DIII-D Wall Change Community Forum – Day 1

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and the Wall Change WG

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DOE is requesting a new upgrade in the 5YP involving a full change-out of the carbon/graphite DIII-D wall

- **Every DIII-D review committee highlights the "undesirable" C wall**
  - Perceived limitation on relevance of DIII-D results, particularly for boundary/PMI
- **Tungsten seen as the most obvious option, but not a given**
  - Another material might be preferred, but logic must be "coherent and overwhelming"

The community is given freedom to define a wall change-out that best aligns with DIII-D/DOE-FES mission to advance the FPP physics basis

Working Group Formed to Lead This Effort

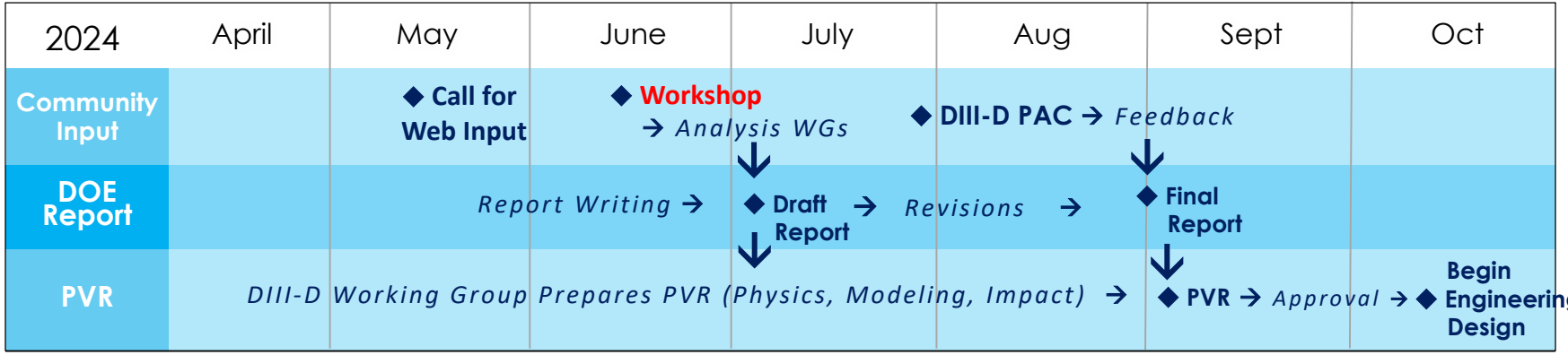
- **Role of Working Group:**
  - Solicit community input (aka this forum)
  - Report to DOE
  - Develop Physics Validation Review (PVR)

- **Sharepoint site:**
  - https://fusionga.sharepoint.com/sites/DIII-DTechnology/SitePages/New-Wall-Working-Group.aspx

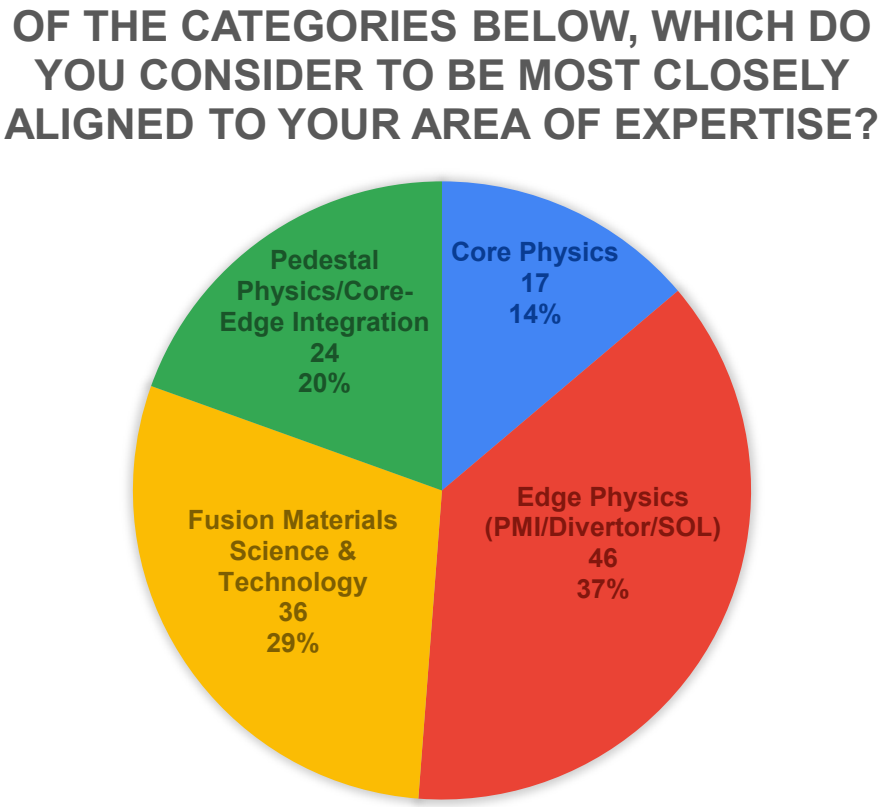
Group/Area	Representative
PIT Group	Abrams, Dvorak
FPP Group	Shafer, Holcomb
PMI	Rudakov, Sinclair
Core-Edge	Wang
PMI Modeling	Lasa
Diagnostics	Hong
AT Core	Garofalo
W Long-Pulse	J-M Park
Disruptions	Herfindal
Core Transport	Bortolon
Research Div.	Petty
DIII-D Director	Buttery
Ops Director	Sips
Engineering	Murphy
Materials	Coburn, Effenberg
Divertor	McLean
PFC Slag WG	Unterberg, Zamperini

Timeline for Physics Input to Wall Change Out

- **Community input obtained via multiple channels:**
  - Community Workshop June 12-13 (we are here)
  - Fusion Materials Coordinating Committee (FMCC): align with roadmaps
  - DIII-D Program Advisory Committee (PAC): mission, pitfalls, international support
- **Target completed PVR & start of engineering design by October 2024**

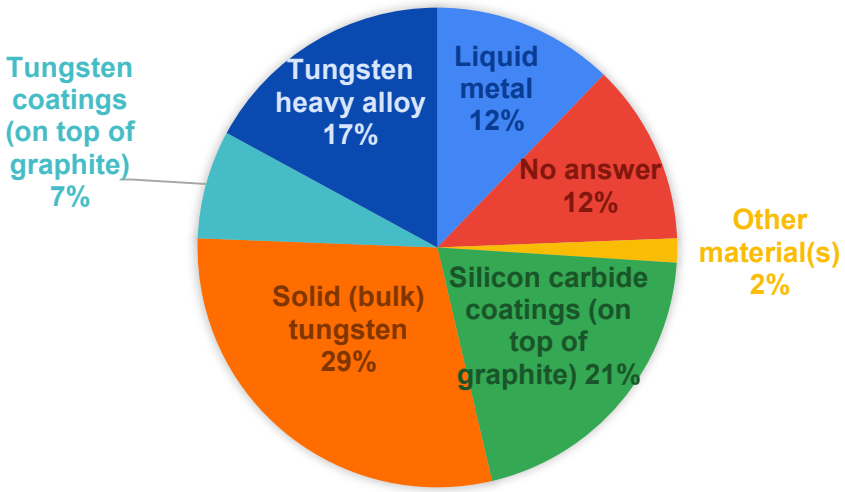


Over 100 community members completed survey (thank you!)

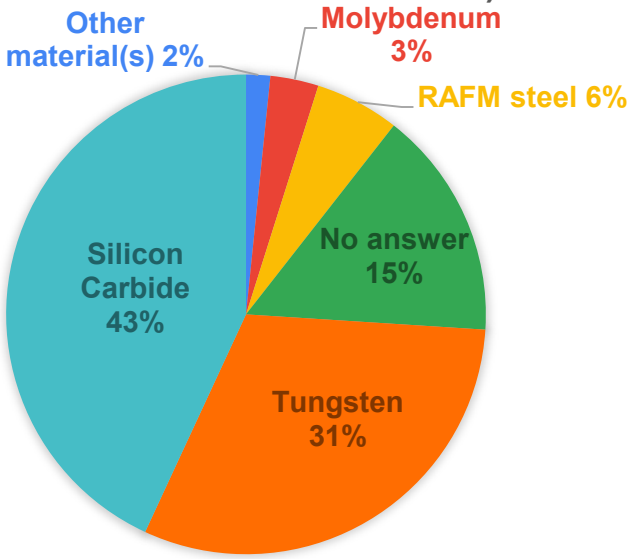


No clear consensus (yet) on material choices

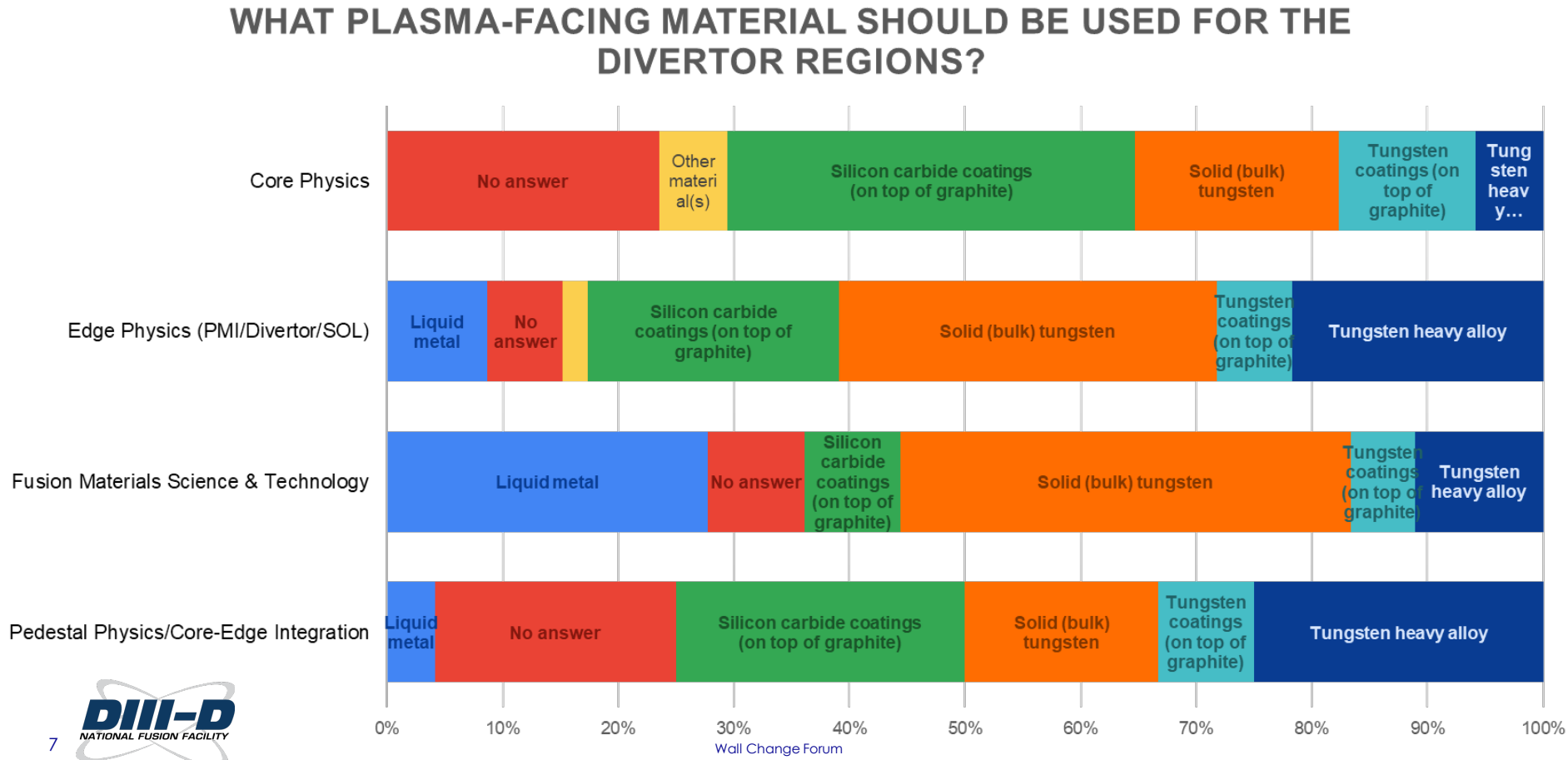
WHAT PLASMA-FACING MATERIAL SHOULD BE USED FOR THE DIVERTOR REGIONS?



WHAT PLASMA-FACING MATERIAL SHOULD BE USED FOR THE MAIN WALL REGIONS (OUTSIDE OF AREAS OF HIGH HEAT FLUX)?



Cross-tabs reveal interesting correlations…



DIII-D NATIONAL FUSION FACILITY

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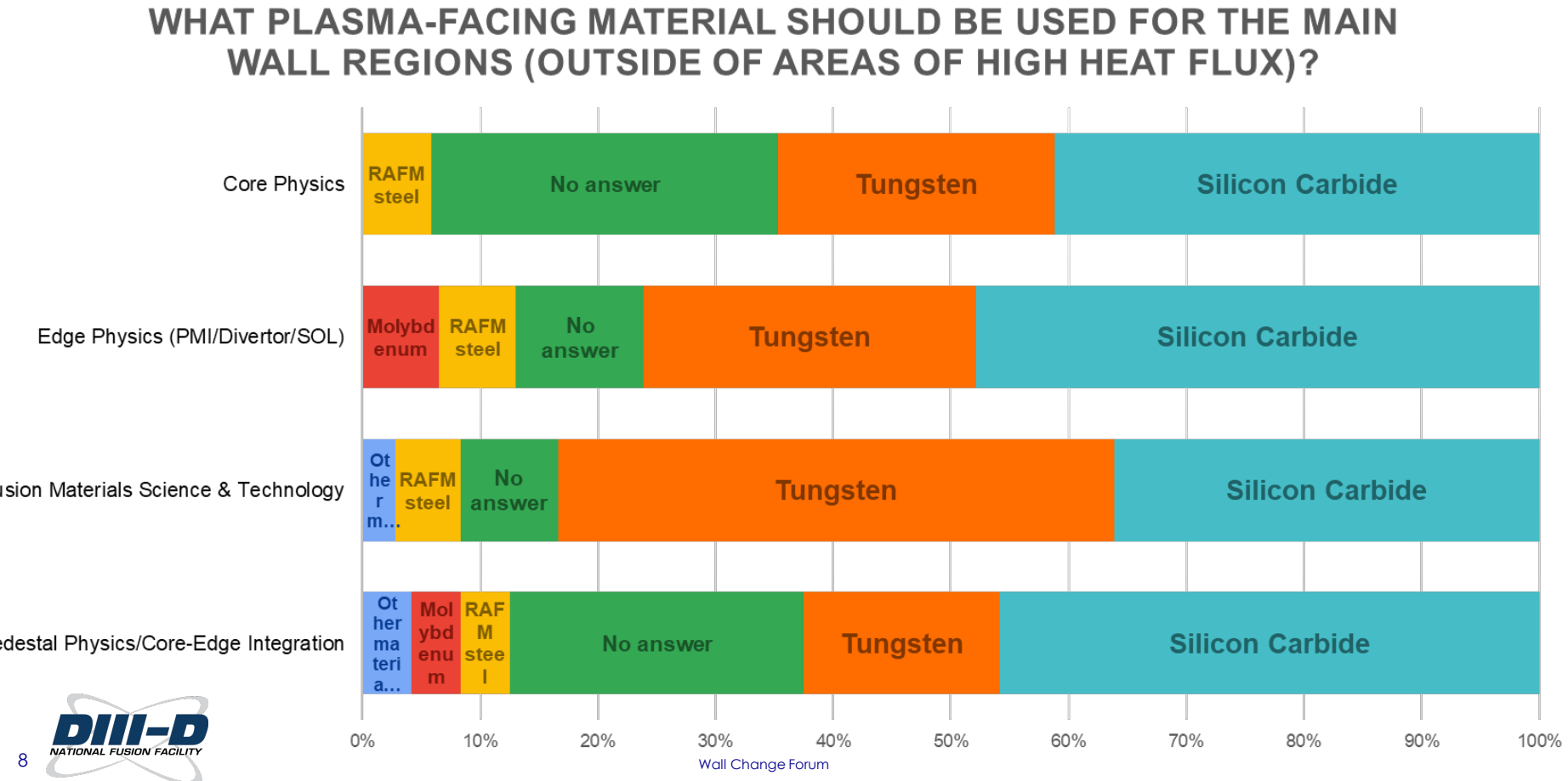

Physics Emphases According to ChatGPT-4o

- Core: "Ensure that new wall materials can support high-performance core plasmas in fusion reactors, aiming to achieve better integration and improved reactor operation."
- Edge: "Select and test wall materials that can support high plasma performance, manage impurities, and withstand the harsh conditions of fusion reactors, thereby advancing the understanding and development of fusion power technology."
- FM&T: "Select and validate new wall materials that can withstand the demanding conditions of fusion reactors while supporting high-performance plasma operations and contributing to the broader goals of fusion energy research."
- Ped/CEI: "Understand and mitigate the impact of new wall materials on plasma performance, impurity transport, and achieving high-performance, reactor-relevant scenarios in fusion devices."