Draft: February 18, 2000

U.S. DEPARTMENT OF ENERGY

STRATEGIC PLAN

Strength through Science: Powering the 21st Century

Energy Resources

National Security

Science

Environmental Quality

Corporate Management

Editor's Notes:

1. This draft is for consultation with Congress, our stakeholders, and the public.
2. The web page for the draft Strategic Plan and comments is: **www.doe.gov/strategic_plan**
3. Comments are requested by March 31, 2000 and may be provided through the web page (preferred), by e-mail to: **StrategicPlan@hq.doe.gov**, by fax to: (202) 586-4025, or mail to: Bill Kennedy, CR-70, Department of Energy, 1000 Independence Ave. SW, Washington, DC 20585.

SECRETARY'S STRATEGIC OUTLOOK

Introductory Comments from the Secretary

[Editor's note: to be provided]

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THE DEPARTMENT AND IT'S CHALLENGES

This strategic plan for the Department of Energy has been drafted in accordance with the Government Performance and Results Act of 1993 (GPRA). This plan is a product of the Department's Strategic Management System's process, described herein, to make DOE more productive and accountable to the taxpayers.

This edition of the DOE Strategic Plan is the second plan prepared as prescribed by GPRA. The plan was developed using our experience gained from:

- the development and use of Performance Agreements between the Secretary of Energy and the President of the United States,
- the development of the Strategic Management System, as well as the *Comprehensive National Energy Strategy, Accelerating Cleanup: Paths to Closure,* and the Office of Science Strategic Plan, and
- reviews by Congress and the General Accounting Office of our Results Act implementation.

To maximize the value of the document, the strategic planning of the business lines clearly reflect the linkage of the resources and results. The plan reviews the Department's challenges and how it is meeting those challenges with its resources and capabilities. The plan then describes the process and procedures involved in the strategic planning. Finally, each business line within the Department delineates its objectives, performance goals and strategies.

The DOE Mission

The Department of Energy mission is:

> ***To foster a secure and reliable energy system that is environmentally and economically sustainable, to be a responsible steward of the Nation's nuclear weapons, to clean up our own facilities, and to support continued United States leadership in science and technology.***

The Department of Energy is working to assure clean, affordable, and dependable supplies of energy for the Nation, now and in the future. That means increasing the diversity of energy and fuel choices and sources, bringing renewable energy sources into the market, strengthening domestic production of oil and gas, supporting commercial nuclear energy research, and increasing energy efficiency.

The Department is also the lead agency for the Administration's strategy to bring market competition to the electricity industry. Competition allows consumers to choose an electricity provider that offers them the best products at the best rates. The Energy Department also maintains the Strategic Petroleum Reserve for use in case of oil disruptions and operates four Power Marketing Administrations that sell and distribute over $3 billion of electric power generated at Federal hydroelectric plants.

The Department is charged with maintaining the safety, security, and reliability of the U.S. nuclear weapons stockpile, without underground nuclear testing. DOE also manages and safely dismantles excess nuclear weapons and disposes of surplus fissile nuclear materials. DOE provides policy and technical assistance to curb global proliferation of weapons of mass destruction, emphasizing U.S. nonproliferation, arms control and nuclear safety objectives in Russia and the Newly Independent States as well as worldwide. DOE also develops and ensures the safety and reliability of nuclear reactor plants to power Navy warships. New legislation created a new National Nuclear Security Administration to perform these functions.

The Department of Energy is cleaning up the environmental legacy from over 50 years of nuclear weapons production. We are using our scientific and technical expertise to help accomplish cleanup, but the cleanup challenge is enormous. Cleanup involves the safe treatment, storage, and final disposal of radioactive wastes, surplus nuclear materials, and spent nuclear fuels that remain at the sites of the Nation's nuclear weapons facilities and energy research and development sites. The Department is also working on a long-term, permanent disposal site for the growing inventory of spent nuclear fuel from commercial nuclear reactors. In 1987, Congress amended the Nuclear Waste Policy Act and directed the Department of Energy to study Yucca Mountain, Nevada, as a permanent disposal site. The Yucca Mountain Site Characterization Project involves extensive scientific study on Yucca Mountain's geology, hydrology, biology, and climate to determine if it is a suitable site.

The Department of Energy's laboratories help support American leadership in science and technology. The more than 30,000 scientists and engineers at Energy Department laboratories are conducting breakthrough research in energy sciences and technology, high energy physics, superconducting materials, accelerator technologies, material sciences, and environmental sciences in support of the Department's mission. DOE's work helps us better understand the fundamental building blocks of nature— from quarks and high energy physics, to the properties of light and the structure of atoms. Whether it was the DOE-supported scientist who helped develop seismic techniques for increasing oil production, or the work on cancer research and the human genome, the breakthroughs in scientific research conducted by our scientists supports the Department's missions on behalf of all Americans.

In managing the Department's operations, minimizing the environmental, safety, and health risks at all the Department's facilities and the security of the national enterprise are both a number one priority. The Department is also making improvements in its contracting to become more competitive in its contract award process and hold contractors more accountable in the execution of the contracts.

The DOE Vision

We aspire to achieve the following vision:

The Department of Energy, through its leadership in science and technology, will continue to advance U.S. energy, environmental, economic, and national nuclear security by being:

- A key contributor to ensure that the United States has a flexible, clean, efficient, and accessible system of energy supply and with minimal vulnerability to disruption.
- A vital contributor to reducing the global nuclear danger through its national security, nuclear safety, and nonproliferation activities.
- A world leader in environmental restoration, nuclear materials stabilization, waste management, facilities decommissioning, and pollution prevention.
- A major partner in world class science and technology through its National Laboratories, research centers, university research, and its educational and information dissemination programs.
- A safe and secure workplace that is recognized for management excellence, nurtures creativity, is trusted, and delivers results.

The DOE Core Values

The Department will succeed only through the efforts of its people. How well we perform individually and collectively is a function of the beliefs and values that motivate our behavior. The Department of Energy has chosen the following core values to serve as guideposts and our conscience in fulfilling our mission and achieving our vision.

1. We are customer-oriented.
2. We value public safety and respect the environment.
3. We believe people are our most important resource and should be treated with fairness, respect, and dignity.
4. We value creativity and innovation.
5. We are committed to excellence.
6. We work as a team and advocate teamwork.
7. We recognize that leadership, empowerment, and accountability are essential.
8. We pursue the highest standards of ethical behavior.

An amplification of these core values appears on the inside of the back cover.

DOE'S Challenges

The Nation and the world will face significant energy, national nuclear security, environmental cleanup, and science challenges in the 21st Century. Many of these challenges, such as the environmental restoration of contaminated nuclear weapons production sites, surfaced years ago and are being addressed in ongoing DOE technical programs. Others, such as cyber-security, global warming. and nuclear terrorism, are more recent and will be more aggressively dealt with in future efforts. In fulfilling its mission responsibilities, DOE is prepared to meet these challenges, with its unique scientific and technical assets—including 30,000 scientists, engineers, and other technical staff at laboratories which have a capital value of $30 billion. In addition, the Department must also address a number of its own organizational and management challenges if it is to serve its customers in the most effective and efficient manner.

Energy Challenges

America's expanding energy needs will present a number of challenges for the Nation in the coming years. The first challenge that the Nation faces is rising energy demands in all three end-use sectors:

- In buildings, to energize expanding building stocks for the commercial services, and in the home, for the comfort and entertainment of an increasing population.
- In industry, to power the industrial production for an expanding Gross Domestic Product.
- In transportation, to meet the Nation's increasing personal and industrial transportation demands.

While shifts in the makeup of energy supplies and use patterns will occur, no single "silver bullet" technology exists to address the energy demands across the three sectors. Instead, the Nation will continue to require a broad portfolio of energy resource, production, conversion, delivery and storage, and end-use technologies to meet the growing energy needs of the buildings, industrial, and transportation sectors.

A second energy challenge facing the Nation is the forecasted growth in oil imports, up from about 50 percent of total use today to 65 percent in 2020. This has both economic and national security implications for the country. Economically, it represents a massive export of U.S. dollars and jobs to foreign countries. From a national security standpoint, it means that our country will become increasingly dependent upon foreign oil reserves in the 21st Century, should recent trends continue. This challenge makes the Department's research and development activities that are designed to increase the availability of low-cost domestic oil or alternative fuels (e.g., biofuels) a prudent investment for the country's continued economic well-being and national security.

A third energy challenge facing the Nation is reflected in the growing concern about the emissions associated with the current approaches to fossil energy recovery and use: locally as smog, regionally through transmission by winds, and even globally in the form of emissions of greenhouse gases. For example, energy production and use are the primary sources of the Nation's carbon emissions, accounting for 98 percent of total U.S. carbon emissions in 1997 (Source: EIA "Emissions of Greenhouse Gases in U.S." 1998). With increasing energy

consumption, and absent any change in energy policies or regulations, carbon emissions are projected to increase about 33 percent over 1997 levels by 2020. The Department's Energy Resources R&D Portfolio is addressing the carbon emissions challenge by proposing investments in a variety of clean fuel options, such as natural gas and renewable energy technologies, as well as energy efficiency technologies applicable to the buildings, industry, transportation, and utility sectors. The Energy Resources R&D Portfolio also recognizes the continuing importance of nuclear power in generating clean, emission-free electricity.

The impact of energy supply and use on the global economy demonstrates how the energy needs of all nations are interconnected and interdependent. Consequently, U.S. participation in international cooperative activities is essential to internationally promoting our energy, economic, and environmental interests .

National Security Challenges

For almost 50 years, America's national security has relied on the deterrent provided by nuclear weapons. These weapons—designed, built, and tested by the Department of Energy and its predecessor agencies—helped to win the Cold War, and they remain a key component of the Nation's security. However, with the end of the Cold War there is a new and complex set of challenges to address in the Department's national nuclear security mission. One of the most critical is being met by the Stockpile Stewardship Program, created in 1993 to maintain the nuclear deterrent without nuclear testing, as directed by Presidential Decision Directive 11, Moratorium on Nuclear Testing. This program continues to maintain an aging stockpile, restructure and modernize the weapons complex, and retain the capability to resume nuclear testing and reconstitute production capabilities, if national security required resumption of testing.

The worldwide proliferation of weapons of mass destruction (WMD) has emerged as one of the most serious dangers confronting the United States since the end of the Cold War. In November 1994, President Clinton has stated that, "The proliferation of weapons of mass destruction continues to pose an unusual and extraordinary threat to the national security, foreign policy, and economy of the United States." The President also declared the proliferation of nuclear, biological, and chemical weapons and the means of delivering such weapons a national emergency through Executive Order 12938. At least 20 countries are known to be or suspected of developing weapons of mass destruction, underscored by the underground nuclear tests by India and Pakistan. The fragmentation of the former Soviet Union (FSU) has led to concerns about the accountability, control and disposition of nuclear weapons, components, materials, and information. The increased potential for attack using nuclear, chemical, biological, and cyber weapons means our domestic security is increasingly defined by our Nation's ability to detect and counter these weapons. Additionally, safety and security of existing nuclear weapons and materials stockpiles are of increasing concern as economic and social pressures mount in FSU countries and the Baltics.

In response to security concerns at the national weapons laboratories, the Congress created the National Nuclear Security Administration (NNSA) in the National Defense Authorization Act of Fiscal Year 2000, Public Law 106-65, to administer national security missions of the Department of Energy. The Department of Energy's policies and procedures to maintain the integrity of the nuclear weapons activities have always been a priority. Therefore, the NNSA's operation and function will be a principal concern.

Environmental Quality Challenges

The Department of Energy is responsible for cleaning up the 50-year environmental legacy left at the industrial complexes where nuclear weapons were designed and manufactured. The Department manages the problems associated with the large quantities of various types of radioactive waste surplus nuclear material, and spent nuclear fuel that remain at the sites of the Nation's nuclear weapons facilities and at nuclear energy research and development sites. Though these cleanup activities are focused on nuclear and radioactive materials, the technologies required to deal with this problem are also applicable to the much larger realm of nonradioactive hazardous materials, metals, chemicals, and solvents used in the commercial and industrial sectors that impact the environment.

The magnitude of this problem is illustrated by the following statistics. Seventeen states have DOE facilities that have associated environmental impacts. DOE sites contain approximately 3 million cubic meters of solid radioactive and hazardous waste buried in the subsurface and there are an estimated 75 million cubic meters of soil and 475 billion gallons of groundwater that are contaminated. There are over 20,000 facilities that were used to support nuclear weapons production and other activities, many of which are now contaminated by radioactive materials, hazardous chemicals, asbestos, and lead. Millions of gallons of high activity radioactive waste are stored in large underground tanks; some of these tanks, which have exceeded their design life, have deteriorated and leaked. There are 165,000 cubic meters of mixed waste at 36 sites, contained in 2,300 waste streams. Finally, large quantities of fissile material residues and other processing intermediates were left in production lines or stored in a condition unsuitable to ensure long-term stability when weapons production was halted in the early 1990s.

In addition, the United States has growing inventories of spent nuclear fuel from commercial nuclear power reactors currently stored at reactor sites in 33 States, and spent fuel from nuclear-powered naval vessels. Geologic disposal is the national strategy for the ultimate disposition of this spent fuel and of defense related high-level radioactive waste. It is also the technical foundation for our international stance on nuclear nonproliferation, as well as the likely path forward for other materials such as excess fissile materials.

Science Challenges

The 20th Century has brought many scientific advancements that have resulted in dramatic changes in commerce computing and communications technologies, and in the diagnosis and treatment of disease. We are learning to control matter at the atomic level, develop cleaner energy sources, look deeply into the cosmos, and understand and cure many diseases. Today, companies conduct business worldwide with a few strokes of a keyboard using communications protocols originating from computing sciences and high energy physics research in which DOE played a key role.

Affordable, abundant energy has been the cornerstone of our strong economy, and population growth and industrialization will greatly increase the world's use of energy. Yet fossil energy sources are often limited, and they frequently have significant environmental consequences on a local, regional, and global scale. Basic research is essential to create technologies providing new fuels and to seek out new supplies of traditional fuels. New knowledge is indispensable to convert known fuels to more effective forms; generate, store and transmit electricity with less waste; and find more efficient ways to use energy.

Scientific advancement is the cornerstone of all of DOE's business lines. American industry needs greater scientific understanding to track pollutants through their intricate interactions with the environment if they are to uncover new ways to dispose of toxins and climate-changing greenhouse gasses. To predict the consequences of energy use and to test possible mitigation strategies requires advances in scientific computations to bring together new knowledge and vast amounts of data. Unraveling the human genome and understanding the cellular environment promises the knowledge necessary to improve the diagnosis and treatment of disease. Understanding these complex challenges requires cross-disciplinary approaches and the vast scientific resources of this Department.

Management Challenges

The Department of Energy is an $18 billion a year agency charged with addressing diverse issues of extraordinary technical and scientific complexity. DOE employs almost 16,000 Federal employees and over 100,000 contractors; it owns and manages over 50 major installations located on 2.4 million acres in 35 States making it the Nation's fourth largest Federal landowner. It is also an agency with multiple performance and management challenges. These challenges have been primarily identified through the Department's own internal reviews and Inspector General reports, but have also been reported by others such as the Office of Management and Budget, General Accounting Office, Congressional committees, and the National Partnership for Reinventing Government (NPR). The most significant management challenges the Department is addressing include:

- Improving the organization of the Department and the relationship of the field structure to the program offices to improve efficiency, strengthen management, ensure accountability, and improve reporting requirements.

- Ensuring the continued development of our staff to meet human resource challenges: nearly half the current R&D technical managers will be able to retire within five years; serious skills gaps have developed due to significant downsizing; there exists virtually no pipeline to develop future managers; and the DOE technical manager corps lack gender and ethnic diversity.

- Reforming our project management and large facilities acquisition processes to better adhere to project schedules and budgets.

- Revising the management and control of DOE's classified information, particularly the handling and protection of nuclear weapons data and computer security, and ensuring the security of DOE's nuclear materials and facilities.

- Fully integrating the R&D programs within each of its business lines to take advantage of the interrelationships across these areas.

- Increasing the use of competition in the selection of contractors and improving management of our contractors.

- Improving integration of performance and budget planning at the program level to develop a sound performance measurement system.

Meeting the Challenges

Meeting the aforementioned challenges will require a strong, effective, and efficient Department of Energy working closely with its stakeholders and with the Congress. The process began with the Department's first and second strategic plans published in 1994 and 1997, respectively, and continues with this plan. Highlights of the progress that has been made include:

- We proposed electricity restructuring legislation that would bring needed competition to a monopolized market, saving consumers $20 billion a year.
- We worked with the electric utility industry to accelerate its Y2K readiness to successfully avoid power disruptions on January 1, 2000.
- We launched a new climate change initiative to work with developing countries to reduce greenhouse gas emissions.
- We sold the Elk Hills Petroleum Reserve which brought $3.65 billion into the U.S. Treasury. This was the largest Federal divestiture ever, and collected over $2 billion more than originally estimated by the Congress.
- We implemented a series of petroleum and natural gas initiatives to enhance domestic production—a necessity for our energy security by lessening our reliance on imported oil.
- We are maintaining a safe and reliable nuclear arsenal without underground testing.
- We moved away from the Cold War buildup of weapons toward reducing our stockpile.
- Our weapons technicians have safely dismantled more than 11,000 nuclear warheads since 1990.
- Our scientists now have the world's fastest supercomputers, capable of more than 3 trillion operations per second.
- We are helping Former Soviet Union countries safeguard and reduce their nuclear weapons arsenal.
- We accelerated the cleanup of the Cold War's environmental legacy from the production of nuclear weapons.
- We are applying the excellence of our laboratories in chemical and biological sciences to the challenge of detecting and defeating the threat of a terrorist chemical/biological attack.
- To date, Department of Energy associated scientists have won 72 Nobel prizes. With 530 lifetime awards, the Department was also the largest 1999 winner of R&D 100 Awards—awarded annually by R&D Magazine for the 100 top advancements in science and technology most likely to benefit society. In 1999, DOE scientists won 43 of these awards.
- In 1998, DOE technologies won 2 out of 10 DISCOVER Magazine awards; the Nobel Prize in Physics winner for 1998, Robert Laughlin, did his early work at DOE's Lawrence Livermore National Laboratory; researchers from 4 DOE labs won the 1998 Gordon Bell

prize, given by the high performance scientific computing community for best performance of a supercomputing application; and Science magazine's "Breakthrough of the Year for 1998" was shared by DOE's Supernova Cosmology Project, based at Berkeley Laboratory.

- In 1995, we began a comprehensive effort to downsize DOE's operations and streamline its procedures. The goal was to accomplish a 25 percent reduction in Federal staffing by the end of FY 2000. By January 1999, the Department had met that goal—almost 2 years ahead of schedule. Our contractor employment has also come down significantly, and, as of the end of 1998, contractor employment was 31 percent lower than in 1992.

- In early 1999, we unveiled the largest, most sweeping reform of security programs in DOE's history, including the creation of a new high-level Office of Security and Emergency Operations, improved oversight, increased nuclear materials inventory accountability, additional cyber-security improvements, a zero-tolerance security policy, new counterintelligence measures, accelerated safeguard and security improvement goals, more physical upgrades, cyber-threat training, and an extension of the executive order on automatic declassification.

- We have reorganized the management of the construction and operation of the Spallation Neutron Source—a state of the art research facility—to ensure that this $1.36 billion facility will come in on schedule and within budget, and restore U.S. leadership in the important field of neutron science.

- We developed a clearly defined and well articulated Departmental R&D portfolio. This will ensure our R&D programs are properly structured and take advantage of interrelationships with all relevant program areas.

- In December 1998, Secretary Richardson announced a targeted effort to bring specialized skills into the Department as part of a Workforce 21 initiative. This initiative will put in place employment practices to ensure that we have essential expertise to carry out our mission. These efforts will bolster our skills and comprehensive expertise Department-wide, and will expand diversity within our workforce, increasing the presence and position of women, minorities, and the physically challenged.

- We are making increasingly effective use of performance-based contracting and competition in our facilities management contracts.

- We are conducting external independent reviews of DOE's construction projects, with a complementary on-going study of overall management and the facilities acquisition process.

We are conducting a comprehensive review of laboratory overhead funding to maximize the effectiveness of limited financial resources. We must continue to consolidate and realize a maximum return on the investment that the American people have made. The Department in the last few years has established an ambitious set of initiatives to privatize major functions, overhaul the Department's contracting and financial practices and accomplish the hard job of down sizing. The result is a Department that works smarter and cheaper and is more accountable. This new strategic plan builds upon the knowledge and experience we have gained and in doing so, lays out the courses of action to address our Nation's energy, national, economic, and environmental security challenges in the 21st Century.

DOE's Unique Capabilities

The Department of Energy has evolved a mix of core competencies that make it uniquely suited to advance science and technology; secure clean, reliable energy sources; improve the local and global environment; and reduce the nuclear danger.

The Department's roots can be traced to the Manhattan Engineer District of the U.S. Army Corps of Engineers, which was established in 1942 to manage the development of the atomic bomb. After World War II, Congress created the Atomic Energy Commission in 1946 to direct the design, development and production of nuclear weapons.

The Atomic Energy Commission was also responsible for developing nuclear reactors, and beginning in 1954, regulating the commercial nuclear power industry. Contributions from these early efforts included isotope power sources for space missions, nuclear medicine, and high speed computers.

In 1974, Congress replaced the Atomic Energy Commission with two new agencies: the Nuclear Regulatory Commission and the Energy Research and Development Administration—the latter created to manage the nuclear weapons, naval reactors, and energy development programs, and to research the environmental, biomedical, and safety aspects of energy technologies.

In 1977, Congress created the Department of Energy, which brought together functions and responsibilities of the Energy Research and Development Administration, the Federal Energy Administration, the Federal Power Commission, and the Power Marketing Administrations under one cabinet-level department.

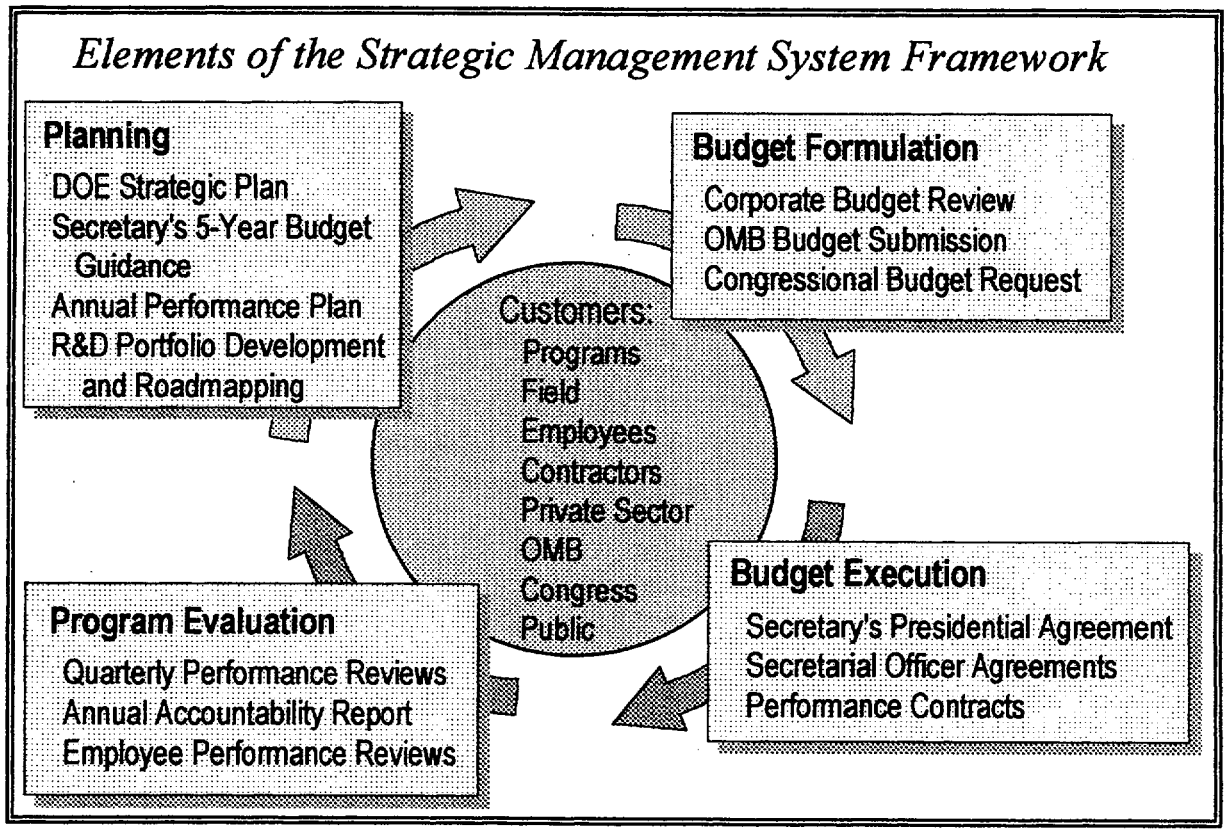
The roles and responsibilities of the Department have reflected the R&D and new energy needs of the Nation which are manifested in the facilities and technologies utilized by the Department. DOE's unique energy-, defense-, cleanup-, and research-related responsibilities have led to distinct and singular scientific engineering capabilities at its laboratories and facilities across the Nation. Universities throughout the Nation have received contracts and grants from DOE in which contractor scientists are able to pursue the research that underlies the mission of the Department. Emanating from the Department's system of laboratories are accomplishments that extend from Nobel Prize awarded atmospheric ozone chemistry to development of the world's fastest computer based on large scale parallel linkages of a common computer chip and over 496 R&D Magazine's "R&D 100 Awards"given annually to recognize important inventions. Additionally, DOE's basic science and applied research has made the partnering with industry increasingly more practical. DOE is now the leading federal agency in patent applications with more than 1,500 patents and 400 licenses granted.

DOE'S STRATEGIC PLANNING

Strategic planning is one of the integral steps in fulfilling the Department's mission and this strategic plan is the fundamental basis for all planning within the Department. This plan sets DOE's long-term directions and policies to be carried out by DOE's programs and field organizations. Their entire range of activities are categorized into four business lines and an overall corporate management area.

DOE'S Strategic Management System

Meeting new program challenges and the Administration's management improvement goals required the Department to significantly improve its management processes. This led to the development and implementation, in March 1996, of a corporate Strategic Management System for the FY 1998 and outyear budget cycles. The system meshes the interrelated strategic planning, budgeting, and program evaluation processes throughout the Department. It provides the framework by which the Government Performance and Results Act, National Partnership for Reinventing Government, and other legislated financial and management requirements are to be satisfied.



Performance is the common link that ties the system together. Measuring performance expands the concept of "success" from the mere accomplishment of activities to that of delivering desired outcomes and results to customers. Consistent performance measures are used throughout the

processes of planning, budget formulation and execution, and evaluation. In planning, performance is defined in terms of measurable results. In budget formulation and execution, resources are allocated and expended to deliver measurable products and services. In evaluation, success is based upon the measurement and analysis of what is actually delivered. This concept of performance cascades through all of the Department's organizational levels, i.e., from the DOE corporate level down to the contractor level. Ultimately, performance measurement provides a path of accountability between the Department's long-term vision and the day-to-day activities of individual Federal and contractor employees.

Role of Program Evaluation

There have been several program evaluations and analyses that influenced the development of this strategic plan, its general goals, objectives, performance goals, and strategies. Significant strategic decisions and documents, such as the *Comprehensive National Energy Strategy*, *Accelerating Cleanup: Paths to Closure*, DOE FY2000 Stockpile Stewardship Plan (a.k.a. the "green book"), the Office of Science Strategic Plan, the DOE Research and Development Portfolio (roadmaps), Stockpile Stewardship Plan, the DOE review of the Stockpile Stewardship Program, and the DOE Policy Office study of GRPA plans have been completed subsequent to the publication of DOE's 1997 Strategic Plan.

In June 1998, the Department published the site-by-site, project-by-project projection of the technical scope, cost, and schedule required to complete all 353 projects at DOE's 53 remaining cleanup sites in the United States. The document was called "*Accelerating Cleanup: Paths to Closure*." This comprehensive management tool informs DOE official, stakeholders, regulators, Tribal Nations, and the Congress, what the consequences of resource allocations.

Pursuant to Section 801 of the Department of Energy Organization Act, the Department developed and published a Comprehensive National Energy Strategy (CNES) in April 1998. The plan set forth five common sense goals for national energy policy with associated objectives and strategies to illustrate how these goals would be achieved. The goals, objectives, and strategies, taken together, formed a blueprint for the specific programs, projects, initiatives, investments, and other actions that would be developed and undertaken by the Federal Government. That work has been carried forward in the development of this strategic plan and the general goal, objectives, performance goals, and strategies in the Energy Resources business line.

As part of a long-range planning process to define the goals, objectives, strategies, and the portfolio of research DOE sponsors, two workshops were held in 1998, each attended by over 100 scientific professionals from universities, National laboratories, and industry. Combining this endeavor with ongoing processes, the Office of Science developed and published a strategic plan in the Summer of 1999. This strategic plan intends to be faithful to that effort.

In 1999 the Department launched an effort to perform detailed roadmaps of science R&D areas of complex systems, carbon sequestration, scientific simulation, and science facilities. These roadmaps chart the necessary steps and sequence to achieving a desired end goal. Additionally, the roadmap includes considerable detail at the research and activity level as well as contingencies to ensure success and address technical and institutional uncertainties.

The Stockpile Stewardship Plan is the result of a corporate-level, multi-year program review required by the National Defense Authorization Act for FY 1998 (Public Law 105-85). The effort develops the stockpile stewardship strategy to ensure high confidence in the safety and reliability of the nuclear weapons stockpile. For FY 2000, the planning was first successfully aligned with the budget process and therefore supporting the Administration's FY 2000 budget deliberations.

In October 1999, the Secretary of Energy directed the Under Secretary to undertake a comprehensive internal review of the Stockpile Stewardship Program. The review examined the accomplishments of the program over the previous three years and the program structure in meeting current and long-term needs for certifying the stockpile. The study was to form a basis for assessing whether the balance between program elements supported the national strategy. The results of that evaluation were released on November 22, 1999 and stated that (to be provided).

Since the first round of GPRA strategic plans were published in September 1997, there have been many formal and informal critiques of DOE's plan as well as the other Federal agency plans. DOE's Policy Office produced a benchmarking study of DOE's plan versus the other plans to provide a section by section comparison against the best-in-class. This study provided some useful information and insight into how to modify the structure and content of the new plan to improve its value. The changes are discussed under the previous section on "Major Changes to the 1997 Strategic Plan" on pages 8 and 9.

The Department is considering, as a management challenge, the most effective manner in which to implement a process for routine program evaluations. In addition, the Department is examining how to factor in program evaluations necessitated by external factors.

The accountability and evaluation within DOE of each program, goal, and objective has never been greater. Whether in response to legislation or as an initiative within Department management, the programmatic review being conducted has intensified to gauge programmatic performance and the consistency within the Department's mission. Strategic planning is a continuous process, the primary goal of this effort is to revise the Strategic Plan such that it is made consistent with the more current documents above. In addition, this provides us an opportunity to correct weaknesses in the 1997 plan.

DOE'S Business Lines and Corporate Management

Through our strategic planning efforts, we identified four business lines and a corporate management area that most effectively utilize and integrate our unique scientific and technological assets, engineering expertise, and facilities to achieve our mission and to benefit the Nation.

These areas, which directly affect the security and the quality of life of every American citizen, are:

- **Energy Resources** - How we will assure adequate supplies of clean and affordable energy, reduce U.S. vulnerability to supply disruptions, encourage efficiency, advance alternative and renewable energy technologies, and increase energy choices for all consumers.

- **National Nuclear Security** - How we will effectively support and maintain a safe, secure, and reliable enduring stockpile without nuclear testing, safely dismantle and dispose of excess nuclear weapons and surplus fissile materials, provide technical leadership for national and global nonproliferation and nuclear safety activities, and develop and support nuclear reactor plants for naval propulsion.

- **Environmental Quality** - How we will minimize the environmental, safety, and health risks from DOE facilities and materials, safely and permanently dispose of civilian spent nuclear fuel and defense related radioactive waste, and develop the environmental technologies needed to carry out this mission efficiently and effectively.

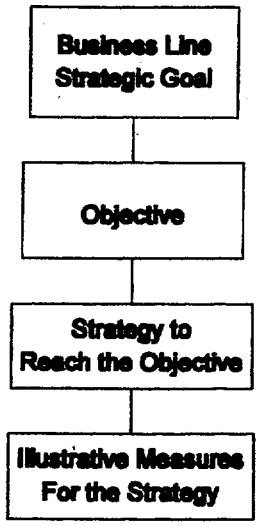
- **Science** - How we will use the unique resources of the Department's laboratories and the country's universities to maintain leadership in basic research, advance scientific knowledge, underpin applied research and technology development in support of the Department's other business lines, contribute to the Nation's science and mathematics education, and deliver relevant scientific and technical information to the scientific community.

- **Corporate Management**- How well we support the Department's world class programs depends on the excellence of our environmental, safety, and health; security; and management practices and systems.

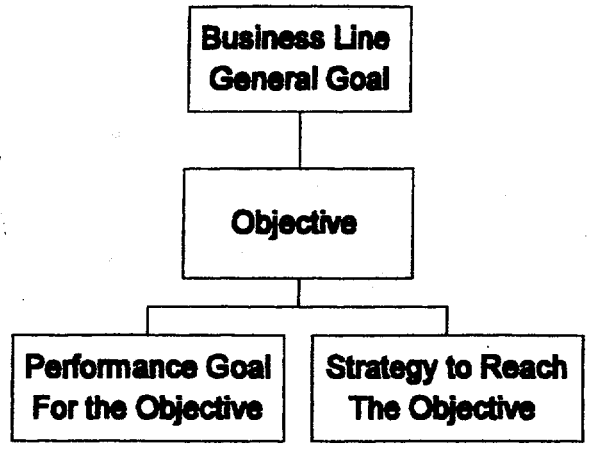
Major Changes from the 1997 DOE Strategic Plan

The four business lines in the current Plan are essentially the same as those in the 1997 Strategic Plan. They are Energy Resources, Environmental Quality, National Nuclear Security, and Science. Technology was separated from the Science Business Line, and is no longer Science and Technology, and redistributed throughout the appropriate business lines. In order to improve management, in April 1999 the Secretary defined the business lines as line management and staff functions, including oversight, as part of the Corporate Management area. Oversight responsibilities from the Offices of Environment Health and Safety, Security, Intelligence, and Counterintelligence were moved under Corporate Management.

The design of this plan is also changed. Terminology is now more consistent with Government Performance and Results Act, P.L.103-62 (GPRA) definitions. The business line strategic goals are now business line general goals. Instead of each objective having strategies supported by illustrative measures, each objective is now defined by a set of performance goals and a set of strategies as shown in the following figures.



1997 Strategic Plan design



2000 Strategic Plan design

Interagency Crosscutting Coordination

Although DOE's goals and objectives reflect unique roles and responsibilities, success will depend upon closely coordinated planning and the continuation of working relationships with a number of Federal agencies, State and local governments, Tribal Nations, private industry, and Congress.

It is especially important to recognize the complementary role other Federal agencies play in our energy, defense, environmental, and science programs. A table listing the Federal agencies that have coordinated program activities in each of the Department's business lines and Corporate Management is provided in Appendix A. Additional descriptions of these efforts are provided in the individual business line sections of the plan.

While DOE's responsibilities and programs are coordinated with other Federal agencies, there are some cross-cutting government functions and initiatives that the Department participates in that are beyond the mission of any one agency. Government functions and responsibilities such as national security, global climate change, medical research, and science education draw upon the expertise and capabilities of many agencies that need to work together to meet these overarching, common goals. The challenge is to define the role and develop the programs within each participating agency that best use that agency's unique financial, human, and technical resources to optimize overall government performance. The Office of Management and Budget (OMB) and the White House Office of Science and Technology Policy play an important leadership role in coordinating science and R&D efforts. DOE's contribution to these cross-cutting programs is founded upon the distinctive technical and scientific expertise and capabilities located within the Department's laboratory system and facilities. DOE is committed to continue working closely with other Federal agencies and with OMB and Congress to ensure its programs provide critical and unique contributions to these crosscutting efforts.

Congressional & Stakeholder Consultations

For the development of this plan, Congressional consultation began with preliminary discussions with Congressional staff in late September 1999 and delivery of a plan outline in December. In February 2000, a draft of the plan was provided to the Congressional staff, stakeholders, and placed on the DOE web page for public comment. A second meeting with Hill staffers is planned to discuss the first draft plan. Following the completion of the comment period in March 2000, DOE will prepare its final draft plan to be provided to Congressional staff in May for a final review. The plan will be published and placed on DOE's web page by the end of June. A summary of all stakeholder comments and DOE's responses will be placed on the Department's web page by mid June.

Since the previous strategic plan was published in September, 1997, significant strategic decisions and documents, such as the *Comprehensive National Energy Strategy*, *Accelerating Cleanup: Paths to Closure*, DOE's FY2000 Stockpile Stewardship Plan ("green book"), the Office of Science's Strategic Plan, and the DOE Research and Development Portfolios (roadmaps), have been completed. Each of these involved consultations with stakeholders and were improved through the process.

Strategic planning for the Science business line was significantly affected by two national workshops held 1998 at which more than a hundred leading scientists, technologists, high-tech managers, science communicators, and futurists participated. During post-workshop development of the strategic framework, the Director of DOE's Office of Science engaged in numerous conversations with the scientific community, the Congressional committees of jurisdiction, Office of Management and Budget, and broader stakeholder communities.

Because the future viability of federal facility clean-up depends on it, DOE has involved all stakeholders including, states, other government agencies, local citizens, environmental groups, other interest groups, members of academic institutions, various DOE offices, regulators, and Tribal Nations as partners in ensuring that cleanup is conducted in the safest, most efficient, and most cost effective manner possible. Similarly, to implement the Nuclear Waste Policy Act DOE conducts frequent formal and informal interaction with Federal regulatory agencies, the Congress, the State of Nevada, affected units of local government, and diverse Program stakeholders consisting of environmental groups, technical and professional organizations, policy groups, electric utilities and Tribal Nations. Each Program milestone presents opportunities for public participation and consultation, and many key Program actions are subjected to the formal public comment process.

In some cases, performance goals and strategies incorporate stakeholder input derived from the National Environmental Policy Act process carried out in previous years. A number of Records of Decision ensuing from Programmatic Environmental Impact Statements, Environmental Impact Statements or Environmental Assessments provide the foundation for performance goals.

In addition, the Department works with the Defense Nuclear Facilities Safety Board (DNFSB) to implement recommendations relating to activities at the Department's defense nuclear facilities affecting nuclear health and safety. The Department solicits advice and guidance from the Environmental Management Advisory Board (EMAB) on a wide variety of topics relating to the management of the EM program. The EMAB's membership consists of state and local

government representatives, technical experts, and stakeholders. The Department also solicits advice from its Site Specific Advisory Boards, which have representatives at 11 sites. The Boards provide consensus advice and recommendations to the Department's environmental restoration and waste management activities.

Key External Factors

Although this strategic plan was developed in consultation with the Congress, customers, and stakeholders, there are still factors external to DOE's direct control that can influence the desired outcomes. These factors include:

- Climate change may prove to be one of the most important strategic energy drivers, the corrective policies of which may require carbon emissions to be reduced to, or lower than, 1990 levels during the next 15 to 25 years through regulatory action.

- By 2015, 60 percent of the existing coal-fueled and 40 percent of the nuclear-powered electric generating plants will be 40 years old. It is not clear how long these plants can operate due to regulatory and economic issues.

- The Nuclear Regulatory Commission (NRC) and the DOE are engaged in efforts to update their respective Yucca Mountain specific radiation implementing regulations. The NRC may need to amend its proposed rule when the Environmental Protection Agency (EPA) issues its final standards.

- Without legislative relief, restructuring the electric utility retail market could adversely impact industry's investment in longer-term research, development, and demonstration of renewables and advanced, lower-emission fossil fuel and advanced nuclear power technologies.
- The private sector's policies and performance contribute to the success of programs that meet technical, cost, and performance goals.

- Uncertainties are inherent in the environmental cleanup program due to the complexity and nature of the work. Decision making by stakeholders regarding program's cost, schedule, and scope the extent of cleanup The level of uncertainty varies by site depending upon the type and amount of cleanup required.

- Public perception directly affects Congressional and Administration support for DOE programs.

- Stable funding is necessary to meet planned goals and objectives. Two illustrations of this relationship are found in the Civilian Radioactive Waste Management Program. The site cleanup performance schedules are based on receiving the funding levels needed to meet regulatory requirements. Impacts of significantly reduced program appropriations will delay submittal of the license application to the Nuclear Regulatory Commission (NRC) and postpone critical near-term milestones for the Yucca Mountain Site Characterization Project.

DOE is determined to alleviate the negative impact of the external factors. While advanced technology may ultimately mitigate some of these factors, DOE will continue to work with its stakeholders and Congress to support legislation, regulations, and policies that may be needed to address other economic, demographic, social, or environmental factors. An integrated program of stakeholder communication is important. Public trust in many DOE matters dictates that DOE programs maintain high environmental and safety standards and continue to educate and communicate with the public on these matters.

The Department is faced with making significant trade-offs and will work closely with OMB, regulators, and other stakeholders to address compliance requirements and other high priority activities at the sites to establish the appropriate priorities. Cleanup end state will be developed in consultation among DOE and other representatives of the Administration, Congress, Tribal Nations, representatives of regulatory agencies, state and local authorities and other stakeholders.

Data Capacity

The Department has been using one system to track performance at the Departmental level since 1995. FY 1995 is when the Secretary of Energy began developing and signing annual performance agreements with the President. Those agreements implement annual performance plans' performance goals and performance against commitments has been tracked and reported since the first performance agreement using a stand-alone system, known as Solomon. Solomon is now web-based and used within DOE by programs to collect actual performance updates on commitments and by managers to review progress. Solomon is made available to public via a public web site periodically.

Solomon currently is the system which is a management tool for automated storage tracking and reporting on the commitments made by the DOE business lines. Solomon provides a common tool in which the data may be presented and assessments made about the performance of the business lines; however, Solomon does provide the comprehensive perspective needed to plan effectively because it is not linked with the budget.

DOE is intent on developing new standardized technology among its offices to both gauge the performance goals, as delineated in the Strategic Plan, Performance Plan, and Performance Agreement, but to integrate performance and budget data. The system being established to consolidate both the business, organizational and operational information is Budget Management Information System (BMIS).

BMIS which will be used as a comprehensive Department-wide core financial management and budget formulation system. It will be supporting the needs of the Department through enhanced information processing and integration of accounting and budgeting data. This structured approach will effectively balance the organizational needs, while enhancing the ability of DOE to monitor and report on its commitments.

Resource Requirements

The Department will only achieve its goals and objectives with adequate financial, human, infrastructure, and technical resources. In developing this plan, the Department assumed budget appropriations consistent with the Administration and Congress's agreed upon five-year budget deficit reduction targets through FY 2002, except where noted.

In recent years, the Department has lost a large number of staff through reduction-in-force, buyouts, and attrition during a hiring moratorium to meet lowered budget levels. In November 1998, the Secretary of Energy announced the Department's new Workforce for the 21st Century Initiative, "Workforce 21", as the next step in strengthening our technical and management capability to fulfill our critical missions for the Nation. The goals of Workforce 21 enable the Department to hire and retain personnel in key areas with skills and technical expertise critical to our missions in national security, energy resources, environmental management, and science and technology. DOE's workforce, both full time government personnel and contractors, is made up of specialists in the multi-dimensional mission of the Department. These specialists range from the nuclear physicists working in weapons laboratories to mechanical engineers at a environmental waste cleanup site. In addition, as we rebuild our workforce, we have an opportunity to focus on diversity to ensure we have a high quality, representative workforce within DOE.

Relationship Between General and Annual Performance Goals

The DOE strategic plan is the highest tier of planning for the Department. It sets the general goals, objectives, performance goals, and strategies that will be implemented through the annual performance plan, the budget, and the annual performance agreement the Secretary has with the President.

General goals are long-term, outcome-oriented, and stated in a manner that allows a future assessment of whether progress is being made and if the goals were, or are, being achieved. Goals, as well as objectives, are set so their commitments are within the Department's span of influence. The goals are measurable, trendable, quantitative descriptions that allow DOE to assess how well the Department is progressing toward meeting each of them over the duration of the plan.

Objectives define the major accomplishments that lead to achieving the general goal. The objectives are measurable, achievable, and reasonable destination points that can be reached by the conclusion of a specified time period. The objectives direct and guide the Department toward actions. Reasonable means that a DOE program activity can significantly or entirely influence the objective's outcome or output based on credible planning assumptions, and that the objective will substantially advance the Nation beyond today's status quo or maintain a desired outcome or output level.

Performance goals expand on the objective's statement by providing more details on how DOE will determine progress toward the objective's destination. Performance goals define intermediate key program events on the intended path toward the objective's accomplishment and describe precisely what will be measured, including a baseline. A performance goal will directly measure progress toward the objective unless the objective cannot be measured directly. If direct

measurement was not possible, other indications of progress toward the objective were substituted as "performance indicators." The Department's Annual Performance Plan is expected to contain the same performance goals (or indicators), but with annual targets.

Strategies are defined as near-term courses of action that lead us in the direction we must move to reach an objective or overcome an obstacle. Some strategies may contribute to more than one objective.

Strategic planning establishes the strategic direction and priorities of the Department with a clearer linkage of the general goals and objectives to the budget. The linkage to the budget, as defined by the Government Performance and Results Act, is through the Annual Performance Plan. The Annual Performance Plan will tie general goals and objectives to performance goal annual targets and their supporting activities. The budget process sets the performance goal annual targets in conjunction with their cost during the budget formulation process.

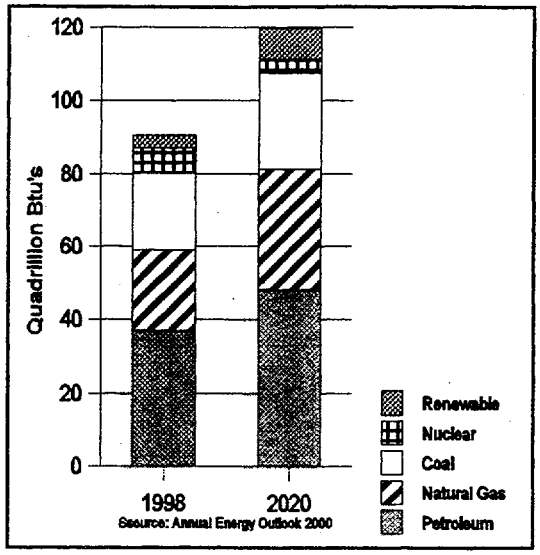
The measures for a specific fiscal year will be highlighted in the Annual Performance Plan submitted with that year's budget. The budget request is becoming performance-based, so the full set of performance measures are literally in the budget request. The measures contained within the annual plan will be clearly linked to the general goals, objectives, performance goals, and strategies contained in this strategic plan.

ENERGY RESOURCES BUSINESS LINE

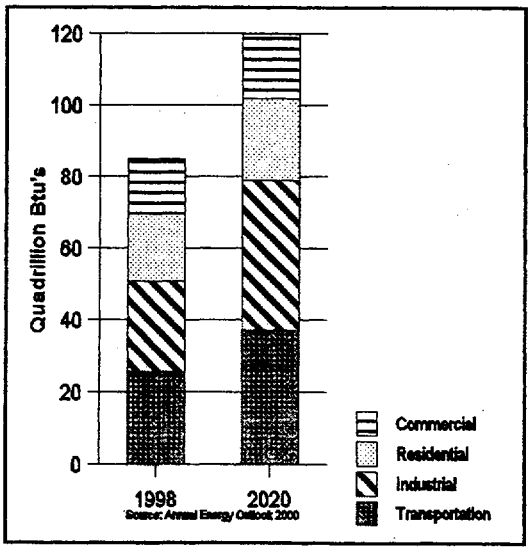
Energy is the vital force powering business, manufacturing, and movement of goods and services throughout the country. The United States spends over one-half trillion dollars annually for energy and our economic well-being depends on reliable, affordable supplies of clean energy. Energy is also a global commodity. Growing populations and rising living standards, economies in transition to market-based systems, and increasing globalization of energy markets demand greater flexibility and creativity in government economic, environmental, foreign, and national security policies.

Situation Analysis

U.S. Energy Supply and Consumption. The two charts in this section show recent and projected U.S. fuel use and sectoral energy consumption. America's energy resources are extensive and diverse. Coal, oil, natural gas, and uranium are abundant, and a variety of renewable resources are available in large untapped quantities. The United States produces almost twice as much energy as any other nation, and nearly as much as Russia and China combined. Although our Nation uses most of this energy domestically, it exports considerable amounts of coal, refined petroleum products, and enriched uranium.



Energy Supply



Energy Consumption by Sectors

Energy is consumed in the four basic demand sectors of our economy: transportation, industry, residential, and commercial. Petroleum currently accounts for nearly 97 percent of fuels consumed in the transportation sector. Electricity and natural gas are the dominant fuels used in the residential and commercial sectors, while a wide variety of fuels are used in the industrial sector. Over 35 percent of primary energy consumed in the U.S. is used to generate electricity. Nearly 70 percent of the energy in the primary fuels used for electricity generation are lost, mainly as waste heat in the generation process.

Energy Trends and Challenges. Technological advances resulting from both Federal and private sector R&D investments have reduced the cost of energy production and electricity, enhanced the ease and affordability of transportation, improved the comfort and utility of residential and commercial buildings, and supported a vibrant and competitive industry, while also limiting or reducing environmental damage.

One example of the impact of the technological advances is the fact that in the post-1970s era the rate of economic growth, as measured by the Gross Domestic Product (GDP), has outpaced the rate of primary energy consumption. While both GDP and primary energy consumption have risen, and are projected to continue to do so, energy intensity—the ratio of energy consumption to GDP—is forecasted to continue to decrease. Technological advances that led to improvements in primary energy production, energy conversion and delivery, and energy end use in our buildings, industrial sector, and transportation systems have been a key driver of the decrease in energy intensity.

While energy use per GDP has been decreasing, energy use per capita has been increasing in the 1990s due to low energy prices and changing consumer habits and preferences (e.g., suburbanization, larger vehicles, and buildings), as well as an increase in the use of electrical appliances in our homes and businesses (e.g., air conditioners, computers, motors, etc.). Assuming energy and electricity prices remain low into the twenty-first century, this trend is projected to continue, although at a modest rate due to technological advances. When coupled with an increasing population, the net effect is a projected increase in energy consumption. At the same time, the Energy Information Administration (EIA) is projecting a much smaller increase in domestic energy production. Thus we are facing a growing disparity between energy use and energy production in the years ahead. If this situation occurs, America will be increasingly reliant upon energy imports, particularly oil imports, to meet energy needs in the twenty-first century.

America's expanding energy needs will present a number of challenges for the Nation in the coming years, which are captured in the final report of the Energy Research and Development Panel of the President's Committee of Advisors on Science and Technology (PCAST), November 1997, that stated:

> *"The United States faces major energy-related challenges as it enters the twenty-first century. Our economic well-being depends on reliable, affordable supplies of energy. Our environmental well-being—from improving urban air quality to abating the risk of global warming—requires a mix of energy sources that emits less carbon dioxide and other pollutants than today's mix does. Our national security requires secure supplies of oil or alternatives to it, as well as prevention of nuclear proliferation. And for reasons of economy, environment, security, and stature as a world power alike, the United States must maintain its leadership in the science and technology of energy supply and use."*

Three key projected trends underlie these challenges. First, the Nation will face increasing energy demands in all three sectors:

- In buildings, to energize expanding building stocks for the commercial services and in the home, comfort and entertainment of an increasing population.

- In industry, to power the industrial production for expanding GDP.
- In transportation, to meet the Nation's increasing household and industrial transportation demands.

A second important trend is the growth in oil imports, which is forecast to increase from about 50 percent of total use today to 65 percent in 2020. This has both economic and national security implications for the country. Economically, it represents a massive export of U.S. dollars and jobs to foreign countries. From a national security standpoint, it means that our country will become increasingly dependent upon foreign oil reserves in the 21st century, should recent trends continue.

A third trend is the growing concern about the emissions associated with the current approaches to fossil energy recovery and use, both locally as smog, small particulates, etc., and regionally through transmission by winds, and globally in the form of emissions of greenhouse gases. Energy production and use are the primary sources of the Nation's carbon emissions, accounting for 98 percent of total U.S. carbon emissions in 1997 (Source: EIA "Emissions of Greenhouse Gases in U.S. 1997). With increasing energy consumption, and absent any change in energy policies or regulations, carbon emissions are projected to increase about 33 percent over 1997 levels by 2020. Clearly there are many opportunities to improve the performance of fossil-fueled power, the market penetration of renewable energy resources, and the availability of environmentally beneficial emission-free nuclear power technology.

Government Role. During the late 1970s, it became apparent that the decades-old regulation of many energy prices was counterproductive and that the Nation should pursue market-oriented approaches to energy supply and use wherever possible. A consensus developed that competitive markets should be the cornerstone of a successful energy policy, but also that markets alone cannot be relied upon to achieve all of society's economic, environmental, and security goals because these societal benefits often are overlooked by the private sector.

The role of government in energy is now focused on the important tasks of improving the operation of competitive markets and addressing the market's inherent limits. This combined approach allows markets to be the key determinants of supply and demand, while government supplements market forces through policies that bolster energy security and provide for a cleaner environment.

In this context, the Federal government focuses on augmenting energy security by maintaining the Strategic Petroleum Reserve, coordinating emergency responses with our allies in the International Energy Agency, promoting increased domestic oil and gas production and use of alternative fuels, and maintaining military preparedness. The Federal government also seeks to encourage favorable conditions in energy-producing regions of the world to facilitate access of all oil and gas resources to global energy markets.

The government reduces negative environmental effects by regulating pollution, limiting access to environmentally sensitive public lands and waters, and setting standards for energy use in consultation with the private sector. And the government ensures the flow of new and cleaner energy technologies by funding energy research, development, and demonstration, often in concert with the private sector. Ultimately, the continued development of new technologies that provide diverse energy sources, improve the efficiency of end-use, and reduce the negative environmental effects of energy production and use is the key to maintaining our high quality of life.

The Federal government's energy role is articulated through the goals, objectives, and strategies in the April 1998 Comprehensive National Energy Strategy (CNES), which was developed by DOE and other Federal agencies with input from many stakeholders. The CNES includes actions that help increase energy supply diversity and fuel choices, bring renewable energy sources into the market, strengthen domestic production of oil and gas, support commercial nuclear energy research, and increase the efficiency of both power and end use technologies. DOE is the lead Federal agency in implementing CNES through our efforts to assure clean, affordable, and dependable supplies of energy for our Nation. The Department is also the lead agency for the Administration's strategy to bring competition to the electricity industry.

The Department's Energy Resources mission is performed through the integrated efforts of a number of DOE organizations. Three of them, the Office of Energy Efficiency and Renewable Energy, the Office of Fossil Energy, and the Office of Nuclear Energy, Science and Technology manage the research, development, and deployment of advanced energy technologies within each of their respective areas. This work is primarily performed through partnerships with industry, Federal and non-Federal laboratories, universities, and State and local government agencies. Another DOE organization, the Energy Information Administration, publishes energy-related information necessary for informed consumer, market, and policy decisions. The Power Marketing Administrations sell and distribute more than $3 billion of electric power generated at Federal hydroelectric plants. DOE's Office of International Affairs and Office of Domestic Policy are the lead organizations for many of the policy-related thrusts supporting the Energy Resources goal.

Key External Factors

Although this strategic plan was developed in consultation with the Congress, customers, and stakeholders, there are still factors external to DOE's direct control that can influence desired energy resources outcomes. These factors include:

- A host of potential regulatory actions could require major additional reductions in energy-related emissions during the next decade, and some are expensive if compliance must depend on current technology and approaches.

- Climate change may prove to be one of the most important strategic energy drivers, especially if international agreements are reached that would require significant reductions in projected U.S. carbon emissions.

- By 2015, 60 percent of the existing coal-fueled and 40 percent of the nuclear-powered electric generating plants will be 40 years old. It is not clear how long these plants can operate due to regulatory and economic issues.

- DOE may be very successful in carrying out programs that meet technical, cost, and performance goals, and result in technology that is inherently superior to what is currently being used. However, the new technology cannot always compete with existing technology that has lower costs due to its maturity, associated market infrastructure, and economies of scale.

- Where existing and potential future energy policies and regulations do not adequately address environmental and energy security impacts, there may not be adequate market incentives for advanced technology with superior performance.

- Declining Federal and private investments in most energy R&D areas can limit the needs addressed and the likelihood of success

While development of advanced technology may ultimately lead to the mitigation of some of these factors, DOE will continue to work with its stakeholders and Congress to support legislation, regulations, and policies that may be needed to address other economic, demographic, social, or environmental factors. DOE will leverage Federal funding by developing partnerships with other DOE offices, other Federal agencies, State and local governments, foreign governments, national laboratories, universities, industry and other stakeholders to plan and implement programs.

Interagency Crosscutting Coordination

Although DOE's goals and objectives reflect unique roles and responsibilities, success will depend upon closely coordinated planning and the continuation of working relationships with a number of Federal agencies, State and local governments, Tribal Nations, private industry, and Congress.

It is especially important to recognize the complementary role other Federal agencies play in our energy programs. A summary of the energy programs that include other Federal agency cooperation is provided below.

While DOE's clearly defined, singular mission responsibilities and programs are well coordinated with appropriate other Federal agencies, there are some crosscutting government functions and initiatives that the Department participates in that are beyond the mission of any one agency. Government functions and responsibilities such as global climate change, basic research, and science education draw upon the expertise and capabilities of numerous agencies that need to work together to meet these overarching, common goals. At times, it may appear that the programs within these Federal agencies are somewhat overlapping and possibly redundant, and in some cases this may be partially true. The challenge is to define the role and develop the programs within each participating agency that best use that agency's unique financial, human, and technical resources in a way that optimizes overall government performance. OMB and the White House Office of Science and Technology Policy play an important leadership role in coordinating these efforts. DOE's contribution to these crosscutting programs is founded upon the distinctive technical and scientific expertise and capabilities located within its laboratory system and facilities. The Department is committed to continue working closely with other Federal agencies and with OMB and Congress to ensure its programs provide critical and unique contributions to these crosscutting efforts.

Congressional & Stakeholder Consultations

Consultations have been taking place on a continuing basis as part of the energy resources mission area and program offices' normal strategic and multi-year planning and budgeting processes. Planning at this level includes the participation of DOE staff, DOE laboratories, and DOE

management and operations contractors, key customers in the Departments of Defense, State, Commerce, Transportation, and Interior, the Environmental Protection Agency, Nuclear Regulatory Commission, and National Aeronautics and Space Administration, and stakeholders including State and local government agencies, Tribal Nations, industry consortia, academic institutions, the White House Office of Science and Technology Policy, OMB, and Congressional committees. In addition, there was extensive consultation in the development of the Comprehensive National Energy Strategy including public hearings around the country and the solicitation of public commends on the draft.

Program Evaluation and Analyses

DOE continually modifies its Energy Resources programs through its own strategic planning, portfolio planning and analysis, technology roadmapping, and budget planning activities. However, there have been several other planning efforts and studies in recent years that have provided important additional input to DOE's own Energy Resources efforts. They are summarized below.

The *Comprehensive National Energy Strategy*, published in April 1998, fulfills a statutory requirement of the Department of Energy Organizational Act and sets forth the Nation's national energy policy. Its goals, objectives, and strategies form a blueprint for the specific programs, projects, initiatives, investments, and other actions that will be developed and undertaken by the Federal Government, with significant emphasis on the importance of the scientific and technological advancements that will allow its implementation.

The *Energy Resources Research and Development Portfolio*, released in April 1999, is one of five volumes published by DOE that, for the first time, provides in one place a clear description of the Department's entire $7 billion research portfolio. The document is intended to help (1) describe DOE's current R&D activities and showcase recent accomplishments, (2) evaluate whether the energy portfolio is appropriately balanced to meet our long-term strategic mission goals, (3) align our technology investments with broader national policy goals, and (4) plan for future investments through technology roadmapping.

The *Federal Energy Research and Development for the Challenges of the Twenty-First Century*, published in November 1997, is a study conducted by an Energy R&D Panel appointed by the President's Council of Advisors on Science and Technology, and provides a thorough review of DOE's Energy Resources R&D Portfolio. It suggests that four criteria be applied in gauging the effectiveness of R&D work—strategic criteria, diversity criteria, public-private interface criteria, and project-related criteria. This review found that, in general, the R&D activities as addressed in the current DOE program are appropriate. While the study proposed a variety of changes within the program, including some specific reductions, redirections, and increases, their most important recommendation was for a substantial increase in energy technology R&D.

The report *Energy R&D: Shaping Our Nation's Future in a Competitive World*, published in 1995, resulted from a study commissioned by the Secretary of Energy's Advisory Board, and was conducted by a Task Force on Strategic Energy R&D that included leading energy experts from industry, academia, and research. DOE's Energy Resources R&D Portfolio is well in line with the

key program recommendations of that report. For example, the report "recommends that the Federal government continue to provide leadership, focus, and substantial financial support for energy R&D to ensure that the national goals of U.S. energy security, economic strength, environmental quality, and national leadership in science and technology are effectively achieved. Such support is essential to our Nation's future well-being." The Task Force recommended that DOE develop an integrated strategic plan and process for energy R&D, and use this process to determine funding priorities and manage a diverse energy R&D investment portfolio through: (1) a balance of basic research and applied R&D (including industry co-funded demonstrations, (2) near- and long-term R&D to provide continuing return on investment and to contribute to the health and vitality of domestic energy industries, and (3) a continuing commitment to support energy efficiency and renewable energy.

The study, *Technology Opportunities to Reduce U.S. Greenhouse Gas Emissions*, published in 1998, was conducted by 11 DOE National Laboratories and identified 47 technology pathways that offer significant potential to reduce greenhouse gas emissions. These pathways were grouped according to "Energy Efficiency" (buildings, industry, transportation, agriculture, and forestry), "Clean Energy" (fossil resource development, fossil power generation, nuclear energy, and renewables) and "Carbon Sequestration." These technology pathways were reviewed for their likely time profile of contributions toward reducing U.S. greenhouse gas emissions through 2030 (low, medium, or high potential). The report recommends collaborative R&D efforts involving both the private sector, universities, and government. The study concludes that the current Energy Resources R&D Portfolio is largely consistent with development of the range of advanced energy technologies that represent the best opportunities for reducing greenhouse gas emissions over time, and recognizes that the portfolio also addresses the multiple CNES objectives.

The Department of Energy is used to, and readily accepts, evaluations of its programs and performance. The evaluations received from all sources were considered in the development of the current strategic plan. In accordance with the Department's Strategic Management System, program evaluations will continue to be part of the ongoing strategic planning and annual performance planning. Annual program evaluations are scheduled for the Fall of each year. These evaluations will include the review of annual performance plans and performance agreements, the status of delivery of results for the fiscal year, and guidance for development of plans for the next fiscal year. Adjustments to the Strategic Plan will be included in the Annual Performance Plan submitted with the budget.

Resource Requirements

The Department will only achieve its goals and objectives with adequate financial, human, infrastructure, and technical resources. In developing this plan, the Department assumed budget appropriations consistent with the Administration and Congress's agreed upon five-year budget deficit reduction targets through FY 2002.

Federal staffing levels are based upon the Department's Workforce 21 staffing targets. Energy Resources will require $2.095 billion in FY 2000 and 7,575 full-time equivalent Federal employees (which includes the Power Marketing Administrations) to achieve its goal and objectives. There are no additional or special technical or informational resources needed at this time.

GENERAL GOAL

Promote the development and deployment of energy systems and practices that will provide current and future generations with energy that is clean, reasonably-priced, and reliable.

The Energy Resources (ER) goal covers all aspects of domestic energy from supply through end-use, and includes information dissemination and international activities. This goal is effectively advanced through a variety of approaches, including the development of improved energy technologies and standards, energy-related information, policies, legislation, regulation, technologies and standards, and the maintenance of emergency oil reserves.

The following four objectives support the Energy Resources goal by recognizing the strategic barriers and by utilizing the above approaches to overcome them.

OBJECTIVE 1*

Promote reliable, affordable, clean, and diverse domestic fuel supplies.

This objective is supported by maintaining the Strategic Petroleum Reserve and developing technology to: increase domestic oil and natural gas supplies; produce ultra-clean fuels from petroleum, natural gas, coal and biomass; and produce hydrogen from a variety of sources.

Performance Goals

- By 2005, develop advanced diagnostics and imaging systems, drilling technologies, more efficient recovery processes, and less expensive technology/approaches for addressing environmental concerns that will lead to domestic production increases estimated at over 600,000 barrels per day of oil and over 1.5 trillion cubic feet of natural gas.

- By 2005, demonstrate at large-scale, natural gas to liquids production with sulfur levels significantly below the proposed EPA 2004 standard of 30 ppm (current levels for gasoline and diesel are 300 to 500 ppm), and with expected commercial production costs 25 percent less than current technology.

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* The Department is considering combining Objective 1 and 2 to remove the separation of fuel and electricity. The objective being considered is: Promote reliable, affordable, clean, and diverse domestic supplies of energy.

- By 2002, achieve commercial ethanol production using non-corn biomass residues, and by 2010, incorporate cellulosic ethanol production using dedicated biomass feedstocks into existing corn ethanol plants.

- Develop hydrogen systems that are cost-effective to use with fuel cells for the production of electricity for deployment by the end of 2004, and for transportation applications beginning in 2008.

- Continue to assure Strategic Petroleum Reserve site availability of 95 percent or greater to draw down the Reserve at a sustained rate of 4.1 million barrels per day for a sustained 90 day period within 15 days notice by the President.

Strategies

- Develop technologies and improved practices to enhance the availability of domestic oil and natural gas supplies, while minimizing environmental impacts of production.

- Develop advanced diagnostics and imaging systems, drilling technologies, more efficient recovery processes, and less expensive technology/approaches.

- Develop technologies to produce ultra-clean fuels from natural gas, oil, coal, biomass, and hydrogen from a variety of sources, which can be used with minimal negative environmental consequences.

- Maintain an effective Strategic Petroleum Reserve to deter and respond to oil supply disruptions, and cooperate with member nations of the International Energy Agency.

OBJECTIVE 2*
Promote reliable, affordable electricity supplies that are generated with acceptable environmental impacts.

Activities under this objective include support for electricity restructuring legislation, and development of advanced technology for: new and existing fossil fueled, renewable and nuclear electricity generation facilities; and for electricity transmission/distribution reliability.

Performance Goals

- By 2003, enhance modeling capabilities in the areas of electricity transmission, reliability, and market design to support policies that provide reliable, clean, and affordable electricity to customers.

- Provide technologies supporting an increase in the amount of the Nation's distributed power (i.e., electric generating systems connected to the distribution portion of the grid) to ___ percent of new electricity capacity by the end of 2005, and 20 percent by the end of 2010.

- By 2005 support industry adoption of a unified information, data collection and control system that provides real-time information for reliable electric system operation, and for the operation of efficient, competitive electricity markets.

- By 2003, provide technologies to improve the environmental performance of existing coal-fired power plants and reduce compliance costs by 25-75 percent, compared to existing technologies and strategies.

- By 2010, develop and deploy technologies that will improve the availability of operating nuclear power plants from 75 percent to 85 percent.

- The Power Marketing Administrations will receive monthly a control compliance rating of "pass" using the North American Electric Reliability Council (NERC) performance standard.

- By 2005, develop and operate advanced coal power technologies, fuel cells, and advanced subsystems, such as membranes for gas separation, which can be integrated into a new generation of fossil fuel based energy systems ready for commercial deployment by 2015. These systems will have near zero emissions of traditional pollutants, be 50% more efficient than current technologies, and be compatible with low-cost carbon sequestration technologies, also being developed in the same time frame.

- Relative to a 1996 level of 6.5 gigawatts, provide technologies leading to a doubling of renewable energy (non-hydroelectric) generating capacity by ____, and a tripling by 2010.

- By 2005, identify credible candidate designs for fourth generation nuclear power plants that are capable of being deployed in the 2020 time frame.

Strategies

- Provide policy, legislative and technology options to enable the operation of large-scale, interregional, real time, competitive electricity markets, that encompass both central and distributed generation sources, while maintaining system reliability and improving environmental performance.

- Enhance economics and environmental performance or electricity generation by expanding the use of multi-product facilities, such as combined heat and power.

- Develop technology to improve the performance of older fossil and nuclear power plants, permitting continued operation in an increasingly competitive and environmentally constrained industry.

- Through the Power Marketing Administrations, market and reliably deliver Federal hydroelectric power, with preference given to public bodies and cooperatives.

- Develop advanced fossil- and nuclear-based power generation systems that can meet future environmental goals at reasonable cost.

- Provide for the effectiveness of the existing DOE infrastructure that supports nuclear energy R&D.

Boosting Efficiency and Enhancing Process Economics Through Multi-Product Strategies

Historically, the vast majority of domestic electricity generation has been from facilities that only produce electricity, and operate at about 30 percent efficiency due to generation, transmission, and distribution losses. Most of these losses are in the form of heat lost during generation. New and emerging technologies, such as advanced turbines, fuel cells, gasifiers, and materials that can act has molecular sieves, are opening up new possibilities for capturing waste heat, as well as producing ultra-clean fuels and chemicals in addition to electricity. Multi-product plants based on these technologies could also be designed with flexibility to use a variety of feedstocks (e.g., coal, natural gas, biomass, waste fuels). Such plants not only support Objective 2, but Objective 1 by supplying clean fuels, and Objective 3 through capture of waste heat that can heat buildings or be used for industrial processes.

- Improve and increase the amount of distributed power produced by advanced electric generating systems — operating either connected to the distribution portion of the national electric grid or as "stand-alone" power supplies.

- Expand and improve non-hydroelectric renewable energy generating capacity in the United States.

- Maintain the current level of national hydro-power capability and economic competitiveness by developing "fish-friendly" technologies.

OBJECTIVE 3
Increase the efficiency and productivity of energy use, while limiting environmental impacts.

This objective is supported by development of technology, practices and standards that focus on vehicle transportation, commercial and residential buildings, and the processing and extraction industries.

Performance Goals

- By 2004, develop advanced technologies that enable pre-production prototype automobiles with three times the fuel economy of today's conventional automobiles, a primary goal of the Partnership for a New Generation of Vehicles (PNGV).
- By 2003, develop advanced clean diesel engine technologies that enable commercial production of pickup trucks, vans, and sport utility vehicles (SUVs) that achieve at least a 35 percent fuel efficiency improvement relative to current gasoline-fueled trucks.
- By 2004, develop advanced diesel engine and vehicle systems technologies for Class 7 and 8 trucks that allow fuel flexibility, reduced emissions, and reduced parasitic losses (aerodynamic drag, rolling resistance, and drive line losses), thereby increasing the average fuel economy of new heavy trucks to 10 miles per gallon (mpg) from the current 7 mpg.
- Reduce industry energy consumption per dollar of output (i.e., energy intensity) to 25 percent below its 1990 level by 2010, and reduce cumulative industry energy costs by $4.5 billion.
- Reduce annual buildings energy consumption by 2 Quads by the year 2010, and save consumers a cumulative $65 billion by 2010.
- Reduce energy consumption in Federal facilities by 35 percent by 2010 relative to the 1985 consumption level, and reduce carbon emissions by about 100 million metric tons.

Strategies

- Develop and deploy advanced vehicles, fuels and systems that will significantly increase gas mileage and reduce environmental emissions, without compromising safety, comfort, and cost.
- Develop technologies that can significantly improve the efficiency of the Nation's energy intensive industries and reduce environmental emissions.
- Develop products and strategies to increase the efficiency of new and existing residential and commercial buildings.

OBJECTIVE 4
Inform public policy makers, energy industries and the general public by providing reliable energy information.

This objective addresses the provision of information on energy supply, consumption and the use of alternatives, in order to facilitate informed policymaking, technology choice, and efficient energy markets.

Performance Goals

- Publish annually a domestic and international Annual Energy Outlook that forecasts future energy supply and consumption through the year 2020.
- Maintain and improve the web-based networks for the Energy Resources organizations to ensure wide distribution of information about Energy Resources programs, such that the average number of unique monthly users of Energy Resources Web Sites will grow at least 20 percent per year through 2005 (from a baseline of about 70,000 per month in 1997.)

Strategies

- Provide forecasts for energy supply and consumption through the year 2020.
- Make information more easily accessible to the general public on-line by designing and producing products for electronic dissemination, rather than for hard copy or a hard copy image reproduced electronically.
- Undertake information and education programs to familiarize the general public with DOE energy technologies and their applications, availability, and benefits (e.g., related to environment, health, economics, and reliability).

OBJECTIVE 5
Cooperate globally on international energy issues.

The energy market is now a global market. This objective addresses international activities to promote U.S. economic, environmental and security interests.

Performance Goals

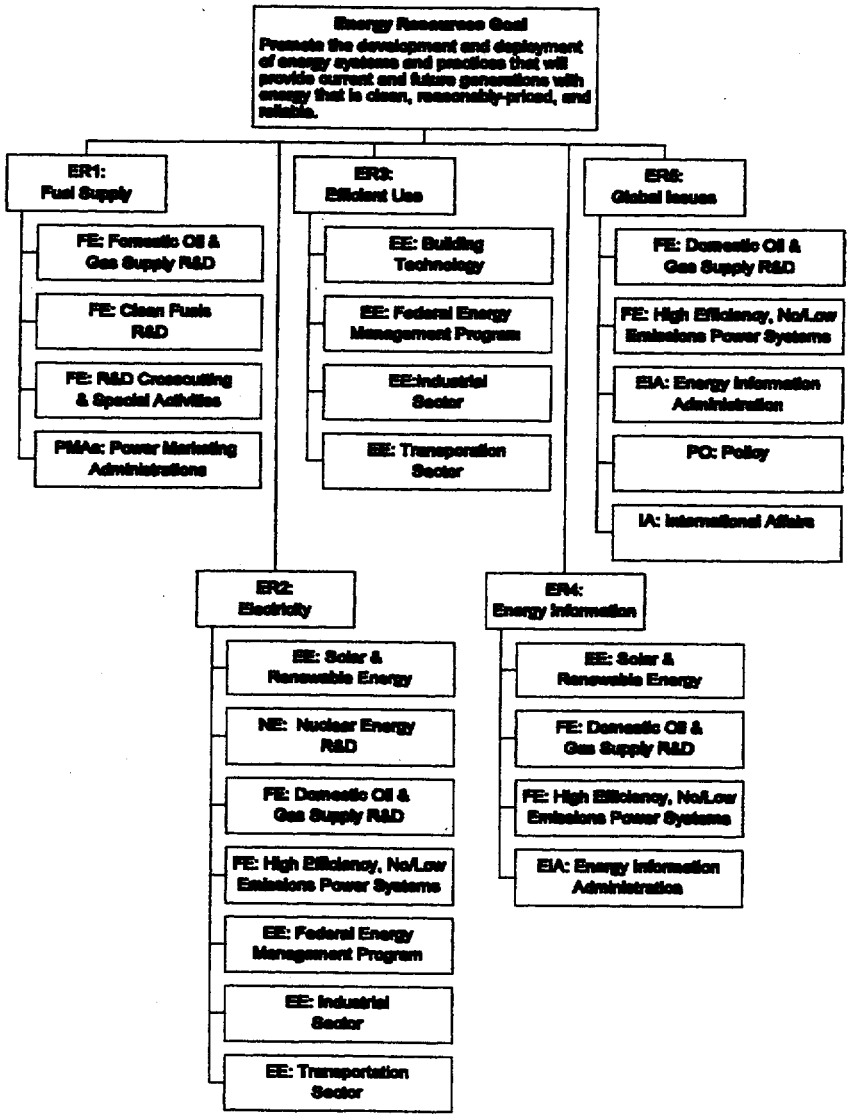
- Achieve $3 billion in annual export sales of energy efficiency technologies by 2010 and create ____ million jobs in the United States.
- Achieve $5 billion in annual export sales of renewable energy systems by 2010 and create ____ million jobs in the United States.
- Remove barriers to U.S. companies in energy efficiency, renewables, oil and gas recovery and clean coal technology markets in China, Indonesia, the Phillippines, Brazil, India, South Africa, and the newly Independent States, and other developing economies.
- Through government-to-government efforts, provide information that impacts at least one developing country's legal/regulatory framework each year in a way that encourages U.S. private sector energy investment.
- Implement an international agreement with Brazil to assist in economic reforms, to attract foreign capital and technologies, and to promote the use of coal and clean coal technologies, which is anticipated to lead to projects for U.S. companies totaling $1 billion through 2002 and $10 billion through 2010.

Strategies

- Enhance energy security by diversifying the international supply of oil and gas
- Obtain developing country commitment to greenhouse gas emissions reductions
- Promote open energy markets
- Promote deployment of clean and efficient energy systems.

Linkage to Budget Structure

The Energy Resources general goal is supported by objectives. Each objective is being pursued through long-term strategies. The DOE's budget Decision Units fund work on those long-term strategies. Annual performance goals are discussed with the Decision Units in the Annual Performance Plan submitted with the budget for each fiscal year. The following chart shows which Decision Units support which objectives.



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NATIONAL SECURITY BUSINESS LINE

The Department of Energy is charged by law to enhance U.S. national security through the military application of nuclear technology and to reduce the global danger from the proliferation of weapons of mass destruction. In carrying out these responsibilities, the Department currently uses 4 offices to manage and direct these activities. These offices will make up the National Nuclear Security Administration (NNSA) beginning in March 2000. The Office of Defense Programs (about $4.5 billion budget per year) is responsible for maintaining and enhancing the safety, reliability, and performance of the U.S. nuclear weapons stockpile, including the capability to design and produce nuclear weapons. In addition, it also is required to maintain nuclear test readiness consistent with the Supreme National Interest clause of the yet unratified Comprehensive Test Ban Treaty (CTBT), as directed by the President, in order to meet national security requirements. The Office of Naval Reactors (about $700 million per year) is responsible for providing the U.S. Navy with safe, militarily-effective nuclear propulsion plants and ensuring the safe and reliable operation of those plants, beginning with technology development and continuing through reactor operation and, ultimately, reactor plant disposal. The Office of Nonproliferation and National Security (about $700 million budget per year) is responsible for promoting international nuclear safety and nonproliferation, and providing key analytical and technical support to negotiations and implementation of international agreements related to weapons of mass destruction. The Office of Fissile Materials Disposition (about $250 million per year) is responsible for eliminating surplus U.S. weapons plutonium and highly enriched uranium and for assisting Russia in eliminating its surplus weapons-grade plutonium.

In addition, the Department has security responsibilities that are carried out by another 4 offices. The offices of Security and Emergency Operations, Intelligence, Counterintelligence, and Independent Oversight and Performance Assurance are assigned these functions. Finally, the Office of Worker Transition and Community Assistance implements programs to minimize the adverse impacts of downsizing DOE's national security enterprise.

Situation Analysis

The national security environment is increasingly complex for the United States. In the early 1990s, as part of its world leadership role in arms control, the United States halted production of new nuclear warheads and declared a moratorium on underground nuclear testing. To support the testing moratorium, the President directed the Department of Energy to develop a science-based, Stockpile Stewardship Program to maintain the safety and reliability of our nuclear deterrent. At the same time, pending final evaluation of the effectiveness of that program, the President directed the Department of Energy to retain the capability to reconstitute the nuclear weapons stockpile and to continue to ensure the safety and reliability of the remaining nuclear weapons stockpile for the foreseeable future.

Based on the continuing confidence in the Stockpile Stewardship Program, the President announced that the United States would continue to refrain from nuclear testing in order to encourage other nations to do so, therefore to reduce the danger from nuclear weapons proliferation. The START I treaty provided for real reductions in the number of nuclear weapons, and future arms reductions, anticipated through treaties such as START II, which has been ratified by the U.S. Senate, and the proposed START III, which has yet to be negotiated, will further reduce nuclear weapons stockpiles and increase inventories of surplus plutonium and highly enriched uranium in the United State and Russia. Already, hundreds of tons of weapons plutonium and highly enriched uranium are no longer needed for defense purposes, both in the United States and Russia. Disposing of current inventories, as well as more material from future arms reductions, presents a time-sensitive challenge to eliminate the danger from use or diversion of these surplus fissile materials.

The threat that nuclear weapons or materials in Russia and other sources could be stolen or diverted is real, particularly under current political and economic conditions throughout the world. If acquired by terrorists or non-nuclear nations, these weapons or materials could readily be used against the United States, Russia, and other nations. A National Academy of Sciences report has noted that the threat of nuclear weapons or materials falling into the hands of terrorists or non-nuclear nations through theft or diversion is a "clear and present danger." At least 20 nations are known to be or are suspected of developing weapons of mass destruction, as shown by the recent underground nuclear tests of India and Pakistan, and the continuing situation in Iraq, Iran, and North Korea. Detecting, then preventing, potential use of these weapons of mass destruction is in the overall interests of the United States.

The United States will respond to adverse international events that affect our overall national interests. Responding to international crises often requires the resources of the United States Navy in projecting a forward presence and quickly protecting our national interests. Nuclear powered submarines and aircraft carriers must perform safely, reliably, and effectively in meeting military deployment objectives. In the next decade, the Navy will commission a new Virginia Class of attack submarines and a new CVNX Class of aircraft carriers to meet its evolving national defense responsibilities for the first part of the next century.

The security challenges faced by the Department are in large part attributable to rapid advances in technologies that are globally available, making it increasingly easy for persons outside the Department to access sensitive information or damage critical facilities. Access to such sensitive information, particularly by those with foreign interests, must be closely scrutinized to avoid unauthorized releases. Computer hackers resolutely attempt to gain access to information systems, and cyber security controls must be, and are being, upgraded continually to thwart such attacks. The Nation's energy-sector critical infrastructure assets are interdependent and connected to other sectors by information systems and, by virtue of these interdependencies, are vulnerable to attack. Incidents of terrorism at home and abroad in the past few years have resulted in the need for the Nation's first responders to be trained and equipped to counter threats from weapons of mass destruction, such as chemical or biological agents. As materials are consolidated and transferred to designated storage locations, the need for accuracy in inventory and accounting procedures for our inventories of plutonium, uranium, and other special nuclear materials is even more critical.

Successes

The success of the Department's national nuclear security programs is clearly evident. The nuclear weapons stockpile remains a safe and credible deterrent through an effective Stockpile Stewardship Program. The Department's nuclear propulsion plants power over 40 percent of the U.S. Navy's major combatants and continue to operate safely and reliably, meeting all military requirements. Nonproliferation activities provide a disciplined approach to treat reduction work in the former Soviet Union. They also evaluate measures for new agreements and identify and evaluate potential threats to our national security from weapons of mass destruction. The Department has signed one new agreement to further our cooperation on materials protection, control & accounting; and is on track to sign a second implementing agreement with the Russian Navy. The Russian Federation has, with Departmental encouragement and assistance, opened two new computer centers in formerly closed nuclear cities, as a first step toward redirecting former weapons scientists and engineers to commercial civilian employment. The elimination of surplus fissile materials is on track, both domestically and internationally. The final Environmental Impact Statement for surplus plutonium disposition is complete, the preferred sites identified, and preliminary facility design is underway for two plutonium disposition facilities in the United States. Negotiations with Russia on a bilateral plutonium disposition agreement are near completion. Fourteen percent of the 50 metric tons of U.S. surplus highly-enriched uranium destined for the United States Enrichment Corporation was shipped for down-blending and fabrication into low-enriched, commercial reactor fuel.

On the security side, to train first responders to counter threats from weapons of mass destruction, DOE is involved in ongoing joint and interagency exercises with Federal, State, and local counterparts. A standardized, departmental tracking system has also been developed and is being installed at various facilities across the DOE complex.

Challenges

Continuing these successes in the next century, however, presents several challenges in directing and focusing the Department's national nuclear security activities. Maintaining safety and reliability of the nuclear weapons stockpile in the absence of nuclear testing becomes progressively more difficult, but achievable, as time goes by. Certifying the reliability and safety of the nuclear weapons stockpile requires significant advances and investments in computing and experimental capability. Needed new technology requires new facilities that are costly and complex. Recruiting workers with the key skills and retaining workers with the institutional knowledge to conduct nuclear work requires stable program funding to eliminate cyclic fluctuations of program support. The development of technologies and systems to monitor, protect, and account for nuclear material and to ultimately and quickly dispose of nuclear materials must keep pace with the increasingly sophisticated efforts of smugglers to move such material or thieves to remove such material from safekeeping in sites throughout Russia and other countries. Exponential growth in key nonproliferation programs outpaces Federal staffing available to provide the oversight or technical support to interagency efforts on a range of arms control and nonproliferation programs. Most recently, Congressional action established a new, semi-autonomous agency within the Department of Energy which has responsibility for the Department's national nuclear security functions. The Department has assessed the necessary implementing steps to assure the Congress and the public that the Department can effectively manage and direct these important and diverse national nuclear security programs. The implementation plan was published on January 1, 2000.

Key External Factors

Most of the programs in this business line focus on nuclear weapons, nuclear power, nuclear facilities, nuclear processing, and transportation. Other programs focus on international efforts to reduce the global danger from weapons of mass destruction. The prime external factor potentially affecting performance in all areas is public perception related to nuclear issues. Public trust in nuclear matters dictates that each of the programs in the national nuclear security business line maintain high environmental and safety standards and continue to educate and communicate with the public on these matters. Public perception directly affects Congressional support for these programs, so an integrated program of stakeholder communication is important.

Interagency Crosscutting Coordination

The Department's national nuclear security work is integrated with many elements of the U.S. government. Nuclear weapons stockpile work is coordinated between the Department of Defense and Department of Energy through the Nuclear Weapons Council and the Under Secretary of Energy's Executive Review Group, which includes key officials and experts in the national security community. For naval nuclear propulsion work, the U.S. Navy and the Department have a unique and integrated partnership, defined in Executive Order 12344 and Title 42 of the U.S.C. 7158. For nonproliferation programs, key agencies include the Department of State, which is the lead agency for all policy matters in dealing with other countries, the Department of Defense, and the International Atomic Energy Agency, and several non-governmental organizations. For the international effort to dispose of fissile materials, the Department of State provides the policy support and the Department of Energy technical support. For the domestic fissile materials disposition effort, the Department of Energy uses the expertise of the United States Enrichment Corporation and the Tennessee Valley Authority in disposing of U.S. highly enriched uranium, while the Nuclear Regulatory Commission works with public utilities on licensing aspects of the preferred use of mixed oxide fuel in commercial power reactors.

In the areas of security and emergency operations, DOE participates in interagency groups such as the Joint Security Policy Board and with the Departments of Defense, State, Justice, and the National Security Council. In response to terrorism and weapons of mass destruction, we are working with these same agencies to train and equip first responders and conduct exercises that include local law enforcement. The Technical Support Working Group, with representation from these agencies, promotes exchange of technologies developed to counter threats and improve our security systems and protection capabilities. DOE, through partnership with other agencies, and association with professional organizations, has stayed abreast of state-of-the-art developments, and through identified user needs, promotes implementation of applicable technologies to reduce threats to the Department's nuclear facilities, personnel, and critical assets.

Congressional & Stakeholder Consultations

Performance goals and strategies in this business line reflect the authorization and funding provided by the Congress. There is continuing consultation with Congress on these programs through the annual authorization and appropriation processes.

Many performance goals and strategies in this business line incorporate stakeholder input derived from the National Environmental Policy Act process carried out in previous years. A number of Records of Decision ensuing from Programmatic Environmental Impact Statements, Environmental Impact Statements or Environmental Assessments provide the foundation for performance goals.

Program Evaluation and Analyses

The mission for national security programs is contained in the Atomic Energy Act of 1954, as amended and Title 32 of the National Defense Authorization Act for Fiscal Year 2000, Public Law 106-65. The objectives, performance goals, and strategies are strongly influenced by a number of internal and external reviews and reports that, collectively, provide the Department's program managers appropriate information to reorient programs and budgets and maintain a balanced program.

For the nuclear weapons stockpile, the performance goals and strategies, which are embodied in the Stockpile Stewardship Plan, are driven by Presidential Decision Directives and the annual certification process. The execution of the Stockpile Stewardship Plan is reviewed annually and its results are incorporated into work plans. The recently completed National Security technology roadmapping of the research and development portfolio is consistent with the stockpile stewardship 17 "campaigns" to address critical capabilities needed to achieve nuclear weapons stockpile certification; results of those "campaigns" are integrated into the Stockpile Stewardship Plan. A similar effort focused on the infrastructure of the complex is underway and defined in the Readiness in Technology Base and Facilities Implementation Plan. A number of external evaluations and analyses also provide information for changes in program performance goals and strategies. The Department of Defense recently completed a review of the Department's readiness to conduct an underground nuclear test, and a review of the capability and capacity of the Y-12 Plant and the Pantex Plant to accomplish current and projected workload. It is anticipated that the Kansas City Plant will be reviewed next. Concerns over the skill mix of the Department of Energy's nuclear weapons complex led to a Congressionally directed report by the Commission on Maintaining U.S. Nuclear Weapons Expertise Report. The report offered a dozen recommendations to support the recruitment and retention of scientific, engineering, and technical personnel for the nuclear weapons program— implementation is ongoing. A follow-up report, prepared by the Department of Energy and the Department of Defense, is due for completion by the Spring of 2000.

The Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 (P.L. 105-261) section 3158 directs the Secretary of Energy to develop clear and specific criteria for judging whether the science-based tools, which are being used by the DOE for determining the safety and reliability of the nuclear weapons stockpile, are performing in a manner that will provide an adequate degree of certainty that the stockpile is safe and reliable. In meeting this commitment, the DOE will submit a report to Congress in Fiscal Year 2000 that will include a description of the information needed to determine that the nuclear weapons stockpile is safe and reliable and the relationship of the science-based tools to the collection of that information. A description of the criteria, to the extent they have been developed, will also be provided. As directed by section 3259, an independent panel has been established to examine the certification process as well as the criteria developed in response to section 3158.

For the Naval Reactors program, the performance goals and strategies reflect the long-standing partnership between the Department of Energy and the U.S. Navy on providing naval nuclear propulsion systems. Semi-annual reviews of performance execution, in addition to monthly financial and technical work reviews with the government contractor organizations, provide routine evaluation of progress of these program efforts.

For nonproliferation and national security programs, the performance goals and strategies benefit from the advice of the Nonproliferation and National Security Advisory Committee, which provides technical advice of research and development activities of the Office of Nonproliferation and National Security. Additional review of the Materials Protection Control and Accounting program by the National Research Council, the General Accounting Office, the Department's Inspector General, and other information provided by the program's technical survey team resulted in a programmatic re-assessment in 1999.

For fissile materials disposition efforts, the performance goals and strategies reflect results from three Records of Decision from environmental reviews and a technical baseline reviewed by independent reports conducted by the National Academy of Science. In addition, the three planned U.S. plutonium disposition facilities have completed Congressionally-directed external, independent project review. The United States and Russia recently agreed to the top-level schedule for plutonium disposition by Russia of Russian plutonium, which will guide the path forward and track the disposition activities.

Resource Requirements

Accomplishing the universe of activities in this business line requires about $6 billion each year. The Department will continue to identify resources within the 050 National Defense account (specifically the 053 subfunction, Atomic Energy Defense Activities) to meet its national nuclear security responsibilities, but a stable level of funding continues to be important to assure appropriate planning and program performance. Recruitment and retention of key technical and scientific personnel with the appropriate skill mix will require a focused effort to assure continuity of nuclear weapons stockpile, naval reactors, and nonproliferation program efforts. The Stockpile Stewardship Program will require significant investments in computing and modeling capabilities, experimental facilities, and nuclear expertise to be able to certify to the President the safety and reliability of the enduring stockpile without additional nuclear testing. Unprecedented growth in nonproliferation operations in Russia requires the Department to strengthen and expand the Moscow Office and to ensure adequate program management and project oversight by Federal staff for these highly visible and priority programs.

GENERAL GOAL

Enhance the national security through the military application of nuclear technology and reduce global danger from weapons of mass destruction.

The Department of Energy Strategic Plan includes National Nuclear Security as an independent business line. DOE is responsible for all aspects of the "*military application of nuclear*

technology". In the Department, this encompasses the nuclear weapons stockpile activities and the naval nuclear propulsion program. *"...[R]educe global danger from weapons of mass destruction"* covers the detection and prevention of proliferation of materials, technology, and expertise related to chemical, nuclear, and biological weapons, and the elimination of surplus weapons-usable plutonium and highly enriched uranium of the United States and Russia.

OBJECTIVE 1

Maintain and refurbish nuclear weapons in accordance with directed schedules to sustain confidence in their safety, reliability and performance, indefinitely, under the Comprehensive Test Ban Treaty (CTBT) (not yet ratified) and arms reduction treaties.

Performance Goals

- Annually certify to the President on the assessment of the safety and reliability of the nuclear weapons stockpile and the need or lack of need to resume underground testing to certify the safety and reliability of nuclear weapons.
- Meet all annual weapons maintenance and refurbishment schedules developed jointly by DOE and DoD.
- Meet annual schedules for the safe and secure dismantlement of nuclear warheads that have been removed from the U.S. nuclear weapons stockpile.

Strategies

- Conduct a program of Directed Stockpile Work (DSW) that supports the Specific Life Extension Program (SLEP) and is integrated and linked to Campaigns and Readiness in Technology Base and Facilities.
- Complete surveillance, maintenance, design and manufacturing activities necessary for the refurbishment and certification of the stockpile as identified in directive schedules.
- Apply the improved technologies and tools developed by the Campaigns to achieve DSW performance goals.
- Dismantle nuclear weapons in a safe and secure manner.

OBJECTIVE 2
Achieve a robust and vital scientific, engineering and manufacturing capability to enable the future certification of the enduring stockpile and the manufacture of nuclear weapon components under the CTBT (not yet ratified) by 2007.

Performance Goals

- Achieve the Campaign "End States" and the related mid-level milestones in accordance with the Stockpile Stewardship Plan.
- Perform 3-D, high fidelity physics and full-system simulations of weapon performance and safety by FY 2004.
- Provide the capability to deliver SLEP refurbishment products at one-half the cost, in one-half the time, and with no defects by FY 2004.
- Provide a reliable source of tritium no later than FY 2006.
- Rebaseline the National Ignition Facility (NIF) project.

Strategies

- Conduct a series of Campaigns to achieve experimental, simulation, engineering and manufacturing capabilities necessary to achieve confidence in stockpile manufacturing and certification into the future.
- Adopt and implement advanced development and production technologies.
- Conduct the Defense Applications and Modeling Campaign. Develop the 100 teraflop computer, and the visualization and transfer tools required to achieve the simulation goals by FY 2004.
- Conduct the Tritium Readiness Campaign. Design, produce and operate the tritium target and extraction facility for use with commercial light-water reactors to provide tritium by FY 2006.

OBJECTIVE 3
Ensure the vitality and readiness of DOE's nuclear security enterprise.

Performance Goals

- Ensure the physical infrastructure and facilities are operational, safe, secure, and compliant, and that a defined state of readiness is sustained at all needed facilities.
- Ensure a capability to resume underground nuclear testing within three years in accordance with the Presidential Decision Directive and Safeguard C of the CTBT (not yet ratified).
- Ensure the availability of a workforce with the critical skills necessary to meet long term mission requirements.
- Maintain the DOE secure transportation asset for the safe and secure movement of nuclear weapons and components.
- Complete construction of NIF in accordance with the rebaselining.
- Achieve annual recurring cost savings from separated workers that is at least three times the cost of separation.
- Support local community transition activities that will create or retain, cumulatively 20,000 to 25,000 new private sector jobs.
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Strategies

- Provide an appropriately-sized, cost-effective, safe, secure, and environmentally sound enterprise for national nuclear security programs.
- Maintain nuclear test readiness in accordance with the Presidential Decision Directive and Safeguard C of the CTBT (not yet ratified).
- Implement the recommendations of the "Commission on Maintaining the United States Nuclear Weapons Expertise" as delineated in the joint DOE/DoD report of March 15, 2000, on Nuclear Expertise Retention Measures.

- Continue restructuring and modernizing the weapons complex consistent with the Stockpile Management and Restructuring Initiative (SMRI).
- Continue with construction of new facilities such as the National Ignition Facility (NIF), the Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT), and a new Tritium Extraction Facility.

OBJECTIVE 4

Provide policy leadership, technology development and program implementation to prevent the proliferation of WMD, detect WMD proliferation, monitor WMD treaties and agreements, improve international nuclear safety, security and accounting of weapons-usable nuclear materials, and counter WMD terrorism.

Performance Goals

- Support interagency efforts to achieve ratification of the CTBT, complete negotiations for the Fissile Materials Cutoff Treaty (FMCT), reduce fissile material stockpiles worldwide, and complete agreements for transparent dismantlement of nuclear warheads by the end of 2005.
- Prepare the DOE complex for increased inspections under international treaties and agreements by 2003.
- Perform an air-borne demonstration of new technology for detecting WMD proliferation by 2005.
- Conduct an integrated operational demonstration of biological agent detectors and hazard prediction models in an urban environment by 2002.
- Deliver the first operational, next generation, space-based, optical nuclear explosion detector to the Air Force by 2005.
- Work with the Russian Federation to accelerate the halt the assembly of new weapons by the end of 2000 and halt disassembly of weapons by the end of 2003 at two major Russian production facilities.
- Improve the safety of 65 reactors at 21 Soviet-designed nuclear power plants and assist the 9 host countries to implement self-sustaining nuclear safety programs and internationally accepted safety practices by 2005.

- Install sustainable physical security and accountancy upgrades on unsecured Russian weapons-usable nuclear material on more than 400 buildings at 40-plus Russian sites by 2020. Consolidate this material into fewer buildings at fewer sites to reduce theft targets and overall security costs by 2020.

- Ensure that the nonproliferation aspects are met of the February 1993, U.S./Russian Agreement for the purchase over 20 years of low enrichment uranium (LEU) derived from at least 500 metric tons of HEU removed from dismantled Russian nuclear weapons by 2015.

- Implement comprehensive reforms of DOE export control practices by 2002.

Strategies

- Nonproliferation and Verification R&D: Develop and demonstrate technologies needed to: remotely detect the early stages of a proliferant nation's nuclear weapons program; locate, identify and characterize nuclear explosions; produce operational satellite-based nuclear explosion monitoring sensor systems; in cooperation with Russian Federation, develop means to better detect radiation signatures from weapons-material to prevent smuggling and to increase transparency into weapons dismantlement; and improve U.S. capability to detect the proliferation of chemical and biological agents at an early stage and to minimize the consequences of potential use of chemical or biological agents.

- Arms Control and Nonproliferation: Consolidate nuclear material into fewer buildings at each site in Russia and reduce the number of sites with material; work with the Russian Navy to expand cooperation to include all nuclear material of proliferation concern; address sustainability and operations of installed MPC&A upgrades to ensure long-term operations and continued enhanced security and address infrastructure issues to develop and support Russian nuclear procedures, laws, inspections and training; under Initiatives for Proliferation Prevention and Nuclear Cities Initiative, engage weapons scientists, engineers, and technicians in peaceful projects at their institutes to prevent "brain drain" and create economic diversification; complete ratification and implementation of U.S. protocol for IAEA "Strengthened Safeguards System" including supporting U.S. responsibilities for declarations and on-site inspection at DOE facilities; continue efforts to ensure transparent and irreversible nuclear reductions by conducting analyses and technology development efforts for transparency activities focusing on verified warhead dismantlement; and maintain core competency as technical experts to U.S. government agencies on nuclear export control initiatives.

- HEU Transparency Implementation: Monitor the dilution of 30 metric tons of HEU to LEU from dismantled Russian nuclear weapons for purchase by the United States Enrichment Corporation (USEC) pursuant to the 1993 agreement between the United States and the Russian Federation; and conduct special monitoring inspections in Russian facilities and maintain permanent presence offices in Russia to have confidence that the LEU being purchased by USEC has been derived from HEU removed from dismantled nuclear weapons.

- International Nuclear Safety: Assist countries to reduce the risks from Soviet-designed nuclear power plants and to implement a self-sustaining nuclear safety improvement program capable of reaching internationally accepted safety practices. Implement projects in the areas

of operational safety, training and simulators, safety assessments, and fire safety and other hardware upgrades. Promote nuclear safety culture improvements internationally by providing strong leadership in international nuclear safety organizations and centers. Establish and strengthen international nuclear safety centers and international environmental safety centers. Work with the U.S. Agency for International Development on the multinational effort to shut down the Chernobyl plant as soon as practicable, to safely decommission the plant, and to stabilize the unit 4 shelter.

OBJECTIVE 5

Reduce inventories of U.S. and Russian surplus weapons fissile materials in a transparent and irreversible manner.

Performance Goals

- Eliminate U.S. surplus highly enriched uranium within approximately 20 years by down-blending the material to low enriched uranium for peaceful use as fuel for commercial reactors.
- Eliminate U.S. surplus weapons-grade plutonium within approximately 20 years by converting some of the material to mixed oxide fuel and some of the material to an immobilized high-level waste form.
- Implement a bilateral agreement with Russia to eliminate similar quantities of Russian surplus plutonium.

Strategies

- U.S. Highly Enriched Uranium (HEU) Disposition: Transfer quantities of surplus HEU or low-enriched uranium (LEU) derived from HEU to the United States Enrichment Corporation and the Tennessee Valley Authority to make LEU fuel for commercial reactors; over time, arrange for disposition of additional lots of surplus HEU through down-blending and commercial use; determine a path forward for the disposition of U-233.
- U.S. Plutonium Disposition: Implement the Administration's preferred hybrid strategy for plutonium disposition, following agreement with Russia. Complete the design, and construct three key U.S. plutonium disposition facilities for pit disassembly and conversion, immobilization, and mixed oxide (MOX) fuel fabrication; operate the Pit Disassembly and Conversion Facility to convert surplus weapons plutonium to an unclassified oxide form suitable for disposition and international inspection; operate the Immobilization Facility using the can-in-canister approach that immobilizes surplus impure plutonium in a ceramic material, which is then surrounded with vitrified high-level waste; operate the MOX Fuel Fabrication Facility to convert oxide material into a MOX fuel; and irradiate the MOX fuel in existing, domestic, commercial reactors.

- Russian plutonium disposition: Assit in conducting tests and demonstrations of plutonium disposition technologies with Russia; participate in U.S. government efforts to obtain a bilateral agreement with Russia for the disposition of surplus weapons plutonium; assist U.S. government efforts to secure international financing to support plutonium disposition in Russia; develop advanced reactor technology; accelerate efforts under the Expanded Threat Reduction Initiative; and initiate and assist in the design of plutonium disposition facilities to be constructed in Russia.

OBJECTIVE 6

Provide the U.S. Navy with safe, militarily-effective nuclear propulsion plants, and ensure their continued safe and reliable operation.

Performance Goals

- Ensure the safety, performance, reliability, and service-life of operating reactors.
- Develop new technologies, methods, and materials to support reactor plant design, including the next generation submarine reactor, which will be complete by FY 2004, and initiate detailed design efforts on a reactor plant for the next generation aircraft carrier, CVNX, construction of which will begin in 2006 and be complete by 2013.
- Maintain outstanding environmental performance—ensure no personnel exceed Federal limits for radiation exposure and no significant findings result from environmental inspections by State and Federal regulators.

Strategies

- Conduct planned development, testing, examination and evaluation of nuclear fuel systems, materials, and manufacturing and inspection methods to ensure Naval nuclear reactor plants are able to meet Navy goals for extended warship operation.
- Complete scheduled design, analysis, and testing of reactor plant components, and systems including performance analysis to ensure the operational safety and reliability of reactor plants for use in Navy nuclear powered warships so they can fulfill their national defense mission.
- Accomplish planned core and reactor component/system design and technology development efforts to support the Navy's acoustic requirements.
- Safely and responsibly inactivate shutdown, land-based reactor plants in support of the Program's and Department's environmental clean-up goals.

- Maintain a utilization factor of at least 90 percent for test reactor plants to ensure availability for planned tests of cores, components, systems, materials, and operating procedures and for scheduled training; and provide for development of servicing equipment to help ensure reactor safety and reliability.

- Maintain outstanding environmental performance through radiological, environmental, and safety monitoring and clean up of Naval Reactors facilities.

OBJECTIVE 7
Ensure the security of the Department's nuclear materials, facilities, and information assets.

Performance Goals

- Prevent unauthorized/undocumented loss of nuclear materials.

- Protect DOE classified and unclassified information assets.

- Reduce DOE site vulnerability and national energy emergency vulnerabilities.

- Consolidate DOE safeguards and security funding into a single line item budget.

Strategies

- Develop and implement plans and policies to enhance security.

  - Implement revised DOE protective force order which addresses planning, training, and exercises to prepare for a weapon of mass destruction event.

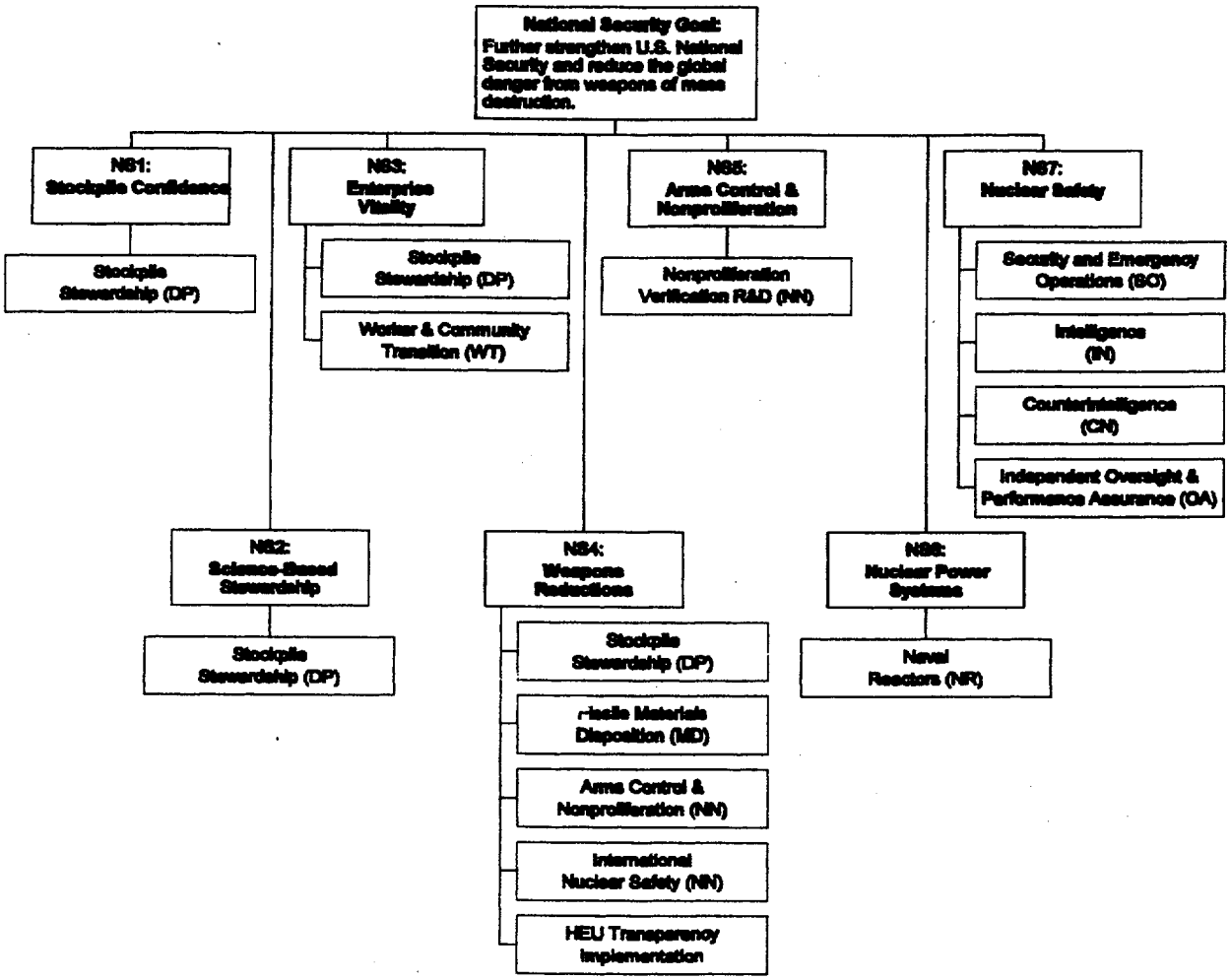
- Develop and implement cost-effective technical solutions to protect DOE's critical assets, which include special nuclear materials, classified information, and DOE facilities. Design and develop National Energy Sector technical methodologies to enhance the protection of the sector's critical infrastructure assets, for example, addressing stability, countermeasures, and inter-sector interdependencies. Implement the Cyber/Computer Security Program Plan.

  - Update and expand Departmental Cyber security policies.
  - Establish robust cyber security training curriculum..
  - Begin fielding consistent security protection mechanisms.
  - Monitor security events at all DOE sites and provide early warning of cyber threats.

- Maintain inventory control of plutonium (Pu), Highly Enriched Uranium (HEU), and waste.
  - Maintain baseline measurement uncertainty information on Pu and HEU inventories and identify where accountability information is inadequate.
  - Work with the Nuclear Regulatory Commission to maintain information on nuclear materials in waste.
  - Conduct validation and technical assessments on inventory data.
- Effectively maintain information on visits and assignments by foreign nationals to DOE Federal and contractor sites.
- Classification/declassification.
  - Audit documents declassified by other agencies to ensure that nuclear weapon design information is not inadvertently released.
  - Review DOE information to classify that which warrants protection in the interest of national security and declassify that which does not warrant such protection.
- Reduce DOE facilities' vulnerability to chemical threats through sensor development and chemical protective equipment.
- Demonstrate improvement of a comprehensive emergency management system to ensure effective Departmental response to all DOE emergencies. Maintain robust emergency response assets in accordance with Presidential Decision Directives, the Atomic Energy Act, Executive Order 12656, and Federal Emergency Plans.
- Conduct safeguards and security evaluations at 20 major sites and perform continuous cyber security inspections and no-notice reviews at 14 major Departmental sites to provide an independent assessment of the status of safeguards and security programs for the Secretary and to establish a baseline of findings.
- Perform regular assessments of emergency management programs at DOE sites.
- Strengthen the ability to manage safeguards and security as a specifically identified, direct-funded activity within the Security and Emergency Operations budget.

Linkage to Budget Structure

The National Security goal is supported by seven objectives. Each objective is being pursued through long-term strategies. The DOE's budget Decision Units fund work on those long-term strategies and the annual performance goals are discussed with the Decision Units in the Annual Performance Plan submitted with the budget for each fiscal year. The following chart shows which Decision Units support which objectives.

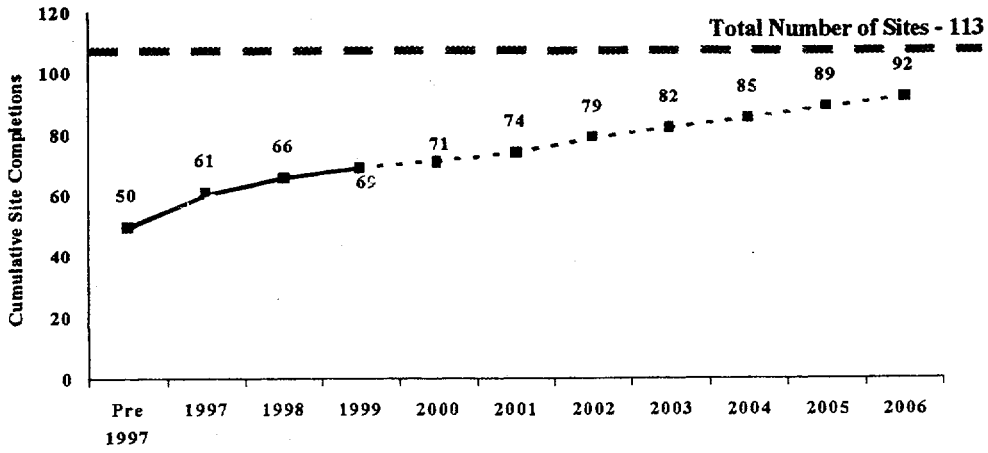


ENVIRONMENTAL QUALITY BUSINESS LINE

The Department of Energy is committed to honoring the Government's obligation to clean up sites across the country that supported the Nation's production and testing of nuclear weapons, to dispose of spent nuclear fuel from civilian nuclear power plants and of Department-owned spent nuclear fuel and high-level radioactive wastes, and to protect human health and the environment.

The nuclear weapons complex generated large amounts of waste, which pose unique problems, including vast volumes of contaminated soil and water, radiological hazards from special nuclear material, and a vast number of contaminated buildings and structures. Much of this massive infrastructure, waste, and contamination still exists.

The Department of Energy has made significant progress over the past decade in meeting the enormous challenge of cleaning up the nuclear weapons complex, resulting in substantially lower risks. As of the beginning of FY 2001, cleanup will be completed at 71 of the 113 geographic sites, leaving 42 to be completed.**



** As of the beginning of FY 2000, 44 geographic sites remained to be cleaned up (this includes the addition of the Waste Isolation Pilot Plant (WIPP), which is a disposal site). DOE plans to clean up 2 sites in FY 2000 (Grand Junction Office in Colorado and Columbus Environmental Management Project -- King Avenue in Ohio), leaving 42 sites remaining as of the beginning of FY 2001.

By 2006, the Department intends to complete cleanup at 21 of the remaining 42 sites. At the other 21 sites remaining after 2006, including our five largest sites, treatment will continue for the remaining "legacy" waste streams and management (including nuclear material stabilization and disposition) of legacy nuclear materials will continue. Long-term stewardship activities will be implemented to protect human health and the environment from hazards remaining at DOE sites after cleanup is complete.

In addition to the environmental legacy of nuclear weapons production, the United States has growing inventories of spent nuclear fuel from commercial nuclear power reactors currently stored at reactor sites in 33 States at 72 power plants and one commercial storage site. By 2035, the United States will also have accumulated 2,500 metric tons of spent nuclear fuel from reactors that produce materials for nuclear weapons, from research reactors, and from reactors on the Navy's nuclear-powered ships and submarines. Additionally, the byproduct of producing both the civilian and military fuels is some 700,000 metric tons of depleted uranium hexafluoride. Approximately 100 million gallons of high-level waste in liquid and sludge/slurry forms from the production of nuclear weapons are stored in underground tanks in Washington, South Carolina, and Idaho. Geologic disposal is the national strategy for the ultimate disposition of this spent fuel and of high-level radioactive waste. It is also the technical foundation for our international stance on nuclear nonproliferation, as well as a viable path forward for other materials such as excess fissile materials.

The Department has made substantial progress in characterizing Yucca Mountain, Nevada, to determine its suitability as a geologic repository site for these wastes. A viability assessment drawing on 15 years of study was completed in 1998. This assessment concluded that work should proceed toward a decision in 2001 on whether to recommend the site to the President. A draft environmental impact statement was published for public comment in 1999. If the site is recommended for development as the repository site, a final environmental impact statement will accompany the site recommendation.

Under current schedules, the work to support a Secretarial decision on whether to recommend the site to the President will be completed in 2001. This decision will consider the views of the State of Nevada, affected Indian tribes, and the Nuclear Regulatory Commission, as required by the Nuclear Waste Policy Act. In turn, the President will decide whether to recommend the site to Congress. If Congress agrees with the President's recommendation and the site is designated for continued development, the Department could submit a license application to the NRC in 2002 for construction authorization. Under current plans, emplacement of waste in the repository would begin in 2010.

Situation Analysis

The Department's Strategic Plan was developed concurrently with planning done since the *Accelerating Cleanup: Paths to Closure* was published in June 1998 (DOE/EM-0362). *Paths to Closure* provided a comprehensive picture of the cost, duration, scope and complexity of completing the environmental cleanup mission. These cost, schedule and scope projections are essential for better management – they provide critical information on technical activities, budgets, worker safety and health, and risk to inform regulators, state and local officials, stakeholders, Tribal Nations and others.

As part of the cleanup planning process, the sites' cleanup activities were organized into more than 400 discrete projects (which are described in Project Baseline Summaries). The sites developed detailed project baselines for their projects that define the overall cleanup requirements, specific cleanup milestones, critical interactions between projects, and costs over time. The sites' baselines, built from the individual project baselines are the foundation for the summary-level goals and objectives included in this Strategic Plan.

The geographic site completion goals in this Plan will be consistent with the budget and planning scenarios from here forward. At some sites, this plan assumes funding levels in excess of current funding levels due to increasing regulatory requirements. To meet the goals established in this Plan will require the resolution of several key factors including budgetary shortfalls, identification and implementation of technology solutions to cleanup problems, further definition and agreement on cleanup standards and end states, and improved efficiency and reduced costs.

The DOE Strategic Plan should be viewed as part of an ongoing planning process that will continue to evolve in response to stakeholder comments, programmatic decisions, changing circumstances, and future budgets Maintaining public trust and confidence is a vital part of moving the cleanup program forward. The public has been requested to help formulate a long-term approach to cleaning up the weapons complex and to engage in dialogue on overall site strategies and end states, compliance, integration, cleanup priorities, and records of decision for specific projects. Because expected funding levels are below projections, the Department will continue to work with stakeholders, regulators, state and local governments, and Tribal Nations about programs and activities at each of DOE's sites – and collectively make choices regarding priorities and needs.

The Department's repository site characterization effort has proven to be far more complicated and time-consuming than was envisioned when the Civilian Radioactive Waste Management Program was established, and the Department has had to respond to diverse technical, oversight, operational, budgetary, regulatory, and political challenges as they have evolved over time. The Department is engaged in litigation over its inability to begin waste acceptance by January 31, 1998, as originally envisioned in the Nuclear Waste Policy Act of 1982, and the Program's continued progress may be adversely affected by inadequate outyear funding.

Key External Factors

There are a number of factors external to DOE's full control that can influence our desired environmental outcomes. These include the following:

Funding. The site cleanup goals are based on funding levels needed to meet regulatory requirements. Lower funding could prevent site cleanup goals from being achieved as currently defined. The Department is faced with making significant trade-offs and will work closely with OMB, regulators, and other stakeholders to address compliance requirements and other high priority activities at the sites to establish the appropriate priorities.

The Department's schedule for the Civilian Radioactive Waste Management Program remains critically dependent on adequate program funding. Significantly reduced program appropriations could delay submittal of the license application to the Nuclear Regulatory Commission (NRC) and other critical milestones for the Yucca Mountain Site Characterization Project.

Regulatory Requirements. Environmental laws and regulations and Federal Facility Compliance Agreements drive the Department's cleanup decisions. Significant changes to the existing regulations could potentially impact achievement of the environmental quality strategic objectives.

The Environmental Protection Agency (EPA) is in the process of developing new Yucca Mountain-specific radiation release standards. The NRC and the Department of Energy are engaged in efforts to update their respective implementing regulations. The NRC may need to amend its proposed rule when the EPA issues its final standards. A new site-specific revision of the Department of Energy's siting guidelines (10 CFR 963) was issued for public comment in the Federal Register in the Fall of 1999. The Department intends to use its new repository siting guidelines as the planning basis for the next statutory milestone, the Secretary's decision on site recommendation.

Cleanup Standards/End States. The final end states for the cleanup effort are not fully defined at some sites. Decisions made regarding the extent of cleanup and cleanup levels at DOE's contaminated sites impact the program's cost, schedule, and scope. The decisions must also consider whether technologies are available and cost effective to address cleanup issues, the potential health risk to workers and other populations, and the possibilities of collateral ecological damage. Land use and cleanup strategies are inexorably linked. Proposed land uses affect the amount and type of cleanup. However, the range of possible land uses (i.e., residential, industrial, restricted) is determined by the feasibility of cleanup. The extent of long-term stewardship required at a site will reflect the end state developed in consultation among DOE and other representatives of the Administration, Congress, Tribal Nations, representatives of regulatory agencies, state and local authorities and other stakeholders.

Uncertain Work Scope. Uncertainties are inherent in the environmental cleanup program due to the complexity and nature of the work. The level of uncertainty varies by site depending upon the type and amount of cleanup required. For example, at some sites the precise nature and quantity of waste and materials is still unknown and suitable cleanup technologies have not yet been identified. Also adding to the uncertainty is the fact that work scope projections address timeframes well beyond the foreseeable future; at several sites the cleanup mission will continue another 40 to 50 years. Future program scope may also increase due to transfer of additional facilities and/or sites, further impacting the uncertainty of out-year work scope and schedules.

Availability of Technological Solutions. The development and deployment of innovative technologies will help meet national needs for regulatory compliance, lower life-cycle costs, and reduce risk to the environment and public health. Suitable cleanup technologies currently do not always exist, making it difficult to estimate cleanup scope and the associated costs.

Interagency Crosscutting Coordination

Successful achievement of our environmental quality objectives depends upon closely coordinated planning and the continuation of working relationships with a number of Federal agencies, State and local governments, Tribal Nations, private industry and Congress.

The Department negotiates and signs environmental compliance and cleanup agreements with the Environmental Protection Agency (EPA) and the state regulatory agencies, as appropriate. Key parameters, such as required cleanup levels, must be negotiated with the appropriate regulators and stakeholders for each site.

The Department has conducted numerous meetings with state, tribal, and stakeholder groups to discuss disposal options for mixed low-level radioactive waste (MLLW) and low-level radioactive waste (LLW) prior to making final disposition decisions. Successful implementation of the Department's long-term stewardship program will require close partnering with other Federal agencies, Tribal Nations, state and local authorities, and other stakeholders. Many of the institutional controls that will be required must be maintained and enforced by local governments.

The Department is engaged in continued formal and informal interactions with the Nuclear Regulatory Commission, the Environmental Protection Agency, and the Nuclear Waste Technical Review Board regarding the Civilian Radioactive Waste Management Program. In addition, the Program collaborates with the State of Nevada and local communities within the State on technical, policy, and operational issues.

Congressional & Stakeholder Consultations

The future viability of DOE facility clean-up depends on incorporating the divergent views of all concerned stakeholders into the decision-making process. All stakeholders, including States, other government agencies, Congressional members, local citizens, environmental groups, other interest groups, members of academic institutions, various DOE offices, regulators, and Tribal Nations, must become true partners in ensuring that cleanup is conducted in the safest, most efficient, and most cost-effective manner possible. Each DOE Operations and Field Office has specific points of contact for public participation; some also have liaisons for budget and tribal issues. Stakeholders are called upon to help with the establishment of goals and strategies as well as afforded several opportunities to provide input during the applicable document review and comment processes.

Similarly, the Civilian Radioactive Waste Management Program's implementation of the Nuclear Waste Policy Act requires frequent formal and informal interaction with Federal regulatory agencies, the Congress, the State of Nevada, affected units of local government, and diverse Program stakeholders consisting of environmental groups, technical and professional organizations, policy groups, electric utilities and Tribal Nations. Each Program milestone presents opportunities for public participation and consultation, and many key Program actions are subjected to the formal public comment process.

In addition, the Department works with the Defense Nuclear Facilities Safety Board (DNFSB) to implement recommendations relating to activities at the Department's defense nuclear facilities affecting nuclear health and safety. The Department solicits advice and guidance from the Environmental Management Advisory Board (EMAB) on a wide variety of topics relating to the management of the EM program. The EMAB's membership consists of State and local government representatives, technical experts, and stakeholders. The Department also solicits advice from its Site Specific Advisory Boards, which have representatives at 11 sites. The Boards provide consensus advice and recommendations to the Department's environmental restoration and waste management activities.

Program Evaluation and Analyses

A program evaluation process is the foundation for the cleanup objectives, strategies, and performance goals reflected in this plan. The focus is on the period through 2006 where there is a well-defined context for addressing cleanup challenges. The details supporting the cost, schedule, and scope estimates decrease further out into the future such that beyond 2006, the estimates are at a planning level and are based on high-level assumptions, which have greater uncertainty because they address time periods beyond the foreseeable future. While a life-cycle perspective is still provided, the emphasis is on the near-term through 2006 – where there is a reasonable context for addressing cleanup challenges.

The Department's recent effort to institute a new portfolio approach to managing Environmental Quality Research and Development (R&D) provides a complete and comprehensive picture of the R&D investment and provides the basis for analyzing, planning, and budgeting the research that will be needed in the future.

Future Evaluations: The Department's environmental management corporate performance measures data are aggregated by project to the site level, to the Operations/Field Office level, and to a total program level, as applicable to provide a complex-wide assessment of program results. At each level of the organization, performance goals are tracked, evaluated and interpreted to determine corrective actions and to assess areas requiring improvement. The Operations and Field Offices have contract management practices for evalution and review in place to evaluate and hold contractors to high performance standards. The Department evaluates progress and results against its objectives and performance measure goals during monthly and quarterly reviews. At each level of the organization, performance goals are tracked, evaluated, and interpreted to determine corrective actions and to assess areas requiring improvement.

Complementing statutory external reviews by the Nuclear Waste Technical Review Board (NWTRB), the Office of Civilian Radioactive Waste Management conducts bimonthly, in-depth reviews of Program activities, schedules, and expenditures.

Resource Requirements

The Department will only achieve its goals and objectives with adequate financial, human, infrastructure, technical, and information resources. In developing this Plan, the Department made the following assumptions:

- Performance goals for geographic site completion are in some cases are higher than projected budgets;

- Environmental cleanup information resources will be based on the requirements established for the Integrated Planning Accountability and Budgeting System (IPABS-IS);

- Science and technology investments will provide the scientific foundation and new technologies and approaches that bring about significant reductions in risk, cost, and schedule for completion of the cleanup mission.

- A highly-skilled workforce, both at Headquarters and the Field, currently exists. However, there is a need to supplement that workforce with technical program and project managers with experience in project management and project sequencing. There is an additional need for technical experts that can effectively evaluate technical approaches and project scope, and consistency and trends across the complex for large scale construction and remediation projects. The Department continues to review "skill mix" requirements to best accomplish its mission and maintain a technically capable workforce.

GENERAL GOAL

Aggressively clean up the environmental legacy of nuclear weapons and civilian nuclear research and development programs at the Department's remaining sites, safely manage nuclear materials and spent nuclear fuel, and permanently dispose of the Nation's radioactive wastes.

This Environmental Quality goal is supported by six objectives. These objectives are closely aligned with the Department's budget structure. The first three objectives relate specifically to the cleanup and closure of sites that were responsible for nuclear weapons production. The objectives differ primarily by the grouping of the cleanup sites based on a 2006 closure date. The first two objectives focus on near-term (2006) site cleanup and closure while the third objective focuses on long-term (post-2006) cleanup activities. The strategies supporting these three objectives are essentially the same. Rather than repeat the same (or similar) strategies for each of the first three objectives, this Plan presents the objectives first, followed by the strategies. Any differences in strategic approach are noted. This commonality also applies to measuring interim progress on these objectives through corporate performance measures. Key corporate performance measures are used to track the progress and results at each site against these objectives. Followed by the discussion of strategies, we list these key corporate performance measures with specific targets from FY 2001 to FY 2006.

The geographic site cleanup and closure dates listed in this plan are from FY 2001 through life-cycle completion. The closure dates align with EM's budget structure (i.e., Site Closure, Site/Project Completion, and Post-2006 Completion) with the exception of several small sites that for administrative purposes are listed under objective 3, post 2006 completion.

OBJECTIVE 1

Clean up and complete closure of the designated closure sites by 2006, with stewardship activities continuing.

Performance Goals

These sites/facilities will have the cleanup completed and will be closed down. There will be no enduring Federal presence on site, except for stewardship activities. Specific performance goals are to be determined for the final Strategic Plan.

OBJECTIVE 2

Complete all environmental cleanup projects at the majority of sites by 2006, where DOE's mission will continue.

A Site is Considered "Complete" (or at its End State) When:

- Deactivation or decommissioning of all facilities in the cleanup program have been completed, excluding any long-term surveillance and monitoring;
- All releases to the environment have been cleaned up in accordance with agreed-upon cleanup standards;
- Groundwater contamination has been contained, or long-term treatment or monitoring is in place;
- Nuclear material and spent fuel have been stabilized and/or placed in safe long-term storage; and
- "Legacy" waste (i.e., waste produced by past nuclear weapons production activities, except high-level waste) has been disposed of in an approved manner.

Activities that May Exist After Completion of a Site Include:

- Ongoing mission activities that are supported by other DOE programs;
- Long-term storage of stabilized waste/material;
- Groundwater treatment and/or monitoring;
- Long-term surveillance and monitoring of the site;
- Contract close-out activities

Performance Goals

This objective is intended to reduce outyear costs by completing projects as soon and as efficiently as possible. These sites have a future DOE mission. Specific performance goals are to be determined for the final Strategic Plan.

OBJECTIVE 3
Make substantial cleanup progress at the sites that will not be completed by 2006, including the three largest sites.

Performance Goals

The objective is to accelerate cleanup and project completion at sites where cleanup activity will continue beyond 2006. This objective is intended to reduce outyear costs by completing projects as soon and as efficiently as possible. At these sites, treatment will continue for the remaining "legacy" waste streams. These sites include the largest cleanup projects: Hanford Site in Washington; Oak Ridge Reservation in Tennessee; Savannah River Site in Couth carolina; and Idaho National Engineering and Environmental Laboratory in Idaho. Specific performance goals are to be determined for the final Strategic Plan.

Strategies

- Restore the environment and deactivate and decommission inactive contaminated facilities at our closure sites, at those sites where cleanup will be completed but DOE's mission will continue post 2006, and at our post 2006 completion sites.

  - Ensure surplus nuclear facilities are secure in a safe and stable condition, including removal of materials, and shut down of facility systems.
  - Safely dismantle facilities, including the removal of contaminated building materials and residue waste, waste treatment, and final disposition of the facilities, which may include complete destruction, release for future use, or entombment in place.
  - Clean up or contain radioactive and/or hazardous materials and pollutants in the soil, groundwater, and surface water, focusing on identifying, containing, remediating, and removing contamination and validating that environmental remediation has achieved the desired end state.
  - Where appropriate, ultimately release land to the public for beneficial reuse.

- Manage, contain, and dispose of waste and materials using a complex-wide integrated approach at our closure sites, at those sites where cleanup will be completed but DOE's mission will continue post 2006, and at our post 2006 completion sites.

  - Integrate waste management programs across the DOE complex by consolidating waste storage, treatment and disposal facilities and use the best business and technology options

to maximize efficiency, reduce environmental risks and costs of operations. Waste will be treated, stored, and disposed consistent with environmental laws and regulations.
- Develop disposition paths for all waste streams and move waste down these paths as quickly as possible.
- Continue to dispose of DOE low-level and mixed radioactive waste primarily at existing disposal facilities although the Department, with stakeholder participation, will consider alternative disposition paths that are more cost effective while still protective of the public and the environment.
- Continue to ship transuranic waste to the Waste Isolation Pilot Plant (WIPP) for disposal, and continue vitrification operations to produce disposal-ready high level waste canisters.
- Continue to minimize generation of new waste, and re-use and recycle where possible to accomplish pollution prevention goals.
- Ensure safe handling and storage of waste in addition to maximizing isolation to reduce risks.
- Treat, store and dispose of High Level Waste in a manner that is safe to humans and the environment, cost effective and in compliance with all applicable environmental regulations.
- Develop and plan for nuclear material disposition streams that provide safe handling, stabilization, storage, and disposition of nuclear materials.

- Safely and effectively manage Spent Nuclear Fuel (SNF).

  - Safely & effectively interim store Spent Nuclear Fuel (SNF) prior to final disposition.

- Build public confidence and involve our stakeholders by providing a range of public participation opportunities tailored to meet the needs and interests of various segments of the public.

  - Solicit assistance in identifying problems, issues and alternative approaches from national, regional, State and local regulators, Tribal Nations, and stakeholders to accomplish the environmental management mission.
  - Ensure that Congress, regulators, Tribal Nations, and other stakeholders have a clear understanding of what the cleanup mission will "produce" and clarify that there is an attainable end point.
  - Set realistic expectations and show interim successes and results.
  - Assure regulators, Tribal Nations, and stakeholders that DOE will not walk away from its enduring surveillance and monitoring long-term stewardship obligations.

- Develop an effective environmental stewardship program at our closure sites and also at those sites where cleanup will be completed but DOE's mission will continue.

  - Provide for smooth transition from cleanup to long-term stewardship through technical, financial, and managerial planning.
  - Ensure continued protection of human health and the environment by monitoring residual hazards and maintaining containment solutions.
  - Work with local communities to ensure that potential receptors do not disturb remaining hazards.

- Maintain the safety and health of our workforce as our highest priority.
  - Do not perform work unless it can be performed safely.
  - Strive to continuously improve safety and health performance and monitor performance through periodic management reviews.
  - Hold EM managers accountable for safety and health performance.

Corporate Performance Measures for Cleanup and Closure

FY2001-FY2006

[THESE WILL BE DISPLAYED IN GRAPHIC FORMAT]

- Complete xx release site cleanups, increasing the number of release site cleanups to xx (xx%) out of a total inventory of xx release sites.
- Decommission xx facilities, increasing the number of facilities decommissioned to xx (xx%) out of a total inventory of xx facilities.
- Deactivate xx facilities, increasing the number of facilities deactivated to xx (xx%) out of a total inventory of xx facilities.
- Ship approximately xx cubic meters of transuranic waste to the Waste Isolation Pilot Plant (WIPP). This completes about xx% of the total volume of TRU waste that requires disposal.
- Dispose of xx cubic meters of Mixed Low Level Waste (MLLW). This completes about xx% of the total volume of MLLW that requires disposal.
- Dispose of xx cubic meters of Low Level Waste (LLW). This completes about xx% of the total volume of LLW that requires disposal.
- Produce xx canisters of High Level Waste (HLW). This completes about xx% of the total number of canisters of HLW that will be produced.
- Make disposition ready xx containers of plutonium metals/oxides/other. This completes about xx percent of the plutonium metals/oxides/other that will be made disposition ready between FY 1997 and FY 2070.
- Move to dry storage xx Metric Tons of Heavy Metal (MTHM) of Spent Nuclear Fuel (SNF). This completes about xx percent of the MTHM of SNF that will be moved to dry storage.
- Treat for stabilization/disposal about xx MTHM of SNF. This completes about xx percent of the MTHM of SNF that will be treated for stabilization/disposal.
- Complete waste, nuclear material/spent nuclear fuel construction projects and infrastructure upgrades that further EM's mission including the xx projects. (Include significant examples).

OBJECTIVE 4

Complete the characterization of the Yucca Mountain site and, assuming the Secretary recommends it for development as a repository and the President and Congress approve, obtain requisite licenses, construct and begin emplacement of spent nuclear fuel and high-level radioactive wastes in the repository in FY 2010.

Performance Goals

- Prepare and determine whether to submit site recommendation to the President in FY 2001.
- If recommended and approved by the President and Congress, integrate plans for disposal of defense and civilian R&D waste into the baseline in FY 2002.
- If approved by the President and Congress, prepare and submit a license application for construction authorization to the Nuclear Regulatory Commission in FY 2002.
- Commence major transportation activities in 2005.
- Commence repository operations in 2010.

Strategies

- Select the reference design and the reference natural systems models for site recommendation and license application in FY 2000. Complete a Yucca Mountain Site Recommendation Consideration Report that will provide the technical basis for a possible Site Recommendation and conduct public hearings on this report in FY 2001. Issue a Final Environmental Impact Statement as required by the Nuclear Waste Policy Act (this also meets a milestone in an FMFIA corrective action plan), and finalize a Site Recommendation Statement for the Secretary of Energy to submit to the President, and then to the Congress in FY 2001.
- Fully integrate plans for disposal of the Department's high-level radioactive waste and spent nuclear fuel generated by nuclear weapons, Naval nuclear propulsion, civilian nuclear research and development, and weapons production-usable fissile materials programs into the OCRWM Program baseline and planning process. Complete technical analyses for Department-owned and Naval spent nuclear fuel and high-level radioactive waste and plutonium waste forms in FY 2002 to support the repository license application.

- Complete all testing and analysis requirements to support the license application design, complete that design, and develop and submit an application to the Nuclear Regulatory Commission for authorization to construct a repository at the Yucca Mountain site in FY 2002. We will then support hearings before the Nuclear Regulatory Commission related to license application.

- Submit a license application amendment to the Nuclear Regulatory Commission to receive and possess wastes in FY 2008 and begin emplacement of waste in the repository in 2010.

OBJECTIVE 5
Manage the material and facility legacies associated with the Department's uranium enrichment activities.

DOE is responsible for the long term management of more than 700,000 metric tons of depleted uranium hexafluoride. This material was generated as a byproduct of the uranium enrichment process used to support the nuclear weapons complex and the civilian nuclear power industry.

Performance Goals

- By 2005, complete the construction of and begin operating the facility or facilities for converting depleted uranium hexafluoride to a more stable form.

- Maintain the inventory of depleted uranium hexafluoride without any exposure to any members of the public and with no significant impact to the environment.

- By 2005, identify viable commercial / industrial uses for depleted uranium.

Strategies

- Work with state, local and Federal regulators to ensure that the storage and maintenance of the Department's inventories of depleted uranium hexafluoride is conducted in a safe and efficient manner that protects the public and the environment.

- Manage the development and implementation of a long-term strategy for the conversion and disposition of depleted uranium hexafluoride in a manner that uses the conversion products and disposes of the remainder at the lowest achievable cost to the taxpayers.

- Manage arrangements with the United States Enrichment Corporation (USEC) on the lease of facilities and electric power supplies, and reimbursable services.

- Conduct basic research that will encourage innovative uses of depleted uranium by industry and government. Work with regulators to reduce the barriers for these uses.

OBJECTIVE 6
Improve scientific understanding and develop and deploy innovative technologies that reduce cost; are more protective of workers, the public, and the environment; and resolve currently intractable problems.

Performance Goals

By 2006:

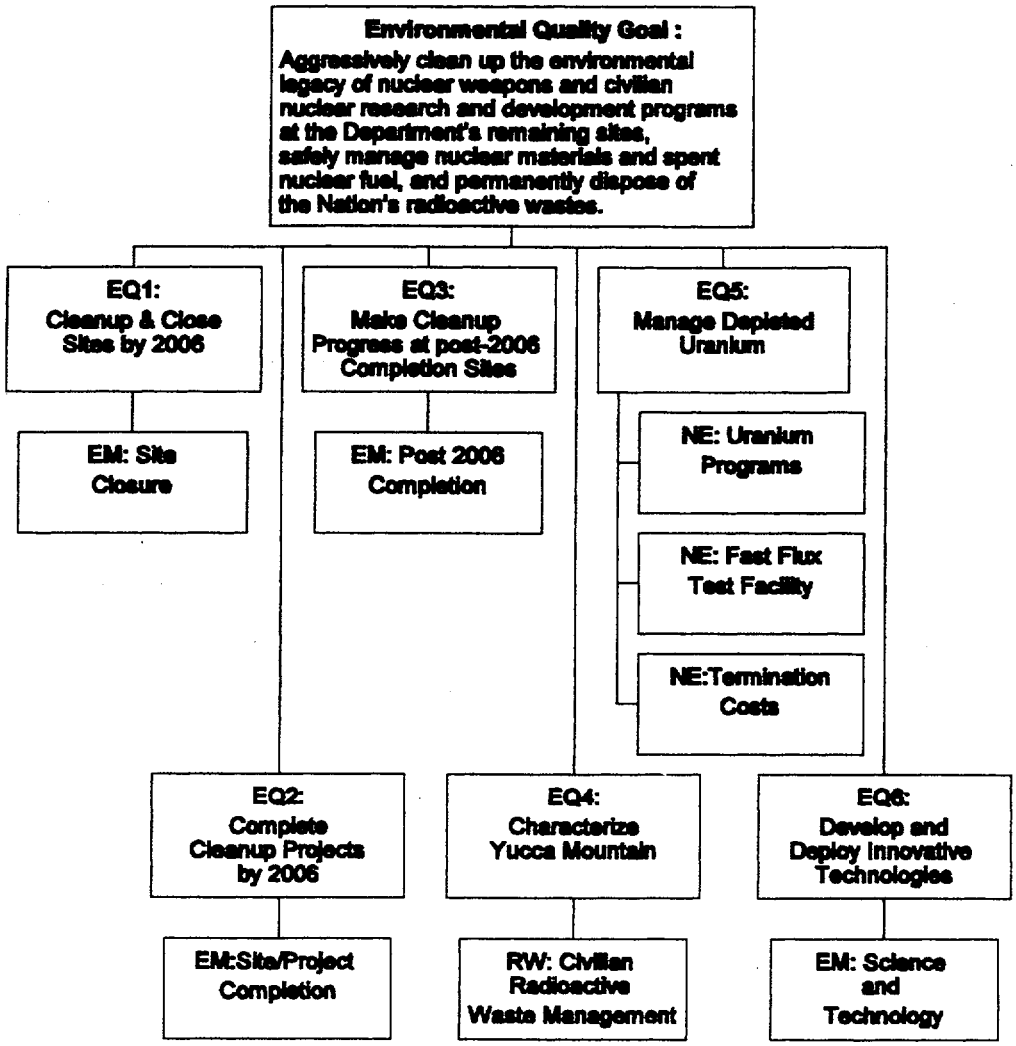
- Deploy over 300 innovative technologies to either improve or enable cleanup efforts.
- Eliminate over 200 of the high priority science and technology needs identified in the cleanup projects.
- Reduce the technical risk of the higher risk waste streams and facilities by 20%.
- By 2005, complete a preconceptual design for an accelerator transmutation of waste (ATW) system that is based on actinide burning in a subcritical reactor.

Strategies

- Provide the full range of science and technology resources, from basic research to technology development to technology demonstration to technical assistance supporting implementation.
  - Focus basic research primarily on environmental problems that will remain post 2006.
  - Provide the technical assistance needed to implement innovative technology and verify technical performance.
- Focus science and technology activities so they are solution driven.
  - Support implementation decisions, create solutions to difficult problems, enable actions that significantly reduce cost and duration of cleanup while maintaining or enhancing safety, or fundamentally transform the nature of the problem.
  - Enhance teams that focus on the Department's major problem areas with the best talent in DOE and the national science communities to form "centers of expertise."
- Function as a fully integrated partner with the cleanup programs at all levels.
  - Link all science and technology investments and activities directly to cleanup program goals.
  - Collaborate with relevant programs in agencies and industry to leverage knowledge and innovative technologies.
  - Develop advanced spent fuel treatment technologies that will reduce the volume of spent nuclear fuel and other radioactive waste that must be disposed.

Linkage to Budget Structure

The Environmental Quality goal is supported by six objectives. Each objective is being pursued through long-term strategies. The DOE's budget Decision Units fund work on those long-term strategies and the annual performance goals are discussed with the Decision Units in the Annual Performance Plan submitted with the budget for each fiscal year. The following chart shows which Decision Units support which objectives.



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SCIENCE BUSINESS LINE

The Department of Energy's investments in science are investments in America's future. Over the last century, our Nation's economic prosperity, quality of life, and security stemmed from strong public commitments to basic research. Most experts agree that publicly funded science is expected to take on even greater importance in the coming century, filling vital needs in knowledge not readily addressed by the normal workings of the marketplace, and providing critical foundations for the technology breakthroughs of the future.

In their evaluation of Federal research programs, the Committee on Science, Engineering, and Public Policy (COSEPUP), conducted under the auspices of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, affirmed that public investment in research yields four distinct benefits: knowledge advancement, knowledge application, human capital development, and mission advancement. As the Nation's third largest government sponsor of basic research, DOE's investments push the envelope even further, attempting to unravel some of the most complex and stubborn mysteries in the *physical, computational, biological, and environmental* sciences.

Powerful accelerators, light sources, neutron beam facilities, plasma and fusion science facilities, genome centers, and advanced computational centers are just some of the major instruments of science that distinguish DOE's capabilities and enhance the Nation's science base. DOE's valuable contributions in science, along with that of its predecessor agencies, is partially reflected through its support to 68 Nobel Laureates from 1934 through 1998.

Against this backdrop, the principal focus and motivation for DOE's science program is to advance new options for clean and affordable energy; pursue understanding of the underlying phenomena and create new options for managing the adverse health and environmental impacts associated with energy production and use; seek deep insights into, and possible new ways to control energy and matter; and equip our Nation with the premier instruments of science and the corresponding scientific workforce that will assure our continued leadership, prosperity, and security well into the next century.

Situation Analysis

Global Leadership. The President's Committee of Advisors on Science and Technology (PCAST) issued a report in June 1999, stating, "U.S. interests and values at stake in energy can only be effectively addressed in a global context." The COSEPUP evaluation affirmed that the United States has been and should remain among the world leaders in all major fields of science. Through international interaction, U.S. scientists can understand, participate in, and capitalize on

the expansion of the frontiers of human knowledge. The trend within the scientific community toward international collaboration on large, fundamental science projects also enables U.S. scientists to interact with and benefit from the international community.

Economic Benefit. During the 20th Century there have been many scientific discoveries that create new opportunities for entrepreneurs and innovators to build spin-off or related industries. Scientific breakthroughs sponsored by DOE have played a key role in many of these new businesses and industries. U.S. economic interests in technology innovation include expanding the market share of U.S. companies in the multi-hundred billion dollar per year global energy technology market. Business can now be conducted worldwide with a few strokes of a keyboard as a direct result of communications protocols developed by the computing sciences and high energy physics communities with whom DOE is a partner. New private sector commercial activities have arisen in such public research areas as:

- Hydrogen-based energy systems
- High-temperature superconducting wires and devices
- Teraflop computers that set world benchmarks for speed
- Medical diagnosis and imaging technologies
- Biomolecular design based on DNA sequencing
- Portable energy storage
- Ion beam and plasma technology

Scientific Complexity. The scientific issues of the future are considered more complex and difficult to address than those faced in the past as we extend further beyond the natural carrying capacity of our environment and must turn to science and technology for solutions. Meeting the challenges of the future will often require entirely new approaches and options—not just evolutionary and incremental changes in technology. Rapidly expanding economies in developing nations and population growth will increase the global use of energy, and many of these energy sources have significant adverse environmental consequences on local, regional, and global scales.

Basic energy research is needed as a foundation for improved technologies to provide alternative forms of fuels; seek out new supplies of traditional fuels; convert known fuels to more efficient, environmentally benign forms; and generate, store, and transmit electricity with less waste. Fundamental science is also needed to track pollutants through their intricate interactions with the environment and to uncover new ways to dispose of toxins and climate-changing greenhouse gases.

Advances in scientific computation can enhance global climate modeling in order to analyze energy use and to test mitigation strategies. Unraveling the human genome and understanding the cellular environment can provide improvements in human health. And, if the Nation's future is to be more secure, new approaches are required to detect and analyze chemical, biological, and nuclear threats rapidly. Understanding and managing these complex challenges will require cross disciplinary approaches.

Management Challenges

Scientific Excellence. The imperative for the science community has never been greater to deliver the most valuable research within available budgets. With reduced industry investment in long-term basic research, government agencies are being called upon to deliver more for less and to assume more of the burden for the long-term well-being of the Nation's science interests. Ensuring performance is another matter. Both the Administration, through the report of the Committee on Science, Engineering, and Public Policy (COSEPUP) of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, *Evaluating Federal Research Programs (1999)*, and the Congress recognize limitations in the use of quantitative measures for basic research, favoring instead expert review as "the most effective mechanism for evaluating the quality, leadership, and relevance of research (especially basic research) performed and funded by Federal agencies."

DOE's approach for ensuring scientific excellence and maintaining the pulse on emerging trends and needs in science centers on the management and use of rigorous peer reviews and on scientific advisory committees. While recognized by many to be among the best and most thorough processes in the field of public research, it is a continued high priority to manage these processes well and to search out improvements and refinements that will further strengthen these quintessential scientific management tools.

Multidisciplinary Research. The need for greater cooperation and synthesis across programs and discipline boundaries has become apparent as the impact of science on society continues to grow and as the complex nature of the pressing scientific questions escalate. This evolution in multidisciplinary research requires new skills and perspectives of interdisciplinary scientists. The framework forming the backbone for this strategic plan and for the science portfolio has already resulted in various crosscutting initiatives. Those and similar initiatives hold the keys to some of the most promising future areas of science.

International Collaborations. Trends toward international collaboration raise issues regarding the appropriate roles and responsibilities of participating nations. If DOE is to be perceived by the international community as a dependable research partner, the Department must receive sufficient, long-term, stable, political and budgetary support to enable long-term science commitments, or risk being excluded from important collaborative ventures that are in our national interest.

Integration of Science and Applied Research. A continuing issue centers on DOE's need to achieve greater integration between basic and applied research programs. Highly participatory strategic planning processes, the development of science and technology roadmaps, and coordinated workshops that focus on integration all help strengthen the linkages between science and its potential beneficiaries.

Coordination Between Headquarters and Field Elements. Recent events have highlighted the necessity for greater coordination between DOE headquarters and its field elements. A new Department-wide alignment is intended to strengthen these relationships, bring clarity to roles and responsibilities, and improve communications. DOE's science management has taken the initiative to accelerate both the needed dialogue and the corresponding planning that will enable administrators and scientists throughout the complex to operate in a seamless, connected way.

External Factors

Federal Budget. Despite large-scale downsizing and government-wide budget cuts over recent years, both the White House and the Congress have consistently supported science programs, reflecting the widely-supported view of the value of basic research to U.S. competitiveness and long-term national interests. Some Federal programs and agencies have done better than others, but the budgets of most Federal programs and agencies have remained at least stable, and many have accommodated at least some modest growth when viewed against inflation. Continued and possibly expanded support is expected for science when viewed against such factors as: a 38 percent decline in private sector R&D spending by the 112 largest U.S. electric utilities between 1993 and 1996; world energy consumption projected to increase by four times the current levels within the next century; and the accelerating pace of scientific discovery and technological advancement, and with it, fierce international competitiveness for marketshare. Continued support for DOE's science programs is anticipated, with modest increases expected over the near-term.

Energy and Environmental Issues. President Clinton requested that the 1997 report from PCAST on the Nation's energy R&D portfolio "address its energy and environmental needs for the next century." In turn, the science program launched a more detailed portfolio review effort, one based on a strategic framework informed by over a hundred of the Nation's leading scientists, technologists, planners, and futurists. One of several important themes that emerged as part of this planning process was the science behind global climate change, an important energy and environmental issue and a controversial matter for policy-makers. Although there appears widespread support for the underlying phenomenon within the scientific community, many scientific questions remain unanswered and, in the absence of this information, there are widely divergent views within the Congress. Such polarization affects the pace of any corrective actions. Nevertheless, the recent trend toward severe weather faced by much of our Nation and rising global temperatures provide insights into possible futures of worsening situations and impetus that raises public consciousness regarding the global climate.

Interagency Crosscutting Coordination

Throughout DOE's biological and environmental research, computational disciplines, and basic energy sciences, there is extensive interagency coordination on crosscutting activities, extending, but not limited, to the National Science Foundation, National Institutes of Health, National Aeronautics and Space Administration, and Department of Defense. Multi-agency initiatives, such as those related to climate change, are "government-wide," and members of the Administration's National Science and Technology Committee, as DOE is, are able to ensure interagency cooperation and coordination and non-duplicative efforts. Additional information about the coordination and crosscutting activities with other Federal, State and local agencies is available in Appendix A.

Congressional & Stakeholder Consultations

The framework for the Science business line resulted from two national workshops held early- and mid-1998 at which more than a hundred leading scientists, technologists, high-tech managers, science communicators, and futurists participated. Participants were invited from laboratories, other government agencies, Congress, DOE offices, and academic institutions. During post-workshop development of the strategic framework, the Director of DOE's Office of Science engaged in numerous conversations with the scientific community, the Congressional committees of jurisdiction, Office of Management and Budget, and broader stakeholder communities.

As the strategic planning progressed, interim versions were posted on the web, and broad based review and feedback were encouraged. Finally, DOE's major science advisory committees were briefed on the evolving framework and their responses were factored into the final version.

Program Evaluation and Analyses

DOE's science advisory committees and an extensive peer review process provide the cornerstone for self-examination and program evaluation. Additionally, DOE has embarked on several important complementary exercises, including a detailed examination of the science portfolio, and development of four separate roadmaps. The science portfolio and corresponding analysis was designed to serve three purposes:

- Connect science programs and activities with the fundamental questions that they address, and articulate the motivation and importance behind these questions.
- Illuminate and capitalize on the connections and opportunities at the boundaries of science disciplines, recognizing that now, and increasingly in the future, advancing the frontiers of science requires multidisciplinary approaches and capabilities.
- Define near-term, next steps on the path forward to tackling some of the major scientific challenges that lie ahead.

The science roadmaps serve to analyze and address high priority research areas and opportunities at a much finer level of planning specificity.

Resource Requirements

Program Budget. With the modest increase over the past three years in the scientific research budget, the Department has been able to selectively fund high priority new initiatives while preserving, with some shifts in emphasis, the core research activities.

In the foreseeable future, the need to keep pace with advancements in science will require substantial modifications to existing instrumentation and, in many cases, completely new facilities. The associated additional costs cannot be accommodated within a largely level funding base without significant adverse consequences for our research programs and support for the Nation's scientists.

Human Resources. Two important human resource issues are anticipated to strongly influence our science programs in the years to come. Each of these presents vulnerabilities and challenges that must be addressed. One issue is essentially a microcosm of the other.

On the larger scale, a recent study by the National Science and Technology Council projects notable shortfalls in the science and technology workforce of the future, problems that will affect both the private and public sector research communities. DOE co-chaired this study and will be proactive in helping to implement some of the solutions.

On a more local scale, but perhaps the item of more immediate concern to DOE's Science program, an alarmingly high percentage of Federal science program managers are already at retirement age or within one to two years of being eligible. This situation creates a high risk for the Science Program that has been difficult to address until now because of inherently lean operations and externally imposed staffing constraints that have limited the ability to create an effective plan for successorship. At risk is the critical experience in managing large, complex scientific programs, as well as vital institutional and historical knowledge vested with these senior technical staff. Because the exodus of these employees is likely to be concentrated over a short period of time, it remains a challenge to achieve the desired smooth transition to a younger workforce.

Information and Technology. Undoubtedly, the continuing push toward a more seamless, connected science establishment will be aided by further advances in computation and communication. Opportunities for laboratory collaboration, remote experimentation, scientific simulation as a potential substitute for more costly experimentation, and sharing and access to vast quantities of scientific data and information will continue to place demands on computation and communication capabilities within the science programs.

GENERAL GOAL

Produce remarkable insights into our physical and biological world and the nature of matter and energy, advancing the basic research and instruments of science that are the foundations for DOE's applied missions and a base for U.S. technology innovation.

OBJECTIVE 1
Fuel the future with science for clean and affordable energy.

Performance Goals

- Hydrogen-related surface chemistry that leads to efficiency gains for hydrogen production and storage, and increased use of hydrogen both as a primary fuel and in fuel cells.
- Advances in the synthesis of superconductivity materials that may lead to superconducting devices capable of operating at temperatures above 100* k, magnetic fields above 4 tesla, or currents above 100,000 amps per square centimeter for more efficient overall systems for the storage and transmission of electric power.
- More adaptable, higher-resolution seismic instrumentation, including new sources and detectors, and improved computer algorithms for tomographic imaging of hydrocarbon reservoirs and subsurface transport pathways.
- Better electrolyte chemistry and improved understanding of ion solutions and surface chemistry that lead to longer-lasting, higher-capacity, rechargeable batteries—even thinner and lighter than plastic wrap.
- New metals and ceramics designed at the atomic level and capable of withstanding even greater levels of severe physical and chemical stresses and extremes of temperatures, leading to applications in manufacturing processes and power production.

Strategies

- **New Fuels.** Advance the science for the development of new and improved sources of domestic fuels, with research emphasis on chemistry and materials science for energy conversion; plant, microbial, and solar conversion sciences; and geosciences.
- **Clean and Affordable Power.** Explore the science that will lead to advanced generation, storage, and transmission of electricity, with research emphasis on metals, ceramics, and condensed matter physics; electrochemical sciences; and plasma science and fusion research.
- **Efficient Energy Use.** Develop the scientific foundations for cleaner, safer, and more efficient energy use, with research emphasis on combustion science, advanced materials for efficiency, engineering sciences, and new catalysis and chemical transformations.

OBJECTIVE 2
Protect our living planet with scientific understanding of energy impacts on people and the biosphere.

Performance Goals

- Improve the spatial resolution of climate models used to simulate the dynamic behavior of the earth's ocean-atmosphere system from the current 300km x 300 km to 150 km x 150 km.
- Improve the atmospheric transport and transformation models used to accurately and quantitatively predict the distribution and concentration of pollutants emitted from energy technologies into the atmosphere.
- Modify at least five microbes or microbial enzymes for potential use in cleaning up radioactive wastes, toxic pollutants, or to modify and upgrade fuel stocks.
- Improve the accuracy of biogeochemical models used to simulate both the net amount of carbon dioxide that is exchanged between the atmosphere and major terrestrial ecosystems each year and how much the net exchange is or would be affected by changes in the types of vegetation or the way the land is used.
- Improve understanding of the biomolecular effects of low-dose radiation, including genetic factors that determine individual sensitivity, to improve the scientific basis for protecting people and the environment from exposure to hazardous energy by-products.
- Develop at least five new radiopharmaceuticals and the associated instrumentation needed for the precise imaging of gene function in the body, for the diagnosis of cancer, brain function and heart diseases, for the staging of surgery, and for the monitoring the progress of disease therapy.

Strategies

- **Sources and Fate of Energy By-products**. Improve our scientific understanding of the sources and fate of energy by-products, with research emphasis on sources and transport in the biosphere, and chemical interactions and transformations.
- **Impacts on People and the Environment**. Provide a basic understanding of the biology and ecology of energy by-products as they affect humans and the natural world, with research emphasis on human health impacts and risks; ecosystem and biological responses; and regional and global consequences.

- **Prevention and Protection.** Create new science-based approaches that minimize energy by-products and protect the biosphere and human health with research emphasis on pollution minimization, cleanup and remediation, carbon sequestration, and health protection regulation and medical research.

OBJECTIVE 3
Explore matter and energy as elementary building blocks from atoms to life.

Performance Goals

- Confirmation of the existence of the Higgs boson or bosons and the first supersymmetric particles.
- Preparation of a coherent model of the origin and fate of the universe, supported by and consistent with observations of neutrino mass, cosmic background radiation, distant quasars and supernovas, and dark matter.
- Optical, ion, and plasma beam technology that can lead to electronic circuitry 10 times denser than that on today's chips.
- Complete a draft of the human DNA sequence by the end of 2000 and the entire sequence by 2003, as well as many other animal and microbes, to provide the starting material needed to understand both normal and abnormal function including development, function, and disease.
- Validation of new approaches and supporting science for plasma confinement and basic plasma phenomena, providing the foundations for possible energy applications.

Strategies

- **Components of Matter.** Understand the nature of matter at the most fundamental level, with research emphasis on elementary particles and their interactions, nuclear matter and interactions, atoms and molecules, and biomolecular building blocks.
- **Origin and Fate of the Universe.** Explore the evolution and fate of the universe through the fundamental relationships of energy, matter, time and space, with research emphasis on the beginning of the cosmos, creation of nuclei and matter, evolution of astrophysical structures, and formation of life.
- **Complex Systems.** Control complex systems of matter, energy and life, with research emphasis on complex phenomena and adaptive systems.

OBJECTIVE 4
Provide the extraordinary tools, scientific workforce, and infrastructure that assure our Nation's leadership in the physical, biological, and computational sciences and in multidisciplinary research.

Performance Goals

- Meet milestones for new accelerators, testbeds, and detectors for theoretical particle and nuclear physics, and (as supported by the physics communities) next-generation machines such as the Next Linear Collider, Muon Collider, and advanced, laser-based optical accelerators.
- Meet commitments and make progress toward new and upgraded probes and instruments for investigating materials, chemical processes, and life, including the completion of the Spallation Neutron Source, the fourth-generation light sources such as free electron lasers and femtosecond x-ray lasers, and new accelerator and reactor designs for the production of research and medical isotopes.
- Create parallel-processor supercomputers that are capable of petaflop speeds (a thousand trillion floating-point operations per second) to serve as powerful platforms for solutions to many complex problems.
- Meet schedules and commitments for advanced power systems to enable the future exploration of space by NASA.
- Implement effective programs for science education through fellowships in universities and colleges, teacher training for secondary schools, outreach to communities, and broad partnership programs in science and technology.

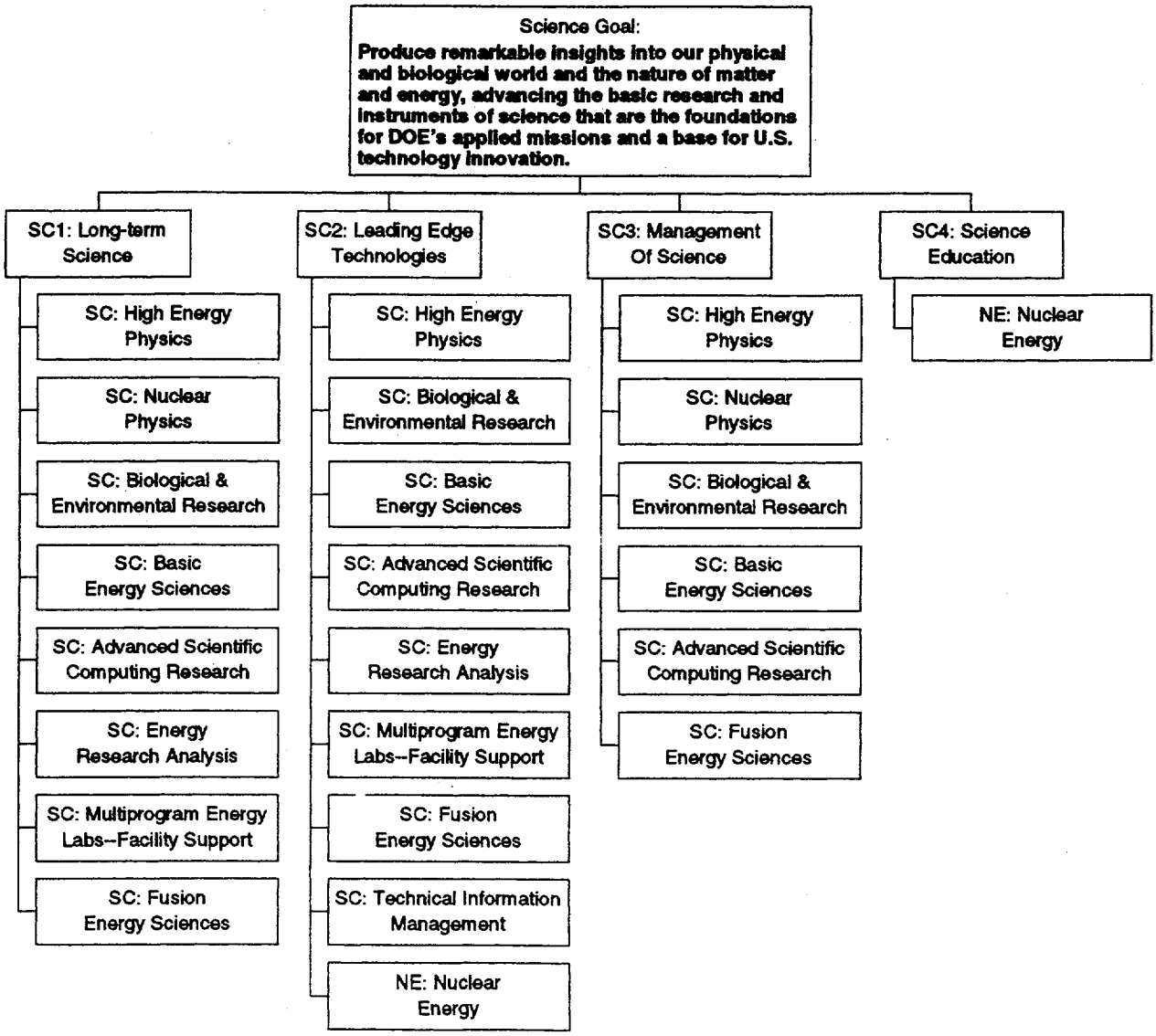
Strategies

- **Instrumentation for the Frontiers of Science.** Provide leading research facilities and instrumentation that expand the frontiers of the physical and natural sciences, with emphasis on accelerators and detectors for high energy and nuclear physics; light sources and neutron beam facilities; and specialized scientific facilities.
- **Scientific Simulation.** Advance scientific computation and simulation as a fundamental tool for scientific discovery, with emphasis on science applications software; ultra-high performance computation and communications facilities; and computer science and enabling technologies.

- **Institutional Capacity.** Strengthen the Nation's institutional and human resources for basic science and multidisciplinary research, with emphasis on the national laboratory system, disciplines essential to our missions, science education, and broadening the scope of research performers.

Linkage to Budget Structure

The Science goal is supported by four objectives. Each objective is being pursued through long-term strategies. The DOE's budget Decision Units fund work on those long-term strategies and the annual performance goals are discussed with the Decision Units in the Annual Performance Plan submitted with the budget for each fiscal year. The following chart shows which Decision Units support which objectives.



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CORPORATE MANAGEMENT

The Department employs strong management principles to support its world class programs and to integrate its diverse portfolio of program missions, its facilities, and its contractors spread over a large geographic base. Corporate Management also involves integrating a genuine concern for the environment, safety, and health of our workers and the public into everything we do.

The strategies in Corporate Management address many of the Department's significant issues, including management challenges identified by DOE managers, by the Department's Inspector General, and by the General Accounting Office (GAO). The challenges addressed below are:

- Enhance the safety and health of DOE contract workers and their communities.
- Strengthen our technical and management capabilities.
- Restructure field management.
- Implement performance-based contracts.
- Improve construction management.

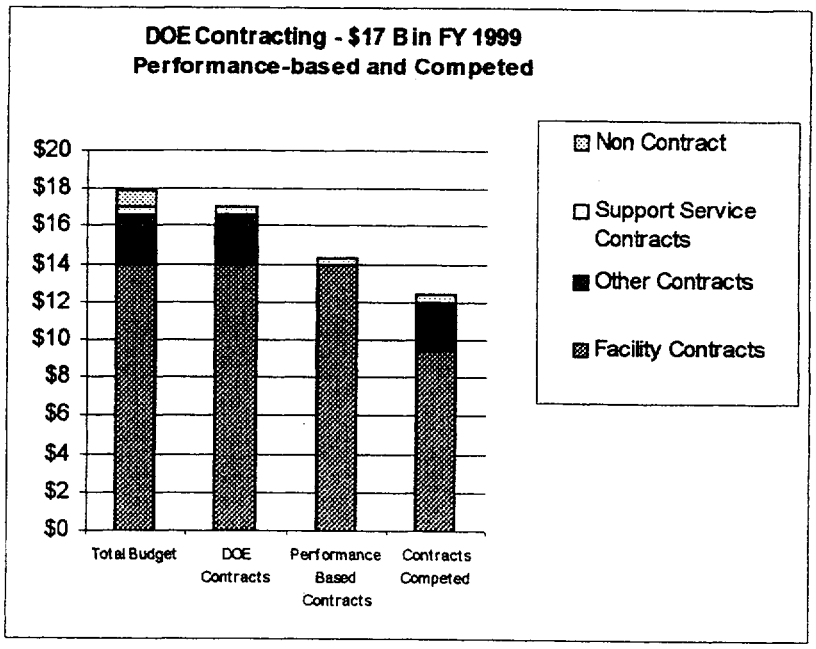
Situation Analysis

By focusing on management issues, the Department has made significant progress aligning resources with agency priorities, streamlining operations, and reducing costs. Many of the strategic alignment goals highlighted in the last Strategic Plan have been accomplished. We have exceeded our goals by realizing cost savings totaling $1.7 billion and employment reductions of 46,000 and 3,800, respectively, for contractor and Federal employees. While we remain committed to sustaining these goals, our focus shifts to new challenges and initiatives.

Safety and Health. Because the Department has stewardship over some of the most hazardous materials known to mankind, our safety and health concerns and environmental problems are formidable. These problems challenge DOE's ability to ensure the health and welfare of workers and the public. In response to these problems, the Department is implementing initiatives including: Integrated Safety Management (ISM), self-assessment and corrective action, and independent oversight evaluations. The Department's long-term plan for correcting nuclear and occupational safety and health deficiencies includes: ongoing evaluation of internal operations, final publication of remaining Nuclear Safety Management Rules during FY 2000, and completion of actions to correct deficiencies in the storage of spent fuel in 2005. In addition, the Department will address these challenges by ensuring the implementation of ISM at all sites by September 2000, by inserting a clause into contracts that puts the contractor's entire performance-based fee at risk for poor safety performance, and by establishing a "safety council" that will ensure ISM targets are met.

Contract Management. In an environment where the Department contracts 94 percent of its budget, excellent contract management is essential. DOE plans to ensure public confidence in our contracting through competition and by rewarding contractors based on their performance. Historically, DOE awarded contracts without competition and based on broad national interest. These awards took place in the context of the Cold War and weapons production. Over the last several years, the Department has conformed more nearly to government-wide standards. We are converting our contracts to meet Federal Acquisition Regulations for performance-based contracts as they are competed or renegotiated. All facility contracts are now performance based as are many other contracts for products and services we acquire.

In 1994, DOE began a major initiative to compete its facility management contracts. However, these facilities/labs, particularly those operated by universities and non-profit organizations, are Federally-funded research and development centers (FFRDC's), statutorily exempt from competition (Competition in Contracting Act). Despite this exemption, DOE has competed FFRDC contracts--for example, Oak Ridge National Laboratory and Brookhaven National Laboratory.



Field Operations. Successive management studies have identified deficiencies in the Department's management of field operations. Most recently, the Secretary tasked a management review of headquarters and field relationships. On April 21, 1999, Secretary Richardson changed the organization and management structure of DOE to eliminate multiple reporting channels and improve lines of communication, direction, and accountability. The change included establishing a direct reporting relationship between the Department's Field Offices to Headquarters Program Offices; clearly establishing Field and Headquarters roles and responsibilities; and creating a Field Management Council, chaired by the Chief Operating Officer, to assure consistent implementation of DOE policies.

Engineering and Construction Management. For the last several years, the Department has set goals for project management. However, we still experience difficulties completing large projects on time and within budget. On June 25, 1999, the Deputy Secretary of Energy announced reforms to strengthen and improve management of our construction and other major projects. The initiatives include:

- Establishing a project management tracking and control system for all projects valued at $20 million or more in total costs.
- Placing projects with significant issues or emerging problems on a Chief Operating Officer's Watch List, with potential funding control and personnel consequences.
- Creating a strong project management organization in the Office of the Chief Financial Officer.

Workforce 21. In recent years, the Department has lost a large number of staff through reduction-in-force, buyouts, and attrition during a hiring moratorium to meet lowered budget levels. In November 1998, the Secretary of Energy announced the Department's new Workforce for the 21st Century Initiative, (Workforce 21), as the next step in strengthening our technical and management capability to fulfill our critical missions for the Nation.

The goals of Workforce 21 enable the Department to hire, and retain personnel in key areas with skills and technical expertise critical to our missions in national security, energy resources, environmental management, and science and technology. In addition, as we rebuild our workforce, we have an opportunity to focus on diversity to ensure we have a high quality, representative workforce within DOE.

Information Technology. The Department is benefitting from information technology advances. Desktop and communication technology developments have allowed our staff offices to remain productive while reducing manpower resources by 32 percent. The compound effect of new commercial off-the-shelf software and process improvements are resulting in significant productivity improvements. The Department has also initiated an effort to modernize our many business support systems using commercial-based software products. Major business system modernization efforts at the Department include Travel Manager, the Corporate Human Resource Information System, and Business Management Information System. These systems will replace obsolete systems that are expensive to operate and maintain, while improving reporting and business efficiency.

Key External Factors

The external factors with the greatest impact on Corporate Management are laws, regulations, Executive Orders, and Administration initiatives, such as, the National Partnership for Reinventing Government (NPR). Within the Department's management offices, significant resources will be applied to fulfill the requirements of legislation including the Atomic Energy Act of 1954, CFO Act, Clinger-Cohen Act of 1996, IG Act, Federal Managers Financial Integrity Act (FMFIA), Government Management Reform Act, Federal Financial Management Improvement Act (FFMIA), Small Business Act, and Executive Orders to address National Security, Environmental Justice, Historically Black Colleges and Universities, Education Excellence for Hispanic Americans, and Tribal Colleges and Universities. Many of our performance goals reflect our continuing efforts to implement these laws and regulations.

Interagency Crosscutting Coordination

DOE managers apply regulations of the Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), the States, and Nuclear Regulatory Commission (NRC).

The Department's management offices enable the Department to collaborate with other Federal agencies including the Office of Personnel Management (OPM), OMB, Treasury, GAO, EPA, and SBA, to fulfill their mutual goals and are subject to their oversight.

Program Evaluation and Analysis

Past program evaluations and analyses have a profound impact on this plan. Examples include Workforce 21, performance reviews of annual plans, self-assessments, Business Management Oversight Performance reviews, semi-annual audit reports to Congress, and annual Accountability Reports. An extensive peer and program review process is followed to assure that reports reflect the highest quality achievable.

Resource Requirements

Resource requirements for Corporate Management are undergoing evaluation as part of the budget process.

DOE will utilize strategic planning and budgeting, performance plans and agreements, and additional corporate-minded approaches and systems to guide Departmental activities and decision-making. We will continually look across programmatic and operational lines, establish priorities and prudently allocate resources, and achieve intended business-like results efficiently and cost-effectively. This corporate mind-set will allow us to further reduce costs and red tape, empower our front-line employees to get the job done, and make the most of our available resources while providing our customers and stakeholders with the high quality products and services they demand.

Contribution to the Strategic Plan. Staff offices often support the strategic objectives of the business lines and corporate management at a level below the reporting threshold of this plan. For example, the Office of Contract Reform and the Board of Contract Appeals both contribute significantly to the strategic objective to improve the delivery of products and services through contract reform and the use of business-like management practices. However, responsibility for these goals resides in the Office of Management and Administration with the Offices of Procurement Policy and Procurement Operations. The Office of Economic Impact and Diversity collaborates with the Energy Information Administration to report on the effects of national energy programs, policies, and regulations of DOE on minorities and minority communities. Examples like these abound in the Departmental offices. On the other hand, many of these offices lead Departmental efforts in attaining our strategic goals.

GENERAL GOAL

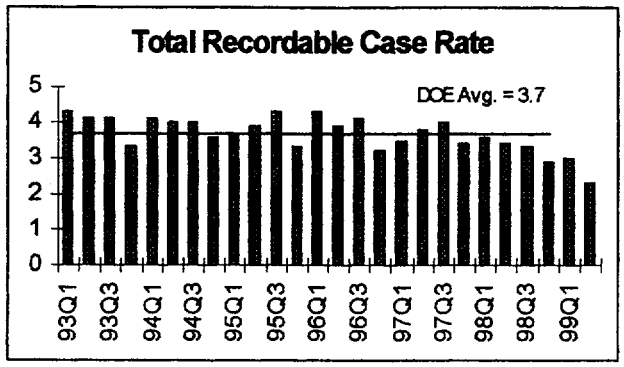
Demonstrate excellence in the Department's environment, safety and health and management practices and systems to support our world class programs.

OBJECTIVE 1

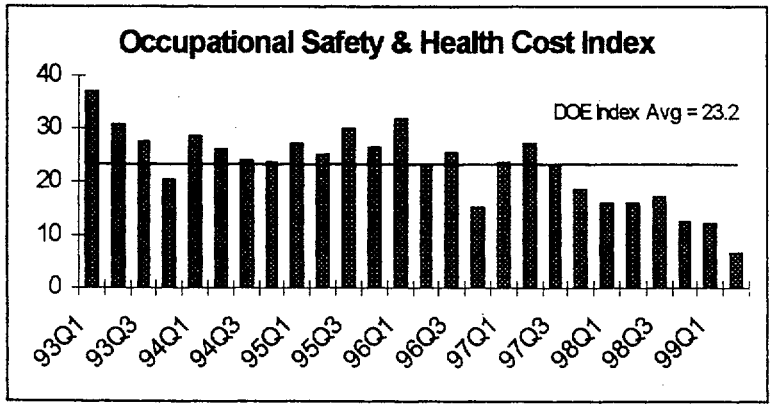
Ensure the safety and health of the DOE work force and members of the public, and the protection of the environment in all Departmental activities.

Performance Goals

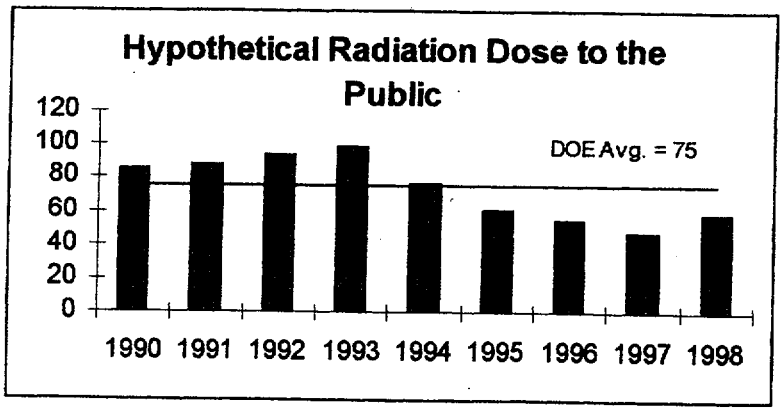
- Reduce the Recordable Case Rate which measures work-related death, injury or illness, which result in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid.



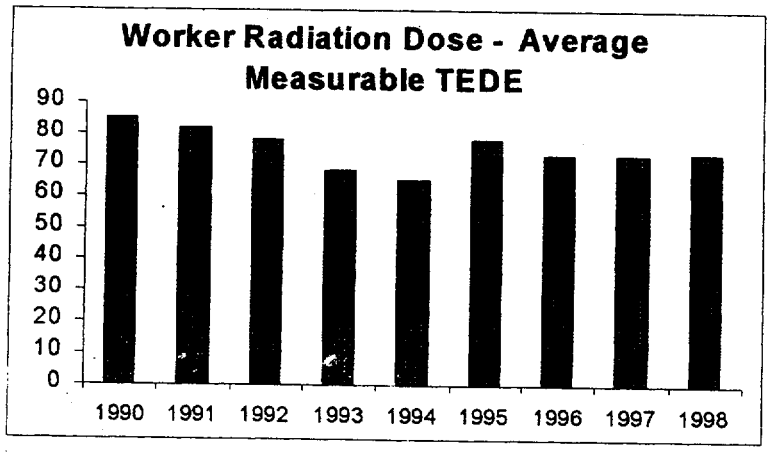
- Reduce the Occupational Safety Cost Index by influencing the critical factors that impact the severity of safety related injuries/illnesses in the Cost Index formula derived from a study of the direct and indirect dollar costs of injuries.



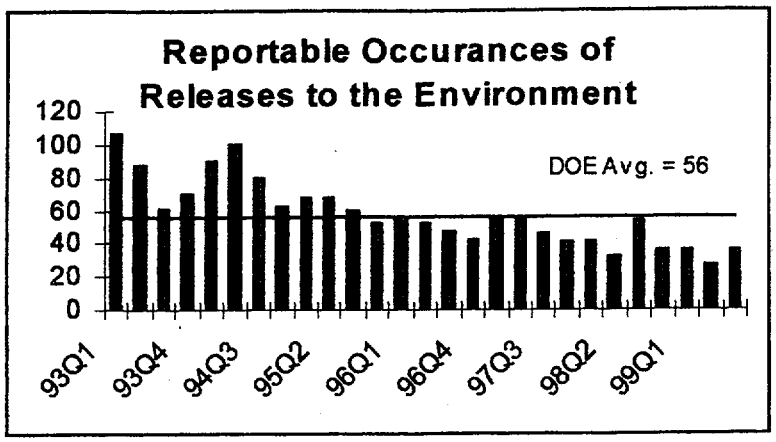
- Reduce the Hypothetical Radiation Dose to the Public which is the estimated collective radiation dose (person-rem) to the public within 50 miles of DOE facilities due to radionuclide airborne releases.



- Reduce the average measurable dose to DOE workers, calculated by dividing the collective total effective dose equivalent (TEDE) by the number of individuals with measurable dose.



- Reduce the Reportable Occurrences of Releases to the Environment which include: Releases of radionuclides, hazardous substances, or regulated pollutants that are reportable to federal, state, or local agencies. Reduce worker health and safety impacts and the number of fatalities as measured by the Recordable Case Rate.



Strategies

- Implement Integrated Safety Management Systems in all major management and operations contracts.

- Maintain current, up to-date DOE policies, standards, and guidance while adopting consensus standards as they apply to the DOE work environment.

- Continue relationships with other regulators (OSHA, NRC, and the States) to accommodate their identified interest and jurisdiction (e.g., new construction and privatized facilities) as appropriate to advance the DOE environment, safety, and health mission.

- Provide products and support in environment, safety, and health that efficiently use centrally managed DOE resources. Programs include the Department of Energy Laboratory Accreditation Program (DOELAP), the Federal Employees Occupational Safety and Health (FEOSH) program, and the nationally recognized Voluntary Protection Program (VPP).

- Provide compliance assurance to DOE line management by supporting the implementation of the Department's National Environmental Policy Act (NEPA) activities.

- Conduct oversight activities to provide information and analysis needed to ensure that DOE, contractor management, and the public have an accurate, comprehensive understanding of the effectiveness, vulnerabilities, and trends of the Department's environment, safety, and health policies and programs.

- Conduct health studies including Occupational Medicine (medical surveillance), Epidemiologic Studies (surveillance and communication of worker injury and illness),

Public Health Activities (health studies, health education and promotion, etc., at DOE sites), and International Health Programs (Marshall Islands program and health studies in the former Soviet Union and Spain).

- Support analysis of the medical effects of radiation through Radiation Effects Research Foundation (RERF) activities. Contribute to the maintenance of the health and welfare of atomic bomb survivors and to the enhancement of worldwide radiation protection practices and standards.

OBJECTIVE 2

Manage human resources and diversity initiatives and implement best management practices to improve the delivery of products and services.

Performance Goals

- Accomplish the Secretary's workforce initiatives.
- Improve DOE technical Federal workforce competencies and capabilities.
- Improve workforce skills and reduce training costs.
- Achieve the Department's diversity goals for hiring and competitive promotions consistent with current Civilian Labor Force statistics.
- Implement a modern financial information management system that is in full compliance with government financial system requirements and meets the Department's informational needs by FY 2003.
- Improve overall efficiency and safety of the Department's aviation program.

Strategies

- Continue to improve DOE organization's workforce planning efforts to identify best practices and to advise on overlaps, inconsistencies, and gaps in planning efforts and continue to track and support Departmental Diversity and Outreach Plans.
- Support the Federal Technical Capability Panel by instituting the Federal Technical Capability Program and implementing the Panel's Annual Plans.

- Implement the milestones in the DOE Corporate Education, Training, and Development Plan; develop and implement a new Technical Leadership Development Program; and, implement an automated Training Module in the Corporate Human Resources Information System (CHRIS).

- Initiate a major Business Management Information System (BMIS) project to implement a modern systems approach.

  - Identify functional and technical system requirements for BMIS and develop evaluation scenarios.
  - Purchase commercial off-the-shelf (COTS) software and hardware for a pilot implementation.
  - Initiate implementation solutions for special DOE requirements for Integrated Contractors and critical system interfaces.
  - Extend the implementation to remaining service centers.

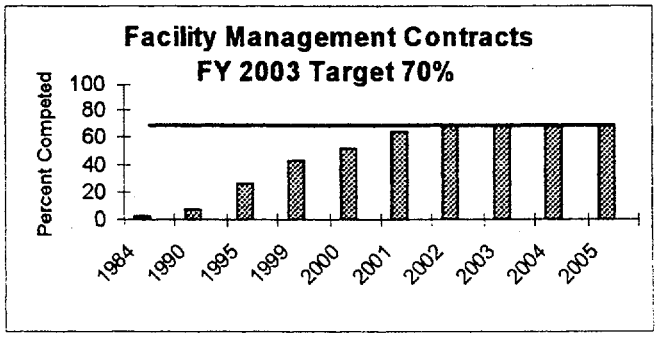
- Conduct self-assessments to measure organizational performance using the National Performance Excellence Standard, the Malcolm Baldridge Criteria. Evaluate results, measure trends, and recommend organizational improvements to leadership.

- Continuously evaluate the cost-effectiveness of the Department's aviation services, and review the conduct of charter and contract aviation services.

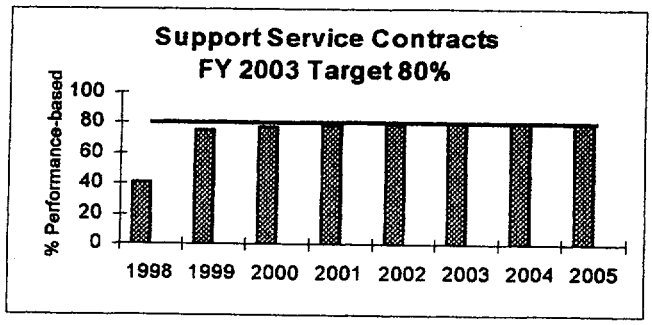
OBJECTIVE 3
Ensure public confidence in the Department's contractual and financial transactions.

Performance Goals

- Achieve 70 percent competitive awards for facility management contracts by 2003.



- Achieve 80 percent performance-based support service contracts by 2003.



- Prepare and publish an annual accountability report that includes the Department-wide audited financial statement with an unqualified audit opinion by March of each year.

- Ensure equitable opportunities for minority educational institutions and small, minority, and women-owned businesses to compete for grants and contracts.

- Design and construct DOE's projects on schedule and at budget.

Strategies

- Make greater use of competition in the award of new Facilities Management contracts.

- Use the Federal Acquisition Regulations to award new support services contracts as performance-based service contracts.

- Establish policy, provide guidance, and coordinate Departmental efforts at reporting performance results, FMFIA results, audit resolution results, management representation letters, financial statements, and other financial data.

- Report on educational and small business goals through periodic reviews of progress toward stated goals.

- Establish a strong corporate project management capability in the CFO.

  - Establish project management tracking and control systems.
  - Strengthen line management accountability for project management results.
  - Revise the criteria and processes for project funding decisions.
  - Implement program/project manager development and credential program.

- Improve the quality, timeliness, and content of communications concerning the Department's functions and activities.

OBJECTIVE 4
Improve the Department's efficiency and effectiveness through Information Technology Systems and Infrastructure.

Performance Goals

- Improve effectiveness of information technology investments in support of all DOE missions.
- Leverage corporate applications and enterprise-wide infrastructure solutions.

Strategies

- Maintain IT investments using a Department-wide comprehensive capital planning process. Establish IT investment review boards comprised of senior program managers.
- Continue the DOE Strategic Information Management (SIM) Program to ensure alignment of major IT investments with DOE strategic business goals and objectives.
- Establish standards and policy that will leverage commercial technology and common solutions.
- Establish common telecommunications and desktop solutions that will reduce costs, improve interoperability, and increase efficiency.

OBJECTIVE 5
Promote the efficient, effective, and economical operation of the Department of Energy.

Performance Goals

- Complete the required annual financial statement audits by designated due dates in the law.
- Complete at least 60 percent of the audits planned for each year and replace those audits not started with more significant audits that identify time-sensitive issues needing review.

- Initiate at least 80 percent of inspections planned for the year and replace those not started with inspections having greater potential impact.

- Obtain judicial and/or administrative action on at lease 35 percent of all cases investigated during the fiscal year.

- Obtain at least 75 percent acceptance rate on criminal and civil cases formally presented for prosecutorial consideration.

Strategies

- Complete required financial audits by designated due dates in the law. Review the Department's implementation of GPRA, GMRA, and FMFIA.

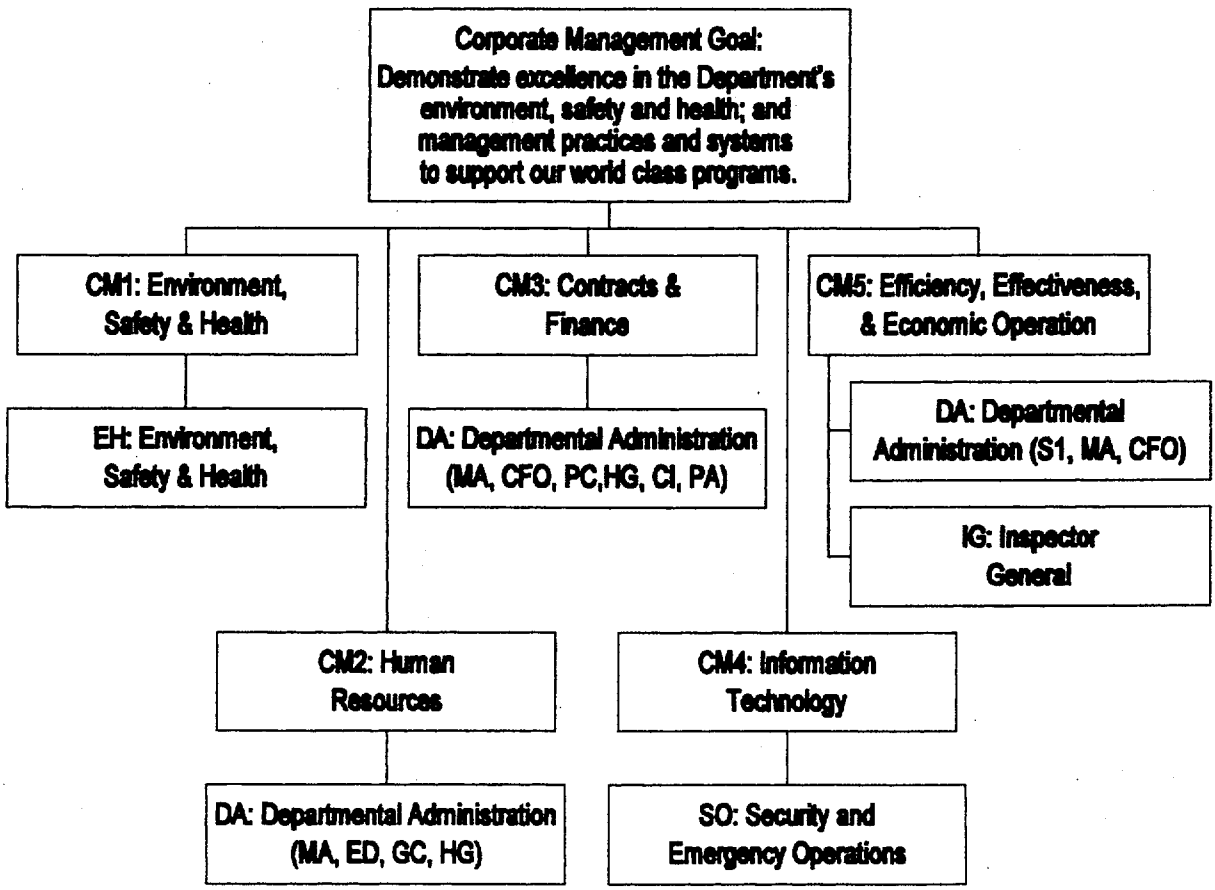
- Plan the Office of Inspector General (OIG) audit, investigation, and inspection workloads by focusing on the issues that are critical. These plans are documented each year in the OIG Annual Performance Plan. Examples of the most critical issues are as follows:

  - Intelligence/Counterintelligence
  - Safeguards and Security
  - Contract/Grant Administration
  - Program Management and Operations
  - Environment, Safety, and Health
  - Infrastructure
  - Financial Management
  - Administrative Safeguards
  - Information Technology Management

- Utilize OIG staff to address emerging issues by responding to departmental priority requests, answering congressional inquiries, conducting joint reviews with other Federal agencies, testifying before Congress, and assisting the Department of Justice in qui tam cases.

Linkage to Budget Structure

The Corporate Management goal is supported by five objectives. Each objective is being pursued through long-term strategies. The DOE's budget Decision Units fund work on those long-term strategies and the annual performance goals are discussed with the Decision Units in the Annual Performance Plan submitted with the budget for each fiscal year. The following chart shows which Decision Units support which objectives.



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APPENDIX A: INTERAGENCY CROSSCUTTING COORDINATION

As shown in the following table, DOE has many projects in each of its business lines that involve the participation of other Federal agencies.

DOE Business line/Project	Federal Agency Participants
Energy Resources	
Partnership for a New Generation of Vehicles	EPA, DOT, NASA, DOD, NSF, DOC
Advanced Vehicle Program	DOT, DARPA, EPA
Corporate Average Fuel Economy	DOT, EPA
Partnership for Advancing Technology in Housing	HUD, DOC
Buildings for the 21st century	All Federal agencies
Energy-related Inventions Program	DOC (NIST)
Million Solar Roofs Initiative	All Federal Agencies
Federal Energy Management Program	All Federal Agencies
Advanced Turbine Systems	NASA, DOC (NIST), DoD, EPA
Combined Heat and Power (Cogeneration)	EPA
Nuclear Energy Research	NRC
Transfer of Naval Oil Shale Reserves	DOI (Bureau of Land Management)
Domestic Natural Gas Production	DOI (Bureau of Land Management)
Electric Industry Restructuring	FERC, EPA, DOC, NRC
Electric Utility Regulation	FERC, EPA, NRC, DOC, DOJ
President's Commission on Critical Infrastructure Protection	Treasury, DOJ, DoD, DOC, DOT, CIA, FEMA, FBI, NSA
Power Marketing Administrations/Hydroelectric	FERC, DOI (Bureau of Land Management, Bureau of Reclamation), Army Corps of Engineers, International Boundary and Water Commission
National Water Resource Needs	Army Corps of Engineers
President's Climate Change Technology Initiative	DOC, NOAA, NIST, EPA, AID, DOT, State
U.N. Framework Convention on Climate Change	NOAA, State, EPA, USDA, DoD, AID, Treasury, DOJ, Labor
Emergency Response	DoD, State, DOT, GSA, TVA, HHS, VA, NOAA, DOJ, USDA, EPA, NRC, FEMA, IAEA, National Communication System
21st Century Research Fund	NIH, NSF, NASA, DOC
Science and Technology (Federal Level)	NSF, DoD, NASA, DOC, EPA, DOT, OSTP, NAS
Use of Federal royalty oil to re-fill Strategic Petroleum Reserve	DOI
Interagency Group on Oil and Gas	DOI, Treasury, White House National Economic Council

DOE Business line/Project	Federal Agency Participants
National Nuclear Security	
Nuclear Classification and Declassification Program	DoD, Defense Special Weapons Agency, State, CIA, Arms Control and Disarmament Agency
International Arms Control and Nonproliferation	State, DOC, DoD, NRC, IAEA, Arms Control and Disarmament Agency, NASA
Nuclear Arms Reduction	State, DoD, IAEA
Emergency Response	DoD, State, DOT, GSA, TVA, HHS, VA, NOAA, DOJ, USDA, EPA, NRC, FEMA, IAEA, National Communication System
First Responder Program	DoD, EPA, FBI, FEMA, Public Health Service
Nuclear Weapons Stockpile	DoD
National Missile Defense Program	DoD
Disposition of Surplus HEU	U.S. Enrichment Corporation
Naval Reactors Program	DoD
International Nuclear Safety Program	State, NRC, DoD, AID, National Security Council, Office of Vice President
High Performance Computing and Communications Program	NSF, DARPA, NASA, NIH, NSA, DOC (NIST), NOAA, EPA, ED, Agency for Health Care Policy and Research
DOE2000 Project	DOC (NIST)
Science and Math Education	ED, NSF, HHS, DoD, National Center for Education Statistics, NIH, National Endowment for the Humanities
Science and Technology (Federal Level)	NSF, DoD, NASA, DOC, EPA, DOT, OSTP, NAS
Law Enforcement Initiative	FBI, Treasury (ATF)
Environmental Quality	
Civilian Nuclear Waste Management	NRC, EPA, NWTRB, DOT
Uranium Mill Tailings Radiation Control Act	NRC
Science and Technology (Federal Level)	NSF, DoD, NASA, DOC, EPA, DOT, OSTP, NAS
Science	
Partnership for a New Generation of Vehicles	EPA, DOT, NASA, DOD, NSF, DOC
Advanced Vehicle Program	DOT, DARPA, EPA
President's Climate Change Technology Initiative	DOC, NOAA, NIST, EPA, AID, DOT, State
U.N. Framework Convention on Climate Change	NOAA, State, EPA, USDA, DoD, AID, Treasury, DOJ, Labor
U.S. Global Change Research Program	USDA, NOAA, NSF, NASA, DoD, HHS, DOI (USGS), State, EPA, OMB, OSTP, Smithsonian Institution
U.S. Human Genome Project	NIH
Large Hadron Collider	NSF, CERN
International Union of Pure and Applied Physics	NAS
National Nuclear Data Center	IAEA

DOE Business line/Project	Federal Agency Participants
High Performance Computing and Communications Program	NSF, DARPA, NASA, NIH, NSA, DOC (NIST), NOAA, EPA, ED, Agency for Health Care Policy and Research, VA
DOE2000 Project	DOC (NIST)
Next Generation Internet	DARPA, NSF, NASA, DOC (NIST), NIH/NLM
Science and Math Education	ED, NSF, HHS, DoD, National Center for Education Statistics, NIH, National Endowment for the Humanities
21st Century Research Fund	NIH, NSF, NASA, DOC
Science and Technology (Federal Level)	NSF, DoD, NASA, DOC, EPA, DOT, OSTP, NAS
Fundamental Research	NSF, DoD, USDA, NASA, NIH
The National Center for Research Resources	NIH, NSF, NASA
Earth Science Enterprise (Mission to Planet Earth)	NASA, NSF, NOAA, EPA, USGS, ED
Radioisotope Generators	NASA
NASA's ORIGINS Program	NASA, NSF
National Science and Technology Council	NSF, DoD, USDA, NASA, DOC, DOI, DOT, EPA, State, Treasury, Labor, HHS, ED, OMB, CIA, NIH, Arms Control and Disarmament Agency
Law Enforcement Initiative	FBI, Treasury (ATF)
Corporate Management	
Nuclear Classification and Declassification Program	DoD, Defense Special Weapons Agency, State, CIA, Arms Control and Disarmament Agency
DOE Downsized Community Economic Adjustment Grants	DOC, Economic Development Administration
DOE External Nuclear Safety Oversight	EPA, NRC, OSHA
Conduct Health Studies	HHS, NIH, CDC, NCI

Legend:
AID = Agency for International Development
ATF = Bureau of Alcohol, Tobacco, and Firearms
CDC = Center for Disease Control
CIA = Central Intelligence Agency
DARPA = Defense Advanced Research Projects Agency
DOC = Department of Commerce
DoD = Department of Defense
ED = Department of Education
DOI = Department of Interior
DOJ = Department of Justice
DOT = Department of Transportation
EPA = Environmental Protection Agency
FBI = Federal Bureau of Investigation
FEMA = Federal Emergency Management Agency
FERC = Federal Energy Regulatory Commission
GSA = General Services Administration
HHS = Department of Health and Human Services
HUD = Department of Housing and Urban Development
IAEA = International Atomic Energy Agency
Labor = Department of Labor

DOE Business line/Project	Federal Agency Participants
NAS = National Academy of Sciences NASA = National Aeronautics and Space Administration NCI = National Cancer Institute NIH = National Institutes of Health NIST = National Institute of Standards and Technology NLM = U.S. National Library of Medicine NOAA = National Oceanic and Atmospheric Administration NRC = Nuclear Regulatory Commission NSA = National Security Agency NSF = National Science Foundation NWTRB = Nuclear Waste Technical Review Board OSTP = White House Office of Science and Technology Policy State = State Department Treasury = Treasury Department TVA = Tennessee Valley Authority USDA = U.S. Department of Agriculture USGS = U.S. Geological Survey VA = Department of Veteran Affairs	

APPENDIX B: STATUTES AND OTHER AUTHORITIES FOR DOE OBJECTIVES [as needed pages]

OUR CORE VALUES

1. **We are customer-oriented.**

   - Our decisions and actions are responsive to our customer's needs.
   - We foster a participatory government in which the opinions and input of diverse stakeholders are sought and considered prior to making decisions.
   - We develop policies to address major challenges in a proactive, collaborative way with our customers and stakeholders.
   - We are open and honest and want to be trusted by our customers and stakeholders.

2. **We value public safety and respect the environment.**

   - We place a high priority on the protection of public health and safety in all of our operations.
   - We are committed to the restoration of the environment through cleanup of contamination caused by past operations.
   - We recognize the seriousness of the environmental impacts of our operations, and we develop and employ processes and technologies to reduce or eliminate waste production and pollution in these operations.
   - We will be a leader in improving the quality of the environment for future generations.

3. **We believe people are our most important resource and should be treated with fairness, respect, and dignity.**

   - We are committed to providing a safe and healthy workplace for all our employees and contractors.
   - We value the needs of individuals.
   - We reward employees based on performance.
   - We are committed to improving the knowledge, skills, and abilities of our employees.
   - We are committed to diversity.
   - We share credit with all contributors.
   - We value listening as an essential tool in learning from others.
   - Our employees are forthright in sharing their experiences so we can learn from each other.

4. **We value creativity and innovation.**

   - We are committed to a flexible operating environment that facilitates the pursuit of new technologies, processes, programmatic approaches, and ideas that challenge the status quo.
   - We seek out, nurture, and reward innovation in daily activities, ranging from the routine to the complex.
   - Our employees are empowered to pursue creative solutions.
   - We recognize and highly regard resourcefulness, efficiency, and effectiveness.
   - We consider adaptable, entrepreneurial approaches that can respond quickly to the rapidly changing world business and political environment to be essential.

5. **We are committed to excellence.**

   - We consider quality and continuous improvement essential to our success.
   - We are committed to excellence in everything we do.

6. **We work as a team and advocate teamwork.**

   - We reinforce the notion of a common or greater Departmental good and encourage interdepartmental teamwork to achieve this goal.
   - We value teamwork, participation, and the pursuit of win/win solutions as essential elements of our operating style.
   - We work as a team with other Federal agencies, government organizations, and external stakeholders in pursuing broader national objectives.
   - We recognize the needs of others for information, and we communicate knowledge and information in an open and candid manner.

7. **We recognize that leadership, empowerment, and accountability are essential.**

   - We are visionary in our everyday activities.
   - Our leaders trust and support individuals to make informed decisions about the processes they own.
   - We are effective stewards of the taxpayer's interests.
   - Our actions are result-oriented.

8. **We pursue the highest standards of ethical behavior.**

   - We maintain a personal commitment to professionalism and integrity.
   - We assure conformance with applicable laws, regulations, and responsible business practices.
   - We keep our commitments.
   - We are objective and fair.