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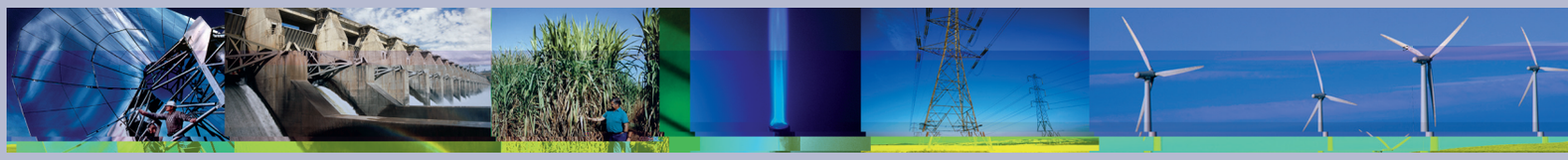
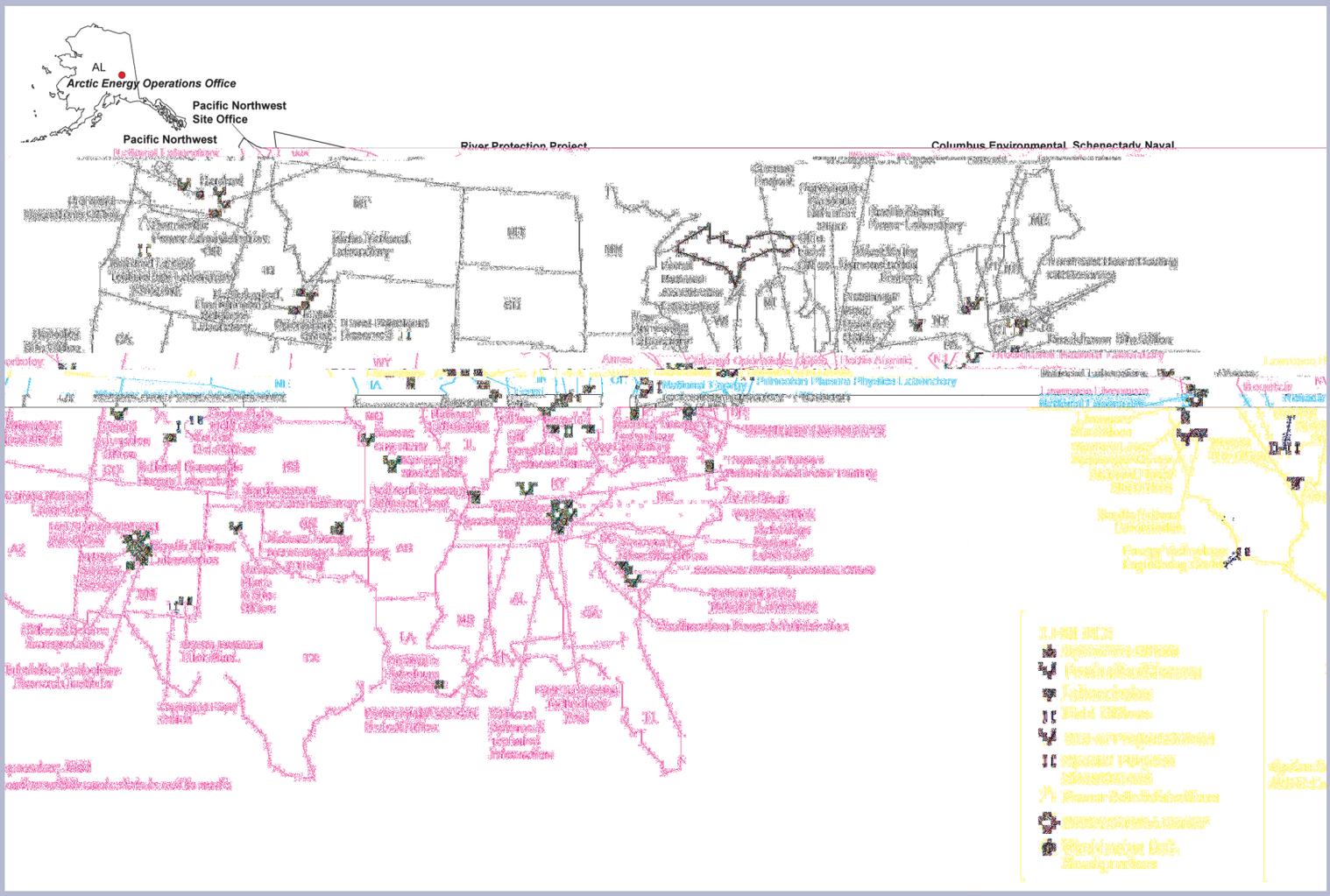


# MAJOR DOE LABORATORIES & FIELD FACILITIES




ACHIEVING RESULTS

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# Operating Principles

***Ensure safe, secure, and environmentally responsible operations***

***Act with a sense of urgency***

***Work together***

***Treat people with dignity and respect***

***Make the tough choices***

***Keep our commitments***

***Embrace innovation***

***Always tell the truth***

***Do the right thing***

# Secretary's Message

Reliable and affordable energy is central to our economic and national security. Indeed, energy helps drive the U.S. and global economy and has a significant impact on our quality of life and the health of our people.

Rapid economic growth, especially in the developing world, is expected to increase world energy consumption by over 50 percent by 2025. The Department is focused on diversifying America's energy supply, improving our energy efficiency, addressing environmental and climate changes, and modernizing our energy infrastructure in order to meet the challenges we face.

The security of the Nation's nuclear weapons and materials has never been more important. There remains a real and ever emerging threat to America from terrorists and the proliferation of nuclear weapons in potentially vulnerable world regions.

This Department of Energy Strategic Plan is our roadmap to address the energy, environmental, and nuclear security challenges before us. The heart of our plan is founded on innovation through science-driven development of new technologies. In the pages that follow, we outline our commitment to energy security, diversity, and efficiency through the development of economically competitive fuels and technologies, including bold new initiatives in nuclear, coal, hydrogen, and renewables, such as, biomass, wind, and solar energy. Diversification of energy supply toward alternate sources can greatly relieve pressures on markets for conventional energy sources over time while helping to cope with growing environmental concerns. Our plan renews and extends our commitment to the environment, both resolving legacy nuclear waste and supporting a future of cleaner energy. And we remain steadfast in meeting our commitment to the national security interests of the United States through a reliable and responsive nuclear weapons stockpile and advancing the goal of global non-proliferation.

As we enhance our energy options and advance our national security interests, we place the highest importance on protecting the health and safety of our workers and the public.

All of us at the Department of Energy are committed to making a difference in the lives of Americans.

Samuel W. Bodman

Samuel W. Bodman

# The Department of Energy Strategic Plan

The Department of Energy (DOE) has a rich and diverse history with its lineage tracing back to the Manhattan Project and the race to develop an atomic bomb during World War II. Following that war, Congress created the Atomic Energy Commission (1946) to take control over the scientific and industrial complex supporting the Manhattan Project and to maintain civilian government control over atomic research and development.

The Department of Energy Organization Act, which created DOE, was enacted in 1977 and DOE officially came into existence in October of that year. That law brought together for the first time, not only most of the government's energy programs, but also science and technology programs and defense responsibilities that included the design, construction, and testing of nuclear weapons. Over its history, DOE has shifted its emphasis and focus as the energy and security needs of the Nation have changed.

Today, DOE stands at the forefront of helping the Nation meet our energy, scientific, environmental, and national security goals. These include developing and deploying new energy technologies, reducing our dependence on foreign energy sources, protecting our nuclear weapons stockpile, and ensuring that America remains competitive in the global marketplace. To help achieve these goals, President Bush has launched two key initiatives: the American Competitiveness Initiative (ACI) and the Advanced Energy Initiative (AEI). The President launched these initiatives recognizing that science, technology, and engineering hold the answers to many of the critical challenges our world faces.

These new initiatives to spur scientific innovation and technology development expand DOE's continuing support for the competitive energy markets, both domestically and internationally, and of policies that facilitate continued private investment in the energy sector. In addition, DOE supports the demonstration and deployment of energy technologies through collaborative efforts with the private sector and public sector entities.

To help ensure that today's brightest students become tomorrow's scientific leaders, President Bush launched the ACI. This initiative increases investment in research and development, strengthens science and math education for America's youth, and encourages entrepreneurship and technology discovery. The goal of this initiative is to invest in our next generation of scientists, engineers, and educators so America can remain at the forefront of innovation and successfully compete in the 21st Century global marketplace.

AEI seeks to improve our energy security and reduce our dependence on foreign oil by changing the ways we power our cars, homes, and businesses. This goal can be achieved by accelerating the research, development, and deployment of clean energy technologies to diversify our Nation's energy mix. AEI directs funds for the advancement of renewable energy technologies such as biomass, wind, and solar energy and continuing investment in hydrogen research and development. Additionally, to tap the Nation's abundant coal reserves, AEI accelerates the development of clean coal technology including building a near-zero atmospheric emissions coal plant. Another component of AEI is the Global Nuclear Energy Partnership, a comprehensive nuclear energy strategy that will enable the expansion of nuclear energy (free of air emissions) worldwide in a clean, safe, and affordable manner.

As the steward of the Nation's nuclear weapons stockpile, DOE is responsible for maintaining nuclear deterrents and leading the international nuclear nonproliferation efforts in a world where terrorism is a real threat to national security and world stability. DOE is also responsible for the safe cleanup of the environmental legacy of the Nation's nuclear weapons program and government-sponsored nuclear energy research. This includes mitigating the risks and hazards associated with disposing of nuclear materials and deactivating and decommissioning facilities no longer needed to support the Department's mission. DOE strives to protect its workers and the public through promulgation and enforcement of nuclear safety and worker health and safety rules.

By implementing DOE's Strategic Plan, we are enhancing America's energy security and sustaining our economic vitality.

# Mission

***Discovering the solutions to power and secure America's future***

# Vision

***The Department's vision is to achieve results in our lifetime ensuring: Energy Security; Nuclear Security; Science-Driven Technology Revolutions; and One Department of Energy—Keeping our Commitments.***

# Strategic Themes

***The Department of Energy's Strategic Plan is designed to deliver results along five strategic themes***

**Theme 1: Energy Security**
Promoting America's energy security through reliable, clean, and affordable energy

**Theme 2: Nuclear Security**
Ensuring America's nuclear security

**Theme 3: Scientific Discovery and Innovation**
Strengthening U.S. scientific discovery, economic competitiveness, and improving quality of life through innovations in science and technology

**Theme 4: Environmental Responsibility**
Protecting the environment by providing a responsible resolution to the environmental legacy of nuclear weapons production

**Theme 5: Management Excellence**
Enabling the mission through sound management

***Within these themes there are sixteen strategic goals which are designed to help DOE successfully achieve its mission and vision.***

Strategic Theme 1

# Energy Security

**Promoting America's energy security through reliable, clean, and affordable energy**

Keeping America economically strong requires reliable, clean, and affordable energy, and the best way to achieve this is through competitive energy markets, science-driven technology, and supportive government policies. Technological advances enable Americans to use new energy sources that did not exist 50, 100, or even 200 years ago. Well-functioning energy markets, supplemented by effective government collaboration, incentives, and regulation, stimulate the private investment and competition necessary to spur the adoption of new technologies. New technological advances in energy supply, distribution, and utilization will help ensure we meet the energy challenges of the 21st Century.

The Department's principal tool for advancing technology is investing in high-risk, high-payoff energy research, development, and demonstration (RD&D) that the private sector would not or could not develop alone in our market-based economy. Since 2001, the Department has invested nearly $10 billion developing and promoting the use of cleaner, more affordable, and more reliable alternative energy sources and DOE is on the threshold of incredible scientific and technological advances that will change how we power our homes, businesses, and automobiles. In January 2006, the President announced the Advanced Energy Initiative to dramatically accelerate research on domestically available fuels that will diversify the Nation's use of energy sources and help reduce America's dependence on foreign resources.

To address domestic energy security, DOE is focused on stimulating private investment in energy supply and advanced technologies through diversifying energy markets, reducing emissions, and increasing reliability and productivity. The Department will work with other Federal agencies to develop a more comprehensive government-wide approach to solving America's energy needs. For example, DOE is working closely with EPA to accelerate deployment of energy efficiency and alternative energy technologies by coordinating activities that enhance progress toward each agency's respective goals.

Strengthening the systems that transmit and distribute electricity and fuels to consumers is imperative for the economic prosperity of Americans and their quality of life. Facilitating the process to modernize the electric grid, enhancing the security and reliability of the energy infrastructure, and facilitating recovery from disruptions in energy supplies are critical DOE activities. In the transmission and distribution (T&D) of electricity, the Department is partnering with industry to undertake research in developing cost-effective solutions in the areas of advanced sensors and high temperature superconductors that will reduce line losses and have the capability to carry more electric current than conventional T&D lines. The Department is also working with other Federal agencies and State and local governments to develop a resilient grid, identify and mitigate congestion, and protect critical services. With regard to fuels, the Department is working with industry and government agencies to address research and infrastructure issues related to the "fuels of tomorrow," such as biofuels and hydrogen, as well as the fuels that are the current lifeline of America's economy—petroleum, natural gas, coal, and nuclear.

The Department also supports research in developing energy efficiency technologies and practices that will enable Americans to use energy more productively. By reducing the energy intensity of America's economy, energy efficiency advances provide one of the best means for reducing the Nation's dependence on foreign fuel supplies and improving the quality of the environment, both in the near and long term. The Department supports innovative RD&D that will increase the energy productivity of all sectors of the economy—buildings, transportation, industry, and electric power.

The Department's programs extend beyond the research, development, and deployment of energy technologies. The Department operates: (1) the Strategic Petroleum Reserve, which provides emergency oil supplies in the event of a serious supply disruption; (2) the Northeast Home Heating Oil Reserve, which helps ensure adequate heating oil supplies in the event of severe energy disruptions; and (3) four Federal Power Marketing Administrations,which sell electricity from Federal hydropower dams.

Over the next six years, the Department will research advanced technologies to achieve its energy strategic goals.

## Energy Security Challenges

The United States is heavily dependent upon oil, especially in the transportation sector. Rapid increases in U.S. and world energy demand, combined with regional resource and production constraints, have led to large increases in oil and natural gas prices, changing the industrial and commercial business environment. The Nation's energy infrastructure is not keeping pace with the growth in energy demand, thereby endangering the reliability of the energy system. Finally, there is a need to reduce the environmental impacts associated with energy use. The following strategic goals address these energy challenges.

## Energy Security Strategic Goals

### Goal 1.1 – Energy Diversity

Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruption and increasing the flexibility of the market to meet U.S. needs.

**Description:** Energy diversity is essential for America's energy security and economic prosperity. In 2004, America imported 65 percent of the crude oil it used domestically. By 2030, the Energy Information Administration forecasts that crude oil imports will rise to 75 percent of our total crude oil supply and natural gas imports will rise from 17 percent today to 21 percent of our total natural gas supply. America's energy security and economic well-being are challenged when the United States is dependent upon other countries for the fuels that account for over 60 percent of the Nation's current energy use. This is especially true in the case of the transportation sector, which is the least energy-diverse sector of the American economy with petroleum accounting for more than 95 percent of the fuel consumed. Taking steps to reduce the transportation sector's dependence on oil is a critical component of the Department's strategic goals.

The Department is investing in both alternative fuels and energy efficiency technologies to reduce the energy-intensity and increase the fuel-flexibility of America's economy while maintaining environmental stewardship. In the near-to-mid term, advances in biofuels, fuel blends, plug-in hybrids, and more efficient vehicle technologies could increase the energy diversity and efficiency of America's transportation sector. In the long term, innovation in hydrogen production, storage, and use may enable consumers to drive vehicles powered by hydrogen produced from multiple domestically available energy sources and help pave the way for a full-scale hydrogen energy economy.

The Department is also pursuing energy diversity by supporting the development of a suite of electricity generation options that can promote reasonable and stable prices and a variety of efficiency technologies that will improve energy productivity in all sectors of the American economy. Taken together, these technologies diversify our energy portfolio and increase our energy security (these advances are addressed in Strategic Goals #1.2 and #1.4).

#### Strategies to reach this goal

- Reduce dependence on energy imports, particularly oil in the transportation sector, by developing and effectively deploying technologies to increase fuel efficiency and enable the substitution of alternatives such as biofuels, electricity, and hydrogen.
- Collaborate globally with governments and scientists to expedite the development and deployment of unconventional energy resources, such as biofuels, that can substitute for oil and natural gas.
- Collaborate globally with governments and scientists to expedite the development and deployment of nuclear power which can substitute for natural gas.
- Ensure adequate crude and regional home heating oil supplies during emergency shortages by maintaining the operational readiness of the Strategic Petroleum Reserve and Northeast Home Heating Oil Reserve.
- Ensure an expanding supply of domestic energy for the American public by promoting the construction of an Alaska Natural Gas Pipeline and the environmentally responsible development of the Outer Continental Shelf and the Arctic National Wildlife Refuge.

### Goal 1.2 – Environmental Impacts of Energy

Improve the quality of the environment by reducing greenhouse gas emissions and environmental impacts to land, water, and air from energy production and use.

**Description:** The consumption of fossil fuels for electricity generation and transportation accounts for three-fourths of the carbon dioxide emissions in the United States and is a major contributor of air, water, and land pollution. The Department is funding research in a robust portfolio of technology options that will help reduce the environmental footprint resulting from the supply, distribution, and use of energy.

In electricity generation, the Department is partnering with industry, academia, State, and local governments, and other countries in advancing a variety of carbon-free electricity options. These partnerships range from wind farms and solar power systems to central station near-zero atmospheric emissions fossil fuel power plants that capture and store carbon. Also included in the partnerships are nuclear facilities that rely upon advanced fuel cycle technologies that will help to address nuclear waste disposal issues. The Department is also helping to mitigate the environmental impacts of electricity generation by reducing the need for new power plants through advances in energy efficiency technologies and peak load reduction technologies and strategies (these advances are addressed in Strategic Goals #1.3 and #1.4).

In transportation, the Department is investing in options that are less carbon intensive than petroleum, such as biofuels, plug-in hybrids, and hydrogen-powered fuel cells. Another option is advancing technologies that enable vehicles to travel further on a gallon of fuel, thereby simultaneously reducing petroleum use and carbon emissions.

#### Strategies to reach this goal

- Support the creation of new nuclear generation capacity to produce carbon-free electricity in the near term (2015); complete a permanent repository for nuclear waste at Yucca Mountain by 2017; and develop next-generation advanced reactor and fuel cycle technologies for deployment in the long term (2025) for both electricity and hydrogen production.
- Advance clean coal technology through public-private partnerships for continued electricity generation from the country's extensive coal resources, ultimately resulting in near-zero atmospheric emissions power plants.
- Support research and development efforts to reduce the costs of renewable energy technologies and accelerate the large-scale use of carbon-free electricity sources.
- Develop technologies to reduce vehicle emissions by improving efficiency and greatly expanding the use of clean fuels, while maintaining vehicle safety, performance, and cost characteristics.
- Work collaboratively with other Federal agencies, private industry, and other countries to accelerate the adoption of technologies capable of substantially reducing global emissions of greenhouse gases and other emissions.

### Goal 1.3 – Energy Infrastructure

Create a more flexible, more reliable, and higher capacity U.S. energy infrastructure.

**Description:** One of the greatest energy challenges facing America is the need to use 21st Century technology to improve our aging energy infrastructure. This infrastructure is comprised of many components, including the physical network of pipes for oil and natural gas, electricity transmission lines, and other means for transporting energy to consumers; facilities that turn raw natural resources into useful energy products; and rail networks, truck lines, and marine transportation.

The energy industry has undergone major changes in the last two decades and more are expected. These changes affect how our energy infrastructure operates. For example, while the electricity industry was once vertically integrated, it is increasingly separated into three isolated segments: generation, transmission, and distribution. Electricity providers have built more power plants; however, without a comparable increase in transmission and distribution facilities, it is not possible to handle the increased output.

Over the next six years, the Department's energy infrastructure activities will be primarily focused on modernizing the electricity grid. The Department will accomplish this objective by working with other

government agencies and industry to reduce the frequency of blackouts, reduce energy losses, and improve asset and energy resource utilization. The results will provide consumers with competitive costs for electricity and a more secure infrastructure.

### Strategies to reach this goal

• Develop advanced wires and coils to increase the capacity, efficiency, and reliability of the electricity system.

• Advance real-time visualization and control tools to improve the reliability and efficiency of the Nation's electricity delivery system by increasing the utilization of transmission and distribution assets.

• Integrate advanced technologies, including distributed generation, storage, and load management on distribution utility feeders to improve the efficiency and reliability of constrained sections of the electricity grid.

• Provide technical assistance to State and regional officials on policies and emergency response options.

## Goal 1.4 – Energy Productivity

Cost-effectively improve the energy efficiency of the U.S. economy.

**Description:** Energy efficiency is the ability to produce more energy services (e.g., lighting, heating, and transportation) from a fixed amount of energy. Energy productivity is the ability to create more economic value (gross domestic product, worker productivity, and air quality) from a fixed amount of energy. Many energy efficiency technologies exist today that produce more lighting, heating, or transportation services, but the higher capital costs associated with these technologies often outweigh the lower energy costs over the life of the technology. As a result, energy efficient technologies do not always increase energy productivity. The major objective of the Department's energy efficiency RD&D is to lower the cost and promote deployment of energy efficient technologies in all sectors of the economy (building, industrial, and transportation), thereby enabling these technologies to increase the Nation's energy productivity.

### Strategies to reach this goal

• Support enhancements to existing energy markets that will help stimulate private investment in more efficient and economically productive end-use technologies.

• Develop integrated building technologies and formulate appliance standards to significantly increase the energy efficiency of residential and commercial buildings.

• Partner with energy-intensive industries to develop technologies that enable more efficient use of energy in their industrial processes.

• Develop technologies that enable cars and trucks to be fuel efficient, while remaining cost and performance competitive.

• Promote increased energy efficiency and sustainable practices in Federal facilities.

## Crosscutting Science Integration

Through recent deliberate and highly disciplined assessments, several critical areas of technology barriers have been identified, that if overcome through basic research, could create paradigm-shifting developments for the U.S. energy sector. They are, in a sense, a select set of grand challenges for the science and technology communities. Specifically, breakthroughs are required in electric energy storage, superconductivity, biofuels (including cellulosic ethanol), hydrogen storage and fuel cells, solar photovoltaic technology, advanced nuclear materials, and capture of $CO_2$ from existing fossil-fueled plants. Additionally, there are significant opportunities for crosscutting science "push," that is to say, areas where fields of science hold seemingly broad potential to accelerate innovation in many areas of energy supply and demand. Significant science opportunities include the design and synthesis of materials exploiting nanoscale understanding; advanced computation and predictive modeling of complex materials, technologies, and systems; catalysis and control of chemical transformations; and systems and synthetic biology for energy applications. While these are not exhaustive lists, they represent an initial and ambitious set that offer high potential payoff, thus motivating the science and technology communities to work together in the years ahead.

## External Factors

The following external factors could affect the Department's ability to achieve the Energy Security theme:

### Federal Government/Consumer Roles

Most energy intensive products (e.g., power plants, automobiles, etc.) have high capital costs and low turnover rates. Power plants can cost billions of dollars to build and generally operate for 30-40 years. The electricity grid infrastructure has required billions of dollars and a century to develop and will require decades to transform. The lifetime of the average automobile is 10-20 years, so a conventional automobile sold today will still be consuming petroleum in 2020 at about 25 miles per gallon. The energy economy, therefore, changes slowly and new technologies receive a cautious reception from consumers because they represent large financial investments that must operate effectively over decades. For electricity, State regulators, who have jurisdiction on retail electric rates for consumers, as well as siting and construction of new electric infrastructure, can be cautious with new technologies as they seek to ensure adequate supply at a reasonable cost. The Federal government works with industry partners, State and local governments, and non-governmental stakeholders to advance programs that encourage consumers to purchase products that contain new energy technologies.

### Fuel Prices

Fuel prices will affect the rate at which many new energy-related technologies penetrate target markets. When fuel prices are high, typically large-scale market penetration occurs sooner than when fuel prices are low. One factor that most of the energy technologies being researched by the Department have in common is that they are more costly than conventional technologies in today's marketplace. The Department is therefore working to reduce the costs of these technologies through the application of new scientific and engineering discoveries. However, fuel prices may affect the rate of transfer from the laboratory to the marketplace independent of the scientific and technological merit of the advances made by the Department.

### Other Federal and State Policies

Air pollution control policies enacted in the United States since the 1970s have affected the adoption rate of energy technologies by internalizing the cost of regulated pollutants. As a result, technologies that utilize cleaner fuels, such as natural gas, have had significant market penetration in many parts of the energy economy. These regulations and other Federal and State policies such as energy tax incentives (e.g., hybrid vehicles) and targeted rebate programs for energy efficient products could also affect market penetration of select technologies and accelerate progress toward the Energy Security goal.

### Energy Disruptions

Natural disasters (e.g., hurricanes, earthquakes, floods, droughts, heat waves, etc.) and other catastrophic events could have a major impact on the Nation's energy security and supply.

Strategic Theme 2

# Nuclear Security

**Ensuring America's nuclear security**

In 2000, the National Nuclear Security Administration (NNSA) was established as a new element within the Department in response to a Congressional mandate to reinvigorate the security posture throughout the nuclear weapons program and to reaffirm the Nation's commitment to maintaining the nuclear deterrence capabilities of the United States. NNSA was chartered to better focus management attention on enhanced security, proactive management practices, and mission focus within the Department's national defense and nonproliferation programs. The Department performs its national security mission involving nuclear weapons and nuclear materials and technology through the NNSA.

Over the next six years, the Department will apply advanced science, engineering, and nuclear technology to help ensure that it meets its national nuclear security strategic goals.

## Nuclear Security Challenges

As NNSA continues to drawdown the nuclear weapons stockpile to the lowest levels since the Eisenhower Administration, we must consider the long-term effects of aging and the implications of successive warhead refurbishments which take us further away from the tested designs of the Cold War stockpile. The current nuclear weapons complex is not sufficiently responsive to fix technical problems in the stockpile or to react to potential adverse geopolitical change. Therefore, the nuclear weapons stockpile and the supporting infrastructure must be transformed. The Department is working closely with the Department of Defense to transform the nuclear deterrent to ensure that it can meet the changing technical, geopolitical, and military needs of the future. A second challenge deals with the ever increasing threat of terrorism. The mere acquisition by terrorists or rogue regimes of nuclear and radiological materials which could be used in weapons of mass destruction or in a "dirty bomb" represents a threat to the United States and to international peace and security. Lastly, increasing national security demands necessitate the development of next-generation naval nuclear propulsion technology.

The following strategic goals address these nuclear security challenges.

## Nuclear Security Strategic Goals

### Goal 2.1 – Nuclear Deterrent

Transform the Nation's nuclear weapons stockpile and supporting infrastructure to be more responsive to the threats of the 21st Century.

**Description:** In accordance with the policy outlined in the 2001 Nuclear Posture Review, the structure of the U. S. nuclear deterrent will transition from one that relies solely on offensive nuclear forces to one that relies more heavily on capabilities. To that end, NNSA must develop a credible, responsive nuclear weapons infrastructure to facilitate a reduction in the size of the stockpile, to support a greater reliance on deterrence by capability, and to change the way we manage risk. NNSA must furthermore accomplish this transformation of the complex while ensuring the safety, security, and reliability of the stockpile without nuclear testing.

In the 1990s, the Nation established the science-based Stockpile Stewardship Program (SSP) in order for DOE to fulfill its responsibilities for ensuring the safety, security, and reliability of nuclear weapons without nuclear testing. Sophisticated scientific tools and computer-based simulation techniques were developed to ensure the Nation had a means to assess the complex phenomena involved in nuclear weapons. Indeed, for more than a decade, SSP has given us confidence that today's stockpile remains safe, secure, and reliable. Now, transformation of the stockpile and the infrastructure is enabled by the success of the SSP. Tools and expertise developed in that program are being applied to design replacement warheads, to ensure long-term confidence in the stockpile, and to enhance the responsiveness of the complex.

NNSA has developed a preferred planning scenario, which sets out the vision for the nuclear weapons complex of 2030. This scenario comprises four over-arching, long-term implementation strategies, complemented by a near-term commitment to build confidence in the transformation process over the

next 18 months. In addition, NNSA will prepare documentation for a National Environmental Policy Act process that will examine all reasonable alternatives to modernize and consolidate the complex.

### Strategies to reach this goal

• In partnership with the Department of Defense, transform the nuclear weapons stockpile by: developing Reliable Replacement Warheads that are safer, more secure, and easier to manufacture and maintain; refurbishing a limited number of legacy-design warheads and ensuring their vitality until they are replaced; and accelerating dismantlement of the Cold War stockpile.

• Transform the current nuclear weapons complex into a modernized, cost-effective complex by: reducing the number of sites, and facilities within sites, that possess large quantities of special nuclear materials; consolidating redundant capabilities; operating science assets as shared user facilities; and designing, building, and operating new facilities in a manner that protects public and worker health and safety and the environment.

• Create a fully integrated and interdependent complex by: implementing uniform and streamlined business practices and processes; using the operating contracts for each site to facilitate the integration and interdependence of the complex; and applying risk-informed decision-making to integrate safety, security, and mission work.

• Drive forward the science and technology base essential for long-term national security by: integrating activities with DOE's Office of Science and other national sponsors; enhancing the Work for Others program; and managing capabilities based on "return on investment" for improving DOE's ability to certify the stockpile.

## Goal 2.2 – Weapons of Mass Destruction

Prevent the acquisition of nuclear and radiological materials for use in weapons of mass destruction and in other acts of terrorism.

**Description:** The Department is committed to detecting, preventing, and reversing the proliferation of nuclear and radiological materials, technology, and expertise. NNSA's nonproliferation work started well before September 11, 2001 and the programs are becoming increasingly global in scope as they strengthen and expand nonproliferation activities outside the territory of the Former Soviet Union. NNSA now works with more than 90 countries to secure nuclear and radioactive materials and halt the production of new fissile material. Additionally, it detects and interdicts illegal trafficking in, or diversion of, nuclear material and proliferation-significant items; destroys surplus weapons-usable materials; strengthens export controls; bolsters nonproliferation regimes; and gives former weapons scientists and technicians an opportunity to make use of their high-technology skills in peaceful endeavors.

While the Department has achieved impressive nonproliferation accomplishments over the past 30 years, DOE nonproliferation programs must continually address and adapt to evolving security concerns. The rapid evolution of nuclear proliferation, in the context of a globalizing world economy, requires the programs to be flexible, creative, and responsive to emerging threats around the world.

NNSA's nonproliferation and threat reduction programs are structured around and integrated with a comprehensive and multi-layered U.S. Government strategy to address the danger that hostile nations or terrorist groups may acquire weapons of mass destruction (WMD) or weapons-usable material, dual-use production technology, or WMD expertise.

### Strategies to reach this goal

• Provide technical and policy leadership to the U.S. Government and international community and pursue collaborative efforts with other countries and international organizations to achieve nonproliferation objectives.

• Develop the technologies and expertise to detect the proliferation of nuclear materials.

• Promote next-generation technologies that minimize proliferation risks.

• Provide technical and other appropriate assistance to secure nuclear weapons, special nuclear material, and radiological materials around the world.

• Provide technical and other appropriate assistance to terminate Russian production of plutonium and eliminate surplus fissile materials.

### Goal 2.3 – Nuclear Propulsion Plants

Provide safe, militarily effective nuclear propulsion plants to the U.S. Navy.

**Description:** NNSA, through the Naval Reactors Program, provides the U.S. Navy with safe, militarily effective nuclear propulsion plants, beginning with reactor technology development, continuing through reactor operation, and ending with reactor plant disposal and management of naval spent nuclear fuel pending shipment to a geological repository. Nuclear power enhances warship capability and creates the flexibility needed to sprint anywhere in the world and arrive ready for combat operations. Sustained, high-speed capability enables rapid responses to changing world circumstances and helps the Navy stretch available assets to meet today's worldwide national security commitments.

The Naval Reactors Program ensures the safe operation of reactor plants in operating nuclear-powered submarines and aircraft carriers and fulfills the Navy's requirement for new reactors to meet evolving national defense demands. This program's long-term development work ensures that nuclear propulsion technology provides options to maintain and upgrade current capabilities, as well as meet future threats to U.S. security.

The presence of radiation dictates a careful, measured approach to developing and verifying nuclear technology, components, systems, and processes, and implementing them into existing or future plant designs. Intricate engineering challenges and long lead times to fabricate the massive, complex components require many years of effort before technological advances can be introduced into the fleet. As advances in various functional disciplines coalesce, work is integrated into the technology applicable to a naval nuclear propulsion plant.

#### Strategies to reach this goal

• Provide operational support and ensure the safety, performance, reliability, and service life for 104 operating reactor plants.

• Develop new technologies, methods, and materials to support reactor plant design for future generations of reactors for submarines and aircraft carriers.

## Crosscutting Science Integration

As part of DOE's planning process, several critical areas of technology barriers have been identified that, if overcome through basic research, could greatly enhance NNSA's posture and ability to deliver on its three strategic goals. They are, in a sense, a select set of grand challenges for the science, engineering, and technology communities. Specifically, breakthroughs are required in radiation resistant materials, innovative materials for safeguards and security, nuclear proliferation detection, remote sensing and analysis of radioactive/fissile materials and nuclear weapons, and modeling and simulation. Additionally, there are significant opportunities for crosscutting science "push," that is to say, areas where fields of science hold seemingly broad potential to accelerate innovation in many areas of national nuclear security responsibilities. Significant science opportunities include the design and synthesis of materials exploiting nanoscale understanding; advanced scientific computing research and mathematics; and physics, chemistry, and metallurgy. While these are not exhaustive lists, they represent an initial and ambitious set that offer high potential payoff, thus challenging the science and technology communities to work together in the years ahead.

## External Factors

The following external factors could affect the Department's ability to achieve the Nuclear Security theme:

#### Technology

Technological challenges may occur. The discovery of an insurmountable scientific or engineering obstacle in a stockpile warhead could make it difficult to certify the reliability of the warhead under current policies.

#### Geopolitical Environment

Changes in the nuclear threats or other threats involving weapons of mass destruction could require changes to the Stockpile Stewardship Program.

### Cooperation with Russia

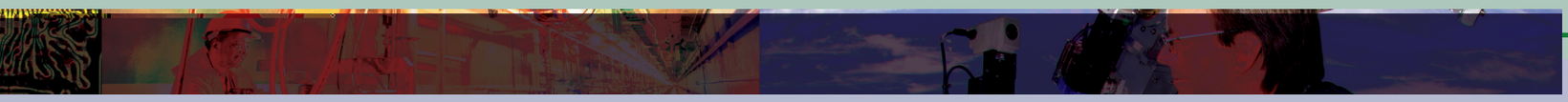
Unprecedented cooperation between the United States and Russia has resulted in great strides being made in the elimination and securing of inventories of surplus materials. This close working relationship is necessary for NNSA to continue making progress in this key area of nonproliferation.

### Cooperation with Other Countries

DOE's efforts are cooperative; they cannot proceed in the absence of committed engagement from U.S. international partners. NNSA needs international partners to provide access for our technical experts, to engage in good faith negotiations, to share in the expenses involved, and to work to sustain the level of nonproliferation activity after the United States has done its part.

### International Atomic Energy Agency (IAEA)

The IAEA is essential to the success of the world's efforts to control nuclear proliferation. It is vital that the IAEA receive needed funding and technical expertise and demonstrate leadership to its member countries to accomplish its mission.



Strategic Theme 3

# Scientific Discovery and Innovation

**Strengthening U.S. scientifc discovery, economic competitiveness, and improving quality of life through innovations in science and technology**

The United States has always been a Nation of innovators and the Department of Energy has been a major contributor to that legacy. DOE-supported basic research has produced Nobel Laureates, numerous paradigm-shifting scientific discoveries, and revolutionary technologies that have spawned entirely new industries. Such breakthroughs have created fundamentally new energy options, underpinned U.S. national security during challenging times, and contributed to the health of our citizenry and the stewardship of our Nation's environmental resources. This great engine of U.S. innovation has played an important role in fueling a strong economy and one of the highest standards of living the world has ever known.

As we look toward the future, we are entering a new era that is characterized by increasingly rapid changes in the pace of discovery and innovation. These changes present both opportunities and challenges, requiring a new U.S. commitment to science and innovative approaches for accelerating the realization of benefits from our research enterprise.

In February 2006, the President announced the American Competitiveness Initiative (ACI) to encourage American innovation and strengthen our Nation's ability to compete in the global economy. The Department has a core responsibility under ACI to cultivate the U.S. scientific base in a way that enables our Nation to compete and win in the global marketplace of ideas and commerce. More specifically, ACI directs the Department of Energy to:

• Increase financial support for innovation-enabling research to support high-leverage fields of physical science and engineering.

• Increase investments in the U.S. scientific infrastructure, particularly at the Department's scientific user facilities, to ensure the U.S. an order of magnitude dominance in key scientific fields that will transform the 21st Century global economy, e.g., biotechnology, nanotechnology, materials science, high-speed computing, and climate change research.

• Improve the capacity, maintenance, and operations of DOE laboratories through new investments and continued pursuit of best practices.

• Provide mentored experiences for K-12 teachers at National Laboratories that will transform teachers of science into "teacher scientists" who can encourage and inspire the next generation of scientists and engineers.

• Provide training opportunities at the Department's National Laboratories as a way to increase the skills and knowledge of the Nation's scientific and technical workforce.

Accordingly, over the next six years, the Department will pursue innovations in science and technology to help ensure that it meets its national science strategic goals.

## Scientific Discovery and Innovation Challenges

The U.S. must remain vigilant as other nations invest heavily in science and technology in an attempt to match our economic productivity and compete with U.S. industry. America's investment in the physical sciences, which many consider to be the cornerstone of the Nation's scientific enterprise, must be strengthened to capture the promise of emerging scientific disciplines that will define the technological progress over the next 100 years. The Nation's incremental changes in technology are not sufficient to maintain the world leadership in industry and academia. The scale and complexity of science and global challenges require multidisciplinary and multinational responses. The Nation's scientific workforce and science literacy must be grown to prepare citizens to compete for jobs and increase overall economic productivity.

## Scientific Discovery and Innovation Strategic Goals

### Goal 3.1 – Scientific Breakthroughs

Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize approaches to the Nation's energy, national security, and environmental quality challenges.

**Description:** The Department has made science-driven innovation a top priority because of a growing awareness of shifts in the energy structure. Also the pace of technological progress must be accelerated to solve critical national challenges. Revolutionary breakthroughs are required and DOE will lead a renaissance in scientific discovery that will rekindle the American spirit and provide the base of new knowledge and the resulting new options and solutions to these seemingly intractable challenges. The Department cannot rely on incremental changes in technology to significantly reduce our dependence on foreign oil, dramatically decrease energy use, increase production, or solve long-term environmental challenges such as climate change.

#### Strategies to reach this goal

• Advance the basic energy sciences to realize transformational discoveries built on the foundations of basic research in materials sciences, chemical sciences, related scientific disciplines and tools, and major scientific user facilities for creating atomic-scale structures.

• Expand efforts in biological and environmental research, including genomic and related biological sciences; creating fundamentally new energy sources and conversion processes; improving climate and earth system modeling; and understanding prediction and control of environmental contaminant fate and transport.

• Increase research to advance the knowledge of plasma and fusion energy sciences to the point where a determination of commercial feasibility of one or more leading designs is possible.

• Advance the computational sciences and the leadership-class computational capabilities required for today's frontiers of scientific discovery.

• Advance fundamental knowledge in high energy physics and nuclear physics that will result in a deeper understanding of matter, energy, space, and time.

### Goal 3.2 – Foundations of Science

Deliver the scientific facilities, train the next generation of scientists and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.

**Description:** The foundations of great science are the people, the powerful scientific instruments, and the laboratories that provide important venues for multi-disciplinary collaboration. The Department serves a critical role within the U.S. science enterprise as managers of the largest system of National Laboratories and major scientific user facilities. Tens of thousands of researchers depend on these facilities and this support forms a core element of the innovative engine that drives the U.S. economy. Many of the world's leading scientists are employed at DOE National Laboratories and annual DOE research grants support the work of scientists, engineers, and technicians at more than 300 universities. In addition, the Department constructs and operates the largest and most advanced set of scientific facilities in the world. These facilities are open to the science community on a competitive basis. The 19,000 scientists who work at these facilities conduct some of the most complex and innovative research being performed today. Skillful management and prudent investment strategies are needed to ensure that the laboratories are staffed and equipped with the necessary resources to support the Department's mission. DOE will ensure that scientific facilities are operated efficiently and effectively and that students are given every opportunity to learn and grow as future scientists, technicians, and engineers.

#### Strategies to reach this goal

• Complete construction and begin operation of major scientific user facilities.

• Improve the operations of the National Laboratory system using a collaborative approach.

• Increase the operating efficiency and safety of the National Laboratories and scientific user facilities, guided by a ten-year site planning process.

• Develop an approach by working with other Federal agencies to recruit the next generation of leaders in science, technology, and engineering.

• Better communicate the importance of science and technology to inspire participation in the innovation economy.

### Goal 3.3 – Research Integration

Integrate basic and applied research to accelerate innovation and to create transformational solutions for energy and other U.S. needs.

**Description:** The Department of Energy manages a mission-driven portfolio of research that spans from the most basic research, exploring the origins of the cosmos, to applied research designed to solve emerging challenges in energy, environment, and national security. The scale and complexity of this research portfolio provides an enormous competitive advantage to the Nation as multidisciplinary teams of scientists, using the most advanced scientific instruments in existence today, are able to respond quickly to national priorities and changes in opportunities at the frontiers of science. As just one example, the Department mobilized enormous resources during the past few years to reclaim world leadership in high-performance computing at a time when other countries had all but taken over this strategically important capability that is vital to long-term U.S. scientific leadership and U.S. competitiveness. This agility in responding to challenges and opportunities is increasingly characterized by DOE's ability to achieve meaningful integration between the basic and applied research communities. The Department's ability to expand on this tradition will only strengthen its competitiveness and the national ability to rapidly convert the fruits of science into the revolutionary technologies that will change forever how our Nation provides for life's most basic needs—whether it be to light the night, heat a home, transport food, cure an illness, or to understand the beginning of time itself.

### Strategies to reach this goal

- Strengthen the ties between the basic research and applied mission programs in Departmental planning.
- Ensure continuous cooperation and information flow between basic and applied research efforts through integrated research management and initiatives.
- Develop strategic partnerships with other Federal research agencies and the public and private sectors to leverage the combined intellectual capital and science resources to solve the Nation's challenges in energy, environment, and national security.

### External Factors

The following external factors could affect the Department's ability to achieve the Scientific Discovery and Innovation theme:

#### World Events

Other nations are rapidly expanding their own science and technology capacity, which increases competition for resources (particularly human resources) and reduces the attractiveness of the U.S. as an innovation leader.

#### Policy Decisions

Policies implemented for national security reasons may affect the free exchange of scientific and technical information or access to U.S. facilities by visiting scientists.

#### Social and Economic Trends

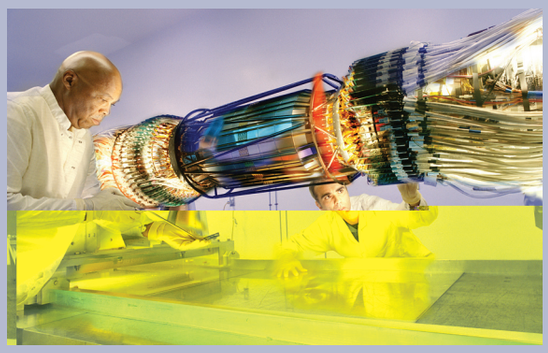
Perhaps the greatest challenge is our inability to attract top-notch scientific talent due to social constraints (security concerns) and/or a poorly performing economy that encourages scientific talent to work elsewhere.

#### Development Communities

One of the great strengths of the U.S. Science and Technology (S&T) system is the close interaction between the scientific community and Federal agencies, which leads to appropriate policy and funding decisions.

#### Science Advisory Committees

Advisory Committees remain a cornerstone of our process for evaluating future scientific opportunities and needs while retaining their independence. At the same time, Federal S&T agency leaders must retain the ability to make independent decisions as significant opportunities arise or national circumstances demand.



Strategic Theme 4

# Environmental Responsibility

**Protecting the environment by providing a responsible resolution to the environmental legacy of nuclear weapons production**

The scope of the Department's environmental cleanup includes stabilization and disposition of some of the earth's most hazardous materials generated from spent nuclear fuel and nuclear radioactive waste material. The cleanup program resulting from over five decades of nuclear weapons production and energy research is the largest active cleanup program in the world. In addition, after active cleanup, residual risks will remain for significant periods of time at most DOE cleanup sites. The Department will take appropriate action to protect human health and the environment from these residual risks. The Department continues its effort to construct a repository for the final disposal of spent nuclear fuel and high level radioactive waste.

Over the next six years, the Department will apply advanced science, engineering, and cleanup technology to help ensure that it meets its national environmental cleanup strategic goals.

## Environmental Responsibility Challenges

Cleanup of the nuclear weapon's legacy is an enormously complex undertaking involving significant challenges. DOE is also faced with Federal, State, and local regulatory policies that create challenges. The Department's effort to construct a repository for the final disposal of spent nuclear fuel and high level radioactive waste continues to meet regulatory challenges. Finally, despite aggressive environmental cleanup efforts, the Department must be prepared to address residual risks that will remain for significant periods of time at most DOE sites.

## Environmental Responsibility Strategic Goals

### Goal 4.1 – Environmental Cleanup

Complete cleanup of the contaminated nuclear weapons manufacturing and testing sites across the United States.

**Description:** DOE is responsible for the risk reduction and cleanup of the environmental legacy of the Nation's nuclear weapons program, one of the largest, most diverse, and technically complex environmental programs in the world. The Department will successfully achieve this strategic goal by ensuring the safety of DOE employees and U.S. citizens, acquiring the best resources to complete the complex tasks, and by managing projects throughout the United States in the most efficient and effective manner. DOE has made significant progress in the last four years in shifting away from risk management to embracing a mission completion philosophy based on cleanup and reducing risk. The Department continues to demonstrate the importance of remaining steadfast to operating principles while staying focused on the mission.

The Department has made progress in recent years in cleanup and/or closure of sites. As many as seven sites will be completed by the end of 2006 including: Rocky Flats, Fernald, Columbus, Ashtabula, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory-Main Site, and Kansas City Plant.

DOE will maintain a focus on site completion, with an additional ten sites or areas projected to be completed by the end of 2009. These include: Argonne National Laboratory–East, Miamisburg, Brookhaven National Laboratory, East Tennessee Technology Park at Oak Ridge, Energy Technology Engineering Center, Lawrence Livermore National Laboratory-Site 300, Inhalation Toxicology Laboratory, Pantex Plant, Sandia National Laboratory, and the Stanford Linear Accelerator Center. Eight Nevada "Off-sites" will be transferred to the Office of Legacy Management in FY 2007. Three of these eight sites (the Central Nevada Test Area, Project Shoal Area, and the Rio Blanco Site) are scheduled to close in 2010.

In addition to its emphasis on site cleanup and closures, the Department is also focusing on longer-term activities required for the completion of the cleanup program. These include:

- Constructing and operating facilities to treat radioactive liquid tank waste into a safe, stable form to enable ultimate disposition.
- Securing and storing nuclear material in a stable, safe configuration in secure locations to protect national security.
- Transporting and disposing of transuranic and low-

level wastes in a safe and cost-effective manner to reduce risk.

### Strategies to reach this goal

• Identify and eliminate the most serious risks to worker safety, human health, and the environment.

• Ensure safe and secure management of nuclear materials and radioactive wastes and enable final disposition of these materials in a geologic repository.

• Reduce the facility infrastructure footprint to maximize resources for environmental cleanup.

• Leverage science and technology to directly address the specific, applied needs for cleanup and closure.

• Utilize project management best practices to improve implementation and performance of clean-up work.

## Goal 4.2 – Managing the Legacy

Manage the Department's post-closure environmental responsibilities and ensure the future protection of human health and the environment.

**Description:** Over the last 15 years, the Department has made significant progress in environmental remediation. Millions of cubic meters of waste have been removed, stabilized, or disposed of, and a number of former weapons facilities have been transformed for other uses. The overall risk to human health and the environment will continue to decrease as the Department completes additional cleanup work. The new challenge will be to successfully manage the environmental remedies and the residual risks in a manner that enables the optimal future use of the land and facilities while continuing to protect human health. This is true for both the sites that are closing and for those that continue to support ongoing DOE missions.

In addition to the sites cleaned up by the Office of Environmental Management, DOE is responsible for sites remediated by other parties. The Department has responsibility for long-term surveillance and maintenance at sites associated with the Formerly Used Sites Remedial Action Program (cleanup is performed by the U.S. Army Corps of Engineers) and uranium mining and mill tailing sites (as specified by the Uranium Mill Tailings Radiation Control Act).

By 2015, DOE will be conducting long-term surveillance and maintenance at approximately 120 sites where there is no longer an ongoing Departmental mission. Roughly two dozen sites with ongoing missions will also have surveillance and maintenance activities; those activities will be managed as an integral part of the overall site operation.

A geologic repository at Yucca Mountain, Nevada, is vital for moving temporarily stored legacy materials from former nuclear weapons sites to a safe, central storage location. The repository is also necessary for preserving the nuclear option for electricity generation which provides approximately 20 percent of the Nation's electricity supply (nuclear energy is also addressed in Strategic Goals #1.1 and #1.2). Integral to attaining this goal is the near-term licensing, subsequent construction, and operation of the permanent repository for nuclear waste at Yucca Mountain authorized under the Nuclear Waste Policy Act.

### Strategies to reach this goal

• Protect human health and the environment through surveillance and maintenance activities that verify workable environmental remedies.

• Preserve, protect, and ensure accessibility of legacy records and information associated with current and historical site and facility operations.

• Optimally re-use lands ensuring that human health and the environment are protected and that regulators and the community are involved.

• Use environmental conflict resolution techniques to assist in the resolution or prevention of disputes.

• Implement the Nuclear Waste Policy Act by completing the construction of a repository for the final disposal of spent nuclear fuel and high-level radioactive waste.

### Crosscutting Science Integration

Based on discussions with the science community, as well as environmental managers across DOE, the Department has identified several areas relating to subsurface biogeochemistry and contaminant transport in groundwater in which hard work in basic science could yeild signifigant benefits to the DOE cleanup mission. Molecular/atomic-scale science addressing the chemical nature of environmental processes

furthers the basic understanding of chemical, physical, and biological processes occurring at larger scales in the subsurface. Investigations of biological processes will lead to a better understanding of the myriad capabilities of microorganisms to affect contaminant transport in the subsurface. The integration of molecular biology and genomics techniques into subsurface science is essential to a mechanistic understanding of biological processes controlling contaminant transport and bioremediation processes in the subsurface. This research coupled with a more complete understanding of groundwater movement and the chemical nature of reactive transport will help to advance new conceptual models of the mobility and fate of contaminants in the environment. Research into novel monitoring and measurement tools is needed to verify the performance of groundwater remediation techniques and long-term stewardship strategies. Resolving subsurface contamination issues requires an integrated scientific approach with teams of researchers working in the laboratory and in the field across scales to decipher and predict the mechanisms controlling contaminant mobility in the environment. And there is both need and significant opportunity to address chemistry and separations for radioactive waste; modeling, simulation, and scaling issues for environmental management; and predictions of high level waste system performance over extreme time horizons. While these are not exhaustive lists, they represent an initial and ambitious set that offer high potential payoff, thus challenging the science and technology communities to work together in the years ahead.

## External Factors

The following external factors could affect the Department's ability to achieve the Environmental Responsibility theme:

### Changes in Regulatory Requirements

The Department must comply with all applicable environmental laws and regulations. Changes in these laws and regulations can affect the requirements associated with the environmental remedies and the resulting surveillance and maintenance activities.

### Cleanup Standards

The end-state for cleanup at many sites is not fully determined at the time of initial project planning, resulting in changing requirements. The extent of cleanup required to satisfy interested parties greatly affects cost, schedule, and scope of work.

### Technology

Technological development is critical for solving complex cleanup issues, but the success of such developments is inherently unpredictable. Suitable and feasible cleanup technologies do not always exist when the development and deployment of such innovative technologies could help reduce risk, lower cost, and accelerate cleanup.

### Uncertain Work Scope

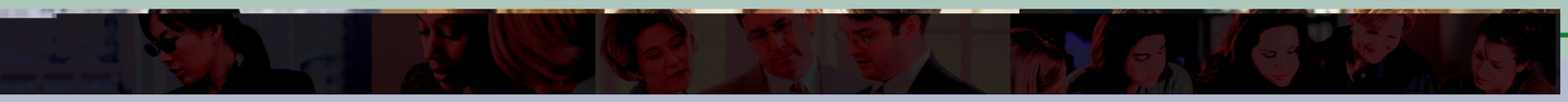
Uncertainties are inherent in the environmental cleanup program due to the complexity and nature of the work. The Department is working to fully understand the types of contaminants, their prevalence, and concentrations at a given site prior to the execution phase of the cleanup.

### Changes in Demographics and Land Use

Changes to the surrounding land use and demographics can affect the Department's approach to environmental protection, as well as the land use on the Federally-owned property. Close coordination with surrounding land owners and communities is necessary to anticipate and adjust to changes that could affect DOE-owned land and facilities.

### Advances in Science and Technology

Advances in science and technology can improve the understanding of the natural environment, efforts to protect the environment, and the potential impact to human health from residual risks. Scientific transformations could enable improved and more cost-effective environmental remedies and/or allow a broader variety of land and facility use.



Strategic Theme 5

# Management Excellence

**Enabling the mission through sound management**

The Department's strategic themes and goals will be accomplished not only through the efforts of the major program offices in the Department but with additional effort from staff offices that support the management of the programs in carrying out the mission. DOE is committed to integrated management and is taking steps to ensure that this is one of the critical initiatives that will assist the Department's leadership in achieving the strategic goals. DOE will endeavor to make sure it has the necessary skills available to carry out the mission and to continue bringing in talented and qualified resources for the future. As DOE strives to meet the needs of the Nation in the area of scientific discovery and innovation and the needs of its employees, cost-effective upgrades, renovations, and replacements will be made to aging and outdated facilities. One of the most important keys to managing the Department is financial stewardship and one of the top priorities for DOE is continually improving its financial performance and accountability over the resources entrusted to it by American taxpayers.

## Management Excellence Challenges

DOE is an organization of diverse programs. While this structure has its advantages, it often hampers integrated management of core functions across the Department. In addition, there are economies of scale and improvements in service that could be attained by implementing a common Department-wide approach to core services utilized by all internal stakeholders. This can be difficult to attain in a program-centered approach to the work. However, DOE also faces near-term challenges that are more fundamental. A significant portion of the Department's budget is awarded to contractors each year and achieving excellence in the Department's management of contracts remains a significant challenge. The average age of the workforce is increasing and the number of skilled employees eligible for retirement suggests an impending knowledge and capability gap in the next three-to-seven years. The Department is implementing a new resource management system that ties together data from various functional disciplines into a single enterprise-wide network. The implementation of this system combined with recent audit challenges requires the Department to adopt new financial and business practices. The Department currently faces accrued under-funded contractor pension plan and post-retirement benefits liability in the billions of dollars. Finally, DOE's infrastructure is aging, which creates both safety and security concerns.

## Management Excellence Strategic Goals

### Goal 5.1 – Integrated Management

Institute an integrated business management approach throughout DOE with clear roles and responsibilities and accountability to include effective line management oversight by both Federal and contractor organizations.

**Description:** The Department has an urgent need to embrace the best management practices to improve processes, performance, and eliminate waste. The Secretary of Energy identified several functional areas within the Department that would benefit from a strengthened management approach including: financial, human capital, information technology, legal, procurement, and public affairs. In order to better coordinate and streamline these functional areas, the Secretary has established an initiative whereby the functional heads will create working groups to implement changes to specific oversight and accountability processes resulting in improvements in the overall functional accountability. DOE has a $23.5 billion budget, about 15,000 Federal employees, and 100,000 contractor employees, as well as a large number of research laboratories, facilities, and operations offices. The Department oversees large-scale special operations, such as the processing and storage of nuclear materials and production of power for large regions of the country. DOE is one of the largest owners of public facilities in the world. Yet, the Department's contracts represent about 85 percent of its work by dollar amount. Management of this operation needs a coherent, well-structured, integrated business management architecture with clear roles, responsibilities, and customer service standards. The Department should have a robust system of clear,

consistent performance objectives and measurements so that it may focus resources more effectively on key objectives and continually improve to meet those objectives.

#### Strategies to reach this goal

• Design and implement a functional accountability model that supports an integrated management approach.

• Develop and implement clear, consistent, enterprise-wide performance goals and measures to better inform decision-makers and ensure accountability for integrated management.

• Develop and implement customer service standards across programs and Departmental elements focused on meeting the cost, quality, and timeliness standards of the Department's customers.

• Develop and implement a strategy to improve the Department's management of contracts and major capital acquisition projects.

### Goal 5.2 – Human Capital

Ensure that DOE's workforce is capable of meeting the challenges of the 21st Century by attracting, motivating, and retaining a highly skilled and diverse workforce to do the best job.

**Description:** People are DOE's most important resource. The Department's human capital management efforts are focused on an integrated approach that ensures human capital programs and policies are linked to the missions, strategies, and goals, while providing for continuous improvement in efficiency and effectiveness. Within the Department, senior managers of the individual program and staff offices are responsible for successfully accomplishing their organization's mission as well as creating a challenging and productive workplace environment. Senior management must also ensure that they plan for a secure workforce, capable of meeting current and future challenges. The Department must provide senior managers with the flexibilities and tools necessary to ensure that their workforce can successfully meet the challenges of the 21st Century.

#### Strategies to reach this goal

• Implement programs and processes that will enable the Department to quickly recruit, develop, and retain a qualified, diverse workforce through an integrated workforce planning system.

• Create a Department-wide performance culture focused on individual and organizational accountability toward the achievement of DOE's programmatic goals and priorities.

### Goal 5.3 – Infrastructure

Build, modernize, and maintain facilities and infrastructure to achieve mission goals and ensure a safe and secure workplace.

**Description:** The Department's real property assets are vital to the accomplishment of its mission. Real property assets of the Department are located at over 50 sites across the Nation with approximately 20,000 buildings and other structures covering 127 million square feet on 3.1 million acres of land, an area roughly the size of the state of Connecticut. The replacement plant value of these assets (not including land value) is $77.1 billion. Unlike many other Federal agencies, the vast majority of DOE sites are government-owned and contractor-operated and maintained. The Department's real property portfolio is composed primarily of large complexes of diverse facilities of critical importance to the DOE mission, such as reactors, accelerators, and Cold War-era buildings that should be retired. The Department owes it to the public and DOE employees to be good stewards and to provide safe and quality work places that are aligned with and supportive of our mission requirements.

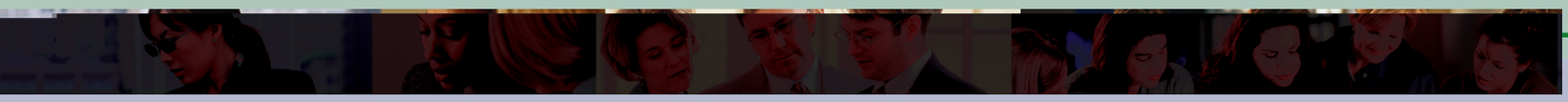
#### Strategies to reach this goal

• Invest in the infrastructure to reduce overall facility square footage and improve energy efficiency and sustainability.

• Implement an active asset management plan to align resource needs with key Departmental goals.

• Improve the information technology infrastructure through upgraded networks and technology and strengthened cyber security.

• Integrate safety and security into every element of the Department's mission to safeguard employees and assets.



## Goal 5.4 – Resources

Institutionalize a fully integrated resource management strategy that supports mission needs and postures the Department for continuous business process improvement.

**Description:** To improve our accountability to the American taxpayers, the Department will improve financial performance and integrate budgeting with strategic and performance planning. To accomplish this, the Department's business systems related to financial information need to be consolidated and streamlined, thus resulting in the ability to produce accurate and consistent financial reports, management information, and annual financial statements for senior decision-makers. An accountability model that supports an integrated, enterprise-wide approach to management is required and standard business practices across Departmental elements are needed. Additionally, the Department is implementing a solid financial and performance-based management information system that will include: cost accounting, travel, payroll, budget formulation and execution, procurement, contracts management, facilities management, human resources, and research and development.

### Strategies to reach this goal

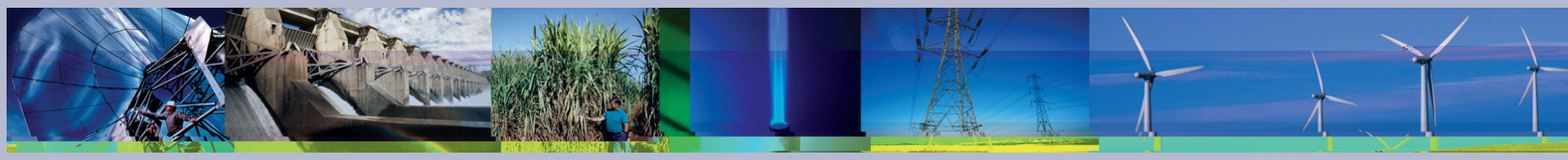
- Conduct meaningful analysis that supports timely decision-making based on financial, operational, and programmatic information.
- Develop and implement standard, enterprise-wide financial and business practices.

### External Factors

The following external factor could affect the Department's ability to achieve the Management Excellence theme:

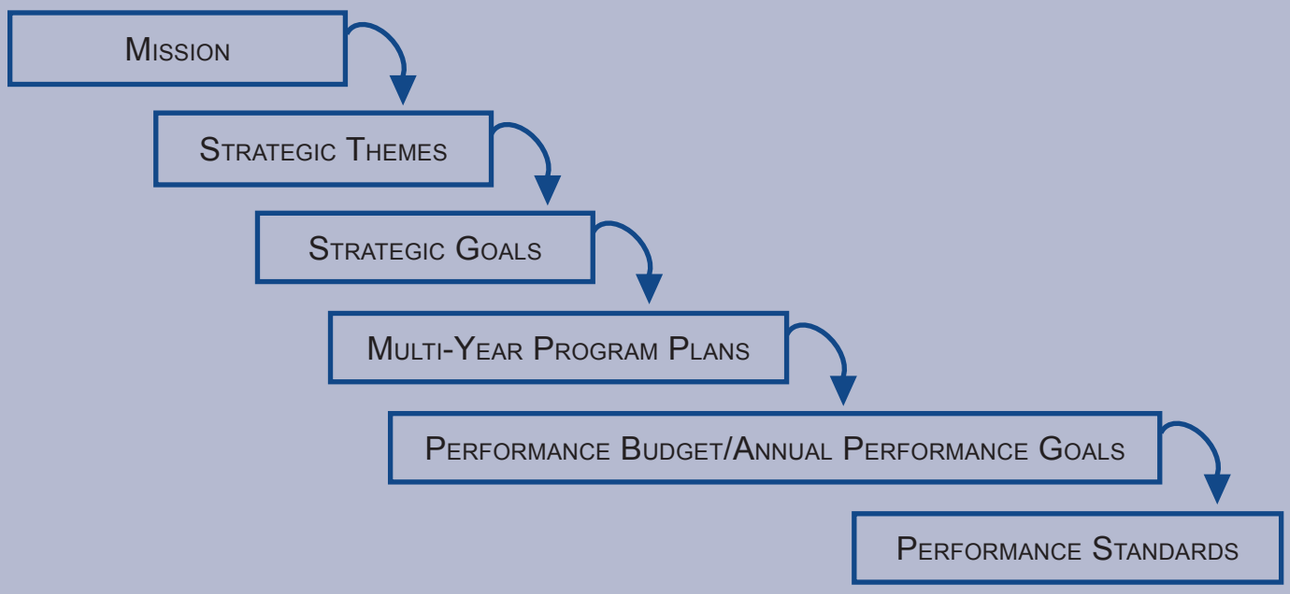
**Competition**

Workforce competition with private industry for highly skilled labor and escalating entry-level salaries may affect the Department's ability to attract and retain a qualified workforce.



# Linking Strategic Goals to Annual Performance Goals

The Department's strategic plan flow is highlighted in the cascade below beginning with the mission statement which flows to the strategic themes. The strategic themes connect to the broader strategic goals and are linked to the annual performance goals in the performance budget through the multi-year program plans. The multi-year program plans allow DOE to strategize over a five-year period how each program will implement the strategic goals of the Department. Annual performance goals and assessment of performance against prior-year goals are included in the budget justification materials each year, to demonstrate that actual and expected performance is considered in the budget process. In addition, these annual performance goals are linked to individual employee and contractor performance standards, thus creating an accountability model for mission achievement.




The Department's annual budget justification is based on projected performance for the requested funding. The Department reports actual performance against targeted performance annually in its Performance and Accountability Report. This report provides the basis for evaluating the Department's progress toward achieving its mission.

ACHIEVING

# Program Assessment

DOE uses a variety of methods and tools to assess its programs. Internally, programs are required to report quarterly on their progress in meeting annual performance metrics. The data is then consolidated for senior management review.

Since 2002, the Department of Energy has been working in conjunction with the Office of Management and Budget to assess its programs using the Program Assessment Rating Tool (PART). Through a series of targeted questions with requirements for specific evidentiary documentation, PART assesses each program's purpose, links to the Strategic Plan, management decision-making, and performance results. Essential for assessing program results is the use of meaningful performance measures that clearly tie to the Department's mission. The Department is committed to increasing the use of key PART measures and associated quantitative targets as annual performance goals in the cascade shown above.

As of 2006, DOE has assessed over 94 percent of its programs using PART and has received over 120 recommendations for program improvement through this process. The Department is committed to continuing to use PART as a vital program assessment tool.

Each of the individual programs within DOE and its National Laboratories undergo reviews for performance and accountability on an annual basis. The results of these evaluations are published in the Performance and Accountability Report which details goals and progress towards meeting those goals.

On an annual basis, the Office of Inspector General (OIG) provides the Department with an objective assessment of program performance. The OIG conducts specific reviews of programs, grants, and contracts at the request of the Department and provides management with recommendations for improvement.

RESULTS

M I S S I O N

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