Gaps and Alternatives for the First Wall Material in DIII-D

A DIII-D Facility Enhancement Activity

Office of Fusion Energy Sciences
Office of Science
U.S. Department of Energy

February 2024

1. ACTIVITY STATEMENT

High-level descriptions of FES, DIII-D, and the proposed facility "activity" as defined by a desired end-point. This is not a statement of work so avoid descriptions of the gap in terms of construction of a system, procurement of equipment, or completion of a set of activities/approaches that would address the gap.

Avoid using DOE project language (e.g., "Mission Need") as much as possible. This will avoid confusion about this facility enhancement being a formal DOE project.

Provide a clear and concise paragraph (a few sentences) that lays out the essential summary of the activity and the gap between the current state of the facility's mission and the research plan. What new capabilities are needed to complete the facility research objectives.

2. CAPABILITY GAP

Provide technical details regarding the capability gap. Clearly describe the gap or shortcomings the activity statement is addressing in terms of an operational or functional performance capability, technological opportunity, or service.
Subsections include:

- Priority of the activity within the FES/DIII-D program
- Key parameters: Describe the key physical parameters of interest and their relevance. Provide a table that compares the current state to the desired state.
- Impact: Describe the impact of not resolving the gap
- Success: Describe targeted outcomes that would confirm the activity was successful

3. ALIGNMENT

Describe how the gap fits into the overall strategy for accomplishing or advancing the mission of DIII-D and FES.

Describe the priority of addressing the gap relative to other facility activities and within FES.

Cite internal or external drivers for this activity, specifically how the activity addresses science and technology gaps in the FES Long Range Plan, or other community reports.

Discuss the gap in the context of the capabilities of other domestic and international facilities.

4. POTENTIAL APPROACH

Describe the various alternatives/approaches to resolving the gap. Include a "Do Nothing" alternative that would retain the existing carbon wall. In the case of a first wall material change, the options could be organized by the first wall material options: carbon, tungsten, silicon carbide, etc.

Describe any functional, technical, operational, staffing, or financial constraints, limitations, or assumptions for the activity.

Discuss key performance parameters.

Discuss technical risks.

5. RESOURCE AND SCHEDULE FORECAST

Describe cost, schedule, and funding estimates along with maturity of the basis for these estimates. It is sufficient to provide a funding range instead of a point estimate. The range can be used to capture uncertainty in the estimate due to risks and unknown issues.

Describe possible impacts of the wall change on other facility systems (e.g., diagnostics).

These estimates are only to provide decision-makers a frame of reference relative to potential future resources and schedules the activity could entail. These are not the preliminary cost and schedule estimates.

6. OTHER

7. REFERENCES