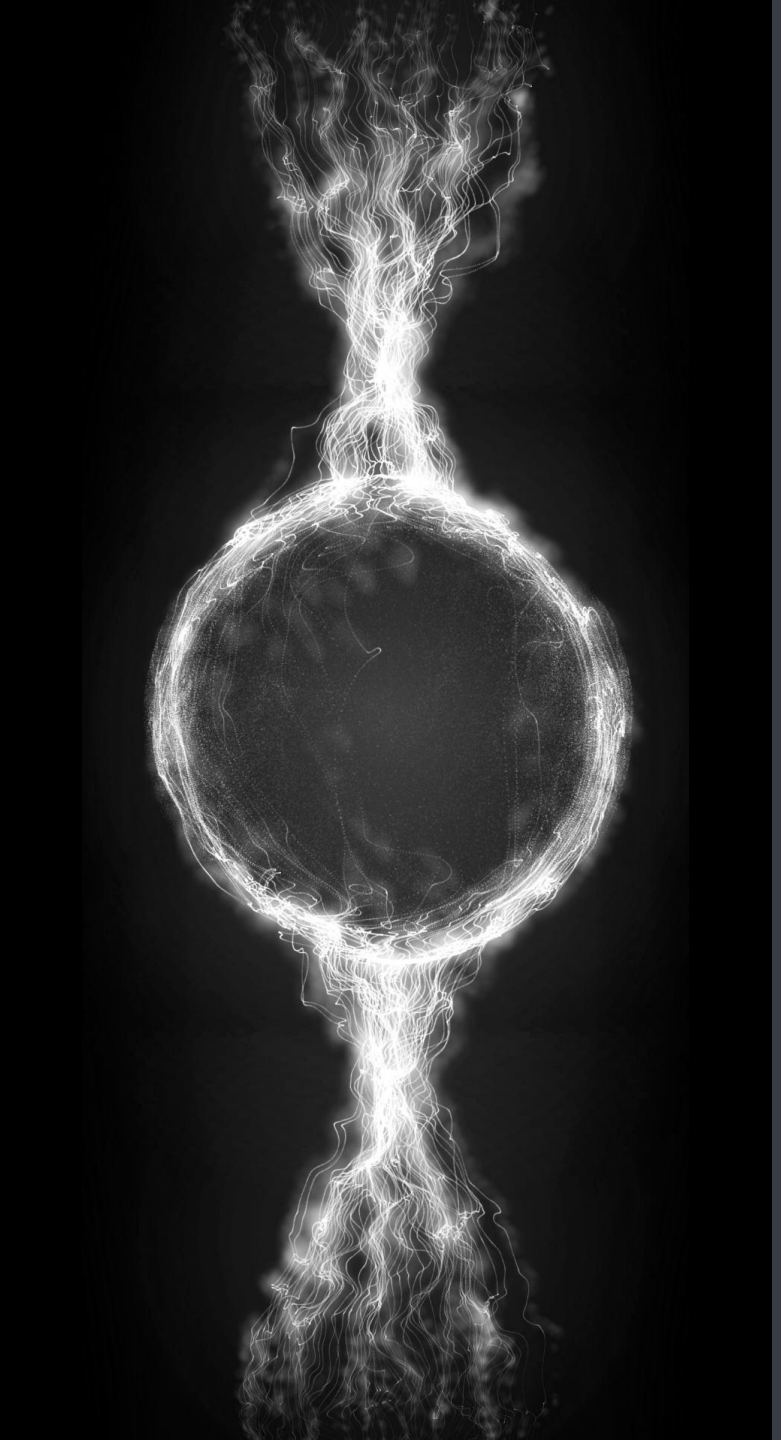


ARPA-E™

APS Advancing Physics

APS Division of Plasma Physics and Gaseous Electronics Conference Joint Meeting

Fusion at ARPA-E

Dr. Adam Sefkow

Program Director

Advanced Research Projects Agency – Energy (ARPA-E)

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Pankaj Trivedi



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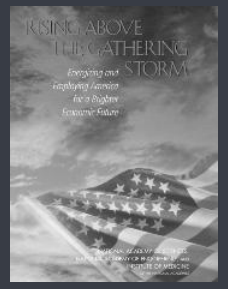
Ray Mattes



Oliver Barham

History of the Advanced Research Projects Agency – Energy (ARPA-E)

In 2007, the National Academies recommended Congress establish an Advanced Research Projects Agency within the U.S. Department of Energy to fund and direct advanced energy research & development.



2007

Rising Above the Gathering Storm **Published** - warning policymakers that U.S. advantages in science and technology had begun to erode

America COMPETES Act **Signed** – authorizing the creation of ARPA-E

American Recovery & Reinvestment Act **Signed** – Providing ARPA-E its first appropriations of $400 million, which funded ARPA-E's first projects

2009





2026

1,900+ Awards
96 Programs

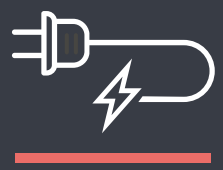
Current Funding:
$350M
(FY26)

ARPA-E's Congressional Statute

1. To enhance the economic and energy security of the United States through the development of energy technologies that:



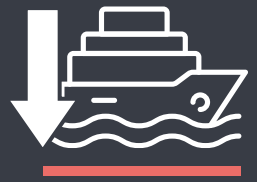
IMPROVE
Energy Efficiency



IMPROVE
Infrastructure Resilience



IMPROVE
Radioactive Waste Management



REDUCE
Energy Imports



REDUCE
Emissions

2. To ensure that the United States maintains a technological lead in developing and deploying advanced energy technologies

We Bring Power to Possibility

The Advanced Research Projects Agency-Energy's vision is American-made energy for all.



Who are we?

The disruption wing of the Department of Energy.



What do we do?

Turn outlier energy ideas into major shifts in industry.



How do we do it?

Direct technologies from concept to prototype to world.



Why do we exist?

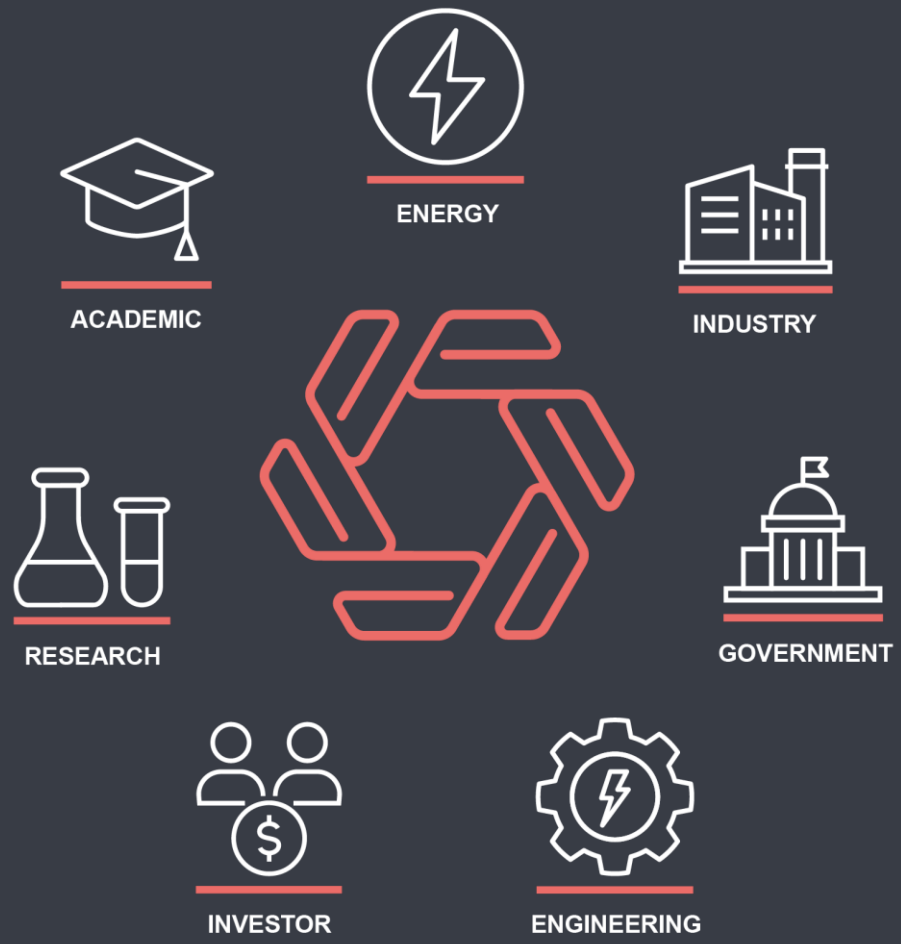
To go where others can't (or won't).

ARPA-E Engages a Wide Range of Stakeholders to Disrupt the Status Quo



Together, We Bring Power to Possibility.

We operate at the nexus of academia, industry, investment, and government.



General Funding Timeline

ARPA-E's non-dilutive funding model enables awardees to pursue groundbreaking ideas with reduced financial risk and the preservation of equity. ARPA-E support accelerates the development of new energy technologies by providing essential resources and expert guidance.



17 Years of Energy Impact

We've always had the same mission: to fund and direct the discovery of outlier energy technologies. Key indicators illustrate how the advanced research and development funded by the Agency translates to scientific, commercial, market, and industry impacts.

SINCE 2009 ARPA-E HAS PROVIDED

$4.64B *in R&D funding to*

MORE THAN **1,900 PROJECTS**

301 Projects have attracted more than

$21 Billion

in private-equity follow-on funding

195

COMPANIES

have been formed by ARPA-E projects

41 Exits

MARKET VALUATIONS WORTH

$32.7B FROM MERGERS, ACQUISITIONS, AND IPO'S

451

PROJECTS

have partnered with other government agencies for further development

9,270

peer-reviewed

JOURNAL ARTICLES

1,622

PATENTS

issued by the U.S. Patent & Trademark Office

491

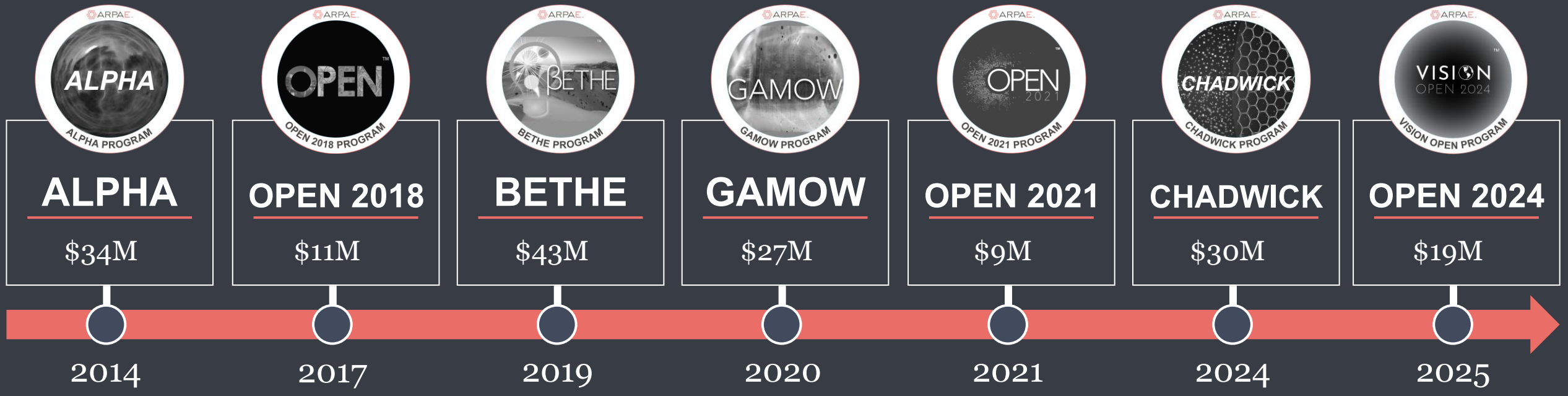
LICENSES

reported from ARPA-E Projects

As of October 2026

A History of High-Impact Fusion Investment

New Concepts → Component Technology and Teams → System Simplification and Cost Reduction → Technology for Longer Lasting Powerplants



$134M in focused funding + $39M in OPEN funding

$134M

focused investment over 12 years

$1.5B

private sector follow-on funding

Fusion (ALPHA, BETHE, GAMOW, CHADWICK)



$135M

in new ARPA-E fusion energy funding – to be deployed as a singular potential program

FIRST GENERATION
The Spark

SECOND GENERATION
The Ecosystem

THIRD GENERATION
The Horizon

Scanning the Full Fusion System

The path forward requires exploration into the toughest technical barriers to commercial fusion power

01



Advanced Plasma Heating & Driver Systems

Heat the fuel

02



Next-Generation Fuel Cycles & Fuels

Optimize the fuel

03



Advanced Power Conversion & Plant Systems

Harvest the energy

04



Innovative Fusion Power Plant Architectures

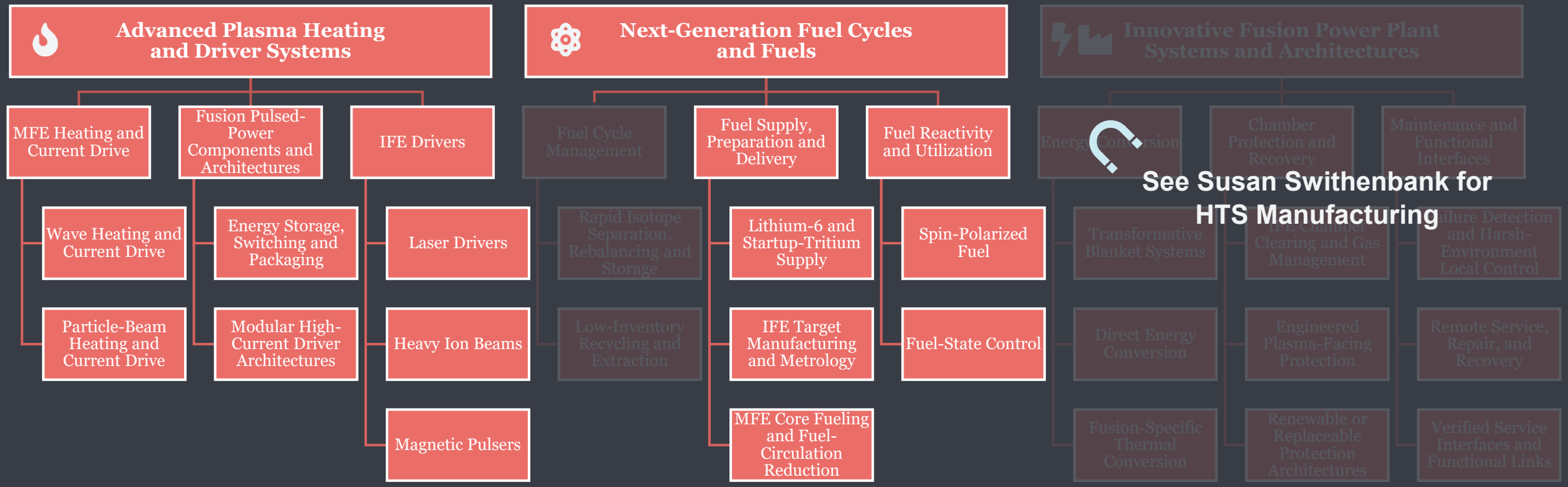
Make it last & pay off

These **areas for exploration** guided how we screened the broader opportunity space.

From a Broad Search to Four Focused Portfolios

- **Evaluated opportunities** across the fusion technology stack
- **Concentrated resources** to build coherent portfolios where ARPA-E can move the needle

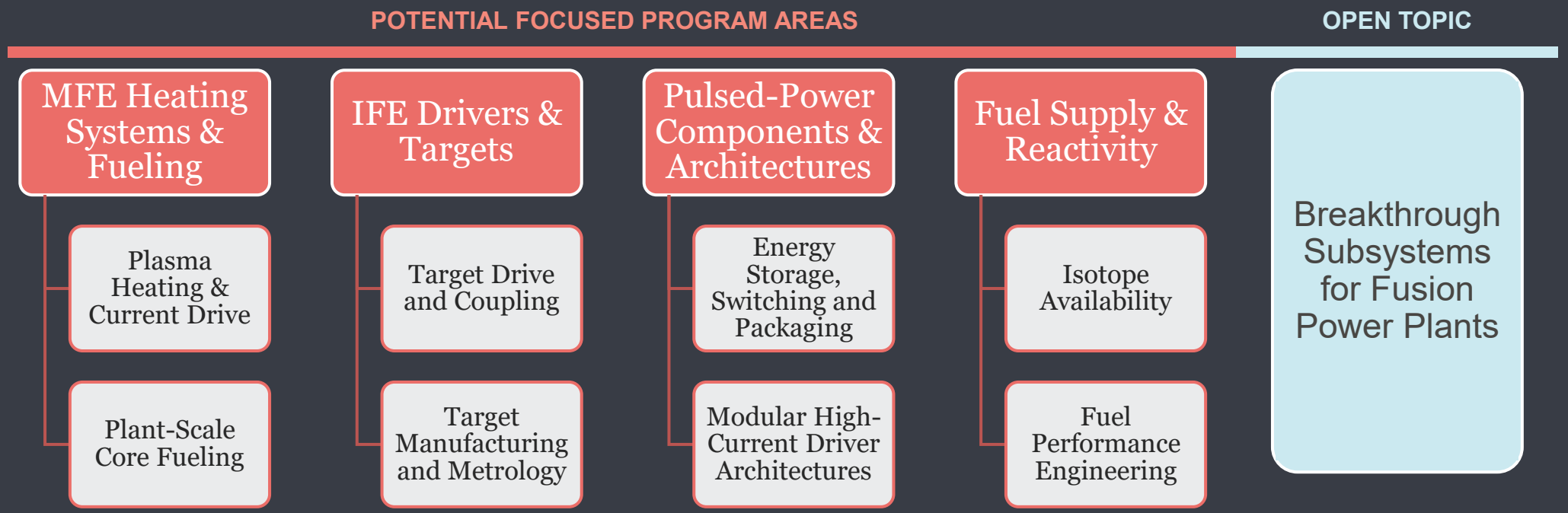
Transformative Enabling Technologies for Low-Cost Commercial Fusion



Transformational whitespace · Critical-path or plant-cost leverage · Decisive validation · Coherent portfolio potential

Cross-Cutting Approach Through One Integrated Potential Program

Transformative Enabling Technologies for Low-Cost Commercial Fusion



CROSS-AREA TEA **Common baselines, validation, and plant-level economics across all awards**

Focused portfolios for more shots on goal. **Open** topic to not miss an exceptional idea.

How Success Could Be Measured

Two Pathways to Program Impact

PROGRAM OBJECTIVE

Develop transformative enabling technologies that clear a path to low-cost commercial fusion.

01 Critical-Path Readiness

Decisively retire a blocking technology risk on the timeline needed for pilot plants or early commercial plants.

Testable deployment consequence

02 Plant-Level Cost & Performance

Materially improve capital cost, recirculating power, availability, lifetime, manufacturing, fuel utilization, or another major plant cost driver.

Traceable plant-level consequence

POSSIBLE PROGRAM-LEVEL METRICS THESE TECHNOLOGIES MUST HAVE THE POTENTIAL TO SUPPORT

Fusion pilot plant deployment	Levelized cost of electricity	Overnight capital cost
WITHIN 8 YEARS	≤ $60/MWh	≤ $4,000/kW-net

Projects must advance at least one pathway. Technology-specific targets will be presented later today.

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