



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

Fusion Energy Sciences Briefing

FESAC Meeting

Dr. Raymond L. Orbach

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Recent Events in Fusion Energy Science

- FY 2005 Budget request contains \$7 million in ITER funding and \$31 million in research identified as related to ITER.
- Energy and Water Appropriations Conference Report funds fusion at \$264 million for FY 2004, up from \$246 in FY 2003. Includes a specific ITER line item.
- Rollout by Secretary Abraham of the Twenty-Year Facility Plan for the Office of Science. ITER is the number one priority.
- NRC report on Burning Plasma Assessment provides a positive path forward for the management of the Fusion Energy Science Program. I have asked FESAC to prioritize FES research programs in response to the NRC report.

The Office of Science FY 05 Budget Request

(dollars in thousands)

	FY 2003 Comparable Approp.	FY 2004 Comparable Approp.	FY 2005 President's Request	FY 2005 Request vs. FY 2004 Appropriation	
Science					
Basic Energy Sciences.....	1,001,941	1,010,591	1,063,530	+52,939	+5.2%
Advanced Scientific Computing Research.....	163,185	202,292	204,340	+2,048	+1.0%
Biological & Environmental Research.....	494,360	641,454	501,590	-139,864	-21.8%
<i>Congressionally-directed projects.....</i>	<i>(51,927)</i>	<i>(140,762)</i>	<i>(—)</i>	<i>(-140,762)</i>	<i>(-100.0%)</i>
<i>Core Biological and Environmental Research.....</i>	<i>(442,433)</i>	<i>(500,692)</i>	<i>(501,590)</i>	<i>(+898)</i>	<i>(+0.2%)</i>
High Energy Physics.....	702,038	733,631	737,380	+3,749	+0.5%
Nuclear Physics.....	370,655	389,623	401,040	+11,417	+2.9%
Fusion Energy Sciences.....	240,695	262,555	264,110	+1,555	+0.6%
Science Laboratories Infrastructure.....	45,109	54,280	29,090	-25,190	-46.4%
Science Program Direction.....	137,425	152,581	155,268	+2,687	+1.8%
Workforce Development for Scientists & Teachers.....	5,392	6,432	7,660	+1,228	+19.1%
Small Business Innovation Research/Technology Transfer.....	100,172	—	—	—	—
Safeguards and Security.....	61,272	56,730	67,710	+10,980	+19.4%
Subtotal, Science.....	3,322,244	3,510,169	3,431,718	-78,451	-2.2%
Use of prior year balances.....	—	-10,000	—	+10,000	+100.0%
Total, Science.....	3,322,244	3,500,169	3,431,718^a	-68,451	-2.0%
<i>Total, excluding Congressionally-directed projects.....</i>	<i>(3,270,317)</i>	<i>(3,359,407)</i>	<i>(3,431,718)</i>	<i>(+72,311)</i>	<i>(+2.2%)</i>

^a Note, when compared to the FY 2004 request (comparable), the FY 2005 request increases \$104,885,000 (3.2%).

Office of Science FY05 Priorities

- **Research Priorities**
 - ITER Negotiations and Supporting R&D
 - Next Generation Computational Architecture and continued development of leadership class computation
 - Nanoscale Science, Engineering, & Technology
 - Hydrogen Production, Storage, and Use
 - Genomics: GTL, including Project Engineering & Design for Protein Production and Tags Facility
 - Climate Change Science Program
 - Scientific Discovery through Advanced Computing (SciDAC)
 - Workforce – Increase Laboratory Science Teachers Professional Development and minority serving institution faculty sabbatical program
 - R&D for new facilities - RIA, BTeV (*Fermilab*), 12 GeV Upgrade (*Thomas Jefferson*) to explore the fundamental nature of energy & matter
 - Linac Coherent Light Source R&D, PED and long lead procurements
- **Return on Investments: User Facility Operations at 95% of optimum vs. 92% in FY04**
- **Safeguards & Security Enhanced Readiness**

Fusion Energy Sciences (FES)

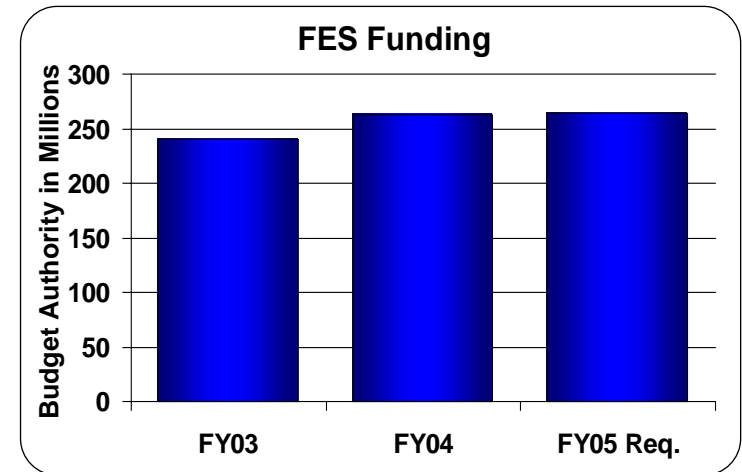
We are now in negotiations on the terms for ITER siting and construction with China, the European Union, Japan, South Korea, and the Russian Federation. Agreement has been reached on cost sharing and allocation of tasks for construction. Efforts continue to select a site.

Science and Enabling R&D (\$179M, +1M)

- Burning Plasmas
- Fundamental Understanding
- Configuration Optimization
- Materials and Components
- Tokamak science and enabling R&D are focused on ITER needs.

Facilities (\$85M, +1M)

- Continue fabrication of the NCSX at PPPL.
- Operation of tokamak facilities more focused on ITER needs.
- ITER direct funding for engineering, management and vendor qualification totals \$7M in FY05 request.



INCITE

10% of NERSC capability made available to the scientific community for high impact science. No requirement for direct relationship to Office of Science programs. INCITE will encourage the development of a new sociology for high-end computation.

- 4,500,000 CPU hours available (10% of NERSC Capability)
- 53 proposals received
- 130,508,660 CPU hours requested
- 65% from U.S. academic institutions
- 12 different scientific disciplines
- 62% for research not funded by DOE
- Three Awards
 - **“Thermonuclear Supernovae: Stellar Explosions in Three Dimensions,”** Tomasz Plewa, Center for Astrophysical Thermonuclear Flashes, University of Chicago (2.7 million processor hours).
 - **“Fluid Turbulence and Mixing at High Reynolds Number,”** Professor P. K. Yeung, Georgia Institute of Technology (1.2 million processor hours).
 - **“Quantum Monte Carlo Study of Photoprotection via Carotenoids in Photosynthetic Centers,”** William A. Lester, Jr., Lawrence Berkeley National Laboratory and the University of California Berkeley (1 million processor hours).

ITER Update

- EU selected Cadarache as their site on Nov. 26, 2003
- P-2.5 in Vienna, Dec. 5 agreed to symmetrical cost sharing at either site, but was unable to recommend site to Ministers.
- PMMI meeting in Washington, DC on December 20th did not ratify site selection. EU commitment of 12% contribution to a Rokkasho site no longer certain.
- Path forward after PMMI included discussions on a “broader approach to fusion” and a final round of technical questions to the sites. Answers received on January 31st.

ITER Decisions Remaining

The ITER parties must still reach decisions on:

- site
- cost sharing
- agreeing to potential candidates for ITER management positions
- how to address concerns on the ITER international organization, intellectual property, regulatory framework and non proliferation.

Site decision is critical—none of the other issues can be resolved without a site decision.

Overview of ITER Site Selection

- Site decision essential. Parties may not be able to sustain ITER momentum “at home.”
- Both sites are excellent; the U.S. has expressed a preference for Rokkasho based on a technical analysis of both site and the strong commitment of the Japanese host to ITER.
- Canada withdrew their candidate site in December.
- None of the sites appear to have regulatory problems, i.e., no regulatory “show stoppers.” We examined “final” concerns in a technical meeting in Vienna two weeks ago.
- Sites can be differentiated on cost, port, rail and road infrastructure, ease of access, and social and cultural “quality of life” attributes.

FESAC Charges

- Workforce Development
- Inertial Fusion Energy, including NNSA relevant work
- Committee of Visitors, focusing first on Theory & Modeling
- Priorities: Scientific issues and Campaigns to address them