

# **Minutes of the Meeting of the Fusion Energy Sciences Advisory Committee**

June 1, 2006  
Hilton Hotel, Gaithersburg, MD

## **Members present:**

Dr. Charles Baker, Sandia National Laboratories  
Prof. Riccardo Betti, University of Rochester  
Dr. Martin Greenwald, Massachusetts Institute of Technology  
Prof. Joseph Johnson, A & M University  
Dr. Rulon Linford, Lawrence Livermore National Laboratory  
Prof. Gerald Navratil, Columbia University  
Dr. Jill Dahlburg, Naval Research Laboratory  
Prof. Jeffrey Freidberg, Massachusetts Institute of Technology  
Prof. Stewart Prager (chair), University of Wisconsin-Madison  
Dr. John Sheffield, University of Tennessee, Joint Institute for Energy and Environment  
Prof. Edward Thomas, Auburn University  
Dr. Michael Zarnstorff, Princeton Plasma Physics Laboratory

## **Members absent:**

Dr. Richard Callis, General Atomics  
Prof. Richard Hazeltine, University of Texas-Austin  
Dr. Kathryn McCarthy, Idaho National Laboratory

## **Ex-officio members present:**

Dr. S. I. Abdel-Khalik (ANS), Georgia Institute of Technology

## **Ex-officio members absent:**

Dr. Melissa Douglas (APS-DPP), Los Alamos National Laboratory  
Dr. John Steadman (IEEE), University of South Alabama

## **Designated Federal Official present:**

Albert Opdenaker III, Executive Assistant for Fusion Energy Sciences, US Department of Energy

## **FESAC Executive Secretary:**

Dr. John Sarff, University of Wisconsin-Madison

Other persons attending the meeting are listed in the appendix.

**Action items from the meeting:**

1. Prof. Navratil will circulate the PART panel's recommended substitutions for the intermediate PART goals and milestones for FESAC individual comment. The revised substitutions will then be given to DOE. It is anticipated that the PART panel will report their ratings at the next FESAC meeting.
2. Prof. Prager will circulate to FESAC a draft letter to Dr. Orbach on the ten-year plan charge, reporting the sub-committee work on addressing the charge. The letter will then be sent to Dr. Orbach.
3. Prof. Prager will send the letter written at the meeting to Dr. Orbach conveying FESAC's views on the Plan for US Participation in ITER as prepared by the US Burning Plasma Organization.

**1. Call to order and meeting logistics.**

The meeting was called to order at 8:30 AM. Prof. Prager reviewed the agenda and then introduced Dr. James Decker as the Acting Associate Director of the Office of Fusion Energy Sciences. With the retirement of Dr. N. Anne Davies, former Associate Director for Fusion Energy Sciences and Designated Federal Official (DFO) for FESAC, Albert L. Opdenaker III, Executive Assistant for Fusion Energy Sciences, has been appointed the new FESAC DFO. The agenda was modified during the course of the meeting, adjusting to Dr. Orbach's schedule and FESAC discussion.

**2. Office of Fusion Energy Sciences perspective.**

Dr. James Decker described managerial changes at DOE and OFES. Dr. Ray Orbach has been confirmed Under Secretary of Science. How this affects operations at the Office of Science will become clearer in the next few months. He provided a status report on the search for the new Associate Director for the OFES. The job solicitation period closed the end of March, with an expectation that the new AD will be announced by this Fall, possibly sooner. A standard initial screening panel has completed its work, and a candidate short-list has been formed. Warren Marton is the acting Director of the ITER and International Division, and the acting Director of the Research Division is rotating between Steve Eckstrand, Gene Nardella, and Erol Oktay (current).

Dr. Decker announced the initialing of the ITER Agreement by the seven parties. This is a major step in the formal establishment of the Agreement, which is currently being prepared for its 120-day review by Congress as stipulated in the Energy Policy Act of 2005. It is expected that the Agreement will be signed November 29, 2006 (at a location yet to be determined).

Dr. Decker described the status of the grant solicitation for the NSF-DOE partnership in Basic Plasma Science and Engineering. More than 200 proposals were submitted. The DOE and NSF program managers have agreed on 29 awards by DOE-alone, 2 joint NSF-DOE awards, while NSF has not yet finalized their decision on NSF-alone awards. He also announced two awards made under the Plasma Physics Junior Faculty Development Program.

Dr. Decker also briefly described the status of the major facilities' operations and well as the organization of the US Burning Plasma Organization.

*FESAC discussion:* Dr. Decker was asked about the status of the budget. The House markup has been completed, with a few amendments. He was unsure of the Senate's schedule. The House's version of the Office of Science budget on the whole was increased \$30M over the Administration's request. This is excellent, given that other programs are not fairing as well. He was also asked when funds for ITER will be formally be allocated. The process in the US is relatively clear, but each party has its own process, and the agreement has provisions to deal with varied starts.

### **3. Draft Plan for US Participation in ITER.**

Prof. Ray Fonck, Director of the US Burning Plasma Organization, presented a draft Plan for US Participation in ITER, which is required by the Energy Policy Act of 2005 (EPAct). The OFES requested that the USBPO prepare this plan, with FESAC consultation.

The USBPO created a Task Group to draft the plan, consisting of 15 community experts, organized in three sub-panels to address the three questions posed in EPAct. The Task Group relied as much as possible on existing reports from previous recent studies. However, some new thinking was required in regard to engaging ITER. The near term audience for the plan is OFES and DOE. The ultimate and main audience is Congress and their staff. The document is not intended for fusion experts, but it does include technical detail in support of the plan. Prof. Fonck emphasized that the document represents a first step at developing a plan to engage ITER, which will mature over time. Future work requires development of specific tasks and timescales, setting of priorities, and incorporation of the plan within the ten-year planning activity (see below). The plan needs to be delivered to DOE next week (June 5-9) in order to meet established deadlines.

*FESAC discussion:* The members thanked Prof. Fonck and his Task Group for developing a good plan in such little time. Several noted that the Overview chapter was too long and perhaps not easily read by non-expert constituencies. Also, the report introduces some new terminology for the same issues discussed in previous community documents. At the time of the meeting, the Executive Summary had not yet been completed and, therefore, not included in the draft given to FESAC. However, Prof. Fonck anticipates this summary will be the major findings discussed in his presentation, with brief explanatory language. He is concerned that it may be difficult to reduce the Overview length without losing content. With a good Executive Summary, it was suggested that the need to reduce the Overview was lessened. Several members were concerned that FESAC will not have seen the Executive Summary before the plan is given to DOE. Prof. Fonck will attempt to convey the report to FESAC prior to submittal so that members can provide their individual comments, but there is insufficient time for FESAC to provide further input as a committee.

Several members noted the plan should more explicitly show connections between ITER and follow-on steps, particularly DEMO. It was also suggested that this plan is an opportunity to emphasize the role of fusion as part of the energy solution. But a potential risk in overemphasizing fusion's role in energy policy was noted, because the US does not have a long term policy for fusion energy.

Other specific points raised include: (1) the illustrated transition from "Preparation" to later operational stages does not recognize the need for continuing preparation of experiments and

diagnostics throughout the life of ITER, (2) the role of technology should be illustrated to begin from “day one”, and (3) US interests in ITER will be different from our partners, which should be addressed in the plan; this implies possible upgrades and additional diagnostic capability beyond ITER’s initial capability.

#### **4. Panel report on program’s progress toward achieving PART measures.**

Prof. Gerry Navratil provided an update on the charge to review and rate the fusion program’s progress toward achieving the long term Program Assessment Rating Tool (PART) goals. At the March 2006 meeting of FESAC, his panel was directed to use the Priorities Panel and Facilities Panel reports to revise the PART Intermediate Milestones. In particular, the Priorities Panel report includes language that may be suitable for this purpose verbatim. The recommended revisions of the Intermediate Milestones were shown for the three established ten year PART goals of (1) predictive capability for burning plasma, (2) configuration optimization, and (3) high energy density physics.

*FESAC discussion:* It was noted the intermediate milestones did not include understanding of electron transport. Prof. Navratil noted that the Priorities Panel report does not promise this by 2015. It was suggested that the intermediate goals could nonetheless include a sense of progress toward this important issue.

It was noted that the verbatim use of the Priorities Panel language might not be optimum for the intermediate goals and milestones. It was also noted that the third PART goal is no longer a well-funded area of research in OFES. For further action, FESAC members will provide Prof. Navratil their individual comments on the revised intermediate milestones. Also, OFES will consult OMB for guidance on possible changes to the goals and ask for clarification of the required timescale for completing the evaluation.

#### **5. Report from Sub-Committee on the Plan for Addressing the Ten-Year Program Charge.**

Prof. Gerry Navratil reported the sub-committee’s work to address the ten-year program charge. The sub-committee included Navratil (chair), Baker, Greenwald, Linford, Prager and Zarnstorff. He described the overall goal, scope, and approach. The proposed scope would include the full range of the MFE part of the US fusion program, with focus on major facilities and their evolution. The IFE part of the program would not be central to addressing the charge, but important to include in the overall strategic picture of the program. Key elements of the planning process would be formation of a FESAC Ten Year Planning Panel (TYPP) to work in parallel with a community wide, year-long process leading to a Snowmass-like meeting in the Summer of 2007. This meeting would be modeled after the Snowmass 1999 and 2002 meetings, with a similar cross-cutting working group organization. The TYPP would develop a detailed response to the charge following the Snowmass-like meeting, analogous to the Snowmass 1999 and 2002 meetings.

*FESAC discussion:* Significant meeting time was devoted to discussing the ten-year planning charge. Several main themes emerged:

The charge letter appears written with intent to address the future of MFE major facilities. The sub-committee recommends that the planning process be broadened to include all MFE

activities, with emphasis on major facilities. Planning for IFE would be included as described above. A number of FESAC members believe that, if the charge is expanded to include all of MFE, the planning process should also include IFE options. Dr. Decker notes OFES needs to provide more guidance on the scope of the planning, but that the Office is in an awkward position without a permanent Associate Director. Polling the committee, a clear majority believe the planning should include all of MFE, whereas the committee is nearly equally split on including IFE.

The benefits of a community-wide Snowmass-like process were debated. Several members note this process has worked successfully in the past, but some note that there is as yet not broad support for such an approach. Given the scale of effort implied by a Snowmass-like event, several note the importance of making sure the planning process will provide OFES the information it needs. Again, the new Associate Director will likely have important input on the process, so several suggested wait for this person's input.

The time schedule for addressing the charge was discussed. The sub-committee's recommendation is to provide an interim report by the Feb. 2007 date requested in the charge, but that the finalized plan would be completed later in Oct. 2007. Several members note that the planning process needs to start immediately in order for a Summer 2007 Snowmass-like event to be successful. In particular, waiting for the naming of a new Associate Director might cause too much delay. At the same time, the ambiguity in the scope of the planning suggests taking time to make sure the process provides the right input for OFES.

The committee began drafting a letter to Dr. Orbach, summarizing the work of the sub-committee. This letter will be finished by email following the meeting. Further, FESAC will invite clarification from OFES on the scope of the charge before forming the ten year planning panel.

## **6. Department of Energy Perspective.**

Dr. Ray Orbach, Director of the Office of Science, described several ITER developments. He participated in the initialing of the ITER Agreement, signaling a conclusion of party negotiations. He described this a "very moving experience". The DOE has been working with Congress to enter the 120-day congressional review period. No construction can occur during this period. The administrative process for establishing authorization to sign the Agreement is beginning. Interestingly, signing of the Agreement ends the process for the US, whereas the other ITER parties will ratify the Agreement as a treaty following the signing. For this reason, a "Provisional Application Period" will span the time period after signing, before the formal Agreement takes effect. The US will have high-level participation in the ITER Preparatory Committee, which is expected to "morph" into the ITER Council. The DOE is very pleased with the nomination of Dr. Holtkamp as Principal Deputy Director General. For the operations phase of ITER, the US requested to be a 13% party member, reflecting strong US interest for scientific participation in ITER.

The FY07 budget is faring well in Congress, passing the House Appropriations Committee at full level plus an addition. Other DOE projects are not as well treated, and Dr. Orbach called this a

“magnificent moment” for science. Senate action is scheduled for June, but the final budget may not be completed before the Fall elections.

On Friday, May 26, Dr. Orbach was confirmed as the new Under Secretary for Science.

*FESAC discussion:* Dr. Orbach was asked if ITER research will be international or by party. He replied it is expected to be international, but the exact form is not known. The ITER intellectual property will be owned by the parties. It is not yet known what will happen if other countries which to join ITER.

Dr. Orbach was asked what information is required on the Feb. 2007 timeframe in answer to the ten-year planning charge. He stated that the charge was written before the President announced the American Competitiveness Initiative, which has formed the basis for out-year budgets. He expects the new Associated Director of OFES to advise on the future of the program. He would rather have a document that advises on program priorities, rather than a “rush job”. But the sooner it comes, the better, to inform the FY09 budget. A delay to March or April is okay. In planning the future, he warns not to go beyond the President’s initiative.

#### **7. Public Comments on Ten-Year Program Charge (five presenters).**

Dr. Glen Wurden, LANL, suggested that, instead of a Snowmass-like approach, a panel of approximately 30 persons could be formed to answer the charge. This could be done more quickly, in particular before the Feb. 2007 date specified in the charge. He argues a panel format would be better for developing capabilities with institutions. He questions whether or not the plans for a private company (GA) should be discussed in a public forum.

Prof. Rob Goldston, PPPL, noted the exciting challenge laid out in future budgets. He argued that the near term goal should be to establish some exciting options, not decide on options in a one year time frame. In this context, IFE options should be considered in the process. He is concerned that the recommended size of the panel is too small. A bigger panel of about 35 persons would be important for broad community participation and buy-in.

Dr. Ed Synakowski, LLNL, argued that the entire community is well-served if IFE is included in the planning process. He observes that there will likely be a lot of interest in fusion when NIF turns on, about the time ITER construction roll-off begins. There should be a coherent view of IFE to build on NIF ignition. He also suggests that before a wide community Snowmass-like meeting, a different approach using town meetings, for example, should be employed. He worries about a potential lack of focus at a Snowmass-like meeting. Lastly he notes a 10-year plan needs to have a 20-year vision.

Dr. Grant Logan, LBNL, notes that the roll-off money will not automatically go to fusion research. It is therefore important to have exciting and cost effective proposals identified, including those for IFE.

Dr. Dave Hill, LLNL, argues that a Snowmass-like process is not the only possible means for broad community buy-in. He urges FESAC to consider other possibilities, and notes community

input is just one part of the process. The decision on the next Associate Director of OFES will be made relatively soon, so he suggested to wait for the new AD's input on the charge.

### **8. ITER Project Status.**

Warren Marton, US ITER Program Manager, provided updates on several ITER issues. The Director General (Ambassador Ikeda) and Principal Deputy Director General (Dr. Holtcamp) nominees have been named. There are an additional six Deputy Directors General positions yet to be nominated. The US has submitted slates for three of these positions. It is expected that these highest level management positions will be resolved by the next IPC meeting in July. At the US's urging, the parties agreed that work performed in support of ITER construction will be credited as specified in the ITER Agreement beginning from April 2006. Presently this applies to US personnel, cash and new design and R&D tasks. A committee has been formed to address issues and make recommendations on the Test Blanket Module program for ITER. The TBM's are to be provided through the Parties' base programs, not within the ITER construction scope or cost estimate. The committee will include both technical and party experts.

Dr. Ned Sauthoff, US ITER Project Manager, presented additional detail on the ITER management organization and the US Project Office personnel. The WBS Team Leaders in the US Project Office have been selected. These persons are charged to develop strong domestic teams and plans and are excellent contacts for interested persons in the community who wish to be involved with ITER. Only three remaining management positions for the US Project Office are yet to be announced. A new procurement link has been added to the Project Office website ([www.usiter.org](http://www.usiter.org)) to facilitate corporate interest and participation in ITER.

Meeting adjourned at 5:45 PM

### **Appendix: public attendees.**

Ray Orbach, DOE	Jeff Hoy, DOE/SC
Scott Willms, LANL	Joanne Wolf, DOE/SC
Ron McKnight	Walter Sadowski
Natalia Melcer, National Academies	Dale Meade PPPL (retired)
Dan Lehman, DOE/SC	Rob Dimeo, OSTP
Grant Logan, LBNL	Ed Synakowski, LLNL
Tony Taylor, General Atomics	Ned Sauthoff, ORNL
Rob Goldston, PPPL	Raymond Fonck, U. Wisconsin-Madison
Ben Cross, SRNL	David Hill, LLNL
Rich Hawryluk, PPPL	Glen Wurden, LANL
Miklos Porkolab, MIT	
James Sexton, IBM	
Don Green, SRNL	DOE OFES:
Kiyo Aratami, JAEA	Erol Oktay
Richard Jones, A.P	Steve Eckstrand
Jay Pecce, IBM	Al Opdenaker
Angela Hardin, Inside Energy	Gene Nardella
Mark O'Riley, IBM	Darlene Markevich
Ron Davidson, PPPL	Curtis Bolton

John Mandrekas  
John Glowienka  
Warren Marton  
Sharon Stevens  
T.V. George  
Rostom Dagazian  
Sam Barish  
Mike Crisp  
Marvin Singer  
Francis Thio  
Adam Rosenberg