

Road to Commercialization: US

Sam Wurzel

Technology-to-Market Advisor, ARPA-E, US Department of Energy

The 2nd IAEA Workshop on Fusion Enterprises
July 12th, 2022

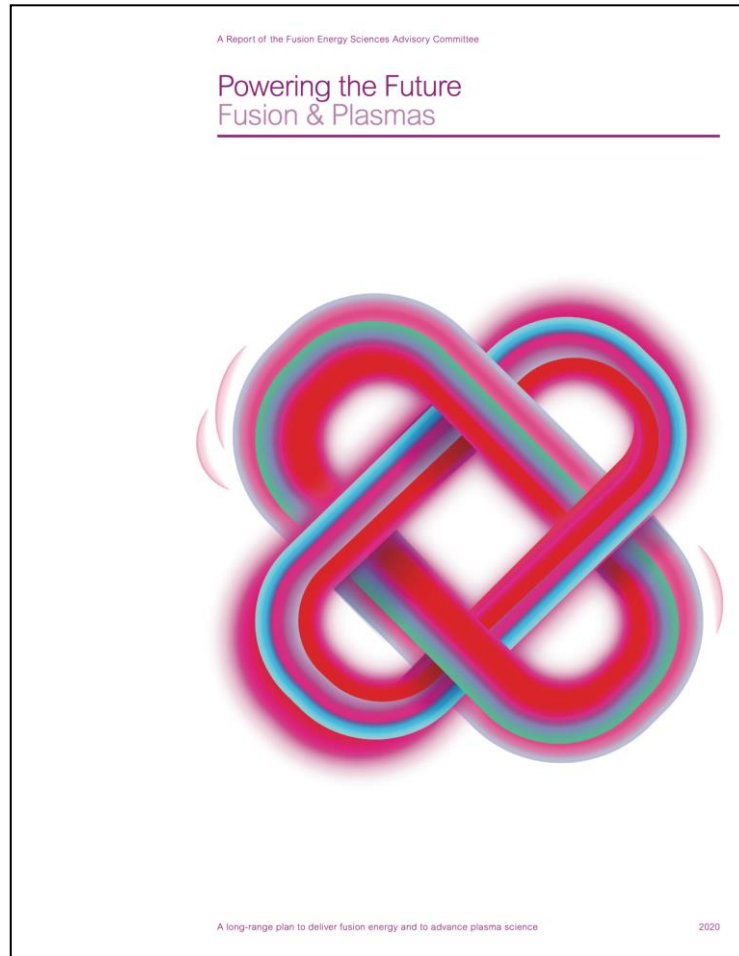
Outline

- ▶ Recent fusion events and milestones in the US
- ▶ ARPA-E's role in fusion commercialization

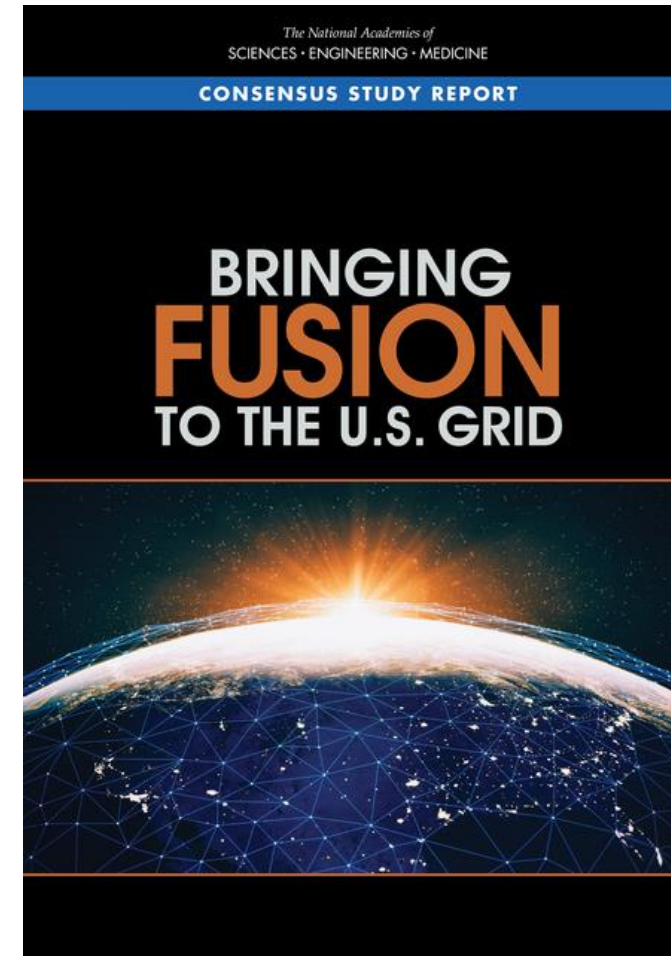
RECENT FUSION EVENTS AND MILESTONES IN THE U.S.

FESAC and NASEM reports

Fusion Energy Sciences Advisory Committee (FESAC) Report



National Academies of Sciences Engineering and Medicine (NASEM) Report



U.S. legislation

Energy Act of 2020, Sec. 2008 Fusion Energy Research

9 “(a) PROGRAM.—As part of the activities authorized
10 under section 209 of the Department of Energy Organiza-
11 tion Act (42 U.S.C. 7139) and section 972 of the Energy
12 Policy Act of 2005 (42 U.S.C. 16312), the Director shall
13 carry out a fusion energy sciences research and enabling
14 technology development program to effectively address the
15 scientific and engineering challenges to building a cost
16 competitive fusion power plant and to support the develop-
17 ment of a competitive fusion power industry in the United
18 States. As part of this program, the Director shall carry



FY 2022 Appropriations Act, Division D, Fusion Energy Sciences

FUSION ENERGY SCIENCES

The Department is directed to follow and embrace the recommendations of the Fusion Energy Sciences Advisory Committee's "Powering the Future: Fusion and Plasmas" report; the agreement reiterates House direction on the related briefing.

The agreement provides not less than \$20,000,000 for the High-Energy-Density Laboratory Plasmas program to advance cutting-edge research in extreme states of matter; expand the capabilities of the LaserNetUS facilities; and provide initial investments in new intense, ultrafast laser technologies needed to retain U.S. leadership in these fields.

The agreement provides not less than \$59,000,000 for NSTX-U Operations, not less than \$33,000,000 for NSTX-U Research, and not less than \$25,000,000 for the Material Plasma Exposure eXperiment.

The agreement reiterates House direction on the Milestone-Based Development Program and the stellarator facility.

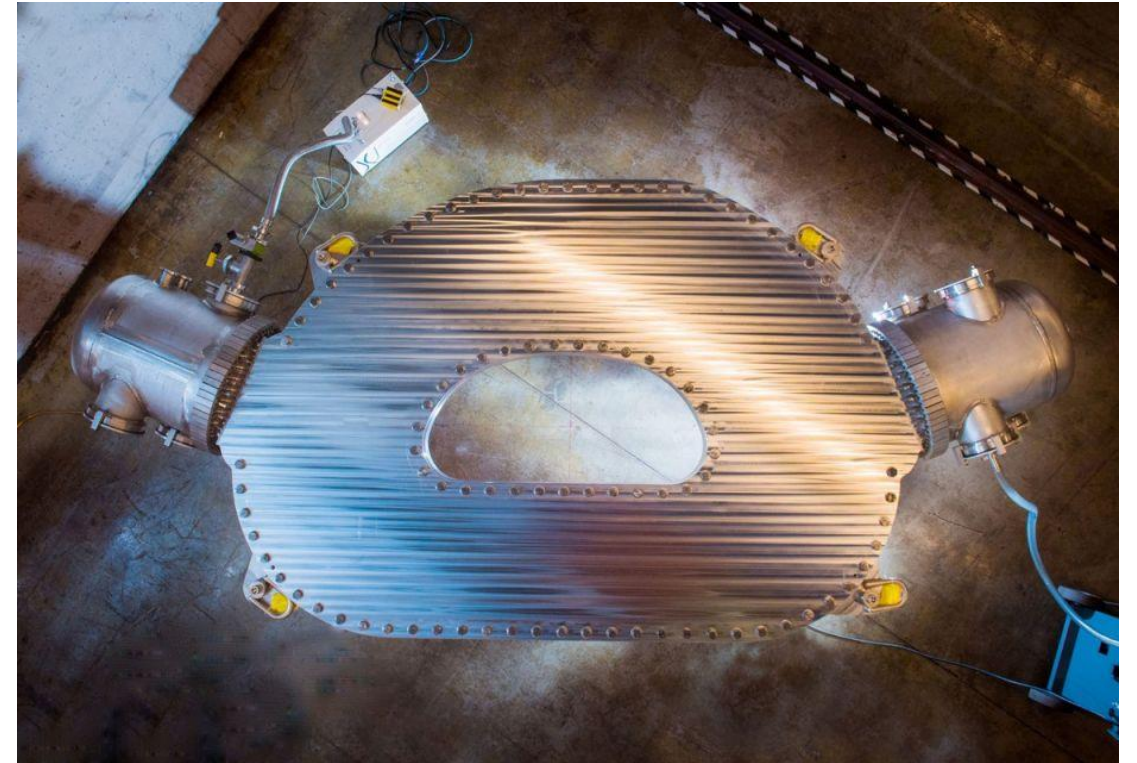
The agreement provides \$242,000,000 for the U.S. contribution to the ITER project, of which not less than \$60,000,000 is for in-cash contributions. The agreement reiterates House direction on an updated baseline for Subproject 1 and a baseline for Subproject 2.



Major milestones achieved in 2021

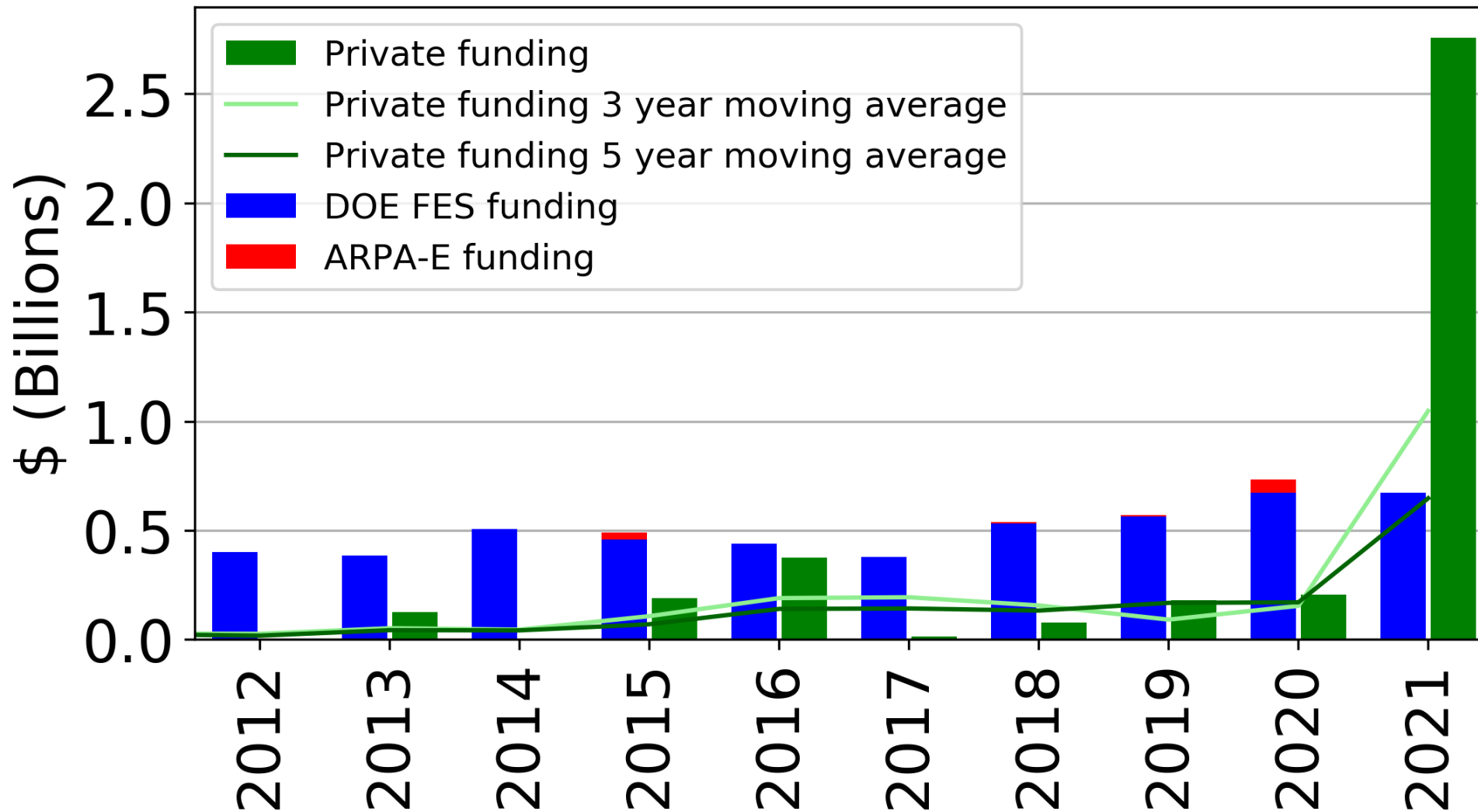


August 8th, 2021
National Ignition Facility achieves hot-spot ignition



September 5th, 2021
Commonwealth Fusion Systems demonstrates
20T toroidal field model coil

2021 Private investment into fusion exceeds public funding



FUSION
INDUSTRY
ASSOCIATION

White House event, bold decadal vision and PPP workshop



WHITE HOUSE SUMMIT: *Developing a Bold Decadal Vision for Commercial Fusion Energy*

THURSDAY, MARCH 17, 2022
10:00 AM – 1:00 PM ET

WWW.WHITEHOUSE.GOV/OSTP/EVENTS-WEBINARS/



DOE Workshop on Fusion Energy Development via Public-Private Partnerships

June 1 - 3, 2022

Capital Hilton, 1001 16th Street NW, Washington, DC

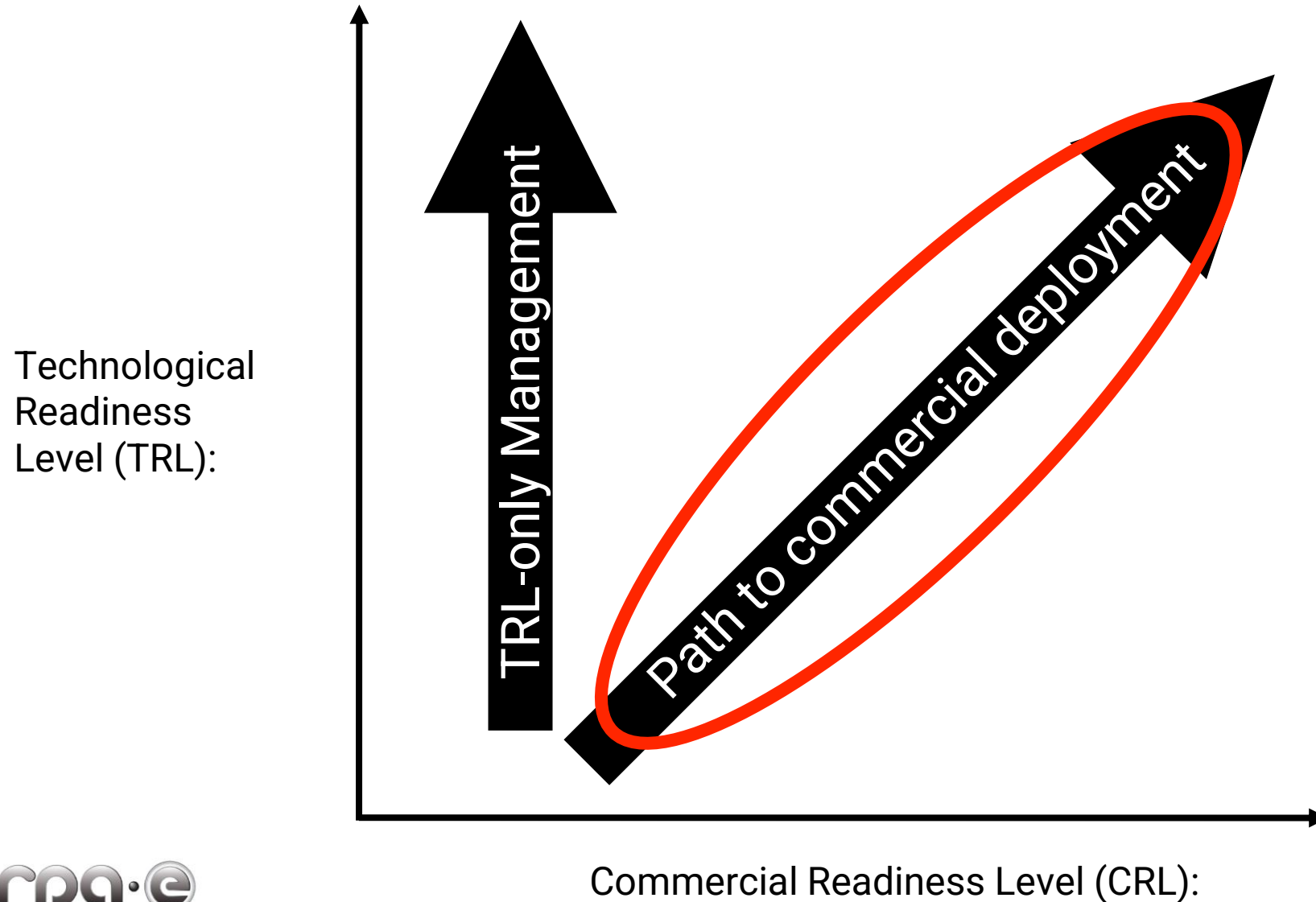
*Hosted by the Office of the Under Secretary
for Science and Innovation*

Sponsored by the Office of Science

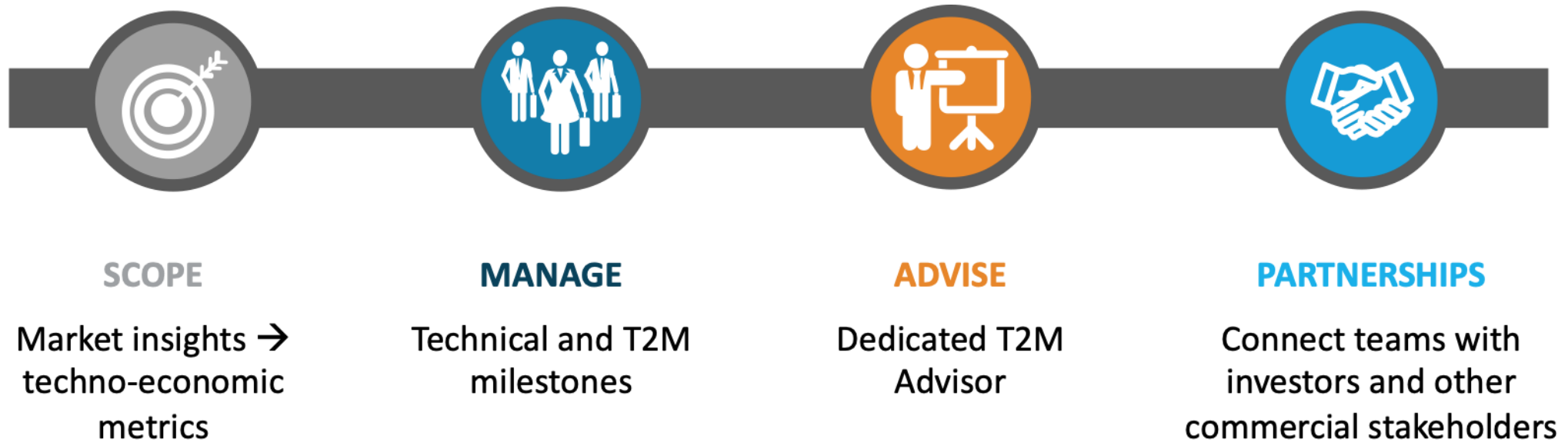


ARPA-E'S ROLE IN FUSION COMMERCIALIZATION

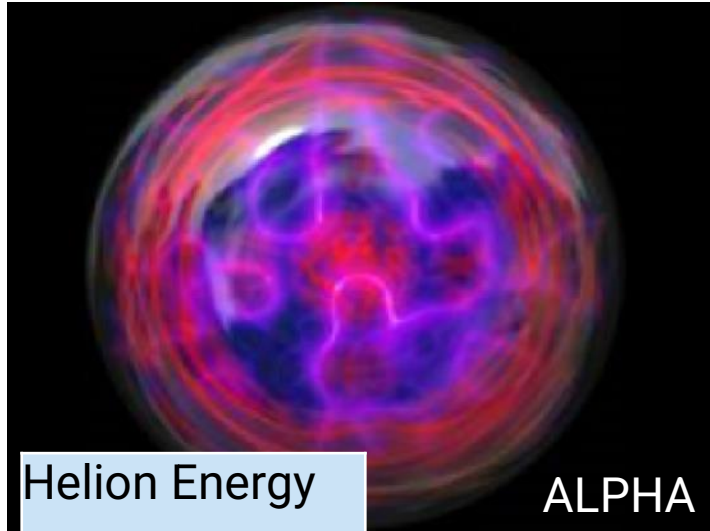
ARPA-E emphasizes the path to commercial deployment



ARPA-E technology-to-market function



ARPA-E fusion programs



Helion Energy

Zap Energy

Hyperjet Fusion

MIFTI



Princeton Fusion
Systems
CT Fusion

OPEN 2018



Commonwealth Fusion
Systems

Type One Energy

Princeton Stellarators

Realta Fusion

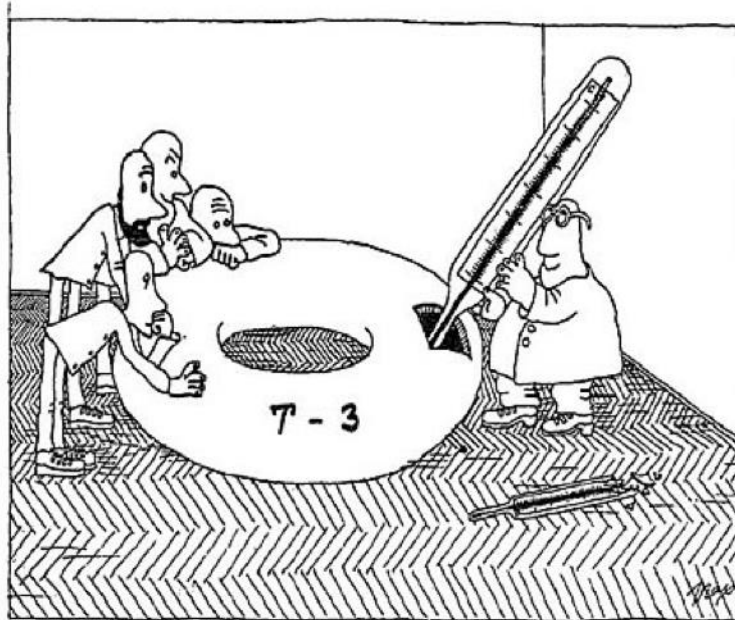


*Italicized companies spun out of
university/national lab projects*

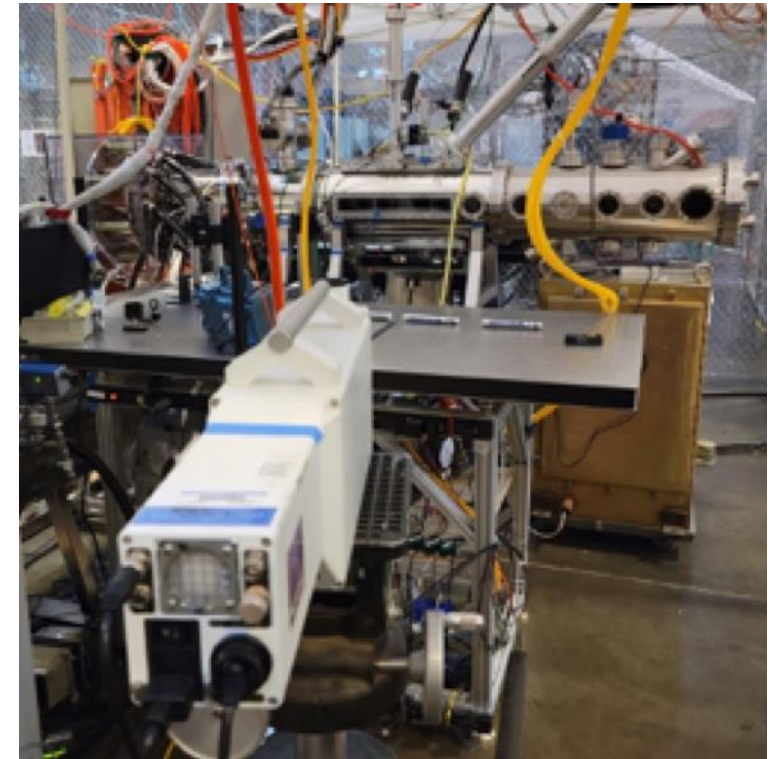
Capability teams (Part of BETHE and diagnostic programs)



ORNL team bringing their diagnostic to the Princeton Field Reversed Configuration (PFRC)

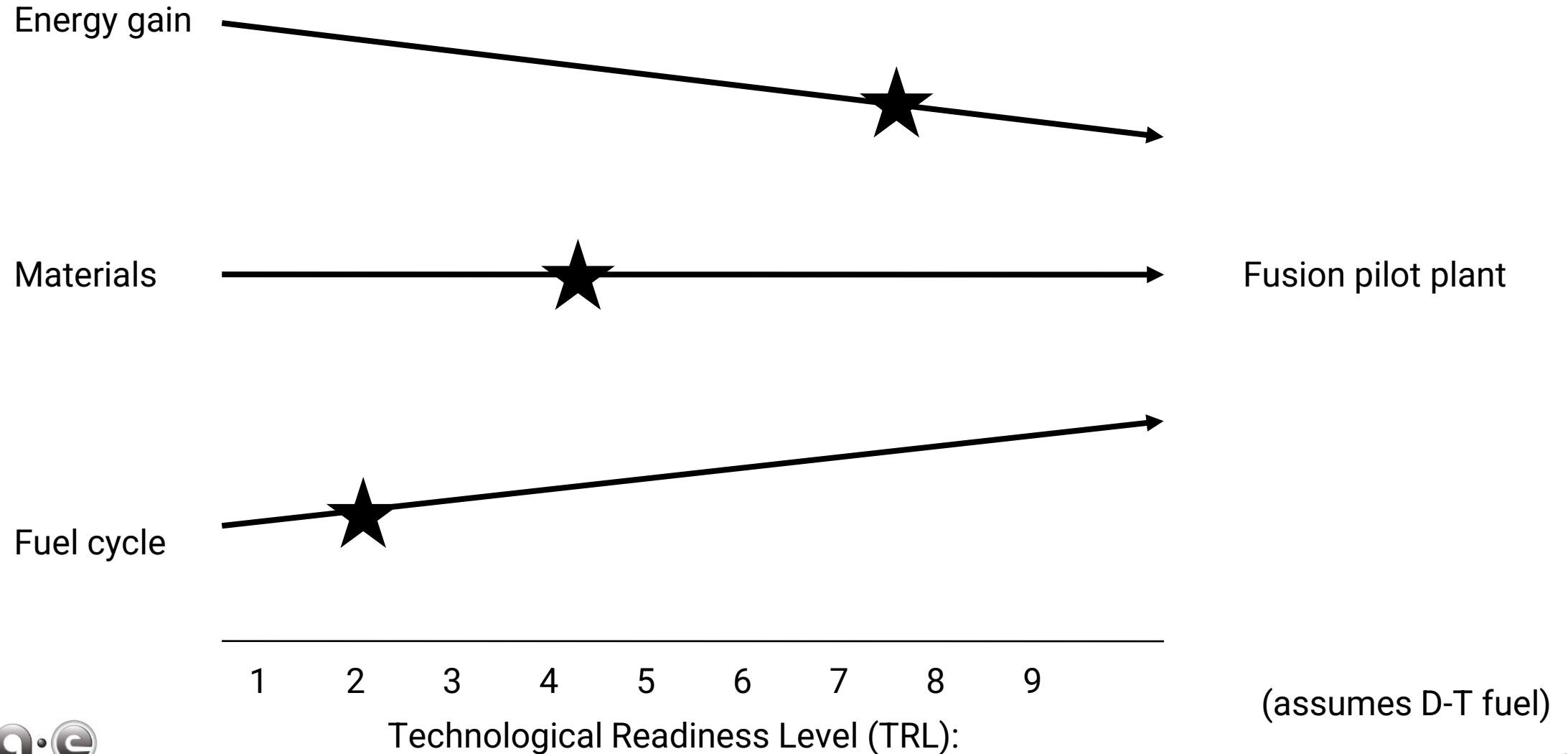


Drawing from the talk "Evolution of the Tokamak" given in 1988 by B.B. Kadomtsev at Culham. <https://www.euro-fusion.org/news/detail/success-of-t-3-breakthrough-for-tokamaks/>



LANL and LLNL bringing their diagnostics to Zap Energy

ARPA-E fusion programs map to remaining technology challenges



THANKS

sam.wurzel@hq.doe.gov