FUSION INDUSTRY ASSOCIATION

The Voice of a new Industry

The Fusion Industry Association is an international coalition of companies working to electrify the world with fusion - the unparalleled power of the stars. Energy from fusion will provide clean power for everyone that's safe, affordable, and limitless.

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Accelerating Innovation in Energy Technologies

President's Council of Advisors on Science and Technology

January 21, 2022

Andrew Holland

Chief Executive Officer

Fusion Industry Association

Why Fusion?

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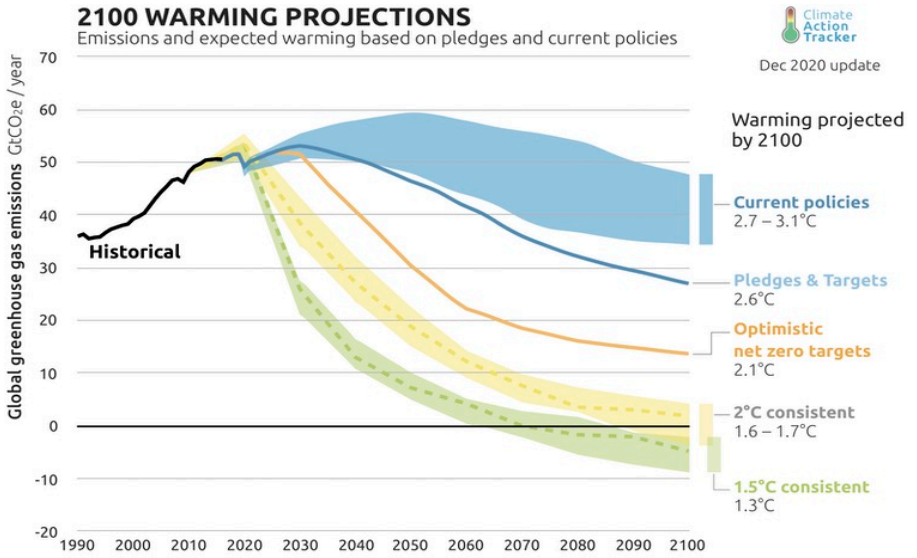
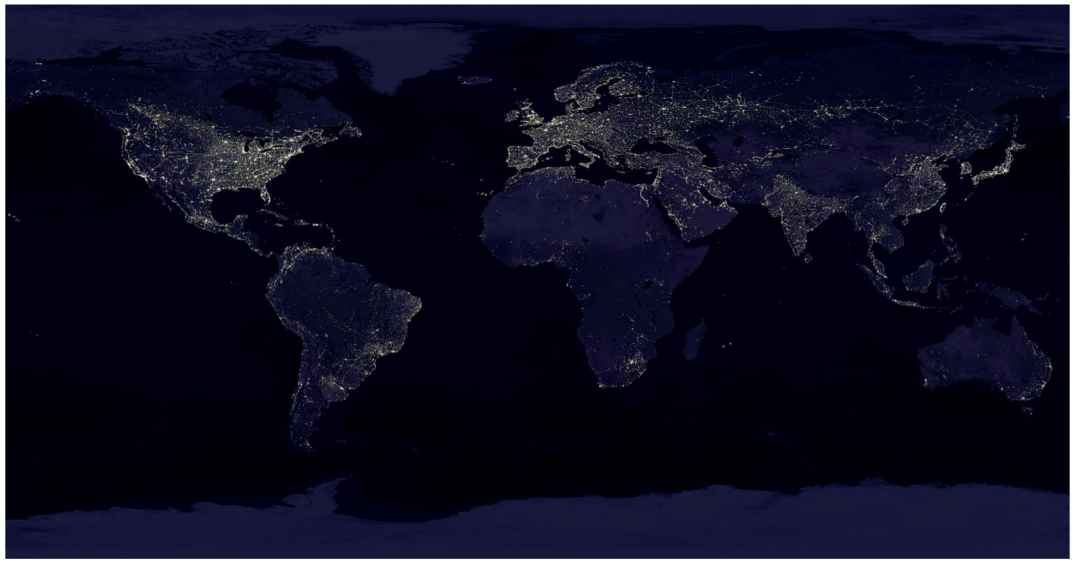
- Fusion is a climate solution
- Fusion enables grid reliability and resilience
- Fusion will finish the job that renewables have started
- Fusion is the industry of the 21st century – driving jobs, prosperity, and export revenue
- Fusion will globalize energy access
- Fusion will end the geopolitics of energy





Fusion Is Close

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Decades of advances in plasma physics

\+ Technology revolutions in materials, computing power, advanced manufacturing

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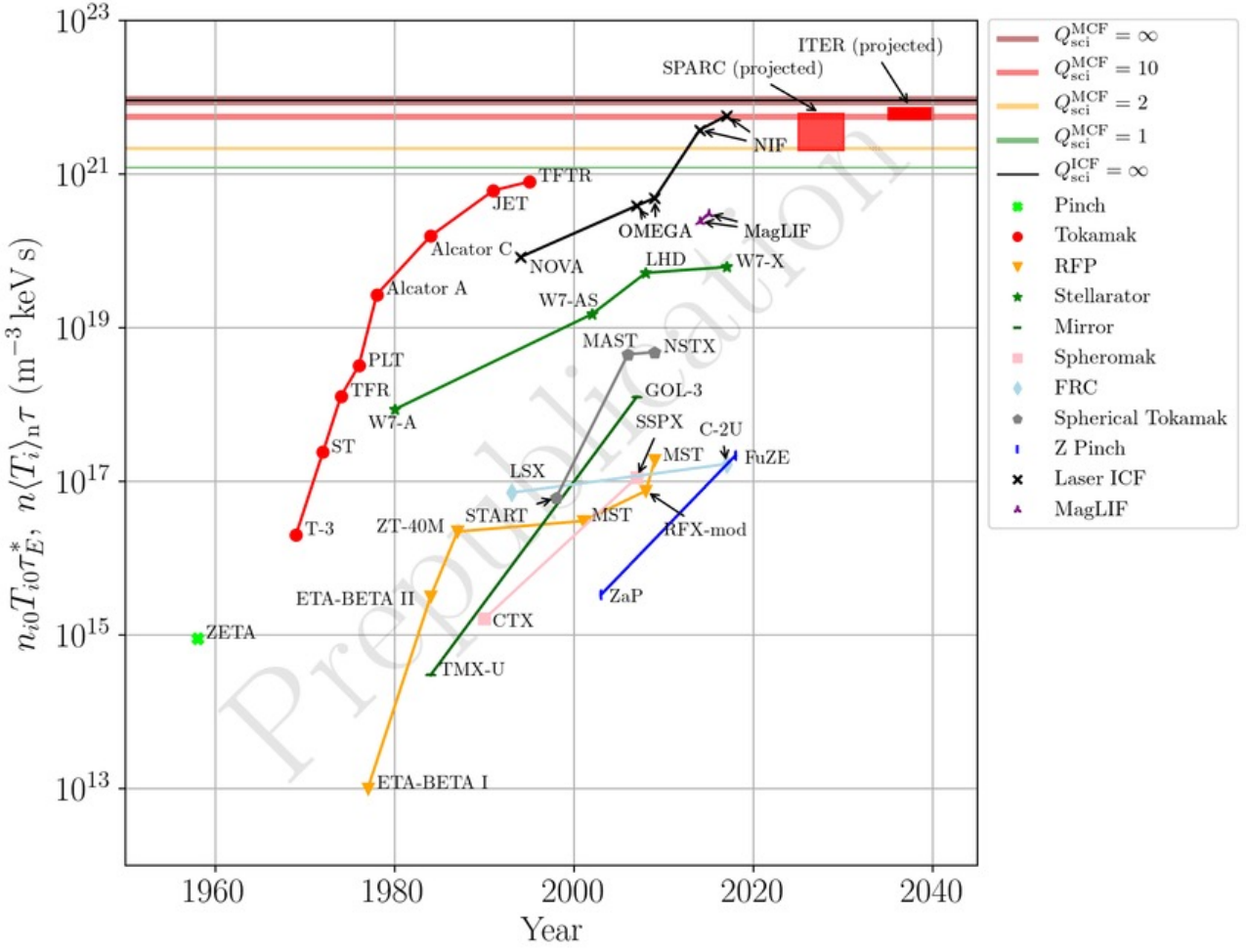
The cusp of net gain energy

U.S. Government investment has enabled this moment: it is time to capitalize on it.



Wurzel, Samuel & Hsu, Scott. (2021). Progress toward Fusion Energy Breakeven and Gain as Measured against the Lawson Criterion.

A Global Competition

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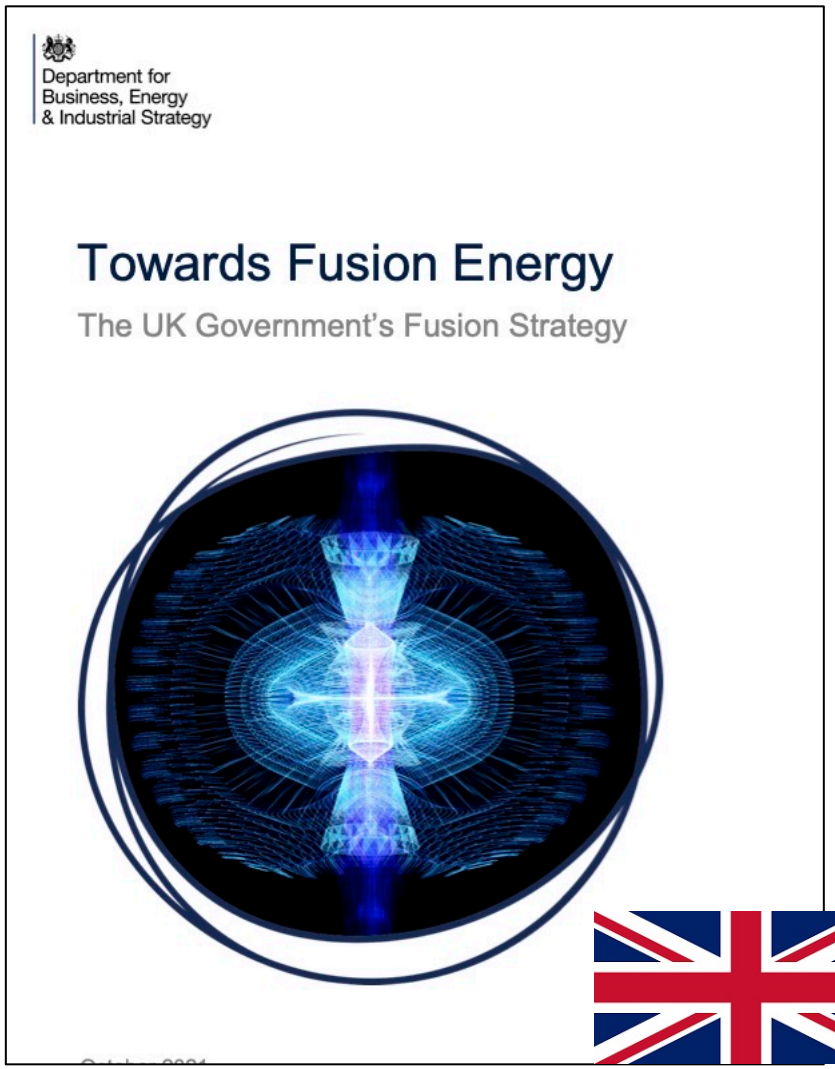
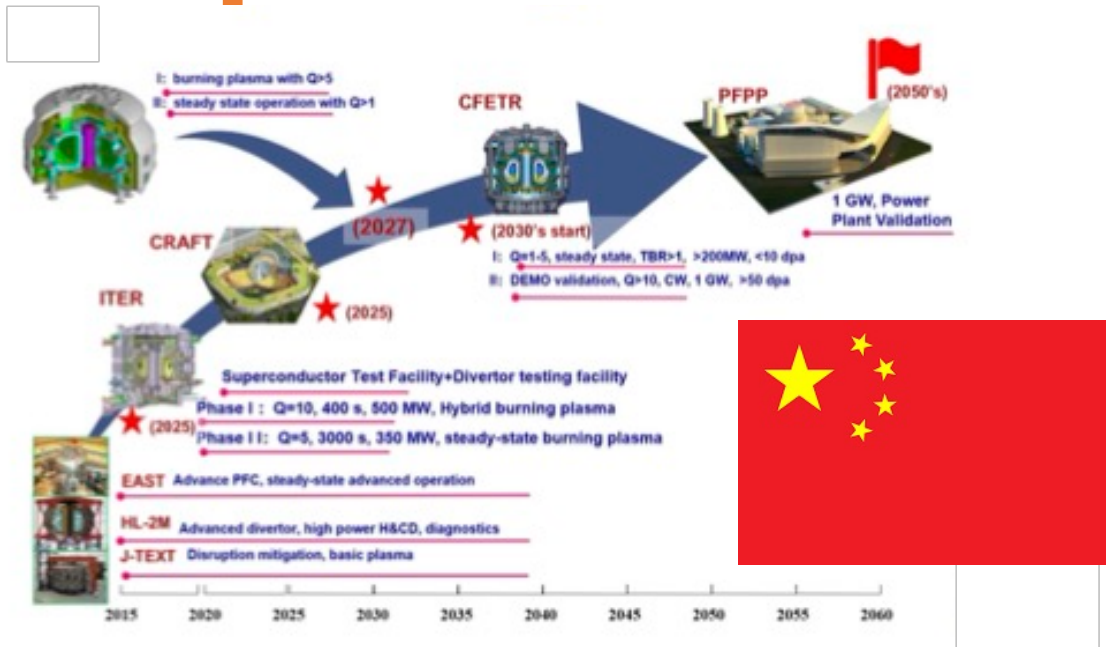




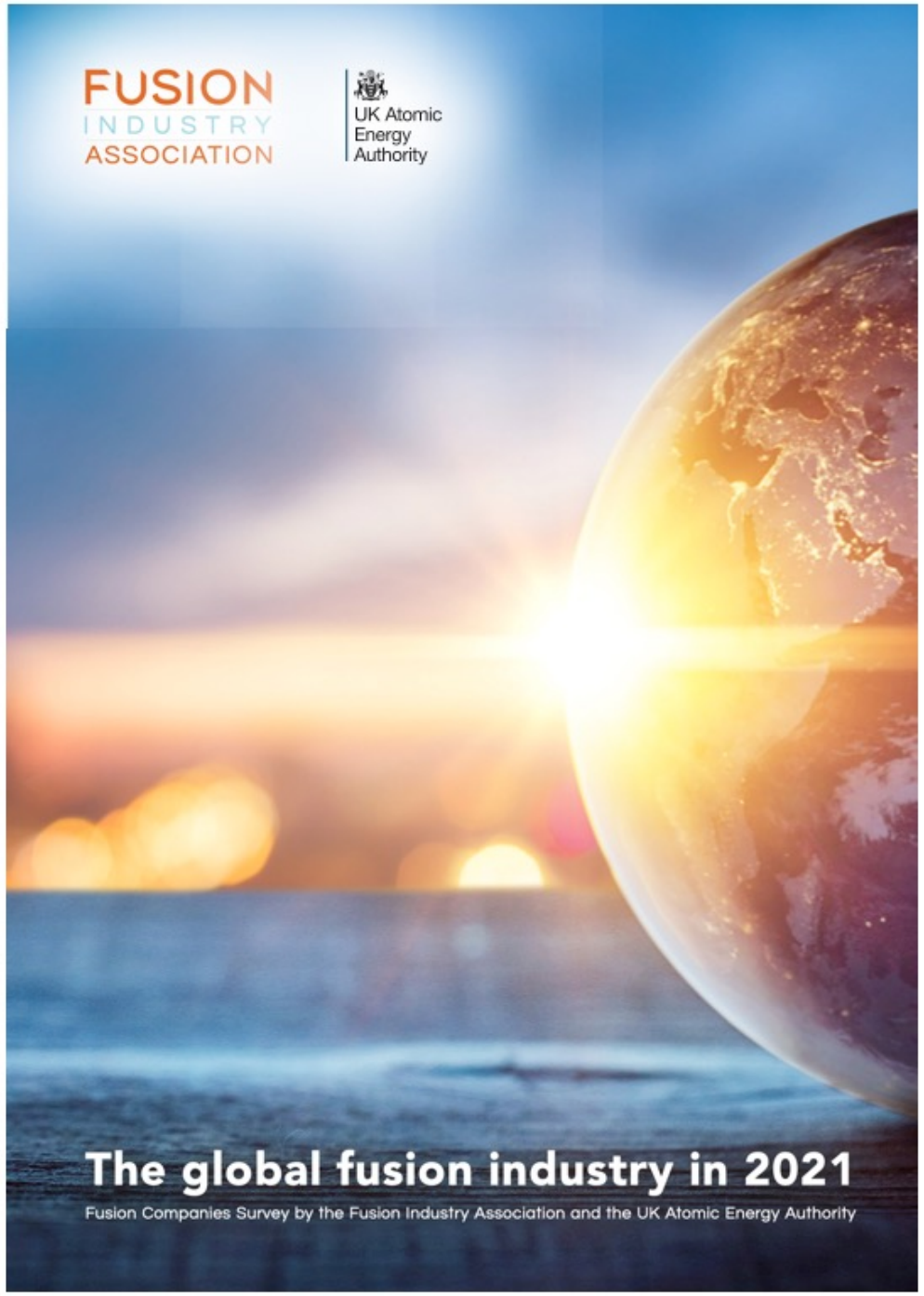
The Global Fusion Industry in 2021

31 verified private fusion companies

- 27 are members of the FIA
- 21 are American companies

Survey from Q2 2021 (23 responses)

- $1.87 billion *(and has grown to over **$4.3 billion** by December 2021)*
- Focused on electricity generation (96%)
- Expect commercialization by the 2030s (83%)



Target Markets

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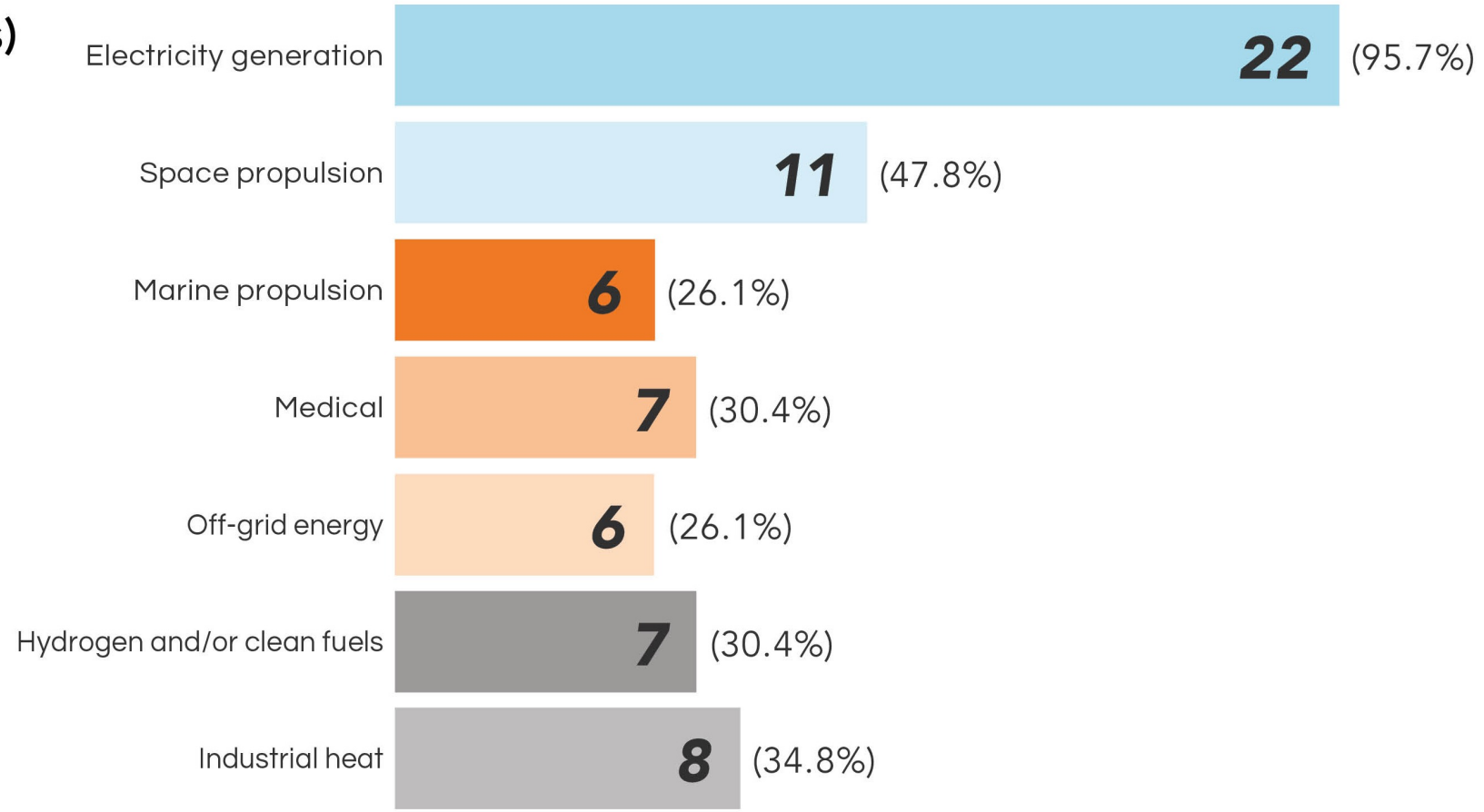
(Respondents could tick multiply boxes)

Target market(s)
23 responses



Technical Approach Taken by Global Fusion Companies

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General approach

- 13 Magnetic confinement
- 5 Magneto-inertial
- 2 Hybrid electrostatic confinement
- 2 Inertial confinement
- 1 Non-thermal laser fusion
- 0 Cold fusion/LENR
- 0 Muon-catalysed fusion

Specific approach

- 3 Field Reversed Configuration
- 3 Tokamak
- 2 Spherical tokamak
- 2 Stellarator
- 2 Z-pinch
- 1 Dense plasma focus
- 1 Direct laser-driven pB11
- 1 Inertial-electrostatic confinement
- 1 Laser-driven inertial confinement (quantum enhanced)
- 1 Magnetic-electrostatic confinement
- 1 Magnetized target fusion
- 1 Plasma jet driven magneto-inertial fusion
- 1 Plectoneme
- 1 Shock-driven inertial confinement
- 1 Spheromak
- 1 undeclared
- 0 Laser-driven inertial confinement

FIA Membership

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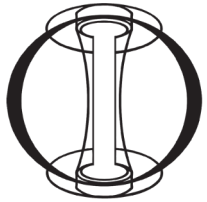
Commonwealth Fusion Systems

generalfusion®

tae TECHNOLOGIES

HB11 ENERGY
LASER BORON FUSION



tokamak energy
a faster way to fusion

ZAP ENERGY

HELION

CTFusion
As Brilliant as the Sun

TYPE ONE ENERGY

first light

FOCUSED ENERGY

MIFTi

RENAISSANCE FUSION

ALBOT

MarvelFusion

INNOVEN Energy

fuse

LPP FUSION

HYPERJET FUSION CORP

SHINE

AVALANCHE

HelicityEspace

HORNE TECHNOLOGIES

NK

PrincetonSATELLITE SYSTEMS

nearstar FUSION

Electric Fusion
Transforming energy for all humanity

Private Fusion Accelerating to a Timeline that is Relevant

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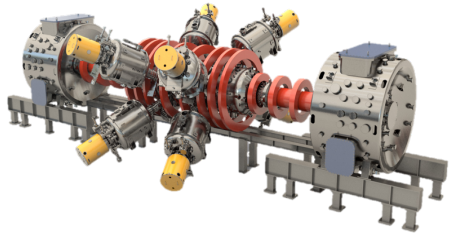
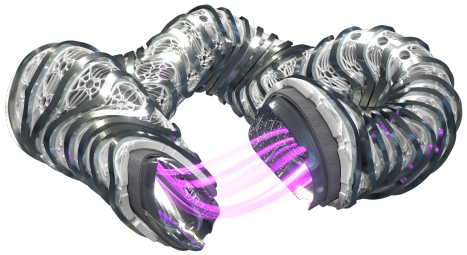
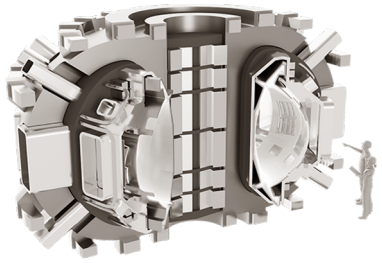
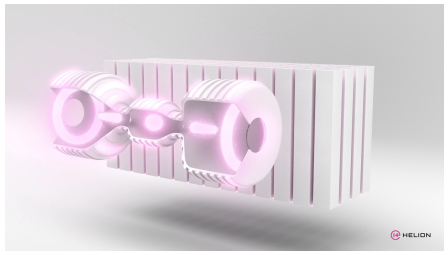
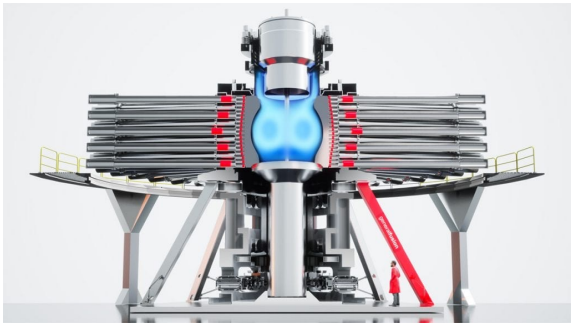
60 years of research	Mid 2020s	Late 2020s	Early 2030s	Mid 2030s
• Scientific basis for fusion energy	• Scientific Proof of Concept	• Design and build Pilot Plants	• Operate Pilot Plants, first sales	• Commercial Fusion, rapid scale-up to global deployment











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How To Accelerate Fusion Energy Innovation?

Three strategic priorities for accelerating fusion energy

Accelerating Fusion Energy

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1. **Build a Partnership with DOE**

   The U.S. Fusion Program must have a comprehensive energy mission.

2. **Direct Federal Support for Private Fusion**

   Pilot Plants are built by and for private industry. New Public-Private Partnerships will enable acceleration towards the fusion-powered future.

3. **Ensure Regulatory Certainty**

   Fusion is safe. Ensuring that fusion power plants are subject to appropriate, risk-informed regulation will accelerate investment and development.

1. Build a Partnership with DOE Fusion Science Program

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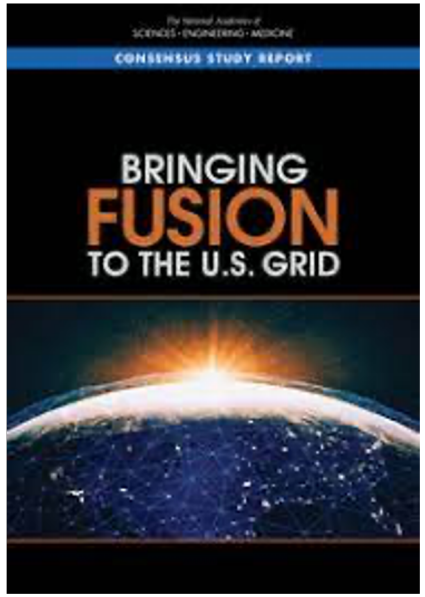
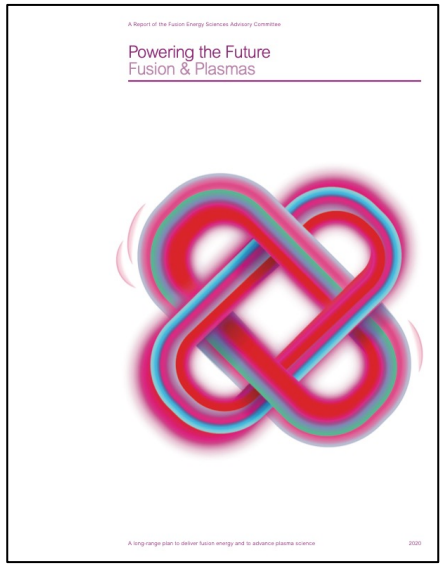
U.S. Fusion program must embrace a mission to accelerate fusion energy

DOE can support fusion commercialization push with world-leading science, computing power, and user facilities

DOE will build the **infrastructure** *(but not the pilot plants)* that enables an American fusion industry

DOE-funded scientists form the backbone of the fusion workforce





2. Direct Federal Support for Private Fusion

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Proposal: Government Cost-Share with Private Fusion

- Models include the successful NASA COTS and DOE SMR cost-share programs
- Directly reimburse private companies for the development of new US-based fusion capabilities
- Leverage government dollars with private sector cost share
- Payments based on performance

STATUS:

- Spring 2020: DOE issued an RFI on setting up a fusion cost-share program
- December 2020: Authorized by Congress in Energy Act of 2020
- Funded at $325m (out of a total of $885m for fusion) in House-passed BBB Reconciliation bill, and $45m in FY22 House Appropriations
- FIA plan calls for $1 billion in cost-share funding
- Broad support from industry, universities, and fusion science community

3. Ensure Regulatory Certainty

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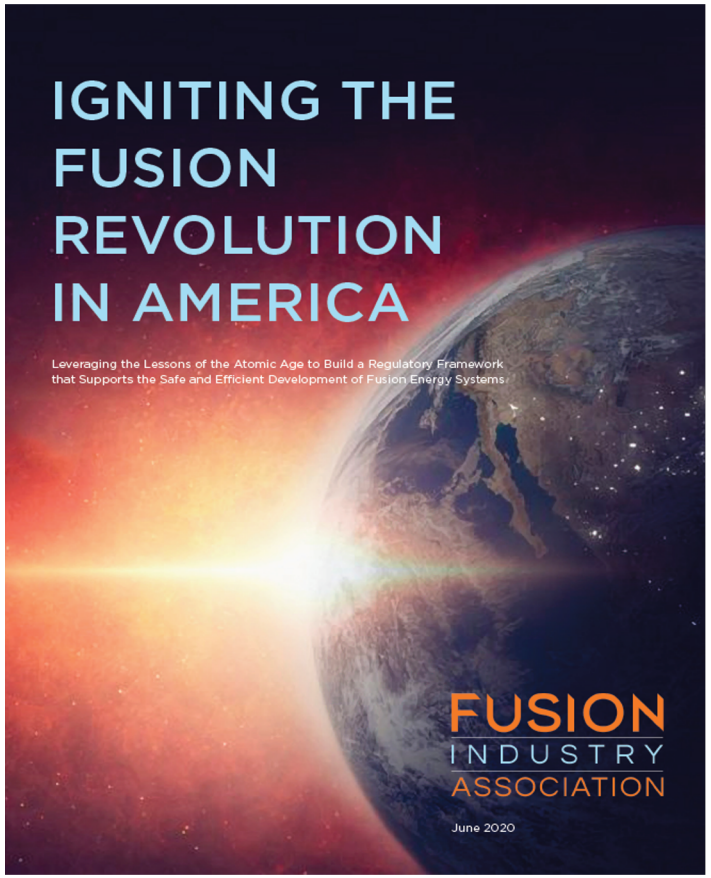
Fusion is Different than Fission

- US Nuclear Regulatory Commission
  - Ongoing public process to determine options for regulatory framework for fusion energy
  - A “Byproduct Materials” approach to regulation best ensure public safety and accelerated adoption of fusion energy
  - NRC should support staff with investment in more fusion expertise
  - Expect an “Options Memo” to the Commission in 2022
- Working with the IAEA to inform a global fusion regulatory structure.



The Race is On

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Thank You

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