

# Building Bridges

## Fusion Science & Technology Roadmap Process

FESAC Virtual Meeting, September 30, 2024

**Jean Paul Allain**

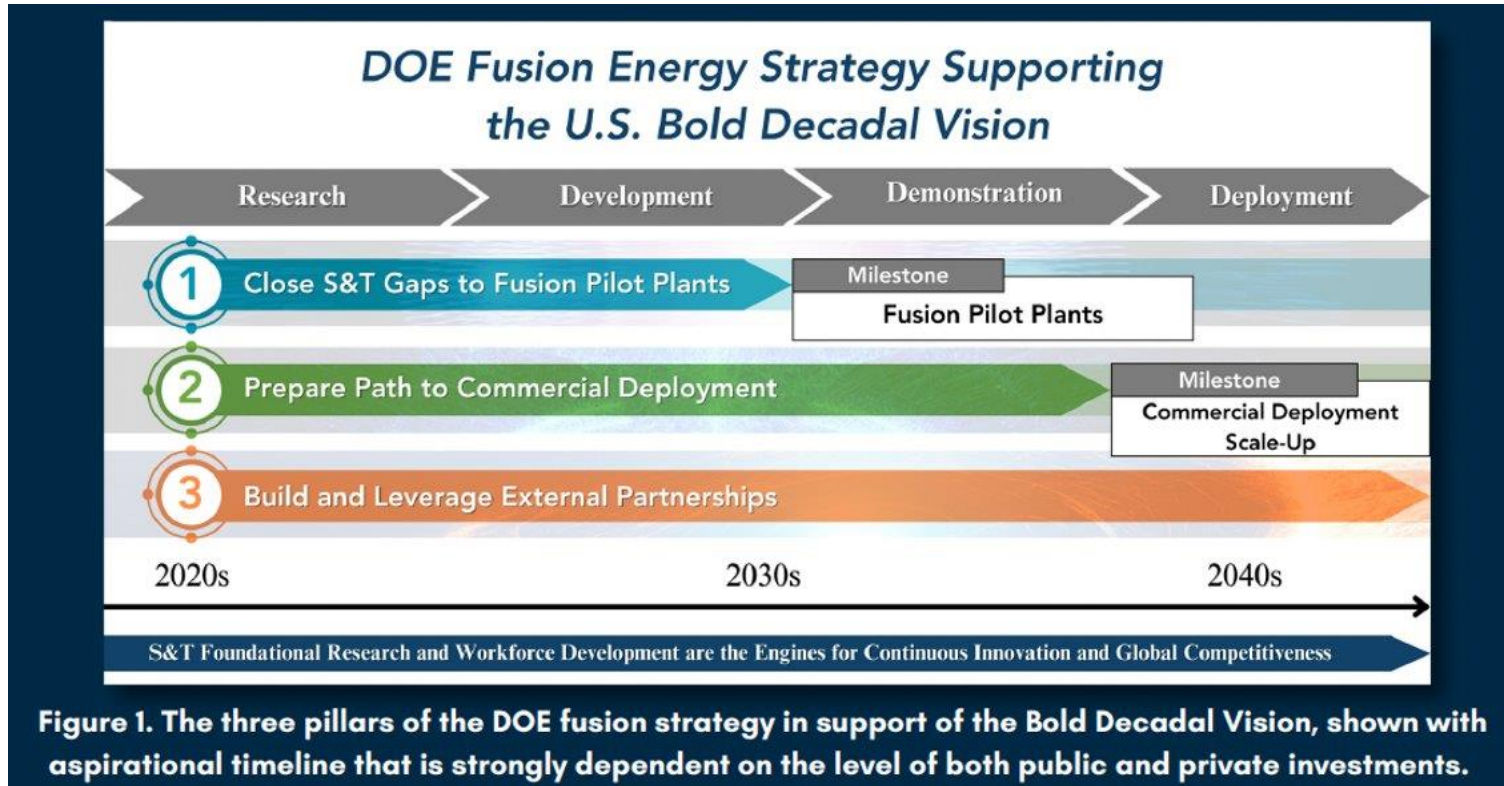
Associate Director of the Office of Science  
for Fusion Energy Sciences



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Science

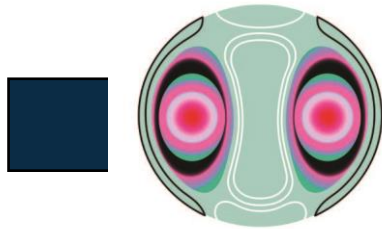
# US Fusion Strategy: BDV and SC FES Building Bridges



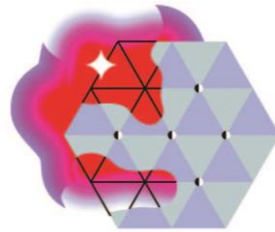
- SC FES supports ALL Pillars of the US Fusion Strategy
- R&D continues beyond demonstration
- Focus on de-risk of technologies and closure of physics gaps
- Tools
  - Fusion S&T Roadmap
  - FIRE Collaboratives
  - Milestone Program
  - Public-Private Consortium Framework for Fusion Energy

# The Road to Fusion Energy is through *combined* private sector “pull” and public sector “push” - with key gaps to address

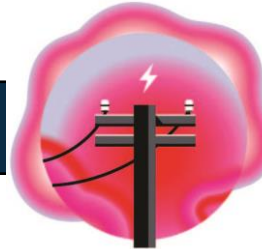
Build LRP  
FM&T Gap  
Facilities



Sustain a burning  
plasma



Engineer for  
Extreme Conditions



Harness Fusion  
Energy

FPP

A Fusion S&T Roadmap with metrics to track progress

Input from industry

- **Focus** on LRP science and technology gaps as a “bridge” to realize a viable path towards fusion energy (“interim stage”)
- Input from industry is integrated in FS&T Roadmap
- FS&T Roadmap guides priorities and partnerships
- FS&T Roadmap is updated regularly to meet industry and R&D needs/gaps with clear timelines

# National Fusion S&T Roadmap

- **Purpose**

- Develop a tool for FES to prioritize and assess progress towards fusion energy science and technology gaps closure and alignment with the Long Range Plan

- **Goals**

- Integrate input from diverse stakeholders (industry, academia, national labs, and international partners) and define metrics

- **Objectives**

- Hold workshops and forums to gather input from CY24-Q4 to CY25-Q2
- Release FS&T Roadmap by end of CY25-Q2
- Update annually based on input and scenarios in fusion energy RD&D

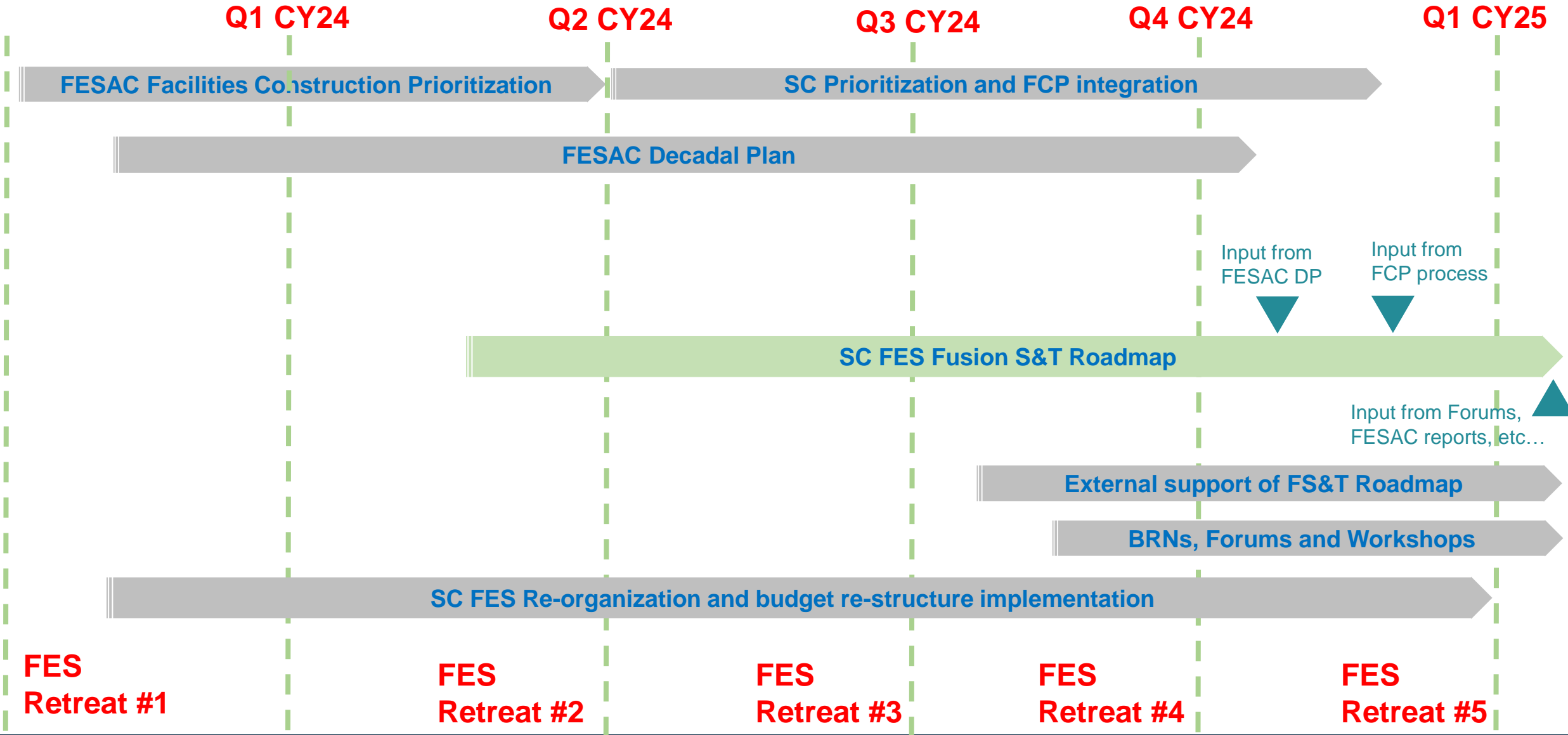


# Actively identifying opportunities to close S&T gaps defined by LRP science drivers



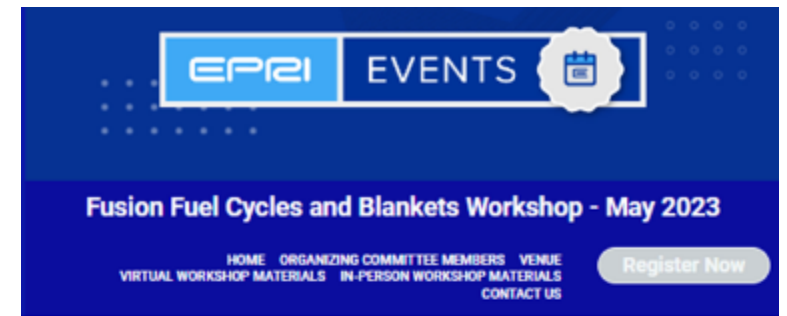
- De-risking gaps by building infrastructure at all scales
- Partnerships with industry and international collaborators
  - Identify opportunities on FM&T and closing key physics gaps
- Bridging to industry: PPP elements in FES
- Bridging to ITER R&D and technology development

# Timeline for FES re-structure and National FS&T Roadmap process



# Fusion Technology Community Workshops

- ◆ IFE BRN | June 2022
  - Identified scientific/technology PROs
- ◆ Fusion Non-proliferation | Hosted by PPPL in January 2023 and SRNL in January 2024
- ◆ Fusion Neutronics | Hosted by ORNL in January 2023
- ◆ Fusion Magnet R&D | Hosted by PPPL in March 2023
- ◆ Fusion Blanket and Fuel Cycle | Hosted by EPRI in May 2023
  - Follow-on: [Blanket and Fuel Cycle Page](#) and a workshop roadmap report
- ◆ Fusion Materials | Hosted by EPRI in November 2023
- ◆ Measurement Innovation BRN | Held in January 2024
- ◆ Private Research Facility BRN | Held in February 2024



## Organizing Committee Members



# Fusion S&T Roadmap Development Plan in FES

- FS&T Roadmap is supported by Facilitator Coordination with external vendor
- **Strategic framework and governance**
  - Alignment with DOE U.S. Fusion Strategy and Building Bridges Vision
  - FACA Compliance
- **Input Gathering Process**
  - Phase A: Pre-planning
    - DOE FES conducts internal review process of strategic goals
    - Tech and Industry Trends Analysis (Facilitator coordinates)
  - Phase B: Formal Input Gathering (Facilitator Coordinated)
    - Multiple sources: FESAC/NASEM reports, community input
    - Series of Forums



# Fusion S&T Roadmap Development Plan in FES (cont.)

- Input Gathering Process (Cont.)
  - Phase C: Informal input
    - Facilitator organizes informal input sessions including digital platforms and virtual forums (ensure further dialogue and feedback)
    - Digital Roadmap Platform
- Facilitator's Role in Synthesis and Integration
  - Phase D: Feedback Synthesis
    - Coordinates input (both formal and informal)\* and integrates key input with any FESAC feedback
    - Addresses definitions of metrics and systems requirements from all input

\*formal input = FESAC, informal input = workshops/forums/BRNs, etc...

# Fusion S&T Roadmap Development Plan in FES (cont.)

- Roadmap Drafting and Review

- Phase E: Roadmap drafting/review process
  - Facilitator supports FES PMs and leadership on content both formal and informal into the Digital Roadmap Platform
  - Facilitator-Driven Visual Development
- Phase F: Final Publication and Implementation
  - Roadmap finalization: FACA compliance checks, input verification
  - Launch Digital Roadmap Platform
  - Implementation schedule and integration with FES Programs

# Summary and Future Outlook: US DOE FES



## Strategic Input

- FESAC LRP/ CPP
- Bold Decadal Vision  
NASEM21/NASEM19
- FESAC FCP
- FESAC Decadal Plan
- Community and BRN Workshops
- FS&T Forums

## Re-alignment

- FES Budget Re-structure
- FES Re-organization
- New FES Staffing
- FES Vision: Building Bridges

## Impact Drivers

- FS&T Roadmap (by: **CY25 Q2**)
- International and Public-Private Partnerships
- Milestone, PFR and FIRE Programs
- Public-Private Consortium Framework for Fusion Energy
- U.S. Fusion Energy Strategy

*The U.S. DOE FES is in a process of transition building a **National Fusion Science & Technology Roadmap** that will guide strategic partnerships towards viable paths to fusion energy*

**Thanks for your  
attention!**

