

**Minutes of the Meeting
Fusion Energy Sciences Advisory Committee
Tuesday, April 30, 2019**

The U.S. Department of Energy (DOE) Fusion Energy Sciences Advisory Committee (FESAC) convened on Tuesday, April 30, 2019 via teleconference from 4:00 p.m. – 6:00 p.m. EDT. The meeting was open to the public and conducted in accordance with the requirements of the Federal Advisory Committee Act. Information about FESAC and this meeting can be found at <https://science.energy.gov/fes/fesac>

Committee Members Present:

Dr. Don Rej (Chair), Los Alamos National Laboratory (LANL)	Dr. Rajesh Maingi, Princeton Plasma Physics Laboratory (PPPL)
Dr. Troy Carter, University of California, Los Angeles	Dr. Gertrude Patello, Pacific Northwest National Laboratory (PNNL)
Dr. Robert Cauble, Lawrence Livermore National Laboratory (LLNL)	Dr. Juergen Rapp, Oak Ridge National Laboratory (ORNL)
Dr. Diane Demers, Xantho Technologies, LLC	Dr. Susanna Reyes, SLAC National Accelerator Laboratory
Dr. Charles Greenfield, General Atomics	Dr. Paul Terry, University of Wisconsin
Dr. Richard J. Groebner, General Atomics	Dr. Erik Trask, TAE Technologies, Inc.
Dr. Stephen Knowlton (Vice-Chair), Auburn University	Dr. Mitchell Walker, Georgia Institute of Technology
Dr. Tammy Ma, LLNL	Dr. Amy Wendt, University of Wisconsin
	Dr. Brian Wirth, University of Tennessee

Committee Members Absent:

Dr. George Nielson, PPPL
Dr. Thomas Sunn Pedersen, University of Greifswald
Dr. Anne White, Massachusetts Institute of Technology (MIT)

Ex-Officio Members Present:

Dr. David Newman, American Physical Society (APS), University of Alaska, Fairbanks
Dr. Arnold Lumsdaine, American Nuclear Society (ANS) – Fusion Energy Division, Oak Ridge National Laboratory
Dr. John Verboncoeur, IEEE - Nuclear Plasma Sciences Society (NPSS), Michigan State University

DOE Personnel:

Dr. James Van Dam, Acting Associate Director for Fusion Energy Sciences, FES
Mr. Joseph May, Director; Facilities, Operations, and Projects Division, FES
Mr. Gene Nardella, Chief of Staff, FES
Dr. Nirmol Podder, FES
Dr. Guin Shaw, FES
Ms. Shahida Afzal, FES
Mr. Daniel Clark, FES

Dr. Samuel Barish, Acting Designated Federal Officer, FESAC

Other members of FES and of the fusion community were present.

Welcome and FESAC Member Roll Call

Dr. Don Rej, Chair, called the FESAC meeting to order, welcomed attendees, and took roll.

Opening Statements by Dr. Rej (LANL) and Dr. Van Dam (DOE)

Dr. Rej summarized the March 2019 meeting and explained FESAC members' roles and responsibilities regarding the Community Planning Process (CPP). Previous CPP meetings have included the Magnetic Fusion Energy (MFE) Town Hall at the Austin U.S.-European Union Transport Task Force Meeting (TTF Town Hall); Brightest Light Initiative (BLI) workshop; Fusion Materials & Technology Community Webinar (FMT Webinar); MFE Town Hall at the Sherwood Fusion Theory Conference (FTC Sherwood); and the Joint Workshop with the National Academy of Sciences, Engineering, and Medicine (NAS) Decadal Assessment of Plasma Science at PPPL (Joint NAS Decadal). The upcoming meetings include the High Energy Density Physics (HEDP) community webinar (May); the joint meeting of HEDP, NAS, and CPP, Rochester, NY (HEDP-NAS-CPP); FMT Town Halls at the 28th IEEE Symposium on Fusion Engineering (SOFE) in June; and the HEDP First (HEDP First) workshop at Fort Collins, CO.

Dr. Rej brought FESAC's attention to conflicts of interest (COI) and reminded FESAC members to avoid leadership roles in the CPP process. FESAC members may submit white papers representing their own interests. Dr. Rej requested FESAC members to be concise when talking and stated that all public comments should be sent to Dr. Barish before 5:00 p.m. EDT today.

Dr. Van Dam shared DOE responses to four questions posed about the CPP. The first question was if individuals funded by FES might use such funding to support their involvement in CPP. DOE responded that this was acceptable as long as the activity is within the work scope of the researcher's grant, and is no greater than a reasonable amount of time (20-25%). The recommendation was to check with the appropriate FES program manager to ensure it is within the work scope. Question two: could or should FES provide funding to support advancing facility concepts to greater maturity to compete in the process? DOE responded no, it is more important to make the science case (i.e., mission need level). High Energy Physics (HEP) and Nuclear Physics (NP) have done similar activities and have followed the same guidance. The 3rd question, in Phase II: should FESAC have a specialized group to prepare cost estimates for facilities? The response was neither HEP nor NP had such a group to look explicitly at facility costs. HEP's Advisory Panel (HEPAP) P5 Subcommittee included members familiar with project management and costing. FES will follow the same process. Question 4 was that the chair of the APS Division of Plasma Physics (DPP), David Newman, and members of the CPP group have approached FES for funding to support town halls and meetings. FES responded that it is willing to do so, but the funds will come through a grant. FES is awaiting a proposal from APS requesting funding to support activities, such as logistics and travel.

First Round Discussion

Dr. Rej called on FESAC members requesting that each respond to four questions. The questions focused on CPP meetings that individuals contributed to or are planning to attend (in person or remotely); willingness to document observations for FESAC use; observations about

the CPP process; and discussion items. Dr. Rej reminded FESAC to be aware of time limits and to pass if necessary.

Several FESAC members participated in past CPP meetings. **Dr. Maingi** and **Dr. Terry** joined the TTF Town Hall. **Dr. Cauble**, **Dr. Ma**, and **Dr. Maingi** attended the BLI workshop. **Dr. Lumsdaine** participated in the FMT Webinar. **Dr. Carter** joined FTC Sherwood and the Joint NAS Decadal workshop. **Dr. Demers**, **Dr. Groebner**, **Dr. Knowlton**, **Dr. Patello**, **Dr. Rapp**, **Dr. Reyes**, **Dr. Trask**, **Dr. Walker**, **Dr. Wendt**, **Dr. Wirth**, and **Dr. Verboncoeur** were unable to attend any previous CPP meetings.

The upcoming CPP meetings will be well covered by FESAC members. **Dr. Knowlton** intends to participate in the HEDP Webinar, **Dr. Terry** will remotely attend the HEDP-NAS-CPP meeting, and **Dr. Ma** will join the HEDP First workshop in July. **Drs. Knowlton**, **Maingi**, **Rapp**, **Lumsdaine**, and **Verboncoeur** intend to join the SOFE meeting which will include FMT Town Halls; **Dr. Demers** and **Dr. Trask** indicated they could attend SOFE remotely. **Dr. Walker** and **Dr. Wendt** said they would be happy to call in to CPP meetings when remotely available. In addition, **Dr. Carter** will help with, and **Dr. Trask** plans to attend, the Southern California Town Hall. **Dr. Greenfield** has participated in several smaller side meetings. Neither **Dr. White** nor **Dr. Wirth** are planning to attend any future meetings, and **Dr. Reyes** mentioned job conflicts and requested being directed to attend events.

Dr. Carter, **Dr. Cauble**, and **Dr. Maingi** took notes at FTC Sherwood and BLI; **Dr. Terry** took notes at the TTF Town Hall and will continue to do so. Several FESAC members were willing to take and share notes at upcoming CPP events. **Dr. Demers** agreed to take notes at CPP remote meetings she attends. **Dr. Greenfield** will take notes at MFE meetings, and **Dr. Patello** will take notes at SOFE. **Dr. Trask** and **Dr. Lumsdaine** were also willing to compile and share notes. **Dr. White** asked if the notetaking task might undermine the overall goals of community consensus, and if notetaking would allow the structure of community consensus to be circumvented. FESAC is writing the ultimate report, and it is likely members will use their own notes rather than CPP notes. (Note: Dr. White provided written notes which **Dr. Knowlton** then served as her rapporteur of her comment presented (above) since Dr. White could not participate in the FESAC conference call due to a schedule conflict.) **Dr. Verboncoeur** is willing to document events, although he recognizes Dr. White's concerns.

Several FESAC members shared their observations about the CPP process. **Dr. Maingi** described questions raised at the TTF Town Hall, such as “why should I invest time to do this” and “what is different compared to last time when this was tried.” He stated that this is a daunting task, and the community needs to have crisp answers from leaders. **Dr. Carter** indicated that the FTC Sherwood meeting was predominantly focused on the overall CPP process, but consensus, facilities, and the roadmap were mentioned. Attendees discussed the method FES should follow compared to the NP and HEP processes.

Dr. Lumsdaine said that the FMT Webinar was largely informational but useful. **Dr. Cauble** considered BLI relatively innovative in that everyone had a science and technical assignment. BLI was structured bottom-up allowing everyone to be heard; the consequence was that discussion time was lost, and some discussions were off topic. Dr. Falcone of the APS agreed to place ideas that were outside the mainstream in a secondary section of the report. **Dr. Ma's** observations from BLI were similar to Dr. Cauble's comments being a bottom-up meeting, but noted that it was an invitation-only meeting and felt exclusive. She said that the white paper process can seem overwhelming and asked if it was possible to submit input without an entire five-page white paper. **Dr. Maingi** shared that BLI used quad charts that addressed *What, Why*

This, How, and Why Now questions. The quad charts were useful for quick talks and as a method for facilitating discussion in a timely manner.

Dr. Greenfield and **Dr. Knowlton** expressed concern about the lack of communication and participation with the MFE community, noting no meetings are planned. **Dr. Greenfield** mentioned that the U.S. Burning Plasma Organization (USBPO) has offered to organize, host, or assist the MFE community. **Dr. Maingi** advised FESAC that a meeting for MFE and FMT would occur July 22-26 at the University of Wisconsin, Madison. Neither **Dr. Terry** nor **Dr. Wirth** had heard anything about the MFE meeting in Madison, WI. **Dr. Terry** was dismayed by the lack of publicity, and relayed frustration about securing travel. **Dr. Trask** shared Dr. Terry's frustration about travel, stating that two weeks is insufficient; he requested CPP events be broadcast earlier than two weeks. **Dr. Groebner** expressed concern about frontier science, the non-MFE research, and university community engagement.

Dr. Reyes questioned how CPP would collect the appropriate amount of information from what appears to be a random series of events. **Dr. Terry** was concerned about the pace and indicated that most events on the calendar have dealt with process but not business. **Dr. Wirth**, **Dr. Greenfield**, and **Dr. Lumsdaine** shared others' concerns that CPP is six months along and still focused on process.

Dr. Lumsdaine stated that it is not too early to consider the FESAC subcommittee's activities and the schedule. **Dr. White**, presented by **Dr. Knowlton** as her rapporteur, observed that there is value in CPP offering more introductory talks about the process; she has heard that colleagues still do not understand the process.

First Round Discussions

Dr. Carter stated that it seems likely FESAC will meet the 2020 deadline, but it may be too late for the current Administration to act. **Dr. Carter** asked if there is interest in supporting the Burning Plasma report as FESAC awaits the CPP input. **Dr. Trask** said it would be helpful to have a working schedule of upcoming FESAC tasks and actions. **Dr. Verboncoeur** encouraged CPP to reach out early and often, as travel remains a challenge with a short notice period.

Dr. Demers recommended that FESAC look at the APS-DPP website and suggested mapping members onto each of the areas listed. In addition to science, the community needs to discuss supporting each other when it is time to make difficult decisions. Open discussions about prioritization require everyone in the community to feel heard and to be reassured that their careers are not in jeopardy.

Dr. Terry asked if a de facto leader would be useful and expressed concern about COIs. He inquired if recusals will be based on FESAC members' statements or actions during the CPP process. **Dr. Walker** encouraged the use of professional facilitators at CPP events. **Dr. White**, presented by **Dr. Knowlton** as her rapporteur, suggested that CPP use DOE resources to hire a stenographer for each meeting, stating that CPP has a structure to avoid behind-the-scenes influence. **Dr. Ma** requested a name change since DPP's involvement is finished.

Dr. Wendt indicated that the meetings seem to be in traditional areas and traditional communities, and asked if coordination across the communities was deliberately delayed. **Dr. Wirth** has experienced community workshop fatigue and feels limited by COI. **Dr. Lumsdaine** suggested capturing the lessons learned from NP's and HEP's experiences so the subcommittee can start with that information; from those processes, a report should come out cognizant of the budget cycle and preparing decision-makers. FESAC should look at the next budget cycle and be ready to take advantage of it. **Dr. Verboncoeur** stated that coordination across committees

remains a challenge, and outreach to the frontiers in fringe communities would be healthy. Several niche areas will be covered in the Joint NAS Decadal and may be covered in the FESAC process.

Dr. Lumsdaine, Dr. Neilson, Dr. Groebner, Dr. Wendt, Dr. Rapp, and Dr. Greenfield's FESAC terms end in June. **Dr. Greenfield** expressed concern that 25% of FESAC members will roll off in June 2019, hoping that the new members would be invited to FESAC discussions. **Dr. Wirth** asked how many FESAC members are set to retire June 2020, and how FESAC addresses the rotation of new members in June 2019 and June 2020.

Dr. Rej summarized the comments from FESAC. There have been many activities on process; there may not be enough time to provide the FESAC report for the current Administration, but FESAC should avoid being rushed. Community support during difficult times is important for a united community. A bottom-up process is good for all to be heard, but there may not be enough time for decision-making. There is concern about timely releases of information. There has been a lack of MFE activities to date, and the community is asking why do this again. Two new ideas were quad charts and professional facilitators for the town halls. Only two weeks' notice for travel is difficult. It is a good idea to have a working schedule for FESAC actions. And, the FESAC member rotation through 2020 must be managed.

Dr. Barish noted that as of 5:00 p.m. there were no public comments.

Second Round Discussions

Dr. Rej informed FESAC that the 2nd Round Robin focused on statements made during the first round. He asked members to comment on those statements.

Dr. Carter noted that the community needs clarity from CPP leaders on their vision of using the town halls and getting more engagement. In terms of process, having more webinars might help assuage concerns about non-engagement. Timing is a concern, but clarifying town halls versus workshops will be helpful. **Dr. Maingi** stated that Dr. Terry and Dr. White's comments aimed to keep the vision of the process fair, and explained that he perceived that a COI exists if FESAC members write a white paper. He recommended that FESAC members listen rather than advocate. He argued that taking notes, attending webinars and community discussions, and trying to hear the community is the job of FESAC members. However, FESAC members' notes should not supersede the community process; members should take personal notes only.

Dr. Verboncoeur appreciated the challenge and efforts of the CPP team, saying he hoped what was shared in the teleconference was additive. **Dr. Lumsdaine** thanked those putting in effort up to this point. Although there is frustration, no one is paid to do this, and everyone has a full-time job. He said that if there is not a sense of pressure and that things are moving too quickly, the CPP is probably not moving quickly enough.

Dr. Cauble stated that the bottom-up approach, conducted at BLI, is necessary but generally inefficient. He stated that historical knowledge of DOE documents may help organizers be cognizant of past efforts and lessons learned, thus ensuring that an informed and efficient discussion takes place. **Dr. Greenfield** suggested that FESAC members look at other large community efforts such as Snowmass, 2015 workshops, and ReNeW. He also recommended identifying the FESAC subcommittee members early to avoid potential conflicts. **Dr. Groebner** was struck by Dr. Cauble's description of BLI as bottom-up but going "off the rails", adding that professional facilitators may help. **Dr. Knowlton** thought FESAC should consider the suggestions made by Dr. Lumsdaine and Dr. Cauble about populating the subcommittee.

FESAC should think about the characteristics of people, their experience and background, and who should represent the community on the subcommittee.

Dr. Rapp indicated that there was not community consensus on strategic recommendations. He stated passively expecting people to submit white papers and go to town halls is insufficient; there needs to be as much outreach as possible. **Dr. Reyes** conveyed worry about understanding the community logic, how things relate and lead to one another.

Dr. Patello appreciated Dr. White and Dr. Maingi's opposing perspective, arguing that notes from a webinar were not a cause for concern, but notes on technical ideas shared in workshops may raise alarm. She added that white papers and presentations would also be considered in the process, thus addressing any anxieties. **Dr. Terry** stated that any notes FESAC members take should not be considered documentation; this needs to come from CPP organizers as part of the process. There are two different objectives to achieve with notetaking - for individuals and for the CPP. **Dr. Trask** asked if FESAC is constrained to down select from materials passed on through the CPP process. At the end of the Phase I and Phase II process, FESAC will have created a final report; the community input is not creating the final report.

Dr. Verboncoeur recommended leveraging the Joint NAS Decadal activities to reach a broader community, adding webinars and having professional facilitators.

Dr. Demers strongly agreed with Dr. Ma's recommendation to rename the process as FES CPP, as it elevates and better reflects the subject of the process. She suggested that organizers add content to their resources page, even from other communities. Dr. Demers encouraged webinars, and remote connections for those who cannot travel, and that the CPP leaders promote increasing awareness of the website, webinars, and video connections. She stated that viewing these in groups would decrease the traffic load on the webinar and encourage group discussions. **Dr. Verboncoeur** agreed that a dynamic website containing past activities and future events, as well as a schedule for CPP and FESAC, will be beneficial to the community and convey progress. **Dr. Greenfield** asked about the future role of the DPP in the CPP process. **Dr. Newman** explained that the original name was just CPP. DPP's role is to facilitate; the proposal being prepared by the leaders will be run through DPP which is only acting as a conduit. Everything has been handed over to the CPP team.

Dr. Groebner explained that there is continuity between actions taken by FESAC and responses from FES. He suggested developing a schematic showing how major FESAC reports have affected things within the community. He also appreciated the idea of a FESAC schedule. **Dr. Reyes** stated that FESAC should alert the community about what is needed, recommending that specific milestones be scheduled. **Dr. Terry** supported a schedule of milestones and supported considerations of the subcommittee membership. He was under the impression that delaying identification of the subcommittee members was to prevent them from being lobbied by others. **Dr. Wendt** agreed on the need for advanced planning of the process. There is valid concern for lobbying subcommittee members, as was expressed in the P5 presentation at the March 2018 FESAC meeting.

Dr. Rapp expressed worry that the timescale, as described at the last FESAC meeting, was characterized as extremely challenging, and expectations of community input were unclear. **Dr. Patello** stated that the two upcoming MFE Fusion and Technology workshops, the first being July 22-26, will be technical.

Dr. Newman responded to issues FESAC members mentioned. The CPP point persons are Earl Scime and Wayne Solomon. There is not a defined difference between town halls and workshops. The earlier town halls focused on process to orient people, but future town halls

should be science oriented. The full program committee was only convened and fully engaged in the last month, and a more complete CPP schedule is forthcoming.

Open Discussion

Dr. Rej called for an open discussion, asking for FESAC's thoughts on the most pressing activities, based on input from this meeting.

Dr. Trask suggested sending email via the DPP mailing list as early as possible, and include upcoming events even if they are six months out and not set in stone. **Dr. Newman** explained that DPP sends such emails upon request; they do not initiate them. It typically takes one to two days to send the emails once the request is made and information provided. DPP could send out a tentative calendar once it is created. **Dr. Verboncoeur** commented that maintaining a website with a dashboard and sending the link out periodically would be better than multiple email messages.

Dr. Demers reminded FESAC that there is a website, and it contains a calendar where the information is listed. She suggested adding small box calendars (April, May, June) that show when events are likely planned. **Dr. Rej** added that Google sites also has a calendar.

Closing Discussion

Dr. Rej asked FESAC members for their views on the teleconference format, process, member rotation, and potential dates for the next FESAC meeting.

Dr. Cauble thought that a teleconference was appropriate and effective if the meeting deals exclusively with long-term planning. **Dr. Greenfield** said that the teleconference meeting worked well, but one reason for that is that FESAC has had the opportunity to work together in the same room; an in-person meeting is helpful to new members. **Dr. Newman** prefers virtual meetings, but understands the purpose of in-person meetings. **Dr. Rej** said he heard that teleconferences are appropriate at certain times, but not all the time.

Dr. Lumsdaine and **Dr. Wirth** agreed that an in-person meeting is necessary to onboard new FESAC members. **Dr. Wirth** added that an in-person meeting would allow FESAC to get a sense of which members will retire in 2020, and stated that holding a discussion on the subcommittee makeup and calendar will be useful. **Dr. Barish** explained that nothing could be shared about potential FESAC members until they are approved by the Secretary of Energy. They must be sworn in before they can participate in a meeting as FESAC members. The swearing in must be done in person.

Dr. Greenfield mentioned that phone calls allow frequent discussions, which is something that will be critical moving forward. **Dr. Trask** asked if it is possible to hold a remote meeting, to lay out a three-month and six-month schedule, adding that a Gantt chart would be useful at the in-person meeting. **Dr. Ma** volunteered to create a Gantt chart for the schedule.

Dr. Cauble stated that an in-person meeting, to ensure new members are onboarded quickly, will be better in the late summer or early fall. **Dr. Wirth** agreed that a late summer, early fall meeting was practical.

Thanks and Announcements

Dr. Greenfield thanked Dr. Rej and Dr. Barish for leading the process and doing an excellent job. **Dr. Rej** appreciated Dr. Greenfield's compliment and announced he would be retiring from LANL today. **Dr. Wirth** echoed appreciation to Dr. Rej and Dr. Barish and extended thanks to those FESAC members who are rolling off. He added that the report Dr.

Wendt led on non-fusion applications was well received and valuable; it was discussed by NAS burning plasma panel. **Dr. Wendt** thanked FESAC for a great experience. **Dr. Rej** concurred and thanked Dr. Wirth and Dr. Wendt. Thanks to Carol Ann Austin (PPPL) who has produced the FESAC minutes for the past couple of years.

Dr. Rej adjourned the FESAC teleconference at 6:00 p.m EDT.

Respectfully submitted,
T. Reneau Conner, PhD, PMP, AHIP
Science Writer
ORISE/ ORAU

Certified as Correct by:



Dr. Donald J. Rej, FESAC Chair

Date

June 3, 2019