Science
Office of Science

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2007 Current Appropriation	FY 2008 Original Appropriation	FY 2008 Adjustments	FY 2008 Current Appropriation	FY 2009 Request
Science					
Basic Energy Sciences	1,221,380	1,281,564	-11,662[a]	1,269,902	1,568,160
Advanced Scientific Computing Research	275,734	354,398	-3,225[a]	351,173	368,820
Biological and Environmental Research	480,104[b]	549,397	-5,000[a]	544,397	568,540
High Energy Physics	732,434	694,638	-5,307[ac]	689,331	804,960
Nuclear Physics	412,330	436,700	-3,974[a]	432,726	510,080
Fusion Energy Sciences	311,664	289,180	-2,632[a]	286,548	493,050
Science Laboratories Infrastructure	41,986	65,456	+1,405[ad]	66,861	110,260
Science Program Direction	166,469	179,412	-1,633[a]	177,779	203,913
Workforce Development for Teachers and Scientists	7,952	8,118	-74[a]	8,044	13,583
Safeguards and Security	75,830	76,592	-646[a]	75,946	80,603
Small Business Innovation Research/ Technology Transfer (SC funding)	86,936[e]	—	—	—	—
Subtotal, Science	3,812,819[b]	3,935,455	-32,748[a]	3,902,707	4,721,969
Congressionally-directed projects	—	125,633	-2,010[f]	123,623	—
Small Business Innovation Research/ Technology Transfer (Other DOE funding)	39,319[g]	—	—	—	—
Subtotal, Science	3,852,138[bg]	4,061,088	-34,758[acdf]	4,026,330	4,721,969
Coralville, Iowa project rescission	—	-44,569	—	-44,569	—
Less security charge for reimbursable work	-5,605	-5,605	—	-5,605	—
Use of prior year balances	-9,920	—	-3,014	-3,014	—
Total, Science	3,836,613[g]	4,010,914	-37,772[af]	3,973,142	4,721,969

[a] Reflects a reduction for the 0.91% rescission in P.L. 110–161, the Energy and Water Development and Related Agencies Appropriations Act, 2008.
[b] Includes $9,920,000 that was reprogrammed from prior year balances to support the GTL Bioenergy Research Centers.
[c] Includes $1,014,000 that was reprogrammed from prior year balances to support Fermilab operations.
[d] Includes $2,000,000 that was reprogrammed from prior year balances to support the Modernization of Laboratories Facilities project at ORNL, as directed in the Conference Report for P.L. 110–161.
[e] Reflects funding reprogrammed within the Science total to support the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs.
[f] Reflects a reduction for the 1.6% rescission in P.L. 110–161.
[g] Reflects funding transferred from other DOE appropriation accounts to support the SBIR and STTR programs.

As part of the third year of the President's American Competitiveness Initiative, the Office of Science (SC) request for Fiscal Year (FY) 2009 is $4,721,969,000; an increase of $748,827,000, or 18.8%, over the FY 2008 appropriation.

The request funds investments in basic research that are important both to the future economic competitiveness of the United States and to the success of Department of Energy (DOE) mission areas in energy security and national security; advancing the frontiers of knowledge in the physical sciences and areas of biological, environmental, and computational sciences; and providing world-class research facilities for the Nation's science enterprise.

SC provides support for the basic research and scientific and technological capabilities that underpin the Department's technically complex mission. Part of this support is in the form of large-scale scientific user facilities. SC facilities represent a sophisticated suite of instrumentation and research capabilities that meet the diverse needs of about 21,000 researchers each year and enable U.S. scientists to remain at the forefront of scientific discovery and innovation. These facilities include the world's highest energy proton accelerator (the Tevatron at Fermi National Accelerator Laboratory); the world's forefront neutron scattering facility (the Spallation Neutron Source at Oak Ridge National Laboratory), and synchrotron light sources such as the Advanced Photon Source and the Advanced Light Source for probing the structure and function of materials. The Department's five Nanoscale Science Research Centers and the computational resources at the National Energy Research Scientific Computing Center and Leadership Computing Facilities offer technological capabilities to the research community that are unmatched anywhere in the world.

The centerpiece of the American Competitiveness Initiative is President Bush's strong commitment to double investments over 10 years in key Federal agencies that support basic research programs in the physical sciences and engineering: SC, the National Science Foundation, and the Department of Commerce's National Institute for Standards and Technology core activities. While the American Competitiveness Initiative encompasses all SC funding, SC also supports other Presidential initiatives and priorities, such as the Advanced Energy Initiative, the Hydrogen Fuel Initiative, the National Nanotechnology Initiative, the Climate Change Science Program, the Climate Change Technology Program, Networking and Information Technology Research and Development, and ITER, an international nuclear fusion project.

Within the Science appropriation, SC has ten programs: Basic Energy Sciences (BES), Advanced Scientific Computing Research (ASCR), Biological and Environmental Research (BER), High Energy Physics (HEP), Nuclear Physics (NP), Fusion Energy Sciences (FES), Science Laboratories Infrastructure (SLI), Science Program Direction (SCPD), Workforce Development for Teachers and Scientists (WDTS), and Safeguards and Security (S&S).

SC supports basic research and technological capabilities that drive scientific discovery and innovation in the U.S. and underpin the Department's mission areas in energy, the environment, and national security. Seeking answers to fundamental scientific questions will result in a diverse array of practical applications as well as some revolutionary advances. Important contributions to meeting DOE's applied mission needs are expected through developments in materials and chemical sciences, especially at the nanoscale. Research in materials sciences will lead to the development of materials that improve efficiency, economy, environmental acceptability, and safety of energy generation, conversion, transmission, storage, and use. Research in chemistry will lead to the development of advances such as efficient combustion systems with reduced emissions of pollutants; new solar photoconversion processes; improved catalysts for the production of fuels and chemicals, and better separations and analytical methods for applications in energy processes, environmental remediation, and waste management. The science, technology, and knowledge base developed from the Genomics: GTL program on understanding and harnessing the capabilities of microbial and plant systems may lead to cost-effective methods for producing new biofuels, better methods for the clean-up of legacy wastes, and tools for modifying concentrations of atmospheric carbon dioxide (CO_2) or for evaluating environmental impacts.

Computational modeling and simulation can improve our understanding of and sometimes predict the behavior of complex systems, as well as lead to the development of solutions to research problems that are insoluble by traditional and experimental approaches, or are too hazardous, time-consuming, or expensive to solve by traditional means. This includes challenges such as understanding the fundamental processes associated with fluid flow and turbulence, chemical reactivity, climate modeling and prediction, molecular structure and processes in living cells, subsurface biogeochemistry, and astrophysics.

Fusion, a fundamentally new source of energy under development, has the potential to provide a significant fraction of the world's energy by the end of the century. The international ITER project is a bold next step in fusion research, designed to produce, control, and sustain a burning plasma, where fusion processes generate sufficient energy to maintain the temperature of the plasma. Through investments in high-energy physics and nuclear physics, SC has historically provided the Nation with fundamental knowledge about the laws of nature as they apply to the basic constituents of matter and the forces between them. These investments in high energy and nuclear physics have enabled the U.S. to maintain a leading role in the development of technologies in areas such as nuclear energy, materials, semiconductors, nuclear medicine, and national security, and technologies such as the accelerator technologies leading to high-power x-ray light sources and advanced imaging techniques have been important to other fields of science.

SC‘s support for research at more than 300 colleges and universities nationwide and access to DOE's leading-edge research facilities provides valuable research and training opportunities for America's scientists, engineers, and science educators, contributing to the advancement of U.S. science and innovation and the development of the Nation‘s future workforce.

Strategic Themes and Goals and GPRA Unit Program Goals

The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, management, and environmental aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. Science supports the following goals:

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

- Strategic Goal 3.1, Scientific Breakthroughs: Achieve the major scientific discoveries that will drive U.S. competitiveness; inspire America; and revolutionize our approaches to the Nation's energy, national security, and environmental quality challenges.
- Strategic Goal 3.2, Foundations of Science: Deliver the scientific facilities, train the next generation of scientists and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.

The programs funded by the Science appropriation have the following six GPRA Unit Program Goals:

- GPRA Unit Program Goal 3.1/2.50.00: Advance the Basic Science for Energy Independence—Provide the scientific knowledge and tools to achieve energy independence, securing U.S. leadership and essential breakthroughs in basic energy sciences.

- GPRA Unit Program Goal 3.1/2.51.00: Deliver Computing for Accelerated Progress in Science—Deliver forefront computational and networking capabilities to scientists nationwide that enable them to extend the frontiers of science, answering critical questions that range from the function of living cells to the power of fusion energy.
- GPRA Unit Program Goal 3.1/2.48.00: Harness the Power of Our Living World—Provide the biological and environmental discoveries necessary to clean and protect our environment, offer new energy alternatives, and fundamentally change the nature of medical care to improve human health.
- GPRA Unit Program Goal 3.1/2.46.00: Explore the Fundamental Interactions of Energy, Matter, Time, and Space—Understand the unification of fundamental particles and forces and the mysterious forms of unseen energy and matter that dominate the universe, search for possible new dimensions of space, and investigate the nature of time itself.
- GPRA Unit Program Goal 3.1/2.47.00: Explore Nuclear Matter, from Quarks to Stars—Understand the evolution and structure of nuclear matter, from the smallest building blocks, quarks, and gluons; to the stable elements in the Universe created by stars; to unique isotopes created in the laboratory that exist at the limits of stability and possess radically different properties from known matter.
- GPRA Unit Program Goal 3.1/2.49.00: Bring the Power of the Stars to Earth—Answer the key scientific questions and overcome enormous technical challenges to harness the power that fuels our sun.

Contribution to Strategic Goals

Six of the programs within the Science appropriation directly contribute to Strategic Goals 3.1 and 3.2 as follows:

Basic Energy Sciences (BES) contributes to Strategic Goals 3.1 and 3.2 by producing advances in the core disciplines of basic energy sciences—materials sciences, chemistry, geosciences, and physical biosciences. The scientific discoveries at the frontiers of these disciplines impact energy resources, production, conservation, efficiency, and the mitigation of adverse impacts of energy production and use—discoveries that will help accelerate progress toward long-term energy independence, economic growth, and a sustainable environment. BES also provides the Nation’s researchers with world-class scientific user facilities, including a reactor and two accelerator-based neutron sources such as the Spallation Neutron Source; four operating light sources plus the Linac Coherent Light Source—an x-ray free electron laser currently under construction—and the National Synchrotron Light Source–II; five Nanoscale Science Research Centers; and three electron beam micro-characterization centers. These facilities provide important capabilities for fabricating, characterizing, and transforming materials of all kinds from metals, alloys, and ceramics to fragile bio-inspired and biological materials. In FY 2009, investments continue in basic research for the hydrogen economy, for solar energy conversion, and areas of forefront science such as ultrafast chemistry and materials, single-atom imaging and chemical imaging, emergent behavior, and complex systems, and support increases for activities related to electrical energy storage and for materials sciences and chemistry underpinning advanced nuclear energy systems.

Advanced Scientific Computing Research (ASCR) contributes to Strategic Goals 3.1 and 3.2 by advancing fundamental mathematics and computer science research that enables simulation and prediction of complex physical, chemical, and biological systems; providing the forefront computational capabilities needed by researchers to enable them to extend the frontiers of science; and delivering the fundamental networking research and facilities that link scientists across the nation to the Department-sponsored computing and experimental facilities. ASCR and its predecessors have been leaders in the computational sciences for several decades and supports research in applied mathematics, computer science, specialized algorithms, and scientific software tools that advance scientific discovery and are essential for research programs across SC and the Department. In FY 2009 the Leadership Computing Facilities (LCFs) at the Oak Ridge and Argonne national laboratories and the National Energy Research Scientific Computing Center at Lawrence Berkeley National Laboratory will continue to be supported. Beginning in FY 2009, the ASCR computing facilities will develop and implement a unified approach to supporting and maintaining software, languages, and tools that are critical to effective utilization of the machines. Support continues for research efforts in Scientific Discovery through Advanced Computing and the core research programs that enable researchers to deliver forefront science by more effectively utilizing the capabilities of the LCFs. Increases in core research in Applied Mathematics and Computer Science in FY 2009 will be targeted on long-term research needs, including support for a new joint Applied Mathematics-Computer Science Institute to focus on the challenges of computing at extreme scales that blur the boundaries between these disciplines, and for new efforts in the mathematics of large datasets.

Biological and Environmental Research (BER) contributes to Strategic Goals 3.1 and 3.2 by advancing research in genomics and systems biology of microbes and plants to harness their capabilities for energy and environmental solutions; by developing models to predict climate over decades to centuries; by developing science-based methods for cleaning up environmental contaminants and for long-term stewardship of the sites; by providing regulators with a stronger scientific basis for developing future radiation protection standards; and by advancing research in radiochemistry and imaging instrumentation and development of an artificial retina. In FY 2009, BER continues the Genomics: GTL program, supporting research at the interface of the biological, physical, and computational sciences to enable biotechnology-based solutions for DOE's energy security and environmental mission goals, including support for the three Bioenergy Research Centers started in FY 2007 and the Joint Genome Institute. The environmental remediation program continues to support fundamental research at the interfaces of biology, chemistry, geology, hydrology, and physics for solutions to environmental contamination challenges, and provides support for the Environmental Molecular Sciences Laboratory. BER leads the Department‘s participation in the interagency Climate Change Science Program, focusing on understanding the principal uncertainties of the causes and effects of climate change, including abrupt climate change, understanding the global carbon cycle, developing predictive models for climate change over decades to centuries, and supporting basic research for biological sequestration of carbon. In FY 2009, support increases for research to advance the science of climate and Earth system modeling and increase the spatial resolution of climate models.

High Energy Physics (HEP) contributes to Strategic Goals 3.1 and 3.2 by advancing understanding of the basic constituents of matter, deeper symmetries in the laws of nature at high energies, and mysterious phenomena that are commonplace in the universe, such as dark energy and dark matter. HEP uses particle accelerators and very sensitive detectors to study fundamental particle interactions at the highest possible energies as well as non-accelerator studies of cosmic particles using experiments conducted deep underground, on mountains, or in space. In FY 2009, HEP places a high priority on the operations, upgrades, and infrastructure of the two major HEP user facilities, the Tevatron Collider and the Neutrinos at the Main Injector (NuMI) beam line at Fermilab. After a very successful eight-year run, operation of the SLAC B-factory are completed in FY 2008. Funding is provided in FY 2009 to support significant analysis of data collected at the B-factory and for safe ramp-down of the facility. With completion of the scientific missions of the B-factory and Tevatron Collider by the end of this decade, the longer-term HEP program continues support for the development of new cutting-edge facilities in targeted areas (such as neutrino physics) that will establish a U.S. leadership role in these areas in the next decade, when the centerpiece of the world HEP program will be at the Large Hadron Collider

(LHC) at CERN (the European Organization for Nuclear Research). HEP increases funding for university and laboratory based research to support U.S. researchers participating in the physics discoveries enabled by the LHC, and continues to provide support for operations and maintenance of the U.S.-built systems that are part of the LHC detectors. Support for International Linear Collider (ILC) R&D continues, but the U.S. role in the global R&D effort is reduced, resulting in a more focused but still robust program that emphasizes technical areas where the U.S. has unique or world-leading capabilities, and positions the U.S. to play a significant role in the ILC, if governments decide to proceed with project. In other accelerator technology R&D areas, funding is increasing, to begin implementation of a strategic plan for technology R&D. Specific areas targeted for increased support are short-term R&D focused on development of high-intensity proton sources; mid-term R&D directed at development of superconducting radiofrequency structures, in view of their potential for a wide range of applications; and long-term R&D on advanced accelerator technologies with the potential to provide transformational changes. The latter effort includes fabrication of a new test facility for advanced particle acceleration concepts. An upgrade of the world-leading Cryogenic Dark Matter Search is planned to begin in FY 2009, jointly funded with the National Science Foundation; and R&D continues for conceptual design for a Joint Dark Energy Mission (JDEM) space-based satellite. HEP and NASA will move forward with a joint competition and concept selection for JDEM in FY 2009, with a planned start for fabrication in FY 2010. In addition, non-accelerator-based elementary particle physics research continues in FY 2009, as does R&D for the next-generation ground- and space-based experiments to further explore the nature of dark energy.

Nuclear Physics (NP) contributes to Strategic Goals 3.1 and 3.2 by supporting peer-reviewed scientific research to advance knowledge and provide insights into the nature of energy and matter, and, in particular, to investigate the fundamental forces which hold the nucleus together and determine the detailed structure and behavior of the atomic nuclei. NP builds and supports world-leading scientific facilities and state-of-the-art instruments necessary to carry out its basic research agenda of fundamental nuclear physics and train a workforce relevant to the Department's missions for nuclear-related national security, energy, and environmental quality. World-leading efforts on studies of hot, dense nuclear matter and the origin of the proton spin with beams at the Relativistic Heavy Ion Collider (RHIC) will continue in FY 2009, and funds are provided to complete the Electron Beam Ion Source, which will provide RHIC with more cost-effective, reliable operations. The studies of hot, dense nuclear matter include NP enhancements to existing LHC experiments. Operation of the Continuous Electron Beam Accelerator Facility (CEBAF) continues, providing beams to better understand the structure of the nucleon. Support for construction of the 12 GeV CEBAF Upgrade is initiated in FY 2009. NP supports efforts in nuclear structure/astrophysics, fundamental interactions, and neutrinos, which include operations and related research at the Argonne Tandem Linac Accelerator System (ATLAS) and the Holifield Radioactive Ion Beam Facility (HRIBF). Funds are provided in FY 2009 for R&D and conceptual design activities for a U.S facility for rare isotope beams which will enable world-leading research opportunities in nuclear structure, nuclear astrophysics, and fundamental studies. The Fundamental Neutron Physics Beamline and neutron Electric Dipole Moment experiment will provide capabilities for studies of the fundamental properties of neutrons and to search for new physics beyond the Standard Model. Support is provided for U.S. participation in the Cryogenic Underground Observatory for Rare Events (CUORE) experiment, important for establishing the neutrino mass and determining whether the neutrino is its own antiparticle. Theoretical research is important in all program areas, and NP supports the nuclear data program, which collects, evaluates, and disseminates nuclear physics data. NP increase support in FY 2009 for basic research in the characterization of radioactive waste through advanced fuel cycle activities. Starting in FY 2009, NP assumes responsibilities for research, development, and production of stable and radioactive isotopes, previously under the DOE Office of Nuclear Energy, important for science, energy, national security applications.

Fusion Energy Sciences (FES) contributes to Strategic Goals 3.1 and 3.2 by advancing the theoretical and experimental understanding of plasma and fusion science and the means for confining plasmas to yield energy. Advances in plasma physics and associated technologies will bring the U.S. closer to making fusion energy a part of the Nation's energy solution. In addition to supporting fundamental research into the nature of fusion plasmas, FES supports the operation of a set of unique and diversified domestic experimental facilities and close collaborations with international partners on specialized facilities abroad in order to test and extend our theoretical understanding and computer models—ultimately leading to improved predictive capabilities for fusion plasmas. The FES research program, including experiments on major facilities and theory and computer modeling activities, will emphasize burning plasma research in support of preparation for the ITER scientific program. In FY 2009, the FES program will begin to develop identify critical scientific issues and missions for the next stage in the U.S. fusion research program during the ITER era which will keep it at the forefront of fusion and plasma sciences in the future. Funding is currently provided for continued fabrication of the National Compact Stellarator Experiment at the Princeton Plasma Physics Laboratory, however, a decision on the project's future will be made in FY 2008 as the project cost and schedule have changed significantly since the initial project baseline was established. FES increases support for efforts in the area of high energy density laboratory plasmas (HEDLP) as part of the HEDLP Joint Program with the National Nuclear Security Administration. FES will also initiate a Fusion Simulation Project in FY 2009 to take advantage of the many recent improvements in computational and computing capabilities for the development of a world-leading predictive plasma simulation code that can be applied to burning plasmas of the type that will be necessary for fusion energy producing power plants.

External factors that affect SC's level of performance include:

- changing mission needs as described by the DOE and SC mission statements and strategic plans;
- scientific opportunities as determined, in part, by new discoveries, proposal pressure, and scientific workshops;
- results of external program reviews and international benchmarking activities of entire fields or subfields, such as those performed by the National Academy of Sciences (NAS);
- unanticipated failures in critical components of scientific facilities that cannot be mitigated in a timely manner; and
- strategic and programmatic decisions made by non-SC funded domestic research activities and by major international research centers

Validation and Verification

Progress against established plans is evaluated by periodic internal and external performance reviews. These reviews provide an opportunity to verify and validate performance. Monthly, quarterly, semiannual, and annual reviews consistent with specific program management plans are held to ensure technical progress, cost and schedule adherence, and responsiveness to program requirements.

Funding by Strategic and GPRA Unit Program Goal

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Strategic Goals 3.1, Scientific Breakthroughs and 3.2, Foundations of Science			
GPRA Unit Program Goal 3.1/2.50.00, Advance the Basic Science for Energy Independence (BES)	1,221,380	1,269,902	1,568,160
GPRA Unit Program Goal 3.1/2.51.00, Deliver Computing for Accelerated Progress in Science (ASCR)	275,734	351,173	368,820
GPRA Unit Program Goal 3.1/2.48.00, Harness the Power of Our Living World (BER)	480,104	544,397	568,540
GPRA Unit Program Goal 3.1/2.46.00, Explore the Fundamental Interactions of Energy, Matter, Time, and Space (HEP)	732,434	689,331	804,960
GPRA Unit Program Goal 3.1/2.47.00, Explore Nuclear Matter, from Quarks to Stars (NP)	412,330	432,726	510,080
GPRA Unit Program Goal 3.1/2.49.00, Bring the Power of the Stars to Earth (FES)	311,664	286,548	493,050
Subtotal, Strategic Goals 3.1 and 3.2 (Science)	3,433,646	3,574,077	4,313,610
All Other			
Science Laboratories Infrastructure	41,986	66,861	110,260
Program Direction	166,469	177,779	203,913
Workforce Development for Teachers and Scientists	7,952	8,044	13,583
Safeguards and Security	75,830	75,946	80,603
Small Business Innovation Research/Technology Transfer	126,255	—	—
Congressionally-directed projects	—	123,623	—
Total, All Other	418,492	452,253	408,359
Total, Strategic Goals 3.1 and 3.2 (Science)	3,852,138	4,026,330	4,721,969

Program Assessment Rating Tool (PART)

The Department implemented a tool to evaluate selected programs. PART was developed by the Office of Management and Budget (OMB) to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews.

In the FY 2005 PART review, OMB assessed six SC programs: ASCR, BES, BER, FES, HEP, and NP. Program scores ranged from 82–93%. Three programs—BES, BER, and NP—were assessed "Effective." Three programs—ASCR, FES, and HEP—were assessed "Moderately Effective." In general the FY 2005 assessment found that these SC Programs have developed a limited number of adequate performance measures. These measures have been incorporated into this Budget Request, grant solicitations, and the performance plans of senior managers. As appropriate, they are being incorporated into the performance-based contracts of management and operating (M&O) contractors.

The Annual Performance Targets are tracked through the Department's Joule system and reported in the Department's Annual Performance and Accountability Report. Roadmaps with detailed information on tracking progress toward the long-term measures have been developed with the Scientific Advisory Committees and links to these reports are provided on SC's PART website. The Scientific Advisory Committees are reviewing progress toward those measures vis-à-vis the roadmaps every three to five years. The first reviews were conducted during FY 2006 and early FY 2007. Links to the results of these reviews are provided on SC's PART website as they become available.

OMB did not complete a PART for any SC Programs for the FY 2009 Budget, but has provided SC with recommendations to further improve performance. The improvement plan action items for the current fiscal year may be found at http://ExpectMore.gov (search by program name).

SC has incorporated this feedback from OMB into the FY 2009 Budget Request decision process, and will continue to take the necessary steps to improve performance.

High-Risk, High-Return Research[a]

SC supports high-risk, high-return research as an essential part of its strategy to successfully accomplish the DOE's mission in areas of energy, environment, national security, and scientific discovery. Whether aimed at grand challenge, discovery-driven, or use-inspired science, SC programs incorporate high-risk, high-return research elements and ideas that challenge current thinking to make the fundamental breakthroughs necessary to accomplish mission and program goals. Every SC program considers a significant fraction of its supported activities to be high-risk, high-return. Because this research is integrated within research portfolios and projects, and there are many interconnected and collaborative efforts within and between the programs, it is not possible to quantitatively separate out the funding contributions to particular experiments or theoretical studies that are high-risk, high-return.

SC programs use several mechanisms to help identify and develop the "high-return" research topics and enabling technologies that form the basis of their portfolios, including Federal advisory committees, program and topical workshops, interagency working groups, National Academy of Sciences (NAS) studies, and special SC Program solicitations. Likewise, SC is evaluated periodically through Committee of Visitors reviews and NAS studies that consider, as part of those reviews, how well programs are supporting high-risk, high-return research as part of their overall portfolio.

Researchers funded through the Office of Science are working on some of the most pressing scientific and technical challenges of our age:

- Harnessing the power of microbial communities and plants for energy production from renewable sources, carbon sequestration, and environmental remediation;
- Expanding the frontiers of nanotechnology to develop materials with unprecedented properties for widespread potential scientific, energy, and industrial applications;
- Pursuing the breakthroughs in materials science, nanotechnology, biotechnology, and other fields needed to make solar energy more cost-effective;
- Demonstrating the scientific and technological feasibility of creating and controlling a sustained burning plasma to generate energy, as the next step toward making fusion power a commercial reality;

[a] In compliance with reporting requirements in America COMPETES (P.L. 110–69, section 1008).

- Using advanced computation, simulation, and modeling to understand and predict the behavior of complex systems beyond the reach of some of the most powerful experimental probes, with potentially transformational impacts on a broad range of scientific and technological undertakings;
- Understanding the origin of the universe and nature of dark matter and dark energy; and
- Resolving key uncertainties and expanding the scientific foundation needed to understand, predict, and assess the potential effects of atmospheric carbon dioxide on climate and the environment.

Pushing the frontiers of science depends on the continued availability of the most advanced scientific facilities for U.S. researchers. SC builds and operates national scientific facilities and instruments that make up the world's most sophisticated suite of research capabilities. To stay at the forefront of research capabilities SC invests in the research and development towards new instruments and facilities that continue to push the envelope of what is technically possible. For example, advanced accelerator and detector R&D for next generation accelerator-based scientific research facilities, such as synchrotron and neutron sources and high-energy particle colliders, is a priority high-risk, high-return research area supported across several SC programs. Basic research investments are also leading to state-of-the-art high-throughput instrumentation for genomics and systems biology as well as for probes for imaging ultrafast science at the nanoscale.

DOE understands the sense of Congress that, even within its annual basic research budget, funding high-risk, high-reward basic research projects requires attention. SC will establish a working group during FY 2008 to evaluate how SC's merit review criteria and program management practices promote the support of high-risk, high-return research and identify the need for and potential mechanisms for improving such support. The working group will also look at strategies to better communicate to the scientific community the high-risk, high-return research areas that are essential to accomplishing SC's mission-driven goals for the Department.

SC Funding for Selected Administration Priorities

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
American Competitiveness Initiative	3,836,613	3,973,142	4,721,969
Advanced Energy Initiative	495,021	508,376	788,111
Hydrogen Fuel Initiative	36,388	36,388	60,400
Climate Change Science Program	125,758	128,363	145,940
Climate Change Research Initiative	22,460	23,672	23,672
Climate Change Technology Program	486,525	498,965	833,301
Networking and Information Technology Research and Development	301,478	380,295	401,399
National Nanotechnology Initiative	195,511	199,534	300,259
ITER (TPC)	60,000	10,626	214,500

American Competitiveness Initiative

The American Competitiveness Initiative encompasses the entire SC budget, as part of a strategy to double overall basic research funding at select agencies over the FY 2006 level by FY 2016. The FY 2009 request is consistent with the planned profile for this initiative. The American Competitiveness Initiative is described further at http://www.whitehouse.gov/stateoftheunion/2006/aci/aci06-booklet.pdf.

Advanced Energy Initiative

SC research activities serve as an enabling function to provide a strong scientific underpinning for options identified in DOE's energy technology portfolio. SC investments today in fundamental basic research in the physical, chemical, biological, and environmental sciences can lead to the transformational breakthroughs essential for the future technologies that could change the way energy is produced, transformed, and used to meet global energy demands while limiting greenhouse gas emissions and environmental impacts. Advances in areas such as materials science, catalysis and chemical transformations, genomics and biochemistry, condensed matter physics, computational sciences, and geosciences can have game-changing impacts on the development of new transportation fuels and vehicle technologies; nuclear, hydrogen-based, and low-emission fossil-based energy technologies; electrical energy storage and transmission; efficient building technologies; and strategies for carbon capture and storage.. The FY 2009 SC request under the Advanced Energy Initiative is for $788,111,000, and supports basic research in the areas of solar energy, biomass, hydrogen, and fusion.

Hydrogen Fuel Initiative

In FY 2009, $60,400,000 is requested for basic research activities to realize the potential of a hydrogen economy. The research program is based on the BES workshop report "Basic Research Needs for the Hydrogen Economy" that can be found at http://www.science.doe.gov/production/bes/hydrogen.pdf. The 2003 report highlights the gap between our present capabilities for hydrogen production, storage, and use and those required for a competitive hydrogen economy. Detailed findings and research directions identified during the workshop are presented in the report.

Climate Change Research

U.S. Climate Change Research is currently organized into the Climate Change Science Program (CCSP) and the Climate Change Technology Program (CCTP). The CCSP includes the interagency U.S. Global Change Research Program (USGCRP), proposed by the first President Bush in 1989 and codified by Congress in the Global Change Research Act of 1990 (P.L. 101-606), and the current Administration's Climate Change Research Initiative (CCRI). The CCRI is a set of cross-agency activities initiated in FY 2003 in areas of high priority climate change research.

- **Climate Change Science Program**: In FY 2009, the BER Climate Change Research subprogram (excluding the Climate Change Mitigation element which focuses on carbon sequestration in the terrestrial biosphere) represents DOE's contribution to the CCSP (USGCRP and CCRI). SC investments supported under the Climate Change Science Program in global and regional climate modeling, combined with measurement and observational experiments, can improve understanding of global carbon cycling and impacts, inform carbon management strategies, and help plan for future energy resource needs. The BER request for CCSP for FY 2009 is $145,940,000.
- **Climate Change Research Initiative**: In FY 2009, BER will continue to contribute to the CCRI from four programs: Terrestrial Carbon Processes, Climate Change Prediction, ARM, and Integrated Assessment. Activities will be focused on helping to resolve the magnitude and location of the North American carbon sink; deployment and operation of a mobile ARM facility to provide data on the effects of clouds and aerosols on the atmospheric radiation budget in regions and locations of opportunity where data is lacking or sparse; using advanced climate models to simulate potential effects of natural and human-induced climate forcing on global and regional climate and the potential effects on climate of alternative options for mitigating increases in human forcing of climate, including abrupt climate change; and developing and evaluating assessment tools needed to

study costs and benefits of potential strategies for reducing net carbon dioxide emissions. BER's FY 2009 CCRI request is $23,672,000

- **Climate Change Technology Program**: In support of the U.S. Climate Change Technology Program, the Department of Energy analyzed its energy technology portfolio across program areas to determine what actions could be taken to reduce greenhouse gas emission (GHG) intensities. The technical planning goal for this analysis was to develop a portfolio of technology options that, if deployed worldwide, could put global GHG emissions on a trajectory to achieve atmospheric concentrations of carbon between 450 to 550 parts per million (ppm). Programs were selected for the new climate change technology portfolio based on their potential to reduce carbon (in billions of tons of carbon) emissions into the atmosphere between FY 2015–2100. SC funding for the CCTP includes the FES program and activities within BES, BER, and NP. The FY 2009 SC CCTP request is $833,301,000.

Networking and Information Technology Research and Development

The activities funded by SC are coordinated with other Federal efforts through the National Information Technology Research and Development (NITRD) subcommittee of the National Science and Technology Council and its Technology Committee. The NITRD Subcommittee provides active coordination for the multiagency NITRD Program. The Subcommittee is made up of representatives from each of the participating NITRD agencies and from OMB, OSTP, and the National Coordination Office for IT R&D. The FY 2009 SC request for NITRD is $401,399,000.

National Nanotechnology Initiative

In FY 2009, there are significant shifts in the nanoscale science and engineering research activities contributing to the SC investments in research at the nanoscale and a substantial overall increase in funding. All five Nanoscale Science Research Centers are in full operation. Funding for research at the nanoscale increases very significantly owing to increases in funding for activities related to the hydrogen economy, solar energy conversion, advanced nuclear energy systems, electrical energy storage, fundamental studies of materials at the nanoscale, and instrumentation for characterizing materials at the nanoscale. The FY 2009 SC request for the National Nanotechnology Initiative is $300,259,000.

ITER

ITER, an experiment to study and demonstrate the scientific and technical feasibility of fusion power, is a multi-billion dollar international research project that will, if successful, move towards developing fusion's potential as a commercially viable, clean, long-term source of energy near the middle of the century. Funding for the U.S. Contributions to ITER project increases in FY 2009 and provides for the U.S. "in-kind" hardware contributions, U.S. personnel to work at the ITER site, and funds for the U.S. share of common expenses such as infrastructure, hardware assembly, installation, and contingency. The FY 2009 SC request for ITER is $214,500,000.

Basic and Applied R&D Coordination

SC continues to coordinate basic research efforts in many areas with the Department's applied technology offices and with the National Nuclear Security Administration through collaborative processes established over the last several years. Coordination areas include energy production from conventional and alternate sources, energy conversion, energy storage and transmission, efficient energy use, waste mitigation, and national security. Specific areas include biofuels derived from biomass; solar and other renewable energy; hydrogen production, storage, and use; materials under extreme environments for the needs of energy technologies and for national security; solid-state lighting and other research promoting efficient building technologies; the Advanced Fuel Cycle, Generation IV Nuclear Energy Systems; vehicle technologies; and improving efficiencies in industrial processes. The Department's July 2006 report *DOE Strategic Research Portfolio Analysis and Coordination Plan* identified 21 additional areas of opportunity for coordination that have great potential to increase mission success. SC supports basic research and coordination efforts that underpin nearly all 21 areas, and six areas are highlighted in the FY 2009 SC budget request for enhanced R&D coordination: Advanced Mathematics for Optimization of Complex Systems, Control Theory, and Risk Assessment; Electrical Energy Storage; Carbon Dioxide Capture and Storage; Characterization of Radioactive Waste; Predicting High Level Waste System Performance over Extreme Time Horizons; and High Energy Density Laboratory Plasmas. SC has sponsored scientific workshops corresponding to these focus areas in collaboration with related DOE program offices, which identified high priority basic research areas necessary for improved understanding and revolutionary breakthroughs. Other areas are being developed for increased emphasis in coming years, including materials under extreme environments, which crosscuts many areas in the Department's applied technology offices and in the National Nuclear Security Administration.

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Applied mathematics for optimization of complex systems, control theory, and risk assessment			
Advanced Scientific Computing Research	—	1,900	2,000
Electrical Energy Storage			
Basic Energy Sciences	—	—	33,938
Carbon Dioxide Capture and Storage			
Basic Energy Sciences	5,915	5,915	10,915
Advanced Scientific Computing Research	—	976	976
Biological and Environmental Research	16,841	16,874	17,374
Total, Carbon Dioxide Capture and Storage	22,756	23,765	29,265
Characterization of Radioactive Waste			
Basic Energy Sciences	—	—	8,492
Biological and Environmental Research	—	—	1,500
Nuclear Physics	200	200	6,603
Total, Characterization of Radioactive Waste	200	200	16,595
Predicting High Level Waste System Performance over Extreme Time Horizons			
Basic Energy Sciences	—	—	8,492

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
High Energy Density Laboratory Plasmas			
Fusion Energy Sciences	15,459	15,942	24,636
Total, Basic and Applied R&D Coordination	38,415	41,807	114,926

Advanced Mathematics for Optimization of Complex Systems, Control Theory, and Risk Assessment: ASCR supports basic research in advanced mathematics for optimization of complex systems, control theory, and risk assessment. A recommendation from the workshop focused on this subject indicated additional research emphasis in advanced mathematics could benefit the optimization of fossil fuel power generation; the nuclear fuel lifecycle; and power grid control. Such research could increase the likelihood for success in DOE strategic initiatives including FutureGen and the modernization of the power grid.

Electrical Energy Storage: About 15% of the BES funding requesting to support basic research in electrical energy storage (EES) is targeted for a formally coordinated program with DOE applied technology offices. The workshop report on this focus area noted that revolutionary breakthroughs in EES have been singled out as perhaps the most crucial need for this nation's secure energy future. The report concluded that the breakthroughs required for tomorrow's energy storage needs will be realized with fundamental research to understand the underlying processes involved in EES. The knowledge gained will in turn enable the development of novel EES concepts that incorporate revolutionary new materials and chemical processes. Such research will accelerate advances in developing novel battery concepts for hybrid and electric cars and will also help facilitate successful utilization and integration of renewable, intermittent power sources such as solar, wind, and wave energy into the utility sector, making these energy sources base load competitive.

Carbon Dioxide Capture and Storage: BES and BER support basic research in carbon dioxide capture and storage. The storage portion of this R&D coordination focus area was a subject of a BES workshop on Basic Research Needs for Geosciences in February 2007, which focused on the research challenges posed by carbon dioxide storage in deep porous geological formations. The workshop report noted that the chemical and geological processes involved in the storage of carbon dioxide are highly complex and its prediction would need an interdisciplinary approach that strongly couples experiments with theory, modeling, and computation bridging multiple length and time scales. The BES effort supports fundamental research to understand the underlying chemical, geochemical, and geophysical processes involved in subsurface sequestration sites. The BER research effort focuses on understanding, modeling, and predicting the processes that control the fate of carbon dioxide injected into geologic formations, subsurface carbon storage, and the role of microbes and plants in carbon sequestration in both marine and terrestrial environments. These aspects of this focus area were also the subject of additional SC workshops that identified basic research areas in CO_2 capture and storage that could benefit the optimization of fossil fuel power generation and the development of carbon neutral fuels.

Characterization of Radioactive Waste: BES, BER, and NP support basic research in radioactive waste characterization. This R&D coordination focus area was the subject of six SC workshops, including three BES workshops. The workshop reports noted that the materials and chemical processes involved in radioactive waste storage are highly complex and their characterization would need an interdisciplinary approach that strongly couples experiments with theory, modeling, and computation bridging multiple length and time scales. The BES effort will focus on fundamental research to understand the underlying physical and chemical processes that occur under the conditions of radioactive waste storage, which include extremes of temperature, pressure, radiation flux, and multiple complex phases. The BER research effort addresses processes that control the mobility of radiological waste in the environment. The NP research effort is focused on characterization of radioactive waste through the advanced fuel cycle activities. The NP program areas are structured as scientific disciplines with goals to understand fundamental nuclear physics. A small portion of on-going research is relevant to the issues involved with radioactive waste and related advanced fuel cycles. The knowledge gained from this fundamental research will lead to breakthroughs in radioactive waste characterization necessary for permanent solutions to nuclear waste disposal, making nuclear power a major component in primary energy usage and lessening our dependence on oil.

Predicting High Level Waste System Performance over Extreme Time Horizons: BES supports basic research in predicting high level waste (HLW) system performance over extreme time horizons. This R&D coordination focus area was a subject of a BES workshop on Basic Research Needs for Geosciences in February 2007, which focuses on research challenges posed by geological repositories for HLW. The workshop report identified major research priorities in the areas of computational thermodynamics of complex fluids and solids, nanoparticulate and colloid physics and chemistry, biogeochemistry in extreme and perturbed environments, highly reactive subsurface materials and environments, and simulation of complex multi-scale systems for ultra-long times. The knowledge gained would in turn enable finding the permanent solutions to nuclear waste disposal, making nuclear power a major component in primary energy usage and lessening our dependence on oil. It would also further advance the goal of addressing environmental remediation needs.

High Energy Density Laboratory Plasmas: In May 2007, SC and NNSA jointly sponsored a workshop to update the HEDLP scientific research agenda. Three scientific themes emerged from the workshop: enabling the grand challenge of fusion energy by high energy density laboratory plasmas; creating, probing and controlling new states of high energy densities; and, catching reactions in the act by ultra-fast dynamics. In FY 2009, the FES request expands existing HEDLP research in response to the research opportunities identified in the workshop.

Scientific Workforce

Workforce development is an important element of the SC mission to help ensure a science-trained workforce, including researchers, engineers, science educators, and technicians. The research programs and projects at the national laboratories, universities, and research institutes actively integrate undergraduate and graduate students and post-doctoral investigators into their work. This “hands-on” approach is important for the development of the next generation of scientists, engineers, and science educators.

	FY 2007	FY 2008	FY 2009
Estimated Number of University Grants			
BES	1,150	1,120	1,500
ASCR	150	170	180
BER	700	715	750
HEP	200	200	200
NP	188	188	188
FES	231	233	233
Total Estimated Number of University Grants	2,619	2,626	3,051

	FY 2007	FY 2008	FY 2009
Estimated Number of Ph.D.s Supported			
BES	4,840	4,770	5,840
ASCR	615	720	745
BER	1,511	1,654	1,720
HEP	1,750	1,660	1,765
NP	981	967	1,040
FES	815	817	807
Total Estimated Number of Ph.D.s Supported	10,512	10,588	11,917
Estimated Number of Graduate Students Supported			
BES	1,580	1,550	2,000
ASCR	335	415	435
BER	400	435	460
HEP	585	585	605
NP	472	460	490
FES	350	354	344
Total Estimated Number of Graduate Students Supported	3,722	3,799	4,334

Indirect Costs and Other Items of Interest

Institutional General Plant Projects (IGPP)

Institutional General Plant Projects are miscellaneous construction projects that are each less than $5,000,000 in TEC and are of a general nature (cannot be allocated to a specific program). IGPPs support multi-programmatic and/or inter-disciplinary programs and are funded through site overhead. Examples of acceptable IGPPs include site-wide maintenance facilities and utilities, such as roads and grounds outside the plant fences or a telephone switch that serves the entire facility.

Examples of current year projects are:

- 5000 Area 13.8kV distribution system upgrade—This project provides new 13.8 kV pad-mounted disconnect switches, underground duct bank and 13.8 kV cabling will be installed to integrate with the existing 13.8 kV system and to improve capacity and system reliability. TEC: $3,250,000.
- 4000 Substation Capacity Expansion—The existing 4000 substation will be reconfigured to increase its reliability and capacity. TEC: $2,300,000.
- West Campus 1500 Series Facility Renovations—The Biological and Environmental Sciences Directorate will consolidate its research activities into West Campus facilities and vacate 40,000 square feet of offices and laboratories, the majority located in 4500S. This project renovates building systems and laboratory space in the West Campus to accommodate the consolidation. TEC: $4,000,000.

The following displays IGPP funding by site:

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Argonne National Laboratory	—	1,500	6,000
Brookhaven National Laboratory	—	400	6,820
Lawrence Berkeley National Laboratory	336	500	4,100
Oak Ridge National Laboratory	6,932	14,200	14,000
Pacific Northwest National Laboratory	13	2,000	1,500
Stanford Linear Accelerator	—	—	3,000
Total, IGPP	7,281	18,600	35,420

The IGPP funding increases significantly in FY 2009 reflecting the elimination of direct funded GPP for multi-program sites, as that funding is transferred to the SLI program to support increased line item construction under the SC Infrastructure Initiative.

Facilities Maintenance and Repair

The Department's facilities maintenance and repair activities are tied to its programmatic missions, goals, and objectives. Facilities Maintenance and Repair activities funded at SC laboratories are displayed in the following tables. SC has set maintenance targets for each of its laboratories to achieve overall facilities maintenance and repair levels consistent with the National Academy of Science recommendation of 2–4% of replacement plant value for the SC laboratory complex.

Indirect-Funded Maintenance and Repair

Facilities maintenance and repair activities funded indirectly through overhead charges at SC laboratories are displayed below. Since this funding is allocated to all work done at each laboratory, these activities are paid for using funds from SC and other DOE organizations, as well other Federal agencies and other entities doing work at SC laboratories. Maintenance reported to SC for non-SC laboratories is also shown.

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Ames Laboratory	1,011	997	1,031
Argonne National Laboratory	29,589	29,613	31,064
Brookhaven National Laboratory	23,767	27,511	28,289
Fermi National Accelerator Laboratory	8,514	8,557	9,668
Lawrence Berkeley National Laboratory	14,006	13,138	16,099
Lawrence Livermore National Laboratory	2,850	2,887	2,953
Los Alamos National Laboratory	100	100	100
Oak Ridge Institute for Science and Education	505	317	325
Oak Ridge National Laboratory	35,711	32,655	33,341
Oak Ridge National Laboratory facilities at Y-12	620	818	818
Office of Scientific and Technical Information	301	307	314

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Pacific Northwest National Laboratory	1,971	1,917	1,340
Princeton Plasma Physics Laboratory	5,226	5,499	5,636
Sandia National Laboratories	1,999	2,045	2,096
Stanford Linear Accelerator Center	5,533	4,353	5,631
Thomas Jefferson National Accelerator Facility	3,231	2,674	2,727
Total, Indirect-Funded Maintenance and Repair	134,934	133,388	141,432

Direct-Funded Maintenance and Repair

Generally, facilities maintenance and repair expenses are funded through an indirect overhead charge. In some cases, however, a laboratory may charge maintenance directly to a specific program. An example of this might be if the maintenance were performed in a building used only by a single program. These direct-funded charges are nonetheless in the nature of indirect charges, and therefore are not directly budgeted. The maintenance work for the Oak Ridge Office is direct funded and direct budgeted by the Science Laboratories Infrastructure program. A portion of the direct-funded maintenance and repair expenses reflects charges to non-SC programs performing work at SC laboratories.

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Brookhaven National Laboratory	3,284	1,711	1,771
Fermilab National Accelerator Facility	3,260	3,411	3,854
Notre Dame Radiation Laboratory	151	161	169
Oak Ridge National Laboratory	16,859	14,897	15,210
Oak Ridge Office	503	550	600
Stanford Linear Accelerator Center	6,097	6,737	6,283
Thomas Jefferson National Accelerator Facility	80	52	53
Total, Direct-Funded Maintenance and Repair	30,234	27,519	27,940

Deferred Maintenance Backlog Reduction

SC is working to reduce the backlog of deferred maintenance at its laboratories as part of the Federal Real Property Initiative within the President's Management Agenda. The total deferred maintenance backlog at the end of FY 2007 is estimated to be $518,000,000[a]. This backlog includes the Argonne, Brookhaven, Lawrence Berkley, Oak Ridge, and Pacific Northwest national laboratories; the Ames Laboratory, Fermilab National Accelerator Facility, Princeton Plasma Physics Laboratory, Stanford Linear Accelerator Center, and Thomas Jefferson National Accelerator Facility; and other SC facilities in Oak Ridge and Notre Dame. The Department's goals for asset condition are based on the mission dependency of the asset. For example, the asset condition index long-term (FY 2015) target for mission

[a] The FY 2008 budget reported an estimated deferred maintenance backlog of $225,000,000 at the end of the FY 2006. This reflected deferred maintenance in excess of the DOE Asset Condition Index targets. The $518,000,000 estimate reflects the total deferred maintenance backlog.

critical facilities is 0.98 or above, where the index is computed as 1 less the ratio of deferred maintenance to replacement plant value. A higher index indicates lower deferred maintenance.

SC's $518,000,000 deferred maintenance back log at the end of FY 2007 exceeded the DOE Asset Condition Index goal by $232,000,000. To reduce the deferred maintenance backlog such that SC achieves the goals, SC sets targets for each of its laboratories for reduction of the deferred maintenance backlog based on the variance from departmental goals (e.g., the 0.98 goal for mission critical facilities). The FY 2007 target for deferred maintenance reduction funding was not met due to delayed appropriations, which postponed the start of planned projects.

Deferred maintenance activities are primarily funded by the laboratories as overhead, charged to all users of the laboratory facilities. The deferred maintenance estimates in the table below are in addition to funding of day-to-day maintenance and repair amounts shown in the tables above. In order to ensure that new maintenance requirements are not added to the backlog, SC has set targets for our laboratories that, overall, exceed 2% of the SC laboratory complex replacement plant value, commensurate with the industry standard funding level recommended by the National Academy of Sciences of 2–4% of the replacement plant value. The table below shows the targets planned for funding of deferred maintenance backlog reduction.

A key additional strategy in reducing deferred maintenance is SC's proposed Infrastructure Modernization Initiative, which will modernize the general purpose infrastructure at SC laboratories. The initiative focuses on increased funding for line item construction projects which will result in significant additional reductions to the deferred maintenance backlog, but are not included within the indirect funding in the following table. SLI is developing measures for tracking the progress of the initiative in reducing deferred maintenance, as well as improving mission readiness, improving operational reliability and safety, and reducing the footprint and average age of facilities.

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Argonne National Laboratory	2,721	1,983	4,581
Brookhaven National Laboratory	3,799	5,374	8,147
Fermi National Accelerator Laboratory	1,621	1,900	2,800
Lawrence Berkeley National Laboratory	2,200	4,038	2,500
Oak Ridge National Laboratory	5,320	6,000	6,500
Princeton Physics Plasma Laboratory	173	177	258
Stanford Linear Accelerator Center	792	686	1,001
Thomas Jefferson National Accelerator Facility	114	646	500
Total, Deferred Maintenance Backlog Reduction	16,740	20,804[a]	26,287[a]

[a] Funding estimates may need to be updated as a result of annual reviews of asset condition and the extent of the deferred maintenance backlog. The SC infrastructure initiative and the conversion from GPP to IGPP may also further impact the FY 2009 estimate. The impact of the FY 2008 appropriation may result in adjustments to the FY 2008 deferred maintenance funding goal.