Science
Proposed Appropriation Language

For Department of Energy expenses including the purchase, construction, and acquisition of plant and capital equipment, and other expenses necessary for science activities in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or facility or for plant or facility acquisition, construction, or expansion, and purchase of not more than 25 passenger motor vehicles for replacement only, including one ambulance and two buses, $4,992,052,000, to remain available until expended: Provided, That $202,551,000 shall be available until September 30, 2014 for program direction.

Explanation of Change

Appropriation language updates reflect the funding and replacement passenger motor vehicle levels requested in FY 2013.

Science
Office of Science

Overview
Appropriation Summary by Program

	(Dollars in Thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Advanced Scientific Computing Research[a]	410,317	440,868	455,593
Basic Energy Sciences[a]	1,638,511	1,688,093	1,799,592
Biological and Environmental Research[a]	595,246	609,557	625,347
Fusion Energy Sciences[a]	367,257	400,996	398,324
High Energy Physics[a]	775,578	790,860	776,521
Nuclear Physics[a]	527,684	547,387	526,938
Workforce Development for Teachers and Scientists	22,600	18,500	14,500
Science Laboratories Infrastructure	125,748	111,800	117,790
Safeguards and Security[a]	83,786	80,573	84,000
Program Direction[a]	202,520	185,000	202,551
Small Business Innovation Research/Technology Transfer (SBIR/STTR) (SC funding)	108,418	0	0
Subtotal, Office of Science	4,857,665	4,873,634	5,001,156
SBIR/STTR (Other DOE funding)	54,618	0	0
Use of prior year balances	-15,000	0	-9,104
Total, Science appropriation/Office of Science	4,897,283	4,873,634[b]	4,992,052

[a] Funding includes support for the Working Capital Fund (WCF). DOE is working to achieve economies of scale through the WCF. The WCF covers certain shared, enterprise activities including enhanced cyber security architecture, employee health and testing services, and consolidated training and recruitment initiatives.
[b] The FY 2012 appropriation is reduced by $15,366,000 for the Office of Science share of the DOE-wide $73,300,000 rescission for contractor pay freeze savings. The FY 2013 budget request reflects the FY 2013 impact of the contractor pay freeze.

Office Overview and Accomplishments

The Office of Science mission is to deliver the scientific discoveries and major scientific tools that transform our understanding of nature and advance the energy, economic, and national security of the United States. The Office of Science accomplishes its mission and advances national goals by supporting:

- Energy and Environmental Science, focused on advancing a clean energy agenda through fundamental research on energy production, storage, transmission, and use, and on advancing our understanding of the earth's climate through basic research in atmospheric and environmental sciences and climate change; and
- The Frontiers of Science, focused on unraveling nature's mysteries—from the study of subatomic particles, atoms, and molecules that make of the materials of our everyday world to DNA, proteins, cells, and entire biological systems;

- The 21st Century Tools of Science, national scientific user facilities providing the Nation's researchers with the most advanced tools of modern science including accelerators, colliders, supercomputers, light sources, neutron sources, and facilities for studying the nanoworld.

The Office of Science has long been a leader of U.S. scientific discovery and innovation. Over the decades, Office of Science investments have driven the modern biotechnology revolution and the transition in the 20th century from observing natural phenomena to the science of control and directed design at the nanoscale. We have pushed the frontiers of our understanding of the origins of matter and the universe, and we have built and operated the large-scale scientific facilities that collectively form a major pillar of the current U.S. scientific enterprise. These investments and accomplishments have led to new technologies and created new businesses and industries, making significant contributions to our Nation's economy and quality of life.

The Office of Science is the lead Federal agency supporting fundamental scientific research for energy and the Nation's largest Federal sponsor of basic research in the physical sciences. The Office of Science supports about 25,000 investigators at about 300 U.S. academic institutions and at all of the DOE laboratories. The Office of Science also provides the Nation's researchers with state-of-the-art national scientific user facilities—the large machines for modern science. These facilities offer capabilities unmatched anywhere in the world and enable U.S. researchers and industries to remain at the forefront of science, technology, and innovation. Approximately 26,500 researchers from universities, national laboratories, industry, and international partners are expected to use the Office of Science scientific user facilities in FY 2013.

Significant accomplishments during FY 2011, described in more detail in the program narratives that follow, include demonstrating self-repair in a bio-inspired artificial solar cell; creating novel designs for memory systems and interconnects to accelerate computer speeds while decreasing their energy demand; engineering microbes to directly convert plant material into a drop-in biofuel; and discovering that the neutrons occupy a larger volume than the protons in Pb-208, a result central to understanding the structure of heavy nuclei.

Complete descriptions of several science discoveries of FY 2011 can be found at http://science.energy.gov/stories-of-discovery-and-innovation/.

The Office of Science appropriation includes ten programs:

- *Advanced Scientific Computing Research* supports research to discover, develop, and deploy the computational and networking capabilities to analyze, model, simulate, and predict complex phenomena important to DOE.
- *Basic Energy Sciences* supports fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels in order to provide the foundations for new energy technologies and to support the DOE mission in energy, environment, and national security.
- *Biological and Environmental Research* supports fundamental research to address diverse and critical global challenges, from the sustainable and affordable production of renewable biofuels to understanding and predicting climate change and greenhouse gas emissions relevant to energy production and technology use.
- *Fusion Energy Sciences* supports research to expand the fundamental understanding of matter at very high temperatures and densities and to build the scientific foundation of fusion energy.
- *High Energy Physics* supports research toward understanding how the universe works at its most fundamental level by discovering the most elementary constituents of matter and energy, probing the interactions among them, and exploring the basic nature of space and time itself.
- *Nuclear Physics* supports research to discover, explore, and understand all forms of nuclear matter, supporting experimental and theoretical research to create, detect, and describe the different forms and complexities of nuclear matter that can exist in the universe, including those that are no longer found naturally.
- *Workforce Development for Teachers and Scientists* supports activities that engage students and professionals in science, technology, engineering, and mathematics (STEM) to help develop the skilled

scientific workforce needed for the Office of Science mission and the Nation.

- *Science Laboratories Infrastructure* focuses on ensuring the continued mission readiness of Office of Science laboratories and facilities to maintain the capability of those assets.
- *Safeguards and Security* supports the Department's research mission by ensuring appropriate levels of protection at the ten SC laboratories.
- *Science Program Direction* supports the Federal workforce that oversees SC investments in scientific research and national scientific user facilities.

The Office of Science is responsible for the oversight of ten DOE national laboratories: Ames National Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Princeton Plasma Physics Laboratory, SLAC National Accelerator Laboratory, and Thomas Jefferson National Accelerator Laboratory.

Alignment to Strategic Plan

Office of Science activities align to three objectives from the DOE Strategic Plan: extend our knowledge of the natural world, deliver new technologies to advance our mission, and sustain a world-leading technical workforce. For the Office of Science, the Strategic Plan identifies nine targeted outcomes for achieving these objectives.

Extend Our Knowledge of the Natural World

- Develop and explore a broad spectrum of new materials that have novel properties, such as catalysis, electrothermal behavior, radiation resistance, or strength, or otherwise contribute to the advancement of energy technologies by 2020.
- Explore the construction and use of x-ray free electron lasers and the next generation of synchrotron light sources.
- Determine the major sources of uncertainty in our understanding of the coupled climate system by 2015.
- Perform a series of experiments through 2020 in the intensity, energy, and cosmological frontiers to illuminate questions about the unification of the forces of nature, the structure of black holes, and the origins of the universe.
- Complete construction of nuclear physics facilities by the end of the decade at Jefferson Laboratory and Michigan State University to test quantum chromodynamics, the theory of nuclear forces, and produce exotic nuclei of relevance in astrophysical processes.

Deliver New Technologies to Advance Our Mission

- Apply systems biology approaches by 2015 to create viable biofuels processes and greatly increase the understanding of microbes in carbon-dioxide climate balance.
- Execute U.S. responsibilities for construction of the ITER project, consistent with sound project management principles.
- Continue to develop and deploy high-performance computing hardware and software systems through exascale platforms.

Sustain a World-Leading Technical Workforce

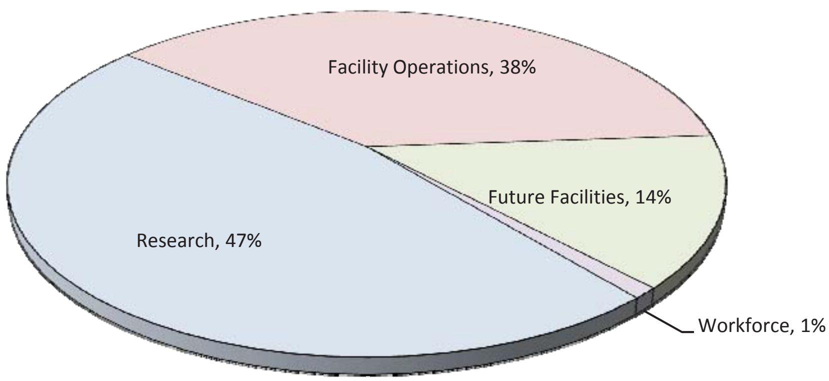
- Provide support by 2015 to students and educators in a manner designed to address skill gaps identified by senior Departmental leadership in the Department's scientific and technical workforce.

In support of its mission, Office of Science funding requests and performance expectations are focused on four areas:

- *Research*: Support fundamental research to increase our understanding of and enable predictive control of phenomena in the physical and biological sciences.
- *Facility Operations*: Maximize the reliability, dependability, and availability of the SC scientific user facilities.
- *Future Facilities*: Build future and upgrade existing facilities and experimental capabilities to ensure maximum benefit from the investments in SC scientific user facilities.
- *Scientific Workforce*: Contribute to the effort aimed at ensuring that DOE and the Nation have a sustained pipeline of highly skilled and diverse science, technology, engineering, and mathematics (STEM) workers.

Goal/Program Alignment Summary

	Research	Facility Operations	Future Facilities	Workforce
Advanced Scientific Computing Research	49%	50%	0%	1%
Basic Energy Sciences	46%	44%	10%	0%
Biological and Environmental Research	65%	35%	0%	0%
Fusion Energy Sciences	45%	10%	45%	0%
High Energy Physics	55%	30%	15%	0%
Nuclear Physics	32%	56%	12%	0%
Workforce Development for Teachers and Scientists	0%	0%	0%	100%
Science Laboratories Infrastructure	0%	0%	100%	0%
Total, Office of Science	47%	38%	14%	1%



Explanation of Changes

The Office of Science FY 2013 request is for $4.99 billion, reflecting growth of $118 million or 2.4% relative to the FY 2012 appropriation. As part of the President's Plan for Science and Innovation, the Budget sustains the commitment to double the budgets of three key science agencies: the National Science Foundation, DOE's Office of Science, and the National Institutes of Standards and Technology laboratories.

Advanced Scientific Computing Research grows $14.7 million or 3.3%. The major changes are increased investments in data-intensive science.

Basic Energy Sciences increases $111 million or 6.6%. The major changes are the support for increases in scientific research related to clean energy including next generation materials and chemical processes and new collaborative efforts with the Office of Energy Efficiency and Renewable Energy to help translate scientific discoveries into new energy technologies.

Biological and Environmental Research includes an increase of $15.8 million or 2.6%. The major changes are investments in the development of synthetic biology tools and technologies, integrative analysis of experimental data sets, and climate observations in the Arctic.

Fusion Energy Sciences decreases $2.7 million or 0.7%. ITER funding grows by $45 million from $105 million to $150 million, while core research is reduced and operations at one research facility are terminated.

High Energy Physics decreases $14.3 million or 1.8%. The major changes in the program are the neutrino beamline upgrades at Fermilab, the start of design for two MIEs (Bella-II and the Large Synoptic Survey Telescope), and the completion of the ILC R&D program.

Nuclear Physics decreases $20.4 million or 3.7%. NP core research is reduced and operation time at NP national user facilities decreases. Construction of the 12 GeV CEBAF Upgrade project continues at a reduced level from FY 2012, and engineering and design effort for the Facility for Rare Isotope Beams is continued at the FY 2012 level.

High-Risk, High-Reward Research[a]

The need for fundamental scientific and technological breakthroughs to accomplish DOE mission goals requires that the Office of Science support high-risk, high-reward research ideas that challenge current thinking yet are scientifically sound. The Office of Science incorporates high-risk, high-reward basic research elements in all of its research portfolios; each Office of Science research program considers a significant proportion of its supported research as high-risk, high-reward. Because advancing the frontiers of science also depends on the continued availability of state-of-the-art scientific facilities, the Office of Science constructs and operates national scientific facilities and instruments that comprise the world's most sophisticated suite of research capabilities.

The Office of Science's basic research is integrated within program portfolios, projects, and individual awards; as such, it is not possible to quantitatively separate the funding contributions of particular experiments or theoretical studies that are high-risk, high-reward from other mission-driven research in a manner that is credible and auditable. The Office of Science focuses on cultivating and improving the program management practices and policies that foster support for this aspect of its research portfolio. Effective program management is critical to the support of high-risk, high-reward research. The Office of Science program managers are experts in their respective fields and communicate research priorities and interests to the scientific community; select proposal reviewers that are open to bold ideas; provide guidance to merit reviewers—including guidance on consideration of high-risk, high-reward research; and make recommendations on proposal selection, weighing inputs from merit review with programmatic relevance, potential impact, and overall portfolio balance. Committees of Visitors comprised of external experts review program portfolios triennially to assess, among other things, the balance and impact of the portfolios, including an assessment of high-risk, high-reward research.

Likewise, several mechanisms are used by the Office of Science to identify and develop "high-reward" research topics, including Federal advisory committees, program and topical workshops, interagency working groups, National Academies studies, and special Office of Science program solicitations. These activities have identified opportunities for new, compelling research. As examples, some of these opportunities are captured in the following reports: *Research at the Intersection of the Physical and Life Sciences*, by the National Research Council (2010); *New Worlds, New Horizons in Astronomy and Astrophysics,* the astronomy and astrophysics decadal survey (Astro2010 report), by the National Research Council; *Next-Generation Photon Sources for Grand Challenges in Science Energy*, by the Basic Energy Sciences Advisory Committee (BESAC) (2009); *Accelerators for Americas Future* workshop report (2009); *Advancing the Science of High Energy Density Laboratory Plasmas* by the Fusion Energy Sciences Advisory Committee (2009); *New Science for a Secure and Sustainable Energy Future*, by BESAC (2008); *Grand Challenges for Biological and Environmental Research: A Long-Term Vision*, by the Biological and Environmental Research Advisory Committee (2010); *U.S. Particle Physics: Scientific Opportunities, A Strategic Plan for the Next Ten Years*, by the High Energy Physics Advisory Panel; and *The Frontiers of Nuclear Science*, by the Nuclear Sciences Advisory Committee (2007).

Basic and Applied R&D Coordination

Coordination between the Department's basic research and applied technology programs is a high priority for the Secretary of Energy. The Department has a responsibility to coordinate its basic and applied research programs to effectively integrate R&D conducted by the science and technology communities (e.g., national laboratories, universities, and private companies) that support the DOE mission. The Department's efforts have focused on improving communication and collaboration between federal program managers and increasing opportunities for collaborative efforts among researchers targeted at the interface of scientific research and technology development to ultimately accelerate DOE mission and national goals.

[a] In compliance with the reporting requirements in the America COMPETES Act of 2007 (P.L. 110–69, section 1008).

Coordination between the basic and applied programs is enhanced through activities such as joint planning meetings and technical community workshops, joint annual contractor/awardee meetings, joint research solicitations, jointly-funded scientific facilities, and the program management activities of the DOE Small Business Innovation Research and Small Business Technology Transfer programs. Additionally, co-funding research activities and facilities at the DOE laboratories and funding mechanisms that encourage broad partnerships are also means by which the Department facilitates greater communication and research integration within the basic and applied research communities. Specific collaborative activities are highlighted in the "Basic and Applied R&D Coordination" sections of each individual Office of Science program budget justification narrative.

Scientific Workforce

The Office of Science and its predecessors have an over 50-year history in supporting the education and training of the skilled scientific workforce needed to tackle some of our Nation's most important societal challenges. Through its six research programs, the Office of Science supports the training of undergraduates, graduate students, and postdoctoral researchers through ongoing sponsored research awards at universities and the DOE national laboratories. Office of Science programs also support the development of individual research programs of outstanding scientists early in their careers to stimulate research careers in disciplines supported by the Office of Science.

Undergraduate activities include short intensive research training internships in specific areas such as geophysics, radiochemistry, nuclear science, computer science and computational-based sciences, plasma and fusion energy sciences, and climate science; and short courses in emerging areas in the physical sciences and engineering, including opportunities for groups underrepresented in the physical sciences. Graduate student level activities include support for short courses and lecture series as part of scientific professional society meetings; summer courses, lecture series, and experimental training courses in areas such as neutron and x-ray scattering, and high energy physics; and summer graduate research internships in targeted areas such as radiochemistry, accelerator physics, and nuclear physics. Opportunities directed towards K–12 educators, carried out primarily through the DOE national laboratories, include workshops, classroom presentations, and summer training programs that provide educators with content knowledge, materials, and activities related to the physical sciences and mathematics to use in the classroom.

In FY 2011, the Office of Science established a common set of guidelines for the reporting of education and workforce development programs by the six research programs to ensure consistent reporting and to ensure consistency with the definitions established by the National Science and Technology Council's Committee on STEM Education (CoSTEM), and the General Accountability Office study team conducting an inventory of all Federal STEM education programs. Significant changes in budget numbers from previous years reflect the consistent use of these guidelines and definitions, and the phasing out of programs terminated in FY 2010 and FY 2011. In December 2011, CoSTEM released its report on the *Federal Science, Technology, Engineering, and Mathematics (STEM) Education Portfolio.* Required by the 2010 reauthorization of the America COMPETES Act, the *Portfolio* report provides an inventory and analysis of the STEM education program across 13 Federal agencies, including DOE.

The Office of Science is committed to participating in the Department's pilot laboratory research internship project for the STEM education program authorized by section 101 of the America COMPETES Reauthorization Act of 2010.

Strategic Plan and Performance Measures

Strategic Goal: The Science and Engineering Enterprise—maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas.

Objective: Extend Our Knowledge of the Natural World

Targeted Outcome: Develop and explore a broad spectrum of new materials that have novel properties, such as catalysis, electrothermal behavior, radiation resistance, or strength, or otherwise contribute to the advancement of energy technologies by 2020.

Targeted Outcome: Explore the construction and use of X-ray free electron lasers and the next generation of synchrotron light sources.

Annual Measure: Maintain specific characteristics of a user facility's beam needed to create data for research experiments. *(Measure applies to both of the prior targeted outcomes.)*

	Target	Actual/Met or Not Met
FY 2013	Light source facilities image resolution of <100 nm for hard x-ray and <18 nm for soft x-ray; X-ray FEL facility with x-ray pulse duration <70 femtoseconds with intensity of >1 trillion (10^{12}) photons per pulse	N/A
FY 2012	Light source facilities image resolution of <100 nm for hard x-ray and <18 nm for soft x-ray; X-ray FEL facility with x-ray pulse duration <70 femtoseconds with intensity of >1 trillion (10^{12}) photons per pulse	N/A
FY 2011	N/A	N/A

Analysis: New instruments lie at the heart of discovery. These advanced instruments image systems that move in space and time and change in energy with the correct resolution for each of these three dimensions. The ability to image structure and function will inform and direct our efforts to control molecules and materials. Devices to direct matter at the levels of electrons, atoms, and molecules will naturally emerge from new generations of facilities. The importance of x-ray free electron laser and the light source facilities for seeing more deeply into nature and discovering a broad spectrum of new materials is specified in two Basic Energy Sciences Advisory Committee reports, *Directing Matter and Energy: Five Challenges for Science and the Imagination* and *Next-Generation Photon Sources for Grand Challenges in Science and Energy*.

Targeted Outcome: Determine the major sources of uncertainty in our understanding of the coupled climate system by 2015.

Annual Measure: Develop a coupled climate model with fully interactive carbon and sulfur cycles, as well as dynamic vegetation to enable simulations of aerosol effects, carbon chemistry, and carbon sequestration by the land surface and oceans and the interactions between the carbon cycle and climate.

	Target	Actual/Met or Not Met
FY 2013	Use global models to estimate the most sensitive elements of cloud and terrestrial carbon for tropics, mid-latitudes, and polar regions.	N/A
FY 2012	Demonstrate coupled climate models at 20 km resolution	N/A
FY 2011	Earth system model to be used in generating scenarios for the IPCC Fifth Assessment Report and provide integrated aerosol sub-model that includes direct and indirect forcing.	Met

Analysis: Deliver improved scientific data and models (with quantified uncertainties) about the potential response of the earth-atmosphere system to more accurately predict the Earth's future climate are essential to plan for future energy needs, water resources, and land use.

Targeted Outcome: Perform a series of experiments through 2020 in the intensity, energy, and cosmological frontiers to illuminate questions about the unification of the forces of nature, the structure of black holes, and the origins of the universe.

Annual Measure: Within 20% deliver a total number of protons to the NuMI neutrino production target for the MINOS and MINERvA experiments.

	Target	Actual/Met or Not Met
FY 2013	Baseline is 2.0×10^{20} (within 20% is 1.6×10^{20})	N/A
FY 2012	Baseline is 1.5×10^{20} (within 20% is 1.2×10^{20})	N/A
FY 2011	Baseline is 2.7×10^{20} (within 20% is 2.2×10^{20})	Met

Analysis: While neutrinos rarely interact with other matter, the number of neutrinos produced by a beam is directly related to the number of protons that strike the neutrino production target. Measuring the number of protons on target should accurately predict the number of neutrinos produced and inform determination of the statistical precision of the experimental measurements.

Targeted Outcome: Complete the construction of nuclear physics facilities by the end of the decade at Jefferson Laboratory and Michigan State University to test quantum chromodynamics, the theory of nuclear forces, and produce exotic nuclei of relevance in astrophysical processes.

Annual Measure: Achieve within 10% for both the cost-weighted mean percentage variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects.

	Target	Actual/Met or Not Met
FY 2013	<10%	N/A
FY 2012	<10%	N/A
FY 2011	<10%	Met

Analysis: Project cost or schedule changes for the baselined 12 GeV project at Jefferson Laboratory, as a result of the FY 2012 appropriation, have not yet been evaluated and reviewed. While the Facility for Rare Isotope Beams project at Michigan State University is not yet baselined, project cost or schedule changes as a result of the FY 2012 appropriation have not yet been evaluated and reviewed.

Objective: Deliver New Technologies to Advance Our Mission

Targeted Outcome: Apply systems biology approaches by 2015 to create viable biofuels processes and greatly increase the understanding of microbes in carbon-dioxide climate balance.

Annual Measure: Increase by at least 50% the number of high quality (less than one error in 10,000) bases of DNA from microbial and model organism genomes sequenced the previous year.

	Target	Actual/Met or Not Met
FY 2013	To be determined based on FY 2012 results	N/A
FY 2012	Sequence 44,855 billion base pairs	N/A
FY 2011	Sequence 1,100 billion base pairs[a]	Met

Analysis: Provides the fundamental scientific understanding of plants and microbes necessary to develop new robust and transformational basic research strategies for producing biofuels, cleaning up waste, and sequestering carbon.

Targeted Outcome: Execute U.S. responsibilities for construction of the ITER project, consistent with sound project management principles.

Annual Measure: Cost-weighted mean percent variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects kept to less than 10%.

	Target	Actual/Met or Not Met
FY 2013	<10%	N/A
FY 2012	<10%	N/A
FY 2011	<10%[b]	Met

Analysis: Adhering to the cost and schedule baselines for a complex, large scale, science project while maintaining a balanced research portfolio will help meet the scientific requirements for the project and promote sound stewardship of taxpayer funds.

Targeted Outcome: Continue to develop and deploy high-performance computing hardware and software systems through exascale platforms.

Annual Measure: Demonstrate progress toward delivering exascale science for advancing fundamental

[a] The target for this annual measure included a base pair per dollar component. This component was achieved.
[b] The FY 2011 project measure applies to Fusion Energy Sciences' National Spherical Tokamak Experiment Upgrade, not to ITER, which has not yet been baselined.

research to understand, predict, and engineer complex systems of interest to the Department.

	Target	Actual/Met or Not Met
FY 2013	Accept and put into service 10 petaflop upgrades at Argonne and Oak Ridge Leadership Computing Facilities to support scientific discovery.	N/A
FY 2012	Develop an exascale plan that is coordinated with NNSA and socialized with the community and policy makers.	N/A
FY 2011	N/A	N/A

Analysis: Advances in high performance computing underpin U.S. leadership in disciplines across DOE missions. The ability to understand physical and engineered systems at unprecedented levels of fidelity along with detailed understanding of the uncertainty will result from future computers. The potential of these computers to enhance DOE's ability to meet its missions across the Department is detailed in the Advanced Scientific Computing Advisory Committee report: *Opportunities and Challenges of Exascale Computing*.

Objective: Sustain a World-Leading Technical Workforce

Targeted Outcome: Provide support by 2015 to graduate students in a manner designed to address skill gaps identified by senior Departmental leadership in the Department's scientific and technical workforce.

Annual Measure: The percentage of SULI students who report in their exit survey they have increased their preparedness for a STEM career as a result of the program.

	Target	Actual/Met or Not Met
FY 2013	≥ 90%	N/A
FY 2012	N/A	N/A
FY 2011	N/A	N/A

Analysis: Provide participants a pathway to STEM careers in scientific disciplines relevant to DOE's mission in energy, environment, and national security, including careers at the Department and its national laboratories.

<u>Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)</u>

(Dollars in Thousands)

	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Advanced Scientific Computing Research	0	12,563	13,438
Basic Energy Sciences	0	42,699	48,898
Biological and Environmental Research	0	17,055	18,759
Fusion Energy Sciences	0	8,167	6,881
High Energy Physics	0	20,040	20,590
Nuclear Physics	0	12,889	12,970
SBIR/STTR (SC funding)	108,418	0	0
Subtotal, SBIR/STTR	108,418	113,413	121,536
SBIR/STTR (funds transferred from other DOE programs)	54,618	N/A	N/A
Total, SBIR/STTR	163,036	N/A	N/A

SBIR and STTR funding is transferred from research programs across the Department to the Small Business Innovation Research/Technology Transfer programs in the Office of Science for distribution to award recipients. All contributing programs participate in the selection of awards. In FY 2011, 2.8% of funding subject to the SBIR/STTR mandate was transferred (2.5% for SBIR and 0.3% for STTR). In FY 2012, the rate increases to 2.95% (2.6% for SBIR and 0.35% for STTR) and increases to 3.05% in FY 2013 (2.7% for SBIR and 0.35% for STTR). FY 2012 funding will be transferred during FY 2012, but no transfer is reflected in this budget document.

Office of Science
Funding by Site by Program

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Ames Laboratory			
Advanced Scientific Computing Research	470	0	0
Basic Energy Sciences	23,647	18,919	21,694
Biological and Environmental Research	894	500	500
Workforce Development for Teachers and Scientists	146	0	0
Safeguards and Security	1,007	993	910
Total, Ames Laboratory	26,164	20,412	23,104
Ames Site Office			
Program Direction	546	545	561
Argonne National Laboratory			
Advanced Scientific Computing Research	79,453	75,832	68,654
Basic Energy Sciences	226,320	213,744	228,429
Biological and Environmental Research	36,769	22,151	28,457
Fusion Energy Sciences	49	40	40
High Energy Physics	19,836	17,868	15,934
Nuclear Physics	29,619	27,235	26,851
Workforce Development for Teachers and Scientists	1,428	0	0
Science Laboratories Infrastructure	14,970	40,000	32,030
Safeguards and Security	9,211	8,858	8,601
Total, Argonne National Laboratory	417,655	405,728	408,996
Argonne Site Office			
Program Direction	3,608	3,974	4,433
Berkeley Site Office			
Program Direction	4,345	3,954	4,072

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Brookhaven National Laboratory			
Advanced Scientific Computing Research	760	300	0
Basic Energy Sciences	257,077	263,388	201,941
Biological and Environmental Research	20,827	16,806	18,911
High Energy Physics	56,799	48,043	45,284
Nuclear Physics	185,163	180,313	178,197
Workforce Development for Teachers and Scientists	2,182	202	0
Science Laboratories Infrastructure	14,970	15,500	14,530
Safeguards and Security	12,228	12,582	12,312
Total, Brookhaven National Laboratory	550,006	537,134	471,175
Brookhaven Site Office			
Program Direction	4,876	4,870	5,027
Chicago Office			
Advanced Scientific Computing Research	53,886	23,050	13,430
Basic Energy Sciences	277,754	306,260	352,209
Biological and Environmental Research	155,312	158,608	130,891
Fusion Energy Sciences	155,249	137,430	106,946
High Energy Physics	132,380	138,069	127,013
Nuclear Physics	81,944	91,721	85,985
Workforce Development for Teachers and Scientists	199	0	0
Science Laboratories Infrastructure	1,382	1,385	1,385
Safeguards and Security	92	133	77
Program Direction	45,152	28,896	31,636
SBIR/STTR	163,036	0	0
Total, Chicago Office	1,066,386	885,552	849,572

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Fermi National Accelerator Laboratory			
Advanced Scientific Computing Research	767	75	0
Basic Energy Sciences	86	0	0
High Energy Physics	409,914	381,857	359,127
Nuclear Physics	976	0	612
Workforce Development for Teachers and Scientists	46	0	0
Science Laboratories Infrastructure	0	0	2,500
Safeguards and Security	3,666	3,533	3,413
Total, Fermi National Accelerator Laboratory	415,455	385,465	365,652
Fermi Site Office			
Program Direction	2,148	2,243	2,310
Golden Field Office			
Workforce Development for Teachers and Scientists	476	0	0
Idaho National Laboratory			
Basic Energy Sciences	2,232	1,700	1,700
Biological and Environmental Research	1,404	1,190	0
Fusion Energy Sciences	2,372	2,222	2,173
Workforce Development for Teachers and Scientists	251	0	0
Total, Idaho National Laboratory	6,259	5,112	3,873

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Lawrence Berkeley National Laboratory			
Advanced Scientific Computing Research	114,009	106,463	105,380
Basic Energy Sciences	169,862	149,992	160,492
Biological and Environmental Research	138,712	130,167	133,151
Fusion Energy Sciences	5,520	4,584	0
High Energy Physics	54,012	47,153	45,419
Nuclear Physics	24,110	23,415	17,946
Workforce Development for Teachers and Scientists	1,149	0	0
Science Laboratories Infrastructure	20,063	12,975	0
Safeguards and Security	6,141	5,127	4,879
Total, Lawrence Berkeley National Laboratory	533,578	479,876	467,267
Lawrence Livermore National Laboratory			
Advanced Scientific Computing Research	15,449	10,178	4,425
Basic Energy Sciences	4,677	1,803	3,251
Biological and Environmental Research	17,671	13,390	14,352
Fusion Energy Sciences	13,601	11,129	5,705
High Energy Physics	2,029	1,731	550
Nuclear Physics	3,392	822	1,164
Workforce Development for Teachers and Scientists	205	0	0
Total, Lawrence Livermore National Laboratory	57,024	39,053	29,447
Los Alamos National Laboratory			
Advanced Scientific Computing Research	7,056	5,770	2,950
Basic Energy Sciences	41,795	38,002	38,952
Biological and Environmental Research	12,677	20,606	23,712
Fusion Energy Sciences	5,182	3,427	2,386
High Energy Physics	1,533	1,380	1,237
Nuclear Physics	11,616	9,548	8,584
Workforce Development for Teachers and Scientists	31	0	0
Total, Los Alamos National Laboratory	79,890	78,733	77,821

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
NNSA Albuquerque Complex			
Advanced Scientific Computing Research	3,000	0	0
National Energy Technology Laboratory			
Basic Energy Sciences	5,000	0	0
Workforce Development for Teachers and Scientists	445	120	0
Total, National Energy Technology Laboratory	5,445	120	0
National Renewable Energy Laboratory			
Advanced Scientific Computing Research	472	186	186
Basic Energy Sciences	12,978	11,888	11,888
Biological and Environmental Research	1,586	1,168	900
Workforce Development for Teachers and Scientists	64	75	0
Total, National Renewable Energy Laboratory	15,100	13,317	12,974
Nevada Site Office			
Basic Energy Sciences	244	244	244
New Brunswick Laboratory			
Program Direction	6,132	5,940	6,145
Oak Ridge Institute for Science and Education			
Advanced Scientific Computing Research	1,500	1,000	1,000
Basic Energy Sciences	4,120	1,600	1,600
Biological and Environmental Research	5,386	2,942	3,378
Fusion Energy Sciences	960	1,100	650
High Energy Physics	1,380	0	0
Nuclear Physics	1,304	910	732
Workforce Development for Teachers and Scientists	13,977	5,295	0
Safeguards and Security	1,671	1,645	1,572
Program Direction	84	0	0
Total, Oak Ridge Institute for Science and Education	30,382	14,492	8,932

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Oak Ridge National Laboratory			
Advanced Scientific Computing Research	110,007	100,240	84,389
Basic Energy Sciences	335,033	316,221	315,047
Biological and Environmental Research	79,385	71,235	72,584
Fusion Energy Sciences	101,251	119,715	160,633
High Energy Physics	50	44	50
Nuclear Physics	37,283	22,548	19,923
Safeguards and Security	9,183	9,016	8,668
Total, Oak Ridge National Laboratory	672,192	639,019	661,294
Oak Ridge National Laboratory Site Office			
Program Direction	4,355	3,998	5,949
Oak Ridge Office			
Biological and Environmental Research	0	1,000	0
Science Laboratories Infrastructure	5,250	5,493	5,934
Safeguards and Security	20,011	18,000	17,864
Program Direction	38,478	34,043	36,071
Total, Oak Ridge Office	63,739	58,536	59,869
Office of Scientific and Technical Information			
Advanced Scientific Computing Research	211	125	125
Basic Energy Sciences	435	125	125
Biological and Environmental Research	542	192	267
Fusion Energy Sciences	252	125	125
High Energy Physics	125	125	124
Nuclear Physics	160	275	125
Workforce Development for Teachers and Scientists	100	0	0
Safeguards and Security	504	497	445
Program Direction	11,250	8,417	8,900
Total, Office of Scientific and Technical Information	13,579	9,881	10,236

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Pacific Northwest National Laboratory			
Advanced Scientific Computing Research	7,099	4,455	1,600
Basic Energy Sciences	28,028	21,811	23,112
Biological and Environmental Research	114,740	119,218	103,999
Fusion Energy Sciences	1,163	1,163	1,163
High Energy Physics	1,005	964	6,408
Nuclear Physics	204	100	83
Workforce Development for Teachers and Scientists	924	115	0
Safeguards and Security	11,515	11,317	11,030
Total, Pacific Northwest National Laboratory	164,678	159,143	147,395
Pacific Northwest Site Office			
Program Direction	5,321	5,170	5,330
Princeton Plasma Physics Laboratory			
Advanced Scientific Computing Research	613	0	0
Fusion Energy Sciences	76,992	71,354	59,482
High Energy Physics	240	0	230
Workforce Development for Teachers and Scientists	127	0	0
Safeguards and Security	2,397	2,232	2,128
Total, Princeton Plasma Physics Laboratory	80,369	73,586	61,840
Princeton Site Office			
Program Direction	1,661	1,763	1,816
Sandia National Laboratories			
Advanced Scientific Computing Research	14,125	11,712	3,549
Basic Energy Sciences	46,993	38,507	39,757
Biological and Environmental Research	1,922	5,976	9,215
Fusion Energy Sciences	3,406	2,913	2,447
Workforce Development for Teachers and Scientists	32	0	0
Total, Sandia National Laboratories	66,478	59,108	54,968

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Savannah River National Laboratory			
Basic Energy Sciences	535	530	530
Biological and Environmental Research	427	40	368
Total, Savannah River National Laboratory	962	570	898
SLAC National Accelerator Laboratory			
Advanced Scientific Computing Research	300	100	0
Basic Energy Sciences	189,655	206,261	254,761
Biological and Environmental Research	4,900	4,375	4,375
High Energy Physics	91,367	83,921	82,491
Workforce Development for Teachers and Scientists	230	0	0
Science Laboratories Infrastructure	40,694	24,110	58,011
Safeguards and Security	3,596	2,676	2,595
Total, SLAC National Accelerator Laboratory	330,742	321,443	402,233
SLAC Site Office			
Program Direction	2,855	2,565	2,641
Thomas Jefferson National Accelerator Facility			
Basic Energy Sciences	3,200	1,500	1,500
Biological and Environmental Research	600	600	600
High Energy Physics	2,012	2,795	10
Nuclear Physics	130,784	138,776	131,398
Workforce Development for Teachers and Scientists	233	119	0
Science Laboratories Infrastructure	28,419	12,337	2,500
Safeguards and Security	1,668	1,446	1,386
Total, Thomas Jefferson National Accelerator Facility	166,916	157,573	137,394
Thomas Jefferson Site Office			
Program Direction	2,147	1,911	1,969

	(dollars in thousands)		
	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Washington Headquarters			
Advanced Scientific Computing Research	1,140	101,382	169,905
Basic Energy Sciences	8,840	95,598	142,360
Biological and Environmental Research	1,492	39,393	79,687
Fusion Energy Sciences	1,260	45,794	56,574
High Energy Physics	2,657	66,910	92,644
Nuclear Physics	21,129	51,724	55,338
Workforce Development for Teachers and Scientists	355	12,574	14,500
Science Laboratories Infrastructure	0	0	900
Safeguards and Security	896	2,518	8,120
Program Direction	69,562	76,711	85,691
Total, Washington Headquarters	107,331	492,604	705,719
Waste Isolation Pilot Plant			
High Energy Physics	239	0	0
Total, Science	4,912,283	4,873,634	5,001,156