U.S. Department of Energy's
Office of Science

Maintaining U.S. Scientific Leadership and Global Economic Competitiveness

FY07 Budget Request for the Office of Science

Raymond L. Orbach
Director, Office of Science
February 6, 2006

The President's American Competitiveness Initiative

"We must continue to lead the world in human talent and creativity. Our greatest advantage in the world has always been our educated, hardworking, ambitious people -- and we're going to keep that edge. Tonight I announce an American Competitiveness Initiative, to encourage innovation throughout our economy, and to give our nation's children a firm grounding in math and science."

"I propose to double the federal commitment to the most critical basic research programs in the physical sciences over the next 10 years. This funding will support the work of America's most creative minds as they explore promising areas such as nanotechnology, supercomputing, and alternative energy sources."

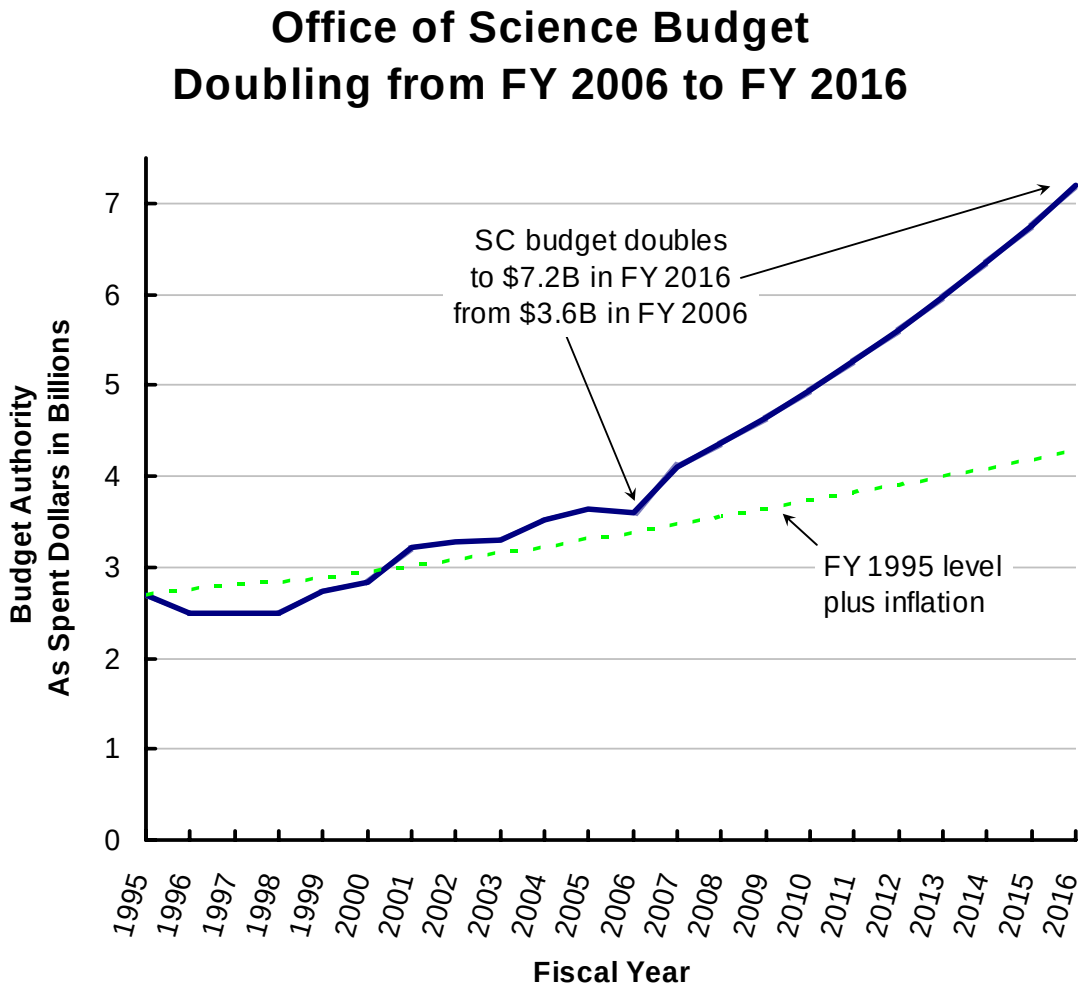
President George W. Bush

State of the Union Message

January 31, 2006

The FY 2007 President's Request for SC funding is a 14.1% increase and sets SC on a path to doubling by 2016

An historic opportunity for our country – a renaissance for U.S. science and continued global competitiveness.



Office of Science Missions

Future of Science

- The Department of Energy's Office of Science is the steward of national science facilities that maintain U.S. world-leadership status in the physical sciences
- Understand Key Questions: the beginning of time, the nature of energy and matter from quarks to the cosmos
- Develop Scientific Workforce: Using the unique capabilities of the DOE laboratories for teacher professional development; enhancing the size and diversity of the scientific workforce

Competitiveness

- Keeping U.S. Research and Development at the forefront of global science
- Scientific Computation – accelerate innovation through virtual prototypes
- Nanotechnology centers provide a unique capability for US universities and industry

Energy Security

- Develop new sources of energy through transformational technologies, e.g., fusion and novel methods of converting biomass to ethanol
- Develop stronger, lightweight materials and improve combustion and catalytic processes to reduce energy consumption and improve efficiency

The President's FY 2007 budget enhances the Office of Science's lead federal role in support for U.S. physical sciences

- SC facilities and instruments ensure for the U.S. an order of magnitude dominance in key scientific fields that will transform the 21st-century global economy: biotechnology, nanotechnology, materials science, and high-speed computing
- SC develops and nurtures a highly trained scientific workforce for the civilian economy and national security, with many Ph.D.'s entering industry and government
- Supports DOE energy mission through long-term, high-risk, high-payoff multidisciplinary research programs
- Provides 42% of federal support to the physical sciences
- We are stewards for high energy physics, nuclear physics, heavy element chemistry, plasma physics, magnetic fusion, and catalysis
- Provides and maintain ten world-class national laboratories and scientific facilities
- Directly supports (FY '07) the research of approximately 24,200 Ph.D.'s, Post Doctoral Associates, and Graduate Students (an increase of ~2600 from FY 2006)

In FY 2007 SC will construct, operate and plan for scientific facilities for the future of science: Consequences for Competitiveness and Education

- **ITER** – the penultimate step to abundant, economical, and environmentally benign fusion energy
- **Leadership in High-End Computation**
  - Provide more than 250 teraflops capability for modeling and simulation of scientific grand-challenge problems in combustion, fusion, and complex chemical reactions
  - 100 teraflops Blue Gene P computer with peak capacity of up to 100 teraflops to expend architectural diversity in leadership computing and address scientific challenges in materials science, catalysis, protein/DNA complexes, and advanced designs of nuclear reactors
  - Increase capacity at National Energy Research Scientific Computing Center (NERSC) to 100-150 teraflops for high performance production computing.
- **Linac Coherent Light Source** construction continues – this X-Ray Free Electron Laser will allow examination of chemical reactions in real-time at the single molecule level
- **Spallation Neutron Source (SNS)** begins operations as the world's forefront neutron scattering facility by an order of magnitude

The President's FY 2007 budget maintains U.S. leadership in the following areas:

- **DOE Nanocenters** 4 of 5 facilities begin operations, as the flagships of nanoscience – providing the U.S. with resources unmatched anywhere in the world
- **International Linear Collider** R&D funding doubled to $60M – would give the U.S. world leadership in the study of particle physics in the next decade
- **Continuous Electron Beam Accelerator Facility (CEBAF) Upgrade** project engineering design (PED) to double energy – will give new insights on the quark structure of matter
- **RHIC** – leverage the unique capabilities of the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory for studies of the internal quark-gluon structure of nucleons and the properties of hot, dense nuclear matter
- **National Synchrotron Light Source-II**, to begin R&D and project engineering design (PED) in FY 2007 – a light source user facility with the world's finest capabilities for x-ray imaging

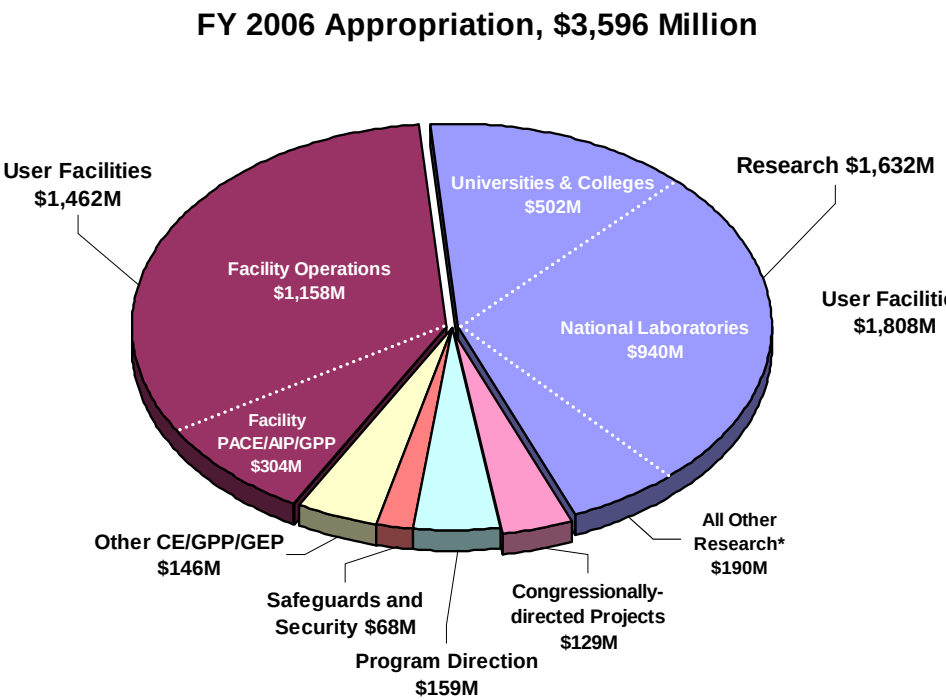
Office of Science
FY 2007 Congressional Budget Request

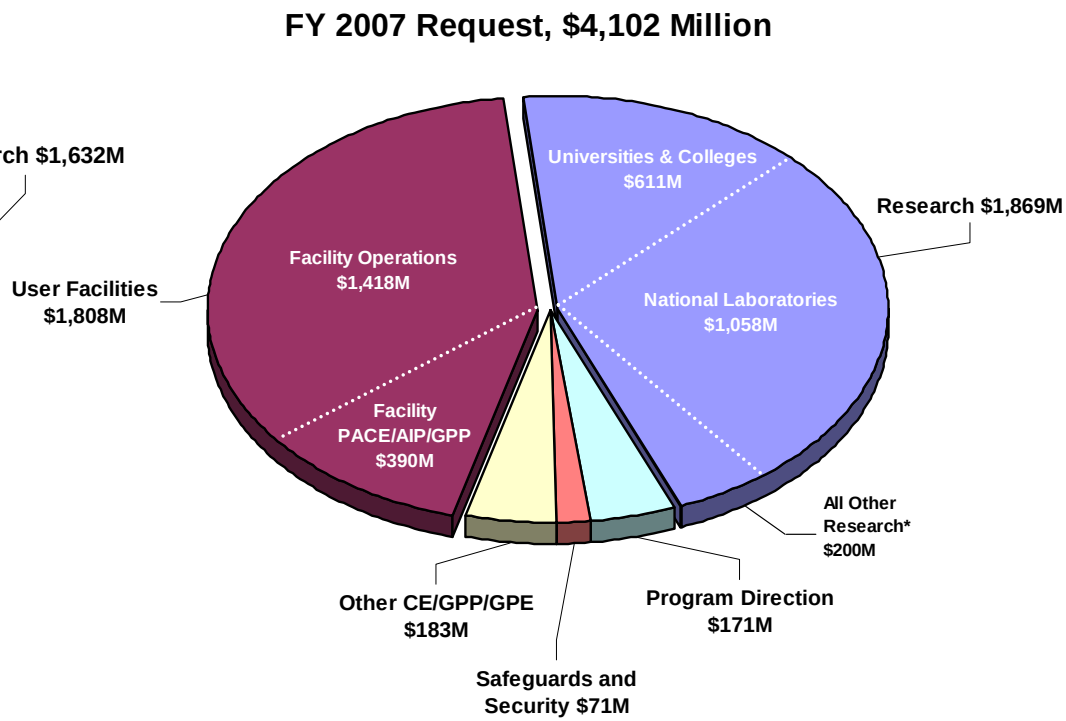
(dollars in thousands)

	FY 2005 Approp.	FY 2006 Approp.	FY 2007 President's Request	FY 2007 vs. FY 2006
Basic Energy Sciences	1,083,616	1,134,557	1,420,980	+286,423
Advanced Scientific Computing Research	226,180	234,684	318,654	+83,970
Biological and Environmental Research				
Base program	487,474	451,131	510,263	+59,132
Congressionally-directed projects	79,123	128,700	——	-128,700
Total, Biological and Environmental Research	566,597	579,831	510,263	-69,568
High Energy Physics	722,906	716,694	775,099	+58,405
Nuclear Physics	394,549	367,034	454,060	+87,026
Fusion Energy Sciences	266,947	287,644	318,950	+31,306
Science Laboratories Infrastructure	37,498	41,684	50,888	+9,204
Science Program Direction	154,031	159,118	170,877	+11,759
Workforce Development for Teachers and Scientists	7,599	7,120	10,952	+3,832
Small Business Innovation Research/Technology Transfer	113,621	——	——	——
Safeguards and Security	67,168	68,025	70,987	+2,962
Subtotal, Science	3,640,712	3,596,391	4,101,710	+505,319
Use of prior year balances	-5,062	——	——	——
Total, Science	**3,635,650**	**3,596,391**	**4,101,710**	**+505,319***

* One half of the $505 million increase is for operations of our scientific facilities, including operations at new facilities: the Spallation Neutron Source and the Center for Nanophase Materials Sciences at Oak Ridge; the Center for Nanoscale Materials at Argonne; the Molecular Foundry at Berkeley; and the Center for Integrated Nanotechnologies at Sandia and Los Alamos National Laboratories. Research is increased by $237 million, 47% of the $505 million increase.

Investments to maintain U.S. scientific leadership and ensure that leading-edge research facilities will be available in the future.





The area of each pie chart is proportional to the funding total for the year.

* All Other Research includes funding for non-profits, other federal agencies, and private institutions.

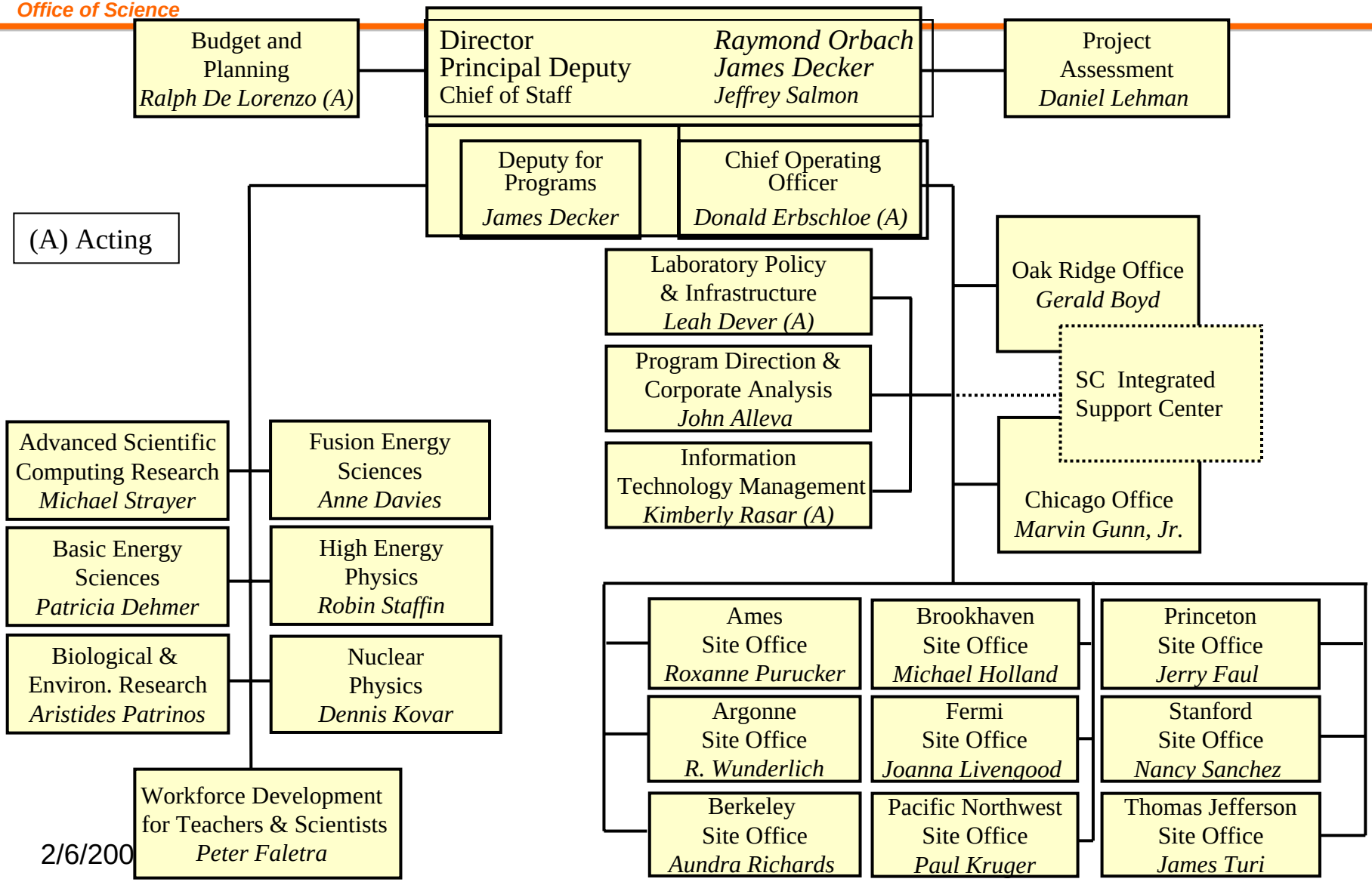
Background materials

Federal Research Funding Rankings

Federal R&D Budget -- FY 2007 Data [1] (dollars in millions)						Crosscut	Crosscut	Crosscut
	Basic Research	**Applied Research**	**Development**	**Facilities/ Equipment**	**Total R&D**	**Networking And Info. Technology R&D**	**National Nanotechnology Initiative**	**Climate Change Science Program**
1	HHS 16,037	HHS 12.540	DOD 68,315	NASA 2,146	DOD 74,234	DOD 1,018	NSF 373	NASA 1,025
2	NSF 3,687	DOD 4,478	NASA 6,755	DOE 1,130	HHS 28,737	NSF 904	DOD 345	NSF 205
3	DOE 3,315	DOE 2,723	DOE 1,990	NSF 482	NASA 12,245	HHS 541	DOE 258	COMMERCE 186
4	NASA 2,226	NASA 1,118	DHS 335	DHS 181	DOE 9,158	DOE 473	HHS 173	DOE 126
5	DOD 1,422	AGRIC. 974	TRANSP. 194	HHS 123	NSF 4,548	NASA 82	COMMERCE 86	AGRIC. 61

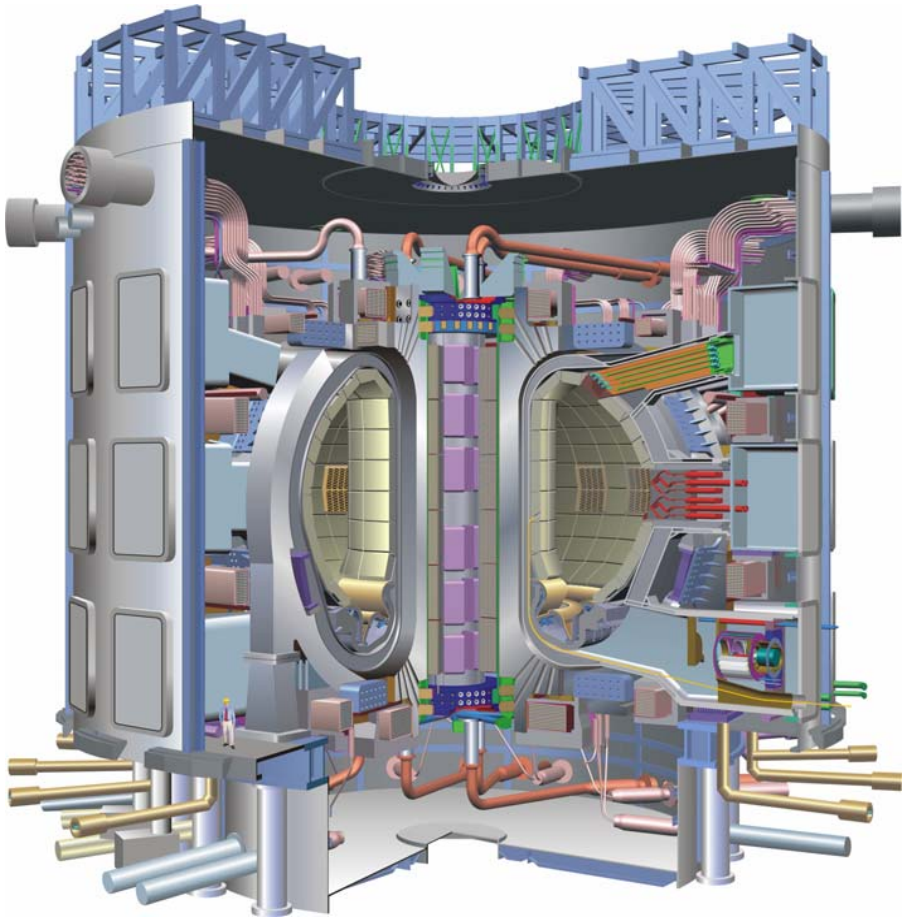
[1] **Source: FY 2007 Budget of the United States, Analytical Perspectives volume, R&D Chapter**

Office of Science



"I am pleased to announce that the United States will join ITER, an ambitious research project to harness the promise of fusion energy."

President George W. Bush
January 30, 2003



500 – 700 MW thermal fusion power
400 sec – 1 hr pulse length

Science Benefits:

Extends fusion science to larger size, commercially relevant, burning (self-heated) plasmas.

Technology Benefits:

Commercial power plant and other relevant fusion technologies.
High duty-factor operation.

Objective:

"To demonstrate the scientific and technological feasibility of fusion energy for peaceful purposes."

Key Steps Taken in International ITER Negotiations

- Cadarache, France, EU Chosen as ITER Host Site

Statement by U.S. Secretary of Energy Samuel W. Bodman:

"Plentiful, reliable energy is critical to continued worldwide economic development. Fusion technologies have the potential to transform how energy is produced and provide significant amounts of safe, environmentally-friendly power in the future. The ITER project will make this vision a reality."

June 28, 2005
Day of Site Selection Decision

- Director General Nominee Designated
- India joins as equal, non-host partner
- Text of ITER Agreement completed

Joint Press Release

TWELFTH ITER NEGOTIATION MEETING

Jeju, Korea, 6th December 2005

Based on the results of intensive working level meetings held throughout the previous week, the Delegations have succeeded in clearing the remaining key issues such as decision-making, intellectual property and management within the prospective ITER Organisation and adjustments to the sharing of resources as a result of India's participation, including in particular cost sharing and in-kind contributions.

With this achievement, the Delegations are pleased to declare that their work is finished, opening the way towards concluding the negotiations at political level.

Nearing the end of ITER Negotiations

Joint Press Release

TWELFTH ITER NEGOTIATION MEETING

Jeju, Korea, 6th December 2005

Delegations from China, European Union, Japan, the Republic of Korea, the Russian Federation and the United States of America gathered on Jeju Island, Korea, on 6th December 2005, to complete their negotiations on an Agreement on the joint implementation of the ITER international fusion energy project.

This was the first time for Korea to host a Meeting of the ITER Negotiators.

At the start of the Meeting, the Delegations unanimously and enthusiastically welcomed India as a full Party to the ITER venture. A Delegation from India then joined the Meeting and participated fully in the discussions that followed. With this exciting new development, over half of the worldÕs population is now represented in this global endeavour.

The seven ITER Delegations also welcomed to the Meeting the newly designated Nominee Director-General for the prospective ITER Organisation, Ambassador Kaname IKEDA, who is to take up his duties as leader of the project.

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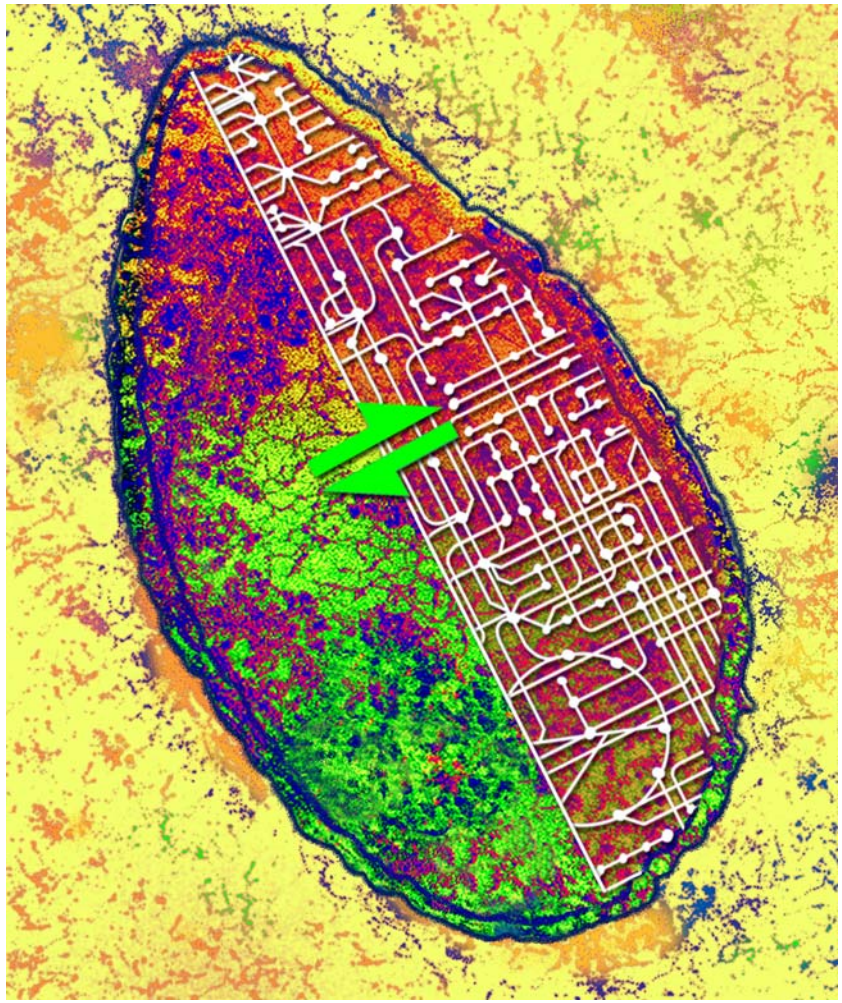
##

Advanced Energy Initiative – Cellulosic Ethanol

Making cellulosic ethanol cost-competitive with gasoline

- Discover or design new, more efficient cellulases
- Understand regulation of cellulose degradation & ethanol production
- Integrate cellulose degradation & ethanol fermentation pathways
- Engineer ethanol production pathways in microbes
- Design “one-step” cellulose to ethanol conversion process in microbes



High Performance Computing Facilities

The National Energy Research Scientific Computing Center (NERSC) provides high performance production computing capacity, services and support to the entire DOE SC research community

The Leadership Class Computing Facilities will provide high performance capability computing that is critical for the scientific leadership of the U.S. The LCF plays a critical role in the implementation of the Federal Plan for High End Computing developed by the High End Computing Revitalization Task Force (HECRTF), which was chartered by OSTP. (http://www.ostp.gov/nstc/html/HECRTF-FINAL_051004.pdf)

In FY07, these activities will:

- Operate the computers at the LCF at ORNL in FY 2007 to deliver 250 Teraflops to competitively selected scientific challenge applications.
- Expand the LCF to ANL with the acquisition of an IBM Blue Gene P at Argonne National Lab, as described in the competitively selected LCF proposal. Upgrade to 500 TF by the end of FY 2008.
- Complete the NERSC-5 procurement to provide 100-150 Teraflops of high performance production computing to a broad suite of application areas and a large (about 2,000) user community.
- Improve understanding of interactions between high-end system architectures and key application performance, in partnership with DARPA, NNSA, and NSA;
- Continue the strong partnership with the DARPA High Productivity Computing Systems program to enable the development of next generation computer systems for science.

Nanotechnology -- Nanoscale Science Research Centers (NSRC)

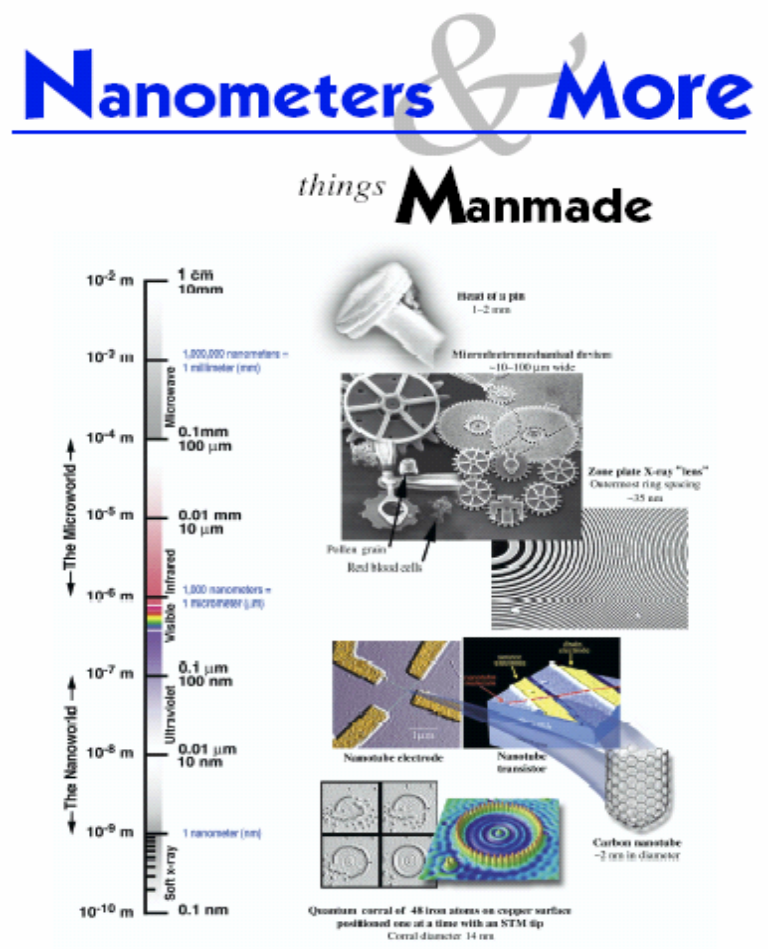
NSRCs are highly collaborative, multidisciplinary research centers and user facilities for the fabrication and study of materials at the nanoscale.

4 of 5 NSRCs will be operating in FY 2007:

- The Molecular Foundry at LBNL ($19.2M)
- The Center for Integrated Nanotechnologies at SNL/LANL ($19.2M)
- The Center for Nanophase Materials Sciences at ORNL ($19.2M)
- The Center for Nanoscale Materials at ANL ($19.2M)

Construction continues in FY 2007 at:

- The Center for Functional Materials at BNL ($18.9M)



U.S. Department of Energy

Office of Science

Nanotechnology — Nanoscale Science Research Centers: Unique Resources, Unique Capabilities

The Molecular Foundry

Lawrence Berkeley National Laboratory

Unique Resource
- Advanced Light Source
- National Center for Electron Microscopy
- NERSC Computing Center

Scientific Focus
- E-beam nanowriter
- Nanofabrication (lithography and stamping)
- Inorganic nanostructures (crystals and tubes)
- Imaging, manipulation, theory and modeling
- Bio-nanostructures (organic, polymers)

Center for Integrated Nanotechnologies

Sandia National Laboratories

Los Alamos National Laboratory

Unique Resource
- Los Alamos Neutron Science Center
- National High Magnetic Field Laboratory

Scientific Focus
- Nano-bio-micro interfaces
- Nanophotonics and nanoelectronics
- Complex functional nanomaterials
- Nanomechanics
- Theory and simulation

Center for Functional Nanomaterials

Unique Resource
- National Synchrotron Light Source

Scientific Focus
- Nanoscale strongly correlated oxides
- Charge transfer on the nanoscale
- Nanometer-thick organic films
- Nanoscale magnetism
- Nanostructured catalysts
- Nanomaterials applications

Brookhaven National Laboratory

Center for Nanoscale Materials

Argonne National Laboratory

Unique Resource
- Advanced Photon Source
- Electron Microscopy Center

Scientific Focus
- Advanced magnetic materials
- Nanocrystalline diamond
- Complex oxides
- Nanophotonics
- Bio-inorganic hybrids
- X-ray nanoprobe characterization
- Simulations of self-organization

Center for Nanophase Materials Sciences

Unique Resource
- Spallation Neutron Source
- High Flux Isotope Reactor

Scientific Focus
- Neutron scattering to probe materials at the nanoscale, at interfaces, and in complex nanophase materials
- Synthesis and nanofabrication
- Nanomaterials Theory Institute
- Hybrid soft/hard materials
- Organic/inorganic nano-interfaces

Oak Ridge National Laboratory

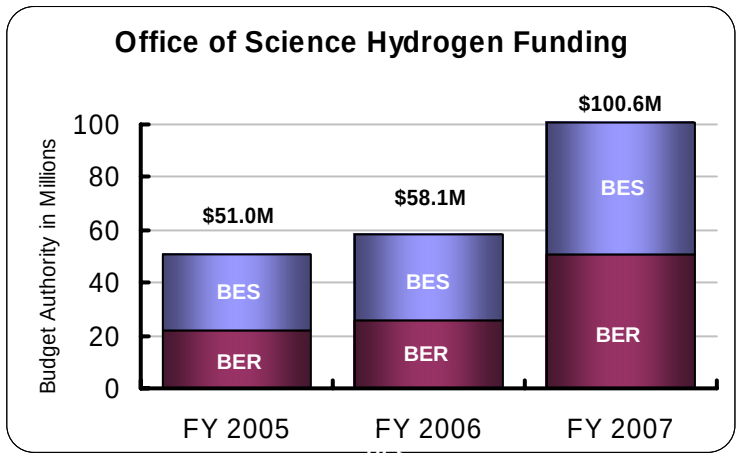
Science for a Hydrogen Economy

Basic Energy Sciences

- Novel materials for hydrogen storage
- Membranes for separation, purification, and ion transport
- Design of catalysts at the nanoscale
- Solar hydrogen production
- Bio-inspired materials and processes
- FY 2005: 70 awards were made for $21.5 million.

Biological and Environmental Research

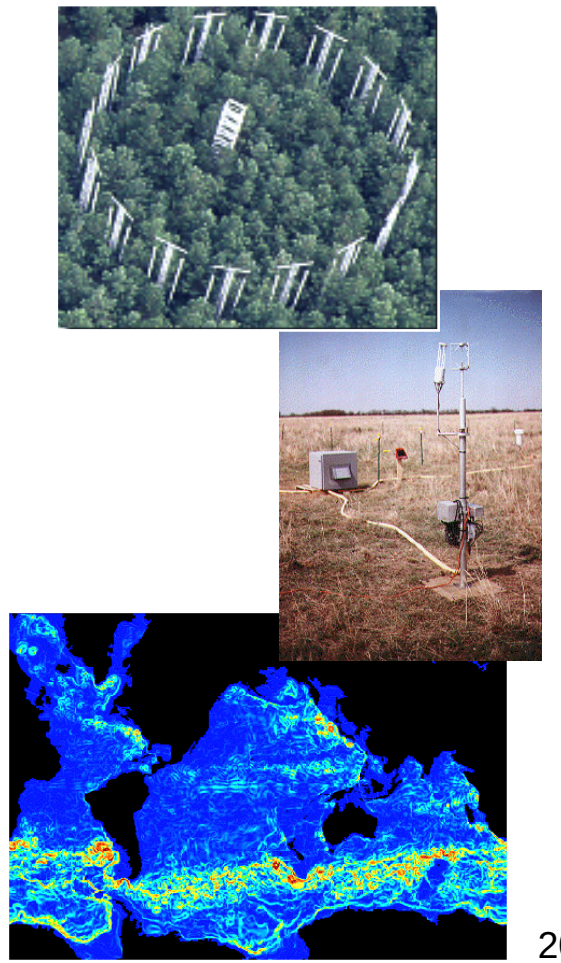
- Genomics: GTL
  - Mechanisms of biohydrogen generation
  - Characterization of microbial hydrogen production diversity
  - Discovery of novel hydrogen producing enzymes
  - Redesign of hydrogen producing pathways in microbes



Climate Change Science Program

The Climate Change Science Program (CCSP) activities in BER include the Climate Change Research Initiative (CCRI) and the U.S. Climate Change Science Program (USCCSP). In FY 07, the DOE CCSP will:

- **Continue performance testing of climate models and their submodels. Focus research to produce new, improved climate simulations with different forcing scenarios, including aerosols, at global and regional scales.**
- **Improve field measurements of atmospheric effects of clouds and aerosols on the earth's radiation balance.**
- **Continue long-term field research on effects of environmental change on the structure and functioning of important North American Ecosystems.**
- **Lead the development of three climate change science synthesis and assessment products:**
  1) **an assessment of the uses, limitation, and uncertainties of climate models;**
  2) **an update of scenarios of greenhouse gas emissions and concentrations and a review of scenario development and application, and**
  3) **an assessment of the current knowledge base about possible effects of global change on energy production and use in the U.S.**



Climate Change Science Program (CCSP)

John H. Marburger III
Director, Office of Science and Technology Policy

CCSP Mission:

Provide science-based information on climate and global change to inform public debate, policymaking, and management of natural resources

SC Climate Change Research includes process research and modeling efforts to:

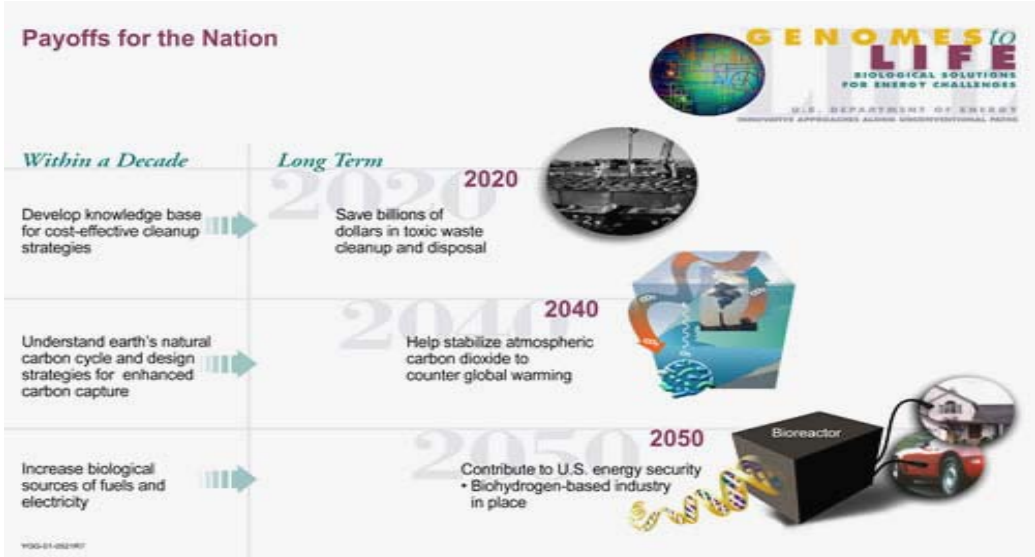
- **Improve understanding of factors affecting the Earth's radiant-energy balance;**
- **Predict accurately any global and regional climate change induced by increasing atmospheric concentrations of aerosols and greenhouse gases;**
- **Quantify sources and sinks of energy-related greenhouse gases, especially carbon dioxide; and**
- **Improve the scientific basis for assessing both the potential consequences of climatic changes, including the potential ecological, social, and economic implications of human-induced climatic changes caused by increases in greenhouse gases in the atmosphere and the benefits and costs of alternative response options.**

Genomics: GTL

Building on advances in sequencing, molecular science and computing to understand and harness microbes to address DOE's energy, environmental and national security missions.

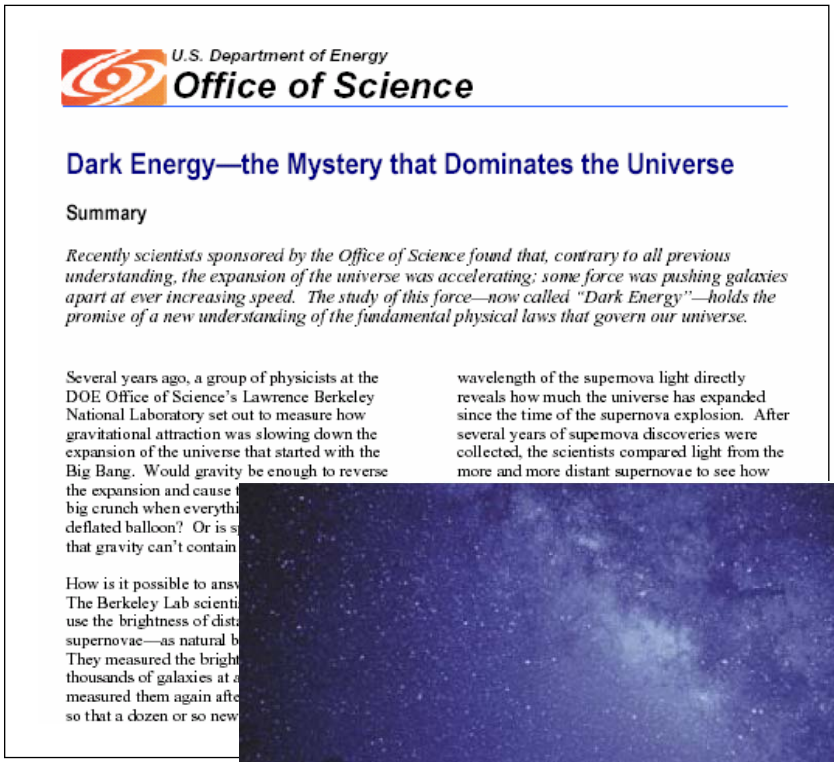
In FY07:

- Characterize and develop computational models to describe the biochemical capabilities of microbial communities.
- Develop high throughput approaches for isolating and characterizing microbial molecular machines.
- Develop computational models that accurately describe/predict the behavior of microbial genetic regulatory networks.



- Develop new technologies and strategies for imaging individual proteins and molecular machines inside microbes.
- Develop new technologies for producing large numbers of microbial proteins and molecular tags to identify those proteins.
- Determine the societal and legal implications of synthetic genomics technology.

An Exciting Time for Physics: *Key Questions*



U.S. Department of Energy
Office of Science

Dark Energy—the Mystery that Dominates the Universe

Summary

Recently scientists sponsored by the Office of Science found that, contrary to all previous understanding, the expansion of the universe was accelerating; some force was pushing galaxies apart at ever increasing speed. The study of this force—now called "Dark Energy"—holds the promise of a new understanding of the fundamental physical laws that govern our universe.

Several years ago, a group of physicists at the DOE Office of Science's Lawrence Berkeley National Laboratory set out to measure how gravitational attraction was slowing down the expansion of the universe that started with the Big Bang. Would gravity be enough to reverse the expansion and cause t
big crunch when everythi
deflated balloon? Or is s
that gravity can't contain

How is it possible to ansv
The Berkeley Lab scienti
use the brightness of dist
supernovae—as natural b
They measured the bright
thousands of galaxies at
measured them again afte
so that a dozen or so new

wavelength of the supernova light directly reveals how much the universe has expanded since the time of the supernova explosion. After several years of supernova discoveries were collected, the scientists compared light from the more and more distant supernovae to see how

What is the dark matter?

What is the nature of the dark energy?

How did the universe begin?

Did Einstein have the last word on gravity?

***What are the masses of the neutrinos, and how have they shaped the evolution of the* universe?**

How do cosmic accelerators work and what are they accelerating?

Are protons unstable?

Are there new states of matter at exceedingly high density and temperature?

Are there additional space-time dimensions?

How were the elements from iron to uranium made?

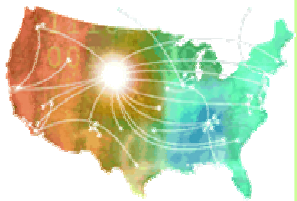
Is a new theory of matter and light needed at the highest energies?

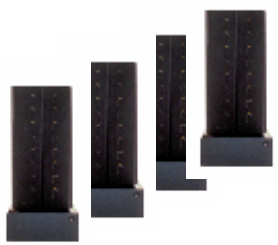
Scientific Discovery Through Advanced Computation (SciDAC)

Brings the power of terascale computing to science

Hardware Infrastructure

Software Infrastructure





OPERATING SYSTEM

ARCHITECTURE

RESEARCH

COMPUTING SYSTEMS SOFTWARE

Data Analysis and Visualization

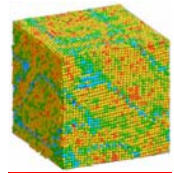
Programming Environments

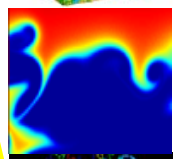
Scientific Data Management

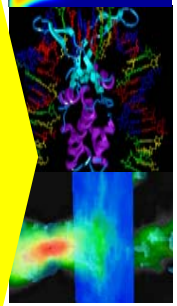
Problem-solving Environments

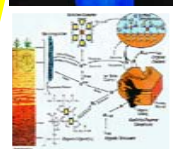
MATHEMATICS

SCIENTIFIC SIMULATION CODES









State-of-the-art electronic collaboration tools will facilitate access to these tools to bring simulation to a level of parity with theory and experiment in the scientific enterprise.

ASCR

BES, BER FES, HEP and NP

Advanced Scientific Computing Research (ASCR)

Research in applied mathematics and computer science to be funded at FY2006 levels. Funding is requested to:

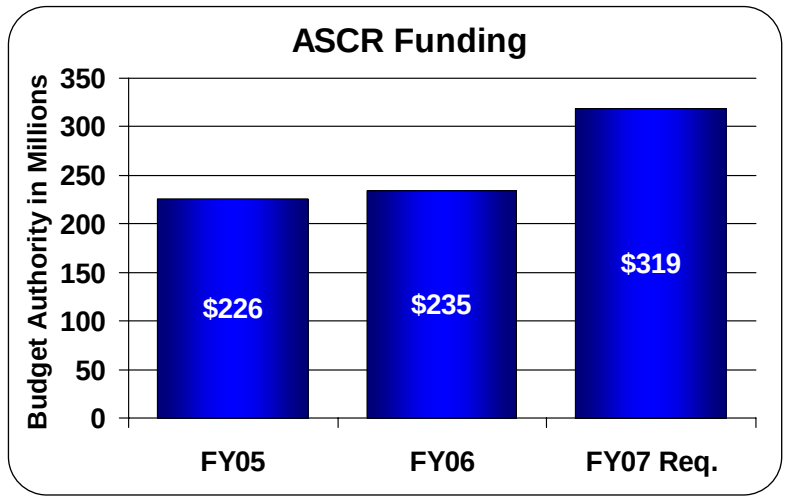
- Advance the underlying mathematical understanding of physical, chemical and biological systems of interest to the DOE.
- Underpin further the development of advanced algorithms to describe, model and simulate complex systems.
- Ensure the effective utilization of high-performance computers to advance science in areas important to the DOE mission.

Increase in Computational Partnerships, fostered by

- The re-competition of SciDAC activities and
- The initiation of university based SciDAC Institutes in FY2006.

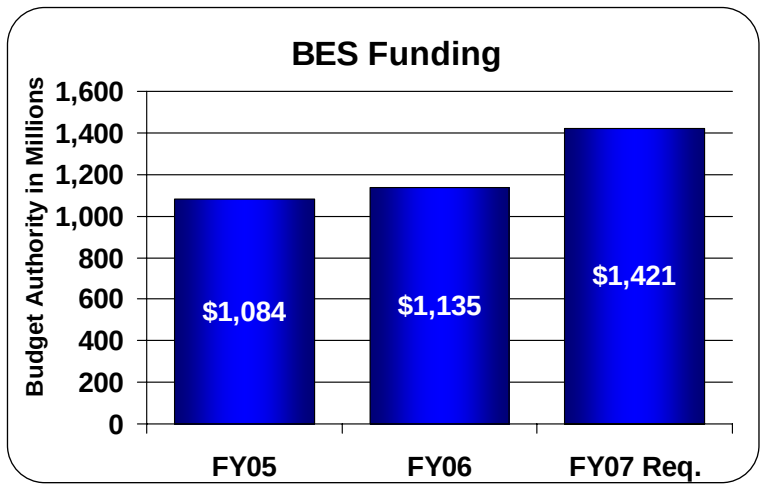
High-performance computing and network facilities and testbeds

- Increase funding for Leadership Class Computing
  - --Upgrade capability to 250 Teraflops at ORNL, Upgrade to 1,000 TF by the end of FY 2008
  - --Acquire up to 100 Teraflops of high-performance computing capability with low electrical power requirements at ANL.
- Increase funding for high performance production computing
  - --Increase capacity at NERSC to 100-150 teraflops.
- Increase funding for ESnet to realize the promise of optical networks for DOE's science research missions.



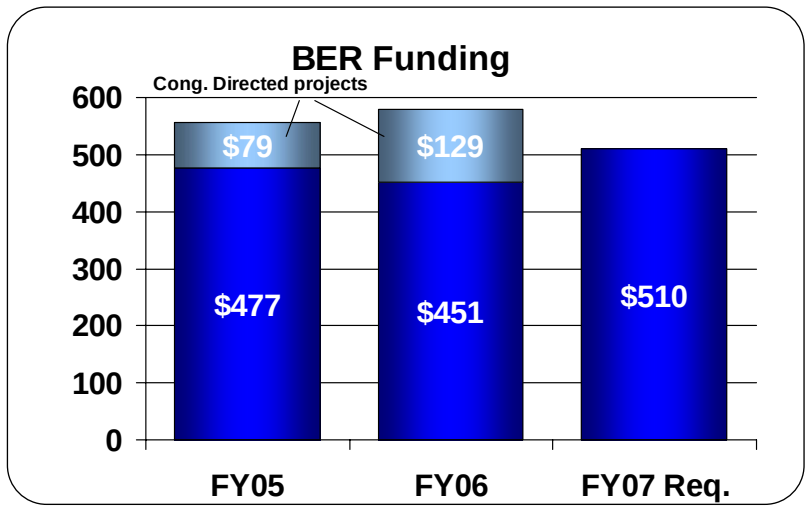
Basic Energy Sciences (BES)

- **Nanoscale Science Research Centers (NSRCs).** Four of five NSRCs are fully operating in FY 2007; the Center for Functional Materials at BNL will continue construction in FY 2007.
- **Core research programs in support of principal investigators.** Research activities increase in FY 2007 with new thrust areas in solar energy utilization, ultrafast science, mid-scale instrumentation, advanced nuclear energy systems, chemical imaging, and complex systems/emergent behavior.
- **Facilities operations.** Facility operations are increased in FY 2007 to provide for optimal operations of the four light sources and three neutron sources and begin the first full year of operations of the Spallation Neutron Source.
- **National Synchrotron Light Source II (NSLS-II) Project.** FY 2007 begins Project Engineering Design and Other Project Costs for NSLS-II, which will be built as a replacement user facility for NSLS. NSLS-II will enable the study of material properties and functions, particularly materials at the nanoscale, at a level of detail and precision never before possible. NSLS-II will provide the world's finest capabilities for x-ray imaging.
- **Linac Coherent Light Source (LCLS) Project.** The LCLS will continue construction at the planned levels. Funding is also provided to partially support operation of the SLAC linac.
- **Basic Research for the Hydrogen Economy.** Research to realize the potential of a hydrogen economy is increased by 54% to a total of $50 million. This research program is coordinated with those of the technology offices and is based on the BES workshop report *Basic Research Needs for the Hydrogen Economy*.



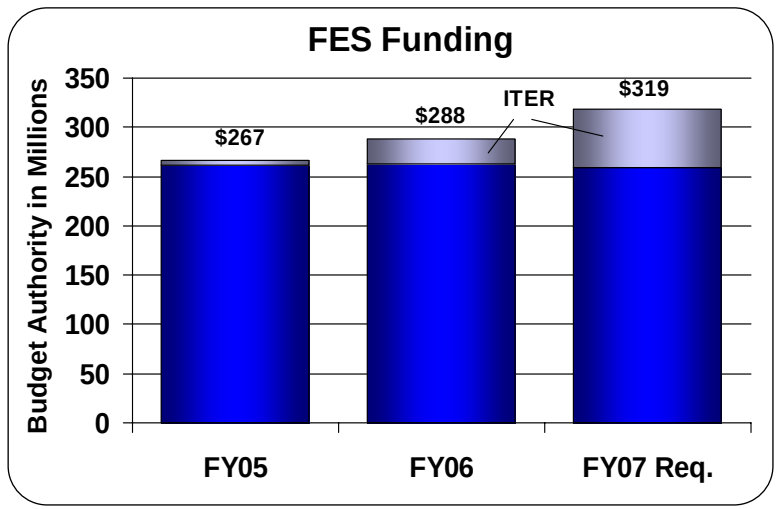
Biological and Environmental Research (BER)

- **Life Sciences** GTL research increases, underpinning biotech solutions for DOE energy/environmental needs, including cellulose to ethanol. Structural Biology infrastructure and low dose radiation research (needed to develop future radiation protection standards) are sustained. Ethical/societal issues of bio- and nano-technology coordinated across the Office of Science.
- **Climate Change Research** supports the Administration's Climate Change Science Program providing data to develop, test and improve climate models that simulate and predict responses of climate to increased atmospheric greenhouse gases (including carbon dioxide) and aerosols.
- **Environmental Remediation Research** underpins DOE's cleanup mission addressing critical, fundamental questions at the interfaces of biology, chemistry, geology and physics at scales ranging from molecular to field.
- **Medical Applications and Measurement Science Research** supports fundamental research and instrument development in imaging, including development of an artificial retina that allows patients to see large objects. Novel radiopharmaceuticals are also developed using innovative radiochemistry.



Fusion Energy Sciences (FES)

- The FY 2007 budget continues the redirection of the fusion program to prepare for and participate in the international ITER project. The redirection will require modest reductions in several program elements not directly related to ITER.
- The U.S. Contributions to ITER Major Item of Equipment (MIE) project will continue with the second year of funding. The FY 2007 request includes (1) $37M Total Estimated Cost (TEC) funding for the U.S. procurement, fabrication, and delivery of medium- and high-technology components, assignment of U.S. personnel to the ITER Organization abroad, provision of cash for the U.S. share of common costs at the ITER site for installation and testing, and contingency for the international ITER organization; and (2) $23M Other Project Costs (OPC) funding for the continuation of R&D and design tasks in support of the procurements for the U.S. Contributions to ITER.
- Operation of the major facilities – DIII-D, Alcator C-Mod, and NSTX - will increase slightly and will focus on physics issues of interest to ITER.
- Advanced Computing (SciDAC) efforts will increase and will continue development of collaboratory tools to facilitate international fusion collaborations.
- Fabrication of the National Compact Stellarator Experiment will continue along a new baseline with completion expected in July 2009.
- High Energy Density Physics, Plasma Technology and Materials Research, Experimental Plasma Research, and Fusion Theory will be reduced.

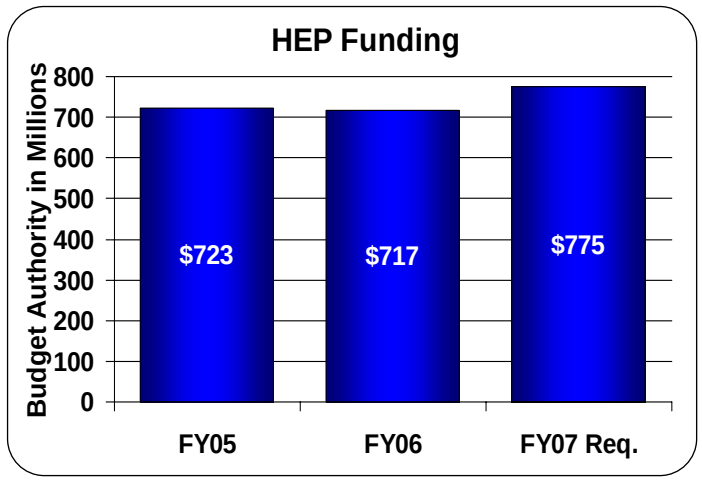


High Energy Physics (HEP)

- **Facility Operations --** The operating national user facilities at Fermilab and SLAC are supported at levels that will provide increased scientific data taking and provide unique opportunities for scientific discovery and maximize overall operations. Significantly increased operational support is provided for U.S. researchers participating at the LHC at CERN.

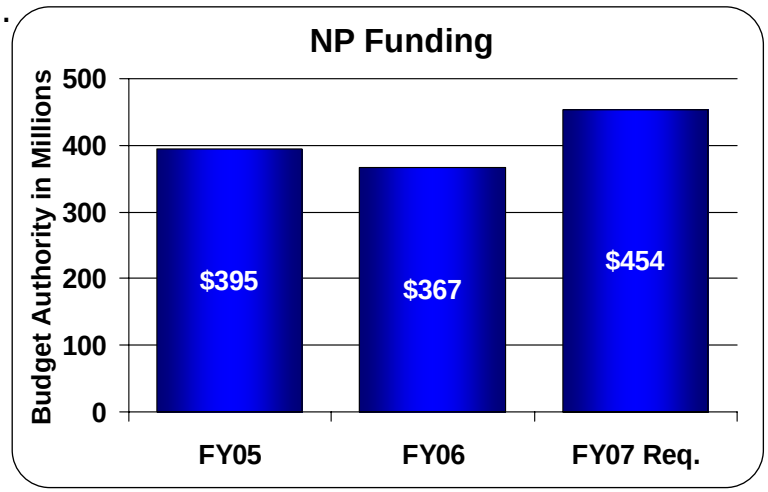
- **Physics Research –** Expands core experimental and theoretical research at labs and universities to maintain strong participation in the Tevatron, LHC and B-factory programs, as well as research associated with new initiatives such as neutrinos, dark energy, and dark matter. Increases accelerator science program to a level needed to support long-term R&D on new particle accelerator techniques. Funding for R&D activities for SciDAC and Lattice QCD are maintained at FY 2006 levels.

- **Linear Collider R&D** – Doubles the funding for ILC R&D from $30M to $60M to support a U.S. leadership role in the international R&D program, and to provide the basis for U.S. industry to compete successfully for major subsystem contracts.



Nuclear Physics (NP)

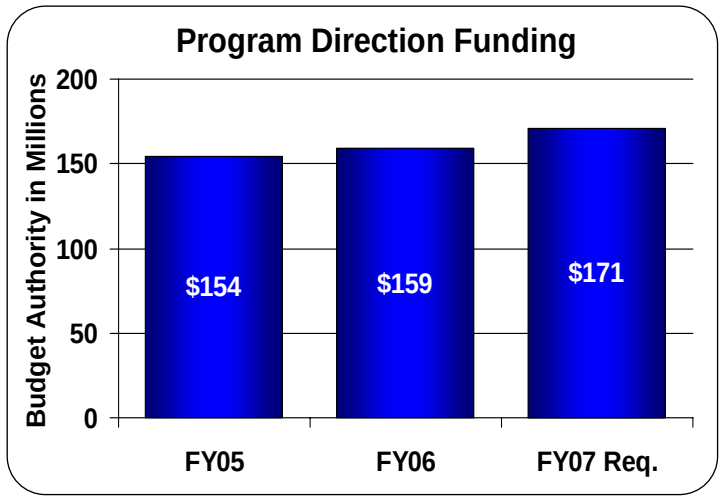
- **Facility Operations.** Facility operations are increased in FY 2007 to operate the program's four National User Facilities (RHIC, CEBAF, ATLAS and HRIBF) at near optimum levels.
- **Core research programs.** University and laboratory research is increased to effectively extract new world-class results from studies of hot, dense nuclear matter, the quark structure of matter, nuclear structure/astrophysics, fundamental interactions, and neutrinos. Increased support is provided for the program's six university centers of excellence.
- **Advanced Instrumentation.** Increased support is provided to fabricate instrumentation critical to achieving the Program's Mission. This includes detector upgrades at RHIC and for the heavy-ion program at LHC, the GRETINA detector for nuclear structure studies, and a detector and beamline at the SNS for measurements of fundamental neutron properties.
- **12 GeV CEBAF Upgrade Project.** Supported are Project Engineering and Design activities for this project that will upgrade the beam energy and research capabilities of CEBAF, the world-leading electron facility for studies of the quark-structure of matter.
- **RHIC Injector Upgrade.** Support is provided in FY 2007 for the Electron Beam Ion Source (EBIS) that will lead to more cost-effective operations and new capabilities for RHIC. EBIS is a joint DOE/NASA project.
- **Accelerator R&D.** R&D efforts that address next generation capabilities are supported, including superconducting radio-frequency developments at TJNAF, electron cooling at RHIC to reach higher beam luminosities and R&D in rare isotope beam capabilities.



Science Program Direction (SCPD)

What does the FY 2007 SCPD increase support?

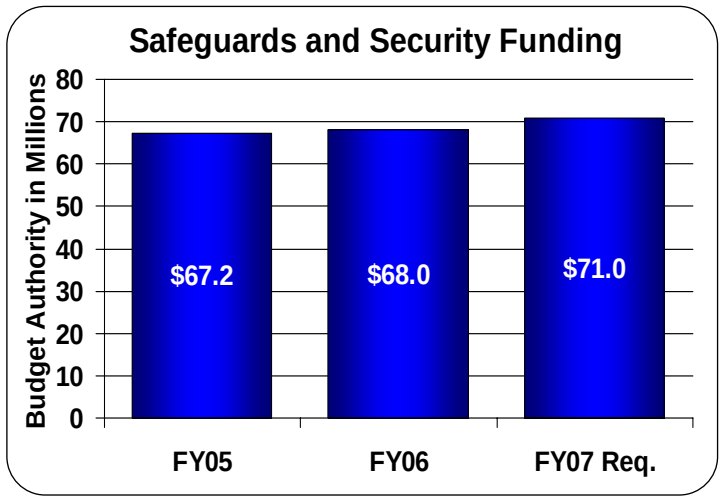
- **Salaries and Benefits:** completion/implementation of OneSC Project; concerns of recent COV reports; annual pay raise; increased pay cap for SES basic pay; enhanced recruitment, and relocation/retention bonuses authorized by the Federal Workforce Flexibility Act of 2004
- **Congressionally mandated competition of laboratory contracts:** travel and short-term expertise
- **Information Management Systems/Infrastructure:** current operating levels for maintenance and operation – partially funded using carryover balances in FY 2005 and prior years
- **ePME Phase 1**: enhancement to receive/review all national laboratory work proposals versus only R&D proposals
- **e-Gov initiatives** (STARS, E-travel, Business Gateway, Integrated Acquisition Environment, Grants.gov) and IT project management training
- **Fixed operating costs** – partially funded using carryover balances in FY 2006 and prior years



Safeguards and Security (S&S)

The mission of the Office of Science (SC) Safeguards and Security program is to ensure appropriate levels of protection against: unauthorized access, theft, diversion, loss of custody, or destruction of Department of Energy (DOE) assets and hostile acts that may cause adverse impacts on fundamental science, national security or the health and safety of DOE and contractor employees, the public or the environment.

- The Office of Science will perform minimal cyber security enhancements to comply with the Federal Information Security Management Act (FISMA) and OMB mandated national standards and guidance.
- The FY 2007 request includes costs for the 2003 Design Basis Threat (DBT). In November 2005 an updated DBT was approved and the full implementation will not be until FY 2008.



Science Laboratory Infrastructure (SLI)

Overview:

The program supports SC mission activities at SC laboratories by addressing needs related to general purpose infrastructure, excess facilities disposition, Oak Ridge landlord and Payment-in-Lieu-of-Taxes (PILT).

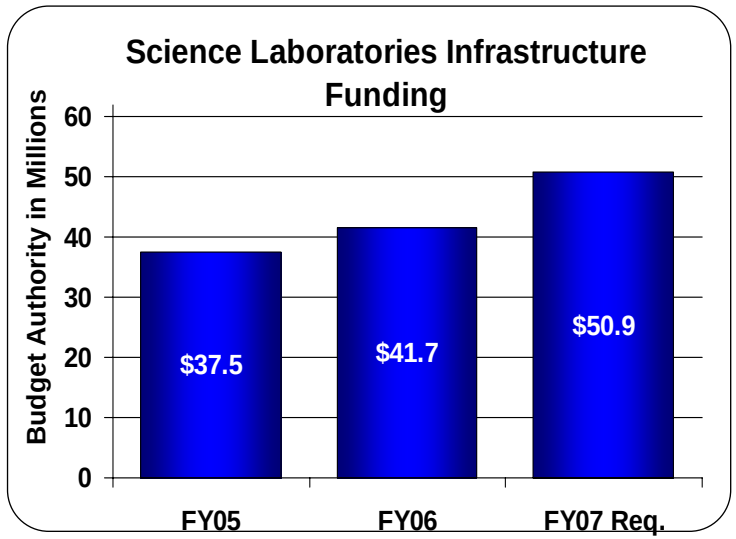
Summary of FY 2007 Budget:

General Purpose Infrastructure Construction - Supports three ongoing line item construction projects: BNL Research Support Bldg, LBNL Bldg 77 Rehab and SLAC Safety and Operational Reliability. Provides funding for four new construction starts: ANL Building Electrical Service Upgrade, Phase II, BNL Renovate Science Laboratories, Phase I, ORNL Modernize Building 4500N, Wing 4, Phase I, and LBNL Seismic Safety Upgrade of Buildings, Phase I.

Excess Facilities Disposition - Supports six projects to clean-up/remove 22,000 sq. ft. of excess space at ANL, BNL and ORNL, to reduce operating costs, ES&H liabilities, and free up land for future use. Continues demolition of the Bevatron Complex at LBNL.

Oak Ridge Landlord - Supports activities to maintain continuity of operations at the Oak Ridge Reservation (ORR), including Federal facilities in the town of Oak Ridge. Includes PILT to local communities around Oak Ridge.

Payment in Lieu of Taxes (PILT) - Provides support to communities surrounding BNL and ANL to replace lost property tax revenue due to DOE use of land.



Workforce Development for Teachers and Scientists (WDTS)

Key Thrusts of FY 2007 Budget:

- **Laboratory Science Teacher Professional Development (LSTPD):** LSTPD was a new program in FY 2004 for 60 teachers. K-14 teachers make a three year commitment to the LSTPD program. FY 2006 funding will allow for a total of about 100 teachers. The FY 2007 budget request would fund approximately 300 teachers.

- **Faculty and Student Teams (FaST):** FaST teams from colleges and universities with limited research capabilities are provided focused research projects in collaboration with National Laboratory scientists to establish a long-term research partnership with the visiting faculty. The FaST program is also intended to foster greater long-term interaction with faculty home institutions through support of the students of participating faculty.

- **Undergraduate Laboratory Internships (Science Undergraduate Laboratory Internships—SULI, Community College Institute—CCI, Pre-Service Teachers--PST):** Undergraduate students participate in a mentor intensive research experience at one of the national laboratories.

- **National Science Bowls (High School and Middle School):** The science bowls provide an academic event, science seminars, and a hands-on model hydrogen fuel cell car race.