complete resource cycles with significantly reduced, little or no net GHG emissions;
- Improved processes and infrastructure for using GHG-free fuels, power, materials and feedstocks;
- CO₂ capture, permanent storage (sometimes referred to as sequestration), and biological uptake;
- Technologies that reduce, control or eliminate emissions of non-CO₂ GHGs;
- Advances in sciences of remote sensing and other monitoring, measurement and verification technologies, including data systems and inference methods;
- Technologies that substantially reduce GHG-intensity, and therefore limit GHG emissions;
- Voluntary government/industry programs designed to directly reduce greenhouse gas emissions;
- Programs that result in energy efficiency improvements through grants or direct technical assistance.

Note: Programs and activities presented for consideration can include Congressionally mandated “earmarks,” but earmarked activities must be relevant to one or more of the CCTP criteria, and descriptions and funding levels must be clearly called out as such in the information provided. Programs and activities funded by mandatory authorizations should not be included.

A.3 CCTP Participating Agencies, Budgets and Requests

In the following budget table, data are provided on CCTP-related activities, per the criteria above, for Fiscal Years 2004 and 2005, and for the President’s Budget Request for Fiscal Year 2006, across all CCTP participating agencies. In each FY, budget data includes activities for CCTP-related research, development and demonstration (R&D).

Table A-1
CCTP Participating Agency – FY 2004 to FY 2006 Budgets and Requests
Categorization of RDD&D Funding To Climate Change Technology
(Funding, \$ Millions) (3)

<u>Department and Account(s)</u>	FY 2004 Actual	FY 2005 Enacted	FY 2006 Proposed (Preliminary)
Department of Agriculture			
Natural Resources Conservation Service – Biomass R&D (Section 9008 Farm Bill)	13.9	14.4	12.4
Natural Resources Conservation Service – Carbon Cycle	0.5	0.5	0.5
Forest Service R&D--inventories of carbon biomass	0.0	0.5	0.5
Agricultural Research Service--Bioenergy Research	2.4	2.4	2.4
Cooperative State Research, Education and Extension Service--Biofuels/Biomass research; formula funds, National Research Initiative	5.4	5.4	6.9
Forest Service--Biofuels/Biomass, Forest and Rangeland Research	0.4	2.4	2.5
Rural Business Service – Renewable Energy Program	22.8	22.8	10.0
Subtotal – USDA	45.4	48.4	35.2
Department of Commerce - NIST			
National Institute of Standards and Technology (NIST) Scientific and Technological Research and Services	9.8	9.5	7.4
Industrial Technical Services - Advanced Technology Program	18.1	20.2	0.0
Subtotal – DOC - NIST	27.9	29.7	7.4
Department of Defense			
Research, Development, Test and Evaluation, Army	15.3	50.5	43.0
Research, Development, Test and Evaluation, Navy	16.5	11.0	7.1
Research, Development, Test and Evaluation, Air Force	0.8	0.8	0.0
Research, Development, Test and Evaluation, Defense-wide	16.8	12.7	9.5
Research, Development, OSD	2.0	0.0	0.0
Subtotal – DOD	51.5	75.0	59.6
Department of Energy			
Energy Conservation	868.0	868.2	846.8
Energy Supply/Electricity Transmission & Distribution	73.0	103.0	84.0
Energy Supply/Nuclear	308.7	394.4	416.1
Energy Supply/Renewables	352.3	380.3	353.6
Fossil Energy R&D (Efficiency and Sequestration)	455.0	388.2	405.3
Science (Fusion, Sequestration, and Hydrogen)	332.7	370.6	398.7
Climate Change Technology Program Direction	0.0	0.0	1.0
Subtotal – DOE	2389.6	2504.7	2505.5

<u>Department and Account(s)</u>	FY 2004 Actual	FY 2005 Enacted	FY 2006 Proposed (Preliminary)
Department of the Interior			
US Geological Survey - Surveys, Investigations and Research - Geology Discipline, Energy Program	0.5	2.0	2.0
Subtotal – DOI	0.5	2.0	2.0
Department of Transportation			
Office of the Secretary for Technology - Transportation, Policy, R&D	4.0	0.8	0.0
National Highway Traffic Safety Admin	0.0	0.0	1.4
Research and Innovative Technology Admin	0.5	0.5	1.0
Subtotal – DOT	4.5	1.3	2.4
Environmental Protection Agency (1)			
Environmental Programs and Management	89.8	91.5	95.7
Science and Technology	20.5	17.5	17.7
Subtotal – EPA	110.3	109.0	113.4
National Aeronautics and Space Administration (2)			
Exploration, Science & Aeronautics	226.6	207.8	127.6
Subtotal – NASA	226.6	207.8	127.6
National Science Foundation			
Research and Related Activities	11.2	10.6	11.3
Subtotal – NSF	11.2	10.6	11.3
CCTP Total (3)	2867.5	2988.5	2864.5
USAID Activities Associated with CCTP (4)			
Development and Assistance	173.0	173.0	147.0
Subtotal – USAID	173.0	173.0	147.0
Total CCTP and Associated USAID Activities	3040.5	3161.5	3011.5

Notes:

- (1) For EPA, FY 2005 Enacted numbers are for those of the President's FY05 request, not enacted, and that once EPA operating plans are complete, the FY05 numbers will change.
- (2) For FY 2006, NASA went through a realignment within its Aeronautics Research. NASA no longer plans to pursue previously reported activities in certain vehicle systems areas.
- (3) Totals may not add due to rounding. All agency data are as of March 2005.
- (4) USAID activities are not included in the totals for CCTP, but are shown here for completeness, to the extent that such activities are consistent with the criteria for inclusion in CCTP, as shown below.

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