



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Briefing on the Administration's Proposed Funding Levels for FES in FY 2013

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February 13, 2012



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This proposal was developed with a long-term view for fusion and the plasma sciences, framed by Administration priorities for near-term payoffs

- This budget was developed in part considering the Administration's high priority of investment in research relevant to clean energy with near-term payoff.
- With this as backdrop, the Administration affirms a strong commitment to ITER, recognizing its importance to fusion and potentially to the energy economy in the second half of this century, the U.S.'s leading scientific role in getting us to this point, and international commitments
- Cuts are realized in a large majority of the non-ITER part of the program. Exceptions are where modest increases are proposed in international research and materials
- With this proposal, a program structure is maintained that can lead to where we need to be in 10 years



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*On program vision and choices made
in the FY'13 budget proposal*



Where we need to be in ten years: overarching considerations

- Total FES budget request is \$398.324M.
 - The U.S. needs to lead in burning plasma science → *Support ITER project at \$150M, an increase of \$45M over FY 12. Maintain DIII-D run time with no upgrades at this time. However, the Alcator C-Mod facility will cease operations in FY'13*
 - Position the U.S. to assert itself in long-pulse, 3D B science, and fusion materials gaps → *Modest increases in international opportunities on long-pulse facilities, both tokamak and stellarator. Continue support of the NSTX Upgrade project and DIII-D to enable an informed decision on an FNSF later this decade, and begin a modest initiative in materials science.*
 - Steward the broader plasma sciences → *Maintain overall FES Program breadth as the non-ITER elements face an overall reduction of about 16%. Continue joint programs in HEDLP and General Plasma Science in non-MFE research at a reduced level*

Overarching considerations regarding ITER

“Why does the ITER project need to grow in such a challenging budget?”

- ITER is the capstone of over 50 years of research in magnetic fusion. This time is critical for its success, and for fusion’s success
- The project is moving out smartly in construction. The Administration affirms here that the U.S. needs to keep pace to the best of its ability. This and the coming years are when contracts need to be placed so that ITER construction can be completed on time.
- With this budget, the U.S. is at the very edge of having an adverse impact on the international schedule at a time when the other Members have demonstrated extraordinary commitment. Further reductions in the U.S. ITER budget will yield an international schedule slip that will at the least add to costs for everyone.

The demonstration of international commitment to ITER during extraordinary times has been exceptionally strong

Member	Comments
China	Highly committed to ITER and fusion overall. Their plan to aggressively invest in fusion requires ITER success, including schedule success. Expressed interest in fusion comes from highest levels of government, including a visit by China's President and Vice Premier to their leading fusion laboratory.
European Union	They are in for 45% of the cost. The EU recently committed to \$1.3B additional Euro of ITER funding to a total of \$2B Euros over the next two years, despite extraordinary financial times. They have recently forged a deal with JA to trade in-kind contribution obligations to help entire project stay on schedule discussions.
India	They fight hard every year for their budget in a complex process, but outward indications of support are very strong. They see ITER is a vehicle for advancing their whole fusion R&D enterprise.
Japan	Their FY'12 funding of \$224M has been approved. This is more than a 3-fold increase in funding over FY'11, despite the earthquake and tsunami.
Russia	Cash is in-hand, and they are eager to spend and get on with the project fully and to stay on schedule
South Korea	Strong commitment; Eager to demonstrate industrial capabilities. Catalyzing trade of obligations between EU and JA. Strident about sticking to schedule.



Overarching considerations regarding modest investments in initiatives

■ Considerations include

- In international research, creating opportunities for U.S. researchers, including students, to have the ability to engage in scientific research and technical capability that is maturing and is not available stateside but which is universally agreed as essential for fusion as a whole
- In materials science, a need is to grow even modestly our research base in this urgent gap area, to enable the U.S. to compete or lead later

FESAC subpanel input on both topics will be timely and important



Overarching considerations regarding program breadth

■ Considerations include

- Portfolio breadth: Maintaining program breadth is a high value embraced by this Office and the Administration.
- Cross-agency partnerships: Provide leverage for the whole enterprise of the plasma sciences, both fusion and otherwise
- Flexibility: Preserve the option of responding to growth opportunities pending input from the NAS on the potential of IFE



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On budget details and moving forward



DIII-D proposal emphasizes maintaining run time and defers upgrades

Research	FY'12 Enacted	FY'13 Proposed
DIII-D	30,300	26,703

Operations	FY'12 Enacted	FY'13 Proposed
DIII-D	38,319	33,260

- The reduction reflects a priority for operations (run time) in FY 2013.
- The Operations funding reduction will halt all major facility upgrades and defer system refurbishments, but still allow for 10 weeks of operation in FY 2013.



Research	FY'12 Enacted	FY'13 Proposed
NSTX	17,549	16,836
Operations	FY'12 Enacted	FY'13 Proposed
NSTX	15,004	6,593
Construction Projects	FY'12 Enacted	FY'13 Proposed
NSTX Upgrade	17,130	22,800

- NSTX Upgrade still on track for project completion per the agreed upon baseline
- Overall funding for NSTX Facility Operations and NSTX-U Major Item of Equipment (MIE) is decreased. Within this combined funding, priority is given to the NSTX-U MIE project so that it can be completed by the September 2015 target date.



Alcator C-Mod Operations cease in FY'13

Research	FY'12 Enacted	FY'13 Proposed
Alcator C-Mod	10,454	8,396

Operations	FY'12 Enacted	FY'13 Proposed
Alcator C-Mod	18,067	7,848

- The Alcator C-Mod facility is shut down in FY 2013. No operations will be conducted and the funding will provide for the safe shutdown of the facility.
- FY'13 will see analysis of data taken in FY 2012 and publication of results. A transition of research staff into collaborative activities on other domestic and international experiments will begin. FES will work with MIT regarding student impacts



International Research is proposed to increase in FY'13

Research	FY'12 Enacted	FY'13 Proposed
International Research	7,435	8,946

- This growth in funding will expand scientific collaboration on a new generation of foreign fusion research facilities in Asia and Europe.
- FESAC input will be considered in developing the details and approach



Experimental Plasma Research Portfolio and MST are nearly flat-funded

	FY'12 Enacted	FY'13 Proposed
MST	6,000	5,750
Experimental Plasma Research	11,000	10,500

- Maintains critical level of effort to enable connections between non-tokamak and tokamak configurations to be established
- Validation and verification emphasis maintained
- FES and community need of further promotion of national lab/university teaming in addressing questions relevant to any form of confinement configuration



Theory and simulation are reduced

	FY'12 Enacted	FY'13 Proposed
Theory	24,348	20,836
SciDAC	8,312	6,556

- The level of support for new and existing efforts will be reduced and the program's scope will be narrowed
- SciDAC: the scope and balance of the portfolio will be maintained at a reduced level of support and fewer Centers may be selected for an award following the ongoing competition.
- The constrained budget environment does not allow the launch of the Fusion Simulation Program in FY 2013

Enabling R&D is reduced, but an emphasis on materials research increases

	FY'12 Enacted	FY'13 Proposed
Plasma Technology	13,911	11,666
Advanced Design Studies	4,337	1,611
Materials Research	7,729	9,371
Total Funding, Enabling R&D	25,977	22,648

- An initiative in fusion materials research is proposed
- The level of support for design studies of future facilities and for the Virtual Laboratory for Technology (VLT) will be reduced.
- The level of support for advanced technologies for future facilities will be reduced.



Research in High Energy Density Laboratory Plasma Physics and General Plasma Science is reduced

	FY'12 Enacted	FY'13 Proposed
High Energy Density Laboratory Plasma physics	24,741	16,933

	FY'12 Enacted	FY'13 Proposed
General Plasma Science	16,780	13,151

- HEDLP program specifics will be informed by the outcome of a competitive merit review of much of the program in FY 2012 and FY 2013, the forthcoming NRC Inertial Fusion Energy (IFE) study report and the Department's response to it, and programmatic priorities.
- In GPS, commitments to NSF/DOE interagency activities will be maintained. Program balance of the laboratory GPS projects will be critically reviewed through competitive peer review.



Budget summary, FES

**Fusion Energy Sciences
FY 2013 Congressional Budget**
(Budget Authority in thousands)

	FY 2011 Actual	FY 2012 Approp	FY 2013 Request
Science			
DIII-D Research	30,716	30,300	26,703
C-Mod Research	10,056	10,454	8,396
International Research	6,105	7,435	8,946
Diagnostics	4,115	3,519	3,519
Other	8,085	11,919	9,193
NSTX Research	16,107	17,549	16,836
Experimental Plasma Research	17,745	11,000	10,500
HEDLP	25,727	24,741	16,933
MST Research	7,005	6,000	5,750
Theory	25,663	24,348	20,836
SciDAC	7,057	8,312	6,556
General Plasma Science	14,810	16,780	13,151
SBIR/STTR	-	8,326	6,881
Total, Science Research	173,191	180,524	154,200

	FY 2011 Actual	FY 2012 Approp	FY 2013 Request
Facility Operations			
DIII-D	35,699	38,319	33,260
C-Mod	17,518	18,067	7,848
NSTX	22,859	15,004	6,593
MIE: NSTX Upgrade	9,700	17,130	22,800
Other, GPE, and GPP	4,568	975	975
MIE: U.S. Contributions to ITER Project	80,000	105,000	150,000
Total, Facility Operations	170,344	194,495	221,476
Enabling R&D			
Plasma Technology	14,501	13,911	11,666
Advanced Design	2,752	4,337	1,611
Materials Research	6,469	7,729	9,371
Total, Enabling R&D	23,722	25,977	22,648
Total, Fusion Energy Sciences	367,257	400,996	398,324



Summary of Administration Budget Request, Office of Science

	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Advanced Scientific Computing Research	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	4,992,052



This budget was developed with a long-term view for fusion and the plasma sciences, framed by Administration priorities for near-term payoffs

- This budget request reflects the Administration's high priority of investment in research relevant to clean energy with near-term payoff
- ITER support is strong
- A program structure is maintained that reflects where we need to be in 10 years
- Cuts are realized in a majority of the non-ITER part of the program. Exceptions are where modest initiatives are begun in international research and materials