

U.S. Department of Energy



Office of Science



Draft Presentation to FESAC

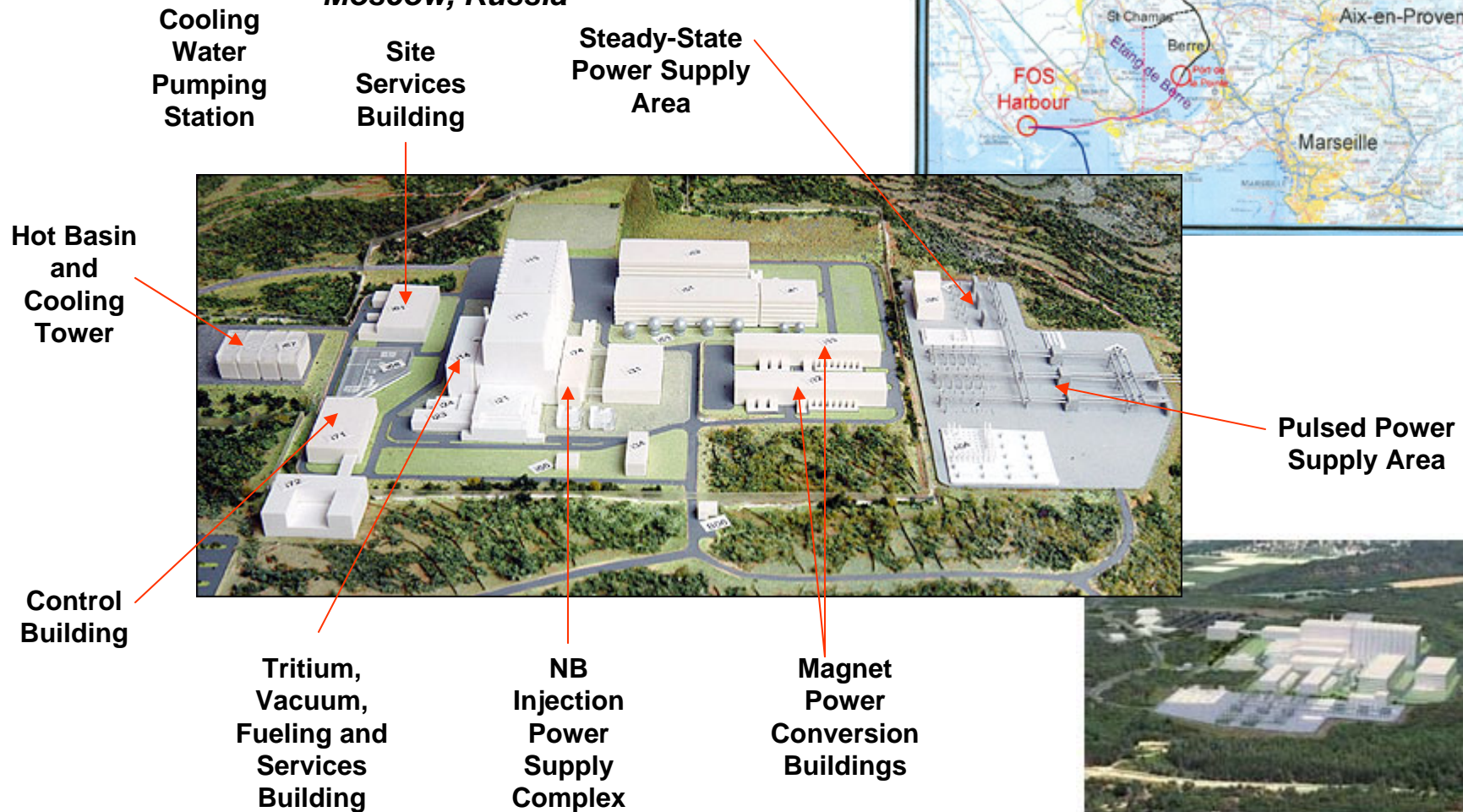
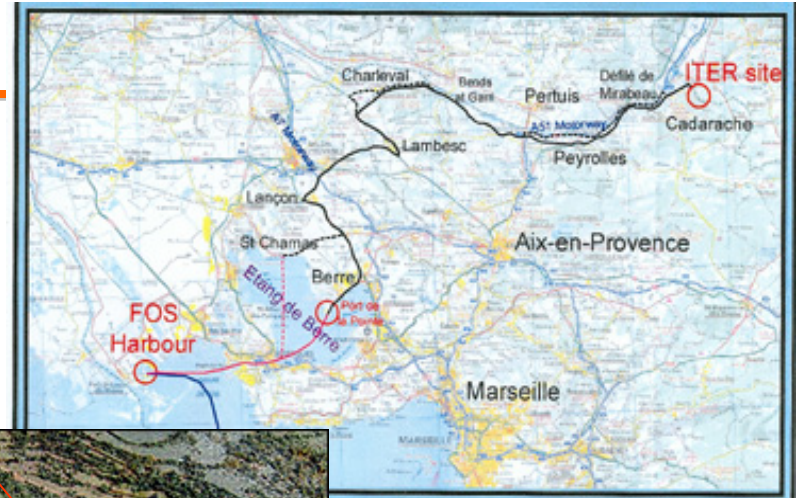
July 19, 2005

Raymond L. Orbach
Director
Office of Science
U.S. Department of Energy



Cadarache, France Selected to Host ITER

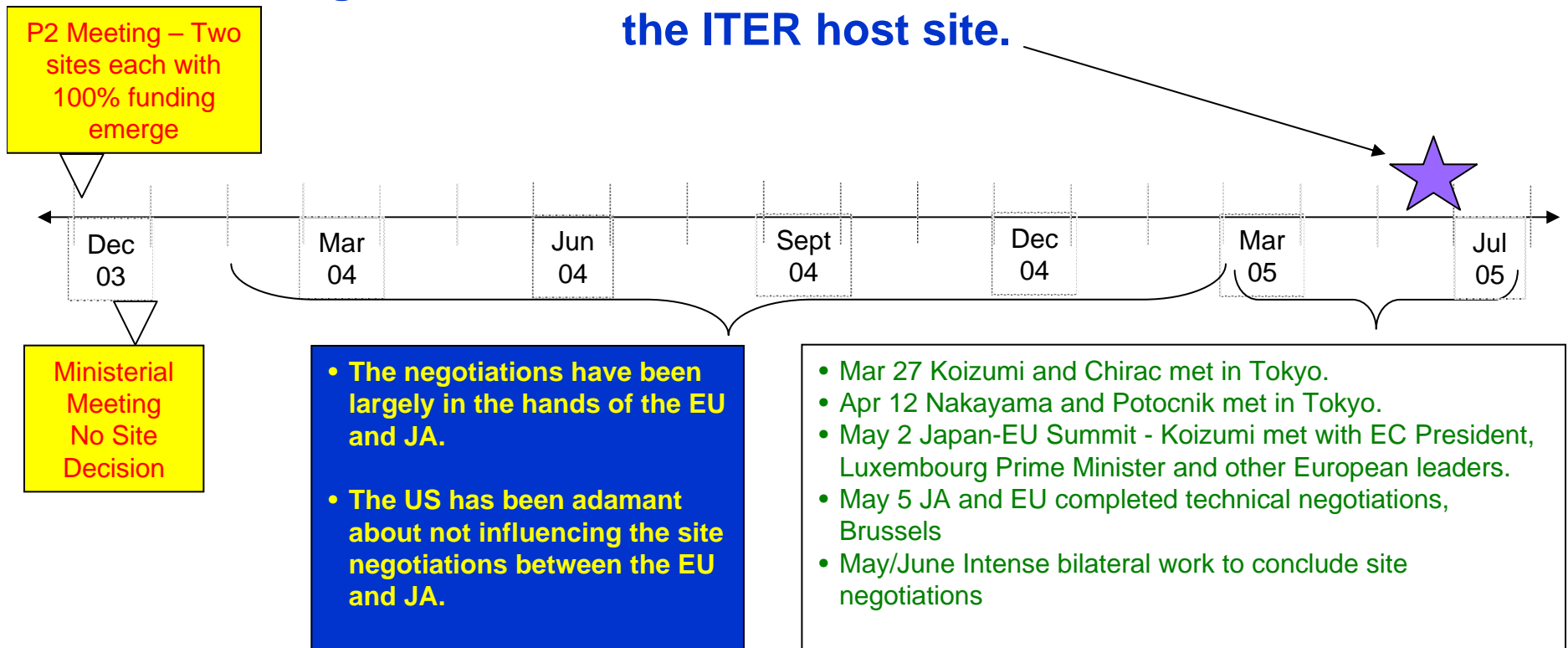
**June 28, 2005
Ministerial Meeting
Moscow, Russia**





Site Negotiations Now Complete

**June 28, 2005 - A
Six-Party Ministerial-level Meeting Successfully Ended the
Site Negotiations with the selection of Cadarache, France as
the ITER host site.**





Near-term Activities

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July to
Dec
2005

- **ITER Parties: Select and appoint Director General and key staff and form ITER working team at Cadarache, including assignment of U.S. personnel**
- **ITER Parties: Negotiate text on the international ITER Agreement**
- **DOE: Continue to complete project activities in U.S., including setting milestones, design/R&D preparations and organizing to implement the US Contributions to ITER project.**
- **U.S. Congress: Address FY06 Budget Request and ITER in Energy Bill**
- **U.S.G. and Congress: Consult on progress of text negotiations**
- **Complete international ITER Agreement and pre-initial or concur on content**

Jan
2006
and
Beyond

- **ITER Parties: Governments initial the international ITER Agreement**
- **FY 2007 Budget Released on February 6, 2006**
- **DOE: Obtain Administration approval via Circular 175 authorizing the U.S. to sign the ITER Agreement, in consultation with Congress**
- **ITER Parties: Sign international ITER Agreement**
- **U.S.G. and Congress: Consult on Ratification or Acceptance of the Agreement**
- **ITER Parties: Ratify or Accept the signed Agreement and its Entry into Force**
- **ITER Parties: Establish international ITER Organization**



The U.S. Continues International Negotiations

➤ Priority negotiation issues include:

- **SITE SELECTION:** Completed June 28, 2005.
- **LEGALITIES AND ORGANIZATION:** The need continues to finalize the international ITER Agreement and obtain approval from all parties' government systems, appoint a Director General, and establish the ITER Organization.



House Appropriations Mark (Reported May 18, 2005)

The Energy and Water Subcommittee approved HR 2419, the fiscal year 2006 Energy & Water Development Appropriations bill.

The bill provides an increase of \$233 million above the President's request for the Office of Science.

Office of Science Highlights:

The House bill provides \$3.67 billion for scientific research, which is...
\$203 million above the President's request
\$66 million above the current year level

- Provides an additional \$22,000,000 to maintain high energy physics at the fiscal year 2005
- additional \$39,000,000 is provided to support the Office of Science initiative to develop the hardware, software, and applied mathematics necessary for a leadership-class supercomputer to meet scientific computation needs
- Fully funds the Spallation Neutron Source at Oak Ridge
- **Funds Fusion Energy Sciences at \$296 million.**



House Appropriations Report Language (May 18, 2004)

Office of Science

The Committee recommendation for fusion energy sciences is \$296,155,000, an increase of \$5,605,000 over the budget request but with a significant redirection of funds as outlined below. The Committee is concerned that two-thirds of the proposed increase for the International Thermonuclear Experimental Reactor (ITER) would be achieved by reducing domestic fusion research and operating time on domestic user facilities. Under the proposed fiscal year 2006 budget, operating time at the three major fusion research facilities (DIII-D, Alcator C-Mod, and NSTX) would be reduced from 48 weeks in fiscal year 2005 to a total of only 17 weeks in fiscal year 2006. If the United States expects to be a serious contributor to international fusion research in general and to ITER in particular, the Nation needs to maintain strong domestic research programs and user facilities to train the next generation of fusion scientists and engineers. The Department's proposal to increase support for ITER at the expense of domestic fusion research is unwise and unacceptable. Such an approach is not only short-sighted, but inconsistent with prior Congressional guidance. Therefore, the Committee directs the Department to utilize \$29,900,000 of funding proposed for ITER and the additional \$5,605,000 to restore U.S.-based fusion funding to fiscal year 2005 levels as follows: \$7,300,000 for high performance materials for fusion; \$14,305,000 to restore operation of the three major user facilities to fiscal year 2005 operating levels; \$7,200,000 for intense heavy ion beams and fast ignition studies; \$5,100,000 for compact stellarators and small-scale experiments; and \$1,600,000 for theory. As in previous years, the Committee directs the Department to fund the U.S. share of ITER through additional resources rather than through reductions to domestic fusion research or to other Office of Science programs. If the Department does not follow this guidance in its fiscal year 2007 budget submission, the Committee is prepared to eliminate all U.S. funding for the ITER project in the future.



Boehlert Amendment to the House Energy and Water Appropriations Bill Approved on House Floor (May 24, 2005)

WASHINGTON, D.C. - The House tonight approved, by voice vote, an amendment by Science Committee Chairman Sherwood Boehlert (R-NY) to prevent the U.S. from entering into an agreement on ITER, the international fusion experiment, before March 1, 2006.

"The Department of Energy is moving ahead with negotiating U.S. participation in ITER, the international fusion energy project, which is all to the good. I support U.S. participation in ITER, a critical experiment that will help determine, finally, if fusion is a realistic option for energy production. If it is, fusion might go a long way toward solving our looming energy supply shortfall.

support U.S. participation in ITER

"But ITER is expensive. The U.S. contribution is expected to exceed \$1 billion. And I want to make sure that before we commit a dime to ITER that we have a consensus on how we will find that money.

have a consensus on how we fund ITER

"I am very, very tired of the U.S. signing on to international science agreements that we later come to regret. We're then left with the Hobson's choice - the Chairman will excuse the expression - the Hobson's choice of either renegeing on our international agreement or funneling money into a project we don't actually need.

planning process and negotiations can and should continue

"So this time we have a chance to avoid that uncomfortable choice. We have time to ensure that the Administration and the Congress and the fusion science community agree on how we're going to pay for ITER before we sign on the dotted line. And that's exactly what this amendment is designed to guarantee.

"The amendment says, in effect, that we can't finalize an agreement on ITER before March 1 of next year. By then we will have in hand both the proposed ITER agreement and the President's fiscal 2007 budget request. With that information, we should be able to determine if there is a consensus on moving forward.

"In the meantime, the site selection and planning process and negotiations on ITER can and should continue. But I will do all I can to prevent the U.S. from entering into an agreement if no one is willing to make the sacrifices necessary to pay for it.

"Again, I look forward to working with Chairman Hobson and everyone concerned with this issue to build a strong and balanced fusion program."



Senate Appropriations Mark (June 14, 2005)

Office of Science

- **The Energy and Water Subcommittee approved a fiscal year 2006 Energy & Water Development Appropriations bill.**
- **The bill provides an increase of \$100 million above the President's request to support the Department of Energy Science facilities, \$240 million above the President's request for the Office of Science. . .**

Office of Science Highlights:

The Senate bill provides \$3.7 billion for scientific research, which is...

\$240 million above the President's request

\$102 million above the current year level

- **\$100 million increase is provided to support 100% utilization of all Department of Energy Science facilities.**
- The Genomes to Life program is provided \$40 million above the request to accelerate the deployment for four research facilities.
- Initiates Nanotechnology Technology Transfer fund at \$30 million.
- Fully funds the Spallation Neutron Source at Oak Ridge
- **Restores funding for domestic fusion research at \$290 million.**



Full Senate Appropriations Language (June 16, 2005)

Reduced funding
for ITER by \$28M
to a funding level
of \$21.5M

FUSION ENERGY SCIENCES

Fusion Energy.—The Committee provides \$290,550,000, the same as the budget request. The Committee has provided \$28,000,000 in additional funding to ensure the full operations on the DIII-D, Alcator C-Mod, and NSTX fusion research facilities. The current budget reduces operations from 48 weeks to just 17 weeks, which the Committee believes is an irresponsible use of the taxpayer investment in these facilities. The Committee has reduced funding for the International Thermonuclear Experimental Reactor [ITER] by \$28,000,000, equal to the amount domestic research has been increased. The Committee is disappointed that a decision has not been made in selecting a site for the location of this international burning plasma user facility. Without a final decision on a location or allocation, the Committee is skeptical the Department will be able to expend the full budget request for this project in fiscal year 2006. If a site is selected, the Committee will work with the Department to provide an allocation that is consistent with the expected needs for this project. Within available funds, the Committee includes \$1,000,000 for non-defense research activities at the Atlas Pulse Power facility.

If a site is selected,
the Committee will
work with the
Department...

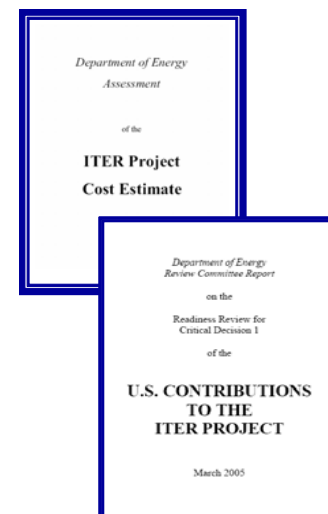


Estimated Cost/Funding Issues

	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	TOTAL
FY06 Cong. Budget	\$49.5M	\$146.0M	\$200.8M	\$207.5M	\$199.3M	\$160.3M	\$126.2M	\$32.4M	\$1.122B

- \$1.122 Billion is a cap imposed by OMB in the FY 2006 President’s Budget process.
- Cost estimates and final design will be refined with final site selection, leading to total project cost estimate at CD-2 milestone.
- The international project performance baseline, including a final allocation of in-kind contributions, will be determined upon completion of the ITER agreement. Then the US project performance baseline, Critical Decision-2, will be obtained.

Two DOE Reviews indicate that estimates are reasonable, but international project uncertainties should be considered:





FY06 President's Budget and Consequences of May/June 2005 Congressional Markups

Office of Science

Fiscal Year	Total Estimated Costs (TEC)	Other Project Costs (OPC)	Total Project Costs (TPC)
2006	46.0	3.5	49.5 ~21
2007	130.0	16.0	146.0
2008	182.0	18.8	200.8
2009	191.0	16.5	207.5
2010	189.0	10.3	199.3
2011	151.0	9.3	160.3
2012	120.0	6.2	126.2
2013	<u>29.0</u>	<u>3.4</u>	<u>32.4</u>
Total	1,038.0	84.0	1,122.0

- Consequences of the proposed Congressional reduction to ~\$21M for project funding in FY06 are project delay and cost increase due to added escalation and key staff extensions.



Scientific and Technological Outcomes

- After 10 years of operation (2014 to 2024), and, in parallel, operation of materials test facility(ies) we will have the confidence, as well as the physics and technical basis to design a demonstration power plant based on fusion.

Magnetic Fusion Energy Facilities Operation Timeline

