

*U.S. Department of Energy*  
**Office of Science**

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*American Society for Engineering Education*  
*Public Policy Colloquium*

*Office of Science Perspectives*  
*On the FY08 and FY09 Budget Cycles*

*Dr. Raymond L. Orbach*  
Under Secretary for Science  
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[www.science.doe.gov](http://www.science.doe.gov)

U.S. Department of Energy



Office of Science



# The Office of Science

## Office of Science FY 2009 Budget Request to Congress (dollars in thousands)

	FY 2007 Approp.	FY 2008 Request	FY 2008 Approp.	FY 2009 Request to Congress	FY 2009 Request to Congress vs. FY 2008 Approp.	
Basic Energy Sciences.....	1,221,380	1,498,497	1,269,902	1,568,160	+298,258	+23.5%
Advanced Scientific Computing Research.....	275,734	340,198	351,173	368,820	+17,647	+5.0%
Biological and Environmental Research.....	480,104	531,897	544,397	568,540	+24,143	+4.4%
High Energy Physics.....	732,434	782,238	689,331	804,960	+115,629	+16.8%
Nuclear Physics.....	412,330	471,319	432,726	510,080	+77,354	+17.9%
Fusion Energy Sciences.....	311,664	427,850	286,548	493,050	+206,502	+72.1%
Science Laboratories Infrastructure.....	41,986	78,956	66,861	110,260	+43,399	+64.9%
Science Program Direction.....	166,469	184,934	177,779	203,913	+26,134	+14.7%
Workforce Dev. for Teachers & Scientists.....	7,952	11,000	8,044	13,583	+5,539	+68.9%
Safeguards and Security (gross).....	75,830	76,592	75,946	80,603	+4,657	+6.1%
SBIR/STTR (SC funding).....	86,936	—	—	—	—	—
Subtotal, Office of Science.....	3,812,819	4,403,481	3,902,707	4,721,969	+819,262	+21.0%
Adjustments*.....	23,794	-5,605	70,435	—	-70,435	—
Total, Office of Science.....	3,836,613	4,397,876	3,973,142	4,721,969	+748,827	+18.8%

\* Adjustments include SBIR/STTR funding transferred from other DOE offices (FY 2007 only), a charge to reimbursable customers for their share of safeguards and security costs (FY 2007 and FY 2008), Congressionally-directed projects and a rescission of a prior year Congressionally-directed project (FY 2008 only), and offsets for the use of prior year balances to fund current year activities (FY 2007 and FY 2008).



# The Office of Science Summary

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**The loss of \$790 million in FY07 and FY08 for the physical sciences will never be recovered:**

- The President's Request for SC for FY 2007 was \$4,102M.  
The Appropriation for SC for FY 2007 was \$3,813M.  $\Delta = - \$289\text{M}$ .
- The President's Request for SC for FY 2008 was \$4,404M.  
The Appropriation for SC for FY 2008 was \$3,903M.  $\Delta = - \$501\text{M}$ .
- The President's Request for SC for FY 2009 is \$4,722M.  
The Appropriation for SC for FY 2009 in ?.  $\Delta = \pm ?$   $\Sigma = - \$790\text{M} \pm ?$ .

**Specific areas of science were marked for major reductions from the President's FY08 request:**

- **BES:** (-\$229 million) Core research programs are seriously impacted by the FY08 budget, but Energy Frontier Research Centers and other efforts in FY09 could put BES back on track.
- **FES:** (-\$141 million) ITER is zeroed out in FY08, but restored in the FY09 budget
- **HEP:** (-\$94 million) Core research programs are seriously impacted by the FY08 budget, but FY09 request could restore to health
- **NP:** (-\$38.6 million) Core research programs are impacted by the FY08 budget, but are restored in the FY09 request
- **Workforce:** 4,300 Ph.D.'s, graduate students and others could not be supported, the FY09 request will support 23,700, a 2,600 increase over FY08 levels.



# Opportunities from the DOE Office of Science

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- New \$100 million DOE Office of Science initiative to establish multiple **Energy Frontier Research Centers** (EFRCs) around the nation in FY 2009
- Centers to be funded at \$2-5 million each per year for 5 years
- Mission: multidisciplinary, fundamental research toward transforming the U.S. energy economy for the 21<sup>st</sup> century
- Open competition: Universities, National Laboratories, nonprofit organizations, and private firms invited to apply, singly or in partnerships
- Awards to be selected by scientific peer review
- Funding Opportunity Announcement to be issued this year<sup>4</sup>



## Possible EFRC Research Areas

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- Conversion of Plants to Biofuels
- Solar Energy Utilization
- Solid State Lighting
- Electrical Energy Storage
- Superconductivity
- Advanced Nuclear Energy Systems
- Combustion of 21<sup>st</sup> Century Transportation Fuels
- Hydrogen Production, Storage, and Use
- Catalysis for Energy
- Materials Under Extreme Environments
- Geosciences for Nuclear Waste and CO<sub>2</sub> Storage



# Our Challenge

## We are now at a perilous moment in the history of funding for science in the U.S.:

- The very large percentage increase between the essentially flat funding for the DOE Office of Science in FY2008 and the FY2009 President's Request will be an attractive target.
  - We could easily, again, become a "donor" program. This is true for all three American Competitiveness Initiative agencies.
- Compounding the danger is the widespread attitude that the proposed increases for the physical sciences under the ACI and America COMPETES act are "a done deal." Neither is "done" until Congress appropriates the funding.
- There is the possibility we may see a "three-peat" and a perpetuation of flat-to-declining budget trajectories.
  - The FY08 budget is a "shot across the bow" to let the scientific community know the direction of Congressional priorities. These were not hasty actions, but represent the will of the people, as expressed through their elected representatives.
- If we are to avoid this scenario we need to actively and publicly make the case for LONG-TERM basic research rather than short-term applied research.

*It is now up to us to make the case.*



# The Future of Engineering is Tied to the Physical Sciences

- **Engineering and Physics are meeting at the nanoscale**
- **The research agendas are the same:**
  - The National Academy of Engineering announced at the AAAS the top 14 engineering challenges for the 21<sup>st</sup> Century
  - Nine of those challenges are directly related to DOE research efforts in the physical sciences





# 21<sup>st</sup> Century Engineering Challenges

The NAE Report identified the following challenges that are also physical science basic research questions:

- Making solar energy affordable
- Providing energy from fusion
- Developing carbon sequestration methods
- Managing the nitrogen cycle
- Providing access to clean water
- Preventing nuclear terror
- Securing cyberspace
- Enhancing virtual reality
- Engineering the tools for scientific discovery

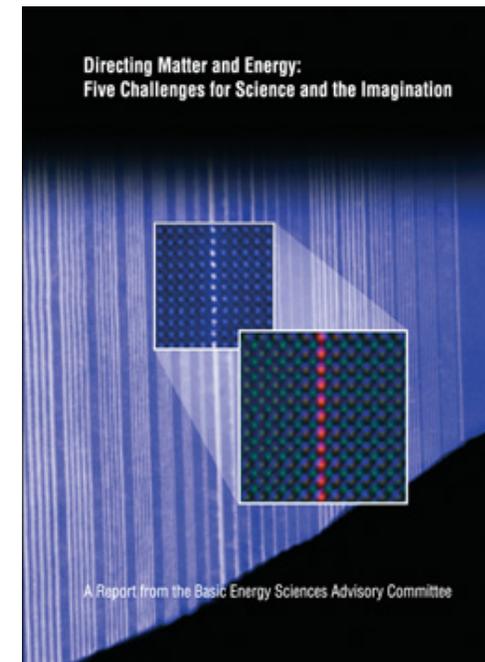
*"Meeting some of these is simply imperative for the survival of our planet. Some will make us more secure against both human and natural threats. And all will improve the quality of life in our nation and the world."*

**Dr. Charles Vest, President  
National Academy of Engineering**



# Engineering is Meeting Physics At the Nanoscale

- Controlling materials processes at the level of quantum behavior of electrons
- Atom- and energy-efficient syntheses of new forms of matter with tailored properties
- Emergent properties from complex correlations of atomic and electronic constituents
- Man-made nanoscale objects with capabilities rivaling those of living things
- Controlling matter very far away from equilibrium



*BESAC Grand Challenge  
Subcommittee Report  
January 2008*



# Looking Forward

The President's Budget Request for FY2009 remains a vote of confidence for the physical sciences, expressing unprecedented support:

*"To keep America competitive into the future, we must trust in the skill of our scientists and engineers and empower them to pursue the breakthroughs of tomorrow . . . This funding is essential to keeping our scientific edge."*

*President George W. Bush  
State of the Union Address  
January 28, 2008*

