Department of Energy
Office of Science
Washington, DC 20585

Office of the Director

July 22, 2011

Dr. Martin Greenwald
Plasma Science and Fusion Center
Massachusetts Institute of Technology
77 Massachusetts Avenue, NW16
Cambridge, MA 02139

Dear Dr. Greenwald:

I request that FESAC address the opportunities for the U.S. plasma and fusion research communities presented by new or soon-to-be commissioned fusion facilities outside the US. In addition, I would like FESAC to elucidate the research needed to fill the gaps in materials science and technology required to sustain fusion plasma operations and to harness fusion power.

There are two reasons to investigate the international research opportunities now. First, plasma dynamics and control may well be defined by the capabilities of facilities that use superconducting magnet technology – currently all overseas. These facilities are at the forefront of advanced tokamak and stellarator research, and they present significant new opportunities for U.S. engagement. In fact, in some cases the U.S. has been invited to participate in setting program direction. Second, budget realities make it unlikely that the U.S. will construct a major new domestic facility for some time, and certainly not during the period of ITER construction. Regarding materials science, technology, and harnessing fusion power, you are already aware of the gaps that have been identified in the world program that must be filled if ITER is to be the penultimate step to a DEMO, and the opportunities for U.S. leadership through well-posed initiatives in these areas of research.

With this in mind, I ask FESAC to consider the following.

1. What areas of research on new international facilities provide compelling scientific opportunities for U.S. researchers over the next 10 – 20 years? Look at opportunities in long-pulse, steady-state research in superconducting advanced tokamaks and stellarators; in steady-state plasma confinement and control science; and in plasma-wall interactions.

2. What research modes would best facilitate international research collaborations in plasma and fusion sciences? Consider modes already used by these communities as well as those used by other research communities that have significant international collaborations.

3. What areas of research in materials science and technology provide compelling opportunities for U.S. researchers in the near term and in the ITER era? Please focus on research needed to fill gaps in order to create the basis for a DEMO, and specify technical requirements in greater detail than provided in the MFE ReNeW (Research Needs Workshop) report. Also, your assessment of the risks associated with research paths with different degrees of experimental study vs. computation as a proxy to experiment will be of value.

I look forward to receiving your assessments by January 31, 2012.

Sincerely,

W. F. Brinkman
Director, Office of Science