

October 12, 2006

**U.S. Climate Change Technology Program Update:  
Implications for International Priorities**

1. On September 20, 2006, the United States released its *Strategic Plan* for the Climate Change Technology Program. See: <http://www.climatechange.gov> .
2. The *Plan* culminates nearly five years of USG coordination and strategy development. It provides strategic direction for \$3 billion in annual Federal R&D across 10 Federal R&D agencies on related technology development
3. The purpose of the *Plan* is to accelerate development of advanced technologies that can reduce, avoid, capture and sequester greenhouse gases, and reduce their cost. The *Plan* envisions futures, aided by advanced technology, that can dramatically transform the way the world produces and uses energy.
4. In the words of Secretary Bodman, "The *Plan* is unprecedented in its scope and scale and breaks new ground with its 100-year planning horizon, global perspective, public-private partnerships, and international collaborations."
5. The *Plan's* messages include: (a) GHG stabilization is the goal, not marginal reductions, requiring a long-term transformation of society; (b) advances in technology will reduce costs, significantly; (c) reduced costs are important, if not essential for broadened policy consensus; and (d) this challenge invites all R&D-capable countries to lend a hand.
6. The *Plan* is expected to have broad impact on U.S. climate change strategy, shape R&D budgets of 10 Federal agencies, encourage private investment, influence upcoming legislative debates on climate change policy, and boost international cooperation.
7. The technology strategy is part of a broader U.S. climate change strategy that includes: (a) near-term actions to reduce greenhouse gas emissions intensity; (b) advances in climate change science, and (c) promoting international cooperation. It gives substance to the President's National Climate Change Technology Initiative and helps implement the climate change provisions of the Energy Policy Act of 2005.
8. Associated with the *Plan* are "Key Technology Initiatives", with many OECD countries participating as international partners. See Key Initiatives List.
9. Finally, the CCTP *Strategic Plan* outlines a series of "Next Steps". These will form the basis for CCTP's work agenda in the coming years, with many opportunities for enhanced international cooperation. See Chapter 10, which summarizes the Plan and outlines Next Steps.

Attachments: Key Initiatives List

## Selected Key Initiatives Related to the U.S. Climate Change Technology Program

The U.S. Climate Change Technology Program (CCTP)<sup>1</sup> embodies the technology component of a comprehensive U.S. approach to climate change.<sup>2</sup> In FY 2007 the Administration requested nearly \$3 billion for a diversified portfolio of CCTP-related research, development, demonstration and deployment activities.

The CCTP portfolio includes support for technologies in energy efficiency, renewable energy, nuclear power, and highly efficient and clean use of coal. More generally, the portfolio supports a broad array of technologies intended to advance the attainment of six complementary strategic goals: (i) reduce emissions from energy enduses and infrastructure; (ii) reduce emissions from energy supply, particularly by development and commercialization of no- or low-emission technologies; (iii) capture, store and sequester CO<sub>2</sub>; (iv) reduce emissions of non-CO<sub>2</sub> GHGs; (v) enhance the measurement and monitoring of GHG emissions; and (vi) strengthen the contributions of basic science to climate change technology development.

Associated with this portfolio are a number of "key initiatives". These initiatives give visibility to integrative aspects of the portfolio and promote coordination and efficiency among underlying activities across programs within an agency and, in some cases, across agencies. The initiatives also encourage and provide a focal point for non-Federal and international participation. While a number of the initiatives are not motivated solely by climate change concerns, as they advance multiple technology goals, such as enhancing energy security, reducing air pollution, and promoting economic productivity and growth, all are expected to contribute to CCTP's strategic goals, as well as to broader energy and environmental goals. In many cases, the domestic initiatives are complemented by international counterparts.

Selected CCTP-related key initiatives are listed below, briefly described and augmented by web links to authoritative information sites. Table 1 summarizes the associated budget data for cases where funding is called out in agency budgets. Some initiatives do not appear as line items in Table 1, but are indirectly supported through related initiatives, as described below. The budget data in Table 1 are for Budget Authority as Enacted for Fiscal Years 2005 and 2006 and for the Administration's Budget Request for Fiscal Year 2007.

### Description of Selected CCTP-Related Key Initiatives

**Asia Pacific Partnership for Clean Development and Climate.** The Asia Pacific Partnership for Clean Development and Climate (APP) includes the U.S., Australia, China, India, Japan and South Korea. The goal of APP is to help partners address national pollution reduction, energy security and climate change

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<sup>1</sup> See: *CCTP Vision and Framework for Strategy and Planning*, at: <http://www.climatetechnology.gov>.

<sup>2</sup> This approach includes four major elements: (1) near-term policies and measures, including financial incentives, to slow the growth in greenhouse gas emissions; (2) investments in climate change science to improve understanding of climate change and its potential consequences and provide a sound scientific basis for decision-making; (3) acceleration of the development and deployment of advanced technologies to reduce, avoid, capture and sequester greenhouse gas emissions; and (4) international cooperation.

concerns. APP will promote and create enabling environments for the development, diffusion, deployment and transfer of existing and emerging cost-effective, cleaner technologies and practices, through concrete and substantial cooperation, so as to achieve practical results. [Source: COP-11 brochure, State Department].

Website: <http://asiapacificpartnership.org>.

**Biorefinery Initiative.** The Biorefinery Initiative is a federal research initiative, the goal of which is to achieve greater use of "homegrown" renewable fuels in the United States and to advanced the technologies needed to make fuel ethanol from cellulosic (plant fiber) biomass, which is now discarded as waste. The Biorefinery Initiative will help to develop bio-based transportation fuels from agricultural waste products, such as wood chips, stalks, or switch grass. [Source:

<http://www.whitehouse.gov/news/releases/2006/01/20060131-6.html>, White House]

Website: <http://www1.eere.energy.gov/biomass>

### **Carbon Dioxide (CO<sub>2</sub>) Capture and Sequestration**

*CO<sub>2</sub> Capture and Sequestration.* The CO<sub>2</sub> capture and sequestration initiative includes a research and development program, regional partnerships and an international component (see below). The R&D program is pursuing evolutionary improvements in existing carbon dioxide capture systems and also exploring revolutionary new capture and sequestration concepts. The program's portfolio covers the entire carbon sequestration life cycle of capture, separation, transportation, and storage or reuse, as well as research needs for two other energy related greenhouse gases, methane and nitrous oxides. [Source: DOE website]

Website: <http://www.fe.doe.gov/programs/sequestration/overview.html>

*Carbon Sequestration Regional Partnerships.* In 2003, DOE launched a nationwide network of seven Regional Carbon Sequestration Partnerships that now include 40 states, four Canadian Provinces, three Indian Nations, and over 300 organizations. These regional partnerships will help to ensure that America is fully prepared to implement this climate change mitigation option. This network will determine the most suitable technologies, regulations, and infrastructure needs for carbon capture, storage and sequestration in different areas of the country. [Source: DOE website]

Website: <http://www.fe.doe.gov/programs/sequestration/partnerships/index.html>

*Carbon Sequestration Leadership Forum.* The Carbon Sequestration Leadership Forum (CSLF) is the international component of the CO<sub>2</sub> capture and sequestration initiative. CSLF member countries include: Australia, Brazil, Canada, China, Colombia, Denmark, European Commission, France, Germany, Greece, India, Italy, Japan, Korea, Mexico, Netherlands, Norway, Russia, Saudi Arabia, South Africa, United Kingdom and United States. CSLF member countries focus on the development of improved, cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term storage. The purpose of the CSLF is to facilitate international cooperation and exchange information to make these technologies broadly available internationally and identify and address wider issues relating to carbon capture and storage. [Source: COP brochure, State]

Website: <http://www.cslforum.org>

**Clean Energy from Wind.** Wind energy diversifies the nation's energy supply, takes advantage of an abundant domestic resource, and helps the nation meet its commitments to curb emissions of greenhouse gases. The Wind & Hydropower Technologies Program, Department of Energy, works with industry to

keep U.S. wind energy technology competitive in global markets, thus broadening competition, lowering costs and strengthening the economy. The program includes a comprehensive wind energy research program, wind turbine research and development, and support for utilities, industry, and international wind energy projects. [Source: DOE Website]

Website: <http://www.energy.gov/energysources/wind.htm>

### **Coal Research Initiative**

*Coal Research Initiative.* The Coal Research Initiative (CRI) encompasses all DOE coal-related research including Advanced Central Power Systems, Carbon Sequestration, Clean Coal Power Demonstrations, and Innovations for Existing Plants. Clean coal research and development will identify the most critical barriers to coal's use in the power sector and demonstrate new, environmentally-sound technologies for coal-based electricity generation. [Source: White House, <http://www.whitehouse.gov/omb/budget/fy2004/pma/cleancoal.pdf#search=%22Coal%20Research%20Initiative%22>]

Website: <http://fossil.energy.gov/programs/powersystems/index.html>

*Clean Coal Power Initiative.* Within the CRI, the Clean Coal Power Initiative (CCPI) is a cost-shared program between the government and industry to demonstrate emerging technologies in coal-based power generation and to accelerate their commercialization. [Source: DOE website]

Website: <http://fossil.energy.gov/programs/powersystems/cleancoal/index.html>

*FutureGen.* The FutureGen is a major initiative under CCPI. The FutureGen project is a public-private partnership involving the Department of Energy and a broad, open alliance of industrial coal producers and electric utilities, as well as state governments and international participation. The project will design, build, construct and operate a nominal 275 megawatt prototype coal-based plant that will produce both electricity and hydrogen with zero emissions. This ten-year effort will integrate advanced coal gasification technology, hydrogen from coal, power generation, and carbon dioxide capture and storage. [Source: DOE website]

Website: <http://www.fossil.energy.gov/programs/powersystems/futuregen>

**Generation IV Nuclear Energy Systems Initiative.** The goal of the Generation IV Nuclear Energy Systems Initiative is to develop and demonstrate advanced nuclear energy systems that meet future needs for safe, sustainable, environmentally responsible economical, proliferation-resistant, and physically secure energy. An integrated part of this initiative is the Generation IV International Forum, which leverages research investments in Generation IV concepts with research funding from its members. Members include: Argentina, Brazil, Canada, Euratom, France, Japan, South Africa, Republic of Korea, Switzerland, United Kingdom, and United States. [Source: DOE website]

Website: <http://gen-iv.ne.doe.gov/>

**Global Nuclear Energy Partnership.** The Global Nuclear Energy Partnership (GNEP) seeks to develop worldwide consensus on an approach for enabling expanded use of economical, carbon-free nuclear energy to meet growing electricity demand. The Partnership would achieve its goal by having nations with secure, advanced nuclear capabilities provide fuel services — fresh fuel and recovery of used fuel — to other nations who agree to employ nuclear energy for power generation purposes only. The Partnership will demonstrate the critical technologies needed to change the way used nuclear fuel is

managed — to build recycling technologies that enhance energy security in a safe and environmentally responsible manner, while simultaneously promoting non-proliferation. [Source: DOE website]  
Website: <http://www.gnep.energy.gov/>

## Hydrogen

*Hydrogen Fuel Initiative.* The Hydrogen Fuel Initiative aims to reverse America's growing dependence on foreign oil by developing technology needed to accelerate transition to a hydrogen economy. Under the Hydrogen Fuel Initiative and the related FreedomCAR Partnership, the Departments of Energy and Transportation will work closely with the private sector to develop technology for hydrogen-powered fuel cells, hydrogen production and fueling infrastructure, and advanced automotive applications, enabling the commercialization of fuel-cell vehicles by 2020. [Source: White House (link above) and DOE website]

Website: [http://www1.eere.energy.gov/hydrogenandfuelcells/presidents\\_initiative.html](http://www1.eere.energy.gov/hydrogenandfuelcells/presidents_initiative.html)

*FreedomCAR (Cooperative Automotive Research) Partnership.* FreedomCAR is a public-private partnership with the nation's automobile manufacturers and petroleum companies that promotes development of hydrogen as a primary fuel for cars and trucks. Its focus is on pre-competitive, high-risk research needed to develop the technologies necessary to enable a full range of affordable, hydrogen-powered cars and light trucks and its supporting infrastructure, including hydrogen from domestic renewable sources and the technologies that utilize hydrogen, such as fuel cells. The program works jointly with the Department of Energy's hydrogen, fuel cell, and related infrastructure research and development efforts, including efforts to develop improved technology for hybrid electric vehicles. [Source: DOE website]

Website: <http://www1.eere.energy.gov/vehiclesandfuels/about/partnerships/freedomcar/index.html>

*International Partnership for the Hydrogen Economy.* The International Partnership for the Hydrogen Economy (IPHE) provides an international institution for IPHE partners to organize, coordinate and implement hydrogen-related international research, development, demonstration and commercial utilization activities needed to accelerate the transition to a hydrogen economy. IPHE Partners members include: Australia, Brazil, Canada, China, European Commission, France Germany, Iceland, India, Italy, Japan, Republic of Korea, New Zealand, Norway, Russian Federation, United Kingdom, and the United States. The IPHE also provides a useful forum for advancing policies and common technical codes and standards and helps to educate and inform stakeholders and the general public on the benefits of, and challenges to, establishing the hydrogen economy. [Source: COP brochure, State, and IPHE Website]

Website: <http://www.iphe.net/>

**ITER.** ITER is a joint international research and development project that aims to demonstrate the scientific and technical feasibility of fusion power. International participants include China, European Union, India, Japan, Republic of Korea, Russian Federation, and the United States. Fusion is the energy source of the sun and the stars. Fusion research is aimed at demonstrating that this energy source can be used to produce electricity in a safe and environmentally benign way, with abundant fuel resources, to meet the needs of a growing world population. [Source: ITER website]

Website: <http://www.iter.org/index.htm>

**Methane to Markets Partnership.** Methane, known commonly as natural gas, is both a fuel and a greenhouse gas. The Methane to Markets Partnership is an international initiative whose members

include Argentina, Australia, Brazil, Canada, China, Colombia, Ecuador, India, Italy, Japan, Mexico, Nigeria, Republic of Korea, Russian Federation, Ukraine, United Kingdom, and the United States. The goal of the partnership is to reduce global methane emissions in order to enhance economic growth, strengthen energy security, improve air quality, improve industrial safety, and reduce emissions of greenhouse gases. It works with the private sector to by targeting cost-effective methane recovery and reuse opportunities at oil and gas systems, underground coal mines and landfills. The private sector, development banks, and other governmental and non-governmental organizations are encouraged to participate in the Partnership through becoming a member of the Project Network. [Source: COP brochure, State; M2M Website]

Website: <http://www.methanetomarkets.org/>

**More Efficient Vehicles.** The President's 2006 State of the Union Address announced the Advanced Energy Initiative, which provides for clean-energy research focused, in part, on alternative ways to power automobiles. As part of this initiative, there is an accelerated program to improve vehicle options and efficiencies using advanced battery technology. Current automobile hybrids run on battery technology developed at the Department of Energy. Under this initiative research would be accelerated in the next generation of battery technology for hybrid vehicles and "plug-in hybrids". Current hybrids only use the gasoline engine to charge the on-board battery. A "plug-in" hybrid, by contrast, could run on either electricity or gasoline and can be plugged into an electrical energy source at night to recharge its batteries. Such vehicles would enable drivers to meet most of their urban commuting needs with virtually no gasoline use. Advanced battery technologies offer the potential to significantly reduce oil consumption in the near-term and greenhouse gases in the longer-term, provided that the electricity is derived from low-emitting generation sources, such as those outlined among the other initiatives presented here.

[Source: White House, <http://www.whitehouse.gov/news/releases/2006/01/20060131-6.html> ]

Website: <http://www.eere.energy.gov/>

**Solar America Initiative.** The purpose of the Solar America Initiative (SAI) is to accelerate the development of advanced solar electric technologies, including photovoltaic (PV) technology and concentrating solar power systems. The goal of the initiative is to make these technologies cost-competitive with other forms of renewable electricity by 2015. The Solar Energy Technology Program, sponsored by the Department of Energy, will contribute to SAI progress through its partnerships and strategic alliances with industry participants, universities, Federal and state government, and other non-governmental agencies. It will support research and development on PV component and system designs, including low-cost approaches for manufacturing, and carry out activities that address marketplace barriers and offer the opportunity for market expansion. [Source: DOE website]

Website: [http://www1.eere.energy.gov/solar/solar\\_america/](http://www1.eere.energy.gov/solar/solar_america/)