

U.S. Department of Energy



Strategic Plan

2014-2018

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(public comment)

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Message from the Secretary

The Department of Energy (DOE) is ready to deliver the innovative and transformative scientific and technological solutions to the energy, security, and economic challenges facing the United States in the 21st century. This strategic plan provides a roadmap for our work and highlights our major priorities for the next few years.

Climate change is a key challenge for the energy sector. To address this problem, we will support implementation of the President's Climate Action Plan to cut carbon pollution and prepare the United States for climate change. We will pursue the President's "all of the above" energy strategy to develop a full range of energy options to support a transition to a low-carbon energy system, aligned with the President's policies to encourage American innovation, create new jobs, enable economic growth, and contribute to increased net exports.

While climate change is a central component of our work, the Department also supports much broader national missions. DOE plays a key role in advancing America's leadership in science through its unparalleled national laboratory system, with more than a hundred Nobel Prize winners resulting from DOE-associated research. We must ensure that DOE continues to lead basic research in the physical sciences, develop the next generation of computation technology, and develop and maintain world-class scientific user facilities at the national laboratories.

We also will advance the President's vision for reducing the levels of nuclear weapons in the world, strengthen nonproliferation efforts, and prevent nuclear terrorism. DOE must maintain a safe, secure, and reliable nuclear weapons stockpile in the absence of underground testing and manage the infrastructure for the research, development, and production activities needed to meet national security requirements. We will carry out our responsibilities in accordance with the Administration's June 2013 Stockpile Stewardship and Management Plan that lays out a comprehensive modernization plan to ensure that our nuclear arsenal remains an effective deterrent.

We will strengthen efforts to reduce the nuclear terrorism threat through measures to identify, control and eliminate nuclear explosive materials worldwide. We also will provide support for the Administration's efforts to prevent the spread of nuclear weapons.

We will address the legal and moral imperative of cleaning up legacy Cold War nuclear waste to protect human health and the environment. Great progress has been made but significant technical challenges remain, and we will implement an integrated, systematic, and comprehensive process to address these issues.

We will foster excellence in DOE management, worker safety, and performance. DOE will focus on continuous improvement in major project execution and cost management; environmental, health and safety compliance; and physical and cyber security.

These and other priorities outlined in this plan are critical to advancing the nation's energy and security goals and strengthening our economy to provide a cleaner energy environment and a more secure country for future generations. I am honored to lead the DOE team, and pleased to transmit the Strategic Plan of the Department of Energy for 2014-2018.

Ernest J. Moniz
Secretary of Energy
February 2014

Overview

The Department of Energy (DOE) is responsible for advancing the energy, environmental, and nuclear security of the United States; promoting scientific and technological innovation in support of that mission; sponsoring basic research in the physical sciences; and ensuring the environmental cleanup of the nation's nuclear weapons complex.

The Energy and Science, National Security, and Management and Performance strategic goals in this Strategic Plan are aligned with the new DOE organizational structure adopted in August 2013. Three Under Secretaries manage the core functions that carry out the DOE mission with significant cross-cutting work spanning across the enterprise. The DOE enterprise is comprised of approximately 14,000 federal employees and over 90,000 contractor employees at both the headquarters in Washington, DC and at 85 field locations. DOE also leads a nationwide system of 17 national laboratories that provides world-class scientific, technological, and engineering capabilities, including the operation of national scientific user facilities used by over 29,000 researchers from the federal government establishment, more than 300 universities, and the private sector.

Science and Energy – DOE leads the nation in the transformational research, development, demonstration, and deployment of an extensive range of clean energy and efficiency technologies, supporting the President's Climate Action Plan and an "all of the above" energy strategy. DOE identifies and promotes advances in fundamental and applied sciences; translates cutting-edge inventions into technological innovations; and accelerates transformational technological advances in energy areas that industry by itself is not likely to undertake because of technical or financial risk. DOE also leads national efforts to develop technologies to modernize the electricity grid, enhance the security and resilience of energy infrastructure, and expedite recovery from energy supply disruptions. DOE conducts robust, integrated policy analysis and engagement to support the nation's energy agenda.

DOE is the largest federal sponsor of basic research in the physical sciences. DOE world-leading research in the physical, chemical, biological, and information sciences contributes fundamental scientific discoveries and technological solutions that support the nation's primacy in science and innovation.

National Security – DOE enhances the security and safety of the nation through its national security endeavors: leveraging science to maintain a safe, secure, and effective arsenal of nuclear weapons; accelerating and expanding efforts to reduce the global threat posed by nuclear weapons, nuclear proliferation and unsecured or excess nuclear materials; and, providing safe and effective nuclear propulsion for the U.S. Navy.

Management and Performance – DOE leads the largest cleanup effort in the world to remediate the environmental legacy of over six decades of nuclear weapons research, development, and production. As DOE carries out its mission, it employs effective and cost-efficient management, supports an engaged workforce, and provides a modern, secure physical and information technology infrastructure. DOE remains committed to maintaining a safe and secure work environment for all personnel and to ensuring that its operations preserve the health, safety, and security of the surrounding communities.

Stakeholder Engagement

We sought and incorporated input and comments from multiple stakeholders during the development of the Plan. Within DOE, we obtained input from senior career officials, the national laboratories, and the Power Marketing Administrations. We also have solicited inputs from Congress and the public. In response to a 14-day public comment period announced December 3, 2013 in the *Federal Register*, DOE received over X comments on X topics.

Mission

Enhance U.S. security and economic growth through transformative science, technology innovation, and market solutions to meet our energy and environmental challenges

Goal 1: Science and Energy

Advance foundational science, innovate energy technologies, and inform data driven policies that enhance U.S. economic growth and job creation, energy security, and environmental quality, with emphasis on implementation of the President's Climate Action Plan to mitigate the risks of and enhance resilience against climate change

Supporting Programs

Advanced Research Projects Agency-Energy	Indian Energy Policy and Programs
Electricity Delivery and Energy Reliability	International Affairs
Energy Efficiency and Renewable Energy	Loan Programs
Energy Information Administration	Nuclear Energy
Energy Policy and Systems Analysis	Power Marketing Administrations
Fossil Energy	Science

We will more closely integrate scientific research, applied energy research and development, and commercialization activity to provide new solutions for a clean energy future in a manner that will enable job creation and economic growth. In addition to integration of science and energy technology programs, DOE will focus cross-cutting technology teams on key challenges to coordinate investments in innovation spanning fundamental research to demonstration of emerging commercial solutions. Supporting implementation of the President's June 2013 Climate Action Plan, including Secretariat support for a Quadrennial Energy Review led by the White House Domestic Policy Council and Office of Science and Technology Policy, will be a major focus of our efforts. We have organized our science and energy component of our strategic plan around three strategic objectives.

Strategic Objective 1 – Advance the goals and objectives in the President's Climate Action Plan by supporting prudent development, deployment, and efficient use of “all of the above” energy resources that also create new jobs and industries

DOE is committed to energy solutions that make best use of our domestic energy resources and help the nation achieve an approximately 17% reduction in greenhouse gas emissions below 2005 levels by 2020, and further reductions in the post-2020 period. We will accelerate innovation through development of technologies that make energy cleaner and more efficient, while leveraging American competitive advantages to seize market opportunities for manufacturing and deployment provided by a globally expanding clean energy industry. DOE will increase energy productivity, support safe and responsible deployment of domestic energy resources, and leverage federal finance capabilities. DOE will implement the six parallel strategies described below to achieve this objective.

Improve energy productivity by increasing efficiency

The President has set ambitious goals to double the nation's energy productivity and to establish energy efficiency standards that will reduce carbon pollution by 3 billion metric tons by 2030. DOE will develop cost-effective, energy-efficient technologies that the private sector can use to remain strong and globally competitive. This includes defining technologically feasible and economically justified end-use standards for appliances and other electronic devices and new capabilities to realize significant savings in the nation's buildings and in industry. DOE will focus investments in technologies and practices that can improve the competitiveness of U.S. manufacturing. As the demand for clean energy products and services continues to grow, we will help domestic manufacturers leverage these approaches to increase their share of the global clean energy market.

Advance options for diverse energy resources and conversion devices for power and transportation

The President's Climate Action Plan established a goal of doubling renewable energy generation from wind, solar, and geothermal sources between 2012 and 2020, and DOE will continue its work to accelerate the development and commercialization of these technologies. We will do so by reducing technology costs and technology risks, as well as by reducing non-hardware costs like siting and permitting, installation, inspection, maintenance, and customer acquisition. We also will address barriers that discourage investment and deployment, including local permitting requirements for distributed generation, and high costs of capital for utility-scale projects. For example, DOE will pursue advances in geothermal resource characterization and exploration. DOE will work with other agencies to reduce permitting time for sustainable, renewable technologies, including for the emerging offshore wind industry.

The President also established a goal of developing 10,000 MW of renewable energy on public lands by 2020, and DOE will continue its work with partner agencies to streamline permitting and to finance transmission to access America's richest renewable energy resources. DOE will maintain and advance hydropower generation, recognizing the critical role these assets play in providing clean, reliable, low cost, carbon-free power that can be readily stored and dispatched. DOE will support implementation of energy solutions for rural and economically distressed energy environments, including tribal communities.

Roughly one-third of U.S. carbon emissions come from power plants and other large point sources. DOE is committed to enabling the safe and permanent storage and utilization of CO₂ captured from these sources. Second generation and transformational carbon capture and storage (CCS) technologies or carbon emission utilization technologies, expected to become commercially available in the mid-2020s, will put us on a path to a low-carbon option for a world currently dependent on fossil fuels for 80% of its energy.

Nuclear energy is currently our largest source of carbon-free electricity. DOE will continue to pursue nuclear power to simultaneously support the Administration's "all of the above" strategy and the need to limit greenhouse gas emissions. We will work to better understand the issues associated with the early closures of existing nuclear power plants, and we will work with selected industry partners to enable them to develop and certify the design of small modular nuclear reactors that could potentially replace aging power plants. DOE also will work to advance the Administration's Strategy for the Management and Disposal of Spent Nuclear Fuel and High Level Radioactive waste within legislative authorities until the necessary full implementing legislation is enacted.

Leverage increased private sector financing for deployment of "all of the above" energy technologies

DOE loan guarantee programs play a critical role in catalyzing investment in clean energy and reduce financing risks for companies, allowing them to deploy innovative clean energy technology projects that may not otherwise attract funding from the private sector. DOE will use federal credit authorities to strategically support clean energy technologies, transmission, and transmission-related storage technologies, as well as alternative fuels production, advanced vehicle and vehicle component manufacturing. DOE also will work with other agencies in addition to state and local governments to use existing authorities that address barriers to increased financing for clean energy deployment.

Accelerate development and deployment of new transportation system technologies to diversify fuel sources, increase efficiency and reduce emissions

To achieve the President's goal to halve our net oil imports by 2020, DOE will partner with industry to discover and promote: adoption of materials, improvements in aerodynamics, and engines and power train technologies that improve vehicle efficiency and will inform regulatory bodies across the government of opportunities for increased fuel economy. DOE will continue to encourage vehicle electrification and work with our partners to address barriers to widespread adoption of all electric drive vehicles. We will pursue alternative fuels made from sustainable resources that can directly substitute for petroleum and use existing infrastructure, while ensuring responsible development of our domestic resources.

Support environmentally responsible development and use of domestic petroleum and natural gas energy resources

DOE will support a range of activities to encourage safe and responsible development and use of domestic petroleum and natural gas resources. DOE will conduct research and development, data collection and information dissemination

programs to promote environmentally responsible development of unconventional domestic petroleum and natural gas resources. DOE will seek to improve the database on methane leakage from natural gas use and encourage greater sharing of best practices for unconventional oil and gas production

Contribute to international efforts to address global climate change

DOE plays a major role in supporting the Administration's international efforts to achieve significant global greenhouse gas emission reductions and enhance climate preparedness. These efforts include bilateral initiatives with China, India, and other major emitting countries and support for broad-based international negotiations, including the United Nations Framework Convention on Climate Change. DOE efforts include advice, tools, reviews of technical data, and support for renewable and clean energy projects to promote sustainable renewable energy development, actions to promote fuel switching, support for the safe and secure use of nuclear power, cooperation on clean coal technologies and programs to improve and disseminate information on energy efficient technologies.

Agency Priority Goal (FY 2014-15)

- ★ Implement elements of the Climate Action Plan, including
 - Supporting the goal of reducing cumulative carbon pollution by 3 billion metric tons by 2030 through standards set since 2009, complete new standards for appliances and federal buildings by the end of FY 2015
 - Awarding up to \$8 billion in loan guarantees to advanced fossil fuel technologies that reduce greenhouse gas emissions by the end of FY 2015

Performance Goals

- Support submission by selected private sector partners of a design certification application for at least one small modular reactor to the Nuclear Regulatory Commission by the end of FY 2015
- Advance implementation of the Administration's Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste
- Operate 3 fully integrated CCS demonstrations and 6 large scale CO₂ storage injections by the end of FY 2015
- By the end of FY 2015, achieve best in class utility scale, commercial scale, and residential scale solar photovoltaic (PV) systems at \$1.85/W_{dc}, \$2.37/W_{dc}, and \$3.10/W_{dc}
- Advance quantification and mitigation of the safety and environmental risks of unconventional and offshore oil and gas development by FY 2014
- Implement the Western Area Power Administration transmission infrastructure borrowing authority program by FY 2015
- Demonstrate the integration of 50% variable distributed energy resources with electric vehicles and building energy management systems by 2015 with high reliability and resiliency
- By FY 2015, up to three commercial scale cellulosic ethanol biorefineries are operational with validation that their outputs are price competitive with gasoline and that there is a greater than 60% greenhouse gas reduction relative to gasoline.

Electric Vehicles: Driving Our Nation toward Clean, Affordable Transportation

With their immense potential for increasing the country's energy, economic, and environmental security, electric vehicles such as plug-in hybrid electric, all-electric vehicles (also known as plug-in electric vehicles or PEVs), and fuel cell electric vehicles will play an increasingly important role in the country's transportation future. Transportation accounts for two-thirds of U.S. petroleum usage, and on-road vehicle are responsible for 80% of this amount. Launched in March 2012, DOE's EV Everywhere Grand Challenge (EV Everywhere) seeks to make the United States the first country to produce PEVs that are as affordable and convenient as gasoline-powered vehicles by 2022.

Current PEV battery costs are below \$400/kilowatt-hour (kWh). DOE analysis indicates that costs in the range of \$125/kWh are required for a broad range of PEVs to be cost-competitive with gasoline-powered vehicles. To achieve these aggressive cost targets, DOE is working with industry to conduct research and development to reduce cost and improve performance and has produced significant accomplishments. For lithium-ion batteries, DOE-funded research has reduced modeled costs for high-volume production from \$1,200/kWh in 2008 to the less-than-\$400/kWh modeled cost of high-energy, high-power batteries today –greater than a 65% reduction. DOE is on track to achieve our 2015 cost target of \$300/kWh. DOE efforts improved fuel efficiency by up to 50% in nickel-metal hydride batteries compared to similar non-hybrid vehicles.

In addition to research and development, the EV Everywhere Grand Challenge also addresses key deployment barriers, including charging infrastructure. EV Everywhere's Workplace Charging Challenge, launched in January 2013, aims to drive a tenfold increase in the number of American employers offering workplace charging in the next 5 years. To date, it already has more than 50 partners.

Solar Energy Technologies Office: SunShot Initiative

Launched in February 2011, DOE's SunShot Initiative is a national effort to make subsidy-free solar power cost competitive with conventional sources of electricity by 2020. SunShot funds work with partners and solar industry pioneers to drive the development of efficient photovoltaic (PV) and concentrating solar power (CSP) technologies, as well as reduce the cost of solar energy by 75% by the end of the decade from 2010 baseline figures. SunShot targets for average installed system price are \$1.00/Watt direct current (W_{dc}) for utility-scale, \$1.25/ W_{dc} for commercial-scale, and \$1.50/ W_{dc} for residential-scale, starting from 2010 baseline figures of \$3.80/ W_{dc} , \$5.00/ W_{dc} , and \$6.80/ W_{dc} for these various sectors respectively. Three years into a 10-year initiative, the solar industry has achieved progress of 60% toward the final 2020 targets. Technology improvements that have enabled that progress have been led by DOE. Over 50% of the world records over the past 35 years in solar cell efficiency have been supported by DOE, including 3 new world records in 2013. To compete in the global marketplace, SunShot is boosting innovation in manufacturing to ensure U.S.-developed technologies can capture a larger portion of the global "value add" in solar manufacturing, estimated at about \$100 billion worldwide. Working with state and local governments, DOE has shown that the permitting processes for consumers who desire access to solar energy can be streamlined to a matter of days instead of months. Best in class utility scale PV systems can now be as low as \$1.92/ W_{dc} and commercial and residential systems at \$2.61/ W_{dc} and \$3.69/ W_{dc} respectively. From 2008 to 2012, cumulative PV deployment in the US increased by about 10 times, from 0.8GW to 7.4GW. By the end of 2013, cumulative PV deployment is expected to have reached approximately 11GW and CSP deployment over 1GW. All of this growth is leading to job creation and DOE is supporting this growing workforce through the Solar Instructor Training Network of 322 community colleges.

Strategic Objective 2 – Support a more resilient, efficient, and secure U.S. energy infrastructure

The nation's transformation to a low-carbon economy requires a modern energy infrastructure that can integrate a diverse energy portfolio, respond to and recover rapidly from disruptions, and deliver highly reliable and affordable

energy. As called for in the Climate Action Plan, a modernized energy infrastructure also must become more resilient to prepare the United States for the impacts of climate change. In a low-carbon economy, communications and control technologies that support the development and integration of variable energy resources become more critical, and DOE will seek pathways that expand the use of dispatchable renewable energy including hydropower, energy storage, and demand response capabilities. While advanced intelligent devices and communications networks improve the visibility, response, and control of energy systems, they also can increase the exposure to cyber attacks. As energy, water, transportation, and communication infrastructures become more interconnected, the reliability of these systems will become more dependent on advanced technologies and strategies for the detection, prevention, and mitigation of vulnerabilities.

DOE will focus on addressing and helping to manage the increased vulnerability of the nation's energy infrastructures to:

- Climate change
- Cyber threats
- Physical threats
- Infrastructure interdependencies

DOE will employ six strategies to achieve this:

Support the Quadrennial Energy Review (QER)

Innovation and new sources of domestic energy supply are transforming the nation's energy marketplace, creating economic opportunities at the same time they raise environmental challenges. To ensure that federal energy policy meets our economic, environmental, and security goals in this changing landscape, the Administration will conduct a Quadrennial Energy Review which will be led by the White House Domestic Policy Council and Office of Science and Technology Policy, supported by a Secretariat established at the Department of Energy, and involving the robust engagement of federal agencies and outside stakeholders. This first-ever review will focus on infrastructure challenges, and will identify the threats, risks, and opportunities for U.S. energy and climate security, enabling the federal government to translate policy goals into a set of analytically based, clearly articulated, sequenced and integrated actions, and proposed investments over a four-year planning horizon.

DOE also will provide energy information and systems analysis for the QER as needed drawing upon its extensive knowledge of energy data, technologies, markets, and scenario analysis including at the state, local and tribal government level.

Develop technologies to modernize the electric grid to improve resiliency, flexibility, and better integrate "all of the above" generation resources

The current power grid must be upgraded to handle the two-way flow of electricity, information, and automated control needed to integrate distributed generation, renewable sources, end-use efficiency, demand response, and other clean energy sources into the power grid in a reliable and cost-effective manner.

Strengthen the effectiveness of Department of Energy emergency response capabilities

DOE will collaborate with industry partners, state, local, and tribal governments, and other federal agencies - offering energy experts as part of the government-wide approach to emergency response. This will better enable the Department to conduct regional emergency response preparedness exercises, revealing gaps and lessons learned. DOE will enhance its Energy Resilience and Operational Center and increase its predictive modeling capabilities of infrastructure risks. DOE also will improve its situational awareness by enhancing current analysis and visualization capability.

Manage the Strategic Petroleum Reserve and be prepared to respond to petroleum market supply disruption

The Strategic Petroleum Reserve (SPR) benefits the nation by providing an insurance policy against potential interruptions in U.S. petroleum supplies whether originating from international supply problems, hurricanes, accidents or terrorist activities. The SPR provides the United States access to international emergency assistance through its

International Energy Agency (IEA) participation. IEA members are required to maintain 90 days of strategic stocks and participate with other stockholding nations in a coordinated release of stocks in the event of a major supply disruption.

Enhance cyber security in energy infrastructure through effective government-industry collaboration in situational awareness and technology development

DOE will work with the public and private sectors to exercise and refine collective cyber incident response capabilities in coordination with states, local, and tribal governments, and other federal partners.

Prevention/Adaptation

DOE will work with the states and localities to develop resilience strategies including energy assurance and preparedness efforts to reduce vulnerabilities and adapt to climate change. DOE will focus on addressing and helping to manage the increased vulnerability of the nation's energy infrastructures including infrastructure interdependencies. Many critical energy (oil, natural gas, biofuels) and other infrastructures (telecommunications, water, transportation, and emergency services) are increasingly reliant on electricity. Other critical infrastructures – ports, harbors, and rail – are also essential for the delivery of energy supplies to consumers. These interdependencies need to be more fully understood to develop comprehensive emergency and prevention protocols.

Agency Priority Goal (FY 2014-15)

- ★ Strengthen the resiliency of U.S. energy infrastructure and prepare the U.S. for the impacts of climate change through new policies and capabilities.

Performance Goals

- Ensure operational readiness of the Strategic Petroleum Reserve by achieving 95% of monthly maintenance and accessibility goals in all years
- Stand up the Emergency Response Council by the end of FY 2015 to establish DOE's emergency response capabilities for natural disasters and nuclear-related events
- Lower the cost of grid-scale (>1 megawatt) energy storage technologies by the end of FY 2015 to \$325 per kilowatt-hour for a 4-hour system to enable more clean energy solutions
- Complete energy impact analyses developed using an analytical framework by the end of FY 2015
- Support the implementation of the Cyber Security Capability Maturity Models and Risk Management Process in the energy sector and demonstrate a tool that includes enhanced communications security between control centers by the end of FY 2015
- With the expertise of national laboratories and energy sector partners, DOE also will develop and demonstrate next-generation technology for more secure interoperable communications within energy delivery system networks
- Demonstrate a dynamic simulation tool to support next generation energy management system at one utility or systems operator by 2018

Enhancing Cyber Security in the Energy Sector

As the U.S. energy delivery networks (electricity, oil, and gas) become more intelligent and interconnected, strong cyber security has become critical for energy reliability and resilience. DOE partnered with industry leaders to develop the *Roadmap to Achieve Energy Delivery Systems Cyber security* that has resulted in technologies and initiatives to strengthen cyber security:

1. More than 10 vendors of power grid equipment have used LEMNOS, an interoperable and secure software architecture developed by Sandia National Laboratories, to develop advanced data communications devices for grid controls. These devices provide enhanced security features and interoperability across various vendor devices, reducing costs in system design, configuration, and operations and maintenance.
2. Utilities are deploying Padlock, a secure gateway, across the grid. Padlock, based on the LEMNOS architecture, provides secure communications between distribution control systems and the field devices they monitor. DOE launched Padlock six months earlier than planned to meet overwhelming demand.
3. DOE's National SCADA Test Bed allows cyber security experts to systematically test deployed systems for vulnerabilities and recommend mitigations and has assessed the cyber security of more than 30 electricity sector supervisory control and data acquisition (SCADA) systems since 2003.
4. Experts from DOE National Labs have trained more than 2,300 operational personnel from more than 200 utilities in advanced cyber security techniques, including "live" exercises in test bed environments, strengthening the sector's ability to detect and respond to complex cyber attacks.
5. More than 25 utilities have participated in the implementation of the Electricity Subsector Cyber security Capability Maturity Model (ESC2M2), a DOE tool to evaluate and benchmark cyber security capabilities and prioritize investments. More than 75 utilities have used the model since its release, and DOE is now adapting the model for the oil and natural gas subsector.

Strategic Objective 3 – Deliver the scientific discoveries and major scientific tools that transform our understanding of nature and strengthen the connection between advances in fundamental science to technology innovation

The Department of Energy, in partnership with its national laboratories, manages a portfolio of basic research that spans exploring the origins of the cosmos to addressing emerging challenges in energy, environment, and national security. The scale and complexity of this research portfolio provides a competitive advantage to the nation as multidisciplinary teams of scientists, using the most advanced scientific instruments, are able to respond quickly to national priorities and evolving opportunities at the frontiers of science. Our three strategies to accomplish this objective follow.

Conduct discovery-focused research to increase our understanding of matter, materials and their properties through partnerships with universities, national laboratories, and industry

Basic science is essential to advance scientific knowledge to fuel future innovation and applied technology efforts. As the federal agency funding the largest share of basic research in the physical sciences, DOE will continue to pursue scientific discoveries that lay the technological foundation to extend our understanding of nature and create new technologies that support DOE's energy, environment, and security missions. Areas of concentration include:

- Advanced scientific computing to analyze, model, simulate, and predict complex phenomena, including the scientific potential that exascale simulation and data will provide in the future. Materials and chemical sciences to understand, predict, and control matter and energy at the atomic and molecular levels to provide the foundation for new energy technologies and mitigate the environmental impacts of energy use.
- Biological and environmental sciences focused on exploring genome enabled biology, discovering the drivers and impacts of climate change, and seeking the determinants of environmental stewardship.
- Plasma science to expand the understanding of matter at very high temperatures and densities and to build the scientific foundation needed to develop a fusion energy source.
- High energy physics to illuminate and answer questions about the unification of the forces of nature, the nature and origin of dark energy and dark matter, and the origins of the universe.
- Nuclear physics to create, detect, and describe the different forms and complexities of nuclear matter that can exist in the universe, including those that are no longer found naturally.

Provide the nation’s researchers world-class accelerators, colliders, supercomputers, light sources, neutron sources, and facilities to conduct mission-focused research

The foundations of great science are the people, the powerful scientific instruments, and the laboratories that provide important venues for multidisciplinary research collaborations. DOE plays a unique role in the nation’s science enterprise through its investments in the design, construction, and operations of unique, world-leading facilities and research tools for discovery. Thousands of scientists from the national laboratories, universities, private companies, and other agencies of the U.S. government use these extraordinary facilities to advance the frontiers of knowledge.

Enhance application-inspired fundamental research that will accelerate the pace of technological innovation

DOE will assure the value and cohesiveness of its science and energy research and developmental programs by:

- Strengthening the partnership among DOE headquarters, DOE programs, and our national laboratories to focus the Department's first-class capital, and scientific, and human resources on solving our most urgent energy, environmental, and economic security challenges.
- Harnessing the analytical and technical expertise of the science and energy programs to ensure that science and technology investments are focused on administration goals.
- Promoting operational innovations in the Department and national laboratories to facilitate the achievement of our collective science and technology missions and expanding the networked approach to science and technology innovation across the national laboratories.

Agency Priority Goal (FY 2014-15)

- ★ Support and conduct basic research to deliver scientific breakthroughs and extend our knowledge of the natural world by capitalizing on the capabilities available at the national laboratories, and through partnerships with universities and industry. In support of this goal, DOE will:
 - Incorporate Science user facility prioritization into programming planning efforts by the end of FY 2015
 - Identify programmatic drivers and technical requirements in coordination with other stakeholders by the end of FY 2015 to achieve higher levels of computing in anticipation of the capabilities that exascale computing would provide

Performance Goal

- Develop capabilities to extend understanding of critical sub decadal processes and incorporate results into Earth system models to improve long term climate change projections
- Variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects kept to less than 10%

Dark Energy Survey: Why Is The Universe Speeding Up?

In 1998, two teams of astronomers studying distant supernovae made the remarkable discovery that the expansion of the universe is speeding up. Yet, according to Einstein's theory of General Relativity, gravity should lead to a slowing of the expansion. To explain cosmic acceleration, cosmologists are faced with two possibilities: either 75% of the universe exists in an exotic form, now called dark energy, which appears to exhibit a force opposite to the attractive gravity that acts on ordinary matter.

The Dark Energy Survey (DES) is designed to probe the origin of the accelerating universe and help uncover the nature of dark energy by measuring the 14-billion-year history of cosmic expansion with high precision. More than 120 scientists from 23 institutions in the United States, Spain, the United Kingdom, Brazil, and Germany are working on the project.

The main tool of the DES is the Dark Energy Camera, a 570-megapixel digital camera weighing approximately 4.5 tons built at DOE's Fermilab in Batavia, Ill., and mounted on the 4-meter Victor M. Blanco telescope at the National Science Foundation's Cerro Tololo Inter-American Observatory in the Andes Mountains in Chile. The camera includes five precisely shaped lenses, the largest nearly a yard across, that together provide sharp images over its entire field of view. The Dark Energy Camera is the most powerful survey instrument of its kind, able to see light from more than 100,000 galaxies up to 8 billion light-years away in each snapshot.

Over the next five years, the DES is expected to obtain color images of 300 million galaxies and 100,000 galaxy clusters and to discover 4,000 new supernovae, many of which were formed when the universe was half its current size. The data collected will be processed at the National Center for Supercomputing Applications at the University of Illinois in Urbana and then delivered to scientists and the public. By studying the expansion of the universe and the growth of large-scale structure over time, the DES will give scientists the most precise measurements to date of the properties of dark energy.

America's 17 National Labs



National Laboratories solve important problems in fundamental science, energy, and national security.

They collaborate with academia and industry to develop and deploy scientific and technological solutions in support of National needs. Specifically, the National Laboratories:

- Conduct world-leading research in the physical, chemical, nuclear, biological, and information sciences that advances our understanding of the world around us;
- Advance US energy security and leadership in clean energy technologies to ensure that energy is abundant, clean, cheap, and reliable;
- Enhance our national security by ensuring the safety and reliability of our nuclear deterrent, helping prevent the proliferation of weapons of mass destruction, and securing our borders.

National Laboratories steward vital scientific and engineering capabilities that are essential to our nation's continued science and technology primacy in a rapidly changing world.

These capabilities are used primarily to address long-term national problems, but also can be tapped to respond to technological surprises and nearer term challenges, as evidenced by the labs' responses to the Gulf oil spill and 9/11. The core of the National Laboratories is a first-rate workforce of research scientists, engineers, and support personnel that is entrusted to serve the American people.

National Laboratories design, build, and operate unique scientific instrumentation and facilities that serve tens of thousands of scientists and engineers from academia and industry collaborating on solutions to pressing and complex problems.

These facilities, which are found nowhere else in the world, support open scientific research as well as classified work. They continually advance the state of the art through the development and use of next-generation tools and technologies. They enable fundamental scientific discoveries, ensure our national security, and assist industry (with new materials, improved manufacturing processes, and advanced product testing).

National Laboratories promote innovation that advances U.S. economic competitiveness and contributes to our future prosperity.

They partner with others, especially industry, to integrate fundamental and applied pre-competitive research to the broad benefit of the economy. They contribute materially to US economic prosperity by making key scientific discoveries, demonstrating the utility of these discoveries in early prototypes, and working with industry to move these technologies into the marketplace, thus creating high-paying jobs. The labs' prowess is evidenced by their disproportionately large number of R&D 100 Awards and proven track record in technology transfer and commercialization.

Goal 2: National Security

Enhance national security by maintaining and modernizing the nuclear deterrent, reducing global nuclear and cyber security threats, providing for nuclear propulsion, and stewarding key science, technology, and engineering capabilities and supporting infrastructure.

Supporting Programs

National Nuclear Security Administration
Intelligence and Counterintelligence

International Affairs

The President's 2010 National Security Strategy, the Nuclear Posture Review (NPR), and the ratification of the New Strategic Arms Reduction Treaty underscored the importance of the domestic and international nuclear mission, and renewed the mandate to maintain a safe, secure, and reliable stockpile for as long as nuclear weapons exist. The NPR presented a path forward to reduce global nuclear security threats while providing peaceful nuclear power for all nations that respect the international nonproliferation regime. DOE will advance the President's vision to move toward a world free of nuclear weapons by both dismantling retired weapons and improving global stability through increased transparency and confidence building measures.

The DOE, through the National Nuclear Security Administration's (NNSA) nuclear security enterprise, is central to preventing proliferation and nuclear terrorism and sustaining a safe, secure, and effective nuclear deterrent. The science, technology, engineering and manufacturing capabilities resident in the nuclear security enterprise underpin our ability to conduct stockpile stewardship and solve the technical challenges of verifying treaty compliance, combating nuclear terrorism and proliferation, and guarding against the threat posed by technological surprise. For example, the unique knowledge gained in nuclear weapons design developed to support the U.S. stockpile plays a critical role in the nation's ability to understand strategic threats worldwide. DOE is responsible for providing the design, development and operational support required to provide militarily effective nuclear propulsion plants and ensure their safe, reliable and long-lived operations.

With its extensive science and technology capabilities and nuclear expertise, of which NNSA is only a part, DOE also provides support to defense, homeland security, and intelligence missions. DOE also provides expert knowledge and operational capabilities for physical security, emergency preparedness and response, and cyber threats.

Strategic Objective 4 – Enhance the safety, security and reliability of the nation's nuclear deterrent without testing

In order to reassure allies and deter potential adversaries as long as nuclear weapons exist, the United States must sustain a safe, secure, and effective nuclear arsenal without nuclear testing. The Department will achieve this objective through two parallel strategies.

Maintain the existing nuclear weapons stockpile safely and securely

As the nation's nuclear weapons age and exceed their stockpile design life, the NNSA must extend their lifespan. The 2010 NPR report, an extensive review of the nation's nuclear weapons program, concluded that study options for weapon life extension programs (LEP) will consider refurbishment of existing warheads, reuse of nuclear components from different warheads, and replacement of nuclear components. The NPR report recommended fully funding the ongoing LEP for the W76 submarine-based warhead and the LEP study and follow-on activities for the B61 bomb, and to initiate a study of LEP options for the W78 intercontinental ballistic missile warhead, including the possibility of reusing the resulting warhead also on submarine-launched ballistic missiles to reduce the number of warhead types.

To achieve this strategic objective, NNSA will continue to work closely with the Department of Defense to modernize the stockpile through timely execution of approved life extension programs, as outlined in the Stockpile Stewardship and Management Plan (SSMP). Without recourse to nuclear testing, NNSA will deliver the scientific capability to assess

weapon performance as well as the component and manufacturing technologies required to support the SSMP. At the same time, NNSA will advance the President’s vision for reductions in nuclear weapons by dismantling retired weapons.

Modernize the Department’s infrastructure to safely and securely manage special nuclear materials

NNSA also will ensure the safety and security of its facilities and the transportation of nuclear materials and weapons components, which can include modernizing its infrastructure

Agency Priority Goal (FY 2014-15)

- ★ Maintain and modernize the U.S. nuclear weapons stockpile and dismantle excess nuclear weapons to meet the national security requirements as assigned by the President through the Nuclear Posture Review. In support of this goal, DOE will:
 - Each year through 2015 and into the future, maintain 100% of the warheads in the stockpile that are safe, secure, reliable, and available to the President for deployment.
 - Conduct activities necessary to complete planned W76-1 production in 2019 and achieve B61 first production unit in 2020, if sufficient funds are available.

Performance Goals

- Complete Kansas City Responsive Infrastructure Manufacturing and Sourcing (KCRIMS) move in 2014 and complete the High Explosive Pressing facility in 2016
- Annually, ensure that mission critical and mission dependent facilities are available without missing key deliverables or compromising the safety and security of facility operation at 95% of scheduled days
- By the end of FY 2024, replace 100% of selected calibration knobs (non-science based models) affecting weapons performance simulation with science-based, predictive phenomenological models
- Complete by FY 2022 the dismantlement of all weapons systems retired before 2009

Modernization through Life Extension Programs

Life extension programs (LEP) modify nuclear weapons to enhance margins against failure, increase safety, improve security, extend limited life component lifecycles, and address identified issues and component obsolescence. For example, insensitive high explosives can be used to replace conventional high explosives to improve weapon safety, and new use control features can enhance weapon security. Components and materials with known compatibility and aging issues or manufacturability problems can be replaced with modern alternatives. Without recourse to underground nuclear testing, science, technology and engineering activities use simulation codes, validated models, and experimental facilities to mature technologies and provide critical data and analytical capabilities required to certify LEP products.

The W76-1 LEP produced the first unit in January 2009. The program remains on track to produce and deliver the warheads to the Navy to complete production not later than the end of FY 2019, consistent with the Nuclear Posture Review.

Strategic Objective 5 – Steward key science, technology and engineering talent, capabilities and infrastructure, especially in nuclear science and technology, to enhance national security

In the National Security Strategy, the President renewed the Nation’s commitment to being the global engine of scientific discovery and innovation. The Nuclear Posture Review notes that our specialized workforce is essential to managing the deterrent and supporting the full range of the President’s nuclear security agenda. DOE provides the experimental and computational capability and infrastructure required to support the Stockpile Stewardship and Management Program and other DOE national security missions. By working at the leading edge of multiple scientific and technical disciplines, the DOE nuclear security programs integrate scientific principles, address theory, field physical

experiments, and conduct complex modeling and simulation to support not only the assessment and certification of the Nation's nuclear weapons, but also nonproliferation, counter-proliferation, and nuclear counterterrorism activities.

NNSA leads the NNSA National Laboratories and sites as an enterprise so they deliver DOE programs, provide critical capabilities to support other national security missions, and drive innovation. Talented researchers, engineers, and technicians work across a range of national-level challenges and reinforce and enhance their skills and expertise by working concurrently on stockpile stewardship and other national security missions. Supercomputers are key to stockpile stewardship and also have been used to provide foreign threat assessments, advance the understanding of human genome and medical research, and open up the field of nanotechnology.

By sponsoring research and fellowship programs at universities and thereby ensuring a pipeline of national security professionals, DOE plays a critical role in ensuring the intellectual vitality of the national security technical enterprise. DOE also pursues strategic partnerships with the Departments of State, Defense, and Homeland Security as well as the U.S. Intelligence Community to ensure that our technical capabilities are accessible and applied to meet the needs of the broader national security community.

Performance Goals

- By FY 2019, demonstrate advanced NIF capabilities that meet the refined requirements of the Stockpile Stewardship and Management Plan.
- By FY 2018, provide data required to support the Stockpile Stewardship and Management Plan boost initiative.
- Identify programmatic drivers and technical requirements in coordination with other stakeholders by the end of FY 2015 to achieve higher levels of computing in anticipation of the capabilities exascale computing would provide

Science-based Stockpile Stewardship

The United States stopped underground nuclear testing in 1992. Science-based stockpile stewardship was developed to provide a comprehensive understanding of the science, technology and engineering phenomena in complex weapons to underpin the assurance of the nuclear deterrent. This approach required the development of a new generation of high-performance computer software and hardware well beyond those then available and a suite of experimental capabilities to investigate the extreme states of matter that occur in nuclear weapons. These states had been previously accessible only in underground tests and in astrophysical objects such as the cores of giant planets and supernovae. Today, stockpile stewardship has demonstrated this goal is achievable. The numerical simulations use sophisticated models and algorithms that are validated through extensive analysis of data from surveillance, the underground nuclear testing archives and new experiments. Unique facilities provide higher fidelity measurements of fundamental nuclear and materials properties while exercising the nuclear security enterprise skills needed to maintain and modernize the stockpile. Continued improvements in the science, technology and engineering understanding and predictive capabilities has allowed a deeper understanding of nuclear weapons performance and provides assurance the stockpile can remain safe, secure and effective without underground nuclear testing.

Strategic Objective 6 – Reduce global nuclear security threats

Preventing nuclear terrorism and the spread of nuclear weapons-related materials, technology, and expertise is a key U.S. national security strategic objective defined in Presidential statements and national security strategy and policy documents. DOE/NNSA pursues this objective by: providing policy and technical leadership to remove and eliminate or secure and safeguard the most vulnerable nuclear materials worldwide; limiting or preventing the transfer and trafficking of WMD-related materials, technology, and expertise; advancing national and international technical capabilities to understand and detect foreign nuclear weapons production and detonation; and developing a comprehensive science-based predictive model for a broad range of nuclear threat devices. DOE also works to strengthen regulatory, safety, security and safeguards infrastructure in countries new to nuclear power; provide and maintain a technically trained-and-ready response to radiological or nuclear incidents worldwide; and provide technical

and analytical support, and capability development, for meeting and monitoring compliance with nuclear nonproliferation, counter-proliferation, nuclear forensics, and arms control treaties.

In pursuing this objective, NNSA works in partnership with the Departments of State, Defense, Homeland Security, the Nuclear Regulatory Commission, the Federal Bureau of Investigation, the Intelligence Community, and other U.S. agencies. Internationally, DOE has a strong and long-established partnership with the International Atomic Energy Agency (IAEA) and actively conducts bilateral program coordination, as well as multilateral consultations through forums such as the Nuclear Security Summit, the Global Initiative to Combat Nuclear Terrorism, and the Global Partnership against the Spread of Weapons and Materials of Mass Destruction. These exchanges, as well as a variety of domestic and international workshops, tabletop and national-level full-field exercises, provide a real-time capability to reduce nuclear security threats, and validate improvements to that capability. DOE also uses the knowledge gained from these information exchanges to inform its regular program strategy evaluations and assessments. For example, the Second Line of Defense program strategic review resulted in adjustments of program scope and priorities and the HEU Reconciliation report identified additional nuclear materials for potential removal or elimination.

Agency Priority Goal (FY 2014-15)

- ★ Continue to make progress toward securing the most vulnerable nuclear materials worldwide. In support of this goal, DOE will:
 - Remove or confirm disposition of an additional 316 kilograms of highly enriched uranium and plutonium for a cumulative total of 5,343 kilograms by the end of FY 2015

Performance Goals

- Complete disposition of 183 metric tons of surplus U.S. highly enriched uranium and 34 metric tons of surplus U.S. weapons-grade plutonium by the end of FY 2040; and protect an estimated 8,500 buildings with high-priority nuclear and radiological materials by FY 2044
- Deploy 148 mobile radiation detection systems and training to 44 countries, and complete transition of 531 sites to full sustainability by the partner country by the end of 2018
- Work with 38 countries to improve export control systems to prevent trade in weapons of mass destruction related materials, equipment, and technology and ensure the full sustainment of radiation detection equipment at over 500 sites by partner countries by the end of 2020
- Work with five countries to build safety, security and safeguards capacity to minimize the risks of the expansion of nuclear power by the end of FY 2018
- Demonstrate improvements in Special Nuclear Material movement detection, warhead monitoring, chain-of-custody, and nuclear safeguards by the end of FY 2018
- Demonstrate Special Nuclear Material production characterization capabilities by the end of 2016
- Complete the validation of the national predictive modeling capability for threat devices by the end of FY 2018
- Maintain an Emergency Operations Readiness Index of 91 or higher annually

Securing Nuclear and Radiological Materials

Globally, there are vulnerable nuclear and radiological materials that are attractive targets to hostile powers or terrorist organizations for use in improvised nuclear devices or in radioactive dispersal devices (“dirty bomb”). To address these threats, DOE/NNSA Office of Defense Nuclear Nonproliferation works with international partners to remove or secure high-priority vulnerable nuclear and radiological material around the world and to minimize the civilian use of proliferation-sensitive materials in research reactors and medical isotope production processes.

Since 2004, DOE/NNSA has:

- Removed or disposed of more than five metric tons of vulnerable HEU and plutonium material – enough for more than 200 nuclear bombs.
- Completely removed HEU from 24 countries and locations.
- Secured more than 1,500 radiological sites around the world containing millions of curies – enough for tens of thousands of large dirty bombs
- Upgraded physical protection at nearly 200 sites storing weapons-grade nuclear materials.
- Successfully converted to LEU use, or verified the shutdown of, 88 HEU research reactors and isotope production facilities in 14 countries.
- Removed and securely disposed of more than 33,000 high-activity radiological sources around the world, including in the United States.

Strategic Objective 7 – Provide safe and effective integrated nuclear propulsion systems for the U.S. Navy

DOE provides the design, development, and operational support required to provide militarily effective nuclear propulsion plants and ensure their safe, reliable, and long-lived operation. DOE is responsible for the reactor plant design and development for the OHIO-class ballistic missile submarine replacement, which will include new technology to allow lower-cost construction while enhancing plant safety and survivability and reducing life-cycle costs. It also will refuel its land-based reactor plant prototype in support of essential research and development efforts, and work toward the recapitalization of the program’s 50-year old used nuclear fuel infrastructure to ensure the flexibility needed to adjust to future mission demands.

Performance Goals

- Provide the Navy with an A1B reactor plant design for next-generation aircraft carrier that increases core energy, provides nearly three times the electric plant generating capability, and requires half the number of reactor department sailors as compared to today’s aircraft carriers by 2015
- Provide the Navy with an S1B reactor plant design that extends core lifetime for the next-generation ballistic missile submarine by 2027

Fukushima Response

On March 11, 2011, an overwhelming tsunami generated by the 9.0 Richter scale Tohoku Region Pacific Coast Earthquake struck the Pacific Coast of Japan. The resulting flooding disabled the control systems at the Fukushima Daiichi Nuclear Power Plant operated by Tokyo Electric Power Company and led to a dispersal of radioactive material across a wide area. On March 14, NNSA teams went to Japan to conduct both ground and aerial radiation surveys to assess the environmental conditions, providing data to inform protective actions decisions by the Government of Japan, the U.S. Armed Forces, and the U.S. Embassy in Tokyo. In addition to the field team, nuclear scientists at DOE laboratories quickly analyzed field data to communicate results to leaders in Japan and in Washington D.C. This 2-month deployment marked the first time a full complement of NNSA Consequence Management capabilities were fielded to a large scale nuclear emergency. Recognizing the Government of Japan’s long-term need to characterize the environment and understand ingestion pathway issues, the NNSA Consequence Management team provided an Aerial Measurement capability to the Government of Japan by first training operators and then transitioning to a self-sufficient Japanese Aerial Measurement System. A joint database of radiological information has also been established, allowing access for scientists around the world.

Goal 3: Management and Performance

Position the Department of Energy to meet the challenges of the 21st century and the nation's Manhattan Project and Cold War legacy responsibilities by employing effective management and refining operational and support capabilities to pursue departmental missions

Supporting Programs

Environmental Management	General Counsel
Legacy Management	Health, Safety and Security
Chief Financial Officer	Hearings and Appeals
Chief Human Capital Officer	Inspector General
Chief Information Officer	Management
Congressional and Intergovernmental Affairs	Public Affairs
Economic Impact and Diversity	

Attaining mission success requires a sustained commitment to performance-based management and expectations of excellence from DOE headquarters to every site office, service center, laboratory, and production facility. At the center of this goal is a highly qualified, capable, and flexible federal workforce that can execute the mission in a safe, secure, efficient, and sustainable manner. The Energy Department cultivates a performance-based system that links work to meet agency and Administration goals, provides for accountability, and achieves results. Management of research and development involves prioritization of those activities with the greatest potential and likelihood for impact. Decisions are informed by rigorous peer reviews. Improving contract and project management across the DOE enterprise is a top priority, along with vigilant protection of our cyber networks. Training will be increased in project costing and planning and upgrades will be sought for the information technology infrastructure.

Agency Priority Goals

- ★ Increase the focus on efficient and effective management across the DOE enterprise and improve performance in the areas of environmental cleanup, construction project management, and cyber security. In support of this goal, DOE will:
 - Retrieve tank waste and dispose of transuranic waste within cost and schedule through FY 2015
 - For projects that implemented the corrective action recommendations, complete at least 90% of the projects—achieving Critical Decision 4, Project Completion—within a 3-year rolling timeline at original scope and within 110% of the cost baseline established at Critical Decision 2, Approve Performance Baseline through FY 2015
 - Achieve full operational capability of the Joint Cybersecurity Coordination Center (JC3), including TS-SCI operations, by the end of FY 2015
- ★ Restructure the relationship and interactions between the Department and the national laboratories to ensure the continued status of the national laboratories as world-class research institutions best able to achieve DOE's mission, maximize the impact of federal R&D investment in the laboratories, accelerate the transfer of technology into the private and government sectors, and better respond to opportunities and challenges. In support of this goal, DOE will:
 - Establish and operate the National Laboratory Policy Council to address high-level policy challenges and develop initiatives to build and focus the laboratory system on critical economic, research and national security priorities
 - Establish and operate the National Laboratory Operations Board to address operational and administrative issues and enhance the effectiveness and efficiency of DOE's management of the national laboratories
 - Improve stewardship of national assets across all of the national laboratories to assure that the laboratory physical plants and their operating practices comply with DOE Orders and Directives and achieve Administration priority initiatives by end of FY 2015

Strategic Objective 8 – Continue cleanup of radioactive and chemical waste resulting from the Manhattan Project and Cold War activities

The Energy Department has been working for nearly 25 years to clean up the radioactive and chemical contamination left by five decades of weapons production and energy research during the Manhattan Project and the Cold War. While much has been completed, some of the highest risk and most technically complex work still lies ahead. Those challenges include designing, building, starting up, and operating complex, hazardous, expensive, and unique nuclear facilities. These facilities include the Waste Treatment Plant in Hanford, Washington; the Integrated Waste Treatment Unit at Idaho National Laboratory; and the Salt Waste Processing Facility at the Savannah River Site in South Carolina. Successful cleanup depends on overcoming technical, quality assurance, schedule, regulatory, and management challenges. The Department will leverage past experience, applying best practices and lessons learned; identify, develop, and deploy practical technological solutions; and look for innovative and sustainable practices that make cleanup more efficient.

Performance Goals

- Retrieve waste from 12 tanks at Hanford, Washington, and close a total of 10 tanks at both Idaho National Laboratory, Idaho, and Savannah River Site, South Carolina, by FY 2016
- Remove more than 21,000 cubic meters of transuranic waste from site inventories in accordance with respective regulatory agreements by the end of FY 2016

Cleaner and Safer Lands

This story has roots in a cold morning in December 1989, when workers at the Rocky Flats Plant in Colorado loaded the last plutonium "trigger" for a nuclear warhead into a tractor trailer bound southeast to the Pantex Plant near Amarillo, Texas. No one knew then that the nuclear weapon built with this plutonium trigger would be the last one made in the United States for the foreseeable future. Until then, the production of nuclear weapons had run continuously, beginning during World War II with the startup of the first reactor to produce plutonium for the top-secret Manhattan Project. But growing concerns about safety and environmental problems had caused various parts of the weapons-producing complex to be shut down in the 1980s. These shutdowns, at first expected to be temporary, became permanent when the Soviet Union dissolved in 1991. The nuclear arms race of the Cold War came to a halt for the first time since the invention of the atomic bomb.

Fifty years of nuclear weapons production and energy research generated millions of gallons of liquid radioactive waste, millions of cubic meters of solid radioactive wastes, thousands of tons of spent nuclear fuel and special nuclear material, along with huge quantities of contaminated soil and water. One of the largest and most diverse and technically complex environmental cleanup operations in the world, DOE's Environmental Management (EM) program has a mission to complete the safe cleanup of this environmental legacy. The EM program was created in the late 1980s to clean up the radioactive legacy of the Cold War. As of 2012, EM has reduced the number of contaminated sites from 107 to 17; and since 2009 EM has reduced its active footprint by 688 square miles, from 931 square miles to 243 square miles, demonstrating tremendous success in the accelerated cleanup of the Cold War legacy. Some major successes include completing cleanup at Rocky Flats, Mound, and Fernald as well as the construction and operation of the Defense Waste Processing Facility at Savannah River.

DOE has made significant progress toward cleaning up the legacy of nuclear weapons production. The \$4.4 billion Fernald site cleanup was accomplished with the support and participation of the local community, and federal and state regulators. The 1,050-acre property has been returned to a natural state that features one of the largest man-made wetlands in Ohio, large tracts of open water, upland forests, a lengthy riparian corridor, and the beginnings of a tall grass prairie. The successful cleanup efforts are reflected in the diverse array of wildlife that now migrates to the site. The Savannah River site in Aiken, South Carolina, has successfully built and continues to operate the Defense Waste Processing Facility, the largest facility of its kind in the world. This facility vitrifies high-level waste into a more stable glass form and has produced over 3,500 (47%) of an anticipated 7,500 vitrified glass waste canisters to date. The Richland site in Washington State pioneered the deactivation of large complex and highly radioactive processing canyons by completing the first ever deactivation of B-Plant/PUREX in 1997.

Strategic Objective 9 — Manage assets in a manner that supports the DOE mission

Following cleanup and closure of sites and facilities, DOE must address post-closure responsibilities. This includes performing long-term surveillance and maintenance of legacy sites, fulfilling commitments to retired contractor pension and medical benefits, and managing records and information for legacy and other sites. These efforts are resulting in sites and laboratories with a smaller footprint and a more efficient and effective infrastructure

Performance Goals

- Increase legacy site responsibility from 87 to xx sites by FY 2016 (sites transferred from DOE, U.S. Army Corps of Engineers, and private licensees under UMTRCA Title II)
- Identify xx federal land properties as excess by FY 2016
- Dispose of xx square feet of excess real property by the end of FY 2016
- Establish a list of real property available for reuse or disposal to non-federal entities by the end of FY 2015

Strategic Objective 10 — Effectively manage projects, financial assistance agreements, contracts, and contractor performance

Improving the effectiveness and efficiency of DOE's financial assistance agreements and contract and project management remains a top priority. These efforts are central to delivering mission critical facilities and capabilities on time and on budget. Contract provisions are being established that will enhance the oversight of contractor cost and technical performance systems and ensure contractors are not rewarded unless DOE mission and taxpayer interests are well served. The use of small business vehicles and strategic sourcing for both federal and contractor management and operating procurements will be expanded.

Performance Goals

- Expand use of Federal Strategic Sourcing Initiative to DOE federal procurement operations while continuing focus on Contractor Supply Chain Council activities to achieve 4% cost savings against actionable spending in FY 2015
- Establish and meet small business prime contracting goals, and increase utilization of small businesses in DOE prime contracts and by DOE's M&O contractors
- Perform a comprehensive assessment of DOE's project management workforce by the end of 2015, and implement a program to assure that the Department is staffed with trained and qualified professionals to assure that capital asset construction projects are effectively managed

Strategic Objective 11 — Operate the DOE enterprise safely, securely, and efficiently while using sustainability practices

The employees of the Energy Department are its strongest asset. When employees' health and safety is protected and they are well trained, empowered, and free from discrimination, they will ensure mission success efficiently and effectively. Needed investment in world-class physical assets will also continue—from brick and mortar facilities to cutting edge technology systems, to enable the United States to remain a world leader in scientific and technological advances. Mission objectives, energy efficiency, and sustainable principles will drive investments in capital infrastructure such as real property and information technology.

The Energy Department is entrusted with a unique mission to protect the nation's federal nuclear industrial operations, and thus holds a special responsibility to maintain oversight of the safety and security of those hazardous operations. Rigorous self-analysis is employed, including performance evaluations and testing conducted independent of site or headquarters line management. Because public trust is vital to success, openness, transparency, and collaboration with workers and their representatives, the communities in which DOE operates, and other stakeholders is maximized. The DOE enterprise—including government-owned, contractor-operated sites—is also being strengthened from a range of cyber threats that can adversely impact mission capabilities.

Performance Goals

- Minimize occupational illnesses and injuries to DOE federal, laboratory, and service contractor employees and reduce radiation exposures to employees, the public, and the environment to as low as reasonably achievable

- Issue and implement policy on bullying and workplace violence by FY 2015
- Complete cross-organizational assessment of processes for resolving issues and conflict and develop recommendations for improvement, if warranted, by FY 2015
- Consolidate DOE federal commodity information technology infrastructure management by the end of FY 2015
- Meet sustainability goals by FY 2018, including 25% reduction in Scope 1 and 2 greenhouse gas emissions from FY 2008 baseline, through ongoing investment in energy efficiency, renewable energy, and building improvements
- Identify the mission and core capability associated with each existing and planned real property asset and assess how well each existing asset meets that mission and core capability by the end of FY 2014

Strategic Objective 12 — Attract, manage, train, and retain the best workforce to meet future mission needs

The Department faces serious workforce challenges over the coming decade, with 15-25% of its employees projected to retire, including many of its most experienced and highly skilled professionals. To meet these challenges, the Department must engage in workforce planning and improve its outreach and recruitment programs in order to maintain a workforce with the technical skills and experience required to accomplish the Department’s science-driven missions. The Department must also significantly improve the quality and efficiency of its human resource systems. The Energy Department is committed to improving human capital policies, programs, and systems through a corporate approach that reduces organizational stovepipes and uses capable and cost-effective information technology systems. Since implementation of the President’s Hiring Reform initiatives in FY 2010, the recruitment process for general schedule positions has been reduced from an average 174 days in FY 2009 to 97 days in FY 2013. Efforts are also underway to improve hiring quality and on-boarding processes and outcomes. There is a continued focus on promoting diversity and inclusion within the workforce. There are plans to implement a strategy for leadership development across all levels of the organization. Skill gaps will be addressed by using such tools as employee skill assessments and individual development plans. Employee accountability will be addressed through annual action plans resulting from employee surveys.

Performance Goals

- Reduce the per employee cost of providing HR services by 50% by reducing organizational HR stovepipes and moving to a corporate approach by the end of FY 2016
- Improve each year on the speed, quality, and diversity of hiring and on-boarding, as indicated by satisfaction surveys and demographic data, while maintaining an efficient time-to-hire and desired retention rates
- Improve the effectiveness of employee skills assessments, training curricula, delivery methods, and individual development plans to support corporate succession planning, closing skills gaps, and leadership development through FY 2018
- Implement a corporate leadership development strategy and framework by FY 2017 that improves leadership and management at all levels and mission performance, using results from the Federal Employee Viewpoint Survey and other surveys
- Ensure accountability for improving employee perceptions, engagement, and performance through the implementation of action items based on the annual Federal Employee Viewpoint Survey results and improved execution of employee performance management in line with the Goals-Engagement-Accountability-Results model by FY 2015