U.S. ACTIONS TO ADDRESS ENERGY SECURITY, CLEAN DEVELOPMENT, AND CLIMATE CHANGE

U.S. ACTIONS TO ADDRESS

ENERGY SECURITY, CLEAN DEVELOPMENT, AND CLIMATE CHANGE

Partnerships in Action

Table of Contents

I. Overview

"Energy security and climate change are two of the great challenges of our time. The United States takes these challenges seriously. The world's response will help shape the future of the global economy and the condition of our environment for future generations."
President George W. Bush 9/28/07

The United States is taking action on a comprehensive and dynamic strategy to address climate change at home and abroad. This approach is designed to foster breakthroughs in clean energy technologies and encourages coordinated global activities that help meet the ultimate objective of the United Nations Framework Convention on Climate Change: stabilizing atmospheric greenhouse gas (GHG) concentrations at a level that prevents dangerous human interference with the climate system while enabling sustainable economic development. We recognize that recent reports by the Intergovernmental Panel on Climate Change (IPCC) have substantially improved the science that guides policy decisions. The recent IPCC conclusions highlight the need to set wise and effective policies to confront the challenges of energy security and climate change.

The United States is meeting these challenges by integrating actions to address climate change and energy security into a broader agenda that promotes pollution reduction and sustainable economic development because those actions will be more sustainable and successful if they produce multiple economic and environmental benefits. Our climate change strategy is based upon the fundamental principle that the world community must produce fewer greenhouse gas emissions and that it must be done in a way that promotes economic growth and helps nations deliver greater prosperity for their people.

Courtesy of NASA

Earth and moon from space.

We know this can be done. In 2002, President Bush announced plans to cut GHG intensity—emissions per unit of economic activity—by 18 percent by 2012, and we are well on track to meet this goal using a diverse portfolio of policy measures including dozens of mandatory, incentive-based, and voluntary programs.

From 2000-2005, the population of the United States grew by 5 percent or 14 million people and GDP grew by 12 percent, or about $1.2 trillion while our GHG emissions increased by about 1.6 percent. Latest estimates show that from 2005-2006, our economy grew 2.9 percent, but our energy-related carbon dioxide emissions actually decreased 1.3 percent.

Recognizing the global nature and the serious challenge of climate change, the United States continues to work collaboratively with nations across the globe. Active bilateral and multilateral climate change initiatives and partnerships are identifying solutions to global climate change. The Major Economies Meeting and other collaborative fora, including the Asia-Pacific Partnership on Clean Development and Climate, are promoting action and partnership among key countries and the private sector. These and other partnerships are reducing greenhouse gas intensity, creating new investment, building local capacity, and removing barriers to the introduction of cleaner technologies.

The partnerships, programs, and policies outlined in this brochure reinforce our commitment to working both at home and abroad to develop concrete solutions to the long-term challenge of global climate change. Many of these efforts have produced or will soon produce tangible results for the environment while also increasing economic development. The United States is working collaboratively to implement innovative programs which will help build consensus and momentum towards a successful post-2012 framework.

II. U.S. Domestic Actions and Partnerships to Slow the Near Term Growth of Greenhouse Gas Emissions

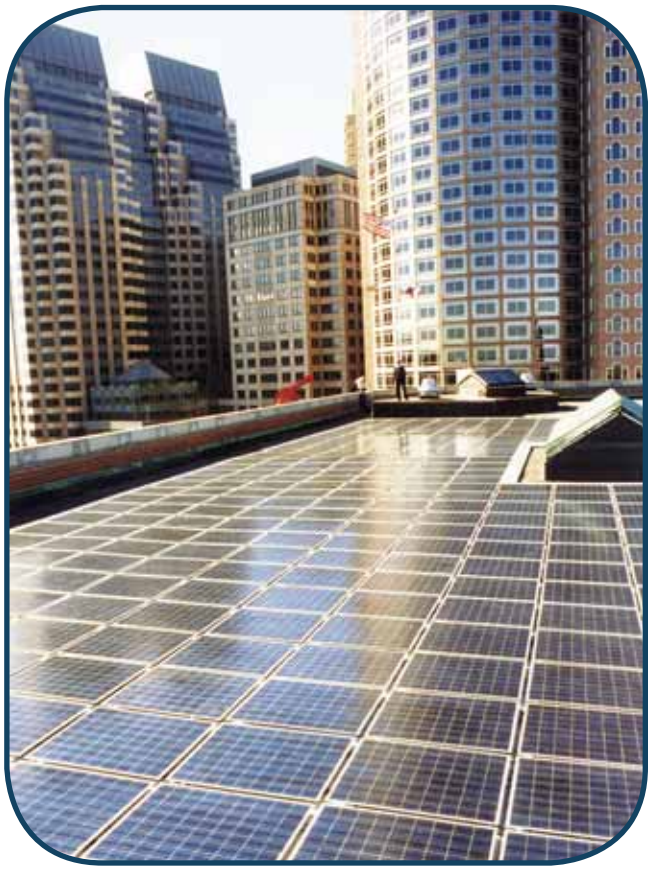
Courtesy of USDA/NRCS

Amber waves of grain in the heartland of the United States. Domestic actions and public/private partnerships are leading to many positive impacts, including the protection of America's natural heritage.

A. Greenhouse Gas Intensity Goal

President Bush has set an ambitious target of cutting our greenhouse gas intensity by 18 percent between 2002 and 2012. Our objective is to significantly slow the growth of greenhouse gas emissions and, as the science justifies, stop it and then reverse it.

While measuring progress in absolute terms is important, the most useful measure for policy management purposes is the relative improvement in greenhouse gas emissions intensity. The intensity measure appropriately recognizes reductions that are achieved through increased investment in efficiency, productivity, and economically valuable outcomes that require less energy or otherwise lead to lower emissions. It sharply discounts reductions produced by economic decline, job loss, or policies that simply shift greenhouse gas emitting activity from the United States to another country – in which case the desired emissions reduction did not actually happen.



Courtesy of DOE

Photovoltaic system, consisting of 372 solar panels on the roof of the Williams building, Boston, Massachusetts.

To help meet our intensity target, further our understanding of climate science, and help reduce our emissions in the long-term, the Administration has committed some $37 billion for climate change related activities since 2001, helping fund numerous programs related to climate change.

The Administration estimates that its goal will reduce cumulative emissions of carbon dioxide (CO_2) equivalent by more than 1,833 million metric tons by 2012, and 366 million metric tons of carbon dioxide equivalent in 2012 alone as compared to business as usual scenarios. Recent data indicate that the United States is on track to meet this goal. Indeed, preliminary figures for 2006 show a 1.3 percent reduction in energy-related CO_2 emissions compared to 2005, despite economic growth of 2.9 percent.

For more information please visit: *http://www.whitehouse.gov/news/releases/2002/02/20020214.html* and *http://www.epa.gov/climatechange/policy/intensitygoal.html.*

B. Presidential Budget

From Fiscal Year 2001 to Fiscal Year 2007, the U.S. Government will have devoted some $37 billion to climate science, technology, international assistance, and incentive programs. President Bush's Fiscal Year 2008 budget calls for $7.4 billion for climate-related activities, includes nearly $3.9 billion for the Climate Change Technology Program, and over $1.8 billion for the Climate Change Science Program, $212 million for climate-change-related international assistance programs, and $1.4 billion for energy tax provisions that may reduce greenhouse gas emissions.

Courtesy of DOE/NREL

A Ford Escape HEV, a Hymotion plug-in hybrid vehicle. Vehicles like this will help meet the President's goal of reducing U.S. gasoline consumption by 20 percent in 10 years.

C. Twenty in Ten

During his 2007 State of the Union address this year, President Bush announced his goal to reduce U.S. gasoline usage by 20 percent over the next ten years. The President has submitted legislative proposals to Congress that would, if enacted:

- Increase the supply of renewable and alternative fuels by setting a mandatory fuels standard to require 35 billion gallons of renewable and alternative fuels in ten years. By 2017, this will displace 15 percent of projected annual gasoline use.

- Reform and modernize Corporate Average Fuel Economy (CAFE) standards for cars and extend the current light truck rule. In 2017, this would reduce projected annual gasoline use by up to 8.5 billion gallons, a further 5 percent reduction that, in combination with increasing the supply of renewable and alternative fuels, would bring the total reduction in projected annual gasoline use to 20 percent.

- Help confront climate change by slowing the projected growth of carbon dioxide emissions from cars, light trucks, and SUVs within 10 years.

On May 14, 2007, the President directed the Environmental Protection Agency (EPA) and the Departments of Transportation (DOT), Energy (DOE), and Agriculture (USDA) to work together to take the first steps towards regulations that would cut gasoline consumption and greenhouse gas emissions from motor vehicles the transportation sector, using the 20-in-10 plan as a starting point.

For more information please visit: *http://www.whitehouse.gov/stateoftheunion/2007/initiatives/energy.html.*

D. Climate Leaders

Announced in February 2002, Climate Leaders is an EPA industry-government partnership that works with companies to develop long-term, comprehensive climate change strategies. Under this program,

Courtesy of UTC

A Pratt & Whitney super alloy production facility of United Technologies Corporation (UTC). UTC worldwide energy use is down by 19 percent and UTC was recognized by the U.S. EPA in 2007 for achieving its initial climate change reduction goal under the Climate Leaders program. UTC has set an aggressive new goal to reduce absolute greenhouse gas emissions by 12 percent by 2010.

partners commit to reducing their impact on the environment by completing a corporate-wide inventory of their greenhouse gas emissions, implementing a management plan to maintain consistent data, setting long-term greenhouse gas reduction goals, and reporting their progress to EPA.

Climate Leaders has grown to include more than 140 partners, with the first eight already achieving their goals. The total U.S. greenhouse gas emissions of Climate Leaders partners are more than 8 percent of the total U.S. GHG emissions.

For more information and a list of Climate Leaders partners, please visit: *http://www.epa.gov/climateleaders.*

E. Climate VISION (Voluntary Innovative Sector Initiatives: Opportunities Now)

Courtesy of DOE

ClimateVISION logo.

In February 2003, President Bush announced that 12 major industrial sectors and The Business Roundtable had committed to work with four of his cabinet agencies (the DOE, DOT, USDA, and EPA) to contribute to meeting his 18 percent intensity reduction goal by improving the energy efficiency or greenhouse gas emissions intensity of its sector. Participating business and trade associations representing 13 energy-intensive industry sectors include aluminum, automotive manufacturers, cement, chemical manufacturing, electric power, forest products, iron and steel, lime, magnesium, minerals, mining, oil and gas, and semiconductors. These sectors account for approximately 40 to 45 percent of total U.S. greenhouse gas emissions.

Climate VISION partners have issued letters of intent to meet specific targets that in 2012 alone could avoid an estimated 90 million metric tons of carbon dioxide equivalent.

For more information, please visit: *http://www.climatevision.gov.*

F. ENERGY STAR®

Recognizing the importance of energy efficiency, EPA established the voluntary ENERGY STAR® program in 1992, and has partnered with DOE since 1996 to accelerate the adoption cost-effective, energy-efficient products and practices in the residential, commercial, and industrial sectors. Since the inception of the program, more than 2 billion ENERGY STAR qualified products across more than 50 categories have been purchased, more than 30,000 commercial buildings have been bench marked for energy usage, close to 725,000 new homes have been constructed to ENERGY STAR specifications, more than 28,000 existing homes have been retrofitted, and hundreds of industrial partners have lowered their energy use using ENERGY STAR tools.

Courtesy of EPA

EPA and the China Standard Certification Center sign a Memorandum of Understanding to work together towards harmonization of energy-efficiency labels for consumer electronics and office equipment.

EPA has recently revised the specifications for many product categories including computers, computer monitors, and imaging equipment; has added new products to the ENERGY STAR family including commercial ice makers, commercial dishwashers, external power supplies and battery chargers; and is in the process of updating the requirements for televisions. In addition, DOE recently updated the qualification requirements for ENERGY STAR residential clothes washers, dishwashers, and refrigerators. EPA has also extended its standardized measurement system for energy use in buildings and facilities to include about 75 percent of the commercial square footage in the United States and about 6 industrial sectors.

In 2006 alone, Americans, with the help of ENERGY STAR, prevented 37 million metric tons of greenhouse gas emissions roughly equivalent to the annual emissions of 25 million vehicles and saved about $14 billion on their utility bills.

For more information, please visit: *http://www.energystar.gov/*.

G. Increased Fuel Economy Standards

The United States has reformed and raised the corporate average fuel efficiency (CAFE) standards for light trucks for seven consecutive years, from model years 2005 to 2011.

The U.S. is working to reduce greenhouse gas emissions from the transportation sector by increasing fuel economy standards and using alternative fuels.

The higher standards are expected to save 14 billion gallons of fuel over the life of the affected vehicles, but the fuel savings from these standards are only part of their benefits. The saving of 14 billion gallons of gasoline means that there will also be a net reduction in carbon dioxide emissions of 103 million metric tons. Since the nation first decided to establish CAFE standards, fuel economy has improved and therefore, projected carbon dioxide emissions have decreased significantly.

If fuel economy had not increased, cars and light trucks would have pumped an additional 11 billion metric tons of carbon dioxide into the atmosphere between 1975 and 2005. That is almost the same as stopping all U.S. fossil fuel combustion for two years.

H. SmartWay Transport Partnership

Launched in February 2004, the SmartWay Transport Partnership is reducing fuel consumption and emissions as well as improving energy security. SmartWay facilitates the implementation of advanced technologies and strategies that help trucking and rail, as well as the shippers that hire them, to improve the overall environmental performance of the freight delivery system. Currently, over 600 companies and organizations have joined SmartWay to reduce emissions of greenhouse gases and air pollutants associated with their freight operations. Additionally, there are over 80 diesel truck and locomotive engine idling reduction projects being implemented around the country. SmartWay is broadening its reach to include other modes of freight transportation throughout the global supply chain, such as ocean shipping and air cargo.

By 2012, it is estimated SmartWay will reduce 33-66 million metric tons of carbon dioxide emissions as compared to business as usual scenarios.

Courtesy of Powerlight Corporation

The Petro Travel Center in Knoxville, TN provides advanced truck stop electrification, limiting emissions.

For more information, please visit: *http://www.epa.gov/otaq/smartway/index.htm.*

I. Reducing Aviation Greenhouse Gas Emissions

The United States supports a comprehensive approach to managing greenhouse gas emissions based on aviation's traditional strengths of technological and operational innovation. Limiting or reducing significant environmental impacts is at the heart of our plan to modernize the U.S. aviation system over the next 20 years. Aircraft and aircraft engines have become dramatically more efficient, resulting in a 70 percent improvement in fuel efficiency in the last 40 years, and U.S. airlines have committed to another 30 percent improvement by 2025.

A plane equipped with winglets, takes off. Winglets and other technical and operational improvements can lead to significant reductions of aviation's greenhouse gas emissions.

The U.S. Next Generation Air Transportation System (NextGen) is pursuing a number of initiatives which will shorten flight times, reduce fuel consumption and engine emissions, and also lessen aircraft noise. New technologies, operational procedures, and improvements to aircraft and air traffic management will greatly improve air transportation efficiency, which means less fuel burned and fewer emissions. Revolutionary aircraft and engines may lead to a 50-70 percent reduction in fuel burn compared to present aircraft in ten to twenty five years and new operational procedures optimized for energy efficiency may lead to a 6-10 percent energy intensity improvement.

For more information, please visit: *http://www.jpdo.gov/.*

J. 2007 Farm Bill: Promoting Biofuels

The Administration's 2007 Farm Bill proposals represent a reform-minded and fiscally responsible approach to supporting America's farmers and ranchers. The proposals continue this Administration's commitment to increase conservation programs (an additional $7.8 billion) and support renewable energy that will help to lead us to the President's goal of reducing annual gasoline use by 20 percent in ten years. In order to meet this goal additional land will be brought into sustainable production of crops for food and fuel feedstocks, and yields, for both traditional crops and energy crops, are expected to improve as our research, science, and technology develop over time.

The Administration's Farm Bill proposals include more than $1.6 billion in new and additional renewable energy funding and targets programs to develop cellulosic ethanol.

Courtesy of DOE/NREL

Corn provides the source of the ethanol powering this bus in Peoria, Illinois.

For more information, please visit: *http://www.usda.gov/wps/portal/usdafarmbill?navtype=SU&navid=FARM_BILL_FORUMS*.

K. Targeted Incentives for Agricultural Greenhouse Gas Sequestration

USDA provides targeted incentives through its conservation programs to encourage wider use of land management and production practices that sequester carbon and reduce greenhouse gas emissions. USDA also provides financial and technical assistance to help farmers install renewable energy systems and make improvements in energy efficiency that help reduce greenhouse gas emissions.

Through the Conservation Reserve Program (CRP), USDA encourages landowners to remove environmentally sensitive cropland from production and to install vegetative covers that sequester carbon. In addition, CRP gives landowners the right to sell carbon credits generated from lands enrolled in the program; current enrollment is 36.8 million acres. In 2006, carbon sequestration on CRP lands was estimated at 50.6 million metric tons CO_2. Additionally, reductions in CO_2 and nitrous oxide (N_2O) emissions associated with reduced field operations and less use of nitrogen fertilizers were estimated at 9.0 million metric tons carbon dioxide equivalent.

The Conservation Security Program (CSP) promotes the conservation and improvement of soil, water, air, energy, plant and animal life on tribal and private working agricultural lands. CSP has emerged as a significant contributor within the area of carbon management through enhancement activities that promote carbon sequestration. Since its inception in 2004, over 22.4 million collective acres have been engaged in soil management activities to improve carbon levels in soils.

Finally, USDA provides Conservation Innovation Grants (CIG) to fund the application and demonstration of innovative technologies and approaches to conservation issues. Many of the awards made through the program have greenhouse gas benefits. For example, farm-level wind and solar power projects reduce CO_2, emissions, and new technologies for livestock manure management and fertilizer application reduce methane and N_2O emissions.

For more information, please visit: *http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp* and *http://www.nrcs.usda.gov/programs/*.

Courtesy of USDA/NRCS

A no-till canola field outside of Pendleton, Oregon. No-till fields are more effective in sequestering carbon.

Courtesy of USDA/NRCS

Low-pressure spray irrigation systems like the one pictured above reduce total energy required to deliver irrigation water to fields.

L. Renewable Energy Systems and Energy Efficiency Improvements for Agriculture

USDA's Renewable Energy Systems and Energy Efficiency Improvements Program provides loan guarantees and grants to agricultural producers and rural small businesses to purchase renewable energy systems and improve energy efficiency. From Fiscal Year 2003 to Fiscal Year 2006, the program has invested $122 million in renewable energy systems and energy efficiency projects, leveraging approximately $1 billion in outside funding sources. Over this period, the program helped finance approximately 400 renewable energy systems (including 22 biodiesel and 8 ethanol refineries, 91 anaerobic digesters, 168 wind energy projects, 40 solar projects, and 15 geothermal projects) and over 400 energy efficiency improvements.

USDA estimates that these may achieve an energy savings amounting to 1,960 kilowatt hours, displacing 8.21 million barrels of oil and an estimated reduction in greenhouse gas emissions of approximately 1 million metric tons of carbon.

For more information, please visit: *http://www.rurdev.usda.gov/rbs/farmbill/index.html.*

M. EPA Domestic Methane Programs

The U.S. Environmental Protection Agency works in collaboration with the private sector and State and local governments to implement several voluntary programs that promote profitable opportunities for reducing emissions of methane, a potent greenhouse gas and clean energy source, from landfills, coal mines, oil and gas systems, and agricultural operations. EPA's methane programs, including the Landfill Methane Outreach Program, Coalbed Methane Outreach Program, Natural Gas STAR, and AgSTAR, are designed to overcome a wide range of informational, technical, and institutional barriers to reducing emissions, while creating profitable methane recovery and use opportunities.

The collective results of EPA's methane programs have been substantial. U.S. methane emissions in 2005 were 11 percent below 1990 levels, in spite of 55 percent GDP growth over that time period. EPA expects that these programs will maintain emissions below 1990 levels in the future due to expanded industry participation and the continuing commitment of partner companies to identify and implement cost-effective technologies and practices.

For more information please visit: *http://www.epa.gov/methane/voluntary.html.*

N. EPA High Global Warming Potential Gas Partnership

A set of voluntary partnerships between EPA and industry is substantially reducing U.S. emissions of high global warming potential (high GWP) gases — including perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF6). The high GWP partnership programs involve several industries, including HCFC-22 producers, primary aluminum smelters, semiconductor manufacturers, electric power companies, magnesium smelters and die-casters, and mobile air conditioning. These industries are reducing greenhouse gas emissions by developing and implementing cost-effective improvements to their industrial processes. EPA High-GWP Partnership Goals include:

- PFC Reduction/Climate Partnership for the Semiconductor Industry—Reduce PFCs 10 percent below 1995 baseline by year-end 2010;
- Voluntary Aluminum Industrial Partnership—A direct carbon intensity (TCE/ton) reduction of 53 percent from 1990 levels by 2010;
- SF6 Emissions Reduction Partnership for the Magnesium Industry—Eliminate SF6 emissions by the end of 2010; and
- Mobile Air Conditioning Partnership—Reduce HFCs 50 percent and improve fuel efficiency by 30 percent.

To date, these voluntary programs have achieved significant emission reductions and industry partners are expected to maintain emissions below 1990 levels beyond the year 2010 despite sizable expansion in many of these industries that would ordinarily be accompanied by higher emission levels.

For more information please visit: *http://www.epa.gov/highgwp.*

Courtesy of 3M Company

Molten Magnesium with Cover Gas.

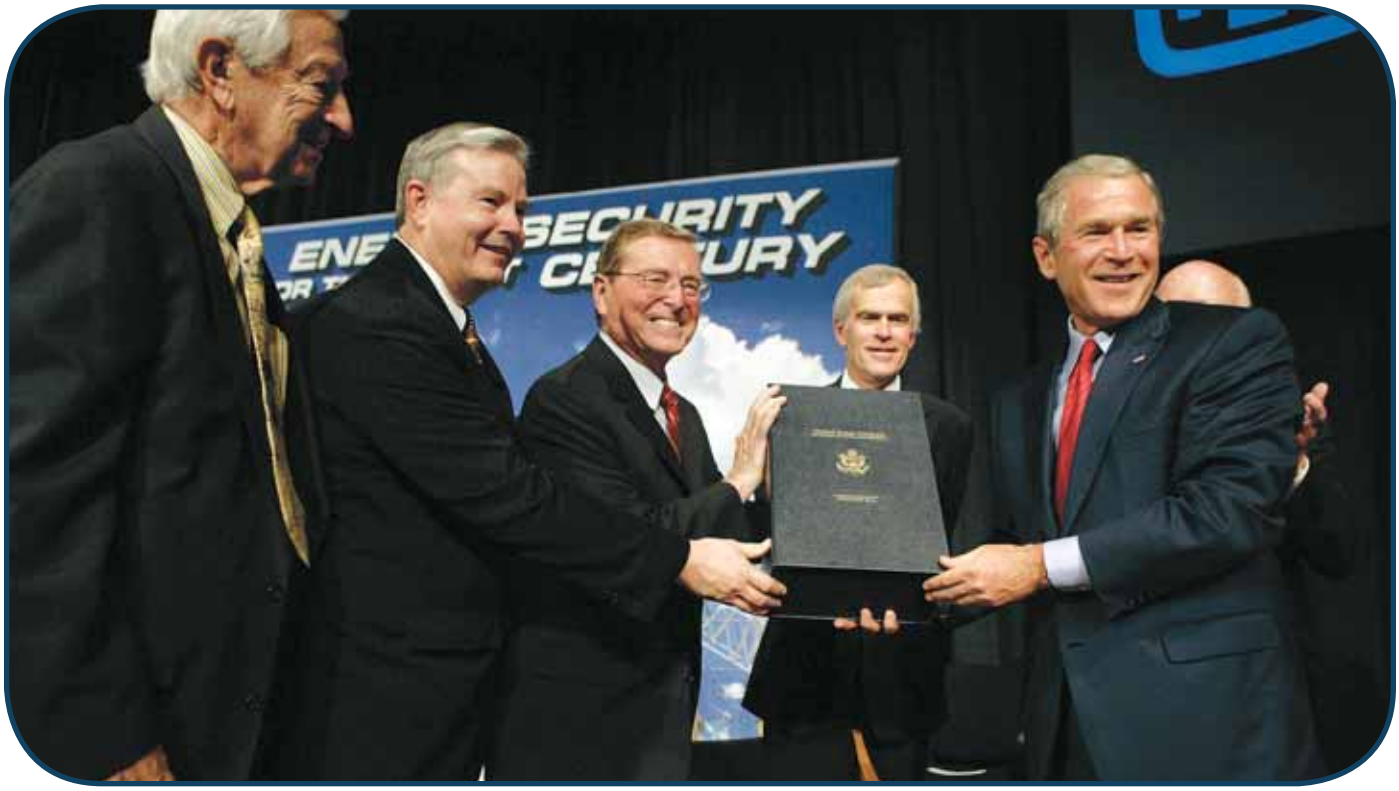
Courtesy of 3M Company

Molten Magnesium without Cover Gas.

The safe handling of molten magnesium requires the use of a protective cover gas and sulfur hexafluoride (SF6), which is a potent greenhouse gas, has been the industry standard cover gas for more than 30 years. In 1999, EPA and the U.S. magnesium industry, with the support of the International Magnesium Association (IMA), launched a voluntary partnership to better understand and reduce emissions of SF6 through technically feasible and economically attractive actions.

O. Energy Policy Act Of 2005: Tax Incentives to Reduce Greenhouse Gas Emissions

The Energy Policy Act of 2005 includes over $14.5 billion in tax incentives from 2005 to 2015. Many of these tax incentives and credits will have significant greenhouse gas reduction benefits and are designed to spur investments in clean energy infrastructure,



Courtesy of the White House

President George W. Bush holds the signed version H.R. 6, The Energy Policy Act of 2005, at Sandia National Laboratory in Albuquerque, New Mexico on August 8, 2005.

enhance domestic energy security, and promote deployment of conservation and energy efficiency technologies, renewable energy and alternative motor vehicles. The Act also grants the DOE the authority to issue loan guarantees for a variety of commercial projects that use technologies that avoid, reduce, or sequester greenhouse gas emissions. Further, it provides standby support coverage to indemnify against certain regulatory and litigation delays for the first six new nuclear plants. In addition, the Act mandates an increase in the renewable content of gasoline from 15.1 billion to 28.4 billion liters while establishing 16 new appliance efficiency mandates.

P. Voluntary Greenhouse Gas Emission Registry ("1605(b)")

The Voluntary Reporting of Greenhouse Gases Program, authorized under Section 1605(b) of the Energy Policy Act of 1992, provides a means for utilities, industries, and other entities to establish a public record of their greenhouse gas emissions and the results of voluntary measures to reduce, avoid, or sequester greenhouse gas emissions. In April 2006, new guidelines were issued for the program. Enforced in 2007, the new guidelines strengthen the program by encouraging comprehensive, entity-wide reporting of emissions and emission reductions, including sequestration, and by increasing the measurement accuracy, reliability, and verifiability of reports.

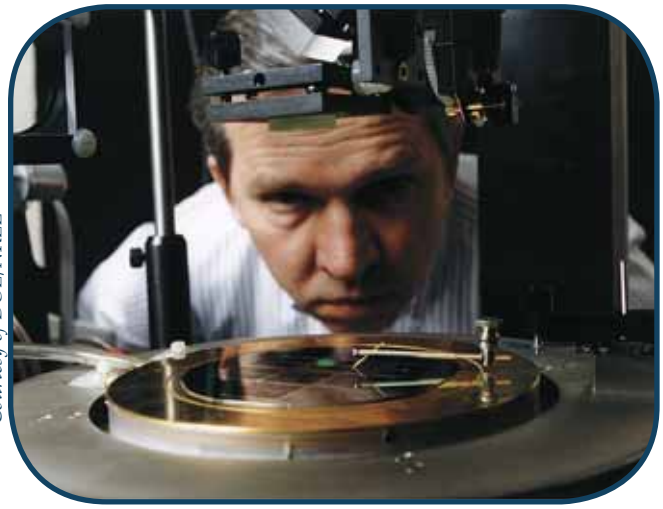
For the 2005 reporting year, 221 U.S. companies and other organizations reported that they had undertaken 2,379 projects and reduced or sequestered 382 million metric tons of carbon dioxide equivalent of greenhouse gases.

For more information, please visit: *http://www.pi.energy.gov/enhancingGHGregistry/ and http://www.eia.doe.gov/oiaf/1605/frntvrgg.html.*

Q. American Competitiveness Initiative (ACI)

President Bush announced the American Competitiveness Initiative (ACI) in his 2006 State of the Union Address. A centerpiece of the ACI is the commitment to doubling the investment in key Federal agencies that support basic research programs in the physical sciences and engineering over the next 10 years. As part of the ACI, the Fiscal Year 2008 Budget does include $4.4 billion, a seven-percent increase over last year's Budget, for the Department of Energy's (DOE's) Office of Science.

The Initiative overall commits $50 billion to increase funding for research and $86 billion for research and development tax incentives, some of which will be directed toward investments in clean energy technology research including solar, bioenergy, wind, hydropower, and hydrogen and fuel cell technology. The Advanced Competitiveness Initiative will enhance cutting-edge basic research, helping to advance U.S. competitiveness by inspiring a new generation of American innovation through world-leading initiatives in high-end computation; bio-energy research centers; fourth generation light sources; and nanotechnology.



Courtesy of DOE/NREL

A scientist examines a photo cell laser test. Research like this in physical sciences and engineering will be doubled over the next ten years as part of ACI.

For more information, please visit: *http://www.whitehouse.gov/stateoftheunion/2006/aci.*

R. EnergySmart Schools

America's K-12 schools spend over $8 billion annually on energy costs. DOE's EnergySmart Schools Initiative promotes energy efficient high-performance schools resulting in cost savings, improved environmental performance, healthier learning environments, and reduced greenhouse gas emissions.

For more information, please visit: *http://www.eere.energy.gov/buildings/energysmartschools.*

S. Green Power Partnership (GPP)

Introduced in 2001 as part of the President's National Energy Policy, the EPA-led Green Power Partnership is a voluntary program that encourages organizations to buy green power as a way to reduce the environmental impacts associated with electricity use. Partners receive technical support and recognition for meeting or exceeding EPA green power purchase requirements. The GPP has more than 750 partners, including Fortune 500 companies, small- and medium-sized businesses, local, state, and federal governments, as well as a growing number of colleges and universities.

Through the GPP more than 10 billion kilowatt hours of green power are being purchased by companies, colleges, municipalities, and other organizations annually. This is the equivalent amount of electricity needed to power more than 600,000 average American households per year or needed to reduce the equivalent carbon dioxide emissions of more than 1.1 million passenger cars on U.S. roads.

For additional information please visit: *http://www.epa.gov/greenpower.*

T. DOE Green Power Network

DOE supports the green power market by funding activities to collect market data, provide analysis, operate the highly regarded Green Power Network Web site, provide technical support to those offering or purchasing green power, and recognize excellence among Green Power Suppliers with the Green Power Leadership Awards.

For more information, please visit: *http://www.eere.energy.gov/greenpower.*

Courtesy of DOE/NREL

Wind, a clean source of energy, can help a utility reduce its net emissions on a per kilowatt-hour basis.

U. Combined Heat And Power Partnership (CHP)

Launched in 2001, EPA's CHP Partnership works collaboratively with its Partners, including large energy users, the CHP industry, federal and state policy makers and other clean energy stakeholders, to identify and facilitate the deployment of new highly efficient CHP projects. The Partnership provides analysis and outreach on emerging markets and enabling policies, technical assistance for candidate sites and public recognition to promote the environmental and economic benefits of CHP.

Courtesy of FuelCell Energy

Sierra Nevada Brewery, Chico, California. Alliance Power Inc. worked with the Sierra Nevada Brewery to install a 1-megawatt CHP system operating since 2005 with four 250-kilowatt Direct FuelCell® high-temperature molten carbonate fuel cells. The CHP system provides nearly 100 percent of the facility's base load power while waste heat is used as steam for the brewing process and for onsite heating.

The Partnership includes over 200 partners and has helped facilitate more than 3,500 megawatts (MW) of new CHP projects in a variety of sectors and applications.

For more information, please visit: *http://www.epa.gov/chp/.*

V. State Clean Energy—Environment Partnership

In 2005, EPA launched the State Clean Energy-Environment Partnership Program, designed to help states adopt a variety of clean energy policies and programs, including both energy efficiency and renewable energy initiatives, measurement and evaluation tools for co-benefits of the policies, and peer exchange opportunities to explore and advance new policies.

The Partnership is working with several states including 15 as formal partners, representing more than 50 percent of the U.S. population and greenhouse gas emissions.

For more information, please visit: *http://www.epa.gov/cleanenergy/stateandlocal/.*

Clean EnergyEnvironment STATE PARTNERSHIP

EPA State Clean Energy Partnership logo.

Courtesy of EPA

III. U.S. Domestic Programs to Advance Climate Change Science and Accelerate Climate Change Technology

Courtesy of DOE/NREL

Sandia National Laboratory's dish/stirling test complex. Technologies like these offer the potential to power a cleaner future.

Courtesy of DOE/NREL

Keck II Telescope atop 14,000-foot Mauna Kea Volcano in Hawaii.

A. Climate Change Science Program (CCSP)

The President established the U.S. Climate Change Science Program (CCSP) in 2002 as part of a new ministerial-level management structure to oversee public investments in climate change science and technology. The CCSP incorporates the U.S. Global Change Research Program, established by the Global Change Research Act of 1990, and the Climate Change Research Initiative, established by the President in 2001. The Program coordinates and integrates scientific research on global change and climate change sponsored by 13 participating departments and agencies of the U.S. Government. It is responsible for facilitating the development of a strategic approach to federally supported climate research, integrated across the participating agencies.

Its principal aims are to investigate natural and human-induced changes in the Earth's global environmental system, monitor important climate parameters, predict global change, and provide a sound scientific basis for national and international decision-making. In 2003, CCSP released its strategic plan for guiding climate research. The plan is organized around five goals:

1. Improving our knowledge of climate history and variability;
2. Improving our ability to quantify factors that affect climate;
3. Reducing uncertainty in climate projections;
4. Improving our understanding of the sensitivity and adaptability of ecosystems and human systems to climate change; and
5. Exploring options to manage risks.

Since CCSP was created in 2002, the program has successfully integrated a wide range of the research and climate science priorities of the 13 CCSP agencies. CCSP has taken on some of the most challenging questions in climate science and is developing products to convey the most advanced state of knowledge to be used by Federal, State and local decision makers, resource managers, the science community, the media, and the general public.

Twenty-one Synthesis and Assessment Products are identified in the Strategic Plan to be produced through 2008. The first of these, Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences, was released in April of 2006 and answers a set of key questions

Courtesy of DOE/NREL

A DOE employee monitors the temperature of combustion gas from a slugging combustor.

related to ongoing observations of the Earth's temperature. This report was an important addition to the IPCC Working Group I Fourth Assessment Report. This year, two more reports have been released. In July, the program released Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations and Review of Integrated Scenario Development and Application, which in part used computer-based models to assess the economic and technological impacts of limiting greenhouse gas emissions. In October, a report was released that summarized our current understanding regarding the effects of climate change on energy production and use in the United States. The report, Effects of Climate Change on Energy Production and Use in the United States, focused on three questions:

1. How might climate change affect energy consumption;
2. How might climate change affect energy production and supply; and
3. How might climate change have other effects that indirectly shape energy production and consumption?

The reports, overall, are designed to address a full range of science questions and evaluate options for responses that are of the greatest relevance to decision and policy makers and planners. The products are intended to provide the best possible state of science information, developed by a diverse group of climate experts, for the decision community.

For more information on the CCSP and a complete list of the Synthesis and Assessment Products please visit: *http://www.climatescience.gov.*

B. Climate Change Technology Program (CCTP)

The United States is leading the development of many advanced technology options that have the potential to reduce, avoid, or sequester greenhouse gas emissions. CCTP was created in 2002, and subsequently authorized in the Energy Policy Act of 2005, to coordinate and prioritize the Federal Government's annual investment in climate-related technology —a proposed $3.9 billion in Fiscal Year 2008— and to further the President's National Climate Change Technology Initiative (NCCTI). Ten Federal agencies support a broad portfolio of activities within this framework.

Basic guidance for the program is provided through CCTP's Strategic Plan, released in September 2006. CCTP's strategic vision has six complementary goals: (1) reducing emissions from energy use and infrastructure; (2) reducing emissions from energy supply; (3) capturing and sequestering carbon dioxide; (4) reducing emissions of other greenhouse gases; (5) measuring and monitoring emissions; and (6) bolstering the contributions of basic science.

CCTP's principal aim is to accelerate the development and reduce the cost of new and advanced technologies. It provides strategic direction for the climate-related elements of the overall Federal technology portfolio. CCTP also is assessing different technology options and their potential contributions to reducing greenhouse gas emissions over the short, mid, and long term. CCTP's boasts

Courtesy of DOE/NREL

Multi-faceted stretched membrane heliostat undergoes a check of its skin.

a diverse R&D portfolio that covers a wide range of technology options in energy efficiency, renewable energy, nuclear power, and clean coal, and non-CO_2 gases.

Many CCTP activities build on existing work, but the Bush Administration also has expanded and realigned some activities and launched new initiatives in key technology areas to support the CCTP's goals. The President's NCCTI, for example, includes 12 discrete R&D activities that, if successful, could advance technologies to reduce greenhouse gas emissions on a large scale.

For more information, please visit: *http://www.climatetechnology.gov/.*

1. Advanced Energy Initiative (AEI)

In his 2006 State of the Union Address, President Bush announced plans for the Advanced Energy Initiative (AEI), which will help reduce America's greenhouse gas emissions, pollution, and dependence on foreign sources of energy by accelerating advanced energy technologies. Examples of AEI investment include: (1) the Solar America Initiative, which aims to make solar energy cost-competitive with conventional forms of electricity by 2015; (2) the Biofuels Initiative, which aims to make cellulosic ethanol cost competitive with gasoline by 2012; (3) the Hydrogen Fuel Initiative, which aims to develop the technology needed for commercially viable hydrogen-powered fuel cells; (4) the Plug-in Hybrid Electric Vehicle (PHEV) research, which aims to develop advanced battery technologies that allow PHEVs to have a 40-mile range operating solely on battery charge; (5) the FutureGen near-zero-emissions coal coal-fired power plant; and (6) the Nuclear Power 2010 program. By investing in these and other advanced energy technologies, AEI will allow us to alter the way we power our buildings and automobiles within 20 years.

Courtesy of DOE/NREL

Dish/engine system under test at the National Solar Thermal Test Facility.

For more information, please visit: *http://www.whitehouse.gov/stateoftheunion/2006/energy/energy_booklet.pdf.*

2. Carbon Sequestration

Carbon capture and storage is a central element of CCTP's strategy because for the foreseeable future, fossil fuels will continue to be the world's most reliable and lowest-cost form of energy. A realistic approach is to find ways to capture and store the carbon dioxide produced when these fuels are used. DOE's core carbon capture and storage program emphasizes technologies that capture carbon dioxide from large point sources and store it in geologic formations.

In 2003, DOE launched a nationwide network of seven Carbon Sequestration Regional Partnerships involving State agencies, universities and the private sector to determine the best approaches for storage in each geographic region and to examine regulatory and infrastructure needs. Today the partner-

Courtesy of DOE

Rig hands strapping control lines to the tubing of the injection well so that acoustic and fluid data can be obtained at a depth of 5,400 feet. This is necessary to prepare the injection well for a CO_2 injection test.

ships include more than 400 organizations in 41 U.S. states, 3 Indian nations, and 4 Canadian provinces. The Regional Partnerships have progressed to a validation phase in which they are conducting 25 field tests involving the injection of carbon dioxide into underground formations where it will be stored and monitored. The Regional Partnerships are also planning several large-scale field tests throughout the United States to validate the efficacy of long-term storage of CO_2 in a variety of geologic storage sites.

Additionally, EPA leads U.S. government efforts to evaluate any risks to human health and the environment associated with underground injection and storage. EPA is responsible for developing regulatory guidance and a risk-management framework under the Safe Drinking Water Act. The Agency also designs inventory and accounting methodologies for carbon capture and sequestration.

For more information, please visit: *http://www.fe.doe.gov/programs/sequestration/index.html.*

3. Coal-fired, Near-zero Emissions Power Generation

The United States has vast reserves of coal, and over half of its electricity is generated from this fuel. Advanced coal-based power and fuels, therefore, is an area of special interest from both an energy security and climate change perspective. The Coal Research Initiative (CRI) consists of research, development, and demonstration of coal-related technologies that will improve coal's competitiveness in future energy supply markets. The Clean Coal Power Initiative (CCPI), within the CRI, is a cost-shared program between the government and industry to demonstrate emerging technologies in coal-based power generation and to accelerate their commercialization. The FutureGen project is a 10-year, government-industry cost-shared effort to design, build,

Courtesy of DOE

An artist's rendition of a coal-fired zero-emission power plant.

and operate the world's first near-zero atmospheric emissions coal-based power plant. This project, which now includes India and the Republic of Korea as partners (with other countries expected to join shortly), will incorporate advanced coal gasification technology integrated with combined cycle electricity generation and the capture and long-term storage of carbon dioxide. Through the CRI, clean coal can remain part of a diverse, secure energy portfolio well into the future.

For more information, please visit: *http://www.fe.doe.gov/programs/powersystems/cleancoal/index.html* and *http://www.fe.doe.gov/programs/powersystems/futuregen/index.html.*

Courtesy of GE Energy; 2005 GE International

Ocean wind farm.

4. Energy Efficiency and Renewable Energy

Energy efficiency is the single largest investment area under CCTP and it provides tremendous short-term potential to reduce energy use and greenhouse gas emissions. Raising the efficiency level of home appliances and commercial equipment is a high priority. Efficiency standards for products that are subject to regulation are being developed at a pace substantially greater than at any time in the history of regulating these products. In addition, Zero Energy Homes and Buildings have been proven technically achievable, but at significant added cost. The DOE believes that the required technical advances to enable most of the nation's new homes to be constructed as net zero homes can be achieved in less that a decade via an aggressive private/public partnership. For commercial buildings, adequate technical capability can be available by 2020.

Renewable energy includes a range of different technologies that can play an important role in reducing greenhouse gas emissions. The United States invests significant resources in wind, solar, geothermal, biomass, industrial and buildings efficiency and alternative transportation technologies. Many of these technologies have made considerable progress in price competitiveness, but there remain opportunities to reduce manufacturing, operating, and maintenance costs of many of these technologies as well as to reduce barriers to market penetration.

For more information, please visit: *http://www.eere.energy.gov/.*

5. Hydrogen

President Bush launched the Hydrogen Fuel Initiative in his 2003 State of the Union Address. The goal is to work closely with the private sector to accelerate our transition to a hydrogen economy, on both the technology of hydrogen fuel cells and a fueling infrastructure. The President's Hydrogen Fuel Initiative and the FreedomCAR Partnership launched in 2002 will provide $1.7 billion through 2008 to develop hydrogen-powered fuel cells, hydrogen production and infrastructure technologies, and advanced automotive technologies. Through its International Partnership for the Hydrogen Economy (see page 26), the United States is pursuing international cooperation to affect a more rapid, coordinated advance for this technology that could lead to the reduction of air pollutants and a significant reduction of greenhouse gas emissions in the transportation sector worldwide.

For more information on these initiatives, please visit: *http://www1.eere.energy.gov/hydrogenandfuelcells/* and *http://www1.eere.energy.gov/vehiclesandfuels/*.

Courtesy of DOE

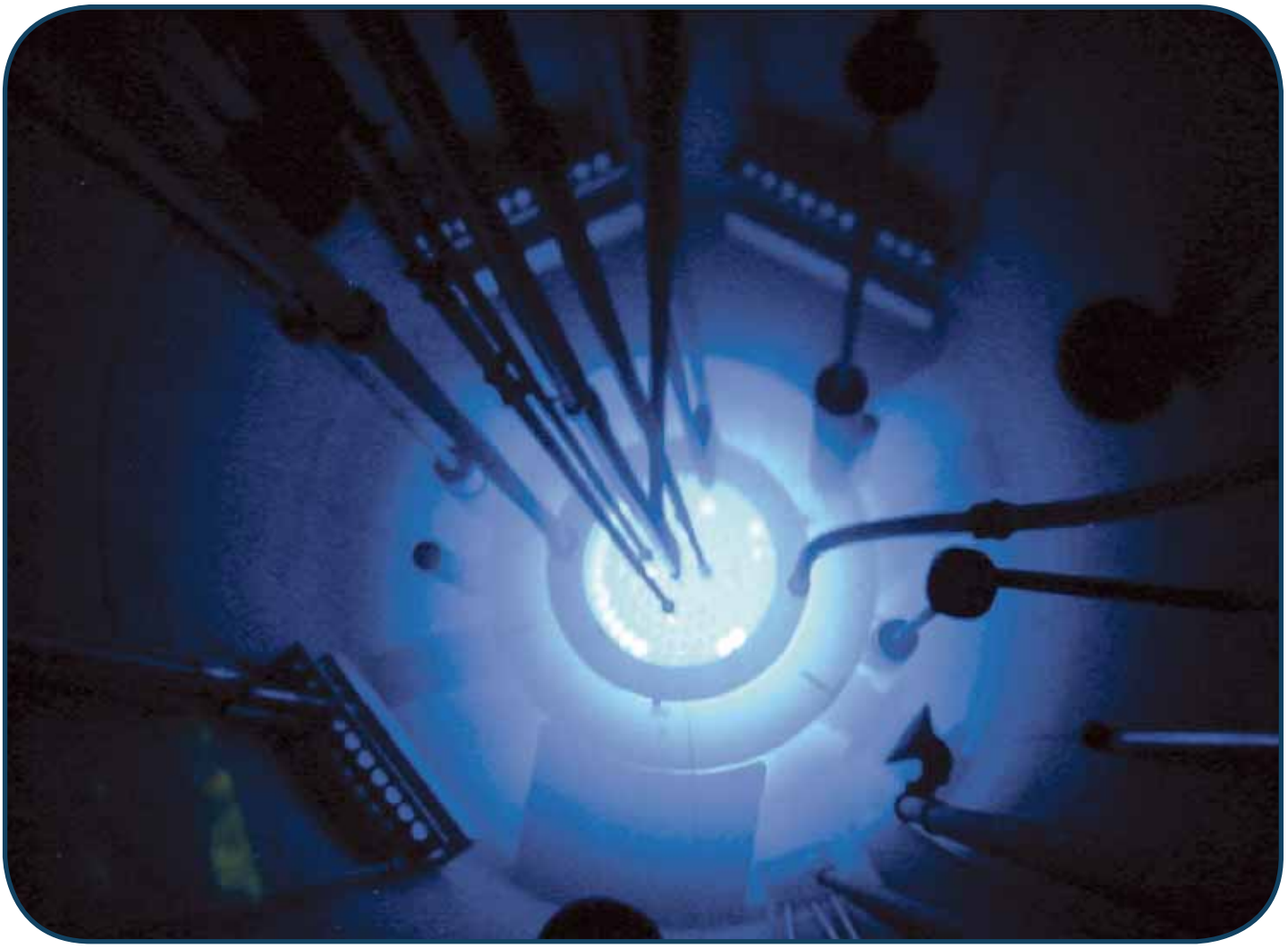
A hydrogen fuel cell like the one pictured provides clean energy.

6. Nuclear Fission

The benefits of nuclear power as a greenhouse gas emissions-free, reliable, and safe source of energy are an essential element in the Nation's energy and environment future. Nuclear power is the second most abundant source of electric energy in the United States, and existing plants are among the most economic sources of electricity on the grid today. The Nuclear Power 2010 program is working with industry to finalize advanced light water reactor designs and demonstrate the Nuclear Regulatory Commission's new licensing process, while the Generation IV Nuclear Energy Systems Initiative is investigating the more advanced reactor and fuel cycle systems that represent a significant leap in economic performance, safety, and proliferation-resistance.

One promising system being developed under the Nuclear Hydrogen Initiative would pair very-high-temperature reactor technology with advanced hydrogen production capabilities that could produce both electricity and hydrogen on a scale to meet transportation needs. Complementing these programs to improve nuclear fuel cycles, including enhancing their proliferation resistance, and for the better disposition of spent nuclear fuel is the Global Nuclear Energy Partnership.

For more information, please visit: *http://nuclear.energy.gov/np2010/neNP2010a.html*.



Courtesy of Oregon State University

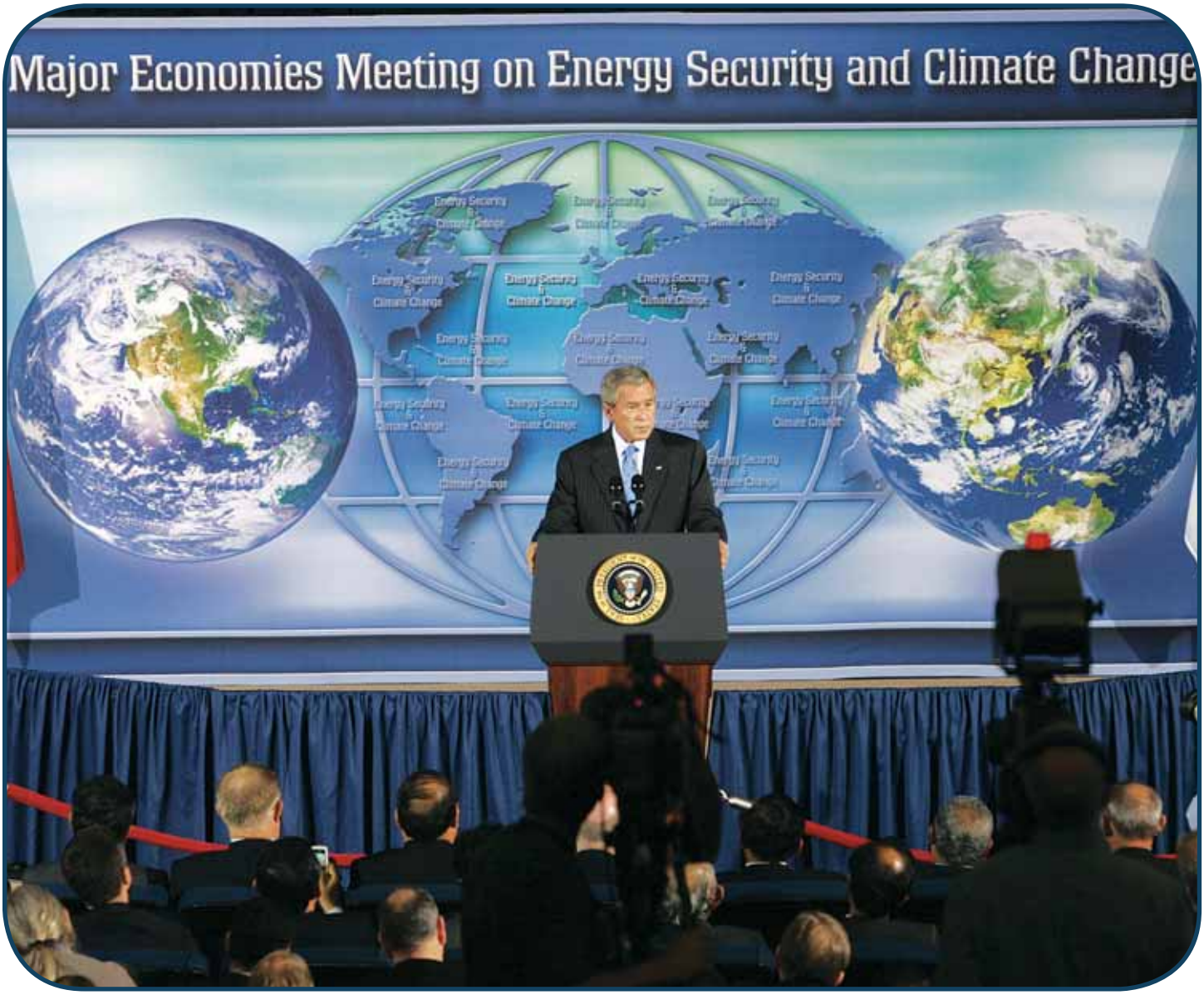
Photo of Oregon State University's TRIGA research reactor core.

7. Fusion Energy

Fusion energy is a potential major new source of energy that, if successfully developed, could be used to produce electricity and possibly hydrogen. Fusion has features that make it an attractive option from both an environmental and safety perspective. However, the technical hurdles of fusion energy are very high, and with a commercialization objective of 2050, its impact would not be felt until the second half of the century, if at all. Nevertheless, the promise of fusion energy is simply too great to ignore.

For more information, please visit: *http://www.sc.doe.gov/feature/fes.htm.*

IV. International Climate Change Partnerships



Courtesy of the White House

President Bush addresses the Major Economies Meeting on Energy Security and Climate Change, Washington, D.C.

A. Major Economies Meeting

On September 27th and 28th 2007, the United States hosted Leaders' representatives from Australia, Brazil, Canada, China, the European Union (Portugal as current EU President plus the European Commission), France, Germany, Indonesia, India, Italy, Japan, Mexico, Russia, South Africa, South Korea, and the United Kingdom, plus the United Nations to participate in the Major Economies Meeting on Energy Security and Climate Change. This effort, which was endorsed by G8 and APEC leaders, is intended to develop a detailed contribution to advance agreement under the UNFCCC.

The President has proposed that these Major Economies will:

- Set a long-term global goal for reducing greenhouse gases;
- Establish midterm national targets, and programs that reflect their own mix of energy sources and future energy needs; and
- Create a strong and transparent system for measuring each country's performance.

For more information on the Major Economies Meeting and a chair's summary of the meeting, please visit: *http://www.state.gov/g/oes/climate/mem/.*

B. Asia-Pacific Partnership on Clean Development and Climate (APP)

The Asia-Pacific Partnership on Clean Development and Climate (APP) brings together major Asia-Pacific countries Australia, China, India, Japan, Republic of Korea, and the United States and in October 2007, Partners warmly welcomed Canada as the seventh APP member. An innovative public-private sector effort, the Asia-Pacific Partnership was established to promote economic development, reduce poverty, and accelerate the development and deployment of cleaner, more efficient technologies to address increased energy needs and the associated issues of air pollution, energy security, and climate change. Through engaging private industry as well as government officials from multiple ministries, the APP is using public-private partnerships to build local capacity, improve efficiency and reduce greenhouse gas emissions, create new investment opportunities, and remove barriers to the introduction of clean energy technologies in the Asia-Pacific region. What makes the approach unique is that APP activities are identified and supported using an innovative "bottom up" approach. Together, APP partner countries account for about half of the world's economic output, energy use, and greenhouse gas emissions.

The Asia-Pacific Partnership has created eight task forces to achieve the initiative's goals: (1) aluminum; (2) buildings and appliances; (3) cement; (4) cleaner fossil energy; (5) coal mining; (6) power generation and transmission; (7) renewable energy and distributed generation, and (8) steel. Each Task Force has developed an Action Plan to serve as their blueprint for cooperation and provide a strategic framework for identifying and implementing priority actions. The United States has committed $45 million to the Asia-Pacific

Courtesy of Department of State

The Asia-Pacific Partnership logo.

Partnership in 2007 for collaborative activities in all eight sectoral areas.

By focusing on concrete knowledge and technology transfer, more than 100 individual projects and activities included in the APP Task Force action plans are already yielding concrete results, including:

- A series of peer exchanges in improving energy efficiency that has already involved more than 200 engineers from all six partner countries. Simple, low-cost best-practice improvements can increase the efficiency of many power plants which, for example, could reduce CO_2 emissions in India alone by over 10 million tons per year;

- APP and EPA-funded technical support to India and China is funding the development of energy efficiency labels, similar to those used in the U.S. ENERGY STAR program. Using the labels on television set top boxes in China alone is expected to result in annual carbon emissions reductions of 17.7 million tons of CO_2 the equivalent of removing three million cars from the road; and

- While actively participating in APP activities, Solar Turbines has received orders to provide 35 megawatts of clean energy technology to the coking industry in China. Based on initial calculations, these transactions will result in approximately 410,000 metric tons of CO_2 equivalent in annual savings once all units are fully operational.

For more information, please visit: *http://www.app.gov* or *http://www.asiapacificpartnership.org.*

C. Washington International Renewable Energy Conference (WIREC)

The United States will host the Washington International Renewable Energy Conference (WIREC 2008) in Washington DC, March 4-6, 2008. WIREC 2008, the third international ministerial-level event on renewable energy, will be a key opportunity for government, industry and civil society leaders to advance the integration of renewable energy and advance shared goals for climate, sustainable development, and energy security. The event builds upon outcomes from the 2002 World Summit on Sustainable Development and the Bonn (2004) and Beijing (2005) Renewable Energy Conferences. The timing for WIREC 2008 is optimal, because many countries have established leadership positions in renewable energy technology development, manufacturing, and market adoption through innovative policies.

WIREC 2008 will focus on rural development, finance, commercialization/market adoption, research and development as well as other cross-cutting issues. WIREC 2008 includes a ministerial level meeting for governments (federal and local), the private sector and civil society, and a co-located, but separately managed trade show and exhibition.

Courtesy of DOE/NREL

Solar Two's power plant heliostats focus sunlight onto the central tower receiver, providing a clean, renewable source of energy.

WIREC 2008 will also provide an opportunity to advance renewable energy globally by bringing world leaders together to raise issues, exchange information, share experiences and best practices, and provide a global platform to highlight and promote strategies for significant development and adoption of renewable energy systems worldwide, including second generation biofuels.

For additional information, please visit: *http://www.wirec2008.gov.*

D. Methane To Markets Partnership (M2M)

Launched in 2004, the Methane to Markets Partnership is a multilateral initiative that promotes energy security, improves environmental quality, and reduces greenhouse gas emissions throughout the world. The Partnership consists of 21 Partners with the European Commission (EC) as the most recent partner to join the group. In addition, over 600 private-sector and other government and civil society organizations participate in the Partnership through the Project Network.

Capturing and using "waste" methane provides an additional energy source that stimulates economic growth while reducing global emissions of this powerful greenhouse gas. The United States has committed up to $53 million for the first five years of the Partnership. EPA estimates that this Partnership could recover up to 500-billion cubic feet of natural gas (183 million metric tons of carbon dioxide equivalent) annually by 2015. Under Methane to Markets, partner countries work closely with the Project Network to promote and implement methane recovery and use projects in four sectors: oil and gas systems, coal mines, landfills, and animal waste management systems.

For fiscal year 2006, Methane to Markets projects developed by the United States, when fully implemented, will result in estimated annual emission reductions of more than 9 million metric tons of CO_2 equivalent. In addition, U.S. government Methane to Market activities has leveraged more than $261 million for methane projects since its inception from the private sector, other countries, and international financial institutions. Private sector and other civil society organizations are encouraged to participate in the Partnership through becoming a member of the Project Network.

Courtesy of EPA

The Methane to Markets Partnership promotes landfill gas projects which use wells like the one shown here to capture methane, generate electricity, and produce alternate fuels while reducing greenhouse gas emissions.

For more information, please visit: *http://www.methanetomarkets.org* or *http://www.epa.gov/methanetomarkets.*

E. International Partnership For The Hydrogen Economy (IPHE)

The International Partnership for the Hydrogen Economy (IPHE), initiated in 2003 by the Secretary of Energy, provides a mechanism to coordinate multinational research, development and deployment programs that advance the transition to a global hydrogen economy. The United States hosted the first Ministerial meeting of the IPHE and the Partnership's 16 countries and the EC are working together to advance research, development, and deployment of hydrogen and fuel-cell technologies,

Courtesy of DOE/NREL

GM hydrogen fuel cell vehicle pulling up to be refueled at the Shell hydrogen refueling station. IHPE is helping projects like these to transition to a global hydrogen economy.

and develop common codes and standards for hydrogen use. The IPHE Steering Committee has officially recognized 30 collaborative projects that advance the group's goals. In addition, IPHE is working on common goals for hydrogen and fuel cell technologies and the technical objectives that support these goals.

For more information, please visit: *http://www.iphe.net/* and *http://www.eere.energy.gov/hydrogenandfuelcells/*.

F. Carbon Sequestration Leadership Forum (CSLF)

The United States hosted the first meeting of the Carbon Sequestration Leadership Forum (CSLF) in Virginia, in June 2003. The CSLF is focused on the development of improved cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term storage. CSLF membership has grown to 22 governments since 2003. Six task forces covering risk assessment, storage capacity estimation, projects interaction and review, legal issues, capacity building in emerging economies, and financial issues have been established to advance the work of the partnership.

Recent accomplishments include the release of a CSLF, Technology Roadmap, and several task force reports. The CSLF also has jointly sponsored workshops with the G8 and the International Energy Agency, and in May 2007, the CSLF sponsored a capacity building workshop attended by participants from six emerging economy partners. To date, 19 projects have been recognized formally by the CSLF.

For more information, please visit: *http://www.cslforum.org/ and http://www.fe.doe.gov/programs/sequestration/cslf/*.

Courtesy of Philip Papadeas, Sandia Technologies

Photograph taken from the air of the Frio test site during drilling of the CO_2 injection well to depths of 5,700 feet. Drill pipe can be seen on the well pad.

Courtesy of NASA

A Boeing Delta II rocket carrying two new NASA Earth-observation satellites, CALIPSO and CloudSat, blasts off in April 2006. The two satellites are contained in the white nose of the rocket, which is on the left.

G. Group On Earth Observations (GEO)

Observation and forecasting of climate change are essential to predicting impacts and developing adaptation measures to allow for sustainable economic growth. On July 31, 2003, the United States hosted 33 nations—including many developing nations—at the inaugural Earth Observation Summit, out of which came a commitment to establish an intergovernmental, comprehensive, coordinated, and sustained Earth observation system of systems. Interest in this initiative continues to grow. More than 70 countries, the European Commission, and 40 international organizations now participate in GEO. While the use and benefits of these observations are extensive, the climate applications of the data collected by the system include the use of the data to create better climate models, to improve our knowledge of the behavior of carbon dioxide and aerosols in the atmosphere, and to develop strategies for carbon sequestration.

The United States was instrumental in drafting a ten-year implementation plan for a Global Earth Observation System of Systems (GEOSS), which was approved by nearly 60 nations and the European Commission at the 3rd Earth Observation Summit in Brussels in February 2005. The Plan includes 2-year, 6-year, and 10-year implementation targets. GEO Members and Participating Organizations have taken substantive and significant steps towards achieving these targets. In November of 2007, the 4th Earth Observation Summit convened in Cape Town to highlight early achievements and to look at future opportunities for international cooperation in the areas of climate observations.

For more information, please visit: *http://earthobservations.org*.

H. Generation IV International Forum (GIF)

The United States has led the development of the Generation IV International Forum, a multilateral partnership with ten other countries and Euratom, fostering international cooperation in research and development for the next generation of safer, more affordable, and more proliferation-resistant nuclear energy systems. This new generation of nuclear power plants could produce electricity and hydrogen with substantially less waste and without emitting any air pollutants or greenhouse-gas emissions.

Since the Forum was formally established in July 2001, the United States has led the development of a technology roadmap, and increased support for R&D projects that advance the Forum's goals.

For more information, please visit: *http://nuclear.energy.gov/GenIV/neGenIV2.html*.

I. Global Nuclear Energy Partnership (GNEP)

GNEP is a ground-breaking effort that seeks to develop a worldwide consensus on enabling expanded use of carbon-free nuclear energy to meet growing electricity demand in a way that enhances energy security while promoting non-proliferation. On September 16, 2007 GNEP furthered these goals as China, France, Japan, Russia, and the United States, who are original GNEP partners, as well as Australia, Bulgaria, Ghana, Hungary, Jordan, Kazakhstan, Lithuania, Poland, Romania, Slovenia, and Ukraine signed a "Statement of Principles" addressing the prospects of expanding the peaceful uses of nuclear energy, including enhanced safeguards, international fuel service frameworks, and advanced technologies.

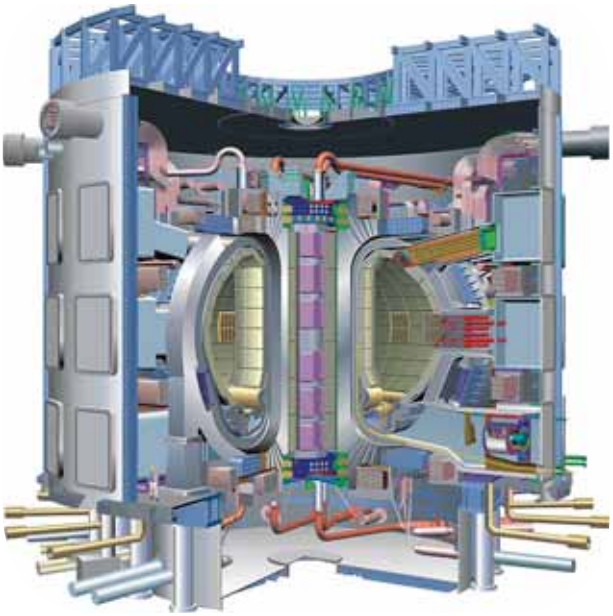
For more information, please visit: *http://www.gnep.energy.gov/*.

Courtesy of DOE

Global Nuclear Energy Partnership Logo.

J. ITER

In January 2003, President Bush committed the United States to participate in ITER, the largest and most technologically sophisticated research experiment in the world designed to harness the promise of fusion energy, the same form of energy that powers the sun. If successful, this international research project (the United States will contribute $1.122 billion for construction) will advance progress toward producing clean, renewable, commercially available fusion energy by the middle of the century. Other participants include



Courtesy of DOE

ITER is an international experiment that aims to harness fusion energy, which powers the sun and stars, to generate electricity. Commercialization of fusion energy would dramatically improve America's energy security while significantly reducing air pollution and emissions of greenhouse gases. This cut-away view of ITER depicts the vacuum vessel, its internal components and its ports, as well as some features of the magnet system, cryostat and surrounding equipment.

China, the European Union, India, Japan, the Republic of Korea, and Russia. An agreement to construct ITER was signed in November 2006.

For more information in ITER, please visit: *http://www.iter.org*.

Courtesy of DOE/NREL

Current U.S. ethanol production is primarily from the starch in corn kernels. The DOE Biofuels Program is developing technology to also produce ethanol from the fibrous material (cellulose) in the corn stalks and husks or other agricultural or forestry residues.

K. U.S. Global Biofuels Engagement

The United States is working multilaterally and bilaterally to increase global use and production of biofuels in a way that protects the environment while also increasing energy security and economic development.

1. Global Bioenergy Partnership (GBEP)

GBEP is designed to power a cleaner future by supporting wider, cost-effective biomass and biofuels deployment, particularly in developing countries where biomass use is prevalent. The United States is actively supporting GBEP's work including leading work on developing common methodologies for measuring the GHG benefits of biofuels. In addition to the United States, GBEP partners include Canada, China, France, Germany, Italy, Japan, Mexico, Russia, the United Kingdom, the Food and Agriculture Organization of the United Nations (FAO), the International Energy Agency, the United Nations Foundation, and the European Biomass Industry Association. The GBEP Secretariat is managed by the FAO.

For more information, please visit: *http://www.globalbioenergy.org/.*

2. International Biofuels Forum (IBF)

IBF, a joint project of Brazil, China, India, South Africa, the United States, and the European Commission, was launched on March 2, 2007 to develop strategies to promote the sustained use and production of biofuels around the globe. The forum has created a mechanism to structure the dialogue among some of the biggest producers and consumers of biofuels to address energy security and global warming issues and to use biofuels as an instrument for development.

IBF is working closely with Global Bioenergy Partnership to create common standards and codes for bioenergy products and to consolidate and facilitate world trade.

3. U.S./Brazil Bilateral Cooperation on Biofuels

On March 2007, United States Secretary of State Condoleezza Rice and Brazil Foreign Minister Celso Amorim signed a Memorandum of Understanding to promote the development and use of biofuels to help reduce the global dependence on oil. Through this partnership, the United States and Brazil are cooperating in three areas: (1) research and development to accelerate development of next generation biofuels; (2) feasibility studies and technical assistance in third countries aimed at stimulating private sector investment in biofuels production and domestic consumption; and (3) commoditization of biofuels through alignment of biofuels standards and codes. Consultants have completed site visits in El Salvador, the Dominican Republic, Haiti, and St. Kitts, and are preparing feasibility studies.

For more information and the Memorandum, please visit: *http://www.state.gov/r/pa/prs/ps/2007/mar/81607.htm.*

V. U.S. Bilateral and Multilateral Initiatives

Courtesy of Ana Paula Paiva, USAID

Solar dryers implemented by USAID/Brazil are improving production and quality of life in Frecheiras, Brazil.

World map with locations of U.S. Climate Change Bilateral Partnerships.

A. Bilateral and Regional Partnerships

The United States has negotiated agreements with major international partners to pursue research on global climate change and deploy climate observation systems, collaborate on energy and sequestration technologies, and explore methodologies for monitoring and measuring greenhouse gas emissions. Since June 2001, the United States has launched 15 bilateral and regional partnerships with Australia, Brazil, Canada, China, Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), the European Union, Germany, India, Italy, Japan, Mexico, New Zealand, Republic of Korea, Russia, and South Africa.

There are over 450 discrete projects on issues ranging from climate change science to energy and sequestration technologies to policy approaches as part of these bilateral partnerships. The countries covered by these bilateral partnerships account for about 80 percent of global greenhouse gas emissions.

For more information please visit: *http://www.state.gov/g/oes/climate/c22820.htm.*

B. USAID'S Global Climate Change Program

As the foreign assistance arm of the U.S. Government, the U.S. Agency for International Development (USAID) plays a key leadership role in delivering climate change-related international assistance to developing and transition countries through the Agency's Global Climate Change Program. USAID sees climate change and development as inextricably linked. Since 1990, efforts to address climate change have been an important part of USAID's development assistance program. USAID's Global Climate Change Program implements "win-win" solutions that provide climate-related benefits while meeting sustainable development objectives, such as reducing growth in greenhouse gas emissions, reducing deforestation, and increasing resilience to climate change in developing countries and countries with economies in transition. Active in over 40 developing and transition countries, USAID commits about $180 million each year to support climate change related development activities. Most recently, USAID has also focused on the development of tools that provide technical assistance and capacity building to developing and transition countries, including:

Courtesy of the Institute for Transportation and Development Policy (ITDP)

TransJakarta: Asia's first Bus Rapid Transit (BRT) system in Jakarta, Indonesia provides mass transportation while reducing emissions. USAID is funding projects that increase economic development and reduce emissions across the globe.

- The publication of an Adaptation Guidance Manual, which identifies a six-step process that will help development partners understand how climate variability and change could affect the performance of development projects.
- An online tool to estimate carbon emissions reductions and sequestration associated with avoided deforestation, sustainable forest management, tree planting, and other improvements to land management.
- The expansion of SERVIR, a platform that integrates satellite and other geospatial data with other information for improved scientific knowledge and decision making by a range of stakeholders, in Africa.
- The development and implementation of voluntary capacity building programs on GHG accounting and reporting in select developing countries.

For more information, please visit: *http://www.usaid.gov/our_work/environment/climate/index.html.*

C. Debt-for-Nature Agreements

Under the Tropical Forest Conservation Act (TFCA), the United States is offering eligible developing countries opportunities to relieve official debt owed to the U.S. Government while at the same time generating funds to support tropical forest conservation programs in beneficiary countries. Partner countries include Bangladesh, Belize, Botswana, Colombia, Costa Rica, El Salvador, Guatemala, Jamaica, Panama (two agreements), Paraguay, Peru and the Philippines. The United States expects to conclude TFCA agreements with other countries, including Indonesia, in the next two years as this successful debt-for-nature program continues. The program may be expanded to include coral reefs in 2007.

Through debt-for-nature agreements, countries in Africa, Asia, and Latin America are able to reduce their debt burdens while protecting forests and wildlife.

To date, the United States has concluded 13 debt-for-nature agreements with 12 countries in Africa, Asia, and Latin America, which will reduce debt burdens and generate $163 million over 10-15 years to conserve 20 million hectares of tropical forests.

For more information, please visit: *http://www.usaid.gov/our_work/environment/forestry/intro_tfca.html.*

D. President's Initiative Against Illegal Logging (PIAIL)

In 2003, the United States launched the President's Initiative Against Illegal Logging (PIAIL) to help countries around the world combat illegal logging, the sale and export of illegally harvested timber, and corruption in the forest sector. PIAIL successes include the $10 million multi-donor Liberia Forest Initiative launched by the United States in 2004 to put the Liberian forest sector on a sustainable and legal basis in the post war era of recovery. Last year, the United States and Indonesia concluded a ground breaking bilateral MOU to combat illegal logging and associated trade. A similar agreement with China is now under discussion as part of the U.S.-China Strategic Economic Dialogue.

For more information, please visit: *http://www.whitehouse.gov/ceq/initiative_against_illegal_logging.pdf.*

Courtesy of Jeremy Holden, Fauna and Flora International

Logging truck in Liberia. Efforts like the PIAIL are helping countries combat illegal logging and reduce the sale and export of illegally harvested timber in the forest sector.

E. Public-Private Forest Partnerships

The TFCA and PIAIL are only two of several U.S. strategies to address avoided deforestation and achieve sustainable management of all types of forests. The United States has invested $68 million to targeted conservation programs as our contribution to the Congo Basin Forest Partnership. In 2006 we launched the Amazon Basin Conservation Initiative, a five-year, $65 million program to help Amazonian countries protect their economically and ecologically vital forests. Through the Sustainable Forest Products Global Alliance, we are helping partner countries and forest products companies to improve the management of 25 million hectares of forest and promote responsible trade worldwide.

Through small grants, the United States is helping the Governments of Indonesia, Malaysia, and Brunei to design and implement the landmark Heart of Borneo initiative announced in February 2007 to preserve 220,000 square kilometers of unique forests on the Island of Borneo. Through the U.S.-led Coalition Against Wildlife Trafficking, the United States has partnered with ASEAN to establish a regional Wildlife Enforcement Network (ASEAN WEN) to combat wildlife crime, including the illegal trade in forest dependent wildlife.

F. U.S. Contributions to the United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC)

The United States is the leading contributor among the 191 Parties to the United Nations Framework Convention on Climate Change (UNFCCC) and is the largest financial supporter of the Intergovernmental Panel on Climate Change (IPCC). For the 2007 Fiscal Year, U.S. contributions totaled $3.7 million to the UNFCCC and $1.9 million to the IPCC. The United States is strongly committed to the ultimate objective of the UNFCCC and U.S. scientists have served as lead authors or review editors on IPCC reports. Additionally, the United States works through many other multilateral venues that address climate change including APEC, the G8, the International Civil Aviation Organization, the International Maritime Organization, and the Organization of Economic Co-operation and Development.

G. U.S. Contributions to the Global Environment Facility (GEF)

The Global Environment Facility (GEF) is an operating entity of the financial mechanism under the UNFCCC. The United States has made a commitment of $320 million over the next four years resulting in $80 million per year contribution. This commitment will fund technology transfer and capacity building in developing countries.

For more information, please visit: *http://www.gefweb.org/*.

VI. International Clean Development Partnerships

Courtesy of Solar Household Energy

Villagers in the Sierra Gorda region of Mexico display a HotPot solar cooker furnished in conjunction with a solar cooking technology dissemination project managed by Solar Household Energy Inc.

A. The Millennium Challenge Corporation (MCC)

The United States is working with partners on sustainable development initiatives that reduce greenhouse gas emissions, build resiliency to climate change, improve energy security, and cut air pollution while ensuring continued economic growth and prosperity. The Millennium Challenge Corporation (MCC) is an innovative addition to U.S. development assistance, based on the concept of rewarding countries that have demonstrated commitment to advance their own sustainable development. The MCC provides significant assistance to countries that implement reforms enabling them to rule justly, invest in their people, and encourage economic freedom.

Millions of individuals living in poverty will benefit from the programs outlined in MCC's first 15 Compact Agreements.

For more information, please visit: *http://www.mcc.gov/.*

B. Clean Energy Initiative

At the 2002 World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa, the United States launched a "Clean Energy Initiative" (CEI), which consists of three distinct but complementary market-oriented, performance-based partnerships. The CEI's mission is to bring together governments, international organizations, industry, and civil society in partnerships to alleviate poverty and spur economic growth in the developing world by modernizing energy services.

For more information on the Clean Energy Initiative, please visit: *http://www.sdp.gov/sdp/initiative/cei/44936.htm.*

GVEP helps deliver electricity o rural communities across the globe, allowing for greater economic development.

1. Global Village Energy Partnership (GVEP)

GVEP is an international partnership with over 1,400 public and private sector partners including the World Bank, the United Nations Development Programme, and leading energy companies. The United States implementation of GVEP, led by the U.S. Agency for International Development, is a 10-year initiative that seeks to increase access to modern energy services for those in developing countries in a manner that enhances economic and social development and reduces poverty.

Through U.S. government support for GVEP and other energy access programs, 19.1 million people have received increased access to modern energy services since the 2002 Johannesburg Summit.

For more information please visit: *http://www.gvep.org/.*

Courtesy of Brenda Doroski, EPA

Cambodia fuelwood savings project manufactures and sells more than 13,000 improved stoves per month. These fuel-efficient stoves are distributed throughout Cambodia.

2. Partnership For Clean Indoor Air (PCIA)

Roughly half the world burns solid fuels such as wood, dung, charcoal, coal, or crop residues for cooking food and heating homes and the number of people relying on such fuels is expected to rise. Indoor smoke inhaled from these stoves results in 1.5 million premature deaths each year. The Partnership for Clean Indoor Air (PCIA) comprises over 150 public and private partners working in over 60 countries to increase the use of affordable, reliable, clean, efficient, and safe home cooking and heating practices. PCIA is focusing on four priority areas: business models and markets for improved cooking and heating techniques; incorporating social and cultural practices to promote adoption of new technology; meeting design and performance guidelines for affordable, reliable, clean, efficient, and safe home cooking and heating practices; and demonstrating reduced exposure to indoor air contaminants.

Since 2003, PCIA partner organizations have succeeded in influencing 1.31 million households to adopt clean and efficient cooking and/or heating practices—resulting in 11 million people with reduced exposure to harmful indoor air pollution. In addition, ten U.S.-funded PCIA pilot projects resulted in:

- More than 1.5 million households educated about the health impacts of indoor air pollution from household energy use;
- Over 320,000 people with reduced exposure to indoor air pollution from cooking and heating in the 76,000 homes in which improved cooking and heating have been adopted;
- Over 650,000 people with a demonstrated increased knowledge of indoor air pollution and mitigation solutions.

PCIA partners and other organizations working with PCIA have a 3-year cumulative goal of bringing improved cooking practices to 6.5 million households, which would reduce indoor air pollution to over 31 million people.

For more information, please visit: *http://www.PCIAonline.org.*

3. Partnership for Clean Fuels and Vehicles (PCFV)

The Partnership for Clean Fuels and Vehicles (PCFV) is working with developing countries to reduce vehicular air pollution by promoting the elimination of lead from gasoline, reducing sulfur from fuels, and introducing clean technologies into new and existing vehicle fleets. The EPA is a founding member and leading supporter of the PCFV, which has over 80 members from governments, industry, and civil society, representing more than 30 countries.

With the assistance of the PCFV and the World Bank, all 49 countries of Sub-Saharan African countries stopped refining and importing leaded gasoline in 2005; providing health benefits for over 733 million people. The Partnership's future targets include the global elimination of lead in gasoline by 2008, and the global reduction of sulfur in fuel to 50 parts per million or below globally.

For more information, please visit: *http://www.unep.org/pcfv/index.asp.*

C. Renewable Energy and Energy Efficiency Partnership (REEEP)

The goal of this multi-stakeholder partnership is to accelerate and expand the global market for renewable energy and energy-efficiency technologies by structuring policy and regulatory initiatives for clean energy and facilitating financing for energy projects. To further REEEP's agenda, the United States has been especially active in developing best practices for financing energy efficiency and renewable energy projects and an open network of affiliated organizations for distributed peer production of models and tools for energy smart community planning and development.

To date, REEEP has funded over 100 projects in 44 countries that address market barriers to clean energy in the developing world and economies in transition. These projects provide new business models, policy recommenda-

Courtesy of EPA

Buses in Mexico City are part of a campaign stressing the public health benefits of vehicle emissions control.

tions, risk mitigation instruments, handbooks, and databases for advancing renewable energy and energy efficiency, in addition to delivering measurable greenhouse gas reductions.

For more information, please visit: *http://www.reeep.org/*.

Courtesy of DOE/NREL

Workers install a PV module in Gosaba, Sundarbans Region, West Bengal, India. More than 3,000 homes in the delta region of the Ganges and Brahmaputra rivers have electricity due to solar home light systems such as this one.

D. Renewable Energy Policy Network for the 21st Century (REN21)

REN21 is a global policy network, which connects governments, international institutions and organizations, partnerships and initiatives, and other stakeholders on the political level with those "on the ground," and is aimed at providing a forum for international leadership on renewable energy. Its goal is to allow the rapid expansion of renewable energies in developing and industrial countries by bolstering policy development and decision-making on sub-national, national and international levels.

To date, REN21 has produced several notable renewable energy analyses, the most noteworthy being its annual comprehensive "REN21 Global Status Report." The United States serves as one of the thirteen national government entities on REN21's Steering Committee.

For more information, please visit: *http://www.ren21.net/*.

Courtesy of DOE/NREL

Geothermal energy provides clean and renewable power; the largest geothermal field in the world is The Geysers, near San Francisco. DOE is working with Calpine Corporation to improve the efficiency of its geothermal facilities at The Geysers.

Notes

U.S. Department of State
www.state.gov/g/oes/climate

Asia-Pacific Partnership on Clean Development and Climate
www.asiapacificpartnership.org

Sustainable Development Partnership
www.sdp.gov