

The PPPL Perspective on the Charge to the FESAC Strategic Planning Panel

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This abstract proposes a talk that will (1) present a view on how the panel could approach its challenging charge, (2) comment on the community activity necessary to define a roadmap to fusion power, with FNSF as a key part of that discussion, and (3) articulate how PPPL can contribute over the next ten years and beyond under different program scenarios. The third topic responds to input from the panel for needed information and will constitute half or more of the talk.

The panel is being presented with a large number of outstanding, detailed initiatives – ranging in cost from \$1M to several hundred \$M each – and will likely receive a variety of compelling roadmaps to fusion power. One approach is to begin deliberations from the top level of a strategic plan and then work “downward” in level toward the detailed initiatives. For example, for magnetic fusion energy the panel can accomplish the following seven tasks: (1) Articulate a ten-year vision for the program – for example, advance fusion energy science so that in ten years the US is ready to breakout into an accelerated energy development program, which includes science and engineering. (2) Define criteria for selecting initiatives – for example, a focus on activities through which the US can be world leaders, or at the world forefront, in selected areas of great importance, (3) Identify technical strategic objectives to be accomplished in ten years – for example, four important objectives are to prepare to play a lead role in ITER and establish solutions that are sufficient to enter an energy development program in the three key areas of a steady-state plasma scenario with high performance, the plasma-material interface, and fusion nuclear materials, (4) Assess gaps in the world fusion program in these four areas, thus identifying openings for US leadership, (5) Identify new initiatives that would satisfy all the above guidelines, (6) With the administration FY15 domestic budget request (at \$266M) as a baseline, identify a limited set of new initiatives to start immediately if the budget were \$300M (the case posed by Congress), which could include scoping activities for new facilities, (7) Identify facilities to ramp down in an orderly manner over time and facilities to start up or, where needed, identify next review or advisory steps needed for those decisions.

In discovery plasma science – with promising areas such as plasma astrophysics, low temperature science and plasma-material interactions, and high energy density plasma physics – partnering and leveraging with other DOE program offices and other agencies would be highly beneficial, financially and scientifically. Such an approach is essential in these times of limited funding.

To arrive at a DEMO requires solving remaining problems in fusion plasma science, plasma-material interactions, and fusion nuclear science. An integration facility such as a Fusion Nuclear Science Facility (FNSF) is essential. However, determining the optimal design and mission of an FNSF requires substantial community discussion. Fortunately, the charge to the panel can be answered fully without determining design and mission scope of an FNSF

At PPPL we have gone through the above assessments and determined potential initiatives through which PPPL can contribute critically to fusion and discovery science, under various US program scenarios. This assessment and the initiatives will be presented.