Fusion Policy and Finance: A Practitioner's Perspective

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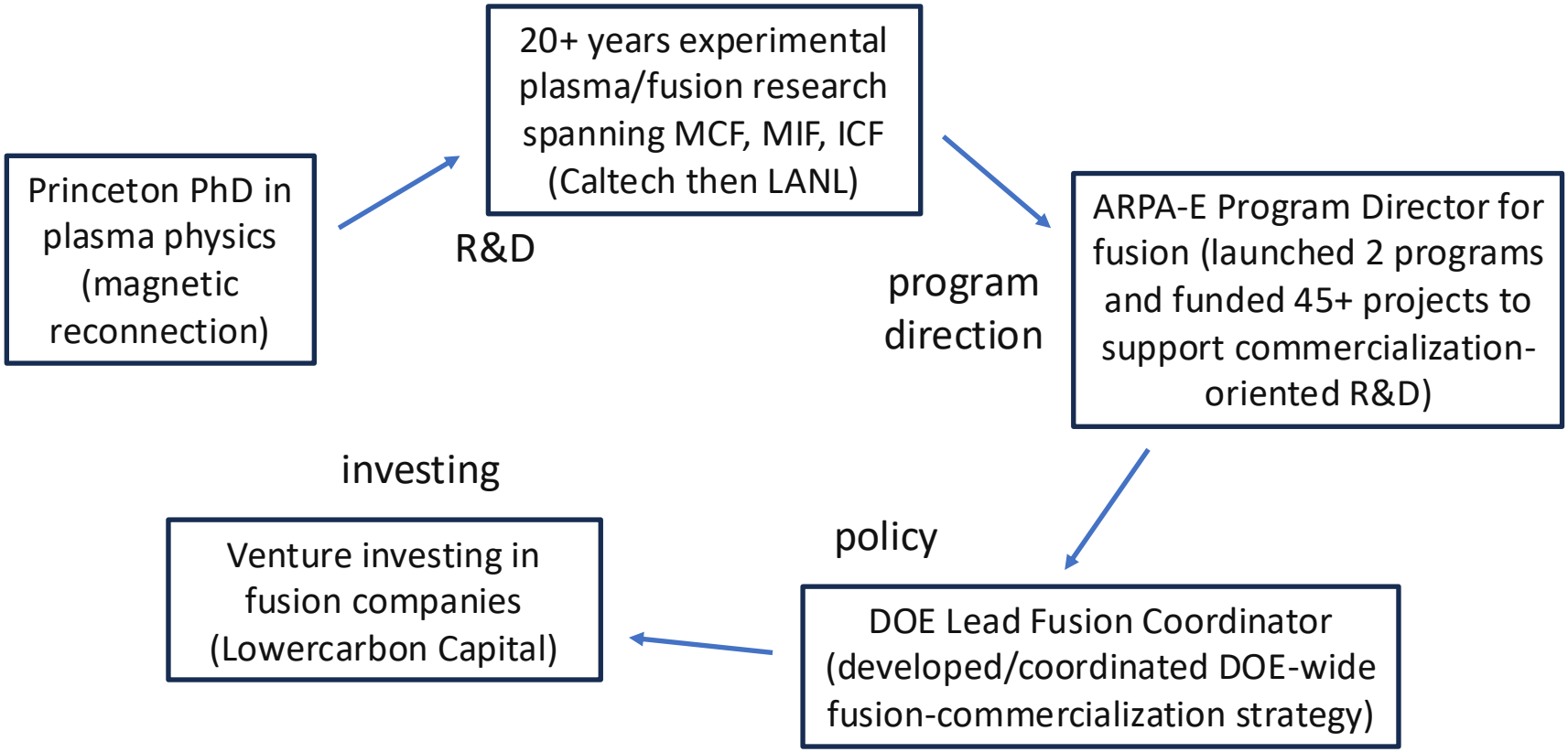
Introduction to Plasma And Fusion Course · June 12, 2026

My career journey so far



My favorite pastimes involve big mountains

Backcountry skiing northeast face of Lake Fork Peak near Taos, NM

Rappelling after a technical climb of Lizard Head Pk near Telluride, CO

Desired takeaways of this talk

- Appreciation of “how the sausage gets made” in terms of policy and financing of energy RDD&D (research, development, demonstration, and deployment)

- Stimulate interest for those of you attracted to the idea of a career in the policy or financial side of fusion or energy RDD&D

Outline

- Policy
  - Roles/tools for energy RDD&D
  - Evolution of US fusion policy/strategy over the past decade
- Financing
  - Federal
  - Private investments
- Outlook for fusion commercialization

POLICY

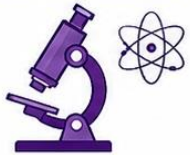
Government policy serves multiple functions

- Sets/prioritizes national objectives to advance national interests
- Coordinates actors
- Addresses gaps that markets alone cannot solve
- Provides signals and stability for the private sector

The Energy Innovation Pipeline: RDD&D

Turning ideas into reliable, affordable, clean energy

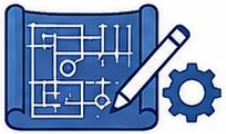
1. RESEARCH
Discover & Understand



Expand fundamental knowledge and explore new concepts.

Low TRL*
(1–3)

2. DEVELOPMENT
Design & Validate



Design solutions and test in the lab to prove feasibility.

TRL 3–6

3. DEMONSTRATION
Prove & Scale

Test in relevant environments at larger scale to reduce risk.

TRL 6–7

4. DEPLOYMENT
First Commercial Applications

First-of-a-kind commercial projects; establish supply chains and operations.

TRL 8–9

5. DEPLOYMENT
Market Expansion

Scale up, drive down costs, and expand market adoption.

TRL 9

6. DIFFUSION
Widespread Impact

Mature technologies delivering reliable, affordable, clean energy at scale.

Increasing Technology Readiness, Reducing Risk, Attracting Private Investment

Societal Impact:

- Lower Emissions
- Energy Security
- Economic Growth
- Better Quality of Life

HOW GOVERNMENT POLICY SUPPORTS RDD&D

FUND BASIC RESEARCH

- Universities
- National Labs
- Science Funding Programs

Builds the knowledge base for future breakthroughs

SUPPORT DEVELOPMENT

- Grants
- Collaborative R&D
- Early-stage Innovation Programs

De-risks ideas and moves them toward viability

FUND DEMONSTRATION

- Cost-share Grants
- Loan Guarantees
- Public-Private Partnerships

Bridges the "valley of death" to prove real-world viability

DE-RISK FIRST PROJECTS

- Loan Programs
- Contracts for Difference
- Risk Mitigation

Crowds in private capital for first commercial deployments

CREATE MARKETS

- Tax Credits
- Clean Energy Standards
- Carbon Pricing
- Procurement

Provides demand certainty to drive investment and scale

BUILD INFRASTRUCTURE & STANDARDS

- Transmission Networks
- Charging/ Refueling
- Standards & Regulations

Reduces uncertainty and enables widespread adoption

Government action at every stage helps overcome market failures, accelerates innovation, and delivers the clean energy solutions society needs.

*TRL = Technology Readiness Level

Over the past decade, US fusion policy transformed from purely R&D to targeting D&D in the 2030s

What effected this change? Confluence of strong technology push (examples, left) and market pull (right):

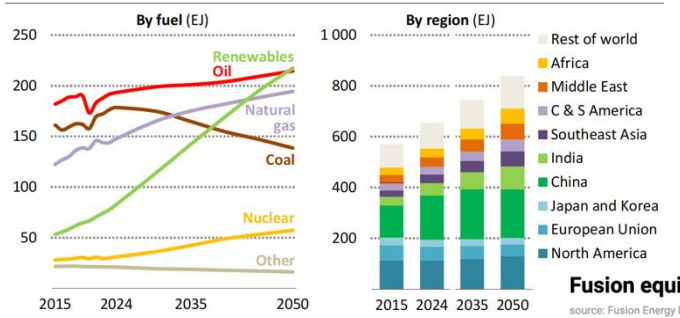
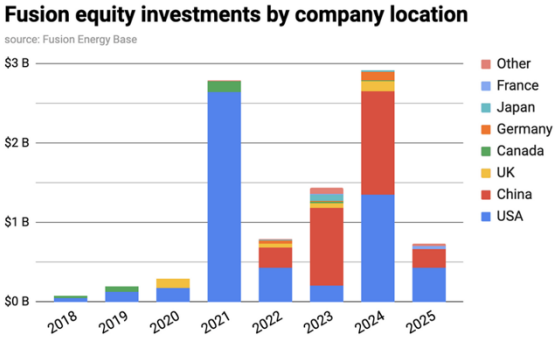
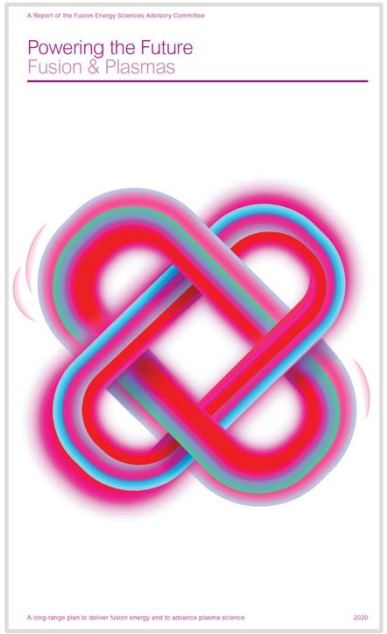


Image credits: LLNL, CFS/MIT, IEA, and Fusion Energy Base



Also required a LOT of groundwork/advocacy for fusion commercialization by stakeholders, e.g., ARPA-E, the Fusion Industry Association (FIA), and FIA member companies

Advocacy for fusion commercialization spilled into US strategic planning → Consensus expert reports essential for policymakers

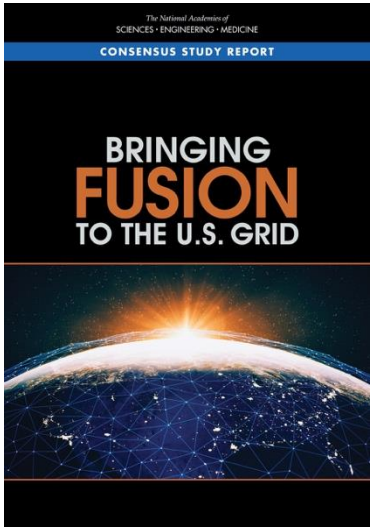


FESAC Long-Range Plan (2020) — Powering the Future

- Shift from a strict focus on tokamak burning-plasma science to broader S&T to enable a cost-competitive fusion pilot plant
- Expand public-private partnerships (PPPs), including milestone-based cost-share programs
- Increase relative support for fusion materials & technology (FM&T) including FM&T test infrastructure
- Embrace development of innovative ideas that could lead to more commercially attractive fusion systems
- Underpinned legislation (Energy Act of 2020) for DOE to "support the development of a competitive fusion power industry in the U.S."

NASEM (2021) — Bringing Fusion to the U.S. Grid

- Demonstrate net electricity in the 2035–2040 timeframe
- DOE and private sector should move forward immediately via PPPs leading to FPP engineering designs that will bring fusion to commercial viability
- Urgent investments needed from DOE and private industry



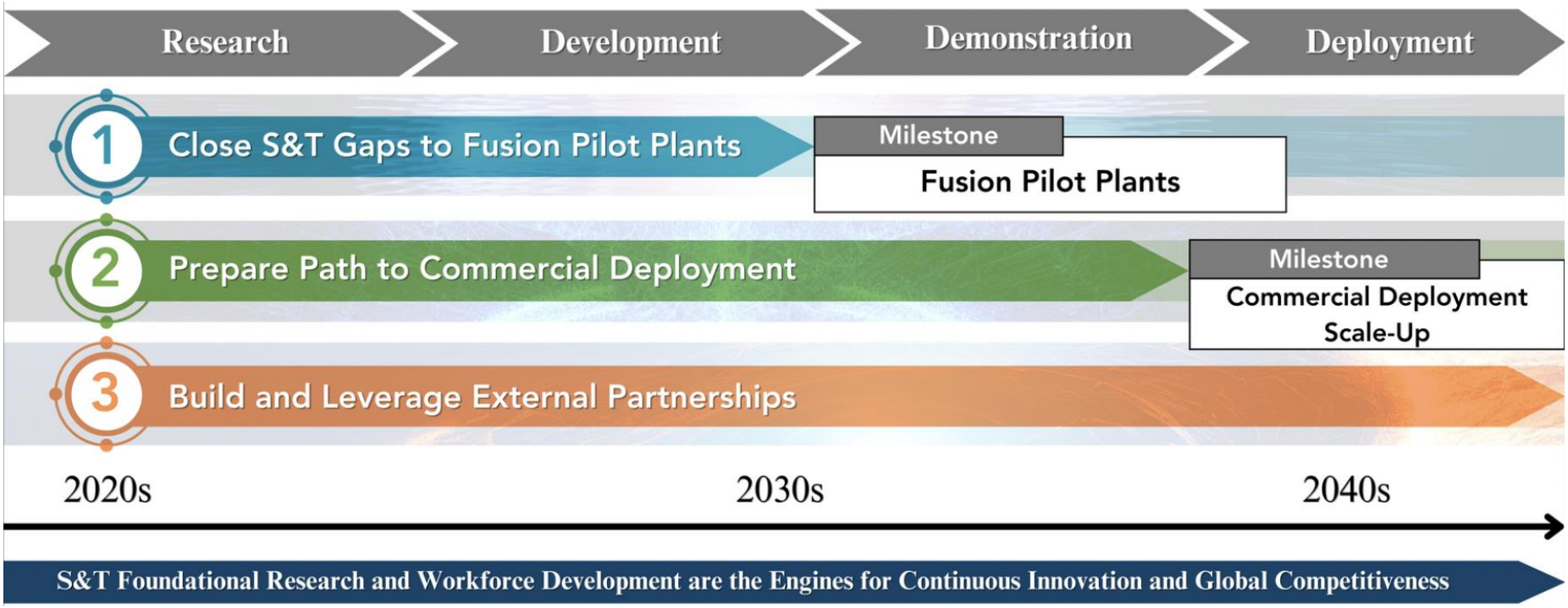
**Briefing of NASEM study/recommendations to PCAST by study chairperson Dr. Rich Hawryluk on Oct. 19, 2021 instigated White House/DOE collaboration to accelerate fusion commercialization.*

White House Fusion Summit (March 17, 2022) on *Developing a Bold Decadal Vision for Commercial Fusion Energy* (BDV)

- Celebrated decades of S&T progress supported by DOE/predecessor agencies
- Recognized significant recent fusion S&T advances (NIF 1.3-MJ shot, CFS TFMC, JET DT metal-wall campaign, etc.)
- Discussed opportunities to leverage the world-leading U.S. private fusion industry and $Bs of private investments
- Emphasized the importance of inclusive engagement to ensure fusion benefits all people, attracts the broadest possible workforce, and is welcomed by communities
- Sec. Granholm announced “all-of-DOE” strategy to accelerate fusion commercialization and appointed me as DOE Lead Fusion Coordinator

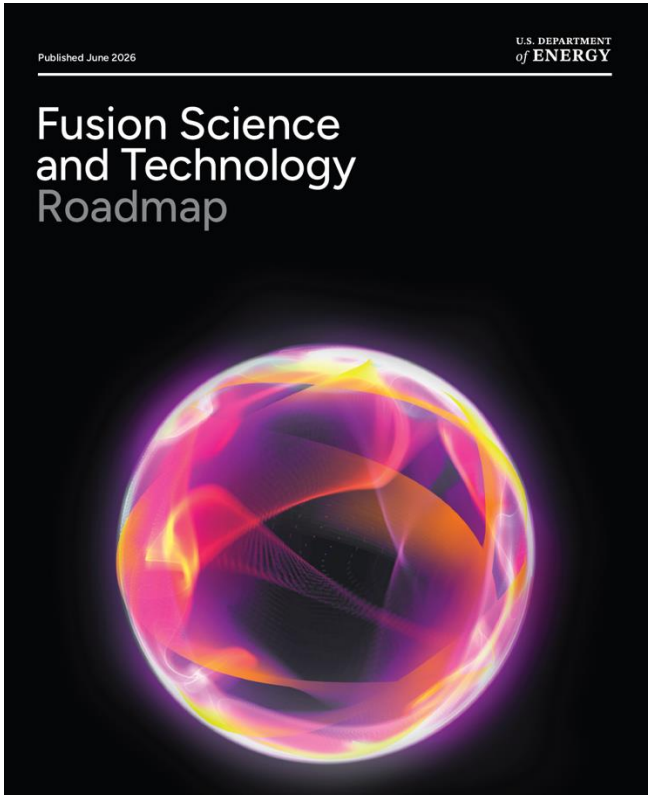
Video of the event: https://www.youtube.com/watch?v=LTtBeF75Yhc.

DOE fusion strategy seeks to enable industry-led fusion pilot (demonstration) plants in the 2030s and prepare for deployment scale-up starting in the late 2030s



https://www.energy.gov/sites/default/files/2024-06/fusion-energy-strategy-2024.pdf

Multi-year DOE planning culminated in the just-released Fusion S&T Roadmap (June 2026)



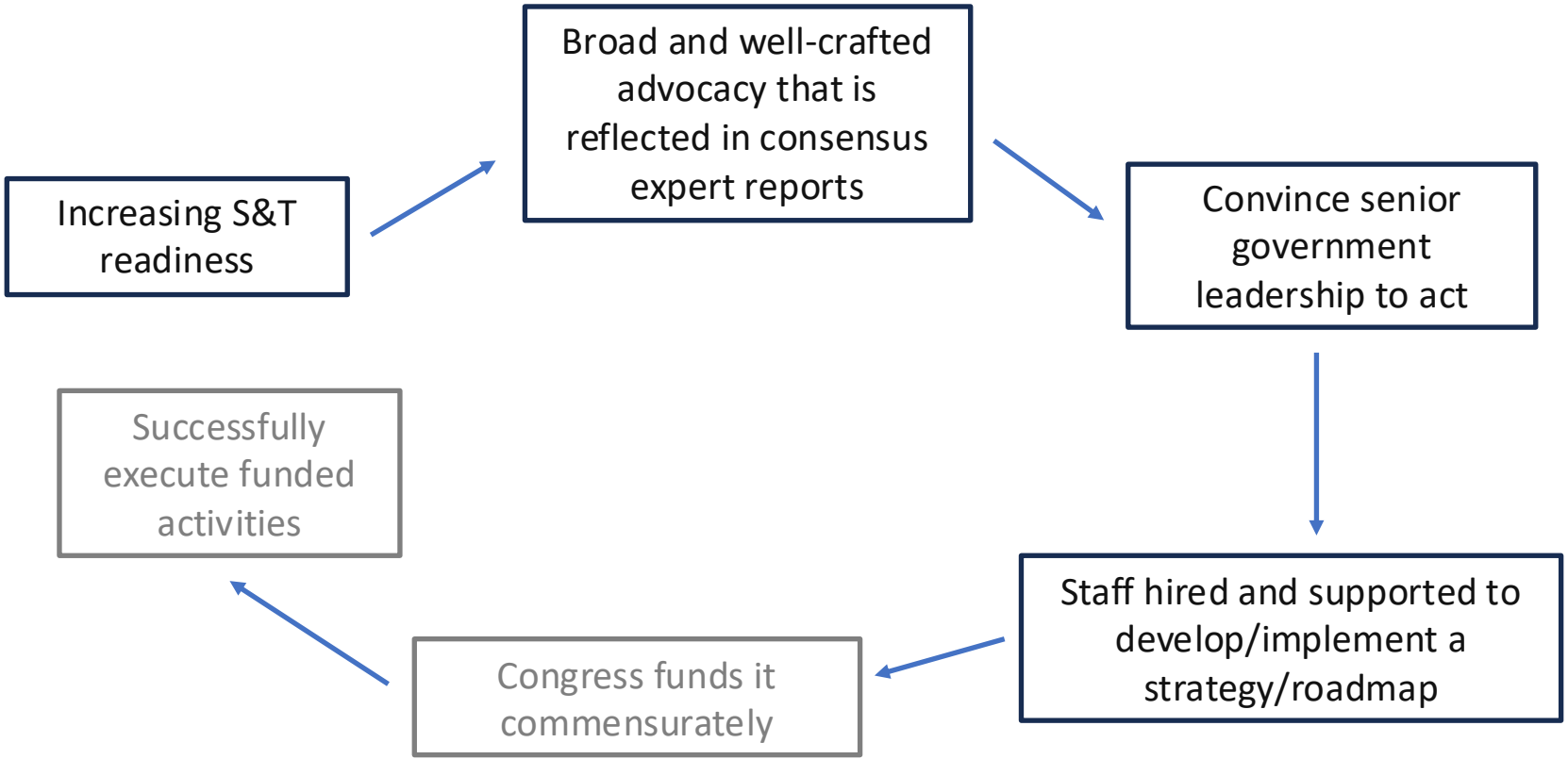
"The Fusion Science & Technology Roadmap is a comprehensive national strategy to accelerate the development and commercialization of fusion energy by the mid-2030s. It charts a clear path for federal support to the growing fusion energy industry, identifying critical science and technology gaps and defining the milestones needed to bring commercial fusion power to the grid. By leveraging public and private sector investments through prudent, strategic processes, the Roadmap marshals these forces to close gaps on the critical path to fusion energy."

– Darío Gil, Under Secretary for Science
U.S. Department of Energy

Acknowledgment to former DOE Associate Director of Science for Fusion Energy Sciences Dr. J.P. Allain for spearheading the FS&T Roadmap.

https://www.energy.gov/documents/fusion-st-roadmap-060926pdf

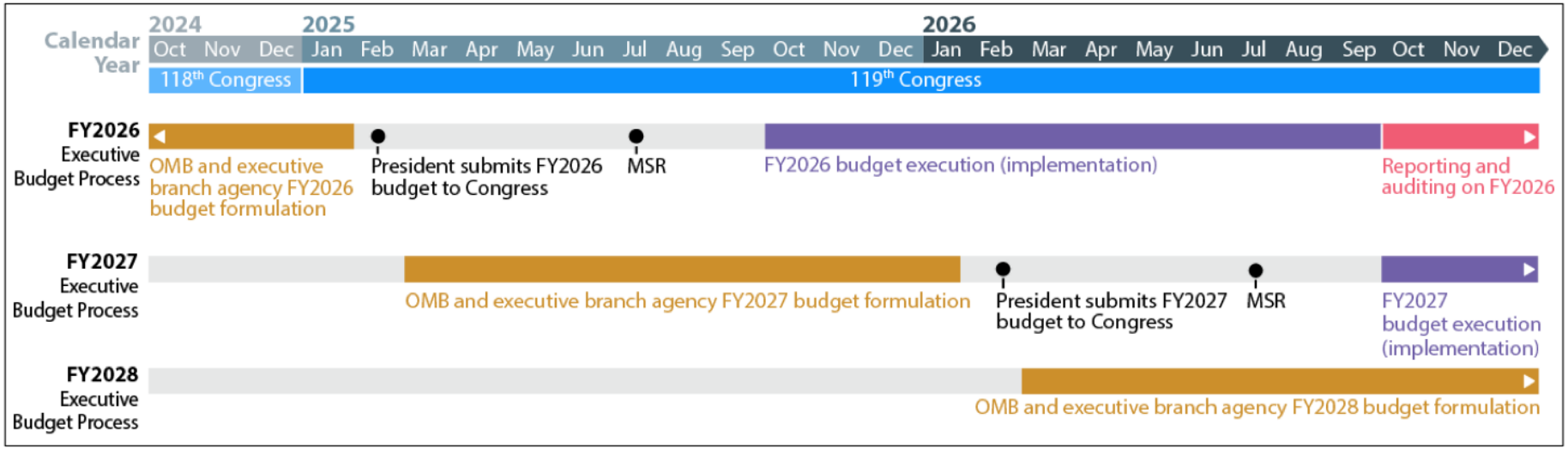
Policy change and implementation is a lengthy journey



FINANCING

without capital, nothing can be accomplished no matter how perfect the policy or plan

Federal annual appropriations process



Congressional Research Service, *The Executive Budget Process Timeline: In Brief* (2025); https://www.congress.gov/crs_external_products/R/PDF/R47088/R47088.7.pdf.

Formulating the President's budget request (PBR)–a view from the trenches

- Very tightly held process–most federal staff have little-to-no visibility
- Must always consider multiple constituents across the executive and legislative branches, otherwise any initiative is likely "dead on arrival"
- Need access to and the support of senior political appointees, especially at the Under Secretary level and above; their Chiefs of Staff are incredibly important for access/prioritization
- Any big shift and/or new ask compared to the previous year's PBR requires coordinated championship from senior agency leadership and the White House, especially the Office of Management and Budget (OMB)
- It may take strong signaling/urging from Members of Congress for major new asks to get across the line in the PBR

FINANCING

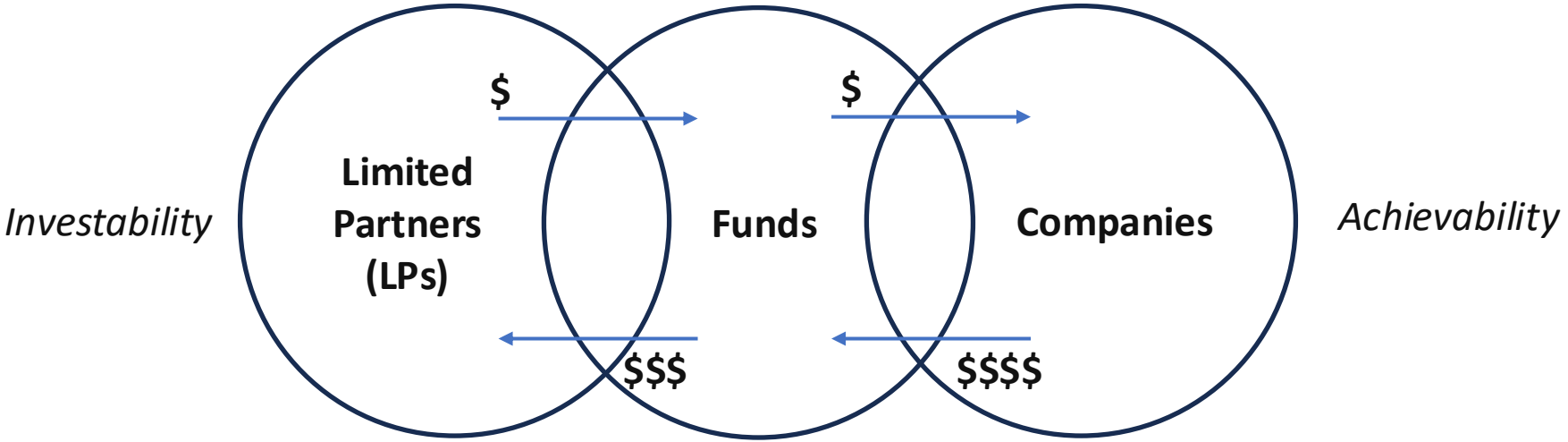
Switching gears to private capital

Why are private investors investing in fusion today?

Because they see a real opportunity for fusion investments to make money, consistent with investors' own requirements for risk, return, and timeline.

As a secondary consideration, many investors interested in fusion have an investment thesis around energy abundance/sustainability and/or national security, and believe in delivering solutions via innovative "hard tech."

Private capital is unlocked when there is overlap in risk, return, and "exit" timeline across all players in the entrepreneurial ecosystem



Capital formation is the highest risk from investors' perspective, especially when $Bs are required to reach pilot/demonstration

Diligence approach for potential investments is both science and art

Team	Technology	Market/exit potential

• Can CEO/founders build a generational hard-tech business?
  • Storytelling
  • Raising capital
  • Recruiting top talent
• Can technical team overcome some of the very hardest S&T challenges and build the technology?
	• Credibility/scalability of the S&T
	• Documented S&T basis (peer-reviewed publications preferred)
	• Clear roadmap, milestones, and capital needs
	• Financeable (from development through deployment)
		• Strong TEA and product-market fit
		• Clear and well-justified business/revenue model(s)
		• Clearly articulated plans to address regulatory, supply-chain, and other commercialization gaps
		• Exit strategy and desired returns on fund timeline

Different ways to “return the fund” with an investment

	Initial ownership %	×	Retention	×	Exit valuation	=	Return	>	Fund size
Ex 1	10% ($3M check)		40% (60% dilution)		$10B (4% ownership)		$400M (MOIC*=133.3)		$250M
Ex 2	2% ($20M check)		60% (40% dilution)		$30B (1.2% ownership)		$360M (MOIC*=18)		$250M
			Depends on # and sizes of subsequent raises		Depends on price/revenue assumptions or market-cap comparisons of similar companies				

*Multiples on invested capital

Lowercarbon's $250M Q>1 fusion fund (launched 2022)

The Race to Q>1

Lowercarbon is funding fusion's biggest breakthroughs.

By: Chris Sacca Date: October 19, 2022

Rationale for a fusion investment fund in 2022:

- Growing global energy demand (especially carbon-neutral) will be hard to meet without fusion
- Q>1 is no longer if but when (NIF ignition occurred later the same year)
- Multiple accelerants converging: compute/AI, new materials including HTS, private funding outpacing govt funding, policy tailwinds, growing number of diverse/credible companies
- Conviction that fusion companies will be among the most valuable companies in history, spawning untold new applications of energy
- Single greatest catalyst for environmental equity and energy democratization

> "At Lowercarbon, we are doing everything we can to ensure Utopia wins. Over the long haul, fusion is our best shot." –Chris Sacca (Lowercarbon's Founding/Managing Partner)

https://lowercarbon.com/2022/10/19/race-to-q1

Different categories of fusion investments today–a Lowercarbon perspective

1. Fusion companies (with higher S&T maturity) most likely to realize a commercial demonstration fusion plant in the 2030s
   - High demonstrated triple product *and* leadership team that can secure $Bs in capital

2. Fusion companies (typically with lower S&T maturity) that may not be FOAK winners but could be NOAK winners
   - Credible S&T plan *and* leadership team that can secure hundreds of $M in capital

3. Fusion supply-chain companies
   - Sizable near-term adjacent markets *and* "letters-of-intent" (LOIs) from the most credible/funded fusion companies
   - Plausible path to becoming a $B-scale company in <10 years

In all cases, must meet our fund targets on return, risk, and exit timeline.

Outlook for fusion commercialization

- International competition is intensifying
  - CN DE JP GB are highly motivated
  - “Sputnik” moment?
  - Still, there are strategic partnership opportunities

- Can the US Government meet the magnitude of the moment?
  - Funding alignment and growth remain challenging
  - Need to build public fusion materials & technology (FM&T) test facilities, and need demonstration-scale federal cost sharing with industry as with other energy technologies
  - New DOE Office of Fusion is a critical and needed opportunity

- Next stage of fusion commercialization requires:
  - Several $B+ facilities
  - Continued S&T advances in the known gap areas
  - New types and scale of capital
  - Resolving supply-chain bottlenecks (for both demonstration and deployment scale-up)
  - Addressing broader needs to enable deployment scale-up (social license, regulatory harmonization, nuclear-nonproliferation framework, grid capacity, etc.)