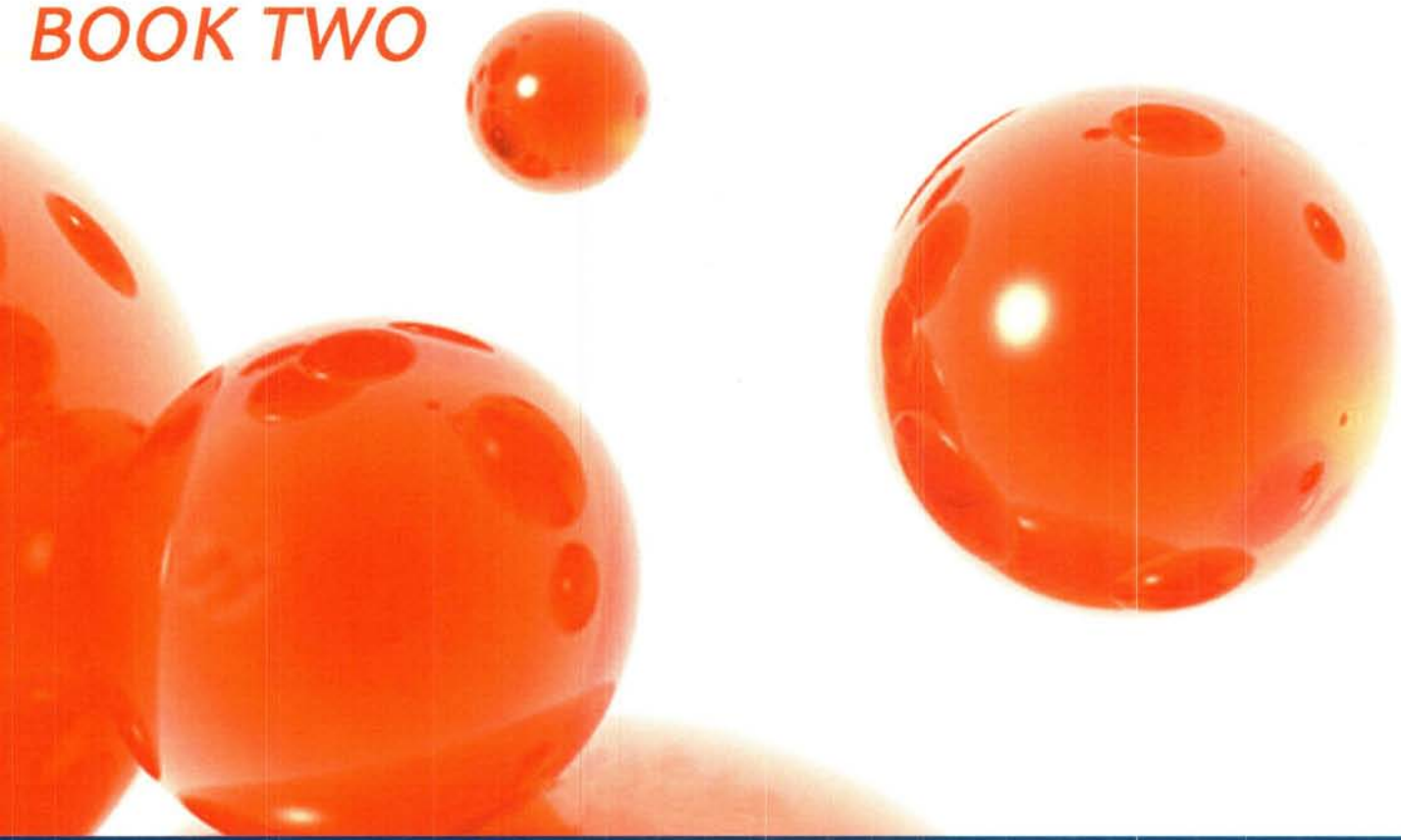
UNITED STATES DEPARTMENT OF ENERGY

TRANSITION 2008

IMPORTANT ISSUES

BOOK TWO



U.S. DEPARTMENT OF ENERGY

U.S. Department of Energy, Transition 2008 - HOT Issue Papers

Section 1 – Energy

1-1 Carbon Capture and Storage (CCS)

- CCS could be developed and accelerated to meet aggressive CO2 emissions goals. This strategy includes FutureGen and Clean Coal Power Initiative (CCPI).
- July 2009 – Select CCPI recipients (closes 1/15/09)
- December 2009 – Award FutureGen based on a December 2008 selection

1-2 Next Generation Nuclear Plant (NGNP) Partnership with Industry

- The Department is working to establish a partnership with industry on the design, licensing, and demonstration of the NGNP. An NGNP is a commercial scale (500-600 MWe) Generation IV version of a Very High Temperature Reactor (VHTR) which has the ability to produce electricity and supply process heat for a variety of industry practices including the production of hydrogen.

1-3 The Future of U.S. Participation in the Global Nuclear Energy Partnership

- The Department's future role in the Global Nuclear Energy Partnership (GNEP) is uncertain due to the House's limitation on the use of FY 2009 funds for GNEP activities.
- Program needs leadership to engage Congress in order to continue U.S. leadership and participation in GNEP.

1-4 Yucca Mountain: Funding Shortfalls for the Repository Program

- Without funding reform, continued funding shortfalls for the repository program will adversely impact the repository schedule and increase taxpayer liabilities.

1-5 Strategic Petroleum Reserve Oil Fill and Compatibility

- The mission of the SPR is to provide energy security for the Nation, and the quantity and quality of oil within the SPR must be adequate to address the nation's emergency needs. Currently, the quantity of oil in the SPR provides less than 60 days of import protection.
- March 2009 - Decision to resume SPR oil fill activities

1-6 Ethanol and Food Prices

- There is public and Congressional concern about the impact of ethanol produced from corn on food prices.

1-7 **Future of EERE's Weatherization Assistance Program**

- The "fit" of the Weatherization Assistance Program within Energy Efficiency and Renewable Energy (EERE) is being re-assessed.
- Early 2009 – Decide if weatherization program should remain in DOE or if DOE should work to have the program transferred to HHS.

1-8 **Transmission and Distribution Requirements for Integrating Clean Generation Technologies While Maintaining Energy Security**

- In an effort to meet energy demand, there has been a large growth in the development of renewable energy. However, the electricity system needs to be modernized before it can fully accommodate and integrate the new generation of energy resources.

1-9 **Future of the Department's Transformational Energy Action Management (TEAM) Initiative**

- Early Secretarial attention will be key if DOE is to be a leader in energy performance.

1-10 **ENERGY STAR® Partnership with EPA**

- DOE and EPA management issues under the ENERGY STAR® memorandum of cooperation

1-11 **Western Area Power Administration's Role in Expanding Power Transmission in the West**

- Western Area Power Administration could be used to expand transmission for renewable generation.

1-12 **Potential Impacts of Reducing Energy Related Greenhouse Gas Emissions**

- EIA has found that proposed legislative requirements to reduce greenhouse gas (GHG) emissions could have significant impacts on energy producers and consumers.

1-13 **Energy Information Administration's Short and Long Term Energy Outlook**

- U.S. and global energy markets have been changing in response to: (1) higher energy prices since 2000, (2) greater influence of developing countries on worldwide energy requirements, (3) recently enacted legislation and regulations, (4) changing public views related to the use of alternative fuels, emissions, and the acceptability of various energy technologies; and more recently, 5) the U.S. and global financial situation.

Section 2 - National Security

2-1 Annual Assessment of the Nuclear Weapons Stockpile

- Report to the President on the Status of the Nuclear Weapons Stockpile.
- March 2009 - Submission of Annual Stockpile Assessment "Package" to the President (March 1) and Congress (March 15)

2-2 Nuclear Weapons Complex Transformation

- Transform the Nuclear Weapons Complex for the Challenges of the 21st Century by 1) transform stockpile; 2) modernize complex; 3) create integrated, interdependent enterprise; and 4) advance science.

2-3 Stockpile Transformation

- Modernizing the "Cold War" era nuclear weapons stockpile.

2-4 2009 Nuclear Posture Review

- Congressionally mandated nuclear posture review due in early 2010.

2-5 Bipartisan Congressional Commission on the U.S. Strategic Posture

- Opportunity to Restore Consensus on U.S. Nuclear Weapon Policy.
- April 2009 - Commission is scheduled to report its findings to Congress.

2-6 Fissile Material Disposition

- Permanent Disposition of U.S. and Russian Weapon-Grade Plutonium.
- Early 2009 - Construction of the Waste Solidification Building is planned to begin in early FY 2009.

2-7 Integration of DOE Nuclear Material Consolidation and Disposition

- DOE has taken steps to improve the integration of Complex-Wide Nuclear Materials Consolidation and Disposition efforts.
- 2009 - Development of the Integrated Nuclear Materials Disposition Plan

2-8 Nuclear Incident Response Teams

- U.S. Government's Nuclear Incident Response Teams reside within NNSA to respond to nuclear and radiological incidents or emergencies.

2-9 OHIO-Class Ballistic Missile Submarine Replacement

- Enabling the most survivable leg of the Nation's strategic deterrence triad, OHIO-class ballistic missile submarines are reaching the end of their operational life. To support the Navy's 30-year shipbuilding plan which includes replacement of this national asset, propulsion plant design and development efforts must begin by 2010.
- 2009 - Construction for the OHIO-class replacement is scheduled to begin

2-10 Nuclear Powered Surface Combatant (CGX)

- As directed in the 2008 National Defense Authorization Act, the Navy is evaluating nuclear-powered propulsion as an alternative for the next-generation Cruiser. Consistent with this direction, and as the final alternative of analysis report demonstrates nuclear power as an attractive option to support the next-generation Cruiser's energy-intense anti-air warfare and ballistic missile defense mission, especially in light of rising oil prices, propulsion plant development is set to begin by 2010.

2-11 Pu-238 Production for Space Exploration and National Security Missions

- The U.S. will exhaust Pu-238 supply by 2015 without resumed production which may have an impact on NASA and national security customers.
- 2009 – Decision on support of efforts to develop an interagency strategy to fund construction of needed facilities and to allocate appropriate costs to user agencies.

2-12 Intelligence: Foreign Intelligence/Counterintelligence Consolidation

- DOE must obtain legislation prior to September 30, 2010 in order to preserve the consolidation of the Department's counterintelligence functions within a single Office of Counterintelligence under the DOE Office of Intelligence and Counterintelligence. Absent such legislation, a "sunset" clause in the 2007 National Defense Authorization Act (NDAA) would reverse the consolidation and recreate the NNSA counterintelligence office.

2-13 Intelligence: Energy, Environment and National Security

- The Office of Intelligence and Counterintelligence is framing a strategic foresight and warning capability to address energy and environmental national security challenges.

Section 3 – Science

3-1 International Thermonuclear Experimental Reactor (ITER)

- ITER is a large-scale fusion energy research facility that will help demonstrate the scientific feasibility of clean, abundant and economical fusion energy for the future.

3-2 Energy Frontier Research Centers

- Energy Frontier Research Centers are intended to foster, encourage, and accelerate high-risk, high-reward basic research that may provide the basis for transformative energy technologies.
- This is a new program; under CR new starts can not be funded.

3-3 DOE Bioenergy Research Centers

- DOE supports three major multidisciplinary centers for complementary and synergistic fundamental research on renewable energy production.

3-4 International Large-Scale Scientific Facilites Collaboration

- Scientific success in the future will require building unprecedented large-scale scientific facilities in the future – these facilities will require extensive international cooperation, coordination and cost-sharing.
- 2009 - Next meeting of the G-8 science ministers and ITER Council

3-5 Isotope Program

- There is a national shortage of key isotopes. Relatively few isotopes are made available by the Department. Many of the isotopes needed to meet domestic demand must be imported.

Section 4 - Management

4-1 Title XVII Loan Guarantee Program

- The Loan Guarantee Program is authorized to issue $42.5 billion in loan guarantees for innovative energy technology projects.
- Application deadlines for the June 2008 solicitations are:
    i. Renewable
        1. Stand-alone and manufacturing projects – 2/26/09
        2. Large scale integrated renewable projects – 2/26/09 for initial application and no later than 4/30/09 for subsequent application material
    ii. Nuclear
        1. Nuclear Power Facilities projects – Initial application submissions were due on 9/29/08 and the balance of the application is due on12/19/08.
        2. Front End Nuclear Fuel Cycle Projects – Initial application submissions were due on September 29, 2008 and the balance of the application is due on 12/2/08.
    iii. Fossil - Initial application submissions are due on12/22/08 and the balance of the application is due on 3/23/09.

4-2 Advanced Technology Vehicles Manufacturing Loan Program

- The Advanced Technology Vehicles Manufacturing Loan Program is authorized to issue up to $25 billion in direct loans.
- The interim final rule must be promulgated no later than 11/29/2008.

4-3 Pending Significant Litigation Matters

- DOE is involved in a number of litigation matters arising out of its diverse activities and programs:
    i. Spent Nuclear Fuel Litigation
    ii. Alleged Exposures to Radioactive and/or Toxic Substances
    iii. National Interest Electric Transmission Corridor Litigation

4-4 Cyber Security

- Senior leadership's awareness and active involvement is critical to sustaining and improving the Department's cyber security posture.

4-5 Contractor Workforce Restructuring

- There is a possibility of reductions in the DOE contractor workforce in FY2009 due to budget uncertainties and other issues. In such circumstances, decisions would need to be made regarding separation programs to be offered by contractors.

4-6 DOE Contractor Human Resources Pension and Benefits Policy

- As of 9/30/2007, unfunded contractor pension and other post-retirement benefit liabilities total $12.3 billion.

4-7 Communication Practices & Brand Management

- The Department is implementing processes to improve how various sub-organizations manage the Department brand and ensure quality communications products.

Energy

Carbon Capture and Storage (CCS)

CCS could be developed and accelerated to meet aggressive CO2 emissions goals. This strategy includes FutureGen and Clean Coal Power Initiative (CCPI).

Summary: The pace of DOE RD&D activities supporting the capability to widely deploy coal power plants with cost-effective CO_2 capture and geologic storage (coal/CCS) should be consistent with the timing of domestic climate change goals.

- Coal/CCS is a promising option that could allow countries to continue to benefit, both economically and from an energy security perspective, from large domestic coal resources under significant carbon dioxide emission constraints.
- Coal/CCS is not currently cost-effective, but there are innovations in the RD&D pipeline that could considerably reduce costs. Most cost-reduction opportunities are related to carbon capture.
- There are significant issues related to carbon storage, including safety, permanence, and geologic storage capacity. Considerable progress in these areas has been and will continue to be made under DOE's Regional Carbon Sequestration Partnership (RCSP) program. The RCSPs are beginning to implement large-scale CO_2 storage tests in locations throughout the U.S. and Canada.
- A significant number of additional demonstration projects, carried out under the FutureGen and Clean Coal Power Initiative (CCPI) programs, will be needed to prove the commercial viability of a suite of coal/CCS technology options applicable to a variety of domestic coal types and geologic storage opportunities.
- The pace of demonstration programs and associated funding for coal/CCS should be driven by climate change goals.
- Even with demonstration program success, widespread commercial deployment will require an extensive CO_2 transportation infrastructure, an insurance framework, regulatory certainty and public acceptance.
- CCS could conceivably be ready for mass commercial deployment by 2025 with a supporting funding increase, and in selected applications by 2020.

Issue

How can DOE programs ensure widely deployable, cost-effective coal/CCS options for coal power plants in an appropriate timeframe?

Status

The prospects for new coal power plants in the US have changed dramatically since early 2007 when a DOE report entitled "Coal's Resurgence in Electric Power Generation" listed 151 coal-fired power plants in the planning stages in the US. By the end of 2007, numerous U.S. coal power plants applicants were refused licenses by state governments, and this trend is continuing. Opposition to conventional coal use is primarily based on CO_2 emissions, and is likely to continue. While it is not yet known whether CCS could be developed, deployed and publicly

accepted, it holds great promise for addressing environmental concerns while meeting the Nation's energy needs.

DOE activities support five strategies that are being pursued to enable coal/CCS to become a major option for reducing greenhouse gases in the U.S. and globally, which include:

1. Accelerate early deployment of CCS in near-zero emission coal power plants by demonstrating, via FutureGen, the capability to integrate near-term CO_2 capture technologies with integrated gasification combined cycle (IGCC) and other advanced coal power plants in commercial settings, and permanently store CO_2 in geologic formations.
2. Develop in the DOE Coal R&D program advanced technologies at the sub-pilot scale which are needed to ensure cost-effective CCS (i.e. provide reduced-cost alternatives to technology used in FutureGen plants) for both retrofit and new plant applications.
3. Demonstrate under the Clean Coal Power Initiative (CCPI) the integration and performance of the most promising advanced CCS technologies emerging from R&D activities for both retrofit and new plant applications.
4. Create economic incentives (e.g. carbon markets, tax credits, loan guarantees, demo funds, etc.) to accelerate the replication of advanced coal/CCS technologies flowing from the CCPI Program in sufficient numbers to achieve the operational experience needed to meet cost and performance targets.
5. Continue to assess and address other potentially significant barriers to CCS deployment that could be mitigated through Federal actions.

The DOE Coal R&D Program (Strategy 2) is focused on development of a "Near Zero Emission Coal Plant" that will emit negligible regulated pollutants and greatly reduced CO_2 via CCS. Cost-reduction is the primary emphasis, and this is being addressed through the development of improved CO_2 capture technologies as well as through power generation technologies such as IGCC that have particular cost and performance advantages when integrated with capture technology.

Additional activities are taking place under the RCSP Program, which encompasses 42 states, 4 Canadian Provinces, and over 350 organizations, and forms the centerpiece of national efforts to place carbon sequestration technologies on the path to commercialization. DOE is helping to develop the technology, infrastructure, and regulations to implement large-scale CO_2 sequestration in different regions and geologic formations within the Nation and in Canada. The RCSPs work with local organizations and citizens who contribute expertise, experience, and perspectives that more accurately represent the concerns and desires of a given region. Collectively, the seven RCSPs represent regions accounting for nearly all domestic coal-fired and industrial CO_2 emissions, and essentially all the potential geologic sequestration sites. The RCSPs are beginning to implement large-volume tests throughout the U.S. and Canada to demonstrate that the capture, transportation, injection, and long term storage of over 1 million tons of CO_2 can be done safely, permanently, and economically. A panel of scientific experts from the International Energy Agency (IEA) has validated that the RCSPs and their large-scale

CO_2 tests are the world's most ambitious and will significantly advance CCS in the U.S., Canada, and internationally.

FutureGen and CCPI are complementary demonstration programs (Strategies 1 and 3). FutureGen is intended to help answer uncertainties associated with the technical integration of CCS and advanced coal power plants, address siting and permitting issues, and help shape and drive the regulatory framework for carbon storage. DOE will only provide funding for the incremental costs associated with the CCS portion of FutureGen plants. The requirement is to capture 90 percent of CO_2 emissions and store at least one million tons per year in a saline reservoir during the project period. This represents about half of the CO_2 captured from a 300 MWe system. The rest could be stored or used in a value-added application such as enhanced oil recovery (EOR).

CCPI is designed as a series of demonstrations to advance the CCS state-of-the-art commercially, including improved versions of initial FutureGen plants. It will be open to a variety of capture processes and CO_2 storage options. There are three principal CO_2 capture processes that work in different ways.

1. Most existing coal-fueled power plants use pulverized coal (PC), and applying CCS to these or new PC plants requires "post-combustion" cleanup, whereby relatively dilute CO_2 in the flue gas is separated from nitrogen using chemical sorbents. This process is very expensive given currently available sorbents.
2. Oxyfuel PC plants use oxygen instead of air, so that the flue gas is mainly CO_2. This makes CO_2 separation from pollutants in the flue gas relatively easy. A major expense is for oxygen.
3. IGCC is an example of "pre-combustion" capture, where coal is converted to a gas that is further processed into hydrogen and CO_2. CO_2 is more concentrated than for PC plants, and can be separated from hydrogen at lower cost using chemicals or membranes. The hydrogen can be used for different purposes, including conversion to electricity via a combustion turbine or fuel cell.

Consistent with the model that has worked well in past DOE-funded clean coal technology demonstrations, CCPI projects will be cost-shared with industry and Federal support will be limited to no more than 50% of the total project cost. This cost sharing historically has been done with multiple demonstrations in a phased approach, and projects are awarded full funding up front in lieu of annual appropriations. CO_2 storage requirements are more flexible than in the FutureGen Program -- CO_2 could be geologically stored or used for value-added applications such as EOR, enhanced gas recovery, or enhanced coalbed methane recovery.

Economic incentives (Strategy 4) to encourage deployment of CCS plants could take on a variety of forms. The Energy Policy Act of 2005 includes provisions for loan guarantees and tax credits for advanced coal power plants, including plants that capture and store CO_2. No loan guarantees have yet been issued but a number of tax credit awards have been made. However, the most important incentive could be legislation that puts an economic value on carbon emissions reductions.

There are other factors that could impede the widespread deployment of CCS (Strategy 5) where Federal actions are necessary or may be helpful. These include development of a regulatory framework for CCS; public acceptance of the safety of CCS; long-term liability issues associated with impacts of potential leakage of CO_2 from geologic formations, and infrastructure challenges that could accompany large-scale CCS deployment (e.g. permitting and building a pipeline network). These factors are being and will continue to be addressed by DOE and others.

Milestones

- Demonstrations:
  - DOE issued a final Funding Opportunity Announcements (FOA) for FutureGen on June 24, 2008, and for CCPI Round 3 on August 11, 2008.
  - As of September, 2008, awards have been made for commercial-scale CO_2 storage demonstration for 6 of the 7 RCSPs.

- Regulation Development:
  - DOE is supporting the EPA process to develop a regulatory framework for CCS: During 2006-2010, DOE will provide analysis and data from two dozen small-scale RCSP geologic storage field tests.
  - Proposed EPA regulations for a national framework for the large-scale injection of CO_2 underground, consistent with protection of underground drinking water resources, were released for public review on July 15, 2008

- Commercial Deployment Incentives
  - On September 22, 2008, DOE announced a solicitation for up to $6 billion in federal loan guarantees for coal-based power generation and industrial gasification that incorporates carbon capture and storage or other beneficial uses of carbon.

Major Decisions/Events

- Demonstrations:
  - The deadline for the submission of FutureGen applications was October 8, 2008. The selection of FutureGen projects is targeted for the end of CY 2008. Cooperative agreements will be negotiated and awarded in 2009. The Department anticipates $290 million will be available for funding of selected projects through fiscal year (FY) 2009 and an additional $1.01 billion is expected to be available in subsequent years, subject to appropriations by Congress.
  - CCPI Round 3 proposals are due January 15, 2009, with selections anticipated by July 2009. DOE could make multiple Round 3 awards and, depending on FY 2009 appropriations, may be able to provide up to $340 million to be distributed among selected recipients.
  - Large scale CO_2 injection for projects under the RCSP is expected to begin between 2009 and 2011. Tests will last for several years, followed by a period of assessment and development of best practice manuals.

- Regulation Development:
  - EPA expects to finalize regulations for the large-scale injection of CO_2 underground in 2011.

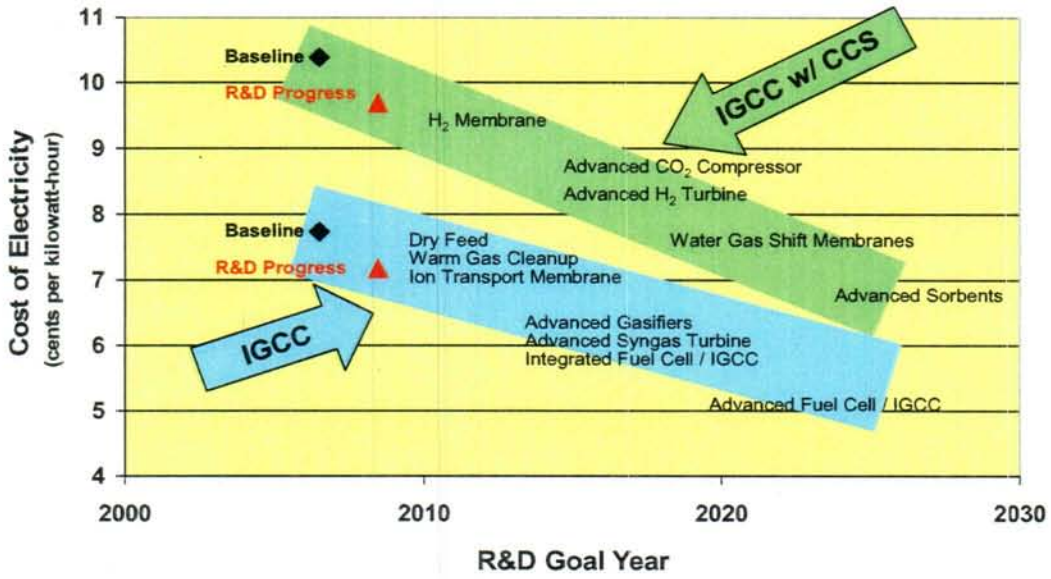
- Commercial Deployment Incentives
  - Applications for up to $6 billion in federal loan guarantee budgetary authority for coal-based power generation and industrial gasification projects using CCS are due in two parts: Part I, consisting of an initial showing of eligibility, is due December 22, 2008; Part II, consisting of additional application materials, is due March 23, 2009

Background on Major Budget Issue – Factors Affecting the Number and Pace of CCS Demonstrations

While FutureGen is intended to demonstrate the technical and regulatory feasibility of coal-fueled electricity generation with CCS, detailed engineering studies estimate that the lowest-cost FutureGen option (i.e., IGCC-based) that could be built with today's technology would increase the levelized busbar cost of electricity by about 70% compared to the lowest-cost plant that would be built without CCS (i.e. supercritical pulverized coal). This may not be an acceptable cost increase domestically, and would not be acceptable for developing countries.

Coal/CCS cost could be significantly reduced by developing a full suite of "reasonable-cost" technology options and practices. Figure 1 below shows technology innovations for IGCC, funded under the DOE Coal R&D Program that together could ultimately drive the cost penalty for CCS from about 70% down to 10%. The indicated dates are estimates for when DOE's R&D goals would be met. These goals assume technology development at relatively small scale, and it could take several additional years before some technologies are ready for commercial-scale demonstration under CCPI. Given an "aggressive" CCPI program, most of the IGCC innovations in Figure 1 could be in an operating demonstration plant by 2025, and incorporated in commercial plants that would be built and operating by 2030. Commercialization of technology innovations associated with other carbon capture options, such as oxyfuel and post-combustion capture, could also occur in this timeframe.

Figure 1. Advanced Coal Power R&D



Multiple demonstrations will be needed to test a reasonable set of advanced technologies at commercial-scale. Historically, incorporating a new subsystem/component into a plant has often had a significant impact on initial performance and economics; hence, industry is reluctant to test more than one or two advanced technologies simultaneously at a single plant. There are a dozen technology advances shown in Figure 1, and incorporating them all would take a significant commitment by industry. Technology advances achieved through private sector and Government–supported R&D are included in the following factors that would be considered for demonstration projects:

- Coal Type - both high and low Btu coals will need to be used. Some gasifiers are more effective than others for abundant, low BTU/high moisture content U.S. Western coals. Oxyfuel or post-combustion capture systems may also prove to be the effective options.

- Capture Systems - A steady progression of new solvents, sorbents and membranes for separating hydrogen, CO_2, and oxygen will become available for large-scale testing for new plant and/or retrofit applications.

- Storage Options – Saline formations are likely to be the storage option of choice in the longer term. However, other opportunities need to be explored, including storage in regionally significant unconventional formations such as basalt and co-storage of CO_2 with various pollutants (e.g. H_2S, SOx, NOx), to significantly reduce overall system costs. Geologic storage for CCPI and FutureGen projects will build on experience

gained in large-scale RCSP tests. These tests are occurring in a number of geologic formations throughout the U.S

If advanced technologies were demonstrated on a schedule consistent with their graduation from the DOE R&D program, it is estimated that at least one major coal/CCS demonstration plant per year will need to commence operations each year for roughly a decade preceding 2025 in order to effectively demonstrate coal/CCS with different coal types, capture system technologies, and storage options. In addition to 10 new power plant demonstrations over the course of a decade, a comparable number of demonstrations should be carried out by other countries because of differences in coal type, geology, regulatory/legal constraints, and technology innovation. Large-scale testing will be far more costly than the preceding R&D, and deploying first-of-a-kind technology is likely to be particularly expensive due to extra risk that frequently leads to unanticipated problems. Significant increases in DOE's coal demo programs will be required.

Demonstrations will also be required for retrofitting existing coal plants, which constitutes a sizeable potential CCS market. While retrofit applications are expected to be more expensive than new plants per ton of CO_2 captured, it should be possible to save money by not applying CCS to the entire existing plant's emissions for demonstration purposes.

Commercial-scale demonstrations could be stretched out over a longer period to reduce annual costs, but this would delay the time when coal/CCS plants will be cost-effective and widely deployable. *This underscores the importance of having climate goals that can be used to determine the desired timing for introducing new greenhouse gas mitigation technologies and practices.*

Paper is as of 11/3/08.

Next Generation Nuclear Plant (NGNP) Partnership with Industry

The Department of Energy (DOE) is working to establish a partnership with industry on the design, licensing, and demonstration of the NGNP. An NGNP is a commercial scale (500-600 MWe) Generation IV version of a Very High Temperature Reactor (VHTR) which has the ability to produce electricity and supply process heat for a variety of industry practices including the production of hydrogen.

Summary: DOE is working to establish a partnership with industry for the design and development of the Next Generation Nuclear Plant.

- Industry is concerned about the reliability of DOE as a partner in the development of long-term projects, and the corresponding uncertainty of obtaining the necessary public capital that depends on annual Congressional appropriations.
- To meet the Energy Policy Act (EPAct) of 2005 goal of a demonstration by 2021, the license application needs to be completed by 2013, driving the planning for the creation of an industry partnership in FY 2009.
- EPAct established the NGNP project and authorized DOE to pursue a public/private partnership to cost share the design, licensing and construction of the demonstration plant.
- DOE has issued two separate Requests for Information and Expressions of Interest in the NGNP Project to shape project strategy and focus an offering of financial assistance.
- Industry has shown interest in a "phased" partnership oriented towards design and licensing, and then, provided necessary public and private capital can be raised, construction of a demonstration plant.
- Congress has doubled the President's budget request for NGNP two out of the last three years.
- In addition to electricity and hydrogen production, high temperature gas reactors can be used as a viable substitute for high temperature process heat currently produced by burning premium fossil fuels, thereby aiding our energy independence efforts.

Issue

The next scheduled milestone for the project will be the establishment of the public/private partnership in order to meet the overall project schedule for completing a demonstration plant by 2021. This would likely occur through some sort of competitive solicitation for proposals from industry.

Status

The project is presently focused on research and development, conceptual plant design, and project planning. An NGNP is a commercial scale (500-600 MWe) Generation IV version of a Very High Temperature Reactor (VHTR) which has the ability to produce electricity and supply process heat for a variety of industry practices including the production of hydrogen. The NGNP operates at much higher temperatures than traditional reactors and requires materials that can withstand extreme temperatures. R&D activities to qualify fuel and materials for the reactor

system are being managed by the Idaho National Laboratory along with input from other labs and universities.

Conceptual design activities are currently being conducted by General Atomics, Westinghouse/PBMR, and AREVA NP through subcontracts held by the Idaho National Laboratory. The objective of these activities is to develop the technical design requirements for the NGNP project which will serve as the basis for soliciting cost sharing partners this year. Planned FY 2009 activities are focused on R&D, design, and licensing activities aimed at resolving regulatory and policy issues for the NGNP.

Milestones

The NGNP Project was formally initiated within the DOE project management system in 2004. The formal authorization of the NGNP project by the EPAct 2005 established milestones and deliverables; the first of which was an independent review of the NGNP program by DOE's advisory committee (Nuclear Energy Advisory Committee (NEAC)). This report was completed on time and forwarded to Congress in April 2006. The second milestone/deliverable was a joint DOE-NRC report to Congress on a licensing strategy for the NGNP which was completed on time and forwarded to Congress in August 2008.

The next scheduled milestone for the project will be the establishment of the public/private partnership in order to meet the overall project schedule for completing a demonstration plant by 2021.

Major Decisions/Events

Pursuant to DOE Order 413.3A, Program and Project Management for the Acquisition of Capital Assets, the next phase of this effort would entail the program providing to the DOE Acquisition Executive (Deputy Secretary) a Critical Decision -1 package for approval of Alternative Selection and Cost Range, which would include an acquisition strategy for establishing the industrial partnership.

Background

In December 2002, the Department, in partnership with the international research community, issued the "Generation IV Technology Roadmap" which identified the potential for gas cooled reactors to provide process heat to industry to meet a variety of needs including hydrogen production, oil sand recovery, coal liquefaction and gasification, and electricity production. This work by over 100 researchers from 14 countries set the stage for the NGNP program.

Subtitle C, Section 641(b) of the Energy Policy Act of 2005 authorized the NGNP project and directed the project to consist of research, development, design, construction, and operation of a prototype plant to generate electricity, produce hydrogen, or both.

As the conceptual design studies have progressed, interaction with industrial end-users identified high temperature gas reactors as a viable substitute for high temperature process heat currently produced by burning natural gas or fuel oil. In this regard, nuclear energy has the potential to provide a significant amount of heat, offsetting carbon emissions and freeing valuable fossil fuels for other uses, in addition to producing electricity or hydrogen. The growing recognition of the

importance of this technology is evidenced by Congressional action to double the President's budget request for NGNP in two of the last three years. Industry estimates that many NGNP type plants could be sold in the next decade if the technology was licensed today given the volatility of premium fossil fuel prices and the uncertainty over future carbon taxes.

Paper is as of 11/3/08.

The Future of U.S. Participation in the Global Nuclear Energy Partnership

The Department's future role in the Global Nuclear Energy Partnership (GNEP) is uncertain due to recent Congressional action on FY 2009 budget request.

Summary: Although DOE has been intimately involved in the growth and development of GNEP through bilateral and multilateral agreements, the future of the Department's role in the partnership is uncertain given the recent Congressional action on the Department's FY 2009 budget request. As of October 1, 2008, the House Appropriations subcommittee's version of the FY 2009 DOE budget contains a limitation on the use of FY 2009 funds for GNEP activities. The Senate version contains no such limitation. As the lead U.S. agency for civil nuclear energy matters, the Department of Energy (DOE) carries out various domestic and international activities to achieve the domestic agenda. DOE works in close coordination with the State Department to support international nuclear nonproliferation goals, energy security, nuclear safety and other nuclear energy objectives. In 2006, the U.S. initiated GNEP, a multilateral framework for international civil nuclear matters in key areas such as technical cooperation, reactor development and deployment, and infrastructure development.

Issue

Recent Congressional action on the Department's FY 2009 budget request has called into question the Department's future participation in GNEP. A prohibition on U.S. participation in GNEP will negatively affect our ability to influence the global nuclear energy enterprise and advance U.S. nuclear nonproliferation objectives.

Status

GNEP provides the Department with a multilateral framework for promoting nuclear energy and nonproliferation in a safe, secure and sustainable manner. DOE cooperates internationally via bilateral and multilateral agreements and has developed or is in the process of concluding nuclear energy research plans with Japan, China, Russia, France, and Australia.

GNEP is one of three international forums through which DOE, on behalf of the U.S. government, seeks to further U.S. civil nuclear energy policy objectives. In addition to GNEP, DOE has an active leadership role in the International Atomic Energy Agency (IAEA) and the Generation IV International Forum (GIF). Within the GNEP framework, the United States chairs the Steering Group and two Working Groups on Infrastructure Development and Reliable Nuclear Fuel Services. The House appropriations bill for FY 2009, if enacted into law, will prohibit DOE from using FY 2009 funds for GNEP.

Milestones

GNEP has broad international acceptance and its progression can be tracked by annual milestones. Currently, 21 partner nations have joined the effort to globally expand nuclear power and help meet growing energy demand in a safe and secure manner, while at the same time reducing the risk of nuclear proliferation and responsibly managing spent nuclear fuel. In May 2008, the GNEP Steering Group met on the Dead Sea in Jordan, and an executive committee meeting of the governing energy ministers was held in Paris, France in October 2008.

Major Decisions/Events

Continued U.S. leadership and participation in GNEP requires DOE executive leadership to engage Congress.

Background

As countries began to embrace the potential for nuclear energy technologies to meet their domestic energy needs, DOE increased its focus on international cooperation on nuclear energy in order to advance U.S. civil nuclear energy policy objectives. As more countries express an interest in nuclear energy as a means to support economic and infrastructure development, decrease reliance on fossil fuels, and curb greenhouse gas emissions, the U.S. must continue its active leadership in the international arena to ensure the global expansion of nuclear energy occurs in a safe and secure manner.

To focus its international cooperation, DOE implemented a set of bilateral and multilateral cooperation programs on nuclear energy development. Bilaterally, DOE established research agreements with Brazil, Canada, the European Union, France, Japan, South Korea, and the Nuclear Energy Agency. In all international cooperation arrangements, including action plans, DOE ensures that sensitive technical cooperation occurs only with countries with which the United States has established agreements that limit proliferation of sensitive nuclear technology, i.e., 123 Agreements for Peaceful Uses of Nuclear Energy.

Multilaterally, DOE participates in several forums focused on nuclear energy research and development. DOE actively participates in international efforts to develop advanced nuclear energy technologies through the IAEA, GIF, and GNEP. GNEP has provided expanded international opportunities to promote the safe and secure deployment of nuclear energy technologies by offering reliable nuclear fuel services and secure and responsible nuclear infrastructure development for countries seeking nuclear power.

Paper is as of 11/3/08.

Yucca Mountain: Funding Shortfalls for the Repository Program

Without funding reform, continued funding shortfalls for the repository program will adversely impact the repository schedule and increase taxpayer liabilities.

Summary: Funding shortfalls for the repository program will adversely impact the repository schedule.

- Delays in beginning acceptance of spent nuclear fuel at the Yucca Mountain repository have already resulted in judgments against the Department. Currently, the earliest projected date that the repository could begin operations is 2020 and, based on that repository opening date, taxpayer liabilities are currently estimated to be up to $11 billion. These liabilities will further increase on average by an estimated $500 million annually for each additional year of delay.
- The significant increases in annual funding needed to construct the repository following receipt of the construction authorization from the NRC (no later than 2012) are unlikely to occur without funding reform.
- The funding reform would reclassify utility fees paid into the Nuclear Waste Fund (NWF) as discretionary resulting in program appropriations from the Fund not having to compete for appropriations with other Federal programs and not impact the Federal budget deficit.

Issue

Delays in beginning acceptance of spent nuclear fuel at commercial utilities have resulted in judgments against the Department and projected taxpayer liabilities which are estimated to be up to $11 billion if the repository were to begin operations at the current earliest projected date of 2020. These judgments are required to be paid out of the U.S. Treasury's Judgment Fund and are in addition to the funds that will be required to license, construct and operate the repository and supporting infrastructure. The Judgment Fund consists of taxpayer funds rather than monies from the NWF. The earliest projected date of 2020 that the repository could begin operations assumes the Office of Civilian Radioactive Waste Management (OCRWM) Program is fully funded. The current process for appropriating funds from the NWF to the Department for Yucca Mountain related activities does not allow the NWF to be used as originally intended by Congress. If these restrictions remain unresolved causing further delays in repository development, the Department estimates that taxpayer liabilities will further increase by an average of up to $500 million annually beginning in 2020.

Status

The NWF has a balance of approximately $21 billion invested in U.S. Treasury instruments. The NWF annually receives approximately $750 million from nuclear utility fee payments and approximately $1 billion from interest earnings. Since 2000, the OCRWM Program has received approximately $1 billion less funding than requested. Beginning no later than 2012, a significant increase in the annual funding levels of between $1.0 and $1.5 billion will be needed to construct the repository and transportation infrastructure and systems. Without an assured funding source, the date for beginning receipt of spent fuel at the repository cannot be credibly established and taxpayer liabilities will continue to increase.

Milestones

While the program can continue the licensing process before the Nuclear Regulatory Commission (NRC) for 3 to 4 years under existing funding levels, to timely construct and operate the repository substantially higher budgets will be needed. With the acceptance (docketing) of the license application in September 2008, the NRC by statute must make a decision on the construction authorization no later than September 2012. The resolution of this appropriations issue will involve a number of competing priorities. If the growing taxpayer liabilities are to be addressed, the Department will need to work toward a resolution that can assure adequate funding in 2012.

Major Decisions/Events

The need to reform the accounting of receipts and disbursements to be consistent with the intended purpose of the NWF has been discussed with the Congress for several years. Legislation was proposed that would fix this problem by reclassifying mandatory NWF fees as discretionary, in an amount equal to appropriations from the NWF for authorized waste disposal activities (S 37 and HR 3358 in the 110th Congress). The Department has testified on several occasions before both Senate and House Committees about the importance of this issue to limiting future taxpayer liabilities. Funding reform is essential before the 2012 appropriations process begins to assuring that the 2020 date for repository operations can be met.

Background

The Nuclear Waste Policy Act of 1982, as amended (NWPA) requires the generators of spent fuel to pay the full costs of disposal through fees paid into the NWF, and requires the DOE to sign Standard Disposal Contracts with the nuclear utilities. In the contracts which DOE executed with utility owners of the existing fleet of commercial reactors, DOE committed to begin accepting the utilities' spent fuel for disposal in 1998 in exchange for payments into the NWF of one mill per kilowatt-hour of electricity produced and sold. The federal courts have held that DOE is liable under the Standard Disposal Contract for past damages incurred due to the federal government's failure to begin accepting spent nuclear fuel commencing in 1998. The resulting damages are paid to utilities out of the U.S. Treasury's Judgment Fund, which are taxpayer funds rather than monies from the NWF. Currently, the earliest projected date that the repository could begin operations is 2020 and, based on that repository opening date, taxpayer liabilities are currently estimated to be up to $11 billion. This taxpayers' liability is estimated to increase by an average of up to $500 million annually for every year the opening of the Yucca Mountain repository is delayed beyond 2020.

Management of this liability issue depends entirely upon beginning operation of the repository at the earliest date possible. Potential funding shortfalls beginning in 2012 represent the most significant schedule obstacle and will translate directly into increased taxpayer liabilities.

The Program has, like numerous other federal programs, received appropriations over the years that have been less than the funding requested. And like other programs, these shortfalls have impacted schedule, sustainability, leadership, retaining expertise through recurring lay-offs and budget cuts, recruiting new federal and contractor talent, etc. Over the 26 years of appropriations for the Program, in only eight of those years was the funding level over $400

million, and has never exceeded $600 million, although higher amounts were requested. Construction of the Yucca Mountain repository, expected to commence in 2012, will require annual funding of between $1.0 and $2.6 billion, well above current and historic levels.

Required funding levels for earliest projected 2020 schedule (dollars in billions):

2012	'13	'14	'15	'16	'17	'18	'19	'20
1.109	1.352	1.466	2.078	2.525	2.587	2.542	1.941	1.645

For any federal program, an increase from one year to another of double or triple the previous funding would be a significant challenge for Congress. In 2012 the Program will need such a dramatic increase after 30 years of funding at a nominally consistent level. But this Program has, unlike other programs, a unique solution that would permit increased funding without impacting the Federal deficit.

Currently, receipts from the utility fee that go into the NWF are scored as mandatory since the payment of the fee is required by the NWPA and treated like a tax, while Program expenditures are scored as discretionary because they require appropriations. Since mandatory and discretionary accounts are treated separately in the Federal budget, mandatory receipts cannot be used to offset discretionary expenditures. Under this arrangement, fee receipts have no impact on the amount that can be appropriated for the Program for which the fee is being paid. Instead, the Program must compete for funding with all other discretionary programs for a limited Federal budget.

The NWF was established by the NWPA to provide an assured source of funds based on the collection of utility fees to carry out the repository program. The current scoring approach restricts the NWF from being used for its intended purpose, and is of particular concern since DOE is contractually obligated to perform services for which the fees are being paid.

The funding reforms presented in legislation proposed in the most recent legislative term (S 37 and HR 3358 in the 110th Congress) would fix this problem by reclassifying the mandatory NWF fees as discretionary, in an amount equal to appropriations from the NWF for authorized waste disposal activities. Funding would then be possible at the higher levels needed to construct the repository without competition with other Federal programs. The appropriations from the NWF would no longer negatively impact the Federal budget deficit. Funding for the Program would still have to be requested by the President and appropriated by the Congress from the NWF.

Without funding reform, it is highly uncertain whether Congress will be in a position to appropriate the significant increases in annual funding that will be necessary to construct the repository and transportation systems. Without this increased level of funding the Program will not be able to set a credible opening date for the repository.

The Program has submitted the license application and it has been docketed by the NRC. The NRC is now required by statute to make a decision on the construction authorization no later than 2012. Future funding shortfalls will translate directly into schedule delays for the opening of the repository along with a corresponding increase in government contractual liabilities.

Paper is as of 11/3/08.

Strategic Petroleum Reserve (SPR) Oil Fill

The mission of the SPR is to provide energy security for the Nation, and the quantity and quality of oil within the SPR must be adequate to address the nation's emergency needs. Currently, the quantity of oil in the SPR provides less than 60 days of import protection.

Summary: The amount of oil in the SPR currently provides less than 60 days of import protection for the Nation. The escalation of high oil prices during 2008 caused Congress to:

- Pass the *Strategic Petroleum Reserve Fill Suspension and Consumer Protection Act of 2008* (P.L. 110-232), requiring the SPR to suspend oil fill activities until after December 31, 2008.
- Propose legislation for the immediate release of 70 million barrels of sweet crude from the SPR and replacement with heavy oil over the next 5 years.

Decisions will be needed regarding (1) whether to resume SPR oil fill in 2009 to increase the nation's energy security and (2) how best to alter the crude mix within the SPR to address the current crude compatibility issues with respect to heavy crude refiners.

Issues:

The Congress, in trying to lessen current oil prices, enacted the *Strategic Petroleum Reserve Fill Suspension and Consumer Protection Act of 2008* (P.L. 110-232), on May 19, 2008, that suspended Strategic Petroleum Reserve (SPR) oil fill activities, to the maximum extent practical, until after December 31, 2008. The issue is whether to resume fill.

DOE will explore resumption of fill using the royalty-in-kind program as well as possible purchase of crude oil using receipts from the 2005 Hurricane Katrina sale. SPR will also receive repayment, plus premium barrels, of the Hurricanes Gustav and Ike emergency exchanges that occurred during 2008 as well as receipt of the royalty-in-kind deliveries that were deferred due to P.L. 110-232.

The qualities of U.S. imports have changed over the years and there is an increasing compatibility issue with refiners which import and process heavy crudes which are not currently available in the SPR. The issue is how best to alter the SPR's current crude mix. Congress has proposed a swap of 70 million barrels of sweet crude for an equivalent value of heavy crude. DOE had proposed to add capacity for storage of heavy crudes as part of the authorized expansion of the SPR to one billion barrels.

Status:

SPR Oil Fill - The Secretary of Energy has been directed by the *Energy Policy Act of 2005* (P.L. 109-58) to fill the SPR to its authorized one billion barrels capacity, as expeditiously as practical, in order to increase U.S. energy security. With a short pause after Hurricanes Katrina and Rita, DOE resumed SPR oil fill activities in July 2007 using Federal royalty-in-kind (RIK) oil, and was on track to complete the fill to its currently available storage capacity of 727 million barrels by December 31, 2008.

However in May 2008, the Congress passed the *Strategic Petroleum Reserve Fill Suspension and Consumer Protection Act of 2008* (P.L. 110-232), which required that the SPR suspend oil fill

activities, to the maximum extent practical, until after December 31, 2008 (unless the 90-day average price dropped to less than $75 per barrel). The SPR suspended further oil acquisition activities and deferred deliveries for 2.1 million barrels of oil to 2009. The SPR inventory had halted at 707.2 million barrels, which is equivalent to about 58 days of net U.S. petroleum imports.

In September 2008, the Secretary of Energy authorized the SPR to conduct a test exchange to address refinery shortages of crude resulting from Hurricanes Gustav and Ike. The SPR released 5.4 million barrels of crude oil to refiners through emergency exchanges, or loans. This oil will be returned, with interest, to the SPR in the first quarter of 2009. The current inventory in the SPR is 702 million barrels.

SPR Oil Compatibility – The SPR currently stores only two crude types – a light, low-sulfur crude and a light, medium-sulfur crude. These two crudes were characteristic of the crudes that were being processed by U.S. refiners in the 1970s and 1980s. Over the years the quality of the crudes being imported has changed and an increasing number of U.S. refineries are processing heavy crudes.

In 2005, the SPR conducted a comprehensive Crude Compatibility Study of the current SPR crude oil streams. In general, the crudes currently stored in the SPR are compatible and desirable for the majority of the U.S. refineries and are well suited to mitigate most supply disruptions. There were, however, eleven refineries of the 150 in the U.S. that have been specifically configured for processing heavy crude largely from Latin America that would be impacted in the event of a disruption of foreign crude supplies. However, they would be able to process a limited quantity of SPR crude and maintain their full production of gasoline.

To address the compatibility issues of the eleven heavy crude refiners and to ensure full protection for the Nation for all disruption scenarios, DOE concluded in its study that it plans to allocate up to 10% of the SPR inventory for heavier crudes in the authorized expansion of the SPR to one billion barrels.

Milestones:

Mar 2009 -	Decision to resume SPR oil fill activities via (a) resumption of DOI RIK oil transfers to DOE and/or (b) direct purchase using the current balances in the SPR Petroleum Account .
Jul 2009 -	Earliest date possible for DOI RIK oil transfers and SPR fill to resume.
Jan 2010 -	Possible SPR fill complete to 727 million barrels.
Sep 2019 -	Targeted completion of SPR Expansion to 1.0 billion barrels

Major Decisions/Events:

SPR Oil Fill Decision – A decision is needed whether the SPR should resume oil fill in 2009 to increase our nation's energy security issue, and support our IEA compliance.

When Congress suspended SPR fill in 2008, SPR had been acquiring Government-owned oil from the Department of Interior royalty-in-kind program. This method has been used since

1999. As DOI awards contracts for the RIK oil on 6-month cycles, the earliest the SPR can resume RIK oil fill activities would be in July 2009.

The SPR also has available balances of $584 million dollars in its Petroleum Account from the oil sale in response to Hurricane Katrina in 2005. All proceeds from crude oil sales from the SPR are transferred into the SPR Petroleum Account as directed by the Energy Policy and Conservation Act (42 USC 4201, *et seq.*). Balances in the Account remain available (without fiscal year limitation) for the sole purpose of acquiring, transporting and injecting oil. These funds could be used to acquire additional SPR oil in 2009. The SPR attempted to reacquire oil with these funds in early 2007, but due to the unstable market at that time the offers received were deemed unreasonable.

SPR Crude Exchange Decision - A decision is needed on how the SPR should alter the crude mix within the SPR to address the current crude compatibility issues and refiner needs for heavy crude oil which is not currently available in the SPR.

Congress has introduced legislation for DOE to implement a "crude exchange" to alter the current crude mix of the SPR - exchanging 70 million barrels of light sweet crude for 70 million barrels of heavy crude, in lieu of DOE's plan to add a heavy crude component in conjunction with the expansion of the SPR. The primary goal of this legislation was to secure the immediate sell-off of oil from the SPR to reduce oil prices.

This proposed "crude exchange" would affect both the level of protection provided by the SPR and the response capabilities of the SPR:

- Reduction of SPR Protection – The amount of oil in the SPR currently provides less than 60 days of net import protection for the Nation. The sell-off of 70 million barrels of oil would further reduce the SPR inventory and the level of import protection until the heavier oil is slowly re-acquired 5 years later.
- Degradation of SPR Response Capability - Exchanging the SPR sweet crude for heavy crude would reduce the ability of the SPR to meet the emergency needs of U.S. refiners. Sweet crude is universally used and is always in demand, especially during emergencies. In the event of a supply loss, refiners increase their demand for sweet as it requires minimal refinery equipment and can increase utilization rates.
- Increased Costs - Compared to the relatively light crude oil currently stored in the SPR, heavy oil is much denser and therefore harder to move around. Millions of dollars would be needed to retrofit existing facilities to handle and store heavy oil.
- Impact on SPR Caverns - The oil in the SPR is stored in solution-mined caverns in salt formations that are specifically designed to accommodate five complete drawdown and refill cycles. However, the impact of emptying a cavern would be that it would reduce the remaining operational life of the cavern to 4 cycles. If this was implemented in conjunction with the expansion of the SPR, there would be no impact on existing cavern life.

Paper is as of 11/3/08.

Ethanol and Food Prices

There is public and Congressional concern about the impact of ethanol produced from corn on food prices.

Summary: Corn ethanol has recently been blamed for significantly contributing to increased food prices. Competing analyses provide different assessments of corn ethanol's actual effect on food prices. The U.S. government holds that the impact of ethanol on food prices has been small (approximately 10 percent of the increase) and ethanol has actually helped lower the price of gasoline.

Issue

- High food prices have raised public concerns about the sustainability of corn ethanol as an alternative fuel to petroleum. These concerns have led to calls to reduce or eliminate the Renewable Fuel Standards (RFSs) enacted in the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007 (EISA), which mandates increased use of ethanol. EERE's Biomass and Biorefinery Systems R&D Program (OBP) believes that at this critical juncture in America's energy future, a repeal of the RFS would negatively impact the future of the U.S biofuels industry.
- The public may not be receiving the full analysis of corn ethanol impacts. Corn ethanol has contributed to increased food prices, but the proportion of that contribution is believed to be small. In addition, the blending of less expensive corn ethanol into recently more expensive gasoline has resulted in lower gasoline prices at the pump compared to gasoline prices with zero ethanol blended. Given more information, the public might think more of corn ethanol impacts (negative at the grocery store, positive at the fuel pump) as a wash.

Status

- The methodology for calculating corn ethanol's effect on food prices is controversial. Methodologies acknowledge that several factors have caused the recent run-up in food prices, including higher fossil fuel costs, a rising developing world, grain shortages, diverting approximately one-fourth of the U.S. 2007 corn harvest to produce corn ethanol, and others. Different methodologies attribute different weights to these factors, and some methodologies go farther than others in including effects along the long and complex agricultural food production chain. For example,
- Several reports have been published that have challenged the notion that ethanol has significantly contributed to increased food prices (Farm Foundation/Purdue University, Texas A&M University, and Iowa State University).

- Keith Collins, former Chief Economist for USDA, and hired by Kraft Foods Global, estimated corn ethanol's effect at 25-35 percent. He attributes the higher percentage to including ethanol's impact on other food crops in addition to corn.[1]
- The U.S. government has concluded that corn ethanol caused approximately 10 percent of the increase in food prices and has lowered gasoline prices through reducing gasoline consumption by approximately 7 percent.
    - In June 2008, DOE and USDA estimated that corn ethanol has been responsible for about 4-5 percent of the increase in food prices in 2008. Later, International Monetary Fund data that DOE and USDA cite suggested that U.S. ethanol production might be responsible for about 10 percent of the 2008 increase in world food prices.
    - In its August decision on the Texas RFS waiver request, EPA estimated that the ultimate effect of the RFS itself (vs. the actual use of ethanol) on food prices would likely be less than a 1 percent change in the food CPI.
- Cellulosic ethanol (ethanol produced from non-food energy crops, wood waste, etc.) is the acknowledged ethanol of the future. Approximately one-fourth of the total 2007 U.S. corn harvest was diverted to produce 6.5 billion gallons of ethanol. Americans consume approximately 140 billion gallons of gasoline per year. With consumption projected to be even higher in the near future, the U.S. cannot continue to rely on fuels made from food crops, like corn, to meet future transportation energy requirements.

Options/ Paths Forward

- There may be a need and opportunity to address the concerns expressed by ethanol opponents through outreach and education by explaining that corn ethanol is a transitional source for biofuels before cellulosic ethanol penetrates the market and that it is not the major cause of increased food prices.
- Increased R&D to improve the sustainability of corn ethanol or on adding cellulosic capabilities to existing corn-based facilities are relatively near-term options. Development of advanced separation and processing technologies (less energy, less emissions, less water demand, higher yields of ethanol, etc.) will both help the existing industry and lower costs in future cellulosic biofuels. DOE's Office of Science is involved in longer-term research to explore the basic building blocks of plant cell walls to achieve a highly efficient system of cellulosic fuel production.
- Cellulosic ethanol derived from wood-waste or fast-growing grasses or trees will eliminate most of the negative impacts of corn ethanol production. EERE has been conducting R&D on cellulosic ethanol production for many years and has made substantial progress toward making it cost-competitive. Continuing that research at its current pace (about as fast as the industry can handle) would be another option for addressing the sustainability issues

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[1] Martin, Andrew. The New York Times. "The Man Who Dared to Question Ethanol." Http://Www.Nytimes.Com/2008/07/13/Business/13feed.Html?Adxnnl=1&Pagewanted=Print&Adxnnlx=1216836882-Ropwm0mbkidzd/Vol3v80g July 18, 2008.

surrounding corn ethanol, with cellulosic ethanol estimated to be in commercial production by 2012.

Background

- Federal efforts to increase ethanol use have been multifaceted:
  - The Federal RFSs mentioned above.
  - Tax subsidies – especially the current 51-cent-per-gallon blender tax credit, set to expire at the end of 2010 – have been the main near-term lever to encourage widespread ethanol use.
  - New incentives for cellulosic ethanol are provided in the new 2008 Farm Bill.
- Ethanol is most widely used in U.S. fuels as a blend of up to 10 percent (E10), comprising about 7 percent of gasoline fuel nationally. This E10 blend can be used in all cars and does not require them to be "flex-fuel" vehicles, i.e. those that can use up to 85 percent ethanol in their fuel (E85). EERE's Vehicle Technologies program (VT) has been testing intermediate blends of gasoline (E15, E20), which, if approved by EPA as "substantially similar" to gasoline, would allow those blends to be widely sold for use in ordinary cars. Testing results show that there are no show-stoppers with respect to the use of intermediate blends (up to E20) in non-flex-fuel legacy vehicles. Widespread use of intermediate blends could substantially increase U.S. ethanol use.
- Currently, imports of ethanol are taxed at a rate that negates the incentive effect of the retail excise-tax exemption. Eliminating the import tariff would likely encourage imports of Brazilian ethanol produced from sugar-cane, which would reduce the impact of ethanol use on food prices and domestic water supplies. This could, however, discourage or slow development of cellulosic ethanol in the U.S., and an expansion of the Brazilian sugar-cane industry could have as-yet unstudied environmental impacts. (For instance, if rainforest is cleared to make room for new sugar cane crops, that would have a negative impact on global climate change.) Currently, there is a window through the Caribbean Basin Initiative (CBI) to allow for up to 7 percent of the U.S. ethanol supply to be imported tariff-free – this provision has never been fully exploited. EERE and PI have analysis and modeling capability for global ethanol supply that will be needed in order to decide an appropriate policy towards ethanol imports.
- While water use throughout the production cycle for corn ethanol has been raised as a current issue, it should be noted that strictly from the processing point of view, biochemical conversion of cellulose is currently much more water-intensive than corn ethanol. The use of water by the corn industry and the future cellulosic biofuels industry needs to be clearly understood and further development of cellulosic feedstocks and conversion processes needs to be approached sustainably.

Paper is as of 11/3/08.

Future of EERE's Weatherization Assistance Program (WAP)

The "fit" of the Weatherization Assistance Program within EERE is being re-assessed.

Summary: The Weatherization Assistance Program (WAP) has been in existence for three decades to help low-income families reduce their energy bills through the use of low-cost, commercial energy efficiency technologies.

The appropriateness and "fit" of WAP within EERE's R&D-dominated portfolio is being re-assessed because of the nature of the activity (State formula grants vs. EERE's predominantly competitive R&D and deployment activities) and because of the typically lower return-on-investment from such grants compared to R&D.

The President's budget did not contain a request for funding WAP in FY 2009. The Continuing Resolution, Public Law 110-329, that became effective October 1, 2008, provided $250 million for WAP.

Issue

- A challenge before the Federal Government today is how best to address energy security and climate change, while continuing to assist low-income families in meeting their energy needs in a period of rising energy costs and a large Federal budget deficit.
- EERE has raised the issue of whether an agency already administering programs similar to weatherization grants should fund and implement WAP instead of the Department of Energy (DOE).
- DOE has urged the transfer of the WAP to the U.S. Department of Health and Human Services (HHS), thereby making it a companion to HHS's Low Income Home Energy Assistance Program (LIHEAP) and consolidating the administration of low-income energy grant programs in a single Federal agency.

Status

- In FY 2008, EERE requested $144 million for WAP and Congress appropriated $227 million.
- In FY 2009, EERE zeroed-out WAP in the request and redirected the funds to R&D programs, which deliver greater benefits because studies have found that EERE's R&D portfolio has historically provided approximately 20 to 1 benefit to cost ratio in comparison to Weatherization's 1.5 to 1 benefit cost ratio.
- The October 1, 2008 Continuing Resolution provided $250 million for WAP.
- DOE will administer the WAP funds as appropriated by Congress in FY 2009.

Major Decisions or Events

The next administration will need to determine if the Weatherization Program should remain in DOE or whether Congress should be urged to transfer the program to another agency such as HHS.

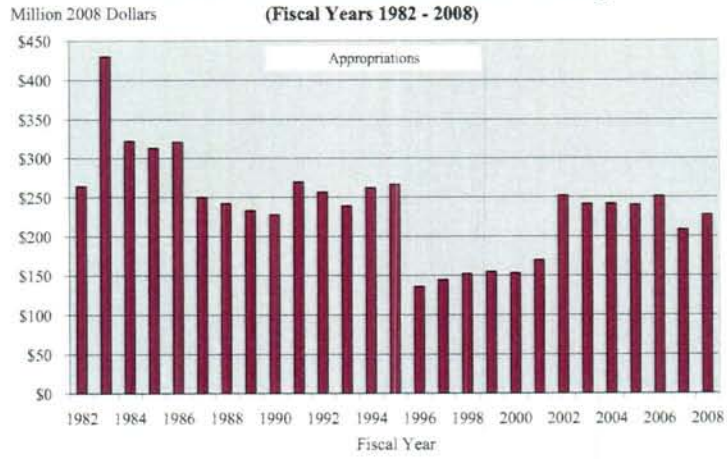
Background

DOE's Weatherization Assistance Program was created under Title IV of the Energy Conservation and Production Act of 1976, which was designed to cut heating bills and reduce imported oil. At first, Weatherization providers emphasized emergency and temporary measures, including caulking and weather-stripping of windows and doors, and low-cost measures such as covering windows with plastic sheets. As providers gained experience and understanding of the cost-effectiveness of different energy efficiency measures, DOE gradually incorporated additional measures within the program. DOE has conducted evaluations that verify savings and cost effectiveness.

WAP provides formula grants to States, which in turn, provide grants to local agencies, primarily to reduce the energy costs of low-income households by installing cost-effective energy efficiency measures while ensuring the health and safety of the people served. Priority is given to the elderly, persons with disabilities, families with children, and households that spend a disproportionate amount of their income on energy bills (presently utility bills make up 17 percent of household expenses for low income families, compared to four percent or less for all other Americans).

Since the inception of WAP in 1976, 3.4 million homes have been weatherized with DOE funds and 6.2 million from all sources. In program year 2006 (the most recently completed statistical year), DOE weatherized 104,283 units with the $242.6 million appropriated by Congress. The average expenditure per household is $2,913, and an average of 30.5 million MBtu of energy is saved as a result of weatherization. This equates to a 23 percent reduction in primary heating fuel use. Low-income families will presently save an average of $413 in reduced first-year energy costs, at current prices. Overall, the program saves $1.53 in energy costs for each dollar invested (based on Calendar Year 2007 EIA energy price projections).

Weatherization Assistance Grants Funding
(Fiscal Years 1982 - 2008)



Funding for low-income Weatherization has historically come from several sources and represents a partnership of both public and private organizations. The largest contribution has come from DOE, totaling more than $7.0 billion since 1980 (in 2008 dollars). In the past 25 years Weatherization funding has ranged from a low of $136 million in FY 1996 to a high of $430 million in FY 1983.[1]

Paper is as of 11/3/08.

[1] Both figures are in 2008 dollars

Transmission and Distribution Requirements for Integrating Clean Generation Technologies While Maintaining Energy Security (Reliability and Availability)

In an effort to meet energy demand, there has been a large growth in the development of renewable energy. However, the electricity system needs to be modernized before it can fully accommodate and integrate the new generation of energy resources.

Summary: A number of significant challenges exist, both in the near and long term, to maximize the penetration of renewables and other clean distributed generation technologies while maintaining the electric system reliability. In the near term, new transmission capacity, energy storage, standardized interconnection and advanced controls and metering are needed in many parts of the U.S. to:

- maintain energy security (reliability and availability) in the face of continued electricity demand growth, increasing costs, and changing energy generation mix;
- catch up after several decades of under-investment in transmission infrastructure; and
- enable compliance with renewable portfolio standard mandates in many States.

In the longer term, many of the challenges are likely to continue but in magnified form due to evolving State/Federal authorities over carbon, renewable portfolio, and environmental regulation. The electricity sector will have to plan for, implement, and effectively manage the extensive changes needed to the Nation's electric transmission and distribution grid. This is called for in order to accommodate a wide range of potential technological, regulatory, and economic futures, while still providing affordable and reliable service to meet growing demand, including the potential for extensive use of plug-in hybrids.

Issue

Much of today's electric transmission and distribution (T&D) system was designed to deliver electricity from centralized generation sources (nuclear, coal and natural gas) to urban load centers. The system was NOT designed to accommodate large amounts of decentralized or remote variable power sources (e.g., renewable sources). In addition, the capital investments in T&D have not kept pace with the demand, resulting in congestion in certain parts of the country. Therefore, the Department's position has been that DOE should develop partnerships with industry and regulators to address this issue from a policy stand point as well as address the technical hurdles to integrating large amounts of variable power into the T&D system. Conducting analysis, modeling, standardization, and monitoring will aid in the development, establishment and implementation of the appropriate energy integration policies to tackle and eventually overcome this challenge. In summary, the four key specific issues are:

- Solving grid congestion while maintaining reliability: 1) how do we best anticipate brownouts and predict the odds of a regional cascading outage; 2) how do we address the declining power quality (smooth vs varied flow) and the cost to industrial "customers" spending more to improve power quality inside their building;
- Enabling connectivity for the growing renewable energy sources: There's growing interest in trying to get 20 percent of our electricity from wind, but existing transmission lines can only connect about 1/4 of the turbines needed to do so;

- Meeting the potential need for grid storage: Putting substantial amounts of intermittent renewables into the grid presents an enormous control and dispatch issue. Advanced control systems might be able to handle 20% wind power, but grid and utility operations will be simplified if options are made available to store renewably-generated power and dispatching it as needed; and
- Addressing the regulatory and policy challenges at the transmission and distribution levels with both the Federal and State authorities: Policy implementation regarding the siting, construction and cost recovery of a new multi-state transmission line and the State and local institutions' ability to tailor and implement new technologies as they become available.

Status

DOE has taken steps toward modernizing the electricity system. Several analysis and coordination activities have been completed and others are ongoing to maximize renewable penetration and promote T&D investment. The activities include:

- DOE's first publication of the *National Electric Transmission Congestion Study* (required every three years by the Energy Policy Act of 2005) in 2006, with the 2009 *Congestion Study* now under way.
- FERC's approval of incentive rates-of-return for many transmission projects, strengthened requirements for transparent regional transmission planning, and continued support of competitive wholesale electricity markets.
- DOE's May 2008 release of the *20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply* report. This report estimated that by 2030, 290-300 additional gigawatts of wind generation capacity would be generated and that only about 70 gigawatts can be physically interconnected using existing transmission lines.
- DOE's ongoing partnership with the Electric utility planners/operators, Western Governors Association (WGA) and the North American Electric Reliability Corporation (NERC) to better understand and identify how to integrate variable power resources such as, wind and solar at the bulk power transmission level.
- The Bonneville Power Administration's 2008 development of new operational and planning methods, such as the "network open season," allowing renewable project developers to request transmission capacity.

Milestones

The challenge will be to integrate these activities under the Eastern, Western interconnections and Electric Reliability Council of Texas (ERCOT) umbrellas. Specifically for each region DOE will provide:

- Complete assessments of renewable energy resources that cover the US by 2010. This could inform the development of renewable energy zones.
- Continue and expand assistance to States and regional grid operators to conduct transmission assessments based on varying levels of renewable penetration. Midwest Independent Transmission System Operator (MISO) expects to publish an initial analysis covering much of the Eastern Interconnection by December 2008. The WGA expects to have preliminary results in 2011.
- OE will complete the designation of energy corridors on Federal land in the West (under EPAct Section 368) by the end of 2008. OE has begun work on designation of similar corridors on Federal lands in the East and Alaska (expect to complete in 2010).

- A joint programmatic environmental impact statement for solar generation is underway in partnership with the Bureau of Land Management. This is expected to be completed in 2009.

Major Decisions/Events

- Announce the results of the Western Governors Association's voluntary Renewable Energy Zones with a system-wide transmission assessment by 2009 and/or 2010.
- The next EPAct 2005- required *National Electric Transmission Congestion Study* will be completed by August 2009. If appropriate, the Secretary may designate additional national interest electric transmission corridors.

Background

There are almost 160,000 miles of transmission lines in the U.S. Total electricity load growth is projected to increase by 29 percent by 2030, at an average rate of 1.1 percent per year according to the Energy Information Administration's *2008 Annual Energy Outlook* reference case.

Technical Challenges: At the bulk power level, there has been an emergence of cost-competitive wind generation over the last several years and now, just behind it, the beginning of bulk power solar in the Southwest. In both cases, the nation has large untapped resources available, but both grid planning and operational challenges exist for wide-scale use of wind and solar at the bulk power level. As the fraction of energy derived from wind and solar energy becomes greater, effective methods for managing intermittent generation on a reliable grid will become increasingly important, particularly should market penetration levels reach 10 percent or higher. It will also become increasingly valuable to be able to store energy (not necessarily at the renewable resource site, and not necessarily as electricity) to improve dispatchability and to balance variable renewable output with conventional generation. Additionally, implementation of advanced sensors (phasor measurement units) will provide valuable operational information.

Regulatory and Policy Challenges: As regulatory policies are adopted that change the nation's energy generation mix to reduce pollutants and carbon emissions, Federal and State authorities face the significant challenge of ensuring that adequate and affordable electricity is generated and delivered reliably to meet growing demand while improving the environment and energy security. FERC has jurisdiction over rates for wholesale market transactions and transmission services. States have jurisdiction over all matters related to the provision of electricity service to retail customers. Permits for the siting of new transmission facilities is a matter of State responsibility, except within areas designated by DOE as National Interest Electric Transmission Corridors. Within such corridors, FERC may exercise siting jurisdiction in certain situations – e.g., if a state fails to act on a siting application in a timely manner or does not have the authority to consider the national benefits expected to be achieved by a proposed facility.

At the transmission level, the biggest challenge is siting, construction and cost recovery of any new multi-state transmission lines that will connect remote renewable sources to urban load centers and increase overall delivery, flexibility and system reliability. Successful regional and interconnection planning should be transparent, inclusive, and capable of informing regulators and affected stakeholders about the transmission system enhancements needed under a variety of potential futures. At the distribution level, the challenges focus on State (and local) institutions and their ability to tailor and implement new technologies as they become available, such as

rooftop photovoltaics and other forms of clean distributed generation, and smart grid technologies, tools, and techniques. For example, some States have adopted interconnection and net metering requirements that promote distributed sources such as rooftop solar. But these vary by State (currently 37 States have differing interconnection regulations and guidelines for solar electric systems), and are capped in most cases to relatively low levels of market penetration. In addition, the variability of interconnection policies, utility policies and tariffs continue to be a barrier to implementing many distributed generation systems.

Paper is as of 11/3/08.

Future of the Department's Transformational Energy Action Management (TEAM) Initiative

Early Secretarial attention will be key if DOE is to be a leader in energy performance.

Summary: The Department of Energy's (DOE) Transformational Energy Action Management (TEAM) Initiative implemented a comprehensive, accelerated approach to energy performance across the DOE complex through the rapid and efficient use of life-cycle cost-effective energy conservation measures. The TEAM Initiative was designed to establish DOE as a model and federal government leader in the adoption of sustainable energy practices and technologies. Positive, measurable progress has been made, but more effort is required.

Full compliance with federal mandates in energy performance has not yet been achieved. A sustained focus on key projects, institutionalizing successful procedures, and developing targeted funding methods will be needed to sustain the momentum to meet or exceed federal requirements and lead by example in demonstrating cost-effective energy management improvements.

Issue

- DOE's renewable energy requirements potentially could be met and exceeded solely through the completion of two currently proposed projects: a biomass power plant at Savannah River Site, and a concentrated solar power plant at the Nevada Test Site. Currently, these projects are still under development to determine their viability.
- Executable Plans submitted by the DOE sites have not yet resulted in achievement of agency compliance with applicable legal requirements. DOE programs need to develop a reasonable, measurable strategic compliance path that meets federal requirements, and develop a funding strategy for compliance activities.
- There is an opportunity to institutionalize best practices and lessons learned from the TEAM Initiative. Key success factors include program accountability, centralized performance tracking, and executive-level progress reporting. Greater success could result by combining appropriated funding and private financing to maximize economical projects.
- The TEAM Initiative was premised on the belief DOE should serve as a federal model for effective energy management. DOE executives should promote comprehensive energy management practices based on the TEAM Initiative across the federal government.

Status

- In FY 2008, DOE awarded projects worth $150 million in energy improvements. Current proposals yet to be awarded may result in an additional $300 million.
- DOE's current overall projected compliance results (*subject to final Executable Plans):*
    - 19 percent energy intensity reduction (goal: 30 percent by 2015)
    - 5.5 percent water intensity reduction (goal: 16 percent by 2015)
    - 4 percent renewable electricity use (goal: 7.5 percent by 2015 *Note: contingent upon SRS project)*

- 75 percent of alternative fueled vehicles have access to alternative fuels, and those AFVs use alternative fuel an estimated 50 percent of the time (goal: 100 percent of AFVs operating exclusively on alternative fuels)

Major Decisions or Events

Executable Plans, due by the end of December 2008, will provide a clear picture of DOE's overall energy management, and the areas needing improvement to meet federal mandates.

Background

Federal agencies have worked to fulfill energy management requirements under statutes such as the Energy Policy Act of 1992 and 2005, the Energy Independence and Security Act of 2007, as well as under presidential orders such as Executive Order (E.O.) 13123, signed in 1999. In January 2007, E.O. 13423 set ambitious performance targets for federal agencies in the areas of energy and water efficiency, renewable energy, petroleum reduction and alternative fuel use, sustainable building standards, and environmental management. To meet these targets, DOE developed a strategic initiative designed to help the Department lead by example in adopting sustainable energy practices and technologies within the agency, and promote responsible energy management across the federal government.

The TEAM Initiative, transmitted in DOE Order 430.2b, set additional requirements designed to accelerate compliance with E.O. 13423. These requirements include: an "Order of Operations," which require DOE sites to pursue all options for financing energy management improvements on a life-cycle cost-effective basis prior to relying on appropriated funding, and; "Executable Plans," or site-level implementation plans that commit sites to meet or exceed the E.O. 13423 requirements. Executable Plans are required to be submitted to Departmental management by the end of calendar year 2008. The Assistant Secretary for Energy Efficiency and Renewable Energy is designated as the Department's Senior Agency Official responsible for the agency's implementation of the E.O. 13423.

Using the resources of the Federal Energy Management Program (FEMP), in particular FEMP's facilitation of Energy Savings Performance Contracts (ESPCs), approximately 40 of the top energy-consuming DOE sites underwent energy evaluations by Energy Service Companies (ESCOs) to identify eligible energy conservation measures. A reporting and tracking process was established by FEMP to monitor site progress, and report regularly senior officials.

As of November 2008, five DOE sites had awarded ESPC contracts representing an investment of $151 million in energy conservation, and an additional 19 projects are being proposed that potentially would invest an additional $300 million in energy conservation measures.

The current round of Executable Plans does not identify sufficient measures to achieve DOE compliance with Federal mandates. However, additional energy efficiency and renewable projects could result if additional DOE site facilities combined appropriated funds and private financing (as provided for under EISA) to implement larger, more comprehensive projects.

One case in particular, a biomass power plant proposed at the Savannah River Site, would make a dramatic impact on DOE's renewable energy compliance. However, currently the status of this project remains uncertain.

Paper as of 11/3/08.

ENERGY STAR® Partnership with EPA

DOE and EPA management issues under the ENERGY STAR® memorandum of cooperation

Summary: The Department of Energy and the Environmental Protection Agency jointly manage the ENERGY STAR® labeling program. A variety of technical and management issues have emerged since the original Memorandum of Cooperation (MOC) was signed in 1996.

Issue

- The Department of Energy (DOE) and the Environmental Protection Agency (EPA) jointly manage the Federal ENERGY STAR labeling program, according to a MOC executed between the agencies in 1996. DOE has raised the issue of the potential for overlap of responsibility under the 1996 MOC. In particular, the responsibility for administration of the program for specific products is in some instances unclear under the 1996 MOC. DOE has had initial discussions with EPA on updating the 1996 MOC. This issue likely will be ongoing.

Background

- Early History. In 1992, EPA introduced ENERGY STAR as a voluntary labeling program to identify and promote energy-efficient computers and monitors. The program was part of the agency's greenhouse gas reduction activities. Over the next few years, EPA developed programs for other office equipment products and for residential HVAC equipment. In 1994, DOE introduced its ENERGY SAVERS program, a voluntary labeling program for appliances. In 1996, the two agencies came together and developed a joint MOC that stated it was "desirable for the Government to utilize a single logo or label to designate high-efficiency products." Under the agreement, the agencies agreed to use ENERGY STAR as the Government's sole designation for efficient products. The MOC gave each agency broad responsibility for administering various product categories. The decision to form a partnership was supported by utilities and other market players that valued a unified Government program.
- In 2005, the joint agency management of ENERGY STAR was formalized by Congress. The Energy Policy Act of 2005 (EPACT 2005), sec.131 established the program through statute within the two agencies and states; "Responsibilities under the program shall be divided between the DOE and the EPA in accordance with the terms of applicable agreements between those agencies."

Paper is as of 11/3/08.

Western Area Power Administration's Role in Expanding Power Transmission in the West

Western Area Power Administration could be used to expand transmission for renewable generation.

Summary: Western Area Power Administration (Western) owns and operates transmission lines across much of the West, but has limited authority and funding to build new transmission.

- Western owns and operates over 17,000 circuit-miles of transmission in the central and western U.S., much of which is in areas with high potential for renewable generation.
- Development of new generation resources (especially renewables) is being constrained by the lack of new transmission lines.
- Western can build new transmission that is related to the transmission of power to its firm power customers in its 15-state service territory, that is to interconnect new generation under Section 211 of the Federal Power Act, or that meets the criteria under Section 1222 of the Energy Policy of 2005, but does not have broad, generic authority to build new transmission lines, and its funding sources are limited.

Issue

Western's transmission system is in regions in the U.S. that have excellent potential for new generation (especially from wind and solar). However, by and large, its existing transmission is committed to the delivery of Federal hydropower to Western's customers. When Western has excess transmission capacity, it is made available to others under its open-access transmission tariff, but new transmission will need to be constructed to move large amounts of new power to load. Western has statutory authority to build new transmission, but only for certain limited purposes, as explained in the Status section below. In addition, Western has no permanent source of funding for building transmission projects.

Status

Western has authority to upgrade existing facilities or build new transmission within its marketing area only under the following conditions:

- When it is needed to reliably move Federal power to Western's firm power customers, pursuant to Reclamation law;
- To interconnect new generation under Section 211 of the Federal Power Act, at the generator's expense;
- When it meets the criteria specified in Section 1222 of the Energy Policy Act of 2005; or
- When a project is specifically authorized by Congress (e.g. the Path 15 Upgrade Project).

To fund transmission projects, Western must rely on appropriations from Congress or funds provided by non-Federal entities (e.g. third-party financing). No significant Federal appropriations have been provided to Western to build new transmission for many years. Except under Section 1222 of the Energy Policy Act of 2005, Western cannot accept funds from third parties who are not also Western customers to build new transmission. Note that Southwestern Power Administration has similar authorities, but has a much smaller transmission footprint than

Western in its service territory and has integrated its transmission network into the processes governing the Southwest Power Pool Regional Transmission Organization. Southeastern Power Administration does not own any transmission. Bonneville Power Administration has broad statutory authorities, including the authority to build transmission generally within the Pacific Northwest and the authority to use third party financing and borrow up to $4.45 billion from the U.S. Treasury, and therefore does not face the same challenges in building transmission facilities. Bonneville's near term challenge will be ensuring access to sufficient amounts of capital for its construction program.

Milestones

In 2004, Western participated in the 500-kv Path 15 Upgrade Project in central California, which was specifically authorized by Congress, and financed primarily by a private investment company.

Major Decisions/Events

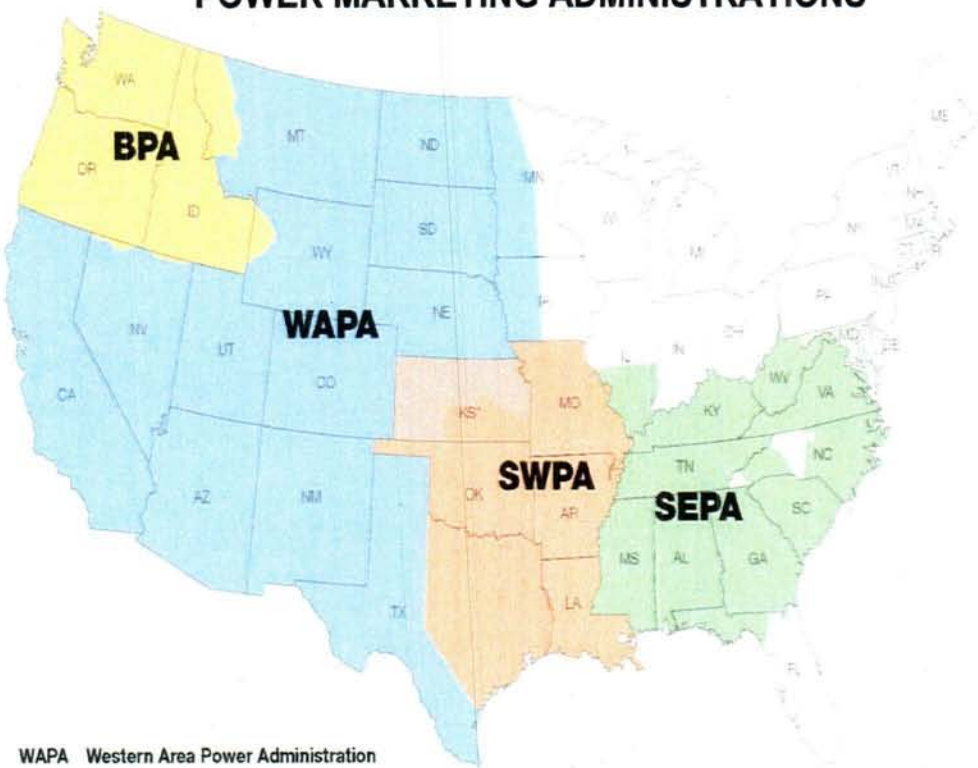
The new Administration will need to determine the appropriate role for Western as it formulates a policy on the best way for the Nation to finance and build new transmission facilities needed to move new power generation to end-use consumers. Legislation is likely to be introduced in the 111th Congress to use Western to advance the development of renewables through the construction of additional transmission lines.

Background

Western markets its power in a 15-state marketing area, as shown on the attached map. Western's core mission is to market and deliver the power produced at Federally-owned hydropower dams in its region, with preference in the sale of this power given to public entities and rural electric cooperatives. To deliver this power, Western owns and operates 17,000 circuit-miles of transmission lines and related facilities. Western only markets Federal hydropower and is not responsible for installing new generation to meet load growth. However, it has been suggested that Western could be a resource for enhancing transmission infrastructure, particularly for the purpose of moving new renewable resources to load centers. Western has eminent domain authority that it can exercise to acquire rights-of-way for transmission it is authorized to construct.

Paper is as of 11/3/08.

POWER MARKETING ADMINISTRATIONS



WAPA Western Area Power Administration

Energy Information Administration (EIA): Potential Impacts of Reducing Energy Related Greenhouse Gas Emissions

EIA has found that proposed legislative requirements to reduce greenhouse gas (GHG) emissions could have significant impacts on energy producers and consumers.

Summary: Legislative requirements to reduce greenhouse gas (GHG) emissions could have significant impacts on energy producers and consumers. Analyses of various legislative proposals prepared by the Energy Information Administration (EIA) have found:

- Reducing GHG emissions would increase the cost of using energy.
- The electric power sector would account for most of the emissions reductions, with new nuclear, renewable, fossil plants with carbon capture and storage equipment (CCS), and, to a lesser degree, natural gas plants, serving as the key compliance technologies.
- The magnitude of the energy price and economic impacts are linked closely to the success of efforts to develop and rapidly deploy large quantities of low-emitting electric generating technologies in a timeframe consistent with the emission reduction requirements.
- If the availability or deployment of the these technologies is limited, the energy price and economic impacts would be larger as the electric power sector turns to greater reliance on natural gas and allowance prices increase to the higher levels required to stimulate emissions reductions in other sectors of the economy.

Issue

Numerous bills calling for reductions in U.S. greenhouse gas emissions or imposing fees on fossil fuel use associated with GHG emissions were introduced in the 110th Congress.

A partial list of these bills includes:

- S. 3036, Lieberman-Warner Climate Security Act of 2008 (Boxer substitute amendment for S. 2191)
- S. 2191, America's Climate Security Act of 2007 (Lieberman-Warner)
- S. 1766, Low Carbon Economy Act of 2007 (Bingaman-Specter)
- S. 280, Climate Stewardship and Innovation Act of 2007 (Lieberman-McCain)
- S. 485 & H.R. 1590, Global Warming Reduction Act of 2007 (Kerry-Snowe) (Waxman)
- S. 309, Global Warming Pollution Reduction Act (Sanders-Boxer)
- S. 317, Electric Utility Cap and Trade Act of 2007 (Feinstein-Carper)
- S. 1168, Clean Air / Climate Change Act of 2007 (Alexander-Lieberman)
- H.R. 2069, Save Our Climate Act of 2007 (Stark)
- H.R. 3416, America's Energy Security Trust Fund Act of 2007 (Larson)

Status/Milestones/Major Decisions/Events

On October 18, 2007, Senators Lieberman and Warner introduced S. 2191, America's Climate Security Act of 2007. On December 5, 2007, the Senate Committee on Environment and Public Works favorably reported and amended S. 2191. On May 21, 2008, S. 3036, a manager's substitute amendment to S. 2191, entitled the "Lieberman-Warner Climate Security Act of 2008, was brought to the Senate floor but not passed. It is likely that S. 3036 will serve as a starting point in the Senate for discussion of legislation to control greenhouse gases.

Background

A summary of EIA's most recent analysis, for S.2191, is described below. EIA analyses of other bills calling for greenhouse gas emissions reductions are available on the EIA web site. While S. 3036 is expected to serve as the starting point for discussion in the new Senate, the main components of the bill are very similar to those of S. 2191, so the key analysis findings would also be expected to be similar. EIA's analysis focuses on the energy-related impacts of climate legislation but does not address the impacts of climate change adaptation programs, nor the potential benefits of mitigating climate change.

S. 2191 is a complex bill regulating emissions of greenhouse gases (GHG) through market-based mechanisms, energy efficiency programs, and economic incentives. Title I of S. 2191 establishes a cap on emissions of greenhouse gases beginning in 2012 through an emission allowance program. The Title I allowance program covers energy-related carbon dioxide (CO_2), methane, nitrous oxide, perfluorocarbons, sulfur hexafluoride, and hydrofluorocarbons (HFCs) emitted from production of hydrochlorofluorocarbons (HCFCs). The emissions covered under Title I represented approximately 87 percent of total GHG emissions in 2006. The Title I caps decline gradually from 5,775 million metric tons (mmt) CO_2-equivalent in 2012 (7 percent below 2006 emission levels), to 3,860 mmt in 2030 (39 percent below 2006 levels), and 1,732 mmt in 2050 (72 percent below 2006 levels. Because of significant uncertainty about the cost, availability and consumer acceptance of some technologies, EIA prepared several alternative cases to examine the potential impacts of S. 2191. EIA's full analysis is available at: http://www.eia.doe.gov/oiaf/servicerpt/s2191/pdf/sroiaf(2008)01.pdf. Key findings include:

S. 2191 significantly reduces projected GHG emissions compared to EIA's *Annual Energy Outlook 2008* (*AEO2008*) Reference Case (EIA's business-as-usual baseline) Projected covered emissions in the S. 2191 cases, net of offsets, are 27 percent to 36 percent lower in 2020 and 45 percent to 56 percent lower in 2030 relative to the Reference Case.

The electric power sector accounts for the most of the emissions reductions. Under S. 2191 the electric power sector is projected to account for between 82 percent and 87 percent of energy-related CO_2 emissions reductions in 2020 and between 82 percent and 92 percent of such reductions in 2030. The reductions are achieved mainly through the deployment of new nuclear, renewable, and fossil plants with CCS. Many existing coal plants without CCS are projected to be retired early because retrofitting with CCS technology is generally impractical.

Total natural gas consumption in 2030 is between 2.7 trillion cubic feet and 4.4 trillion cubic feet higher if the deployment of new nuclear, renewable, and fossil plants with CCS is

limited. If new nuclear, renewable, and fossil plants with CCS are not developed and deployed in a timeframe consistent with the emissions reduction requirements, covered entities are projected to turn to increased natural gas use to offset reductions in coal generation, resulting in markedly higher delivered prices of natural gas. The combination of higher wellhead natural gas prices and higher allowance prices under these conditions doubles the estimated impact of S. 2191 on the delivered price of natural gas to electric generators and industrial users if international offsets remain available, and quadruples that impact if international offsets are also unavailable.

Total coal consumption is significantly reduced. Despite the addition of as much as 64 gigawatts of new coal capacity with CCS through 2030, total coal consumption in 2030 ranges between 62 percent and 89 percent below the Reference Case level. The increased use of coal at these new facilities with CCS is not large enough to offset the reduction that occurs because of the retirement and reduced utilization of existing coal plants. It is possible that the continued addition of coal plants with CCS post-2030 could lead to resurgence in coal use, but these plants will continue to face competition from other low-emission technologies

GHG allowance prices are sensitive to the cost and availability of low-carbon generating technologies and emissions offsets. Estimated allowance prices range from $30 to $76 per metric ton CO_2-equivalent in 2020 and from $61 to $156 per metric ton CO_2-equivalent in 2030. The highest prices in the first 5 years of the cap-and-trade program occur when international offsets are not assumed to be available. The highest prices in the long term occur when it is assumed that key low-emissions technologies including nuclear, fossil with CCS, and various renewables are not developed and deployed in a timeframe consistent with the emissions reduction requirements and international offsets are limited by cost or regulation.

S. 2191 increases energy prices and energy bills for consumers. Relative to the Reference Case, the price of using coal for power generation, including the cost of holding allowances, is between 161 percent and 413 percent higher in 2020 and between 305 percent and 804 percent higher in 2030. The price of electricity is between 5 percent and 27 percent higher in 2020 and between 11 percent and 64 percent higher in 2030. Under S. 2191, average annual household energy bills, excluding transportation costs, are between $30 and $325 higher in 2020 and $76 to $723 higher in 2030.

S. 2191 increases the cost of using energy, which reduces real economic output, reduces purchasing power, and lowers aggregate demand for goods and services. The result is that projected real gross domestic product (GDP) generally falls relative to the Reference Case. Adverse economic impacts generally increase over time as higher cost emissions abatement options are required as emissions caps become more stringent while population and economic activity levels continue to grow. Total discounted GDP losses over the 2009 to 2030 time period range from $444 billion (-0.2 percent) to $1,308 billion (-0.6 percent). Similarly, the cumulative discounted losses for personal consumption range from $546 billion (-0.2 percent) to $1,425 billion (-0.6 percent). GDP losses in 2030, the last year explicitly modeled in the EIA analysis, range from $27 billion to $163 billion (-0.1 to -0.8 percent) while consumption losses in that year range from $58 billion to $149 billion (-0.4 to -1.1 percent). As with energy prices and consumer energy bills, economic impacts are largest when it is assumed that key low-emissions

technologies including nuclear, fossil with CCS, and various renewables are not developed and deployed in a timeframe consistent with the emissions reduction requirements and international offsets are not available.

Paper is as of 11/3/08.

Energy Information Administration's Short and Long Term Energy Outlook

U.S. and global energy markets have been changing in response to: (1) higher energy prices since 2000, (2) greater influence of developing countries on worldwide energy requirements, (3) recently enacted legislation and regulations, (4) changing public views related to the use of alternative fuels, emissions, and the acceptability of various energy technologies; and more recently, 5) the U.S. and global financial situation.

Issue

The Energy Information Administration (EIA) develops three energy market outlooks: 1) the monthly *Short Term Energy Outlook* that provides forecasts of energy supply and demand over the next two years; 2) the *Annual Energy Outlook* (published most recently in June 2008) provides long-term projection of U.S. energy supply, demand, and prices through 2030; and, 3) the *International Energy Outlook* (published most recently in June 2008) that provides long-term projection of international energy supply, demand, and prices through 2030. Key findings from the most recent *Outlooks* are summarized below.

Notes: (1) All EIA projections are based on policies and regulations in place at the time of publication. (2) The long-term projections were developed and released months before the U.S. and global economic downturns; the short-term outlook was released just prior to collapse. Future editions will be updated to reflect the changes brought about by these events.

Short Term Outlook (released October, 2008)

Average household expenditures for all space-heating fuels are projected to be $1,137 this winter (October 1, 2008 to March 31, 2009), a 15-percent increase over the estimated $986 spent last winter. The largest increases will be in households using heating oil and natural gas. The projected increases primarily reflect higher prices, although colder weather than last winter will also contribute to higher fuel use in many areas.

Strong global demand and low surplus production capacity contributed to the run-up to record crude oil prices in July. The current slowdown in economic growth is contributing to the recent decline in oil demand and the sharp decline in prices since July. Nonetheless, oil markets are expected to remain relatively tight because of sluggish production growth. Based on a macroeconomic forecast as of mid-September, West Texas Intermediate (WTI) crude oil prices were projected to average about $112 per barrel in both 2008 and 2009. More recent economic data and the persistence and depth of the credit crisis have caused many leading forecasters to take a much more negative view of U.S. economic growth prospects for the second half of 2008 and all of 2009. With international markets also in trouble, economic growth forecasts for other regions are also being cut. If realized, the projected stall in the U.S. and global economy will have significant implications for oil prices and overall energy markets.

During September, Hurricanes Gustav and Ike shut in a total of 32 million barrels of crude oil and 165 billion cubic feet (Bcf) of natural gas production in the Federal Gulf of Mexico. Recovery is ongoing and expected to continue at least through October, 2008.

Longer Term Outlook (Annual Energy Outlook 2008; International Energy Outlook 2008)

The enactment of the Energy Independence and Security Act of 2007 (EISA) and the Energy Policy Act of 2005 (EPACT 2005) in the U.S. will have a significant impact on the level and mix of U.S. energy production and consumption in the coming years. EISA2007's new fuel economy standards for motor vehicles, the mandate for a substantial increase in the use of biofuels, and new efficiency standards for appliances and lighting will reduce total energy consumption and greenhouse gas (GHG) emissions. These impacts build on the impacts of EPACT2005, which included mandatory energy conservation standards; created numerous tax credits for businesses and individuals; created a renewable fuels standard and eliminated the oxygen content requirement for Federal reformulated gasoline; extended royalty relief for offshore oil and natural gas producers; authorized DOE loan guarantees for new or innovative technology projects that mitigate GHG; provided a production tax credit (PTC) for new nuclear facilities; and extended and expanded the PTC for electricity generated from renewable fuels.

Total Energy

Domestic U.S. energy consumption is projected to grow slowly, at an average rate of 0.7 percent per year, or by 11 percent between 2005 and 2020. Total energy consumption grows rapidly in the developing countries, but much more slowly in the United States. Global energy consumption is projected to grow by over 30 percent between 2005 and 2020, driven by robust economic growth and expanding populations in developing countries. U.S. energy consumption is projected to grow by 11 percent between 2005 and 2020, from 100 to 111 quadrillion Btu.

GHG Emissions

In the absence of energy-related carbon dioxide (CO2) limits, GHG emissions rise rapidly during the projection period. Global energy-related CO2 emissions rise by 32 percent without specific policies to limit GHG emissions between 2005 and 2020. With strong economic growth and continued heavy reliance on fossil fuels, much of the increase in CO2 emissions occurs in the developing nations of the world, especially in Asia. U.S. CO2 emissions are projected to grow by a more modest 7 percent between 2005 and 2020, because of new nuclear capacity, rapid growth in renewables, and the use of natural gas to meet a large share of generation though 2020. Limits on GHGs might include cap-and-trade programs, renewable portfolio standards, and tax credits and loan guarantees for low emission technologies.

Liquids

Liquid fuels continue to dominate global and U.S. energy use. Global oil consumption is projected to grow despite 7 consecutive years of rising prices, growing by 22 percent between 2005 and 2020, driven by robust economic growth and expanding populations in the world's developing countries. Total consumption of liquid fuels in the U.S. will grow 0.4 percent per year through 2020, from 20.8 million barrels per day in 2005 to 22.0 million barrels per day in 2020, with most of the growth and consumption in the transportation sector. U.S. crude oil

production will increase from 5.2 million barrels per day in 2005 to a peak of 6.3 million barrels per day in 2018 as a result of increased production from the deep waters of the Gulf of Mexico and onshore enhanced oil recovery projects.

The U.S. net import share of total liquids supplied is expected to drop from 60 percent to 52 percent between 2005 and 2020. Net crude oil imports will remain constant at about 10 million barrels per day as demand grows while net product imports will decline from 2 to 1 million barrels per day between 2005 and 2020.

Natural Gas

U.S. production of natural gas is expected to grow about 8 percent to 20.0 trillion cubic feet (Tcf) in 2022, and then decline. Offshore production is expected to increase to 2017, then decline. Alaska supply is expected to grow with the opening of the natural gas pipeline in 2020, reaching about 2.0 Tcf by 2021. The long-term outlook depends on the remaining recoverable resource base, technology, expected costs, and the rate of development. EIA estimates that remaining technically recoverable U.S. resources total 1,365 Tcf (2006), 15 percent of which are proved. Areas in the Gulf closed for development total 21.5 Tcf of reserves with another 55.0 Tcf in the Pacific and Atlantic.

In 2007 net imports accounted for about 16 percent of the natural gas consumed in the United States. Pipeline imports, mainly from Canada, make up about 83 percent of total gross imports. U.S. exports of natural gas were sourced to Canada, Mexico, Japan (liquefied natural gas (LNG)), and one LNG cargo to Russia in 2007. After peaking in 2007, EIA projects net pipeline imports to decline from 3.1 Tcf to 0.3 Tcf in 2030 due to resource depletion and growing domestic demand in Canada. LNG imports are projected to increase from 0.6 Tcf in 2005 to 2.4 Tcf in 2020 but the ability of the U.S. to attract LNG imports will remain subject to global market conditions.

Coal

Global coal consumption is projected to grow more rapidly than other fuels. Coal's share of world energy use has increased sharply over the past few years and is likely to continue to do so without significant changes in existing greenhouse gas emissions (GHG) laws and policies. Coal accounted for 27 percent of total world energy use in 2005 and is projected to reach over 28 percent in 2020. Coal's share of U.S. electricity generation is projected to increase to 50 percent in 2020 while the natural gas share declines from 19 percent to 18 percent.

Renewables

Renewables play a growing role in meeting global energy needs, much of it for electricity generation. Global consumption of hydroelectricity and other renewable energy sources are projected to increase by 2.2 percent per year between 2005 and 2020. In the U.S., marketed renewable energy consumption is projected to grow from 6.2 to 11.7 quadrillion Btu between 2005 and 2020. In the U.S., ethanol consumption is predicted to grow from 4.0 billion gallons in 2005 to 21.6 billion gallons in 2020.

Alternative Fuels

Alternate transportation fuels are defined in the Energy Policy Act of 1992 (EPACT92) as : liquefied petroleum gas (LPG), natural gas, alcohol fuels, and electricity (excluding hybrids). Of these, only alcohol fuels—primarily ethanol—are renewables. After decades of promise but little progress in alternate fuels, EIA now projects a major shift toward alternate transportation fuels (ATFs) to begin by the middle of the next decade. By 2030, projects that support or include? alternative fueled vehicles (AFVs) will account for 10 percent of auto sales (23 percent including hybrid-electrics) and 20 percent of light truck sales (35 percent including hybrid-electrics).[1] In terms of fuel consumption, ATFs, excluding ethanol in gasohol, are projected to account for 6 percent of total surface transportation fuel consumed in 2030. Most of this is E85, a blend of 85 percent ethanol and 15 percent gasoline.

EISA provides grants to develop alternate fuel infrastructure. It also prohibits service station franchisors from restricting their franchisees to selling only the franchisors' branded alternate fuels. EISA thus provides a major impetus to crack the "chicken and egg" problem that has always existed between AFV manufacturers and the fuel infrastructure industry. The largest expected beneficiary of these policy initiatives among alternate fuels is E85. A much smaller but rapidly growing fuel is biodiesel which (if made to American Society for Testing Materials (ASTM) specifications), can substitute directly for petroleum diesel, and even non-certified biodiesel can be used in up to 5 percent blends with regular diesel.

Nuclear

World nuclear capacity is projected to increase from 374 gigawatts (GW) in 2005 to 446 GW in 2020. Nuclear capacity only declines in Organization for Economic Cooperation and Development (OECD) Europe, while China is projected to add 28 GW of net nuclear capacity over the projection period, India 11 GW, Russia 10 GW, and the U.S. 8 GW. Total domestic nuclear electricity generation grows from 782 billion kilowatthours (kwh) in 2005 to 868 kwh in 2020 due to upgrades of existing plants and newly constructed plants partially stimulated by the provisions in Energy Policy Act of 2005

Electricity

Rising fuel and construction costs, together with potential regulatory changes, are the key factors affecting the outlook for electricity producers and consumers. The regulatory structure of the industry continues to evolve with some regions of the country continuing to develop fully competitive markets, while others have chosen to retain cost-of-service retail regulation. The environmental regulations faced by the industry are in a state of flux and continued change is expected. The largest uncertainty in the future involves policies that may be enacted to reduce GHGs. Absent such greenhouse gas reduction policies, the industry would be expected to continue to rely heavily on coal over the next 20 years. However, if reductions in greenhouse gases are required, electricity prices would be higher as the industry increased its use of nuclear, renewables, fossil plants (mainly coal-fired) with carbon capture and storage, and natural gas, while reducing its use of existing coal-fired capacity.

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[1] In this document, alternative fuel vehicles are defined as in EPACT92. However, in its *Annual Energy Outlook (AEO)*, EIA includes electric hybrid vehicles as alternative fueled vehicles.

Status/Milestones/Major Decisions/Events

EIA regularly updates its forecasts and outlooks to reflect changes in the economy, new legislation, policies and regulations.

Paper is as of 11/3/08.

National Security

Annual Assessment of the Nuclear Weapons Stockpile

Report to the President on the Status of the Nuclear Weapons Stockpile

Summary: Annual Assessment of the nuclear weapons stockpile requires the incoming Secretary of Energy to co-sign, along with the Secretary of Defense, a Memorandum to the President on the status of the safety, reliability, and performance of the nuclear weapons stockpile and whether an underground nuclear test is required.

- The Department of Energy (DOE)-Department of Defense (DoD) Memorandum is due to the President by March 1, 2009.
- The Memorandum and supporting documents must be forwarded to Congress by March 15, 2009.

Issue

This annual Memorandum reports on the safety, reliability, and performance of the nuclear weapons stockpile and determines if an underground nuclear test is required. In addition, the annual Memorandum has not been provided to Congress in a timely manner for the last few years. To a large extent, this is a process issue which goes beyond the Department. However, not completing this document on time only further supports opinions in Congress that the Department has no strategy or underpinning to support budget requests and long-term strategic issues.

Status

The Laboratory Directors' Annual Assessment letters were signed by September 30, 2008.

Milestones

The Annual Stockpile Assessment Execution Plan for 2008 was issued by the Deputy Administrator for Defense Programs on January 16, 2008. This plan provides the necessary requirements to complete the Annual Assessment process, including milestones. The following is a list of the required milestones:

Milestone	Due Date
Annual Assessment Reports published and distributed	Completed
Laboratory Directors sign Annual Assessment letters	Completed
Brief the Deputy Administrator for Defense Programs, the NNSA Administrator, and the Secretary	December 31, 2008
Laboratory Directors meet with the Secretary	December 31, 2008
Submission of Annual Stockpile Assessment "Package" to the President	March 1, 2009
Forwarding of "Package" to the Congress	March 15, 2009

Note: The "Package" above contains the Memorandum signed by the Secretaries of Energy and Defense; the Report on Stockpile Assessment; Lawrence Livermore, Los Alamos, and Sandia

National Laboratories Directors' Annual Assessment letters; and, the Annual Assessment letter from the Commander of the U.S. Strategic Command.

Major Decisions/Events

The Secretary of Energy will be briefed on the results of the 2008 process in December 2008. This will also include a meeting with the three Nuclear Weapons Laboratory Directors.

Background

The Annual Stockpile Assessment reporting requirements began in 1995 at the request of President Clinton during the Comprehensive Test Ban Treaty negotiations. In a speech made on August 11, 1995, President Clinton established annual reporting requirements that would ensure the Nation's nuclear weapons remain safe and reliable under a comprehensive test ban. These requirements and certain aspects of the Annual Assessment process were codified in Section 3141 of the Fiscal Year 2003 National Defense Authorization Act (Public Law 107-314).

The Annual Stockpile Assessment is not annual "re-certification" of the warheads in the stockpile. It is an assessment of each warhead's existing "certification basis" in light of new information generated by the Stockpile Stewardship Program in the past year.

A summary of requirements from Section 3141 of Public Law 107-314, are:

- Nuclear Weapons Laboratory Directors must conduct an Annual Assessment of each warhead type for which they have responsibility;
- Nuclear Weapons Laboratory Directors and the Commander, U.S. Strategic Command letters are required by December 1;
- The DOE-DoD Memorandum and the Nuclear Weapon Laboratory Directors and Commander, U.S. Strategic Command letters are due to the President by March 1;
- This information is forwarded to Congress by March 15;
- Nuclear Weapons Laboratories must use "Red Teams" that include members from other laboratories to review and challenge the Annual Assessments;
- Nuclear Weapons Laboratory Directors must comment on a number of specific topics to include the need for specific or desirable underground tests, adequacy of science-based tools and adequacy of manufacturing infrastructure; and,
- Nuclear Weapons Laboratory Directors and Commander, U.S. Strategic Command letters must be submitted without change to the President.

The Annual Assessment process is documented in the National Nuclear Security Administration Directive "Business and Operating Policy for the Conduct of the Annual Assessment of the National Nuclear Stockpile," BOP-10.001 dated July 14, 2005.

Paper is as of 11/3/08.

Nuclear Weapons Complex Transformation

Transform the Nuclear Weapons Complex for the Challenges of the 21st Century.

Summary: The National Nuclear Security Administration (NNSA) must transform the nuclear weapons complex—both physical infrastructure and methods of operation—into a more responsive enterprise supporting nuclear deterrence in the 21st Century.

- The current complex is largely a legacy of the Cold War and is too big, too old, and too costly.
- NNSA has proposed a planning scenario for Complex Transformation that rests on four pillars: 1) transform stockpile; 2) modernize complex; 3) create integrated, interdependent enterprise; and, 4) advance science.
- Records of Decision are planned for early FY 2009.

Issue

While NNSA is currently meeting safety, security, and basic stockpile requirements, the eight-site nuclear weapons complex, or "Complex" for short, is too big, too old, and too costly. Special nuclear materials (SNM) are present at more sites than needed. In a post 9/11 world, security has been enhanced and SNM is becoming more and more expensive to secure. Some facilities sized to support a large, Cold War-era stockpile are no longer necessary or affordable. NNSA's Vision of the Future is a smaller, safer, and more efficient Complex that continues to leverage the technical and scientific capability of our workforce to meet essential national security requirements. Complex Transformation represents a major effort to move from a Complex built for the Cold War to a 21st Century enterprise that is at the forefront of science and technology, responsive to future national security requirements, and affordable.

Status

This period of change for the Complex began with the end of the Cold War and the initiation of the Stockpile Stewardship Program (SSP) in the 1990s. The decisions related to the SSP were announced in a 1996 Record of Decision that was based on analyses in the *Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM-PEIS)* and other information. Since early 2002 when the Nuclear Posture Review was sent to Congress, NNSA has focused on establishing a responsive infrastructure to create opportunities for stockpile reductions. A number of other reviews, including Department of Defense assessments and Task Force reports in 2005 from both the Defense Science Board and Secretary of Energy Advisory Board, subsequently identified shortcomings with the current Complex and emphasized a more urgent need to transform. In 2006, NNSA proposed a planning scenario for Complex Transformation that rests on the four pillars referenced above.

Given that current proposals would continue the transformation announced in the 1996 Record of Decision and analyzed in the SSM-PEIS, an updated environmental analysis structured as a supplement to the SSM-PEIS has been proposed and is referred to as the *Complex Transformation Supplemental Programmatic Environmental Impact Statement* or "SPEIS." On December 18, 2007, NNSA announced its intent to prepare the SPEIS to support future

decisions. The draft and final SPEIS evaluated alternatives for continuing transformation of the Complex.

The focus of current work is to complete environmental and business case analyses required to evaluate reasonable alternatives for Complex Transformation. Multiple internal and independent, external teams are engaged in these analyses to provide greater assurance of accuracy in the conclusions.

Milestones

Fall 2008 Notice of Availability for Final Complex Transformation SPEIS that enables subsequent Records of Decision (minimum 30-day waiting period) on major facilities across the Complex.

Major Decisions/Events

Decisions on how to proceed with the following major construction projects:

- Plutonium – Chemistry and Metallurgy Research Replacement.
- Uranium – Uranium Processing Facility.
- Assembly/Disassembly/Surveillance – Weapons Surveillance Facility.
- Storage – Pantex Underground Storage Facility.

Decisions on research and development (R&D) facility and test site consolidation.

- Surveillance flight testing currently at Tonopah Test Range, NV.
- Hydro-dynamic and high-explosive R&D at Lawrence Livermore National Laboratory (LLNL) Site 300.
- Major environmental testing facilities at Sandia National Laboratories (SNL), Los Alamos National Laboratory (LANL), and LLNL.
- Tritium R&D facilities at Savannah River Site and LANL.
- Hydro-dynamic testing facilities (LANL and LLNL).

Decisions on Complex contracting strategy and Request for Proposals for Pantex, Y-12, Kansas City Plant, and SNL.

Background

Although the United States will maintain a nuclear deterrent for the foreseeable future, the current Complex is at a crossroads and faces a set of challenges not seen since its inception in the 1940s. The moratorium on underground nuclear testing and the suspension of new warhead development and production in the early 1990s brought major changes—both technical and cultural—to the Complex. SSP was initiated in the 1990s as the guide to maintaining a viable stockpile in the future without underground nuclear testing. Early years focused on defining approaches, tools, and needed R&D facilities. Over the past decade, emphasis was placed on the computational and experimental tools required to realize the potential of SSP. As these new tools are being commissioned, our manufacturing capabilities and support infrastructure are showing a critical need for investment. NNSA must now enter the next phase and apply the approaches and tools, in combination with a modern, responsive production capability, to maintain our nuclear deterrent with a reduced stockpile. The following are Complex Transformation guiding principles:

- 21ST Century national security requirements can ultimately be met with fewer nuclear weapons and a smaller, more agile nuclear infrastructure to support them, i.e., capabilities of the Complex become more important than numbers of weapons.
- NNSA's Federal and contractor workforces are uniquely capable and essential to fulfilling mission responsibilities. These workforces must continue to be motivated, world-class, and have access to a responsive Complex to address future national security challenges.
- NNSA must retain and exercise fundamental capabilities to design, certify, manufacture components, assemble/disassemble, conduct surveillance, and transport nuclear warheads while sustaining the science base that is the foundation of our deterrent.
- Science and technology capabilities resident in our workforce and infrastructure are a unique and valuable resource for the Nation.
- SSP is working - the national security laboratories and production plants ensure that the Nation's nuclear weapons are safe, secure, and reliable without underground nuclear testing.
- Transformation of the Complex has been underway since the 1990s; however, changes must be accelerated. Acceleration is urgent since overhead costs to maintain and secure the deteriorating physical infrastructure rise while the total budget remains flat or decreases.
- Complex Transformation must take place regardless of future stockpile size or composition.
- Complex Transformation must take place with or without the Reliable Replacement Strategy – proposed facilities are required for either outcome. However, if authorized, could enhance efficiency and responsiveness of the infrastructure by simplifying manufacturing and eliminating the need to use some hazardous legacy materials.
- For smaller future stockpiles, maintaining required capabilities has a greater impact on the minimum size of our facilities than throughput capacity. Neither workforce numbers nor facility square footage scale linearly with the size of the stockpile.
- Complex Transformation forces NNSA to reform how it does business. NNSA plans to consolidate missions and SNM, change site contracting strategies, realign Federal and contractor workforces, reduce square footage, replace buildings, reduce indirect costs, improve risk management, increase business practice uniformity, and acquire commodities at lower cost.

Complex Transformation will remain under intense Congressional scrutiny until the following are completed: replacement of the Cold War-era strategies with a 21st Century nuclear deterrent strategy sharply focused on today's and tomorrow's threats without the need for nuclear testing; determination of the size and nature of the nuclear stockpile sufficient to serve that strategy; and, determination of the size and nature of the Complex needed to support that future stockpile. However, accomplishment of many proposed transformation actions, including planned Records of Decision informed by the Complex Transformation SPEIS, are required to be in place in a timeframe to maintain a viable nuclear capability regardless of the stockpile size and composition.

Paper is as of 11/3/08.

Stockpile Transformation

Modernizing the "Cold War" era nuclear weapons stockpile.

Summary

An aging, Cold War nuclear weapons stockpile can be modernized through advances in technology, and reduced in size and complexity.

- Stockpile reduction discussions are currently underway between the Department of Defense (DoD) and the National Nuclear Security Administration (NNSA).
- Modernization and improvement of warhead surety (safety, security, and use-control) and performance margins may lead to stockpile reductions acceptable to the DoD.
- With the Reliable Replacement Strategy design and cost study now on hold, potential changes to nuclear warheads are focused on advanced safety and security concepts.
- There is an opportunity to meet some transformation goals through an enhanced refurbishment program on the U.S. Air Force (AF) B61 bomb.

Issue

The nuclear weapons in the current U.S. nuclear weapons stockpile were designed during the Cold War. Since that time, there have been major advances in materials science, component design, and the understanding of weapons physics through the Science-based Stockpile Stewardship Program. In addition, there have been significant changes in the geopolitical environment. It is therefore prudent that the current stockpile be modernized and improved in terms of reliability, maintainability, security, and safety, and that the overall size of the stockpile should be reduced.

Status and Risks

- *Legacy stockpile numbers and composition remain intact for 2009.*

The Nuclear Transformation Working Group (NTWG) continues to discuss changes to the stockpile numbers and composition, but the draft FY 2009-2014 stockpile requirements remain largely the same as current requirements. DoD is also preparing to support the Nuclear Posture Review (NPR), which will commence in 2009.

- *Next major weapon life extension program (LEP) has potential for limited Stockpile Transformation.*

In June 2008, the AF and NNSA were directed by the Nuclear Weapons Council (NWC) to begin the two-year study phase to perform a full nuclear and non-nuclear LEP of an AF air-delivered weapon, the B61 bomb. The study will investigate warhead improvements beyond those of a traditional LEP by considering pit reuse and pit rework options to attempt to improve safety and security and to consolidate several versions of this weapon. This LEP would have a First Production Unit target date of 2017 and is beyond the program-of-record, which funds only a refurbishment of the non-nuclear bomb components. The AF is interested in using this refurbishment to begin transformation in the air-delivered stockpile, including new bomb bodies and other transformational approaches. There is the potential to reduce the number of air-delivered weapon types from three (B61 bomb, B83 bomb, W80 cruise missile warhead) to one or two. There is also the possibility of reducing the current number of air-delivered weapons

manufactured and sustained in this refurbishment, by reducing the number of bombs required in the stockpile.

Milestones

Upcoming milestones related to Stockpile Transformation include: the 2009 NPR (due to Congress in March 2010); DoD (Office of the Secretary for Defense and AF) discussions with Congress for support of the transformational B61 life extension approach; and, the September 2008 initiation of the B61 LEP study phase.

Major Decision/Events

There is currently an opportunity for DoD and NNSA to positively impact Stockpile Transformation, both in numbers and types of weapons, and in working to improve safety, security, use control, and performance margins. Decisions made in the NPR will certainly impact the stockpile composition, but there is an immediate opportunity to transform the AF air-delivered portion of the stockpile, with Congressional support and sufficient NNSA and AF funding to execute this program.

Background

Two key contributors to Stockpile Transformation are changing the size and composition of the stockpile, and improving the manner in which nuclear weapons are sustained through either refurbishment or replacement. Both have independent aspects but are also linked; if a nuclear warhead is refurbished or replaced with a higher reliability warhead, it can lead to a reduction in the number of augmentation weapons (warheads retained to hedge against contingencies) required. There have been many recent developments in both aspects of transformation, as discussed below.

- *Right-sizing the stockpile.*
  Following the end of the Cold War, modifications to the stockpile size and composition have occurred gradually, and the U.S. is now left with a stockpile that is expensive to maintain and may not represent the optimum mix of weapons.

  The size and composition of the stockpile is based on DoD requirements to fulfill national security and policy requirements, and is updated each year through coordination among elements of the DoD and the NNSA. Potentially far-reaching changes to the stockpile are now being considered by two interagency organizations: the Transformation Coordinating Committee (TCC) and its working body, the NTWG. Such changes are not guaranteed to be translated into the stockpile requirements; any changes must first be approved by the TCC and then codified by the NWC before it can become part of the Nuclear Weapons Stockpile Memorandum. Until changes in stockpile requirements are approved by the DoD (and ultimately, the President), the U.S. continues to sustain the legacy stockpile.

- *Sustainment strategy for the current stockpile: legacy refurbishment vs. replacement.*
  The post-Cold War approach to U.S. stockpile sustainment has been to maintain capability and the legacy stockpile into the future until the pit end-of-life is reached for each respective warhead type, nominally at the 85-year point. With the current stockpile, legacy weapons will be refurbished until about FY 2050, when pits are projected to begin to need

replacement. Under this approach, large numbers of augmentation weapons must be retained. Until new pits are needed, the warhead LEP strategy replicates legacy components in order to fix known technical issues and therefore extend warhead lifetime an additional 20 to 30 years.

The events of September 11, 2001, and subsequent Presidential direction through National Security Presidential Directive-28 led to a proactive approach to add improvements to warhead safety and security. The new approach was necessary, since the design aspects of legacy warheads limit the improvements that can be made. A reliable replacement strategy would replace legacy stockpile weapons with ones having improved safety, security, use control, and performance margins. Plans for implementing this strategy included early replacement of legacy weapons when LEPs would be required. This approach avoided the expense of reconstituting old processes and remanufacturing of current Cold War weapons while replacing the stockpile with modern warheads that meet the same military requirements. However, this approach has received little support from Congress and is currently on hold. In the meantime, NNSA and DoD will have to continue the LEP strategy for legacy systems, which does not allow for the level of improvements achievable with proposed modern replacement warheads.

Paper is as of 11/3/08.

2009 Nuclear Posture Review

Congressionally mandated nuclear posture review due in early 2010.

Summary: One of the first tasks of the next Administration will be to organize and carry out a review of the Nation's nuclear posture as called for in the FY 2008 Defense Authorization Act. This review will provide an important opportunity to forge a consensus on U.S. nuclear weapons policy and programs. For the 2009 Nuclear Posture Review, focus will be directed to:

- developing options to address challenges in sustaining the safety and reliability of the nuclear stockpile; and,
- conveying the urgency of modernizing the nuclear weapons research and development and manufacturing infrastructure.

Issue

The Department of Defense (DoD) will likely begin preparing its Nuclear Posture Review (NPR) shortly after the next Administration assumes office. This effort will occur during the first year of the new Administration, culminating in a Report to Congress in early 2010. The 2009 NPR will provide an important opportunity to begin forging a consensus on U.S. nuclear weapons policy and programs. In particular, the 2009 NPR will highlight how nuclear forces fit into a broader national security framework, taking into account nonproliferation, nuclear threat reduction, counterterrorism, and strategic arms control.

The National Nuclear Security Administration (NNSA) actively participated in the 2001 NPR and offered broad support to DoD's efforts in framing an innovative conceptual approach to the role of nuclear forces in the post-Cold War era. One result of this effort was to solidify DoD support to redress key NNSA shortfalls in its warhead manufacturing complex. As a result, DoD supported a "topline transfer" of about $3.6 billion from DoD accounts to NNSA's FY 2003-2007 five-year plan.

NNSA's focus for the 2009 NPR will be on developing options to address challenges in sustaining the safety and reliability of the nuclear weapons stockpile and conveying the urgency of modernizing the nuclear weapons research and development and manufacturing infrastructure.

Status

The 2009 NPR will be carried out by the next Administration's national security team. It will be informed by two recent white papers on nuclear strategy provided to the Congress–a July 2007 unclassified paper signed by the Secretaries of Defense, State, and Energy, and a more detailed classified version signed by Secretaries Gates and Bodman and delivered in March 2008. Other related work currently underway includes that carried out in support of the Bipartisan Congressional Commission on the Strategic Posture of the United States. That effort will continue over the next nine months and the Commission's Report to Congress is scheduled for April 2009. It is unknown whether the Commission proposes to address the details of force sizing, nuclear stockpile size, alert posture, targeting, and force operations, matters traditionally within the purview of the Executive Branch.

Major Decisions/Events

The 2009 NPR Report to Congress is due in early 2010.

Background

In section 1070 of the FY 2008 Defense Authorization Act, Congress directed the Secretary of Defense, in consultation with the Secretaries of Energy and State, to conduct a comprehensive review of the nuclear posture of the United States for the next 5 to 10 years. The review is to include the following elements:

- the role of nuclear forces in United States military strategy, planning, and programming;
- the policy requirements and objectives for the United States to maintain a safe, reliable, and credible nuclear deterrence posture;
- the relationship among United States nuclear deterrence policy, targeting strategy, and arms control objectives;
- the role that missile defense capabilities and conventional strike forces play in determining the role and size of nuclear forces;
- the levels and composition of the nuclear delivery systems that will be required for implementing the United States national and military strategy, including any plans for replacing or modifying existing systems;
- the nuclear weapons complex that will be required for implementing the United States national and military strategy, including any plans to modernize or modify the complex; and,
- the active and inactive nuclear weapons stockpile that will be required for implementing the United States national and military strategy, including any plans for replacing or modifying warheads.

The Secretary of Defense will submit a Report to Congress, in unclassified and classified forms, on the results of the NPR. This report will be submitted concurrently with the Quadrennial Defense Review, which will be in the early 2010 timeframe.

Section 1070 conveys "the sense of Congress that the nuclear posture review conducted under this section should be used as a basis for establishing future United States arms control objectives and negotiating positions."

Paper is as of 11/3/08.

Bipartisan Congressional Commission on the U.S. Strategic Posture

Opportunity to Restore Consensus on U.S. Nuclear Weapon Policy.

Summary: The Bipartisan Congressional Commission led by William Perry and Jim Schlesinger will provide an important opportunity to restore a national consensus on U.S. nuclear weapon policy, programs, and posture. The Commission is scheduled to report its finding in April 2009, with an interim report in December 2008.

Issue

The Bipartisan Congressional Commission was established by Congress to identify the basic principles for reestablishing a national consensus on strategic policy. Its main focus will be on the role and mission of U.S. nuclear weapons in the post-Cold War era. The Commission will be meeting over the next 9 months and could have a large impact on the 2009 Nuclear Posture Review. The Commission's final report is due out next April. The National Nuclear Security Administration (NNSA) is offering broad support to the Commission's activities and a representative is participating in these meetings. NNSA will ensure that the new leadership team from the next Administration is aware of this work and of its importance in connection with key nuclear weapons, nonproliferation and threat reduction programs.

Status

The Commission has currently met twice and is scheduled to meet every other month until its final report is released. Initially, it is seeking views from individuals across a diverse spectrum, and to clarify from its customer (i.e., Congress) what would be most helpful in facilitating its oversight function. In its most recent meeting, the Commission interviewed: Rep. Ellen Tauscher; Rep. Duncan Hunter; Rep. Terry Everett; Gen. James Cartwright (Vice Chairman of the Joint Chiefs); Gen. Larry Welch (USAF, ret.); and, David Albright (Institute for Science and International Security). At this stage, the Commission is trying to determine how best to focus its efforts.

Major Decisions/Events

In April 2009, the Commission is scheduled to report its findings to Congress.

Background

The Commission was established under Section 1062 of the FY 2008 Defense Authorization Act. It is composed of 12 members; the Chairmen and Ranking Members of the House Armed Services Committee and the Senate Armed Services Committee were each to appoint three members. The Commission membership is as follows:

William Perry, Commission Chairman, former Secretary of Defense
James Schlesinger, Commission Vice Chairman, former Secretary of Energy and Defense
Harry Cartland, former physicist, Lawrence Livermore National Laboratory
John Foster, Director Emeritus of Lawrence Livermore National Laboratory
John Glenn, former Senator and NASA astronaut

Morton Halperin, former Deputy Assistant Secretary of Defense
Lee Hamilton, former Congressman and Vice Chair of the 9/11 Commission
Fred Ikle, former Director, Arms Control and Disarmament Agency
Keith Payne, CEO and President, National Institute for Public Policy
Bruce Tarter, former Director, Lawrence Livermore National Laboratory
Ellen Williams, University of Maryland Distinguished Professor
James Woolsey, former Director, Central Intelligence Agency

In addition, the Commission has established five working groups under the leadership of the following individuals:

Dennis Blair	Deterrent Force Posture
Linton Brooks	Infrastructure
Ash Carter	Strategy and Policy
Arnie Kanter	Countering WMD Proliferation and Terrorism
Gordon Oehler	External Trends and Conditions

The Commission has been tasked by the Congress to make recommendations regarding the most appropriate strategic posture and the most effective nuclear weapons strategy. More specifically, it has been asked to address:

- the military capabilities and force structure necessary to support the strategy, including both nuclear and non-nuclear capabilities;
- the number of nuclear weapons required to support the strategy, including the number of replacement warheads required, if any;
- the appropriate qualitative analysis, including force-on-force exchange modeling, to calculate the effectiveness of the strategy under various scenarios;
- the nuclear infrastructure (the size of the nuclear complex) required to support the strategy;
- an assessment of the role of missile defenses in the strategy;
- an assessment of the role of nonproliferation programs in the strategy;
- the political and military implications of the strategy for the United States and its allies; and,
- any other information or recommendations relating to the strategy (or to the strategic posture) that the Commission considers appropriate.

Paper is as of 11/3/08.

Fissile Materials Disposition

Permanent Disposition of U.S. and Russian Weapon-Grade Plutonium.

Summary: Consistent with nonproliferation obligations under a 2000 U.S.-Russia agreement, surplus U.S. and Russian weapon-grade plutonium is to be permanently dispositioned.

- The United States is building three facilities to dispose of surplus U.S. weapon-usable plutonium.
- The United States is also working with Russia to dispose of its excess weapon-grade plutonium.
- Major challenges include securing adequate funding from Congress to build the three U.S. plutonium disposition facilities and ensuring a U.S. capability to disassemble nuclear weapons pits on a production scale.
- Disposition of surplus U.S. weapon-usable plutonium is also a critical element in the DOE's efforts to consolidate surplus weapon-usable nuclear materials.

Issue

Under the 2000 U.S.-Russia Plutonium Management and Disposition Agreement, each country is obligated to dispose of 34 metric tons of surplus weapon-grade plutonium. To fulfill the U.S. commitment, DOE/NNSA plans call for three facilities at the Savannah River Site near Aiken, South Carolina: a Pit Disassembly and Conversion Facility (PDCF) to disassemble nuclear weapons cores and convert the surplus weapon-grade plutonium metal into an oxide; a Mixed Oxide (MOX) Fuel Fabrication Facility (currently under construction) to fabricate the plutonium oxide into MOX fuel; and, a Waste Solidification Building (WSB) to process certain liquid waste streams from the PDCF and MOX Facility. Once the plutonium has been irradiated as MOX fuel in a nuclear reactor, it is rendered non-weapon-usable.

Building these three facilities is costly, although cheaper than indefinite long-term storage at multiple DOE sites. Nevertheless, some in Congress have questioned the nonproliferation value as well as the selected technical approach for disposing of surplus U.S. weapon-usable plutonium. The Consolidated Appropriations Act, 2008 (Public Law 110-161) transferred funding for the MOX project and PDCF project from the Defense Nuclear Nonproliferation appropriation to the Nuclear Energy appropriation and the Weapons Activities appropriation , respectively. The Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 (Public Law 110-417) confirmed that fissile materials disposition is a function of the NNSA. The Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 did not address PDCF, and the project continues to be managed by Defense Programs.

More than two thirds of the Department's surplus weapon-usable plutonium destined for the MOX Facility is in the form of nuclear weapons pits and must first be processed by the PDCF before it can go to the MOX Facility. As a result of insufficient funding, NNSA projects an approximately five year gap between the time the MOX Facility is scheduled to commence full operations and the expected time when PDCF will become fully operational. The duration of the gap will largely depend on the availability of adequate funding to support construction of PDCF.

Processing of some of the pits at Los Alamos National Laboratory and alternate sources of MOX feedstock can mitigate this shortfall; however, ultimately a production-scale capability to disassemble nuclear weapons pits will be required to support efficient operation of the MOX facility.

Status

Construction of the U.S. MOX facility began in August 2007 and is progressing well despite a $217 million funding reduction in the Consolidated Appropriations Act, 2008. The MOX project will be only minimally affected by this reduction if these funds are restored in fiscal years 2010 and 2011. The FY 2009 Continuing Resolution will not affect the MOX project as long as Congress appropriates full funding for the remainder of FY 2009 by March. Both the House and Senate Energy and Water Development Appropriations bills for FY 2009 contained full funding of $487 million for the MOX project; however, the House version would place the MOX project in the Office of Nuclear Energy; while the Senate version would leave the MOX project in the NNSA Office of Defense Nuclear Nonproliferation. The Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 authorized full funding for the MOX project in the Defense Nuclear Nonproliferation appropriation and amended the functions of the NNSA Administrator in the NNSA Act to include "eliminating inventories of surplus fissile materials usable for nuclear weapons."

The United States and Russia began formal negotiations on amendments to the 2000 Agreement in May 2008 to reflect the current plans for each country to dispose of 34 metric tons of excess weapon-grade plutonium. The United States has pledged $400 million to support Russian plutonium disposition, with the majority of the total costs to be borne by Russia and foreign government contributions, if available; however, the Department does not plan to request significant funding from Congress to support this United States pledge until the Russian Duma ratifies the amended 2000 Agreement. The Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 authorizes DOE to accept foreign government contributions through December 2015 for use in Russia's plutonium disposition program.

Milestones

The construction of the MOX Facility is already well under way and will continue according to an approved baseline. Construction and cold start up are estimated to be complete in 2016.

NNSA plans to brief an Energy Systems Acquisition Advisory Board (ESAAB) on the WSB in October/November to seek approval for Critical Decision (CD)-2 (baseline cost and schedule) and CD-3 (start of construction). Pending this approval, construction of the WSB is planned to begin in early FY 2009 and must be complete to support MOX cold-start up.

NNSA plans to brief senior management or a pre-ESAAB equivalent on the preliminary Total Project Cost estimate of the PDCF by December 15, 2008. The next major milestone would be to obtain approval of CD-2 at an ESAAB meeting in June 2009.

Major Decisions/Events

In 2009, the main focus of the program will be to continue the MOX Facility construction according to an approved cost and schedule baseline, obtain CD-2 approval for PDCF, identify

solutions to fill the gap between MOX and PDCF start-up, start construction on the WSB, and finalize an amended Agreement with Russia.

Background

Since the end of the Cold War, the United States and Russia have significantly reduced the size of their nuclear weapons arsenals. Because of these reductions, large quantities of plutonium have become surplus to defense needs. The final step in NNSA's defense-in-depth nonproliferation strategy, following detect and secure, is to dispose of surplus weapon-usable fissile materials. As part of the 2000 Plutonium Management and Disposition Agreement, the United States and Russia each committed to dispose of at least 34 metric tons (MT) of surplus weapon-grade plutonium. Following expert review of over 40 different disposition strategies, extensive environmental reviews and numerous public scoping meetings, DOE decided to dispose of surplus U.S. weapon-grade plutonium by irradiating it as MOX fuel in commercial light water reactors. Once irradiated, the plutonium is no longer readily usable for nuclear weapons. At the same time, DOE is supporting U.S. efforts to work with Russia to dispose of Russian surplus plutonium.

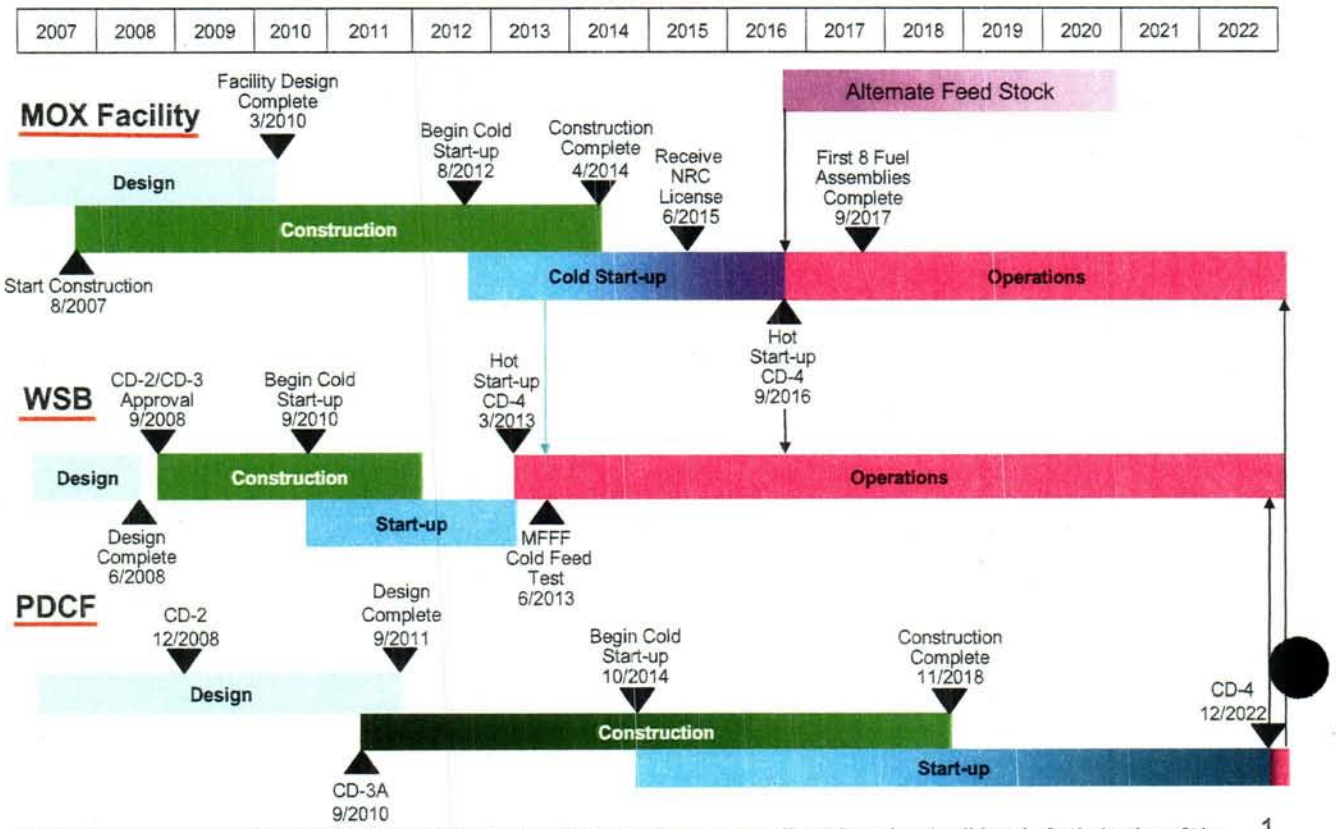
The independently validated total project cost (TPC) to design, construct, and start up the MOX facility is $4.8 billion. The WSB projected TPC is $344 million. The PDCF projected TPC exceeds $4 billion, and has risen significantly as it approaches a nearly complete baseline, largely due to the significantly advanced state of the facility design (now more than 70% complete) and an extended construction schedule.

The fissile materials disposition effort is among the most tangible examples of the U.S. commitment to fulfill its obligation to draw down its nuclear arsenal in a transparent and irreversible manner, consistent with Article VI of the Non-Proliferation Treaty. At the same time, the drawdown reduces safeguards, security, and storage costs and facilitates the modernization of DOE's remaining nuclear complex as well as provides a pathway out of the Savannah River Site for plutonium previously brought there for storage before disposition. If the MOX facility fails to meet certain milestones set forth in section 4306 of the Atomic Energy Defense Act as amended, DOE will be required to halt shipments of defense plutonium to the Savannah River Site.

Program offices that have equities in the fissile materials disposition mission are the Office of Defense Nuclear Nonproliferation, Office of Defense Programs, Office of Environmental Management, and the Office of Nuclear Energy. A separate paper on PDCF is available upon request.

Paper is as of 11/3/08.

Integrated Plutonium Disposition Plan



* Schedules shown for WSB and PDCF are preliminary and have not been externally reviewed and validated. Optimization of the PDCF schedule is ongoing in support of a CD-2 decision.

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*Schedule shown for the MOX Facility reflects current approved baseline, but does not reflect the baseline change proposal which, if approved, would modify the dates slightly.

Integration of DOE Nuclear Materials Consolidation and Disposition

DOE has taken steps to improve the integration of Complex-Wide Nuclear Materials Consolidation and Disposition efforts.

Summary

- DOE has in place numerous site, isotope, and program specific materials consolidation and disposition plans. However, the Department recognized the need for a single integrated projectized plan for the consolidation and disposition of nuclear materials.
- This action will allow the Department to better respond to Congressional concerns that have been raised over time with regard to DOE's ability to track, prioritize, and resource these efforts.
- This action will also allow the Department to better determine the resource requirements, and complex wide implications of operating key facilities and infrastructure components such as the Department's Savannah River Site H-Canyon Facility, and the National Nuclear Security Administration's (NNSA) Secure Transportation Asset.
- In its response to an October, 2007, GAO report recommendation, DOE stated that "the Integrated Project Schedule is expected to be developed in early calendar year 2009." While this is an aggressive objective, steady progress is being made.
- DOE has established, within NNSA, a permanent Office of Nuclear Material Integration (ONMI). Responsibilities of this office include:
  - Updating DOE Order 5660.1B, Management of Nuclear Materials
  - Developing DOE nuclear material management policy and strategic plans; and,
  - Coordinating, tracking, and reporting performance against a DOE-wide Excess Materials Consolidation Integrated Project (EMCIP).

Issue

A single, integrated plan for the consolidation and disposition of DOE nuclear materials will assure that the Department's efforts in this critical area are fully integrated, appropriately prioritized and adequately resourced. This plan will also allow the Department to provide performance reports to external stakeholders including Congress. DOE is aggressively working to have this initial integrated plan available to support Congressional action on the FY 2011 Budget.

This integrated project plan will also allow the Department to better resource and determine operating horizons for critical facilities and capabilities associated with nuclear materials consolidation and disposition.

Status

In 2007, the Department tasked the Department's Nuclear Materials Disposition and Consolidation Coordinating Committee (NMDCCC), which is currently chaired by the NNSA Principal Deputy Administrator, to complete the development of the remaining three of an initial seven integrated implementation plans covering the highest priority multi-program nuclear material consolidation activities in the Department. The eighth plan has been deferred pending analyses and decisions regarding construction of a planned program facility or development of an alternate capability.

At the recommendation of the NMDCCC, the Department has also established, within NNSA, a permanent Office of Nuclear Material Integration (ONMI, NA-58). This organization will assume the responsibility for developing the integrated nuclear materials disposition plan using the NMDCCC Implementation Plans as a starting point.

Milestones

- Approval of a revised nuclear materials management Order in Calendar Year 2008.
- Development of the Integrated Nuclear Materials Disposition Plan in Calendar Year 2009.
- Develop DOE Nuclear Materials Management Strategic Plan in Calendar Year 2009.

Major Decisions/Events

The completion and approval of the integrated nuclear materials disposition plan will permit the Department to:

- Make FY 2011-2016 resource allocation decisions based on better integrated nuclear materials disposition plan data;
- Prioritize consolidation and disposition activities within the FY 2011 Congressional Budget Request based on integrated data; and,
- To track and report nuclear materials consolidation and disposition performance against and integrated, Department-wide set of performance metrics.

Background

DOE manages nuclear materials at about 40 sites. Programmatic owners of nuclear materials include: the NNSA's Offices of Defense Programs; Naval Reactors; and, Defense Nuclear Nonproliferation; and, the DOE Offices of Environmental Management, Nuclear Energy, and Science.

The environment in which DOE manages its nuclear material has shifted from nuclear material weapons production to safe and secure storage at a minimum number of locations and disposition through processing and recovery for energy use or disposal. Enhanced emphasis on mitigating the safety and security risks associated with these materials has, at the same time, increased the importance of minimizing inventories maintained to support programmatic activities.

To respond to these changes, DOE established the NMDCCC in 2005. The NMDCCC was tasked by the Secretary of Energy to develop a strategic plan for consolidating and/or disposing of the Department's nuclear materials; update the Department's nuclear material management order; and, develop and approve plans to implement the highest priority materials consolidation activities within the Department. In Calendar Year 2007, the NNSA Principal Deputy Administrator was assigned by the Secretary to lead the NMDCCC and he set a goal for the committee to complete the remaining implementation plans by the end of Calendar Year 2008.

These plans outlined the strategies for the de-inventory of category I and II nuclear materials from the Sandia National Laboratories in New Mexico which was accomplished this calendar year, and the Livermore National Laboratory in California which was recently reduced by 35%, along with the overall Departmental objectives to reduce excess inventories of Uranium Isotopes, and Plutonium Isotopes from production and research facilities across the complex.

In January of 2008, the NMDCCC recommended that the DOE established ONMI within the NNSA. The Deputy Secretary, and the Under Secretaries for Energy, Science, and Nuclear Security approved the recommendation on February 1, 2008, and ONMI was established as an office within NNSA in July 2008.

ONMI is responsible for coordinating and establishing nuclear materials management policy for the Department, including ownership of the Department's nuclear material management order. ONMI will also have responsibility for integrating the execution of the NMDCCC implementation plans and coordinating, tracking and reporting performance of nuclear material consolidation and disposition activities throughout the Department.

ONMI will use the EMCIP as a primary tool for accomplishing this task. The EMCIP will summarize all Department material disposition plans into a single comprehensive, projectized plan that will be used to maintain near real time status of site specific materials consolidation and disposition activities. The EMCIP will provide Department managers, including field managers, with the ability to encourage cross-program resource planning and scheduling as well as to identify potential choke points not readily apparent in the individual plans; e.g., constrained secure transportation assets or to encourage efficiencies, such as consolidating requirements for production of shipping containers. This tool will also provide utilization and operational impacts data to allow the Department to better communicate the appropriate operational horizons for facilities critical to the nuclear material consolidation and disposition effort such as the Savannah River Site H-Canyon.

Paper is as of 11/3/08.

Nuclear Incident Response Teams

U.S. Government's Nuclear Incident Response Teams reside within NNSA to respond to nuclear and radiological incidents or emergencies.

Summary: Maintaining the Nation's capability to respond to a nuclear or radiological incident or emergency anywhere in the world is a critical component of the Department of Energy (DOE) responsibilities. It is the Nation's last line of defense.

The Nuclear Incident Response Teams reside within the National Nuclear Security Administration (NNSA), Office of Emergency Operations (NA-40). They provide scientific and technical advice to the Explosive Ordnance Disposal Teams from the FBI and DoD to disable a nuclear or radiological bomb.

In the event of an incident involving a nuclear weapon or terrorist nuclear device, the Secretary of Energy has a critical role to play in coordinating with the Attorney General, both to inform the President and to gain Presidential approval for "render safe" activities.

The incoming Secretary and senior staff will be provided a full classified briefing at the appropriate time relating to the Nuclear Incident Response Teams capabilities and Secretarial actions in various situations.

Issue

It is critical that DOE be prepared and able to respond to any nuclear or radiological incidents or emergencies. Some believe that the U.S. is particularly vulnerable to an attack during the early days of a new Administration. This has been referred to as the "Period of Heightened Alert," which covers the period of time from the 2008 elections through July 2009.

The Office of Emergency Operations serves the Secretary of Energy and the Administrator of the NNSA as the primary contact for all emergency management and response activities within the DOE complex, including plans for carrying out the Department's mission essential functions.

Within NA-40, the Nuclear Incident Response Teams are maintained in a state of readiness to meet the requirement for their deployment within hours of notification to search for, locate, and manage a nuclear or radiological incident, anywhere in the world. This is the Nation's capability. It is only resident within the DOE/NNSA; no other U.S. Federal Department or private institution has a similar capability.

Status

The Office of Emergency Operations assures that all of the response teams are operationally ready at all times.

Background

NNSA and its predecessor agencies have accumulated more than 60 years of experience in responding to nuclear or radiological incidents and emergencies. NNSA's nuclear incident

response teams are comprised of highly trained technical experts. Led by a Federal employee, the teams are comprised of personnel from DOE's national laboratories and other facilities in the DOE complex. Not only are the responders highly trained, highly capable, technical experts, they also have the support of home teams comprised of additional technical experts to make sure that the full complement of expertise resident in DOE's facilities is brought to bear in managing an incident or emergency. It is important to note that, except for responding to incidents or emergencies within the DOE complex, the nuclear incident response teams deploy in support of a lead organization – if the incident is a terrorist or suspected terrorist incident in the U.S., the FBI has lead responsibility; if the incident involves a U.S. nuclear weapon in DoD custody, or if it is an international incident, the DoD has the lead responsibility; for other incidents, the Department of Homeland Security or the Nuclear Regulatory Commission may have the lead responsibility.

"Render safe" is a term used when describing the actions taken to interrupt the explosive process of a device. The device could be conventional (such as an Improvised Explosive Device) or a chemical, biological, nuclear or radiological device/weapon of mass destruction (WMD). DOE teams provide support only for nuclear and radiological devices/WMD. Due to the complexity of the task and extensive safety procedures, the "render safe" process and movement of a nuclear device to a safe location can take three to five days, or more.

Our Nuclear Incident Response Teams bring the expertise of the nuclear weapons complex to the working point; however, they are not explosive ordnance disposal (EOD) technicians. Our team members provide technical advice to the EOD technicians (FBI for domestic incidents/DoD for international).

In the event of an accident or incident involving a nuclear weapon or radiological materials, NA-40 will deploy specialized teams to conduct "render safe" activities. Emergency Operations personnel will notify and brief the Secretary of Energy and the Administrator of the NNSA of the situation. The Secretary is responsible for coordinating with the Attorney General to request approval from the President to carry out "render safe" procedures and to provide recommendations to the President at various steps throughout the process.

Paper is as of 11/3/08.

OHIO-Class Ballistic Missile Submarine Replacement

Enabling the most survivable leg of the Nation's strategic deterrence triad, OHIO-class ballistic missile submarines are reaching the end of their operational life. To support the Navy's 30-year shipbuilding plan which includes replacement of this national asset, propulsion plant design and development efforts must begin by 2010.

Summary: OHIO-class ballistic missile submarines are approaching the end of their useful service lives and must be replaced.

- The submarine based strategic weapon is adaptable, timely, and the preferred alternative for strategic deterrence capability.
- The Navy has recently completed studies for an OHIO-class replacement, with platform development set to begin in FY 2010 and construction in FY 2019.
- To support the Navy's schedule, the reactor core and propulsion plant design and development work must begin by FY 2010.
- Total estimated DOE cost: $1.3B.

Over-target Requirements

FY10	FY11	FY12	FY13	FY14
59.0	91.0	121.0	150.0	170.0

Issue

Ballistic missile submarines (SSBN) have proven their worth for more than 40 years. The itinerant and remote nature of SSBNs, which carry over 50% of the operationally deployed nuclear warheads, assures their survivability. The strategic weapon system deployed on SSBNs is adaptable, timely, and the preferred alternative for strategic deterrence capability. However, OHIO-class SSBNs are approaching the end of their useful service lives and must be replaced.

Status

The Navy recently completed required capability studies for a follow-on replacement to the OHIO-class, and concluded that construction of the lead ship must begin by FY 2019 to meet U.S. Strategic Command's requirements. The Navy's shipbuilding plan and associated budget programming supports this timeline. The Navy's Analysis of Alternatives began in August and will be complete in FY 2010.

Milestones & Major Decisions/Events

Section 231 of Title 10 United States Code requires the Secretary of Defense to submit with the Defense budget to Congress an annual long-range plan for the construction of naval vessels. In accordance with the Navy's 30-year plan, construction for the OHIO-class replacement is scheduled to begin by FY 2019.

The design of a new nuclear powered submarine and associated propulsion plant is needed to meet projected ship mission capabilities for the strategic weapon system as defined by the Navy.

To support the Navy's schedule for a new strategic weapon platform, reactor core and propulsion plant design and development work must begin by FY 2010.

Background

Naval Reactors is responsible for the design and delivery of a new reactor core and propulsion plant to support the next-generation submarine design. Design studies will be required for the new core and additional funding enables manufacturing development at fuel and core vendors. The core design will be targeted to have up to a 40-year operational life, which requires extending reactor technologies beyond current 30-year cores. Further, initial studies and concepts for the plant will focus on both capability and affordability, drawing on existing technologies currently deployed on VIRGINIA-class submarines and being developed for CVN-78 as well as new concepts for integration, automation, and modularity. New technology should provide flexibility for component design and plant arrangements, facilitate lower-cost construction and testing, enhance plant safety and survivability, extend core life, and enable a substantial reduction in power plant watch-standing requirements and associated life-cycle costs.

Paper is as of 11/3/08.

Nuclear Powered Surface Combatant (CGX)

As directed in the 2008 National Defense Authorization Act, the Navy is evaluating nuclear-powered propulsion as an alternative for the next-generation Cruiser. Consistent with this direction, and as the final alternative of analysis report demonstrates nuclear power as an attractive option to support the next-generation Cruiser's energy-intense anti-air warfare and ballistic missile defense mission, especially in light of rising oil prices, propulsion plant development is set to begin by 2010.

Summary: The Navy is planning development of a new nuclear powered surface combatant with a ballistic missile defense and anti-air warfare mission focus.

- 2008 National Defense Authorization Act directs the Navy to construct all future major combatant vessels with integrated nuclear power systems.
- The recently completed Analysis of Alternatives for the Navy's next generation cruiser demonstrates the attractiveness of nuclear power as oil prices increase and demands for energy and operational flexibility grow.
- Reactor plant must meet high electrical power and energy demands for advanced radar and associated technology that is planned for the next generation cruiser.
- DOE-related design and development efforts must begin in FY 2010 to support the Navy's shipbuilding plan which identifies authorization for the first ship to begin as early as FY 2015.
- Total estimated DOE cost: $712M.

Over-target Requirements

FY10	FY11	FY12	FY13	FY14
57.0	73.0	90.0	101.0	96.0

Issue

The National Defense Authorization Act (NDAA) for 2008 directs the Navy to construct all future major combatant vessels with integrated nuclear power systems. Based on a ballistic missile defense and anti-air warfare mission focus, the next generation cruiser will likely require substantially higher energy capacity (over a six fold increase in electrical load), to support considerably more sensitive warfare systems over long periods of sustainment and with relative independence from the logistics chain supporting operational requirements and reducing vulnerability – a mission tailor-made for nuclear propulsion. The attractiveness of nuclear power increases as oil prices, total ship energy demands, and the need for operational flexibility grow.

Status

The Department of Defense's Analysis of Alternatives has been completed. Consistent with the FY 2008 NDAA, the Navy is developing its FY 2010 budget submission predicated on a new design nuclear powered cruiser, with ship authorization occurring as early as FY 2015.

Milestones & Major Decisions/Events

To support ship authorization as early as FY 2015 with delivery in FY 2021, design and development of the nuclear propulsion plant must begin by FY 2010. Aggressive near-term actions beginning in FY 2010 will be required to complete the necessary design work to support procurement of long-lead time reactor plant components beginning in FY 2012. The Navy's shipbuilding plan and associated budget programming identifies construction authorization of the first next generation cruiser to begin as early as FY 2015. The reactor plant components are the earliest components loaded into the ship during construction.

Background

The nuclear-powered next-generation cruiser will use a single, modified next-generation aircraft carrier propulsion plant (A1B) as the baseline for this reactor plant. However, significant modifications to the existing design will be required to tailor power and energy requirements to the cruiser's mission needs and life-of-ship requirements. Additional funding is needed to modify the A1B core design, perform manufacturing development at fuel and core vendors, and analyze reactor plant components to validate their performance for cruiser (versus aircraft carrier) operational tempos and ship performance characteristics (e.g., differing pitch and roll limits; pipe stress analysis; shock inputs; etc). To support the aggressive design and construction timeline, enable increased energy output for advanced military capabilities, and comply with the FY 2008 NDAA, reactor core and propulsion plant design and development efforts must begin by FY 2010.

Paper is as of 11/3/08.

Pu-238 Production for Space Exploration and National Security Missions

The U.S. will exhaust Pu-238 supply by 2015 without resumed production which may have an impact on NASA and national security customers.

Summary: The Department of Energy (DOE) needs to reestablish production of plutonium-238 (Pu-238).

- DOE will be unable to supply radioisotope power sources for the National Aeronautics and Space Administration (NASA) and national security applications after 2015.
- Worldwide, there is no known capability to produce more Pu-238.
- The earliest timeframe to resume production of Pu-238 is approximately seven years after project initiation.
- Without funding of $30 million for production FY 2010, there will be significant disruptions to Federal users for future missions.
- The FY 2009 House Appropriations Committee language for both NASA and DOE directs the Office of Science and Technology Policy (OSTP) to develop in 2009 a coordinated strategy to reestablish a domestic production capability.

Issue

The DOE has supplied unique power systems to NASA and national security users for over four decades. These nuclear power systems provide long-lived constant power for space science and exploration missions and national security applications where no other power sources can meet mission requirements. The radioisotope that is used to fuel these systems, plutonium-238 (Pu-238) is no longer produced domestically. The remaining domestic inventory and the inventory available for purchase from Russia will be nearly exhausted after supplying the next two budgeted NASA missions. The Department's ability to supply these power systems will end in 2015 without a new source of Pu-238. A Record of Decision was issued in 2001 to resume production of Pu-238. Although pre-conceptual work was performed, production was never reestablished. OMB contends that cost for new production capabilities should be paid by the user agencies (i.e., NASA and national security customers).

Status

An April 2008 letter from the NASA Administrator to the Secretary of Energy requested that the Department maintain its abilities to supply systems for a set of projected mission requirements, but states that NASA should not pay for production facilities. National security users have also indicated that Pu-238 production is the Department's responsibility, although no specific projects have been identified beyond those that are currently being supported. DOE capital acquisition efforts to reestablish a Pu-238 production capability are currently on hold pending availability of funding. At present the issue is still under discussion; no funding has been requested to resume PU-238 production.

Milestones

DOE completed the Nuclear Infrastructure Programmatic Environmental Impact Statement (EIS) in December 2000 that evaluated reestablishing a domestic capability to produce Pu-238 at a rate

of 5 kg/y to meet user needs. The associated Record of Decision, issued in January 2001, identified the need to reestablish production using existing facilities at Oak Ridge National Laboratory and Idaho National Laboratory. The Department approved the mission need for a project to reestablish domestic Pu-238 production in February 2004. In response to a DOE-wide reevaluation of security requirements for the storage and transportation of special nuclear material prompted by the events of September 11, 2001, the Department initiated an effort to consolidate all Pu-238 operations related to production of radioisotope power systems, including any new production of Pu-238, at a single, highly secure site. In July 2004, the Department approved the mission need for the Pu-238 Consolidation Project. The notice of intent to prepare the Consolidation EIS was issued in November 2004 and the draft Consolidation EIS was issued in June 2005, but that effort has been placed on hold in order to further assess alternatives. DOE has continued to examine options for production of Pu-238 using existing facilities or new construction at various sites, however most planning efforts have been suspended due to a lack of funding.

Major Decisions/Events

Without FY 2010 funding to reestablish Pu-238 production, there will be significant disruption to Federal users for future missions. In FY 2009, DOE anticipates supporting efforts to develop an interagency strategy to fund construction of needed facilities and to allocate appropriate costs to user agencies.

Background

DOE is authorized by the Atomic Energy Act to produce special nuclear material and to provide power systems that use special nuclear material to other Government agencies. DOE is also designated by the 2006 National Space Policy to maintain the capability and infrastructure to develop and furnish nuclear power systems for use in U.S. Government space systems. Federal users reimburse DOE for Pu-238 fuel and other mission-specific costs, and DOE has historically funded costs to maintain a capable infrastructure. DOE also has the authority to purchase Pu-238 from foreign suppliers; however, with the exception of the remaining available inventory in Russia that DOE has already under contract in order to meet its commitments through 2015, no other foreign supply has been identified. Russia, like the U.S., ceased Pu-238 production and would require substantial investment to reestablish its own production capability.

There is strong interagency interest in resolving this issue. The April 2008 letter from the NASA Administrator provided a detailed mission planning set that indicates an ongoing and future need for radioisotope power sources. Without these sources, future space exploration beyond Mars would no longer be possible. This issue is receiving Congressional interest for resolution, as well.

The National Aeronautics and Space Administration Authorization Act of 2008 (H.R. 6063, passed by the House and sent to the Senate in June 2008) directs the Office of Science and Technology Policy to develop a plan for restarting and sustaining the domestic production of radioisotope thermoelectric generator material for deep space and other space science missions and to submit the plan to Congress not later than 270 days after enactment. NASA was also directed in the legislative report accompanying the FY 2008 omnibus appropriations bill to enlist the National Research Council to examine issues related to future supplies of Pu-238 and to

prepare a report by March 31, 2009, to assist with effective planning for future missions. The version of H.R 6063 passed by the House provides NASA $5 million to reconstitute a program for Pu-238 production. The draft House report of the Energy and Water appropriation for FY 2009 (bill number not yet assigned) also provides DOE $5 million for Pu-238 production and further advises that a funding request for DOE restart of production and for NASA's marginal costs of production be included in the President's budget request for FY 2010. The full cost to reestablish production of Pu-238 for options currently under consideration is in the range of $200 - 400M in constant year dollars over a period of 6-7 years with an operating cost of approximately $35M per year.

Paper is as of 11/3/08.

Intelligence: Foreign Intelligence/Counterintelligence Consolidation

DOE must obtain legislation prior to September 30, 2010 in order to preserve the consolidation of the Department's counterintelligence functions within a single Office of Counterintelligence under the DOE Office of Intelligence and Counterintelligence. Absent such legislation, a "sunset" clause in the 2007 National Defense Authorization Act (NDAA) would reverse the consolidation and recreate the NNSA counterintelligence office.

Summary: Section 3117 of the 2007 John Warner National Defense Authorization Act abolished the NNSA counterintelligence office and transferred its functions, personnel, funds, assets, and other resources to the Secretary of Energy, to be administered (except to any extent otherwise directed by the Secretary) by the Director of the Office of Counterintelligence of the Department of Energy. The Department's intent in seeking this consolidation was to ensure the accountability of DOE intelligence programs, while also maximizing efficiencies and synergies among DOE intelligence assets. The legislation included a sunset date of September 30, 2010 in the event the consolidation proved unsuccessful. On the contrary, however, DOE's counterintelligence program has registered significant gains in resources, stature, and the quality and sophistication of its products as a function of consolidation.

Issue

After two years, consolidation has been a success. Intelligence reports generated from counterintelligence debriefings increased by 166% between FY 2006 and FY 2008. The number of open DOE counterintelligence investigations is up by 40% since FY 2006. Counterintelligence budgets and personnel have also steadily increased during this period—a time when virtually all other programs around the intelligence community have experienced declining resources. The National Counterintelligence Executive (NCIX) this year identified DOE's program as on a par with the government's top counterintelligence programs.

Status

The successes and effectiveness of a unified Departmental counterintelligence program, and the potential for disruption that could be occasioned by re-separating DOE and NNSA counterintelligence activities, argue in favor of maintaining a consolidated program.

Milestones and Strategy

By spring 2009, DOE should be prepared to approach key Congressional committee staff and members—in particular, House Armed Services Committee, House Permanent Select Committee on Intelligence, and Senate Select Committee on Intelligence—to lay out the progress made by DOE's counterintelligence program and the value of a consolidated program. Later in 2009, as part of the Department's annual round of legislative proposals, DOE should submit language to eliminate the clause. DOE also should ensure the continued support of the Director of National Intelligence by keeping that organization informed of the Department's plans and progress.

Background

At the end of 2005, DOE's intelligence components were a highly fractured assortment of organizations: one focusing on foreign intelligence analysis, another on counterintelligence operations at NNSA facilities and organizations, and a third responsible for counterintelligence at non-NNSA portions of DOE as well as counterintelligence policy for the entire Department. The Secretary of Energy, in consultation with the Director of National Intelligence and with the support of the intelligence community, decided to pursue consolidation of these disparate organizations—first by approving the consolidation of DOE intelligence and counterintelligence functions, and then by requesting language in the National Defense Authorization Act to transfer NNSA counterintelligence functions to the DOE Office of Counterintelligence. Legislative agreement was reached, subject to a sunset clause on the NNSA-DOE consolidation that would take effect after four years.

Paper is as of 11/3/08.

Intelligence: Energy, Environment and National Security

The Office of Intelligence and Counterintelligence is framing a strategic foresight and warning capability to address energy and environmental national security challenges.

Summary

Mounting energy and environmental challenges are changing the global security landscape. If left unaddressed, these unconventional challenges threaten to destabilize the global economy and societies worldwide. The Department of Energy, Office of Intelligence and Counterintelligence (IN) is developing a new collaborative strategic intelligence (i.e., strategic foresight and warning) capability that will better position the Intelligence Community to anticipate and respond to increasingly unpredictable events.

IN's strategy involves:

- Building a prototype for an innovative and collaborative international network;
- Linking ground-breaking scientific and analytic methodologies and research;
- Leveraging currently untapped cutting-edge S&T potential in DOE laboratories;
- Drawing upon diverse expertise in order to consider interdependent security-related phenomena; and
- Integrating new scientific knowledge about the impacts of climate change and energy choices into U.S. intelligence assessments.

Issue

Interactions among the processes driving demographic change, energy consumption, and environmental degradation have unleashed powerful, but still inadequately understood, forces capable of destabilizing natural ecosystems, regional economies, and political regimes. There are already serious warning signals — including the recent abrupt changes in the Arctic environment, the collapse of major fisheries, riots in many countries over sharply higher food and fuel prices, the rapid depletion of critical aquifers that supply cities and farmers with water, ocean acidification, the rapid decline of mountain snowpack and glaciers, and the spread of infectious diseases— that expose fragility in a number of interactive social, political, and environmental systems. These and other warning signals are linked and possess the potential to amplify and reinforce each other. One example of the interconnections is the effects of energy use on global climate change, where the observed rate of greenhouse gas emissions and impacts has already exceeded those illustrated in the most extreme scenarios considered by the Intergovernmental Panel on Climate Change in its *Fourth Assessment Report* (2007).

The National Intelligence Strategy of 2005 calls on the intelligence community to *"anticipate developments of strategic concern and identify opportunities as well as vulnerabilities for decision-makers"* and to *"develop, sustain, and have access to expertise on every transnational issue and every threat to the American people."* Although energy and environmental issues fall into these categories, the intelligence community has not traditionally focused on these issues. Moreover, traditional intelligence community processes and values do not readily advance

knowledge on inherently unclassified, transnational issues such as energy and the environment, for which most expertise in these areas is outside the U.S. intelligence community.

Status

Recognizing that energy and environmental security issues are manifestly linked to national security, IN established a directorate devoted to this topic in May 2007.

In Fiscal Year 2008, a staff of one detailee and a DOE staff officer:

- Created and tested an international virtual community able to harness and integrate expertise from outside the U.S. Intelligence Community
- Sponsored and summarized three international conferences involving nearly 200 participants representing more than 25 nations and several DOE laboratories
- Presented briefings on the initiative at the invitation of several foreign governments, including the United Kingdom, Canada, Singapore, Italy, the Netherlands, Czech Republic, Japan, Slovakia, and Mexico
- Engaged non-government organizations, including the Council on Foreign Relations, Brookings Institution, Princeton University, London School of Economics, New School for Social Research, Charles University in Prague, and the Prague Security Studies Institute
- Sustained a growing, collaborative, online space characterized by extensive international participation
- Hired four additional federal government staff, three of whom joined the team in September 2008

Challenges

In the short term, the principal challenges we face are:

- Acquiring sufficient FY 2009 funding to build on progress to date;
- Establishing a diversity of contract vehicles to meet a diversity of needs;
- Ensuring collaborative workspace for uncleared and foreign government participants;
- Developing informed support for the development of a prototype online knowledge-creating community; and
- Extending the envisioned capability through trust-based international networks.

Milestones and Strategy

Although initiated by DOE's Office of Intelligence and Counterintelligence, this program will succeed only if it is able to attract and engage multiple stakeholders within the U.S. and abroad. The primary approach will be to cultivate substantive ties aligned behind a strategic foresight mission that crosses disciplinary, organizational, and national boundaries. The desired end-state is a self-correcting, decentralized network that is rapidly updated and recognized as a trusted broker of reliable strategic insight and warning. Key partners will include foreign governments, international organizations, international business, academia, and expert research organizations. The operating model will have the following features:

- **U.S. leadership**: The international network initially will be coordinated by DOE.
- **Web-based platform**: A platform will be established to facilitate generation and sharing of information worldwide. (A "beta" prototype is scheduled to be released in December 2008.)

- **Conferences and workshops**: Face-to-face meetings will bring together current and prospective partners, foster the development of social and intellectual capital, and complement on-line communications. An international "critical issues summit" and report is planned for early 2009.
- **Critical issues networks:** Partners with shared geographic and thematic issues and interests will be able to collaborate to explore system vulnerabilities. The critical issues will have emerged from collaborative discussions prior to, and during, the critical issues summit.
- **Products of the Strategic Foresight System:** Outputs from the strategic intelligence network are expected to include dynamic simulation exercises, jointly-authored research works, and the identification of a suite of early warning indicators that can be periodically surveyed to assess the evolution of key interactions and feedbacks among energy, environment, and security concerns.

Major Decisions/Events

Key milestones for FY 2009 (dependent on availability of funds and contract vehicles) include:

- Host a Critical Issues Summit on Energy and Environmental Security in early 2009
- Convene the Edinburgh Energy and Environmental Security Summit in mid-2009
- Host a university and DOE multi-laboratory Energy and Environmental Security consortium event, tentatively scheduled for September 2009

Background: Context, Risk, and Sensitivities

Two particular challenges are likely to confront this novel initiative:

Increased Demands for Intelligence Support. In the coming year, policymaker demands for intelligence support on energy and environmental security are likely to be substantially greater than in past years, partly due to international preparations for the 15th Conference of the Parties to the UN Framework Convention on Climate Change (Copenhagen, December 2009). The current IN plan for a strategic intelligence capability is not appropriate for tactical intelligence support, which can be handled through traditional channels. IN's new approach, however, can be used to help frame policymakers' strategic choices on energy and environmental issues.

Challenges to Traditional Practices. The internationally networked aspect of DOE/IN's approach represents a departure from current policies and expectations of DOE and other members of the U.S. Intelligence Community on security, counterintelligence, information technology, and human resources. Nonetheless, the new initiative is consistent with the strategic direction that the Director of National Intelligence has outlined in the Intelligence Community's *Vision 2015*. The complex security challenges that face all nations argue for a transformation of intelligence practices to permit increased understanding of transnational risks through more open engagement with non-governmental organizations and foreign governments. With energy and environmental challenges, as well as daily evidence of threats to societies arising from insufficient understanding of the forces of globalization, the use of novel approaches such as DOE/IN's new initiative is essential to the creation of strategic intelligence.

Paper is as of 11/3/08.

Science

ITER Project

ITER is a large-scale fusion energy research facility that will help demonstrate the scientific feasibility of clean, abundant and economical fusion energy for the future.

Summary

ITER (Latin for "the way") is a joint international research and development project that aims to demonstrate the scientific and technical feasibility of fusion power. The partners in the project are the European Union, Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA. ITER will be constructed in Europe, at Cadarache in the south of France. U.S. contributions to ITER include: a DOE Office of Science Major Item of Equipment (MIE) project consisting of approximately 80% domestic procurement of hardware, including supporting R&D and design; and 20% cash costs, such as personnel, including U.S. engineers and scientists; assembly; and other costs. As the host party, Europe will contribute 45.4% of the construction cost, with the six other partners, including the U.S., each providing 9.1%.

Issue

There are different priorities and interests among the ITER Members, including management style and willingness to accept schedule delays and cost increases, many of which are caused by immaturity and shortcomings of the 2001 ITER design. The U.S. contribution to the construction of ITER was expected to be between $1.45 and $2.2 billion, depending on the final design, commodity and labor, exchange rates, and other costs. Components for which the U.S. is responsible will be built under subcontracts to the U.S. ITER Project Office, Oak Ridge National Laboratory, the entity managing. Added to this, is the aspect that Cadarache is essentially a "green field" site so the ITER Organization (IO) team has little existing physical and staff infrastructure to help them launch the project. Project management and business systems are not yet fully operational.

Status

ITER construction is underway. The U.S. is exerting positive influence on the management of this project to control cost, scope and schedule. The U.S. has openly discussed our concerns and proposed solutions, impressing upon the other Members and the IO the importance of cost control including: (1) assigning additional personnel at U.S. cost to assist in the IO's 2007 Design Review: (2) assisting the IO to develop a bottoms-up Integrated Project Schedule; and (3) taking every opportunity to promote "best practices" through the ITER Management Advisory Committee (MAC) and through the Financial Audit Board (FAB) while at the same time helping to ensure the scientific quality of the project through the Science and Technology Advisory Committee (STAC). While the US has been accused of being a "bull in a china shop," we have found that over time, many of our proposals have been accepted by the other Members, and also presented by other Members as their own.

The FY 2009 request for ITER is $214.5M – this request has been approved by both the House and Senate Appropriations Committees. We are currently operating under a Continuing Resolution at the FY 2008 omnibus appropriation spending rate of $10.6M and have $15.5M of carryover from the supplemental appropriation passed in FY 2008. The FY 2008 request was $160M. The reduction in FY 2008 funding will likely have impacts on the cost of the project and on the schedule range. FY 2009 and 2010 reductions could cause additional severe impacts. Despite the funding challenge, the U.S. has remained fully engaged in ITER activities at the internal level, including those associated with governance.

Milestones

Next ITER Council Meeting expected in mid 2009
ITER Construction is underway
Expected completion of construction in 2018

Major Decisions/Events

The US will need to determine if it should keep the pressure on the IO management to contain costs and make reasonable schedule progress while contending with the Members' differing perspectives. It is already known that the schedule goal, contained in the ITER Agreement, for completing the construction phase in 2016 is not achievable.

Background

The ITER Project is the highest priority in the DOE Office of Science's *Facilities for the Future of Science: A Twenty-Year Outlook.* ITER is an international collaboration of seven partners (China, Japan, Korea, Russia, India, the European Union and the U.S.) to design, build, and operate a first-of-a-kind international tokamak research facility in Cadarache, France, that is aimed at demonstrating the scientific feasibility of fusion energy for peaceful purposes, an essential feature of which would be achieving sustained fusion power generation. ITER's design objectives are to produce at least 500 MW (a power gain factor of ≥ 10) for pulses lasting at least 400 seconds. If successful, ITER will be a major step towards designing a fusion demonstration power plant (DEMO). Fusion energy, the energy that powers the sun and stars, has the potential to provide an abundant source of clean and economical energy. With adequate investment in R&D, fusion power plants could become a major part of America's electric generating capacity by the latter half of this century.

At the November 1985 Geneva Summit, a Reagan-Gorbachev initiative led to the ITER Conceptual Design Activities (CDA) which began in April 1988 and were successfully completed in December 1990 and carried out jointly by the U.S., the European Union, Japan and the USSR under IAEA auspices. On July 21, 1992, the European Union (EU), Japan, the Russian Federation and the U.S. signed a 6-year ITER Engineering Design Activities (EDA) Agreement. The US completed its responsibilities under the EDA and did not extend our participation in 1998, effectively withdrawing from ITER.

On January 30, 2003, President Bush announced that the U.S. would join the ongoing ITER negotiations. From that time until the signing of the ITER Joint Implementation Agreement (Agreement), the negotiators resolved a number of critical issues, including siting of the ITER project in Cadarache, France; management and financial responsibilities and allocation of

material (in kind) contributions; and the creation and staffing of an ITER Organization to manage ITER's construction and operations.

The Secretary of Energy delegated the role of US Negotiator to the Director of the Office of Science (later conducted by Dr. Orbach in his capacity as Under Secretary for Science) and his staff. The Department of State Legal Advisor and Science and Technology Advisor provided important support, as did the Department of Energy's Office of General Counsel.

The ITER Agreement was formally signed in November 2006 and went into force on October 24, 2007. The Agreement, which was initially applied on a provisional basis, was ratified as a treaty by the other partners after signature. However, the US ratified it as a Congressional-Executive Agreement prior to signing under the authority provided by the Energy Policy Act (EPAct) of 2005.

Paper is as of 11/3/08.

Energy Frontier Research Centers

Energy Frontier Research Centers are intended to foster, encourage, and accelerate high-risk, high-reward basic research that may provide the basis for transformative energy technologies.

Summary: As part of the FY 2009 budget request, the Office of Basic Energy Sciences (BES) in the U.S. Department of Energy's Office of Science proposes a $100 million Energy Frontier Research Centers (EFRCs) initiative. The purpose of these Centers will be to integrate the talents and expertise of leading scientists in a setting designed to accelerate research toward meeting our critical energy challenges. Knowledge from the EFRCs could decisively enhance U.S. energy security and protect the global environment in the century ahead.

Issue

EFRCs will bring together the skills and talents of multiple investigators to enable fundamental research of a scope and complexity that would not be possible with the standard individual investigator or small group research project. As such, the EFRCs will strengthen and complement the existing portfolio of the single Principal Investigator and small group research projects currently supported within BES core research areas.

Under the EFRC initiative, universities, national laboratories, nonprofit organizations, and for-profit firms were invited to compete, singly or in partnerships, to establish a Center through a Funding Opportunity Announcement (FOA). The EFRCs will harness the most basic and advanced discovery research in a concerted effort to establish the scientific foundation for a fundamentally new U.S. energy economy. These integrated, multi-investigator Centers will conduct fundamental research focusing on one or more of several "grand challenges" recently identified in major strategic planning efforts by the scientific community (see Background below).

Status

It is anticipated that approximately $100 million will be available for 20-30 EFRC awards in FY 2009. The exact number of awards and amount of funding is entirely contingent upon the final FY 2009 appropriation for BES. The EFRC awards are expected to be in the $2–5 million range annually for an initial 5-year period. The magnitude of the funding and the five-year minimum commitments are important aspects of the program that permit an EFRC to establish a comprehensive management plan. According to the FOA, the management plan of an EFRC application will be a key selection factor in the evaluation of the proposal by the Merit Review Panels. The method by which a successful ERFC will operate will vary depending on the resources of institutions involved, the expertise of the research performers, and nature of the scientific challenges being addressed.

EFRCs are planned as initial 5-year awards with interim reviews after about 3 years to ensure appropriate progress. After the initial 5-year awards, BES plans to allow those EFRCs that have demonstrated adequate progress in their interim reviews to compete for renewal, along with new

EFRC applications. As always, outyear funding is subject to satisfactory progress in the research and the availability of funding appropriations. EFRC awards will not include construction of physical centers, but capital investment in instrumentation and infrastructure are expected as part of the EFRC awards, and the usage and leverage of existing facilities, including the BES user facilities, is encouraged.

Milestones

- The FOA soliciting EFRC proposals was published on April 4, 2008. Approximately 130 questions seeking clarification of the FOA were formally posed and responded to by DOE. These clarifications also lead to three amendments of the FOA, published on April 23, June 19, and September 3.
- The EFRC FOA requested, but did not require, Letters of Intent (LOIs) from potential applicants, which were due on July 1, 2008. 251 LOIs were received from 42 states and the District of Columbia.
- The deadline for submission of full proposals was October 1, 2008; approximately 280 proposals were received prior to the deadline.
- The initial review of the EFRC applications for eligibility, completeness, and responsiveness to the FOA is now underway by Federal officials in BES and the Chicago Operations Office (CH). Applications deemed grossly incomplete, that include ineligible entities or personnel, or that are deemed non-responsive to the FOA will be declined without further merit review.
- A Merit Review Evaluation Plan has been established that describes in detail the use of multiple Merit Review Panels (MRPs) to provide stringent peer review of the EFRC proposals based on the four review criteria codified in 10 CFR Part 605.
- BES will develop the MRP structure and assemble the MRPs for a review of all EFRC applications in late February, 2009. The panel review process will be overseen by the directors of the two BES research divisions. The MRP evaluations will be summarized by BES program staff and funding recommendations will be forwarded to the Associate Director of BES. As stated in the FOA, awards will be announced by DOE in April, 2009, pending appropriations.

Major Decisions/Events

- EFRC awards cannot be made under the "no new starts" restriction associated with the Continuing Resolution that funds BES for the first 5 months of FY 2009 at FY 2008 levels. But the merit review process will proceed as described above, so that BES is in position to make awards in FY 2009 if funds are ultimately appropriated.
- DOE, SC, and BES will incur a significant loss of credibility with the scientific community if funds are not provided in the final FY 2009 appropriation. The EFRC initiative has generated tremendous excitement in the research community and galvanized extraordinary team arrangements between universities, DOE laboratories, private industry, and non-profit entities. The research community has made a massive effort in formulating teams and writing proposals in response to the EFRC FOA. The community recognizes the critical role of basic science in addressing our nation's energy and environmental challenges and has responded impressively.

Background

The 21st century brings with it staggering challenges for advanced energy technology. Limited supplies of traditional fossil energy resources and a clear consensus on the negative global effects of traditional fossil fuel utilization demand the discovery of transformative energy technologies for the development and effective utilization of new energy sources that are abundant, clean, and economical. Incremental advances in current energy technologies will not fully address the energy challenges of the 21st century. History has demonstrated that radically new technologies arise from disruptive advances at the frontiers of scientific thought. The incredible development of information technology of the 20th century provides the most recent example. What might a vision of 21st century energy technology look like? Imagine a virtually unlimited supply of electrical power from solar-energy systems, modeled on the photosynthetic processes utilized by green plants, and power lines that could transmit this electricity from the deserts of the southwest to the Eastern Seaboard at nearly 100 percent efficiency. This is but one of many visions of a new energy future that can only come from continuing to push the frontiers of science.

The Basic Energy Sciences (BES) program supports fundamental research in focused areas of the natural sciences in order to expand the scientific foundations for new and improved energy technologies and for understanding and mitigating the environmental impacts of energy use. BES has long invested in innovative basic research aimed to achieve this mission through its core research areas. In 2001, the Basic Energy Sciences Advisory Committee (BESAC) conducted a far reaching study to assess the scope of fundamental scientific research that must be considered to address the DOE missions in energy efficiency, renewable energy resources, improved use of fossil fuels, safe and publicly acceptable nuclear energy, future energy sources, and reduced environmental impacts of energy production and use.

The scientific community responded to this BESAC study with enthusiasm through participation in a week-long workshop, whose results were published in early 2003 in the report, *Basic Research Needs to Assure a Secure Energy Future*. That report inspired a series of ten follow-on "*Basic Research Needs*" workshops over the next five years, which together attracted more than 1,500 participants from universities, industry, and DOE laboratories. The full reports from these 11 workshops can be found at: http://www.sc.doe.gov/bes/reports/list.html. The topical areas of Basic Research Needs are: Assure A Secure Energy Future, the Hydrogen Economy, Solar Energy Utilization, for Superconductivity, Solid-State Lighting, Advanced Nuclear Energy Systems, Clean and Efficient Combustion of 21st Century Transportation Fuels, Geosciences: Facilitating 21st Century Energy Systems, Electrical Energy Storage, Materials under Extreme Environments, and Catalysis for Energy.

The New Era of Science. Together, these workshop reports highlighted the remarkable scientific journey that has taken place during the past few decades. The resulting scientific challenges, which no longer were discussed in terms of traditional scientific disciplines, described a new era of science – an era in which materials functionalities are designed to specifications and chemical transformations are manipulated at will. Over and over, the recommendations from the workshops described similar themes – that in this new era of science, we would design, discover,

and synthesize new materials and molecular assemblies through atomic scale control; probe and control photon, phonon, electron, and ion interactions with matter; perform multi-scale modeling that bridges the multiple length and time scales; and use the collective efforts of condensed matter and materials physicists, chemists, biologists, molecular engineers, and those skilled in applied mathematics and computer science.

The Science Grand Challenges: This goal to direct and control matter at the quantum, atomic, and molecular levels requires a change in our fundamental understanding of how nature works. A BESAC Grand Challenges subcommittee was convened, which examined the primary roadblocks to progress. The results of that examination were presented in the report, *Directing Matter and Energy: Five Challenges for Science and the Imagination*, where a new era for energy science was posed in five challenges:

- How do we control material processes at the level of electrons?
- How do we design and perfect atom- and energy-efficient synthesis of revolutionary new forms of matter with tailored properties?
- How do remarkable properties of matter emerge from complex correlations of the atomic or electronic constituents and how can we control these properties?
- How can we master energy and information on the nanoscale to create new technologies with capabilities rivaling those of living things?
- How do we characterize and control matter away – especially very far away – from equilibrium?

Addressing these grand challenges provides a path forward to the transition from observation to control of matter.

Paper is as of 11/3/08.

DOE Bioenergy Research Centers

DOE supports three major multidisciplinary centers for complementary and synergistic fundamental research on renewable energy production.

Summary: The Office of Biological and Environmental Research (BER) in the Department of Energy's Office of Science has established three major multidisciplinary *DOE Bioenergy Research Centers* (BRCs) to accelerate the basic scientific research needed to develop sustainable, cost-effective methods of producing cellulosic ethanol and other biofuels. The BRCs have been given initial funding for five years to overcome some of the central obstacles to cost effective biofuel production; recalcitrance and identification/engineering of candidate plants for biofuel production.

Issue

The BRCs are tackling the scientific challenge of redesigning inedible plant material for ease of breakdown and improved subsequent microbial and enzymatic processing into biofuels such as ethanol. The three BRCs are taking complementary and synergistic approaches, using high-risk, innovative methodology and cutting-edge genome-enabled technology.

The BioEnergy Science Center (*BESC*) at Oak Ridge National Laboratory is focusing on the central problem of "recalcitrance"--overcoming the resistance of plant fiber, or lignocellulose, to degradation into sugars that can be converted into fuels. Research by *BESC* investigators has shown that recalcitrance forms the major cost barrier to achieving commercially viable production of cellulosic ethanol and other fuels from lignocellulose. *BESC* is focusing directly on the bioenergy crops of switchgrass and poplar as well studying the microbes that can degrade them, attempting to re-engineer both the plants and microbes to facilitate degradation.. *BESC*'s longer-term objective is to achieve "Consolidated Bioprocessing," or combined degradation and fuel synthesis in one step, using a re-engineered microbe or community of microbes.

In addition to focusing on recalcitrance, the Great Lakes Bioenergy Research Center (*GLBRC)* at the University of Wisconsin is pursuing the alternative approach of engineering plants to produce more starches and oils. These substances can be more readily converted to fuels. *GLBRC* points out that a 20 percent plant oil content could nearly double the fuel yield from plant biomass. *GLBRC*, reflecting its affiliation with universities with strong agricultural programs, is focusing on re-engineering a wide variety of plants as well as microbes that can degrade plants and produce fuels. *GLBRC* also has a major "Thrust Area" studying sustainability issues surrounding the development of a biofuels economy.

The Joint BioEnergy Institute (*JBEI*) led by the Lawrence Berkeley National Laboratory is focusing on the widely studied "model plants" of *Arabidopsis* and rice (as well as some work on switchgrass), for which there is abundant genotypical and phenotypical information. *JBEI* believes that changes in model plants can be accomplished more readily and then transferred to bioenergy crops. *JBEI* is pursuing a series of unique strategies on microbes, including reengineering microbes to better degrade plant fiber and to produce a range of fuels beyond ethanol that are more like gasoline.

Status

The Office of Biological and Environmental Research (BER) in the Department of Energy's Office of Science has established three major multidisciplinary *DOE Bioenergy Research Centers* (BRCs) to accelerate the basic scientific research needed to develop sustainable, cost-effective methods of producing cellulosic ethanol and other biofuels.

Each BRC is led by a team of top scientists. The BRCs represent the leading edge of the Department's basic science research effort aimed at creating the scientific and technological foundations for a new U.S. biofuels economy. The establishment of the BRCs reflects the Department's conviction that transformational breakthroughs in basic science will be essential to make plant fiber-based biofuels feasible as a cost-effective substitute for a substantial portion of petroleum-based transportation fuels.

The three BRCs include:

- The *BioEnergy Science Center* (BESC), led by Oak Ridge National Laboratory (ORNL) and headquartered on the ORNL campus, in Oak Ridge, TN;
- The *Great Lakes Bioenergy Research Center* (GLBRC), led by the University of Wisconsin Madison (UWM) in partnership with Michigan State University and headquartered on the UWM campus in Madison, WI; and
- The *Joint BioEnergy Institute* (JBEI), led by the Lawrence Berkeley National Laboratory (LBNL), and located near Berkeley, CA.

All three BRCs are multi-institutional partnerships. Partner institutions include universities, DOE National Laboratories, private firms, and nonprofit organizations (see map attached).

Milestones

DOE has established clear goals and criteria for appraising BRC performance. All BRCs are required to have detailed management plans and to set clear science milestones and deliverables to focus and guide their research programs. BER closely monitors research progress and conducts a formal annual progress of each BRC.

Major Decisions/Events

The BRCs began operations in September 2007, and were funded for an initial five year period. The BRCs will undergo a 3rd year progress review that will allow BER to assess whether to issue renewal funding.

Background

The BRCs are part of BER's Genomics: GTL program. This program is building on the major advances in biology achieved under the Human Genome Project (which DOE initiated in 1986), supporting cutting-edge genomics-based system biology research on microbes and plants to serve DOE missions in energy, environmental clean-up, and carbon sequestration.

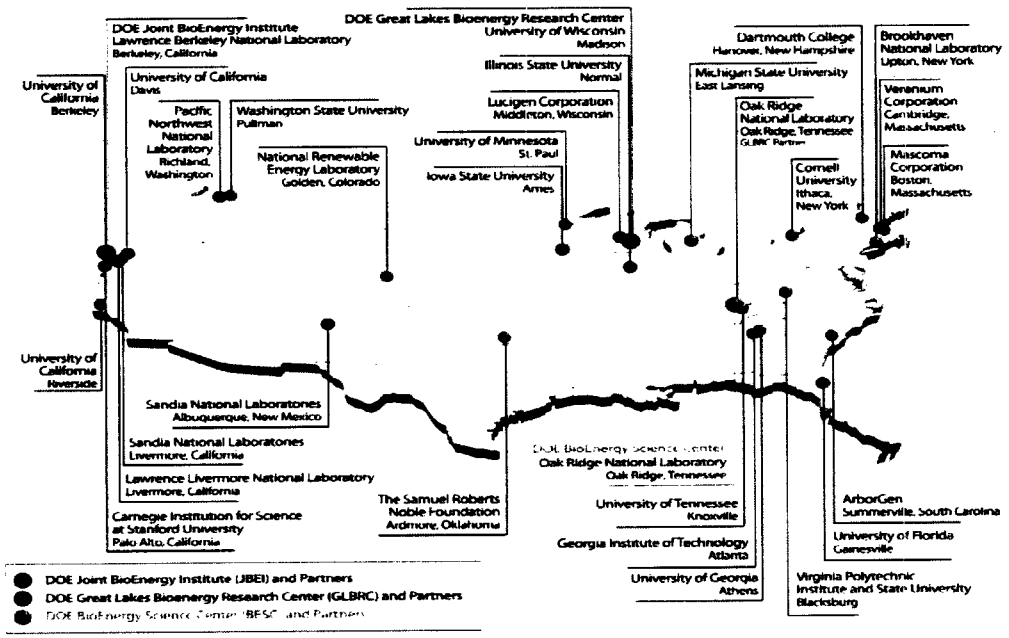
The BRCs were chosen by open competition, initiated by an August 2006 Funding Opportunity Announcement. Universities, national laboratories, private firms, and nonprofit organizations were invited to compete singly or as partners. Selection was made through an intensive scientific

merit review process and announced in June 2007. The BRCs started up in September 2007, after concluding agreements with DOE on the terms and conditions of their awards.

Paper is as of 11/3/08.

DOE Bioenergy Research Centers: Multi-Institutional Partnerships

DOE Bioenergy Research Centers



International Collaborative Large-Scale Science Facilites

Scientific success in the future will require building unprecedented large-scale scientific facilities in the future – these facilities will require extensive international cooperation, coordination and cost-sharing.

Summary

The Office of Science (SC) believes that it is beneficial to engage with major international partners to identify possible areas of cooperation on the construction and operation of large-scale facilities for basic research. It is important that these discussions be led by the funding agencies that have it in their missions and budgets to build and operate the facilities.

Issue

Large-scale research facilities are essential to an increasingly wide range of scientific disciplines. These may include particle accelerators for high energy physics, reactors for fusion experiments, light sources, neutron sources, space-based missions, underground neutrino facilities, and even virtual facilities such as computer networks and data archives. As these large-scale facilities become more complex and more expensive to build and operate international coordination becomes increasingly important. Large-scale scientific facilities at costs of $1 billion or more may need to be planned, constructed and operated in an international collaborative framework so as to share the costs of facilities beyond the financial means of any one nation and to avoid unnecessary duplication of capabilities. This class of facilities would include projects that offer scientific discovery opportunities and for which funding may be secured based on mission relevance to a number of government agencies.

Status

International cooperation on large-scale research facilities was discussed at the G-8 Science Ministerial in Okinawa in June 2008. It was agreed to continue discussions as to how these projects could be better coordinated during future G-8 Ministerials next year.

In August 2007, the Department of Energy (DOE) published the "Four Years Later: An Interim Report on Facilities for the Future of Science: A Twenty-Year Outlook." The "Facilities for the Future of Science", published in 2003, was the first long-range facilities plan prioritized across disciplinary lines issued by a government science funding agency. The DOE enlisted input from relevant federal advisory committees to establish its priorities. These committees serve as a means to furnish expert advice, ideas and diverse opinion to the Federal Government and to increase public-private partnerships. The EU and the UK have also published similar facility plans and SC encourages other major international partners to do the same to facilitate this type of dialogue and cooperation.

Milestones

Next meeting of the G-8 science ministers is currently unscheduled, but expected during 2009.
Next ITER Council Meeting will take place mid-2009.

Major Decisions/Events

The G-8 venue would be the best venue for advancing these overarching discussions.

Background

For further details, please refer to the Facilities for the Future of Science, report by the U.S. Department of Energy, 2003 (updated in 2007); and the European Roadmap for Research Infrastructures, 2007.

Paper is as of 11/3/08.

Isotope Development and Production

There is a national shortage of key isotopes. Relatively few isotopes are made available by the Department. Many of the isotopes needed to meet domestic demand must be imported.

Summary: The Department of Energy (DOE) is establishing a prioritized isotope development and production program.

- Stable and radioactive isotopes are vital to the mission of many Federal agencies and play a crucial role in basic research, medicine, industry and homeland defense applications.
- The Department's isotope program produces those isotopes which are not commercially available or whose supply is not meeting demand, within available funds. The program relies on a suite of accelerator and reactor facilities both at national laboratories and universities for production.
- Although isotope availability has decreased domestically due to decreased or defunct production capabilities, demand for isotopes has increased. However, the Isotope Production Program budget has not grown commensurate with the increased demand.
- The Department receives routine and numerous inquiries from Congress, industry and other stakeholders regarding isotope availability.
- The Department of Energy's FY 2009 Congressional Budget Request proposes to transfer the DOE Isotope Program from the Office of Nuclear Energy (NE) to the Office of Science's (SC) Office of Nuclear Physics (NP).
- The FY 2009 Budget Request also includes $3.1 million for research and development and production of research isotopes; this is a new initiative for the program.
- On August 5, 2008 DOE sponsored the 3-day workshop, *Workshop on the Nation's Needs for Isotopes: Present and Future,* to discuss the Nation's needs for stable and radioactive isotopes and options to meet the current and future demands. Stakeholders (users and producers) from the different communities and disciplines participated and represented over 18 Federal departments and agencies, 17 academic institutions, 8 national laboratories and 14 private industries and companies.
- The Isotope Program is working with industry, stakeholders and other Departmental elements to resolve isotope supply issues and proposals such as californium-252, americium-241, and helium-3.

Issue

There is a national shortage of isotopes. The consequences of shortages of radioactive and stable isotopes needed for research, medicine, homeland security, and industrial applications are severe, ranging from the inability to treat cancer, to the failure of detecting terrorist threats, to restricting search for energy resources. Investments in new capabilities will be needed to meet the growing demands of the Nation and foster research in the applications that will support the health and welfare of the public.

Status

DOE has proposed to move the isotope program from NE to SC to enhance the Department's support of the program. The Isotope Program will remain within NE until a Fiscal Year 2009 Appropriation is passed. Close communication exists between NE and SC's Office of Nuclear Physics, as decisions are made that would impact the future program within SC. Isotope production will continue based on customer requests and payments and availability of facilities.

Milestones

In September 2007 The National Academies (NAS) released a report, "Advancing Nuclear Medicine Through Innovation," which identified several areas in isotope production warranting attention, including the need to focus on the development of new radionuclide production technologies and the need to train new technical and academic personnel. This study was jointly sponsored by DOE and NIH.

In August 2008 the Nuclear Science and Advisory Committee (NSAC) was charged by NP to develop a prioritized list of research opportunities for producing and/or using isotopes, and to develop a long-range strategic plan for stable and radioactive isotope development and production. One objective of the strategic plan is to examine the robustness of current isotope production operations in terms of technical capabilities and infrastructure, research and development of production.

In August 2008, DOE initiated the formation of a Federal Working Group with the National Institutes of Health to address the recommendations of the NAS report. One of the goals of the Working Group is the generation of a five year prioritized production schedule of medical isotopes.

Major Decisions/Events

The report titled "The Nation's Needs for Isotopes: Present and Future," from the August 2008 DOE workshop will be issued in Calendar Year 2008.

The Nuclear Science and Advisory Committee (NSAC) isotope subcommittee members have been selected and the first meeting will be November 13-14, 2008. The report on priority of research isotopes is requested by April, 2009, and the long-term strategic plan report is requested by July 31, 2009.

Background

The Isotope Production and Applications subprogram, which operates under a revolving fund as established by the FY 1990 Energy and Water Appropriations Act (Public Law 101-101) as modified by Public Law 103-316, maintains its financial viability by utilizing a combination of Congressional appropriations and revenues from the sale of isotopes and services. These resources are used to maintain the staff, facilities and capabilities at user-ready levels and to support peer-reviewed research and development activities related to the production of isotopes. Commercial isotopes are priced at full cost. Research isotopes are priced to provide reasonable compensation to the government while encouraging research.

Paper is as of 11/3/08.

Management

Title XVII Loan Guarantee Program

The Loan Guarantee Program is authorized to issue $42.5 billion in loan guarantees for innovative energy technology projects.

Summary: The Loan Guarantee Program Office (LGPO) administers the federal loan guarantee program that was authorized by Title XVII of the Energy Policy Act of 2005 (EPAct 2005). Under this program, DOE may issue loan guarantees for new or significantly improved energy technology projects that avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, where the applicants have a reasonable prospect of repaying the principal and interest on their debt obligations.

- The Loan Guarantee Program (LGP) is an important component of our Nation's efforts to combat climate change and to commercialize new, alternative clean energy sources.
- This program is moving forward expeditiously, but very deliberately, to ensure rigorous risk evaluation to fully protect the federal government and the U.S. Taxpayer.

Issue

The Loan Guarantee Program (LGP) has the authority to issue up to $42.5 billion in loan guarantees. Of the total amount, $4 billion is available until expended and the remaining $38.5 billion is currently due to expire on September 30, 2009. Prior to recommending to the Secretary that the application from the 2006 and 2008 solicitations receive a loan guarantee the LGP will perform a full due diligence review to ensure that the borrower is creditworthy and there is a reasonable prospect of repayment of all principal and interest on the borrowed amount.

Status

In August 2006:

- The Department issued policy guidelines for use in connection with its first solicitation of proposals for loan guarantees.

- The Department issued its first solicitation for pre-application for loan guarantees.

In October 2007:

- The Department issued final regulations implementing Title XVII at 10 CFR Part 609. These regulations were issued less than eight months after Congress provided the first dedicated funds for administrative operations of the LGP and the first budgetary authority to support the issuance of loan guarantees.

- The Department invited 16 pre-applicants out of 143 to submit full applications for loan guarantees. The 16 included 6 biomass projects, 3 advanced fossil energy technology projects, 2 solar projects, 2 industrial energy efficiency projects, 1 electricity delivery and energy reliability project, 1 hydrogen project and 1 alternative fuel vehicles project. Completed applications are due on November 19, 2008.

In June 2008:

- The Department issued three solicitations with the potential to provide up to $30.5 billion in loan guarantees.
  - Energy Efficiency Renewable Energy and Advanced Transmission and Distribution - $10 billion
  - Nuclear Power Facilities - $18.5 billion
  - Front End Nuclear Fuel Cycle - $2 billion

In September 2008:

- On September 22, 2008, the Department issued a solicitation for Advanced Fossil Energy Technologies with the potential to provide up to $8.0 billion in loan guarantees. This solicitation supports the following project type categories:
  - Coal-Based Power Generation and Industrial Gasification that incorporates carbon capture and sequestration or other beneficial uses of carbon ($6.0 billion).
  - Advanced Coal Gasification ($2.0 billion)

Milestones

- In October 2007, DOE invited 16 project sponsors responding to DOE's August 2006 solicitation to submit full applications for a loan guarantee.

- To date, of the 16 project sponsors, the LGP has received one complete application and application information from three additional project sponsors. The Loan Guarantee Program expects additional completed applications to be submitted by the November 19, 2008 cut-off date.

Major Decisions/Events

The application deadlines for the June 2008 solicitations are:

- Energy Efficiency Renewable Energy and Advanced Transmission and Distribution:
  - Stand-alone and manufacturing projects - February 26, 2009
  - Large scale integrated renewable projects – February 26, 2009 for initial application and no later than April 30, 2009 for subsequent application material.

- Nuclear:
  - Nuclear Power Facilities projects – Initial application submissions are due on September 29, 2008 and the balance of the application is due on December 19, 2008.
  - Front End Nuclear Fuel Cycle Projects – Initial application submissions are due on September 29, 2008 and the balance of the application is due on December 2, 2008.

- Advanced Fossil Energy Technologies:
  - Initial application submissions are due on December 22, 2008
  - The balance of the application is due on March 23, 2009

The Department intends to retain the capabilities of outside firms with engineering, financial, marketing and legal expertise to assist in DOE's due diligence reviews of individual applications and negotiation of loan guarantee agreements. The costs of those services will be paid by the applicants.

Background

- In conformity with Office of Management and Budget Circular A-129, the Department established a Credit Review Board (CRB), comprised of senior Department officials, on March 16, 2007. The CRB is the internal governing board with authority to oversee all policy matters affecting LGP operations.

- The Department's Loan Guarantee Program Office (LGPO) officially began operations on April 1, 2007 with the Director of the LGPO coming on board on August 6, 2007. Since August 2007, the Director has secured the services of a cadre of employees and contractors with extensive project finance experience, complemented in several instances by particular experience in the Federal Government's Overseas Private Investment Corporation (OPIC) and other agencies.

- Pursuant to the Consolidated Appropriations Act, 2008, Congress authorized the Department to issue $38.5 billion in loan guarantees until September 30, 2009. The FY 2009 Budget request proposed to extend that authority to 2010 for all projects other than nuclear and 2011 for nuclear projects.

- The new Loan Guarantee Program at the Department of Energy is unique in a number of ways:
    - Self-Pay Credit Subsidy: It is a self-pay program in which the risk premium (credit subsidy) is paid up front, in full, by the borrower from funds that may not come from funds obtained from the Federal government, unless otherwise explicitly authorized by Congress. As such, appropriated funds will not be used to cover the cost of the credit subsidy, as is often the case in other Federal loan and loan guarantee programs.

    - Working with credit rating agencies: The Loan Guarantee Program credit subsidy model utilizes independent credit assessments provided by the credit rating agencies as a starting point for assessing a project's probability of default. Few other agencies have adopted this type of external assessment discipline.

    - Risk Assessment: The program uses a "state of the art" credit subsidy model, including significant interface with independent credit rating agencies to establish the risk profile of its potential borrowers, improvement on the transaction through negotiation, and a final validation of risk through the independent credit rating agency.

- Dynamic to meet needs of energy sector: The program has features that force it to continually research and meet the financing needs of the dynamic U.S. energy technology sector. Under 10 CFR Part 609, loan guarantees may not be offered if the technology has been used in 3 or more commercial projects in the United States within a period of at least 5 years for each such project. This standard requires the program to work closely with DOE's program offices, laboratories and the scientific and venture capital community in seeking out new technologies to support.

- Technology innovation: The Loan Guarantee Program focuses on significantly improved technologies, i.e., technologies that are not yet commercially deployed, as compared to commercial technologies in service in the United States. Other Federal agencies' loan guarantee programs typically focus on conventional technologies that are out on the marketplace.

Paper is as of 11/3/08.

Advanced Technology Vehicles Manufacturing Loan Program

The Advanced Technology Vehicles Manufacturing Loan Program is authorized to issue up to $25 billion in direct loans.

Summary: The Advanced Technology Vehicles Manufacturing Loan Program (ATVMLP) will allow DOE to provide direct loans to automobile manufacturers and component suppliers to finance the cost of re-equipping, expanding, or establishing a manufacturing facility in the United States to produce qualifying advanced technology vehicles; or qualifying components; and, engineering integration performed in the United States of qualifying vehicles and qualifying components.

- This program is moving forward expeditiously, to ensure meeting requirements of the legislation to fully protect the federal government and the U.S. Taxpayer.

Issue

DOE is establishing a direct loan program as authorized under Section 136 of the Energy Independence and Security Act of 2007 (EISA), Public Law 110-140, as amended by Section 129 of Division A of the Consolidated Security, Disaster Assistance, and Continuing Appropriations Act, 2009 , P.L. 110-329, The Department is working to:

- Establish the Advanced Technology Vehicles Manufacturing Loan Program organization (ATVMLPO) reporting directly to the Chief Financial Officer. This organization will be the operational arm of the loan program..

- Establish and recruit staff for the ATVMLP, including an SES Director.

- Issue an interim final rule within 60 days of enactment (no later than 11/29/2008) of P.L. 110-329 as required by Section 136(e) of EISA, as amended. .

Background

With the passage of P.L. 110-329, Congress provided appropriations to support up to $25 billion in direct loans to support the development and construction of Advanced Technology Vehicles Manufacturing facilities including the re-equipping, expansion or establishment of a facility that manufactures advanced technology vehicles or qualifying components or engineering integration performed on such projects. P.L. 110-329 also appropriated $10 million for DOE's administrative expenses to implement the program.

Paper is as of 11/3/08.

Pending Significant Litigation Matters

DOE is involved in a number of litigation matters arising out of its diverse activities and programs

Summary: DOE currently has three significant pending litigation matters:

- Spent Fuel Litigation
- Alleged Exposures to Radioactive and/or Toxic Substances
- National Interest Electric Transmission Corridor Litigation.

Issue

DOE is involved in a number of litigation matters arising out of the Department's diverse activities and programs. Below is a summary of significant pending litigation matters.

Status

Spent Nuclear Fuel Litigation

As specified by the Nuclear Waste Policy Act of 1982 (NWPA), DOE entered into contracts with more than 45 utilities in which, in return for payment of fees into the Nuclear Waste Fund, the Department was required to begin disposal of spent nuclear fuel (SNF) by January 31, 1998. Because DOE has no facility available to receive SNF under the NWPA, DOE has been unable to begin disposal of the utilities' SNF as required by the contracts. Significant litigation claiming damages for partial breach of contract has ensued as a result of this delay.

To date, eight suits have been settled involving utilities that collectively produce about 29.7 percent of the nuclear-generated electricity in the United States. Under the terms of the settlements, the Judgment Fund, 31 U.S.C. 1304, paid approximately $353.4 million to the settling utilities for delay damages they have incurred through September 30, 2008 and will make annual payments to them for future costs as they are incurred. In addition, two cases have been resolved by final judgments: a judgment of $35 million that was not appealed and paid by the Judgment Fund; and a final judgment awarding no damages affirmed by the appellate court.

Fifty-seven cases remain pending either in the Court of Federal Claims or in the Court of Appeals for the Federal Circuit. Liability is probable in these cases, and in many of these cases orders have already been entered establishing the Government's liability and the only outstanding issue to be litigated is ascertaining the amount of damages to be awarded. However, it should be noted that the courts have not resolved the significant issue as to whether the Government can assert the unavoidable delays defense, under which, if applicable, the Government would not be liable for any damages.

Under current law, the Department will not be required to reimburse any damages or settlements in this litigation that have been paid out or will be paid out of the Judgment Fund.

Alleged Exposures to Radioactive and/or Toxic Substances

A number of class action and/or multiple plaintiff tort suits have been filed against current and former DOE contractors in which the plaintiffs seek damages for alleged injuries or diminution of property values caused by exposure to radioactive and/or toxic substances as a result of the historic operations of DOE nuclear facilities. The most significant of these cases arise out of operations of the facilities at Rocky Flats, Colorado; Hanford, Washington; Paducah, Kentucky; Portsmouth (Piketon), Ohio; Mound, Ohio; and Brookhaven, New York. Collectively, in these cases, damages in excess of $109 billion are sought.

These cases are being vigorously defended. Two cases have gone to trial. In the Rocky Flats litigation, the jury returned a substantial verdict in favor of the plaintiffs. The court has entered judgment on the verdict, and the defendants have filed appeals. In the Hanford litigation, following rulings by the court of appeals, seven of twelve "bellwether" plaintiffs' claims were resolved in favor of the defendants, relatively small judgments in favor of two "bellwether" plaintiffs were affirmed, and three "bellwether" plaintiffs' claims were remanded to the district court for further proceedings. The defendants have filed a petition for a writ of certiorari in the U. S. Supreme Court. Proceedings on the remaining Hanford plaintiffs' claims have been suspended while appeals are prosecuted. In addition to the Rocky Flats and Hanford cases, some cases have been dismissed by trial courts based on legal rulings, and some of those rulings have been appealed to the courts of appeals. Final resolution of these issues has not been determined.

Based on the resolution of prior similar litigation, and the favorable results obtained to date in most of the pending cases, the Department believes that the likelihood of liability in many of these cases is remote, and that in those cases where liability is reasonably possible, if any liability is ultimately imposed, it would be significantly less than what the plaintiffs seek.

National Interest Electric Transmission Corridor Litigation

Section 1221(a) of the Energy Policy Act of 2005 (Pub. L. 109-58) (EPAct) added a new section 216 to the Federal Power Act (FPA), 16 U.S.C. § 824p. FPA section 216(a) requires the Secretary of Energy to conduct a nationwide study of electric transmission congestion within one year from the date of enactment of that section and every three years thereafter. Following consideration of alternatives and recommendations from interested parties, the Secretary is required to issue a report based on the study "which may designate any geographic area experiencing electric energy transmission capacity constraints or congestion that adversely affects consumers as a national interest electric transmission corridor [(NIETC)]." 16 U.S.C. § 824p(a)(2). The effect of a National Corridor designation is to delineate geographic areas within which, under certain circumstances, the Federal Energy Regulatory Commission (FERC) may authorize "the construction or modification of electric transmission facilities." 16 U.S.C. § 824p(b). However, FERC jurisdiction is triggered only when either: the State does not have authority to site the project; the State lacks the authority to consider the interstate benefits of the project; the applicant does not qualify for a State permit because it does not serve end-use customers in the State; the State has withheld approval for more than one year; or the State has

conditioned its approval in such a manner that the project will not significantly reduce congestion or is not economically feasible. 16 U.S.C. § 824p(b)(1).

DOE published a National Electric Transmission Congestion Study in August 2006, which was followed by a notice and comment period, a draft NIETC designation, and further opportunity for comment. On October 5, 2007, DOE designated two NIETCs, the Mid-Atlantic Corridor (DOE Docket No. 2007-OE-01) and the Southwest Corridor (DOE Docket No. 2007-OE-02), in a National Electric Transmission Congestion Report and Order. 72 Fed. Reg. 56992. After considering requests for rehearing, DOE issued an Order Denying Rehearing, effective March 11, 2008, which affirmed the NIETC designations. 73 Fed. Reg. 12959.

Various states, state utility commissions, and environmental groups have filed a total of 18 lawsuits, in both district and courts of appeals, challenging DOE's NIETC designations. The cases currently pending in district court are awaiting the court's ruling on the Government's motion to dismiss for lack of subject matter jurisdiction. For the circuit court cases, which represent the majority of the litigation, the Judicial Panel on Multidistrict Litigation randomly selected the Ninth Circuit Court of Appeals as the circuit in which all petitions for review of DOE's NIETC designations are to be heard. The Ninth Circuit has issued an order consolidating the individual petitions for review, and has set the following briefing schedule: the petitioner's brief is due December 29, 2008, and the Government's brief is due March 30, 2009. Unless a party was to file a motion for expedited oral argument, oral argument will likely not be held until late 2009 or early 2010.

Paper is as of 11/3/08.

Cyber Security

Senior leadership's awareness and active involvement is critical to sustaining and improving the Department's cyber security posture.

Summary: Within the Department of Energy (DOE), cyber security is part of everyone's job, especially for senior leadership. Good cyber security in DOE depends on the Secretary, the Deputy Secretary, the Under Secretaries and other key officials carrying out leadership roles in cyber security management.

Ensuring adequate protection of the Department's information and information systems against cyber attack depends on a solid understanding by senior leadership of the cyber security threat, the risks facing the Department as a result of this threat, and the roles that each leader has in overseeing management of cyber security throughout the DOE complex, including the field. As new leaders come on board they each should be briefed on the overall cyber security posture of the Department and the roles each has in ensuring adequate cyber security protection of the Department's information and information systems. This should be done through classified briefings, where possible, which is necessary to portray the complete cyber security picture.

Issue

Cyber attacks are increasing in complexity and frequency, and are becoming more aggressive. DOE is attacked over a million times each day in a wide variety of ways, although DOE has defense-in-depth mechanisms in place throughout the complex. Even with this protection, some of the continuing, very sophisticated attacks on DOE and other parts of the Federal government have been able to penetrate DOE networks and computers. DOE has a cyber security defense based on industry and government best practices, and it continually improves its defenses. However, cyber attacks continue to evolve to avoid detection by these defenses.

DOE has implemented a comprehensive cyber security program, with DOE-wide cyber guidance in place through the DOE directives system. Application of this guidance depends on actions by the Under Secretaries and other leaders to develop, maintain, and oversee implementation of cyber security in each of their organizations, including the DOE National Laboratories and other field organizations for which they are each responsible.

DOE's cyber security management is based on the assessment and management of risk, with stronger controls in place to protect very sensitive information and systems for which there would be a high impact if compromised. The impact could include loss of confidentiality of information, loss of integrity of information and systems, and/or unavailability of systems to perform their intended function. Each Under Secretary in his or her cyber security plan takes into account the overall risk to the organization's programs in applying government-wide and DOE guidance to protect information and systems within the organization, and may require mandating even stronger controls than the DOE-wide minimum requirements.

When a DOE site has experienced a significant cyber breach as a result of an attack or other compromise, such as the compromise of data by a hacker or loss of a laptop computer, there is a

short window of opportunity in which defined DOE-wide processes must be executed to mitigate possible adverse impacts. Both the advance preparation for such events and the impetus to act "instantly" when an attack is detected must have full senior management support, including application of the appropriate level of resources.

Status

Two DOE Cyber Security Summits have been held, the most recent in July 2008. The Summits enabled senior leaders to understand better the continually evolving threat, and to plan, at a strategic level, how DOE should set priorities for the levels of protection for the Department's most sensitive information. It was also recognized that DOE must continue to ensure adequate protection for all sensitive information and the systems the Department depends on to conduct its missions. DOE continues to explore areas where the special cyber security expertise within DOE, especially at the DOE National Laboratories, could be applied to DOE's benefit and to support the government-wide Comprehensive National Cyber Security Initiative, including protection of the National energy sector.

There is significant Congressional interest in DOE's ability to protect itself against cyber attack. Congressional Members and staff should be kept informed regarding DOE's approach to managing its information and systems responsibly and using the best available state of the art defenses.

Milestones

Individual cyber security briefings are planned for the incoming Secretary and Deputy Secretary, and for the incoming Under Secretaries.

Major Decisions/Events

- Individual cyber security briefings for incoming senior leadership (Secretary, Deputy Secretary, Under Secretaries, and Assistant Secretaries).

- Cyber Security Executive Steering Committee meeting (Under Secretaries, HSS, EIA, PMA representative, led by CIO) (March 2009) – to include presentations of the cyber threat, complex-wide defenses in place, and processes for managing cyber incident attacks.

- DOE Cyber Summit III (July 2009) – to include discussion of expanded use of DOE cyber security expertise at the DOE National Laboratories to protect DOE, the Federal government, and the Nation's critical infrastructure.

Background

Protecting the Department's assets has been a priority and a challenge since the 1990s, as more reliance was placed on interconnected computing environments and use of the Internet. Laws have required increasing attention to the protection of sensitive information and information systems, including the Federal Information System Management Act of 2002, which currently provides direction for cyber security management in the Federal government. Over the last few years, the number of cyber attacks on Federal systems and the sophistication of many of these attacks have increased to the point that cyber security defense has become an important part of

the planning and operations for agencies like DOE. Since the Department is so dependent on information technology that it cannot function without it, protection of the integrity and availability of systems and data is critically important.

The challenge to DOE is to provide a high level of protection for its most sensitive information while it provides adequate protection of other sensitive information, including PII. The DOE cyber security program uses a risk-based approach to prioritizing actions to be taken to protect systems and information, which is key to determining the appropriate amount of protection, taking into account the threats and risks, the value of the information and systems to DOE, and the resources expended to provide cyber protection.

The DOE comprehensive cyber security program relies on:

- DOE-wide cyber security guidance, through the DOE directives systems, for minimum steps that must be taken to provide adequate protection of systems and information

- Implementation of this direction under the guidance of the Under Secretaries, the Administrator, Energy Information Administration, the Power Marketing Administration leaders, and the Chief Information Officer, who are responsible for cyber security in their respective organizations

- Centrally provided services such as cyber security training and cyber incident management that support individual DOE sites in detecting and handling cyber attacks, protection of the entire complex once an attack on one site is detected, and reporting cyber incident information to the Federal government's incident handling center (the DHS/USCERT) to help protect the entire government's systems and information

Paper is as of 11/3/08.

Contractor Workforce Restructuring

There is a possibility of reductions in the DOE contractor workforce in FY2009 due to budget uncertainties and other issues. In such circumstances, decisions would need to be made regarding separation programs to be offered by contractors.

Summary: The Department of Energy (the Department) must comply with Section 3161 (section 3161) of the National Defense Authorization Act for FY 1993. Section 3161 was enacted to address workforce restructuring issues with respect to employees of contractors at the Department's defense nuclear facilities.

- Approximately eight sites are currently estimating the possible need to separate plus or minus 2200 management and operating contractor employees
- Since 1993, approximately 50,000 contractor personnel have separated without work disruption of operations at DOE sites
- The number of DOE contractor employee separations across the complex has decreased significantly over the past few years
- The Department is required to submit an annual report on contractor workforce restructuring activities to Congress each year
- The Office of Legacy Management has the lead role in coordinating the Department of Energy's contractor workforce restructuring activities

Issue

Contractor workforce restructuring programs always present sensitive issues, and often are of particular interest and concern to Members of Congress in whose districts or States the program will occur. The Department's policy is to give advance notification to Members of Congress of any potential contractor employee workforce restructuring programs in their respective districts or States.

Status

Currently relatively small scale contractor workforce restructuring programs are pending at various sites. These programs are due to budget uncertainties, funding reductions, changes in workscope and other issues. Many of the DOE sites have a general Workforce Restructuring Plan in place that provides a road map for how site contractors would, if need be, implement workforce restructuring programs.

Milestones

A well established process is in place to ensure that timely Congressional notifications of contractor employee workforce restructuring actions are made.

Major Decisions/Events

Decisions may have to be made on DOE approval or disapproval of contractor workforce restructuring programs in FY2009 due to issues concerning needed employee skills, contract transition, funding levels, or project completion.

Background

Since 1993, approximately 50,000 contractor personnel have separated without work disruption of operations at DOE sites. However, over the past decade the number of contractor employee separations across the DOE complex has decreased significantly. Through contractor workforce reductions the Department has realized annual savings of almost $4 billion in payroll costs including, salaries, severance, and pension and medical costs. Section 3161 of the National Defense Authorization Act for FY 1993, authorized the Department to provide enhanced benefits to separated contractor workers (e.g. enhanced severance payments, educational, outplacement and, relocation assistance) in addition to benefits provided under contract. FY 2004 was the last year funds were appropriated for that purpose.

Paper is as of 11/3/08.

DOE Contractor Human Resources Pension and Benefits Policy

As of 9/30/2007, unfunded contractor pension and other post-retirement benefit liabilities total $12.3 billion.

Summary: Increasing costs and liabilities associated with contractor employee pension and other post-retirement benefits (mostly retiree medical benefits) compete with programmatic activities for limited funds. In FY 2007, the Department reported an unfunded liability of almost $2 billion for contractors' defined benefit pension plans, including $92.6 million attributable to contractor retirees from three of the four closed DOE sites (Rocky Flats, Mound, and Fernald.) The Department reported an aggregate contractor unfunded liability of $12.3 billion, as of September 30, 2007, for both pensions and other post-retirement benefits.

- Department contracts (less than 50) at major DOE sites and facilities require reimbursement to contractors for allowable pension and post-retirement medical benefit plan employee costs.
- When contracts are competed and awarded to new contractors, the new contractors are required by contract terms and conditions to continue to sponsor existing pension and post-retirement medical benefit plans for the incumbent workforce and provide market-based benefit plans for new employees.
- DOE's obligation to reimburse allowable pension and post-retirement medical benefit costs for contractor retirees does not end when contract performance is completed and a site is closed.
- Continued management and administration of closure site retirement benefits has been accomplished by transferring this requirement to another DOE cost reimbursement contract that is a corporate relative of the closure site contractor.
- DOE needs to continue to use a corporate approach, and plan strategically for management and funding of lifecycle contractor employee benefit costs in order to manage the cost volatility and liability growth.

Issue

The Department faces a significant challenge in balancing its responsibility for mission funding and the funding necessary to provide its contractors the flexibility to offer pension and post-retirement medical benefits. In FY 2006 and FY 2007, DOE reimbursed its contractors a total of $858 million and $721 million, respectively, for its contractors' contributions to their defined benefit pension and other post-retirement medical benefit plans. In addition, between FY 2000 and FY 2007, the amount the Department reimbursed contractors for both defined benefit pension and other post-retirement medical benefit plans increased from $263 million to $721 million (a 174% increase). Unpredictable upward fluctuations in pension cost reimbursements and post-retirement medical cost inflation create challenges for DOE budget development and execution.

Status

The Department is continuing its efforts to manage cost volatility and long-term liability growth through implementation of DOE Order 350.1, *Contractor Human Resource Management*, issued in 1996. This policy requires that contractors provide total benefit packages for employees (including retirement benefits) that do not exceed the average value of benefits provided by comparable private sector organizations by more than 5%. Pursuant to contractual obligations, since 2005 most new DOE site/facility management contractors have implemented a strategy to meet this requirement by creating two different benefit programs, one for incumbent employees and one for new employees. Both programs include pension and medical benefits. Generally, DOE contractors that have assumed responsibility for existing employee benefit packages that exceed market value by more than 5% have established new pension plans, typically defined contribution plans, for new employees while initiating corrective actions, as appropriate, to bring existing benefit packages into compliance with DOE Order 350.1 for incumbent contractor employees.

In April 2006, the Department issued Department of Energy Notice 351.1, *Contractor Employee Pension and Medical Benefits Policy*, to address the issue of cost volatility and the risk of rising costs and liabilities. In response to stakeholder and Congressional concerns the Department suspended the Notice in June, 2006 and subsequently decided not to reissue it.

Background

The Department's liability for contractor employee pension and other post-retirement medical benefits stems from the evolution of Management & Operating (M&O) contracts during World War II. During this time, the Atomic Energy Commission (AEC) entered into arrangements with private contractors comprised of industrial and academic organizations for the construction and operation of facilities necessary for the atomic energy program. M&O contracts contemplate long-term relationships where contractors handle day-to-day management and operation of the facilities, and the Government reimburses the contractors for virtually all costs and exercises broad oversight.

This contracting approach allowed the AEC to attract, invest in and retain highly specialized talent from academia and the private sector that was not otherwise available to the Government. Work performed by contractor employees had no commercial counterpart, required a stable, long-term workforce, top secret (and higher) security clearances and extensive on-the- job training, and was performed at remote and often undesirable worksites. M&O contractors provided benefits designed to retain employees for the long term. The specialized nature of AEC work and government investments made to achieve a stable workforce drove the requirement for follow-on contractors to retain existing employees and pay and benefits structures. DOE has continued this practice by utilizing cost-reimbursement contracts for its facility management contractors under which DOE reimburses the allowable costs of employee pension and welfare benefits to enable contractors to recruit and retain the workforce necessary to accomplish DOE missions.

Paper is as of 11/3/08.

Communications Practices & Brand Management

The Department is implementing processes to improve how various sub-organizations manage the Department brand and ensure quality communications products.

Summary, Background, and Issue:

In an effort to enhance the Department's brand and ensure quality products, the Department is finalizing a style guide and directive.

Department has lacked a Department-level style guide to give graphic designers and producers of communications products appropriate guidance on how to present the Department, and how to present their individual organizations within the Department. There has also been no process in place to make brand architecture decisions – specifically, decisions about how organizations should relate to the Department and what entities within the Department should be permitted to put forth unique identities (often manifested by unique logos).

The result has been inconsistent and confusing communications products, where the Department is often represented by a suite of logos representing different offices or parts of the organization and its work, with no apparent connection. This shows up in a variety of ways on exhibits, brochures, electronic products, etc., which in some cases, are so visually cluttered that no one or two brand identities can stand out with any consistency. The visual clutter becomes a barrier to clear messages as well.

These fundamental issues create barriers to good communication. No matter the top level messages, processes should be in place to organize how the Department presents itself to various audiences, and only allow sub-organizations to build their own brand identities when that makes sense via an integrated Department thought process.

Status

A style guide and directive, both to be issued in the coming weeks, provide guidance and direction, and establish the process by which the leadership can make future decisions on appropriate brand identities.

Progress has been made rolling out specific components of this effort with the Department's program offices and National Laboratories which are beginning to adopt a more consistent approach in their products.

The Secretary, Deputy Secretary, program offices and National Laboratory Directors Leadership Council have been briefed on the progress.

Milestones

A style guide and directive will be issued by December 15, 2008.