DOCKETED	
Docket Number:	26-ERDD-01
Project Title:	Fusion Research and Development Innovation Initiative
TN #:	269439
Document Title:	Fusion Research and Development Innovation Initiative Workshop Presentation
Description:	Presentation slides for Fusion Research and Development Innovation Initiative staff workshop on April 2, 2026
Filer:	Nathan Lubega
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	4/8/2026 4:18:52 PM
Docketed Date:	4/8/2026

Fusion Research and Development Innovation Initiative | Staff Workshop

April 2, 2026

Housekeeping

- Workshop is recorded on Zoom
- Zoom workshop recording and presentation slides will be posted on event page: https://www.energy.ca.gov/event/2026-04/staff-workshop-fusion-research-and-development-innovation-initiative
- Use Q&A function to ask questions during the workshop
- Submit comments to the Fusion R&D Initiative Docket No. **26-ERDD-01**: https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=26-ERDD-01
- Comment Deadline: Thursday, April 16, 2026, 5:00 PM
- Views presented in this workshop do not necessarily represent the views of the CEC or State of California

Background

- Senate Bill 80 (Caballero, 2025) establishes the Fusion Research and Development Innovation Initiative.

- This initiative shall provide financial incentives up to $5 million to;
  - Advance research and development into fusion energy.
  - Accelerate the deployment of new research and technology capabilities that support the commercialization of fusion energy.
  - Deliver the world's first fusion energy pilot project in the state by the 2040s.

- Workshop Goal: To inform public and solicit input on fusion energy research topics to inform future funding opportunities under this initiative.

Workshop Agenda

- **Opening Remarks**
- Introduction to Fusion Energy
- Existing and Needed Capabilities and Resources for Fusion
- Panel Discussion #1: Informing a State-led Fusion Initiative
- Break
- Statewide Initiatives to Support a Fusion Ecosystem
- Role of Workforce and Community Development
- Panel Discussion #2: Delivering the First Fusion Pilot Plant
- Concluding Remarks

Opening Remarks

Noemí Otilia Osuna Gallardo, Commissioner

Introduction to Fusion Energy

Jackson Williams
Fusion Scientist
Livermore Institute for Fusion Technology
Lawrence Livermore National Laboratory

LIFT
LIVERMORE INSTITUTE FOR FUSION TECHNOLOGY

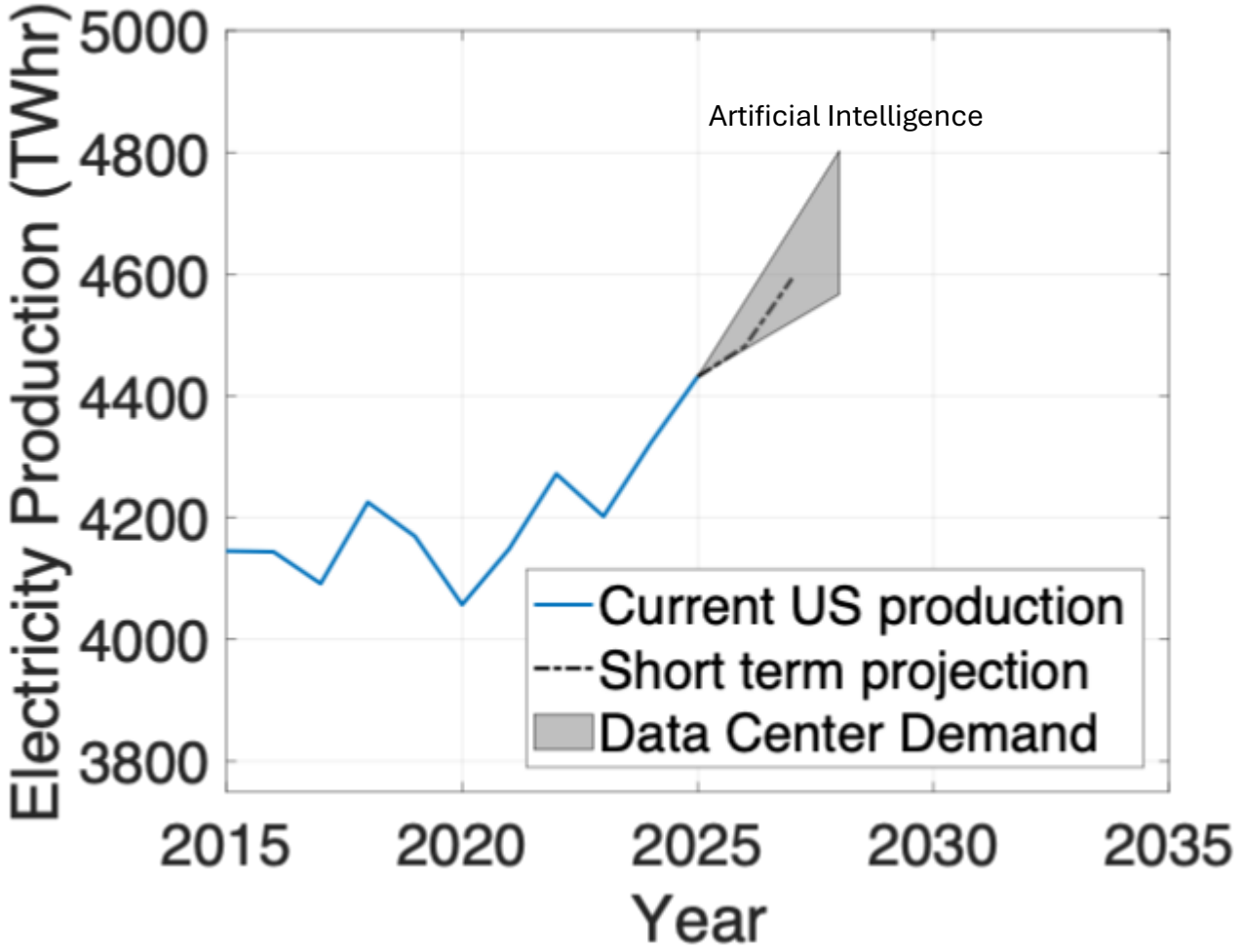
California Energy Commission - Staff Workshop
Fusion Research and Development Innovation Initiative
April 2, 2026

LLNL-PRES-2015336

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC

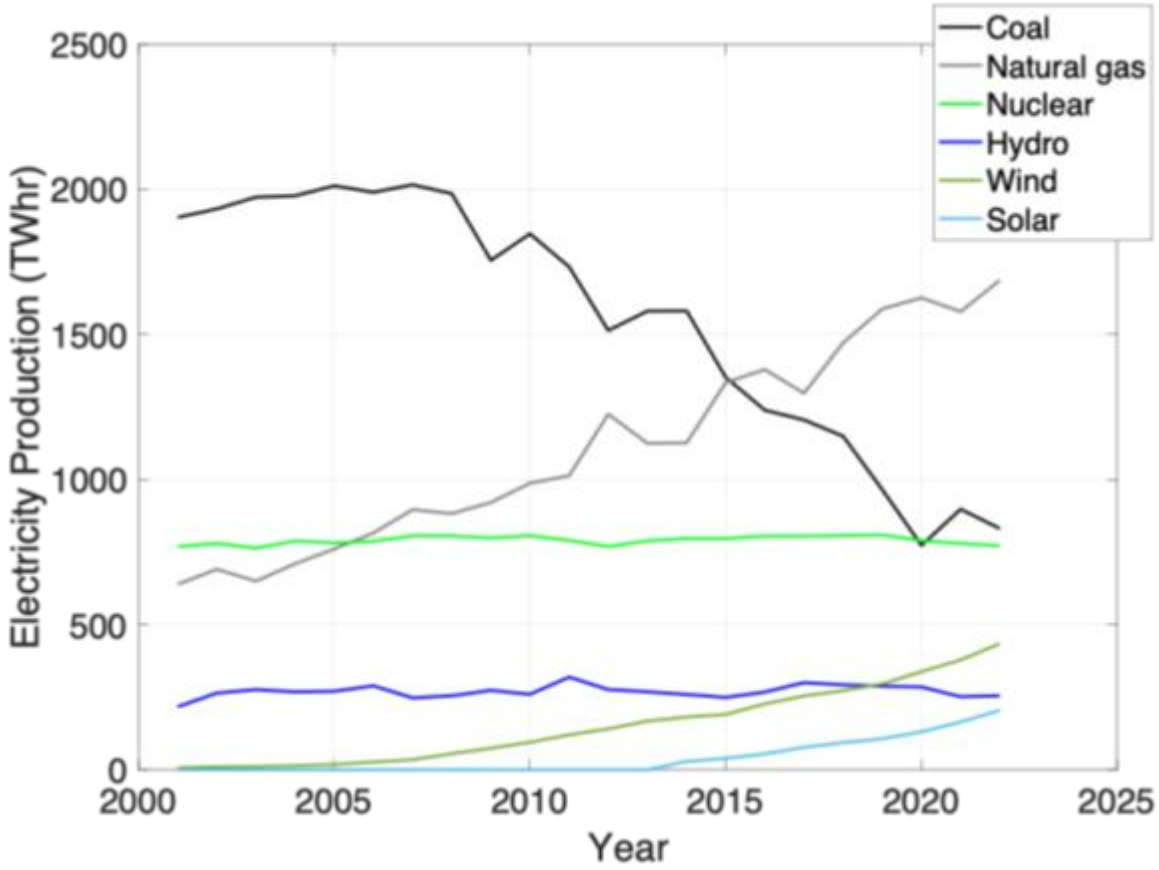
Lawrence Livermore National Laboratory

US electricity energy production to rise by ~20-50% in next decade



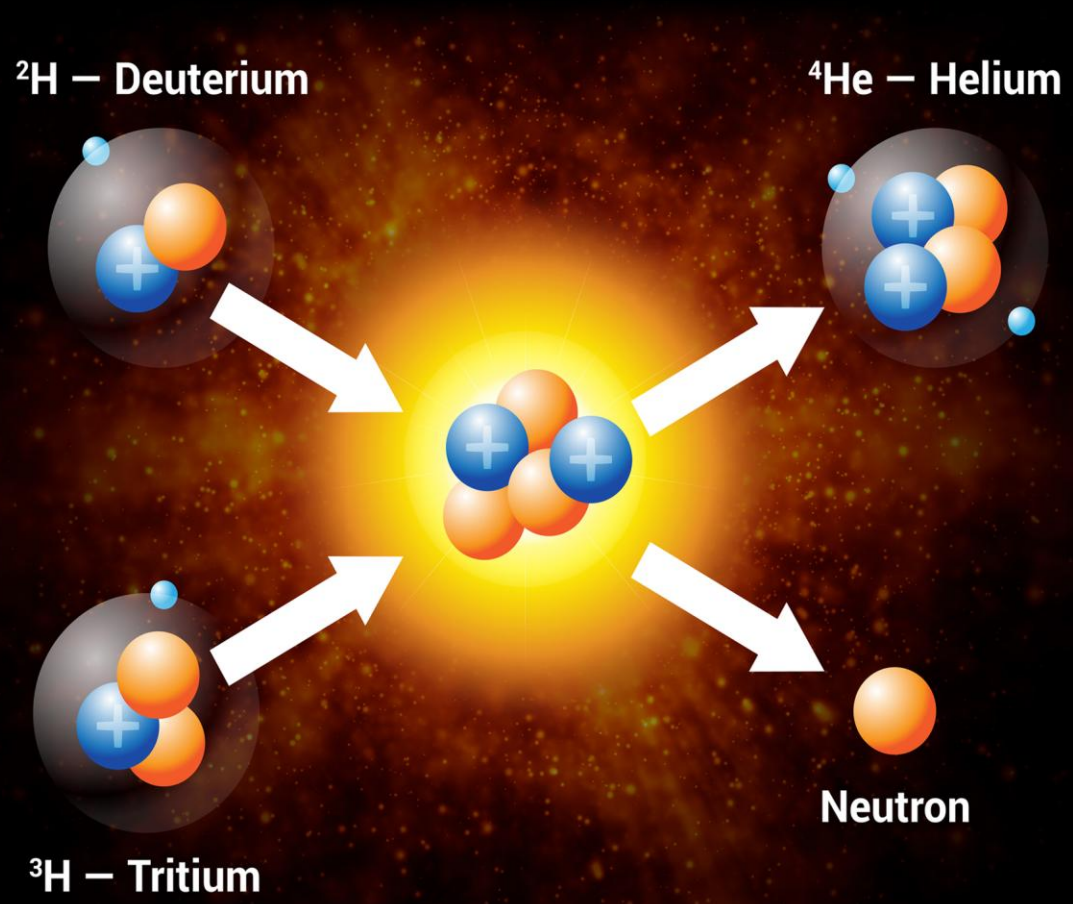
We need consistent sources of baseload energy

Fusion Energy has the potential to be a safe, abundant, and consistent source of electricity that does not generate long lived nuclear waste

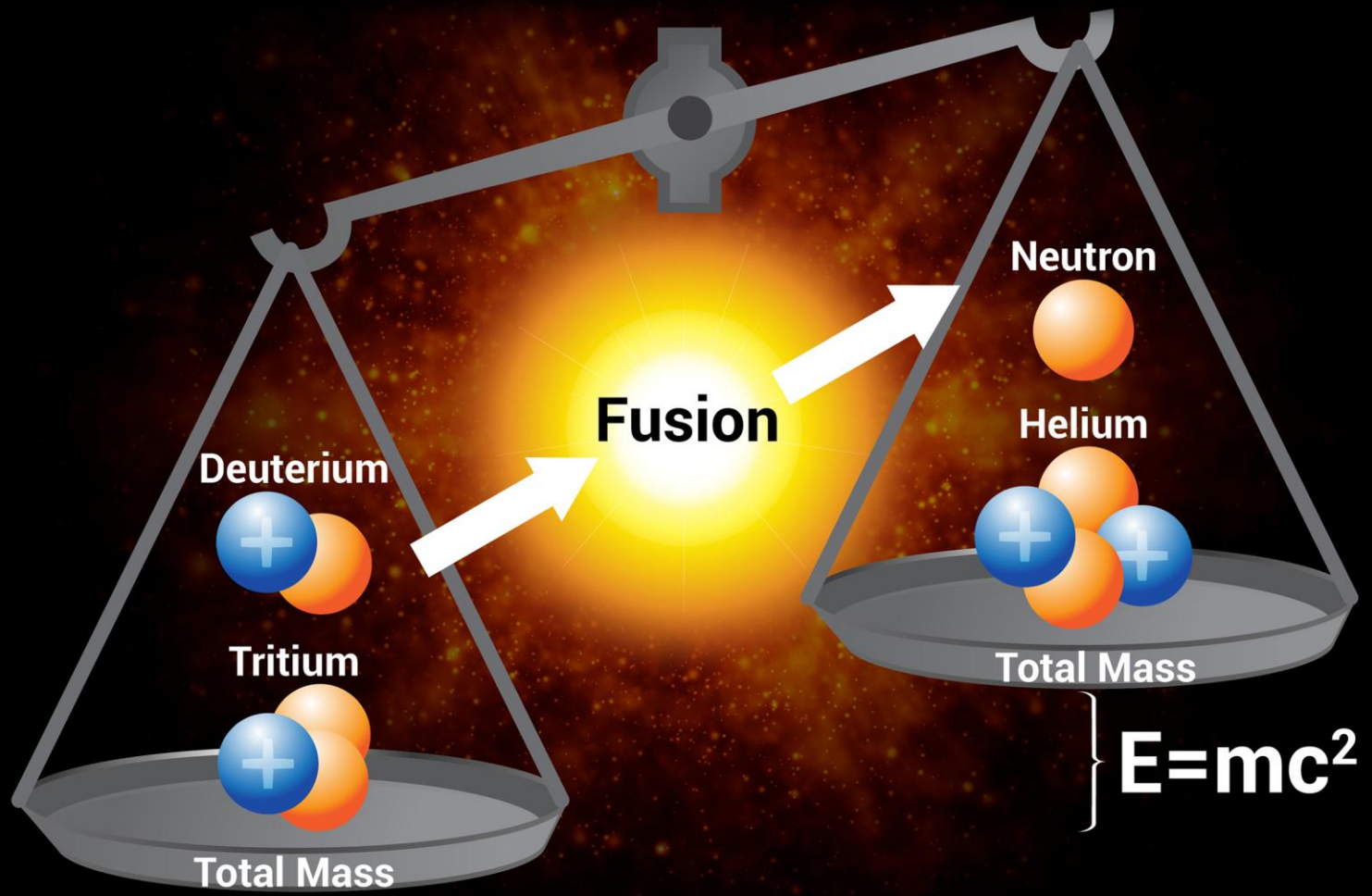


U.S. Energy Information Administration

Fusion is the release of energy from the ‘fusing’ of two elements

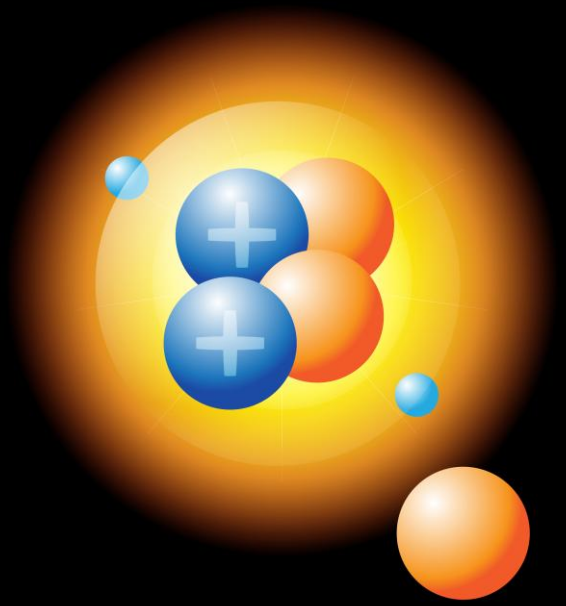


The energy results from the difference in mass

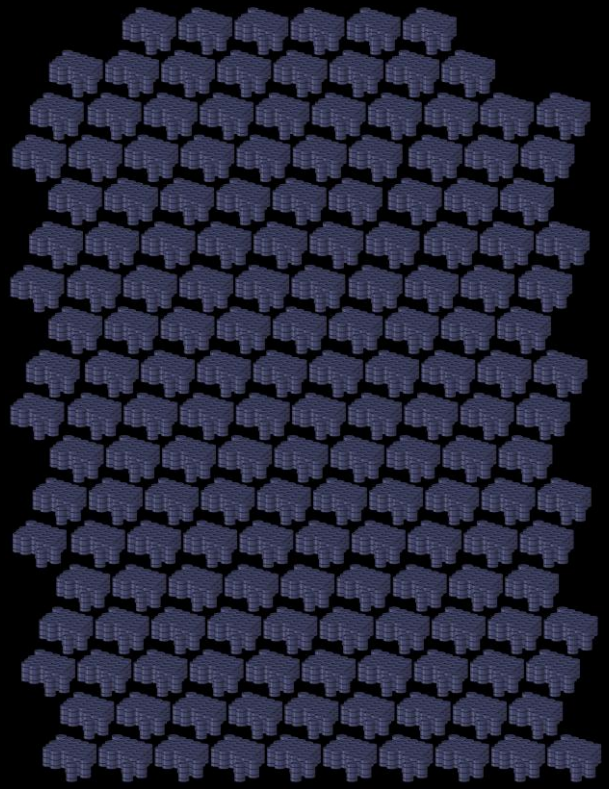


Fusion fuel is extremely energy dense has the **potential** to be abundant

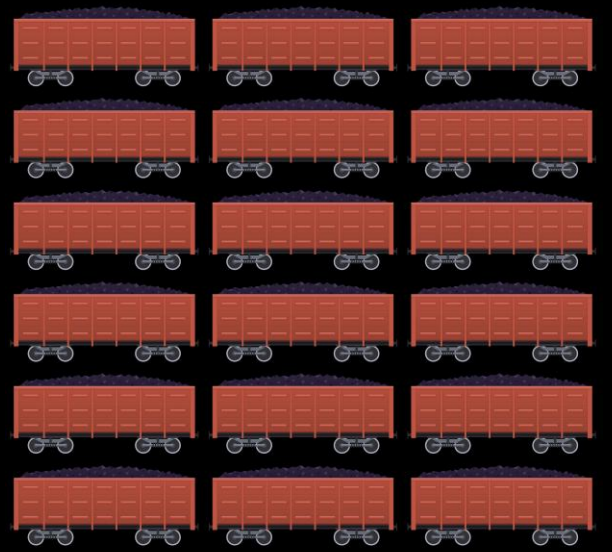
1 Pound
of Fusion Fuel



5,000 Barrels
Of Oil



3.5 Million
Pounds of Coal

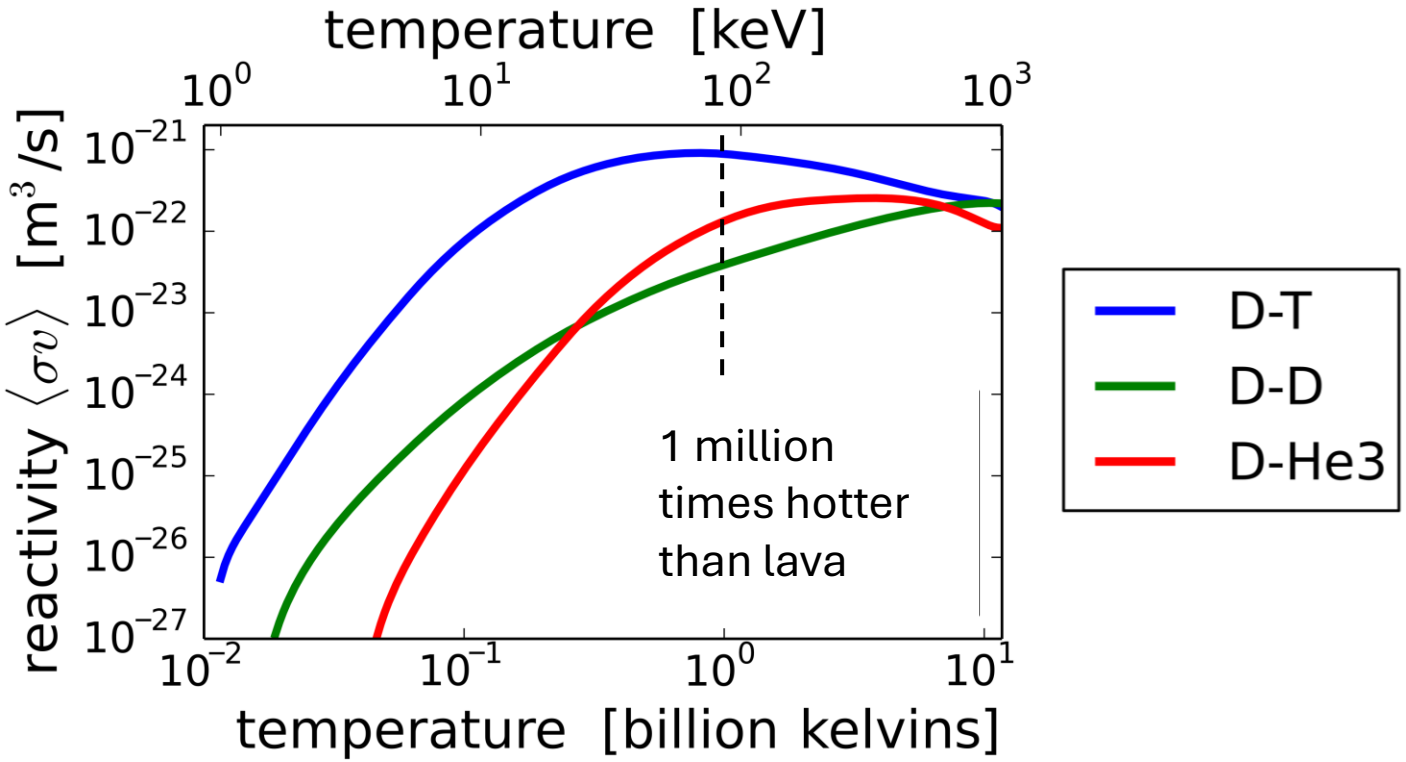


Fusion energy has many promising elements

Abundant | **Nonpolluting** | **Safe** | **No High Level Waste**

If fusion energy has so many positives, why haven't we harnessed it?

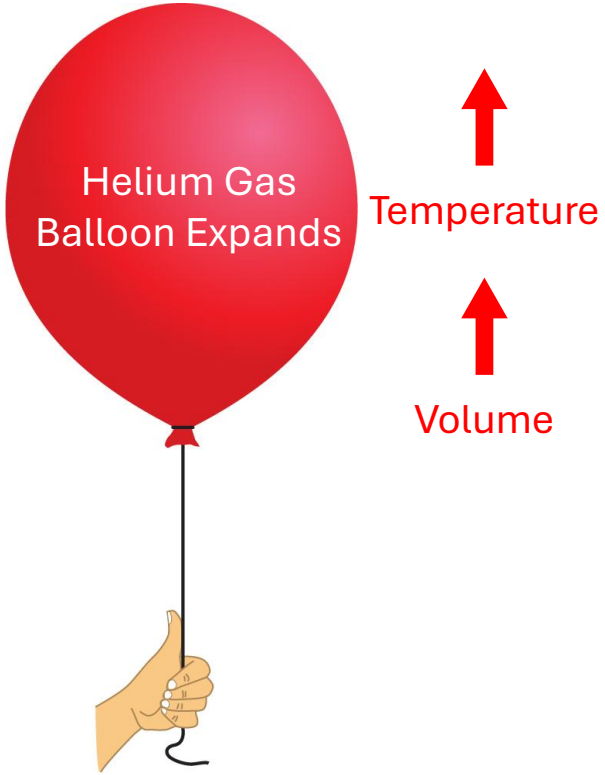
We need enormous temperatures to fuse atoms

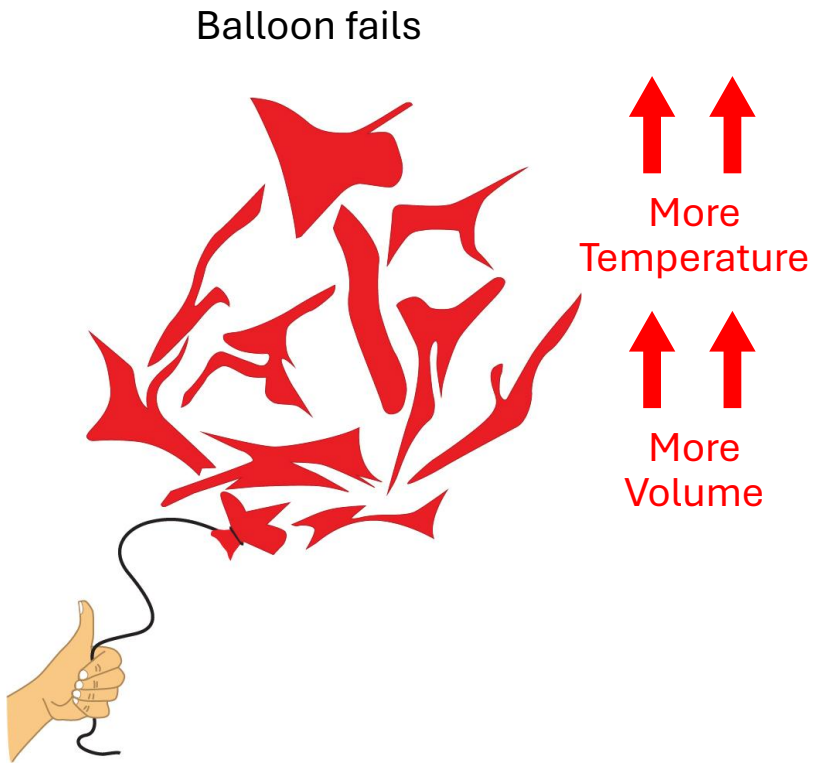


Energy released will depend on temperature, volume, time and density

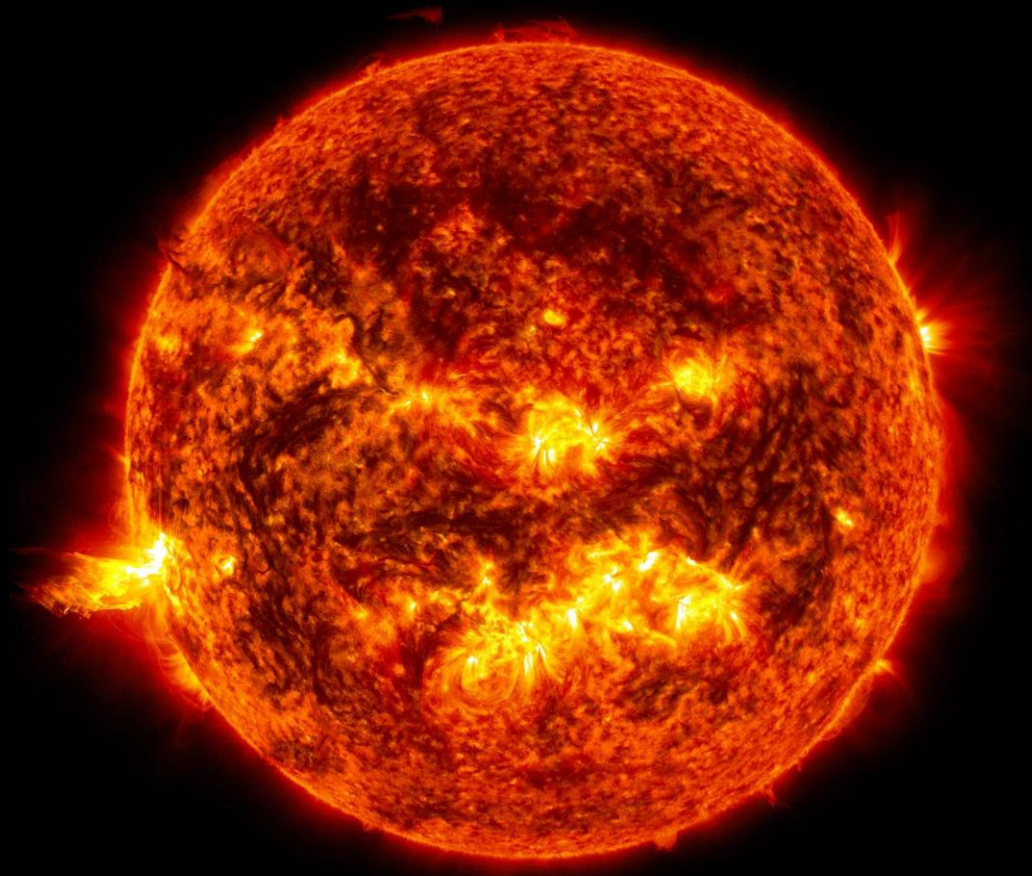
Creating a sustained fusion burn is a grand scientific challenge

As temperature and densities increase, it becomes harder to confine the fusion reactions





Creating a sustained fusion burn is a grand scientific challenge cont.

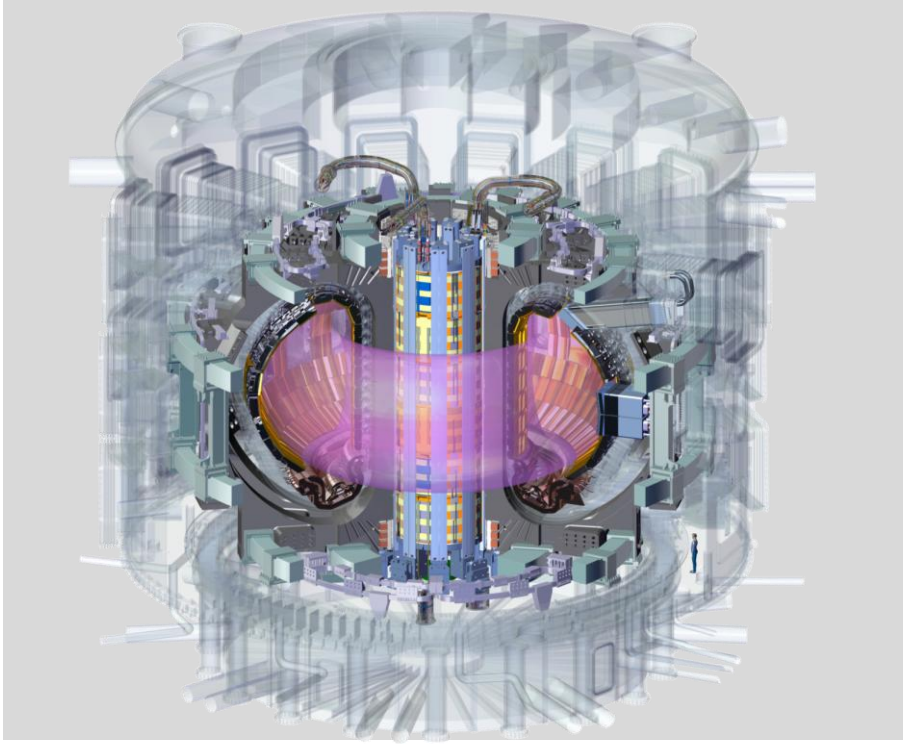


Stars' own gravity provides the force to sustain the temperatures and densities needed for fusion

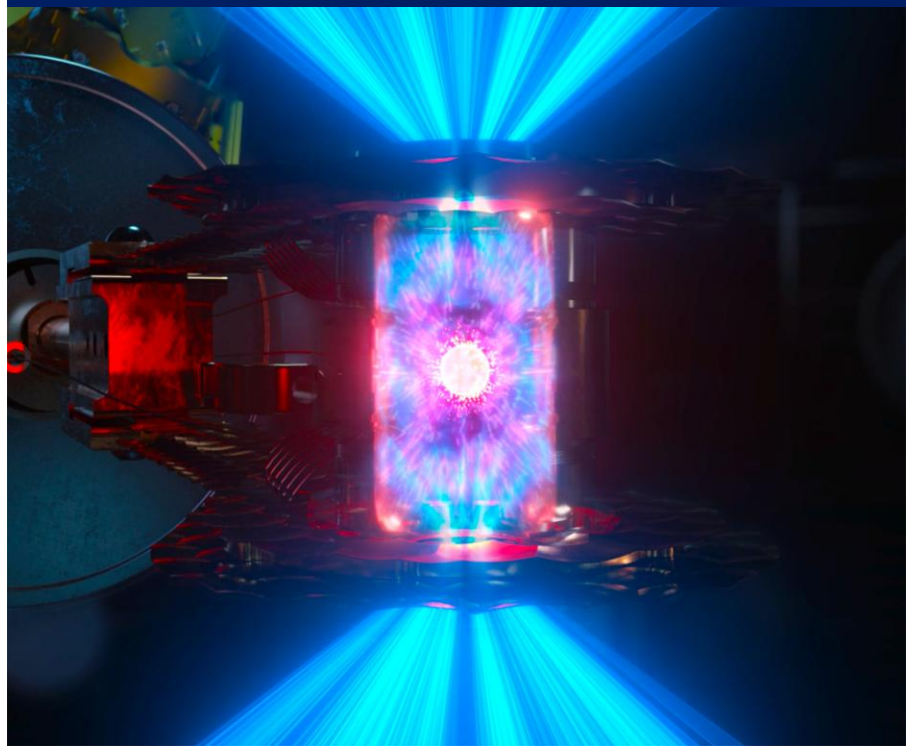
Image: NASA

Here on Earth, we pursue two main approaches to fusion energy

Magnetic confinement
"furnace / boiler"



Inertial confinement
"car engine"



Density

Time and Volume

On Dec. 5, 2022, LLNL demonstrated **fusion ignition** in the lab

LLNL's National Ignition Facility delivered **2.05 MJ** of laser energy to a target, creating a plasma with a temperature of **130 million °C** and producing **3.15 MJ** of fusion energy

Can Fusion Solve the Climate Crisis?
Scientists made a huge breakthrough on the road to emissions-free power. Here's what that means, and doesn't mean.
Forbes

BREAKING • INNOVATION
Here's How Nuclear Fusion Works—And Why It's A Big Deal For Scientists

The New York Times

SCIENCE
Fusion Industry Suddenly White-Hot After U.S. Lab Breakthrough
With commercialization years away, investors flock to technology's long-term clean-energy potential

ENERGY
What to know about DOE's fusion milestone
Experiments at a U.S. government lab may have provided "proof that the physics work." But future fusion reactors might turn to a different technology for replicating the energy that powers the sun.

THE WALL STREET JOURNAL.

REUTERS®

POLITICO

CNBC

U.S. to reveal scientific milestone on fusion energy

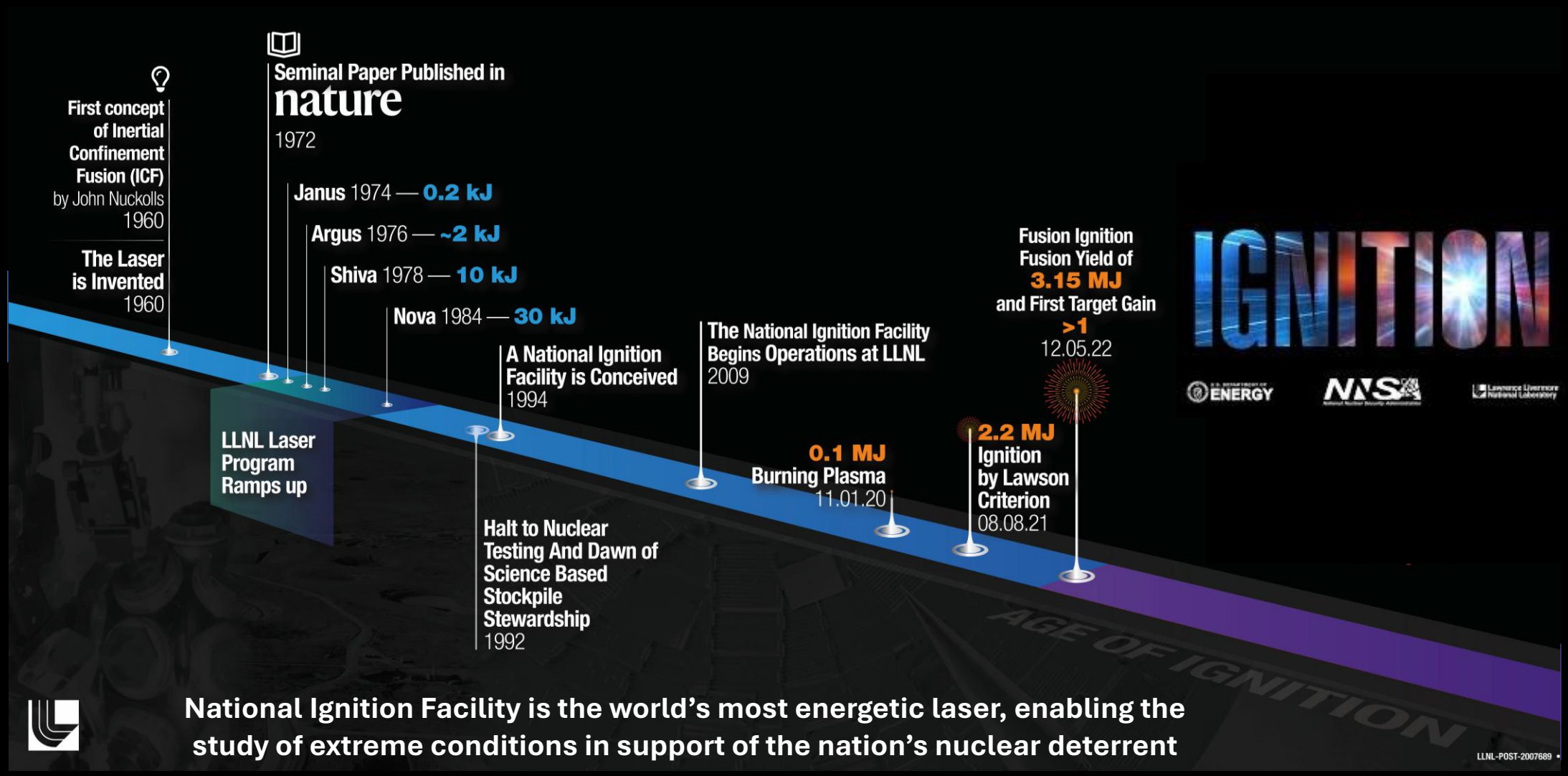
Scientists announce a fusion breakthrough with big implications for clean energy

CLEAN ENERGY
Nuclear fusion breakthrough: Scientists generate more power than used to create reaction

What to know about DOE's fusion 'breakthrough'

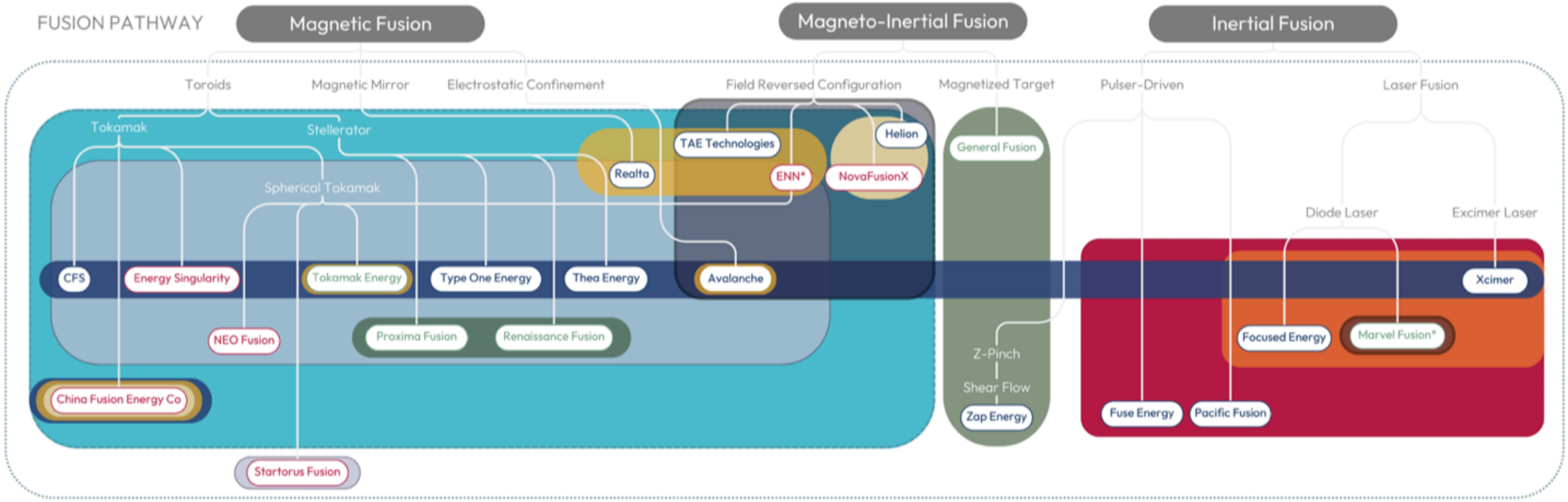
E&E NEWS | ENERGYWIRE

LLNL has pursued laser fusion for half a century



National Ignition Facility is the world's most energetic laser, enabling the study of extreme conditions in support of the nation's nuclear deterrent

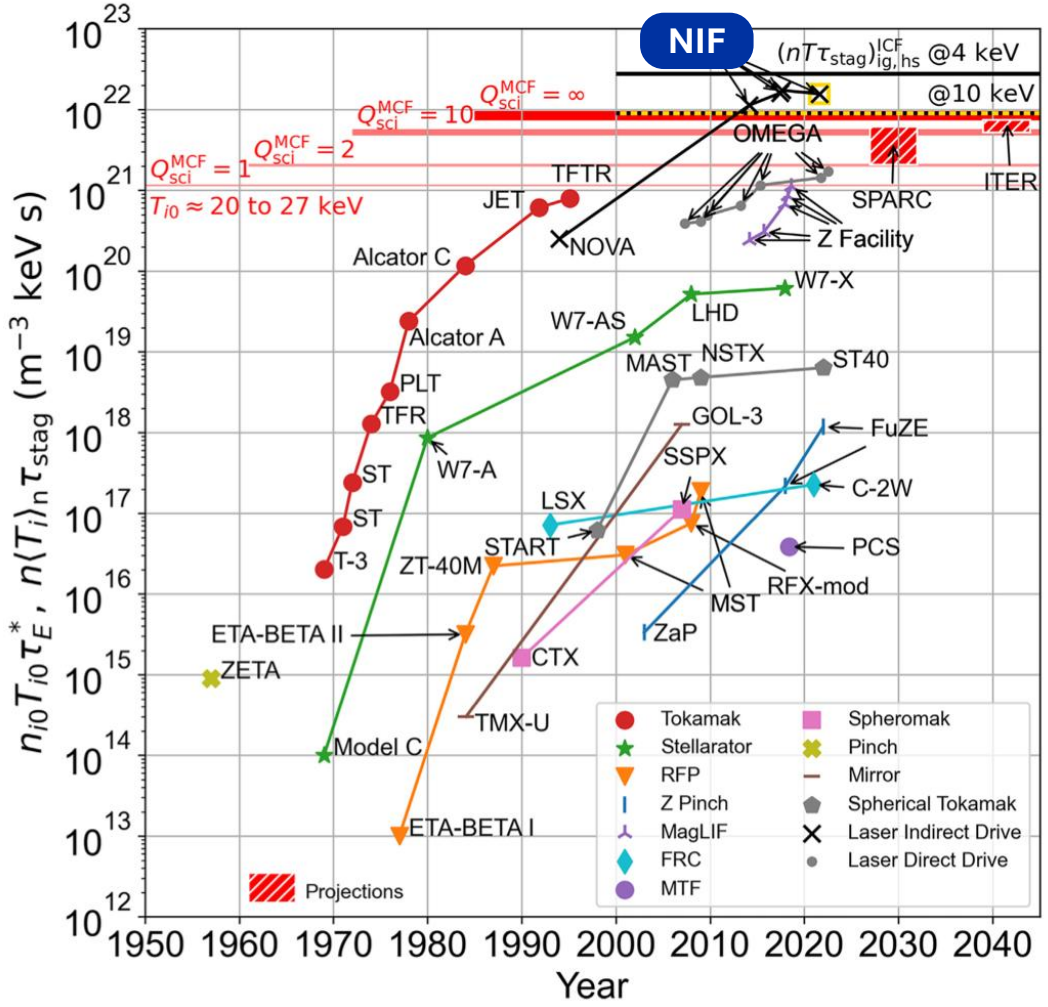
What now? More than 20 companies have each raised >50M$ USD to pursue various approaches



Special Competitive Studies Project: Commission on the scaling fusion energy Oct. 2025 report.

Meaningful progress occurs at Scientific Breakeven, $Q_{sci} \geq 1$
Power to the grid occurs at Engineering Breakeven, $Q_{eng} \geq 1$

1 billion times



Q_{sci}
ratio of fusion power / **heating** power

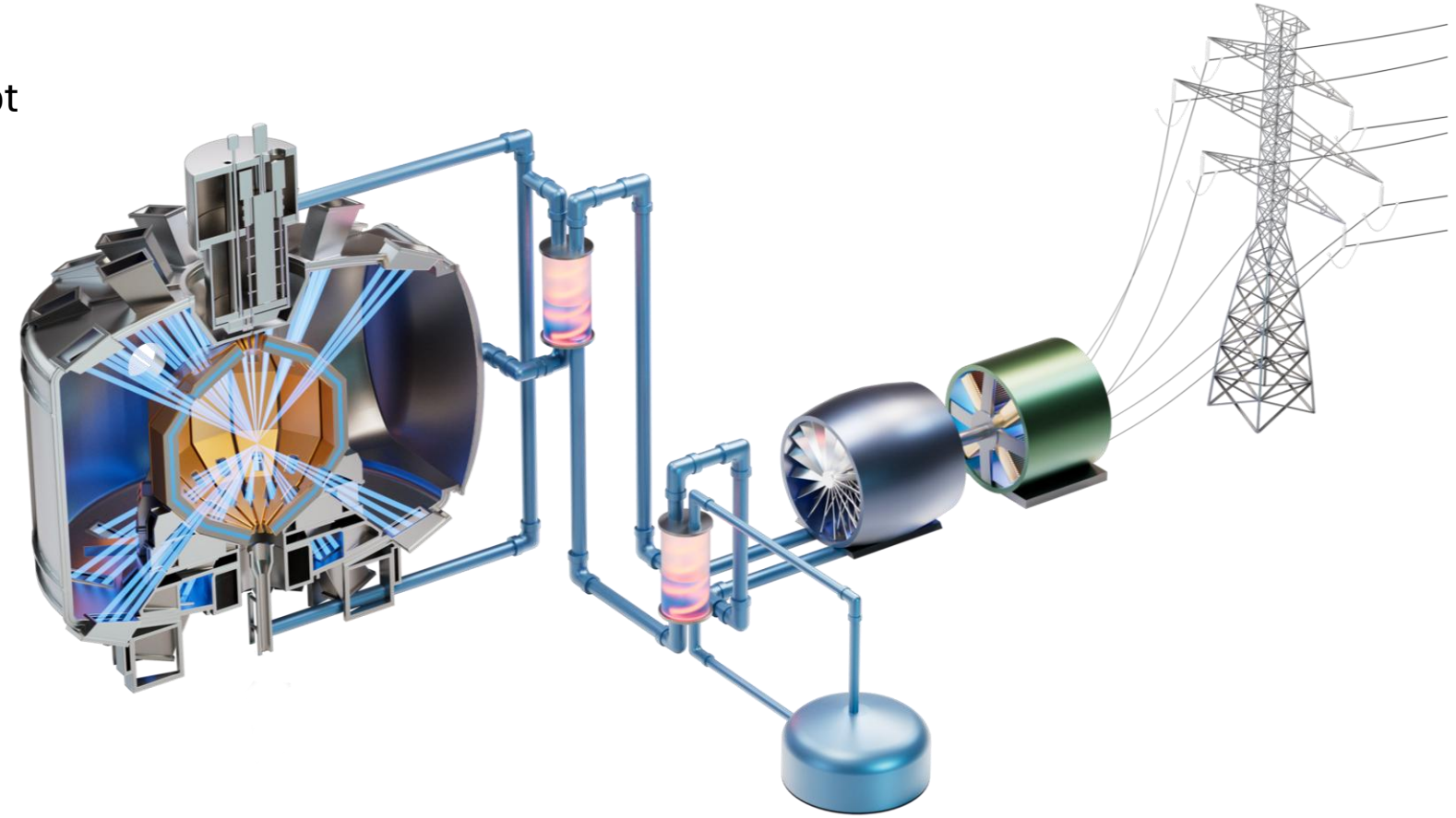
Q_{eng}
ratio of fusion power / **plant** power

	Scientific Breakeven	Engineering Breakeven
Laser Fusion	☑	☒
Magnetic Fusion	☒	☒

S. Wurzel and S. C. Hsu, Phys. Plasmas, 2025

Taking a gargantuan leap from science demo to power plant (Step 0)

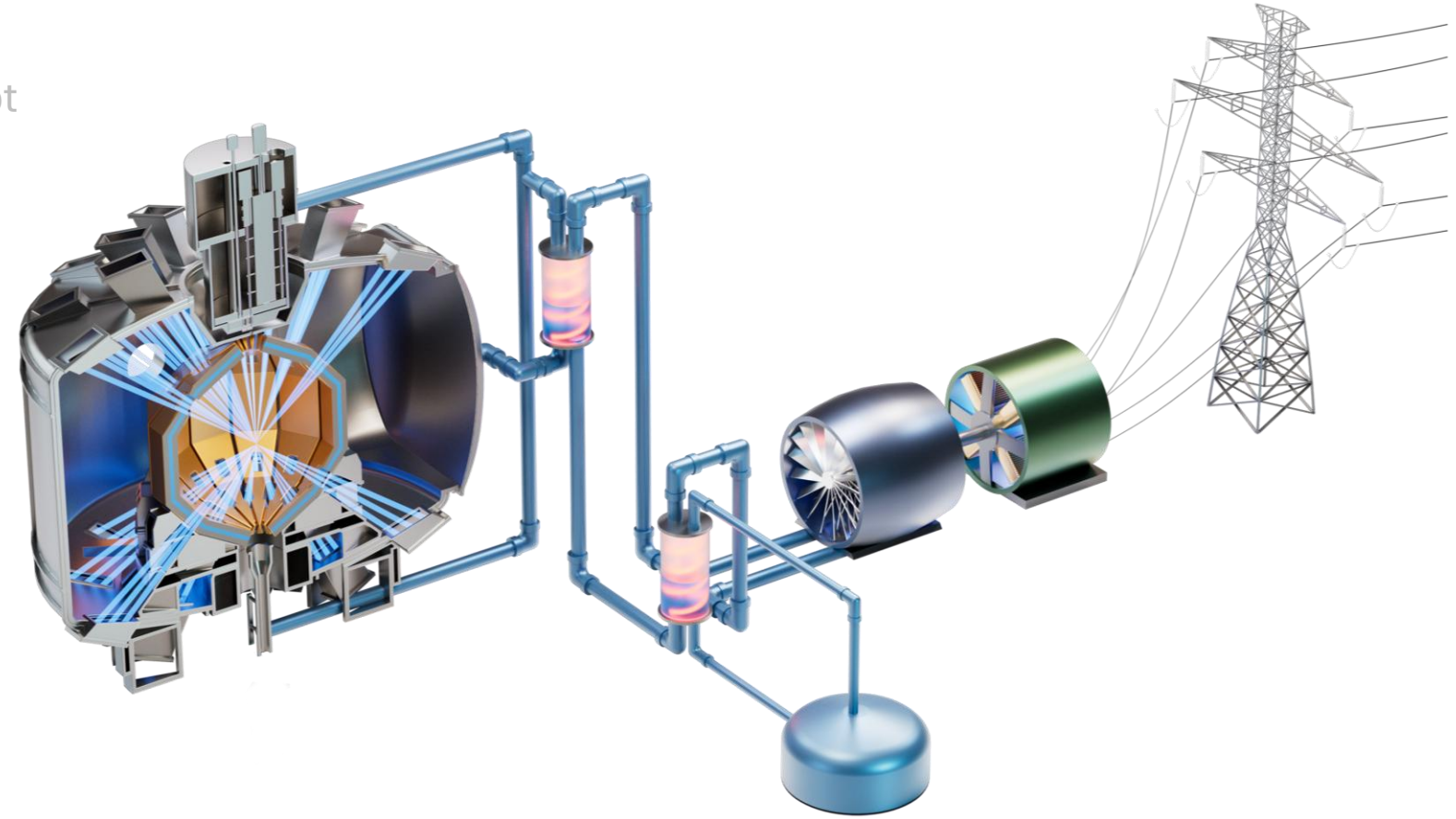
Step 0
Demonstrate physics concept



Taking a gargantuan leap from science demo to power plant (Step 1)

Step 0
Demonstrate physics concept

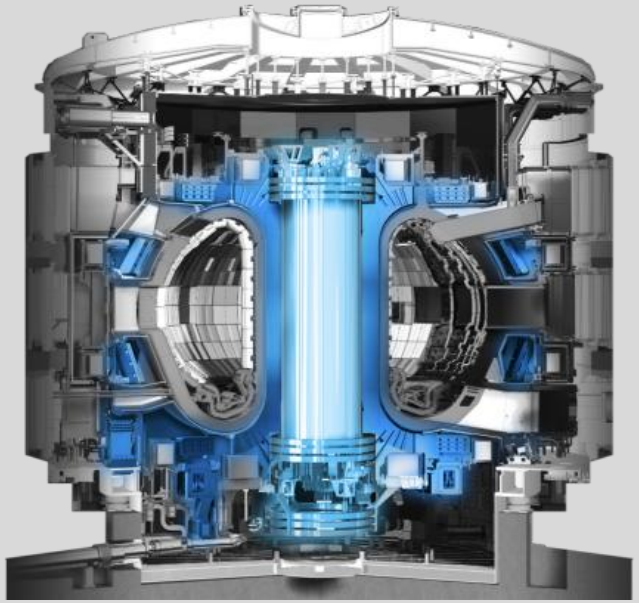
Step 1
Create more fusion energy that it takes to run power plant



Operating a fusion power plant takes energy

For laser driven inertial fusion energy, drivers need ~10X more efficient, and Q_{sci} needs to increase ~5X

For magnetic confinement, heating is much more efficient, but Q_{sci} needs to increase at least 10X

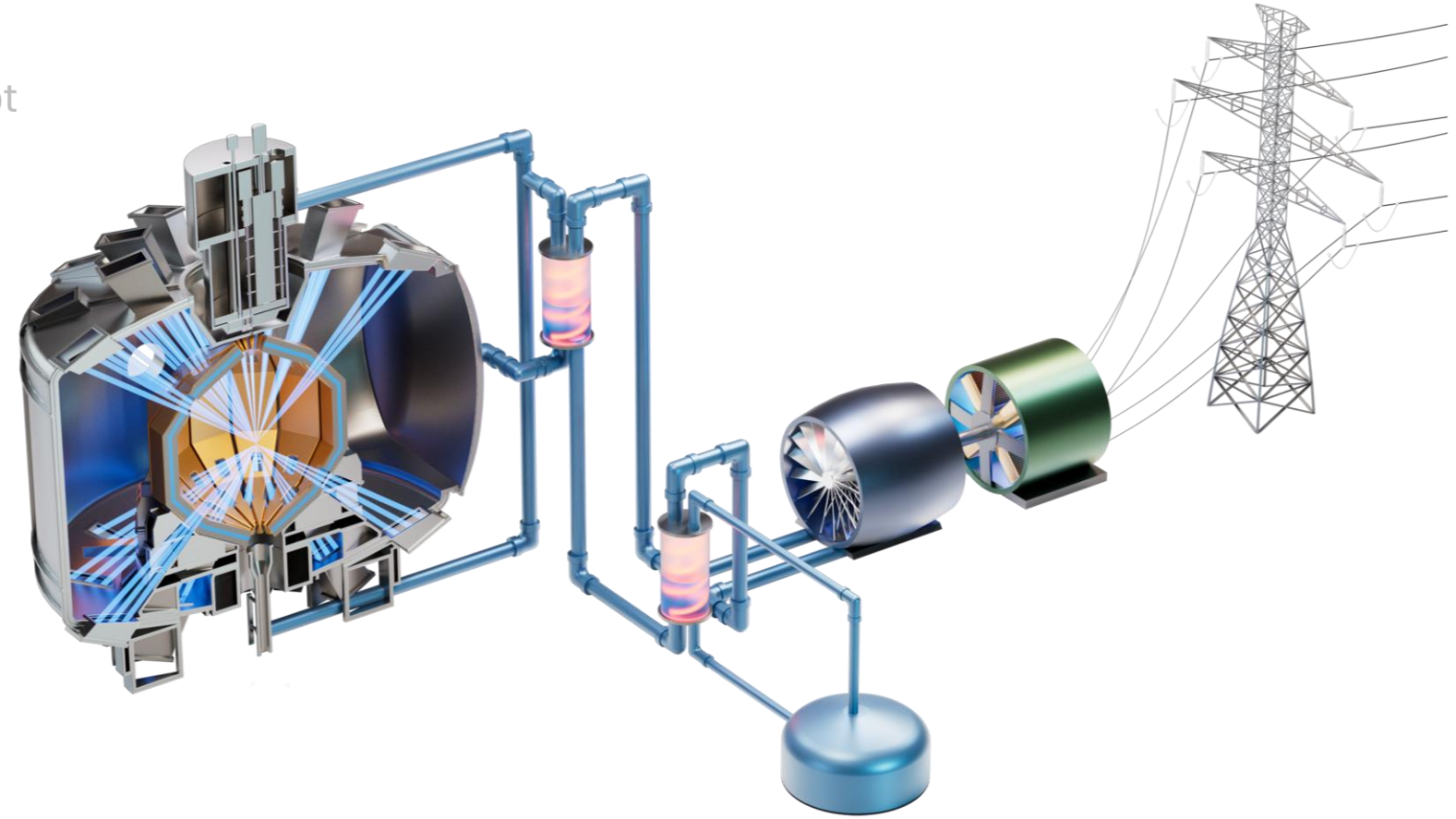


Taking a gargantuan leap from science demo to power plant (Step 2)

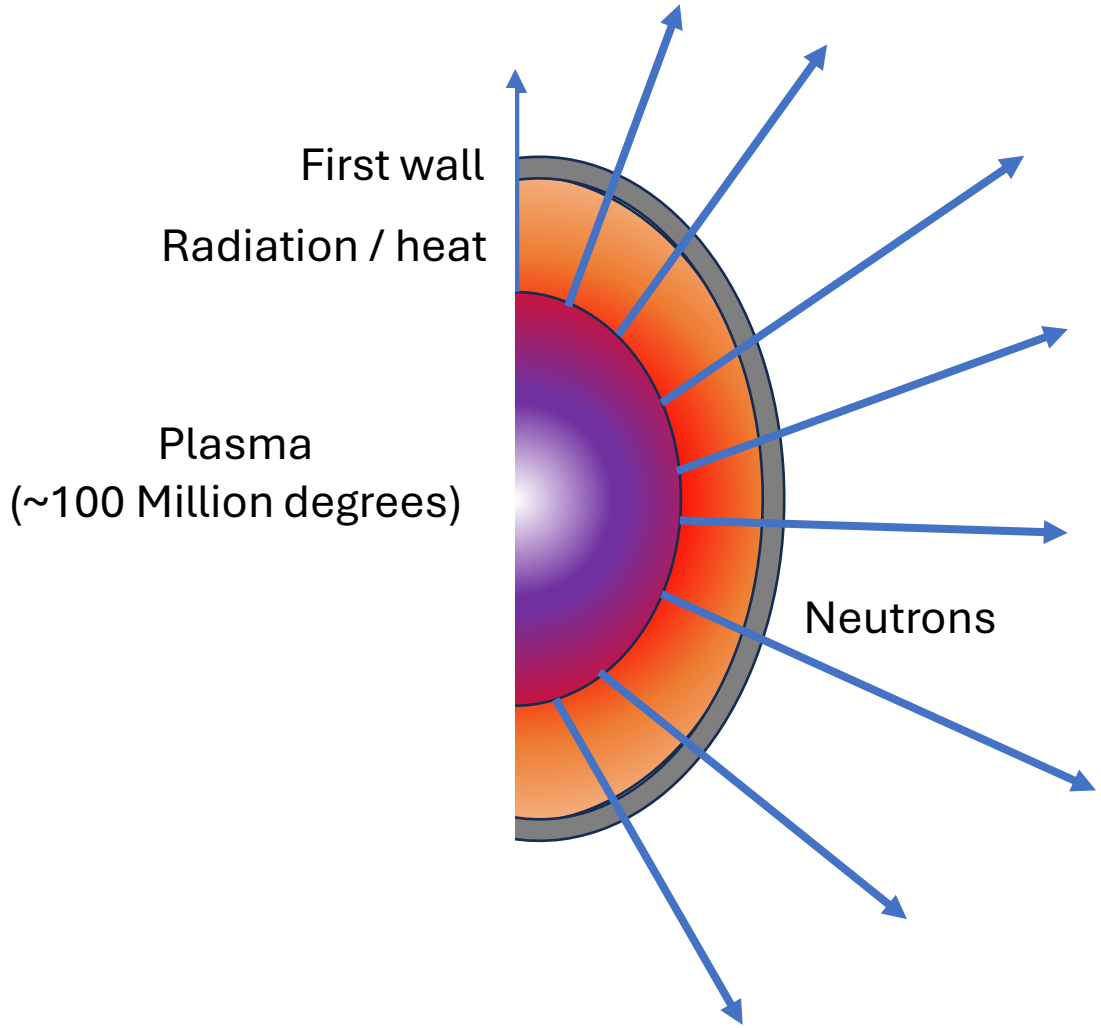
Step 0
Demonstrate physics concept

Step 1
Create more fusion energy that it takes to run power plant

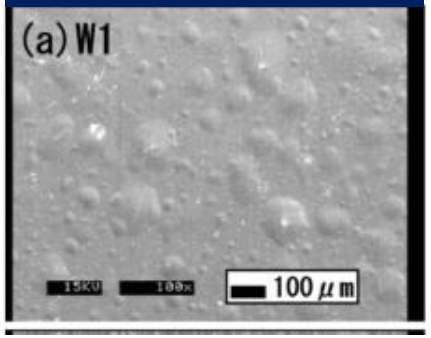
Step 2
Don’t destroy things



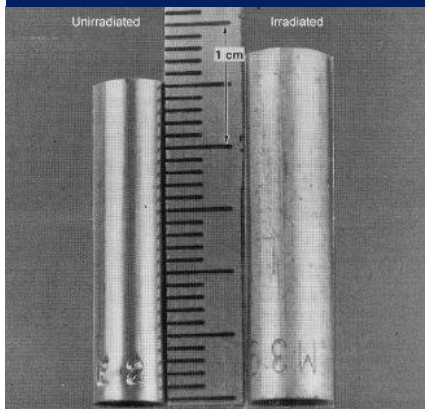
A “first wall” has to protect the rest of the plant



Surface blistering



Neutron embrittlement



Survival is key

- First wall must survive at ~1000° C
- Must not erode and inject too much material into plasma
- Must survive for large fraction of plant lifetime

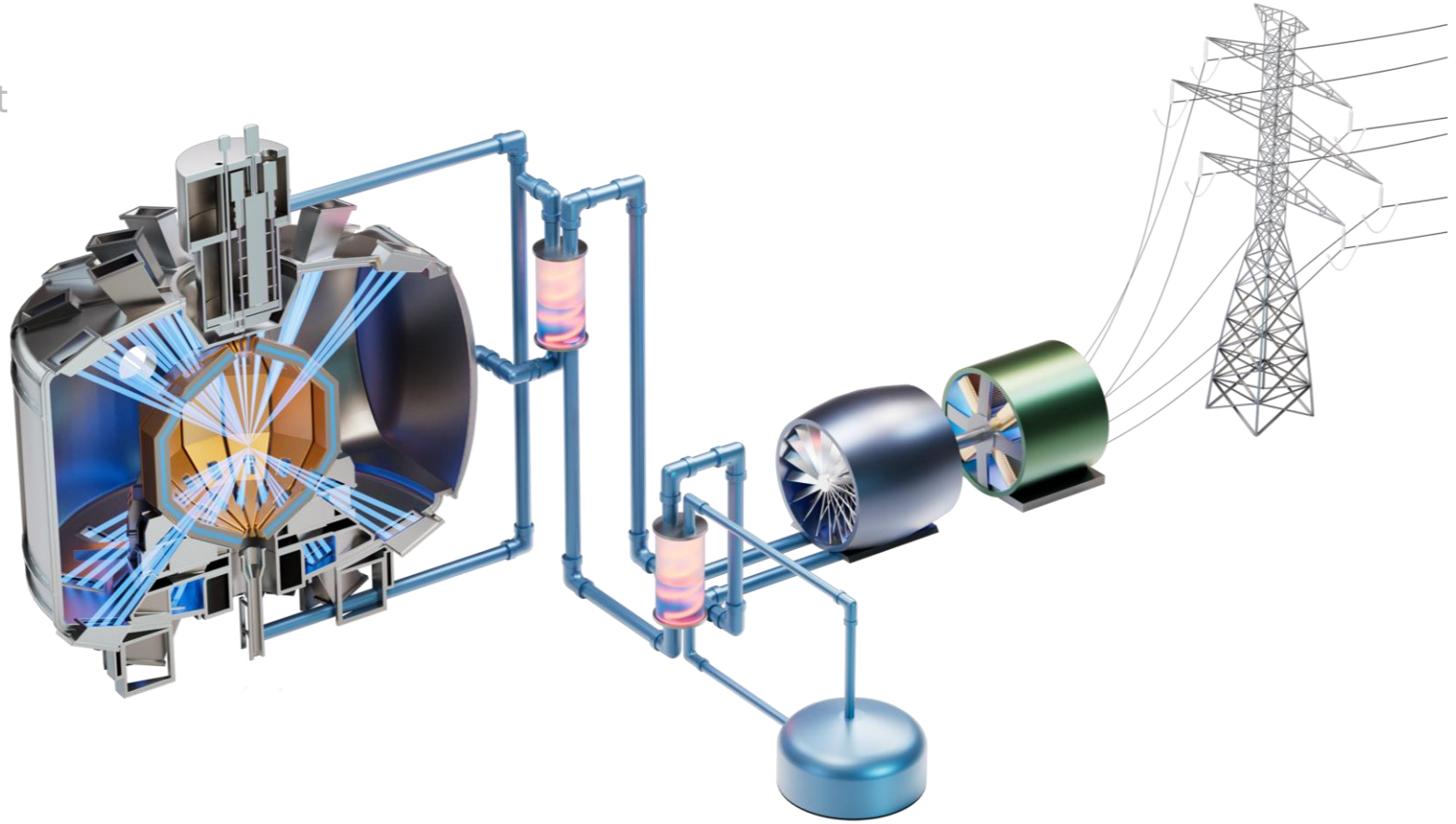
Taking a gargantuan leap from science demo to power plant (Step 3)

Step 0
Demonstrate physics concept

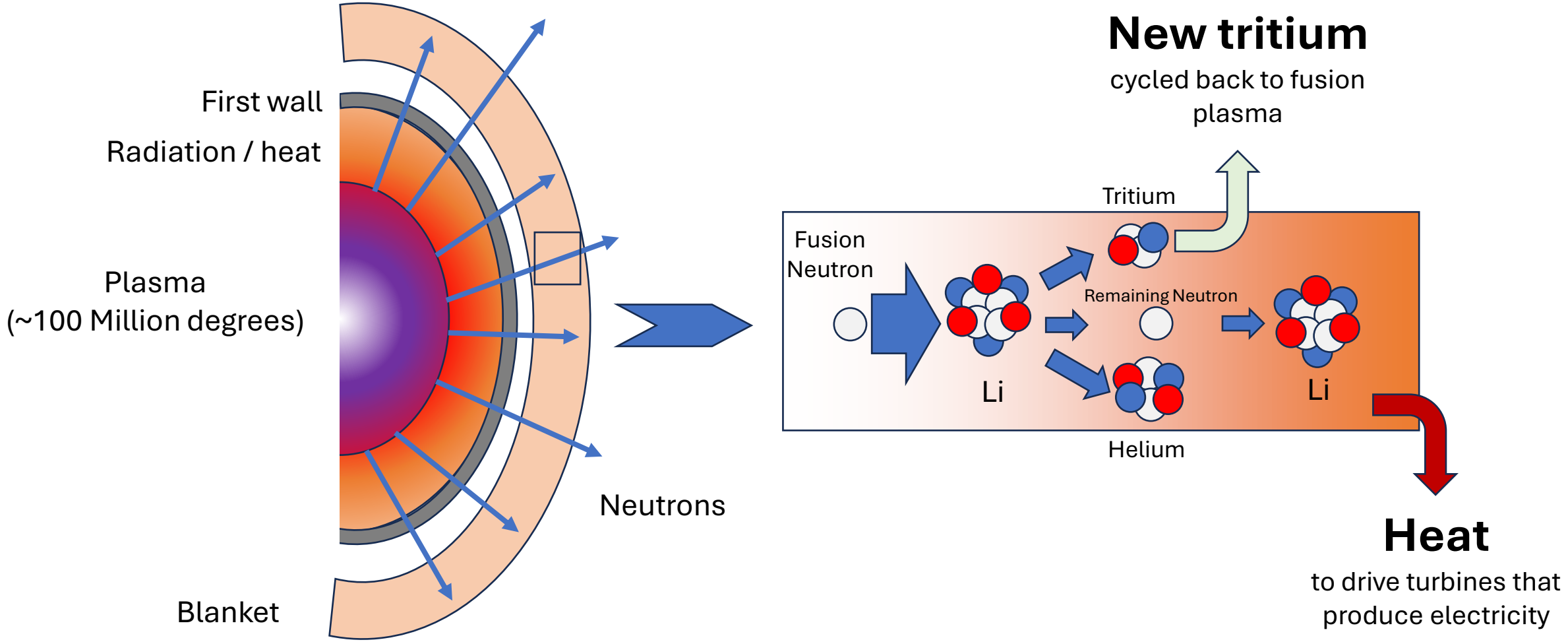
Step 1
Create more fusion energy that it takes to run power plant

Step 2
Don’t destroy things

Step 3
Make your own fuel + harness that fusion energy!



Fusion neutrons interact with a surrounding “blanket,” generating new fuel and heat



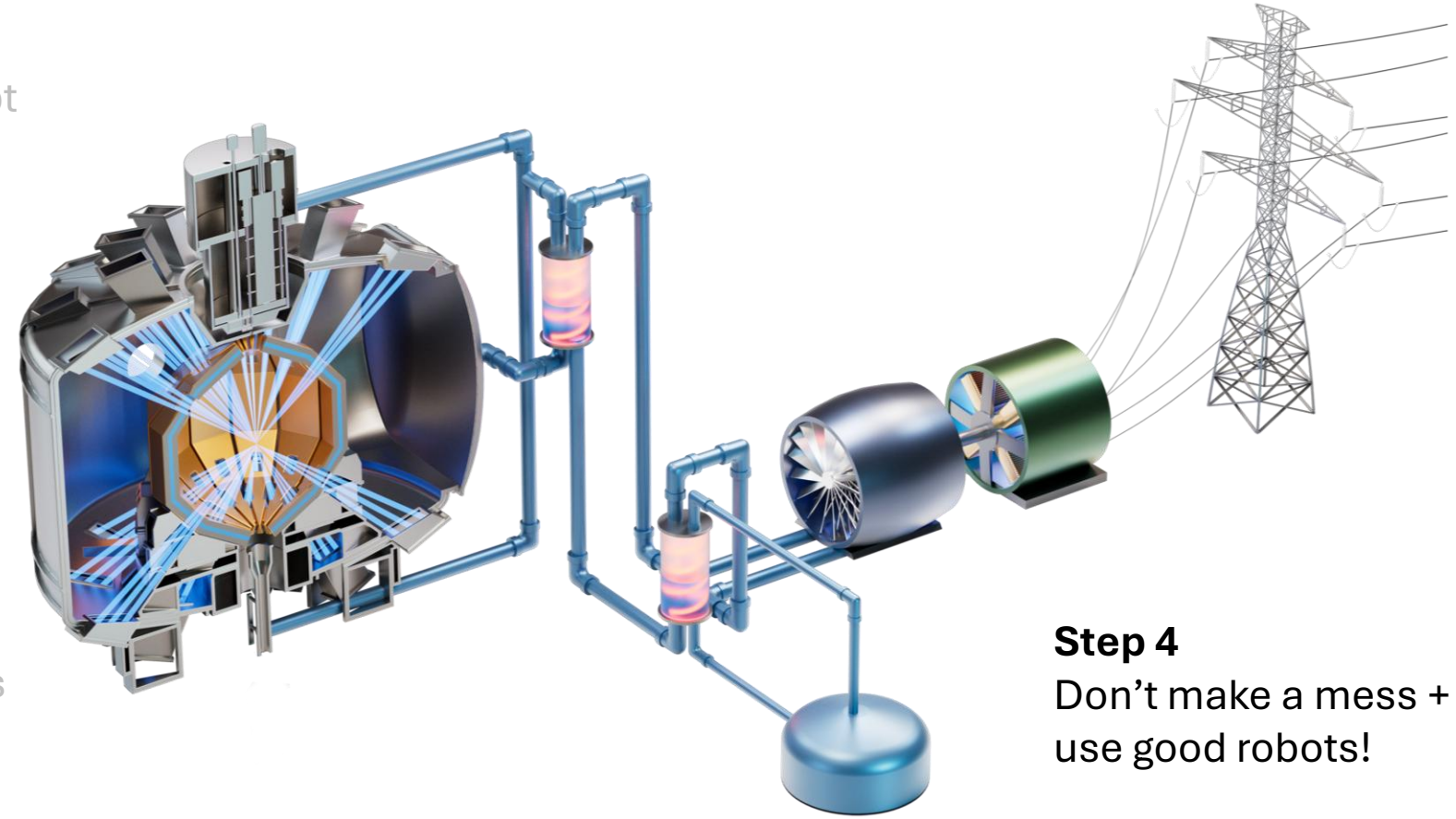
Taking a gargantuan leap from science demo to power plant (Step 4)

Step 0
Demonstrate physics concept

Step 1
Create more fusion energy that it takes to run power plant

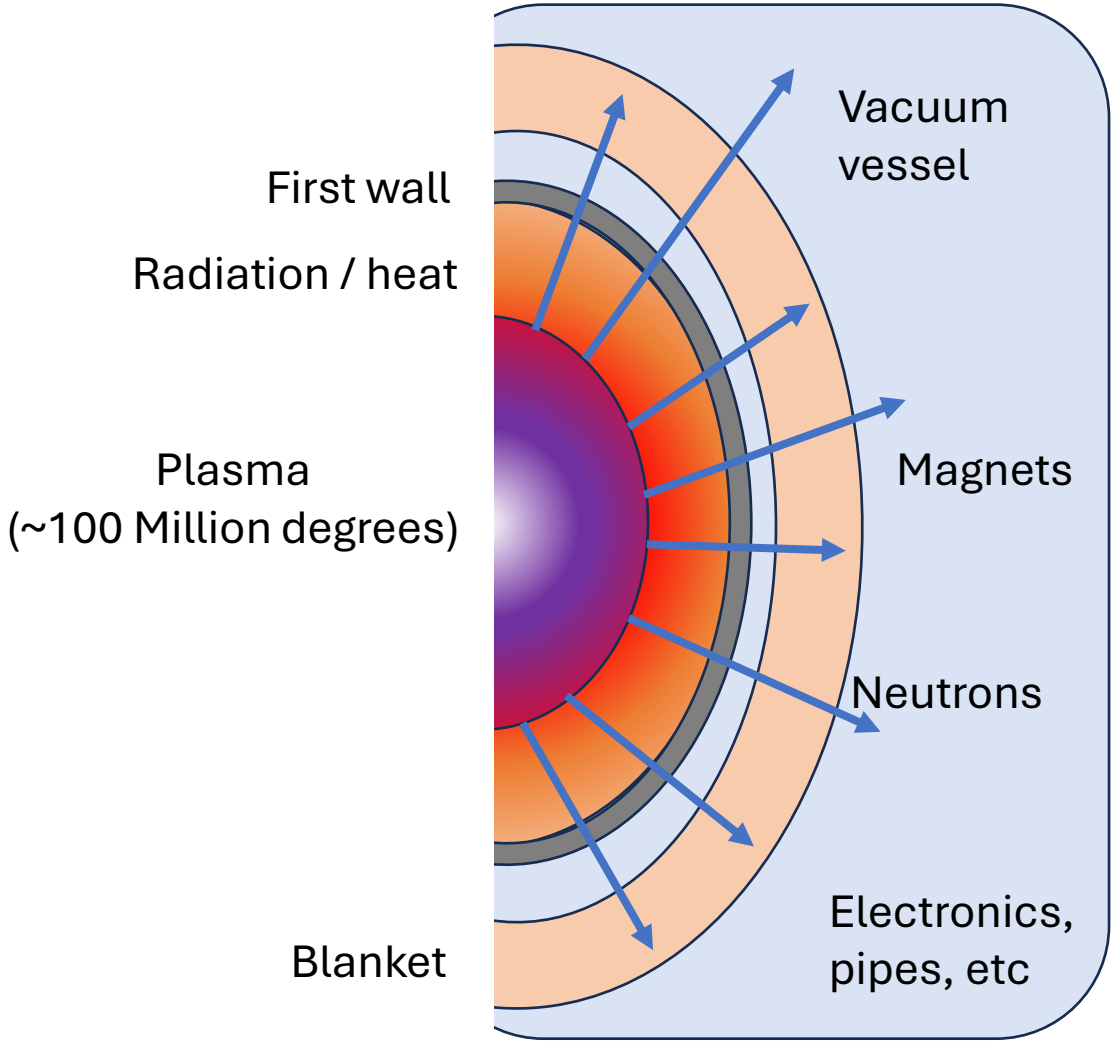
Step 2
Don’t destroy things

Step 3
Make your own fuel + harness that fusion energy!



Step 4
Don’t make a mess + use good robots!

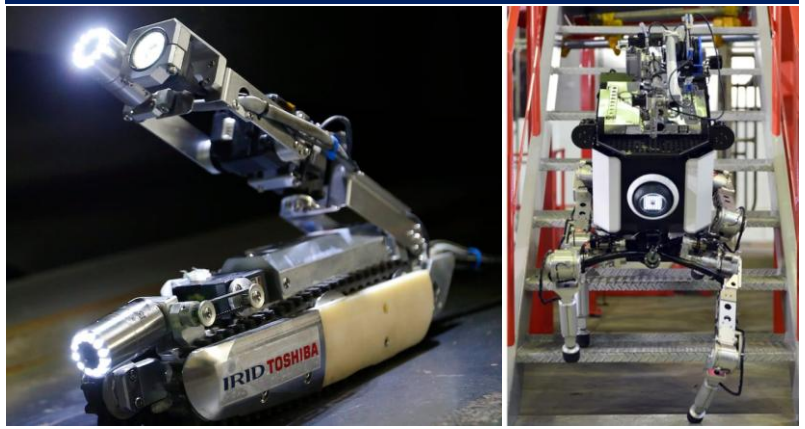
Energetic neutrons can activate materials, making them radioactive



We need to:

- minimize activated material
- choose low activation materials with short half lives
- maximize component lifetime to reduce waste
- have a remote inspection and maintenance plan (hence, robots)

Remote inspection & maintenance



Despite these immense challenges, unprecedented momentum and resources are being brought to bear

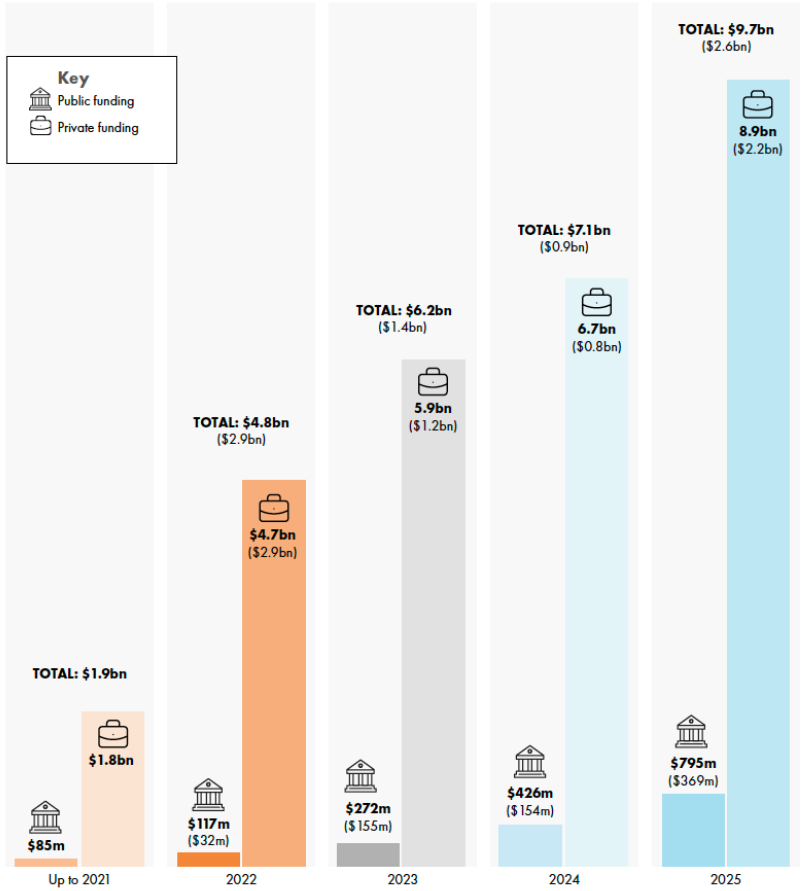
DOE Creates New Fusion Office as Part of Major Reorganization

NOV 21, 2025

The reshuffle elevates fusion within DOE's hierarchy and transfers oversight of certain applied R&D offices away from the under secretary for science.

Lindsay McKenzie

Fusion Funding YOY



Reuters World Business Markets Sustainability Legal Commentary Technology Investigations

General Fusion to go public in US via $1 billion SPAC deal

By Dharna Bafna

January 22, 2026 9:58 AM PST · Updated January 22, 2026

Reuters World Business Markets Sustainability Legal Commentary Technology Investigations

Trump Media bets on fusion energy with $6 billion TAE deal

By Deborah Mary Sophia and Timothy Gardner

December 18, 2025 11:27 PM PST · Updated December 18, 2025

ENERGY TRANSITION | PRIVATE EQUITY & VENTURE CAPITAL

Commonwealth Fusion Systems Raises $863 Million to Bring Fusion Power to the Grid

Emanuela Hawker August 29, 2025


While there are many challenges ahead, the future is BRIGHT!

Workshop Agenda

- Opening Remarks
- Introduction to Fusion Energy
- **Existing and Needed Capabilities and Resources for Fusion**
- Panel Discussion #1: Informing a State-led Fusion Initiative
- Break
- Statewide Initiatives to Support a Fusion Ecosystem
- Role of Workforce and Community Development
- Panel Discussion #2: Delivering the First Fusion Pilot Plant
- Concluding Remarks

Existing and Needed Capabilities and Resources in California for Fusion Development

Presented at

Fusion Research and Development Innovation Initiative

California Energy Commission

Apr. 2nd 2026

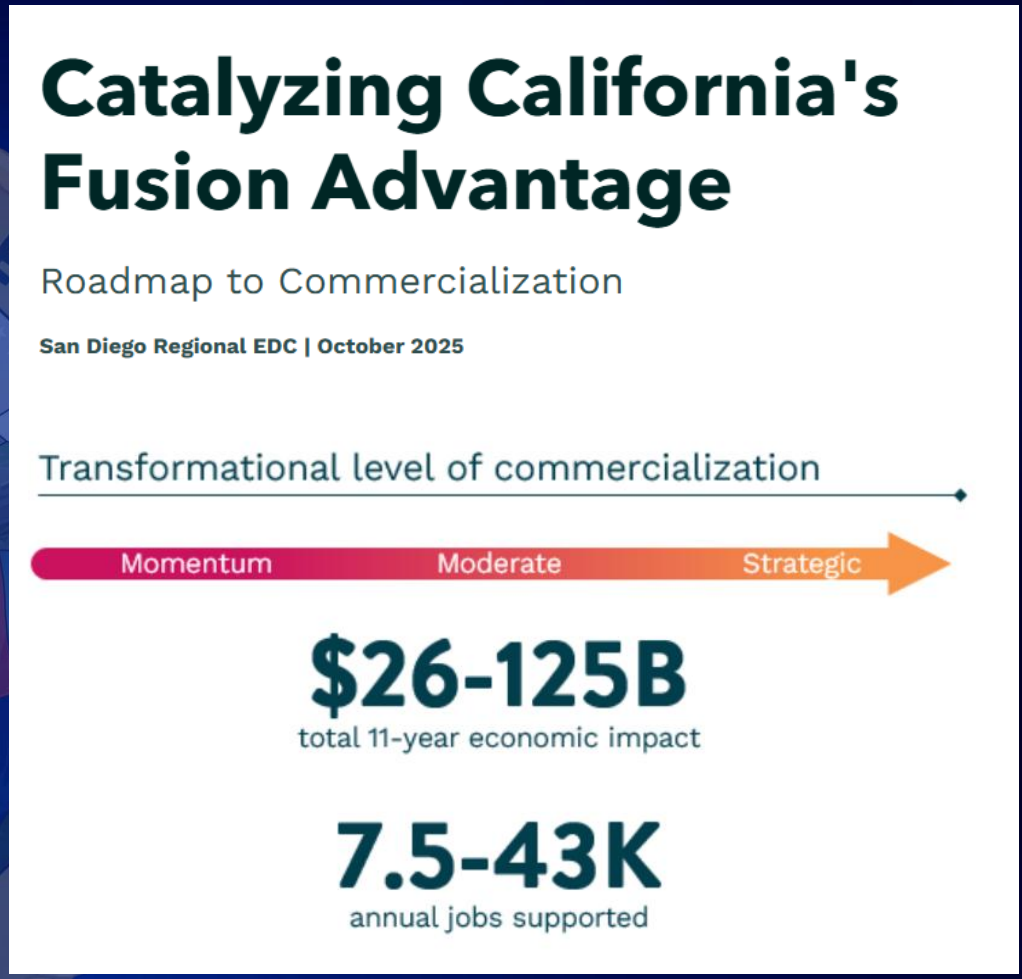
Brian Grierson

Director, Fusion Energy Technologies

GENERAL ATOMICS

SB 80 Represents California's Commitment to Fusion Leadership

- **Largest fusion economy**
  - One-third of U.S. fusion startups
  - Billions in investment
- **World-class infrastructure**
  - DIII-D and NIF
  - Leading companies
  - UC and academia
- **Legislative framework in place**
  - AB 1172 (2027 IEPR assessment)
  - SB 80
  - SB 925 (pending)



https://fusionca.org

GENERAL ATOMICS

California Governor Gavin Newsom Addresses the 2025 Convening of the California Fusion Ecosystem

Hosts

Collaboration

DOE's 2024 Fusion Strategy Explicitly Calls for State Partnerships to Bridge Commercialization Gap

Core Challenge Areas

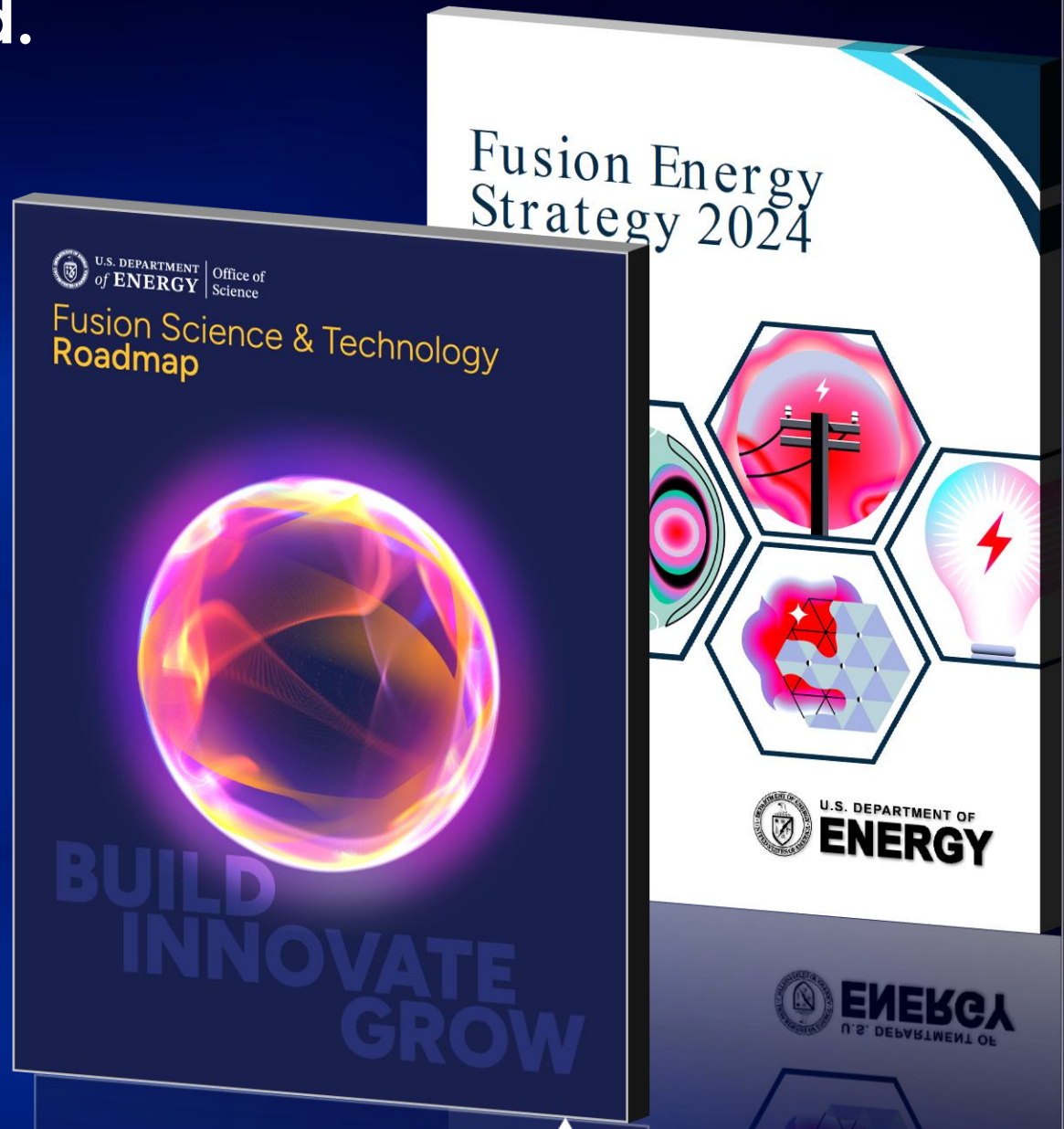
Structural Materials Science & Technology	Survive extreme low and high temperatures, high stress and neutron damage.
Plasma-Facing Components and Plasma-Materials Interactions	Designing and testing materials and systems that can endure fusion's extreme heat flux, neutrons, and plasma interactions to ensure durable, maintainable reactor components.
Advancing Confinement Approaches	Understanding and controlling burning plasmas to achieve stable, high-performance confinement and sustained fusion energy.
Fuel Cycle and Tritium Processing	Developing closed-loop systems to produce, manage, and recycle fusion fuel safely and efficiently.
Blanket Science & Technology	Advancing and testing blanket systems to ensure efficient heat extraction, tritium breeding, and long-term reliability.
Fusion Plant Engineering & System Integration	Designing and integrating the full fusion power plant—power conversion and controls to maintenance, robotics, and digital modeling.

GENERAL ATOMICS

DOE's 2024 Fusion Strategy Explicitly Calls for State Partnerships to Bridge Commercialization Gap cont'd.

- **Accelerate the U.S. fusion industry**
  - Public-private partnerships
  - New facilities in ~ 3 years
  - De-risk technology in ~ 5 years
  - Pilot facilities by the 2040s
- **Opportunity for state-level leadership**
  - Economic: Host new facilities & hubs
  - Jobs: High tech industry of the future
  - Leverage: Federal + private sector

The national roadmap asks states to step forward to amplify new and existing investments



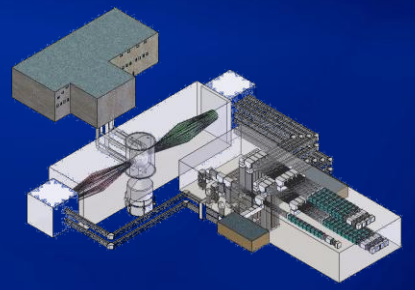
GENERAL ATOMICS

The Path to Fusion Energy in California

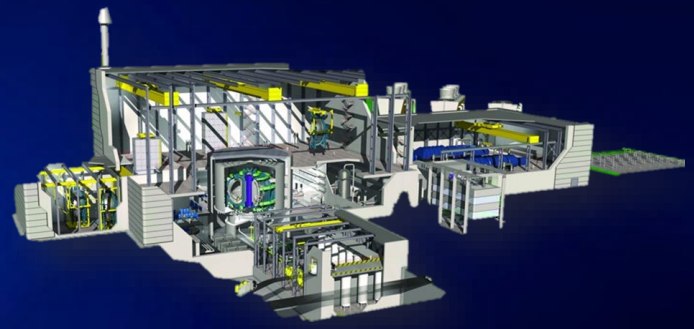
Leveraging Pre-Competitive R&D and Common-Use Capabilities

Technology Maturation, Workforce and Supply-Chain Development (2026 – 2040)

Demo Facilities and First Pilot Plants (2030-40)



Economically Viable Commercial Power Plants



- Public-led hubs for component R&D
- Leverage Facilities for R&D and Training (NIF, DIII-D NATIONAL FUSION FACILITY)
- New fusion test facilities
- Supply Chain Development and Community Engagement for Fusion Power Plants

Commercializing fusion energy will require collaborative investments to deliver new testing facilities and expand the fusion workforce.

GENERAL ATOMICS

Establishing Essential Capabilities through Public Private Partnerships
Build → Innovate → Grow

- FS&T Roadmap convers all aspects of fusion R&D, motivating facilities across six challenge areas and significantly expands blanket and fuel cycle R&D program

Facility	Challenge Area	Purpose	Status; Cost
ITER	Confinement	Burning plasma	CD-2/3; TPC: $6.5B
Beamlet	Confinement	De-risk laser, target, etc.	Pre CD-0; Est. cost: $0.2-0.3B
MPEX	Materials	First wall material tests	CD-2/3; TPC: $0.2B
NHHF	Materials	Component testing	Pre CD-0; Est. cost: $0.2B
FPNS	Materials, Blanket	14 MeV Neutron irradiation	MNS under review; Est. cost: $0.75B
VNS	Blanket, Fuel Cycle	Component qualification	Pre CD-0; Est. cost: $0.5-1.5B
BCTF	Blanket	Blanket component tests	Pre CD-0; Est. cost: $0.1B
IB-FCTF	Blanket, Fuel Cycle	Integrated testing	MNS under review; Est. cost: $0.65B
MEC-U	N/A	High-energy density science	Paused; Est. cost: $0.35-0.45B

FES anticipates building facilities via public-private partnership to reduce federal share.

https://science.osti.gov/About/Federal-Advisory-Committee/SCAC/Meetings/3-27-2026

Establishing Essential Capabilities through Public Private Partnerships Build → Innovate → Grow cont'd.

- FS&T Roadmap convers all aspects of fusion R&D, motivating facilities across six challenge areas and significantly expands blanket and fuel cycle R&D program

	Facility	Challenge Area	Purpose	Status; Cost
Sited →	ITER	Confinement	Burning plasma	CD-2/3; TPC: $6.5B
	Beamlet	Confinement	De-risk laser, target, etc.	Pre CD-0; Est. cost: $0.2-0.3B
Sited →	MPEX	Materials	First wall material tests	CD-2/3; TPC: $0.2B
	NHHF	Materials	Component testing	Pre CD-0; Est. cost: $0.2B
	FPNS	Materials, Blanket	14 MeV Neutron irradiation	MNS under review; Est. cost: $0.75B
	VNS	Blanket, Fuel Cycle	Component qualification	Pre CD-0; Est. cost: $0.5-1.5B
	BCTF	Blanket	Blanket component tests	Pre CD-0; Est. cost: $0.1B
	IB-FCTF	Blanket, Fuel Cycle	Integrated testing	MNS under review; Est. cost: $0.65B
Sited →	MEC-U	N/A	High-energy density science	Paused; Est. cost: $0.35-0.45B

FES anticipates building facilities via public-private partnership to reduce federal share.

https://science.osti.gov/About/Federal-Advisory-Committee/SCAC/Meetings/3-27-2026

SB 80 is the Starting Point for the Next Steps

- SB 80 creates bridge between DOE and CA State
- Tells DOE & private fusion that CA is serious partner
- Grant funding for new facilities catalyzes virtuous cycle

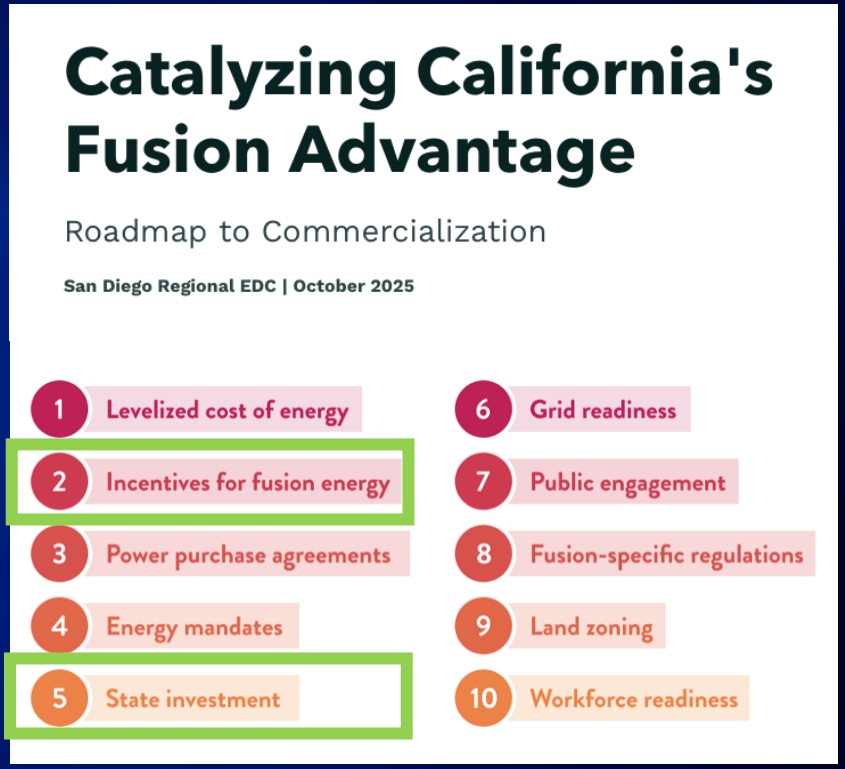
California is the epicenter of global innovation — it's made us the 4th largest economy in the world and the talent pipeline for the nation. Our state was literally born from our ability to lean into emerging industries that will change our world. While others dream, California is delivering the future — the Golden State is where the innovations of tomorrow begin.

Governor Gavin Newsom

GENERAL ATOMICS

The Fusion Research and Development Innovation Initiative Can Catalyze the California Fusion Economy

- **Initial focus on new common-use capabilities**
  - Co-locate with established infrastructure
  - Prioritize facilities with national and local buy-in
- **Establish regulatory and site readiness now**
  - Fusion-specific permitting coordinated across authorities to streamline approvals
  - Integrate fusion energy into grid planning
- **Provide attractive incentive packages**
  - Meaningful fraction of total project costs
  - Competitive with other states pursuing fusion leadership



10 critical factors that will influence California's role in fusion energy

GENERAL ATOMICS

Informing a State-led Fusion Initiative

Panel Discussion #1

Break (Return at 10:30 a.m.)

Workshop Agenda

- Opening Remarks
- Introduction to Fusion Energy
- Existing and Needed Capabilities and Resources for Fusion
- Panel Discussion #1: Informing a State-led Fusion Initiative
- Break
- **Statewide Initiatives to Support a Fusion Ecosystem**
- Role of Workforce and Community Development
- Panel Discussion #2: Delivering the First Fusion Pilot Plant
- Concluding Remarks

Jayden Saldana

Tech Transfer & Commercialization Coordinator
Governor's Office of Business and Economic Development

Overview

About GO-Biz

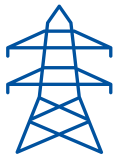
- Point of contact for economic development and job creation efforts.
- Offers services to business owners, communities, and site selectors
- Has a broad range of teams focused on combination of services, policy, and program management.

Our Teams

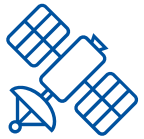
Within GO-Biz, we have a number of teams that are here to support parnters across the fusion ecosystem.

Business Investment Services

California Competes



Energy and Climate



Innovation and Emerging Technologies

International Affairs and Trade

Infrastructure and Economic Development Bank

Regional Economic Development

Supply Chain

Small Business Advocate

State Economic Blueprint – CA Jobs First

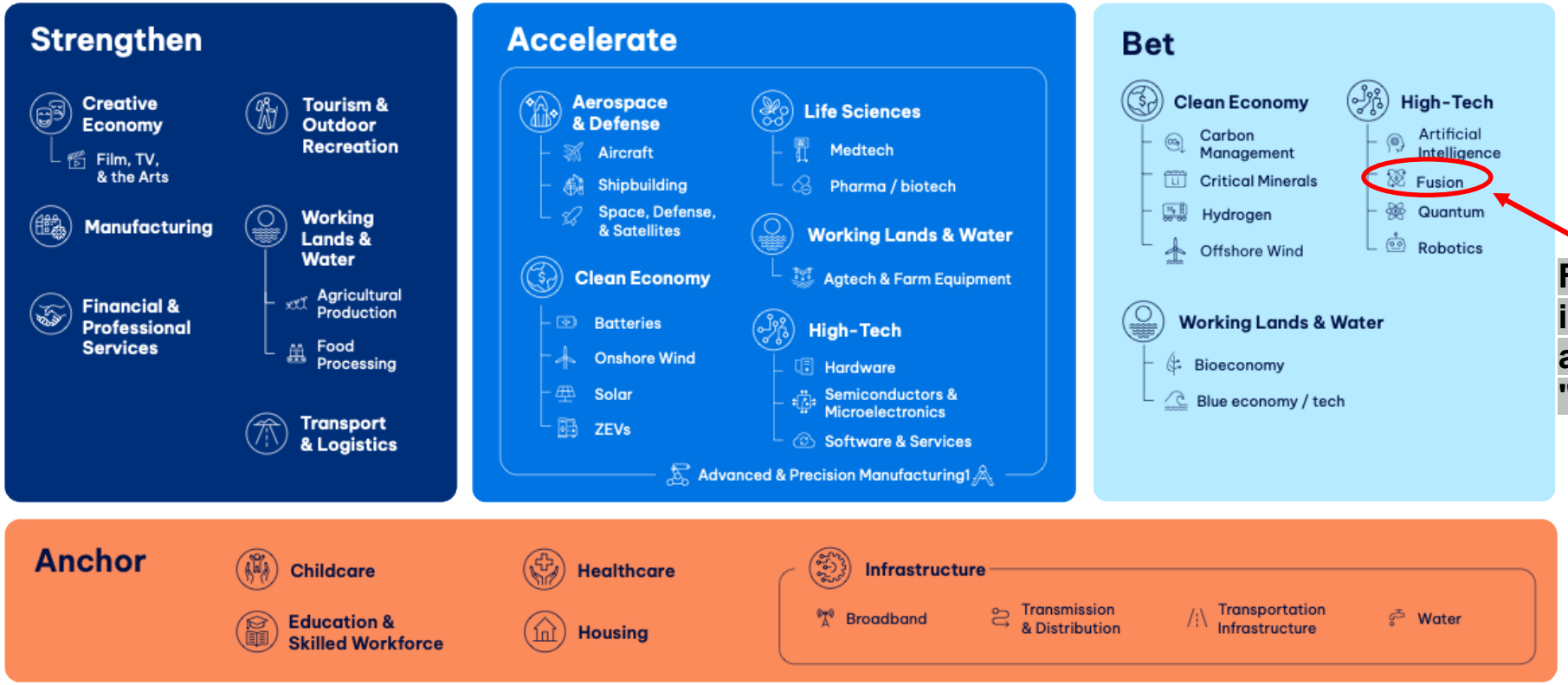
Released in 2025:

- Statewide data-driven business and workforce strategy for California.
- Regional investment and sector development across State.
- State subdivided into 13 regions.

Goals of the Blueprint:

1. Support sustainable and equitable growth across regions and populations.
2. Invest in the Workforce for the sectors of the future.
3. Create an attractive environment for and with job creators.
4. Strengthen California's Innovation economy and entrepreneural ecosystem.

California's Diverse and Dynamic Economy is Reflected in its Strategic Sectors



Fusion identified as a strategic "Bet" sector

1. High-value advanced and precision manufacturing play a major role in many of the sectors and subsectors within the 'Accelerate' category

Source: August-October 2024 working discussions with GO-Biz and LWDA, Lightcast, Moody's Analytics, MIT Living Wage, Pitchbook, US Cluster Mapping Project, California Jobs First Regional Plans Part 2, meetings with California Jobs First Regional Collaboratives conveners

CALIFORNIA JOBS FIRST

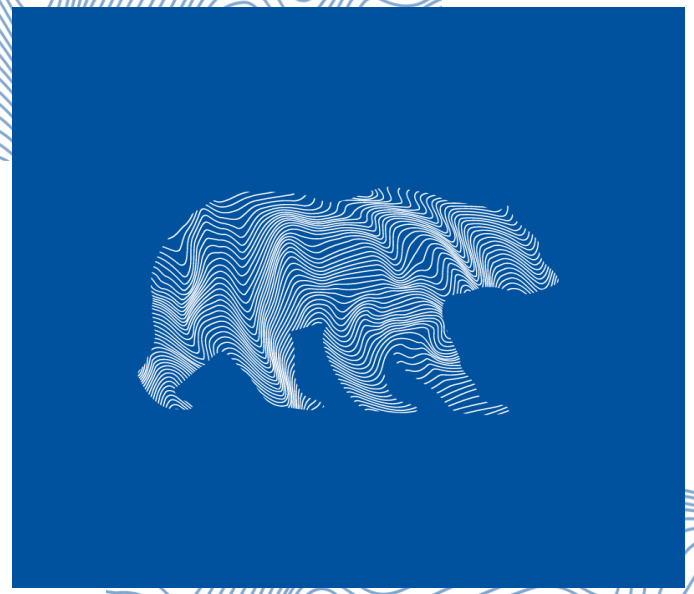
California Fusion

#1
in fusion venture capital and corporate R&D spend on fusion technologies

$36.6B
in Gross Regional Product (GRP) in Physical Sciences & Engineering R&D, the most of any U.S. state

#1
in share of federal funding for fusion technologies inclusive of labs/FFRDCs/universities (2019-2024)

CA Initiatives to Support Fusion



SB 131 – Permitting Reform

Major CEQA reform that, among other things, creates statutory CEQA exemption pathway for advanced manufacturing projects, including qualifying fusion.

SB 80 – CEC Fusion Grant

Creates a CEC fusion hub grant program, including an initial $5M for projects.

SB 86 – Sales Tax Exclusion

Extends the CAEATFA Sales and Use Tax Exclusion program through 2028 and adds fusion projects as eligible.

AB 940 – JF Sector Strategies

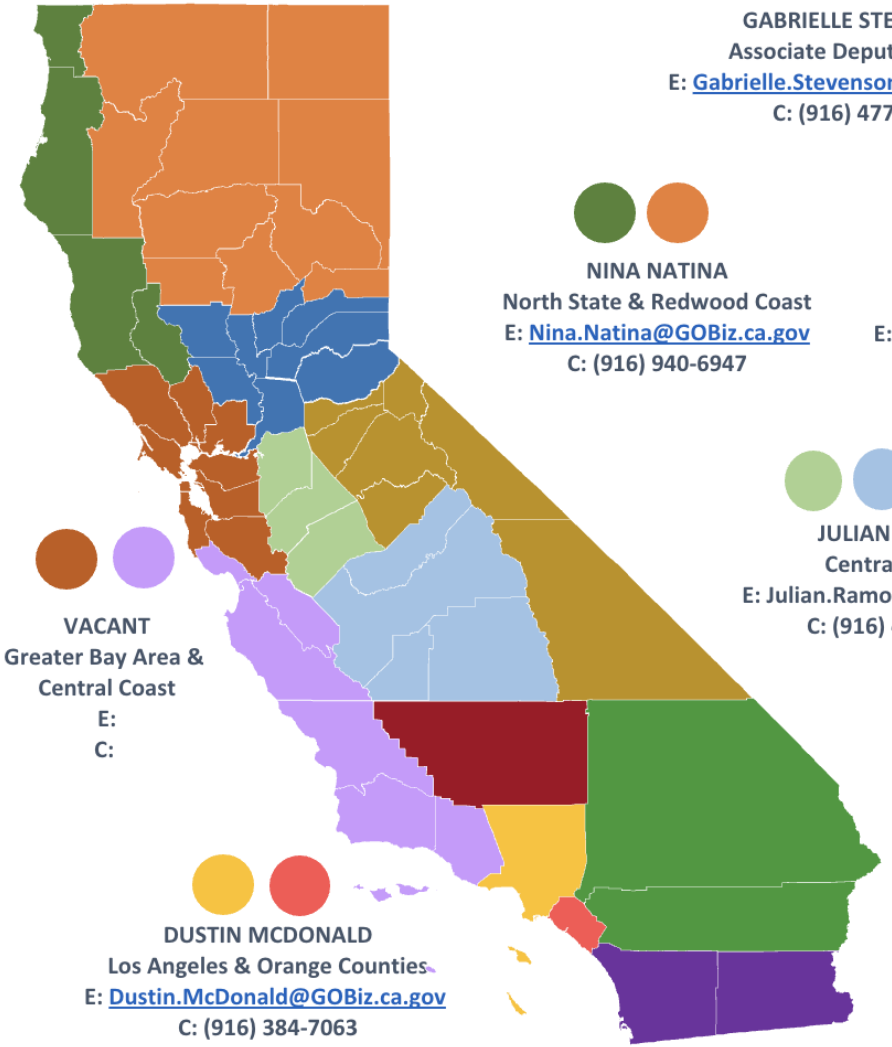
Authorizes GO-Biz to develop sector strategies for industries identified in the Blueprint, including fusion.

Our Services

The **Business Investment Services Unit (CalBIS)** supports the fusion industry by helping fusion companies with confidential:

- ❑ **Incentive navigation**
- ❑ **Site selection**
- ❑ **Permitting Assistance**
- ❑ **Connecting with other state agencies**

REGIONAL BUSINESS DEVELOPMENT STAFF



GABRIELLE STEVENSON
Associate Deputy Director
E: Gabrielle.Stevenson@GOBiz.ca.gov
C: (916) 477-6025

NINA NATINA
North State & Redwood Coast
E: Nina.Natina@GOBiz.ca.gov
C: (916) 940-6947

STEPHEN SUDERMAN
Greater Sacramento & Sierra
E: Stephen.Suderman@GOBiz.ca.gov
C: (279) 348-0832

JULIAN RAMOS
Central Valley
E: Julian.Ramos@gobiz.ca.gov
C: (916) 477-1763

VACANT
Greater Bay Area & Central Coast
E:
C:

MELISSA HOWLETT
Inland Empire
E: Melissa.Howlett@GOBiz.ca.gov
C: (916) 396-3626

DUSTIN MCDONALD
Los Angeles & Orange Counties
E: Dustin.McDonald@GOBiz.ca.gov
C: (916) 384-7063

REBECCA EUSEY
Southern Border
E: Rebecca.Eusey@GOBiz.ca.gov
C: (916) 465-0641

A range of incentives for fusion

Business Incentives

- **California Competes Tax Credit** for job creation
- **R&D Tax Credit** to offset qualifying R&D expenses
- **Property tax abatement** for qualifying facilities >$25M
- **Partial Sales Tax Exemption** for basic mfg equipment
- **Full Sales Tax Exemption** for qualifying mfg equipment

Loans & Bonds

- **Manufacturers:** Up to $10M in low-interest, tax-free financing for facility construction/acquisition and eqpmt.
- **Small businesses:** Loan guarantees (80% of loan value)
- Other IBank and Treasurer's Office Bonds/Loans

Hiring & Training Programs

- **Free customized training** via online Calbright platform
- **Wage reimbursement** (50%) for upskill training
- **Hiring Tax credits** for homeless, veteran & other hiring

Energy & Energy Storage Savings

- **Up to 20% utility savings** over 5 years to businesses at risk of closure or relocation due to energy costs
- **Rebates for self-generation** of distributed energy

Streamlined Approvals

- **CEQA exemption** for advanced manufacturing projects


CALIFORNIA
BUSINESS AND ECONOMIC DEVELOPMENT
Thank you!
business.ca.gov

Workshop Agenda

- Opening Remarks
- Introduction to Fusion Energy
- Existing and Needed Capabilities and Resources for Fusion
- Panel Discussion #1: Informing a State-led Fusion Initiative
- Break
- Statewide Initiatives to Support a Fusion Ecosystem
- **Role of Workforce and Community Development**
- Panel Discussion #2: Delivering the First Fusion Pilot Plant
- Concluding Remarks

From Lab to Liftoff: The Fusion Workforce Transition in California

John McMillan

Assistant Vice President of Economic Development

Division of Research & Innovation and Office of the President

Research to Commercial Deployment

- The Hub of Hubs: California hosts 1/3 of all fusion startups (16) and the nation's two premier research centers: DIII-D (San Diego) and the National Ignition Facility (Livermore).
- Today - Fusion energy accounts for ~4,700 jobs and $1.4B in economic activity - Bay Area, Central Valley, & Southern CA.
- Economic Impact:
  - A projected $125B industry supporting ~40,000 high-quality jobs statewide with adequate government support.
  - Lower estimates are projected at $48B with ~15,000 jobs with less government support.

CA Catalyst – Policy and Leadership

10 critical factors that will influence commercial viability, market adoption, and California's role in the industry

1. Levelized cost of energy
2. Incentives for fusion energy
3. Power purchase agreements
4. Energy mandates
5. State investment
6. Grid readiness
7. Public engagement
8. Fusion-specific regulations
9. Land zoning
10. Workforce readiness

Phase 1: Advanced Degree Era

- Goal - The science of ignition, achieving sustained net energy gain, closing core science gaps, Digital Twin development, & engineering component-level solutions.
- Timeline: Present Day – Early 2030s
- Workforce Profile: High-barrier to entry, specialized roles.
- Key Requirements: Master's and Ph.D. level expertise is standard.
- Key Roles:
  - Plasma Physicists & Theoretical Physicists
  - Materials Scientists (developing specialized reactor blankets)
  - Laser Engineers & Diagnostic Scientists
  - Advanced Computational Modelers (AI/ML)

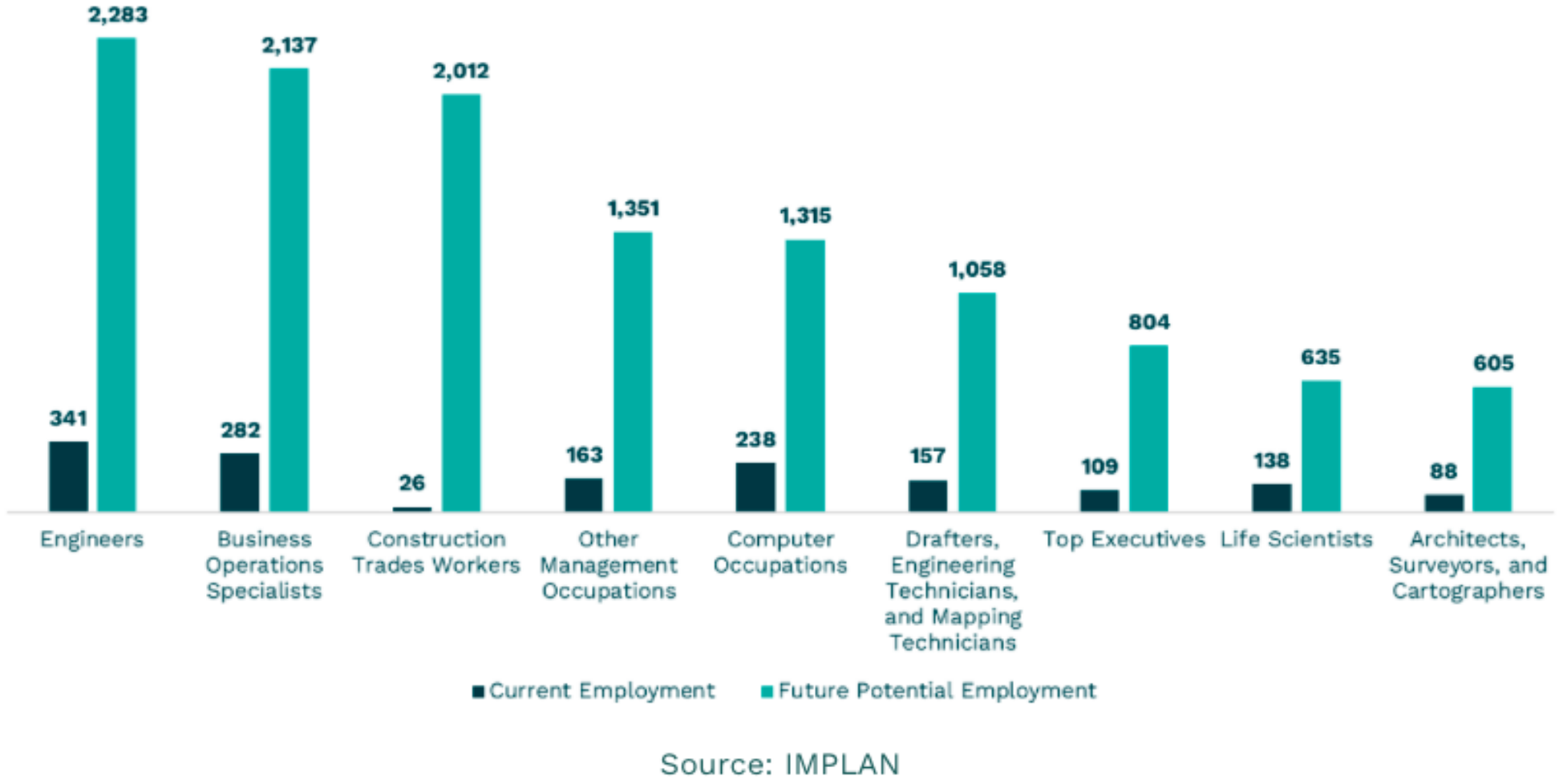
Phase 2: Talent Transition

- Goal - From "Does it Work?" to "Can We Build It?” - Designing, siting, and constructing the first grid-connected fusion pilot plants
- Timeline: Mid-2030s to Mid-2040s
- Workforce Profile: Hybrid workforce - advanced engineering & specialized trades.
- The Transition: R&D remains critical but hiring shifts toward skilled technicians and specialized engineers for systems integration.
- Emerging Roles:
  - Vacuum Systems & Cryogenic Technicians
  - Specialized Welders (exotic metals/nuclear grade)
  - Electrical & Mechanical Engineers (systems integration)
  - Precision Manufacturing Technicians (sub-millimeter components)

Phase 3: Accessible Careers at Scale

- Goal – Commercialization: Deploying a fleet of commercial fusion reactors to meet California's 100% clean energy mandate.
- Timeline: Late 2040’s & beyond
- Workforce Profile: Majority in operations, maintenance, manufacturing, construction.
- The Opportunity: The era of accessible, long-term, high-quality manufacturing and operational careers, requiring certifications, associate degrees, or apprenticeships.
- Dominant Roles:
  - Power Plant Operators (certified)
  - Maintenance Technicians (mechanical, electrical, I&C)
  - Manufacturing Workers (scalable component production)
  - Siting, Permitting, & Environmental Managers

Top 10 Occupations for Fusion



Source: IMPLAN

How can CA get to commercialization?

- Many Issues – Policy and market structure gaps, infrastructure and site selection uncertainty, grid interconnection bottlenecks, supply chain limitations, public perception, etc.
- Workforce challenges in fusion deployment and grid infrastructure
  - Deployment - Existing CA industrial base (aerospace, semiconductors, advanced manufacturing) provides a strong foundation for talent acquisition
  - Deployment - Expand training in mechanical and electrical engineering, materials science, robotics, technicians, welders, operators and other construction-related trades.
  - Infrastructure – CA has a complex and aging electrical grid. The CA energy sector experiencing a significant shortage of technical skills and workers in the sector.
  - Infrastructure – Investing in this workforce today will improve fusion viability over the next decade.

CA Innovation Hubs

- Fusion requires a rare lithium isotope called lithium 6 (~1 ton / GW / year), which can currently only be created using mercury processing technique that has been banned in the US since 1963. Natural sources – 93% Lithium-7, 7% Lithium-6.
- Lithium Valley is concrete example of how state investment can support the development of an Innovation Hub in a disinvested community.
  - Lithium Valley Blue Ribbon Commission
  - Public outreach
  - Programmatic EIR
  - Infrastructure upgrades & repairs
  - CEC Geothermal Opportunities
  - Excise Tax on lithium extraction
  - Highroad Training Partnership Award
  - Academic investments
  - Business tax credits & incentives
  - Priority permitting
  - Health impact analysis funding

CA Catalyst – Policy & Leadership

1. Levelized cost of energy
2. Incentives for fusion energy
3. Power purchase agreements
4. Energy mandates
5. State investment
6. Grid readiness
7. Public engagement
8. Fusion-specific regulations
9. Land zoning
10. Workforce readiness

Conclusion

Statewide Coordination – Linking the Bay Area Fusion Hub with Southern California's industrial ecosystem and Central Valley's opportunity for deploying large scale energy projects.

Workforce Pipeline Integration - Connecting UC-level research to Community College programs to labor unions.

California has demonstrated capacity to lead these types of efforts (Lithium Valley) and can continue to be the heart of the fusion ecosystem with focused attention and investment into the emerging industry.

Thank You

John McMillan
Assistant Vice President for Economic Development
Division of Research & Innovation

jmcmillan@sdsu.edu

Delivering the First Fusion Pilot Plant

Panel Discussion #2

Ways to Participate

- **Visit** https://www.energy.ca.gov/programs-and-topics/programs/fusion-research-and-development-innovation-initiative
- **Subscribe to "Fusion Research and Development Innovation Initiative"**: https://www.energy.ca.gov/subscriptions
- **Submit written comments by 5:00 pm PDT on April 16, 2026** https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=26-ERDD-01
- **Or email** to docket@energy.ca.gov, include Docket No. **26-ERDD-01**

Thank You for Attending!