techleap

Fusion and the innovator's dilemma

Looking at the evolution of the field through the lens of overall trends in innovation

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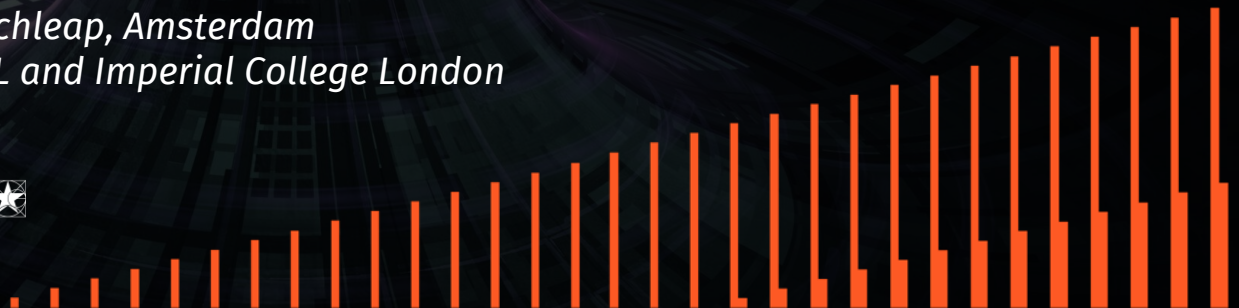
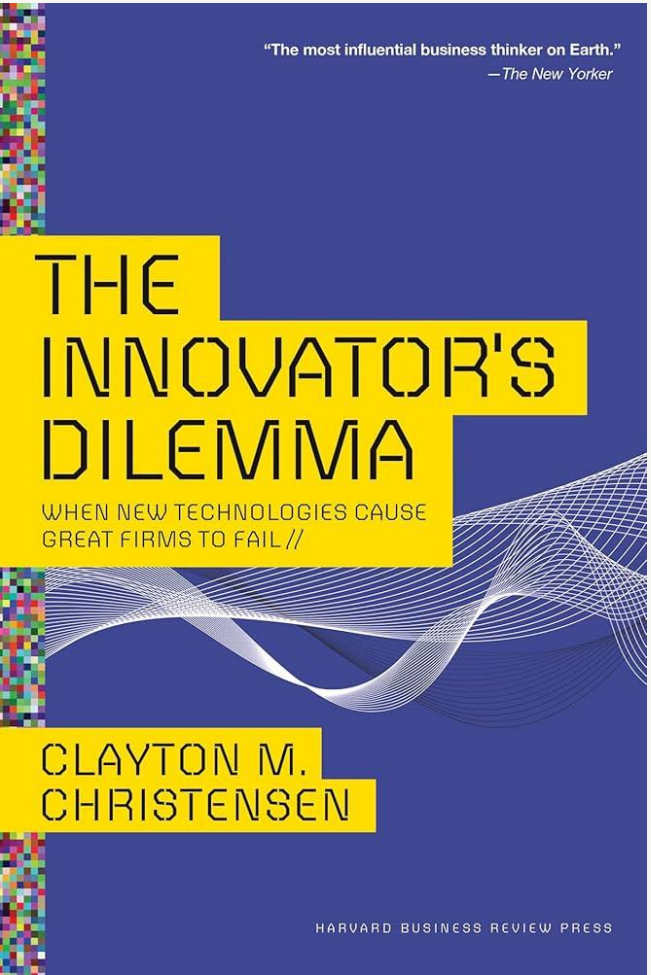
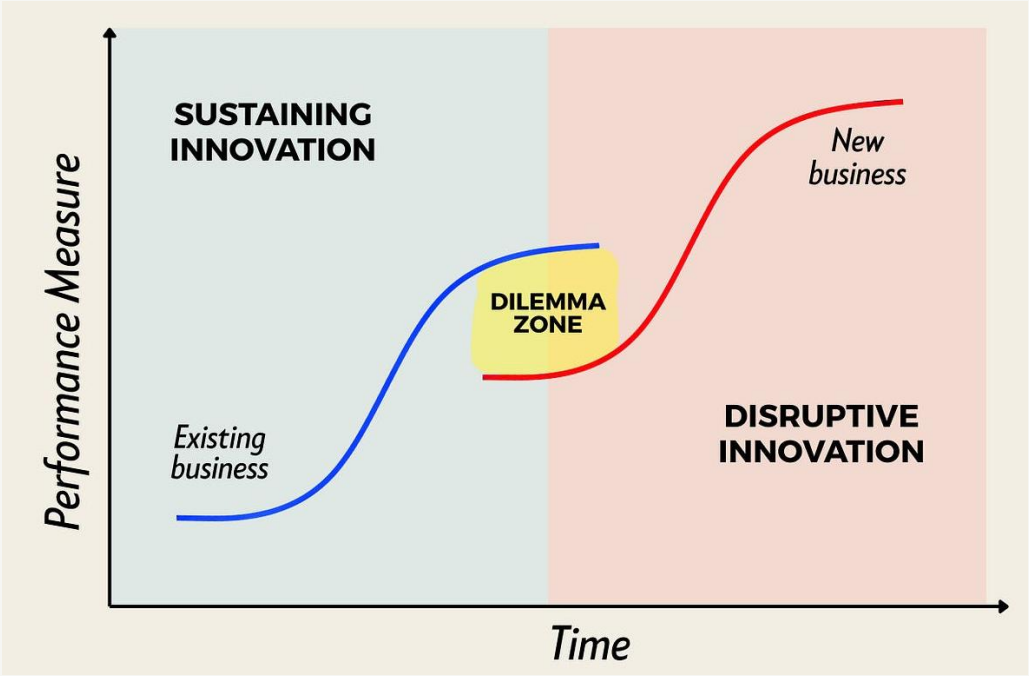
Imperial College London

MINES PARIS | PSL



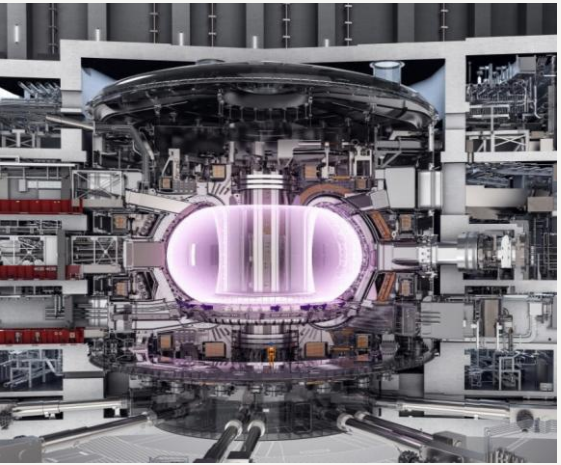
Inspiration for this talk





[1] link

OK... but what does it have to do with fusion?



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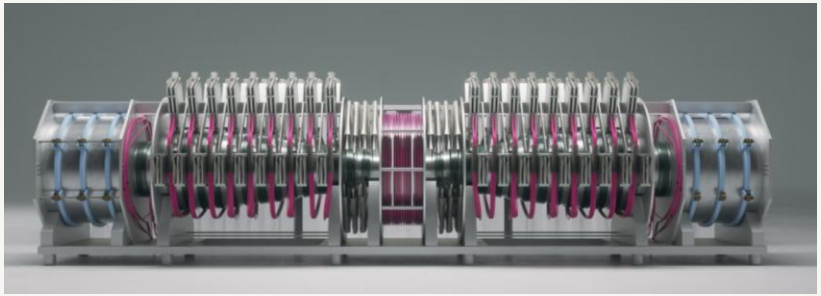
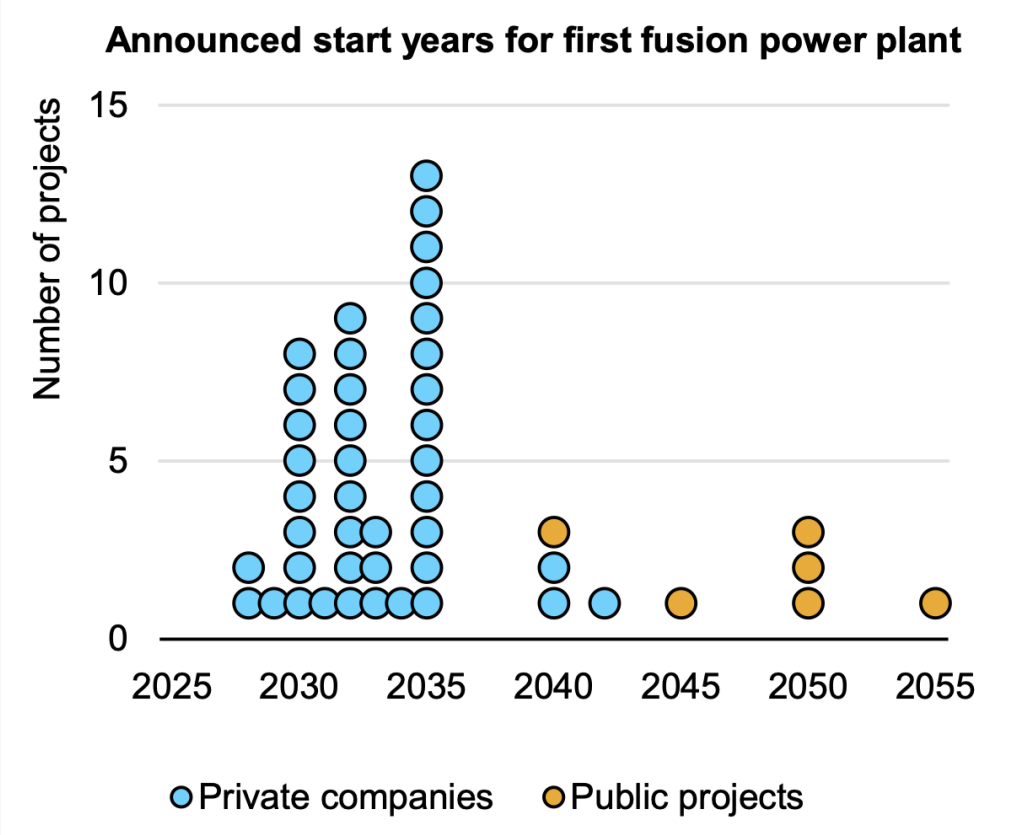
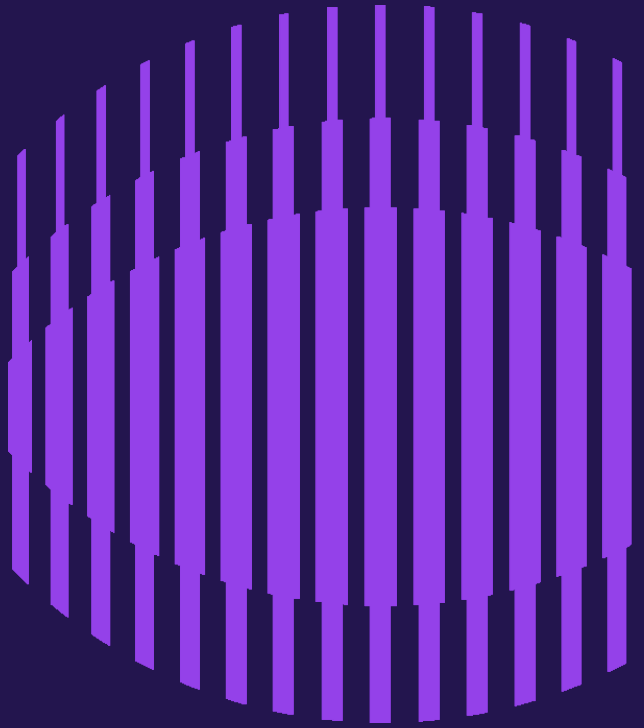




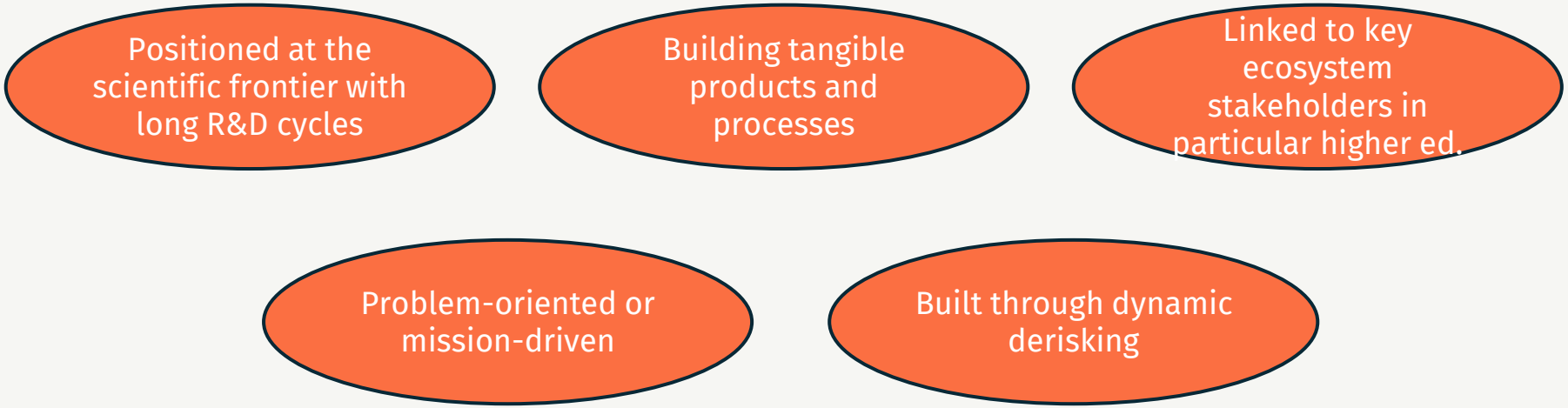
[1]State of Energy Innovation 2026, IEA, link

Let’s take a step back...
The bigger picture



But what is deeptech?

Generic definition[1]: “innovations grounded in major scientific/technological breakthroughs, using disruptive technologies to address fundamental societal challenges”[2]



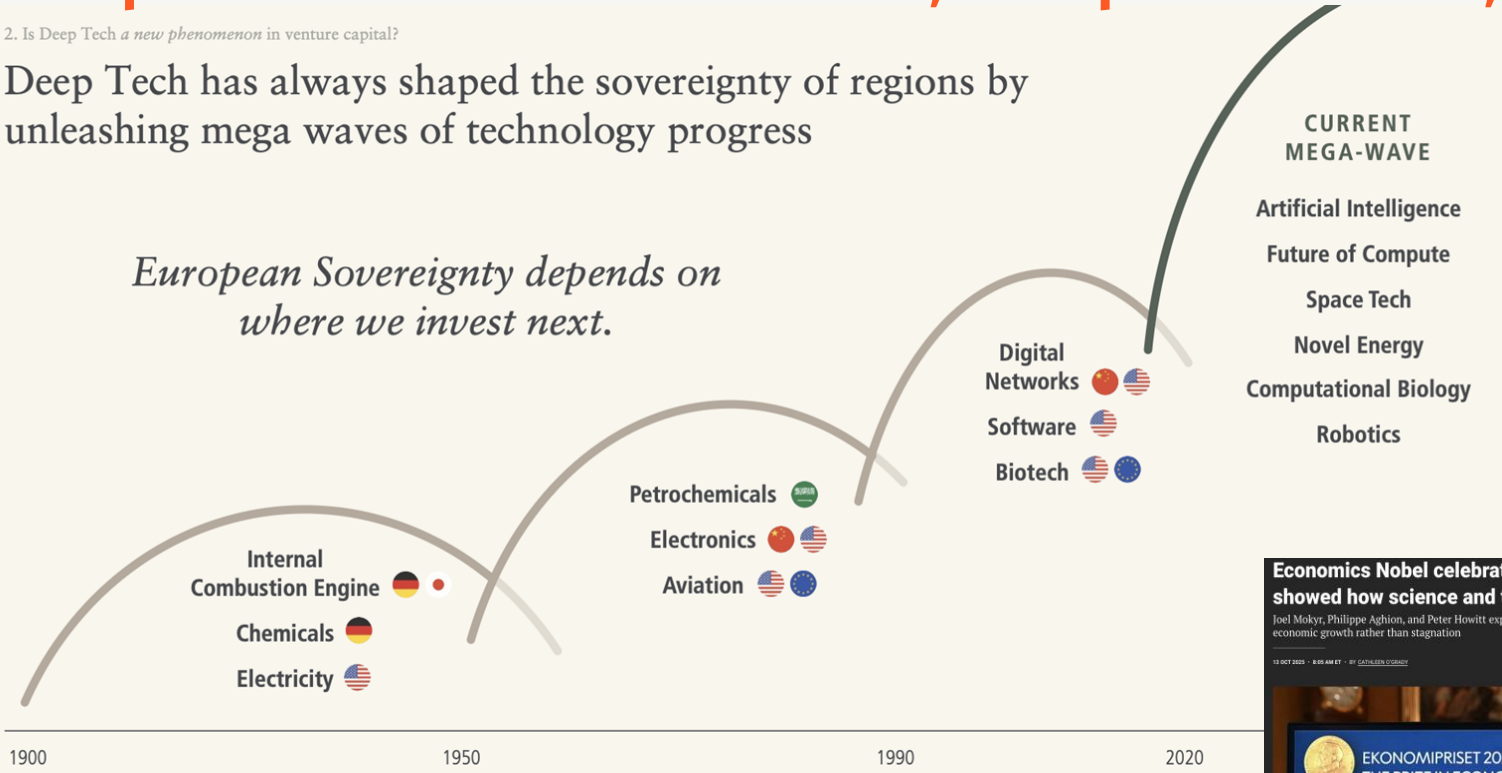
[1]Term first coined by S. Chartuvedi here
[2]Deep tech entrepreneurship – a viable response to today’s grand challenges? Link
[3]What is “Deep Tech” and what are Deep Tech Ventures? Link

Deeptech is about innovation, competitiveness, resilience

2. Is Deep Tech *a new phenomenon* in venture capital?

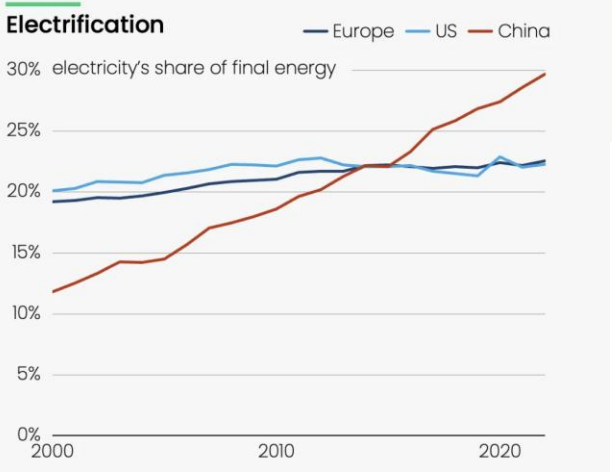
Deep Tech has always shaped the sovereignty of regions by unleashing mega waves of technology progress

European Sovereignty depends on where we invest next.



[1]2025 EU Deep Tech Report link
[2] Science article Link
[3] Draghi report on EU competitiveness Link

The new age: an electric world



Industrial Revolution
1st wave

Iron
Waterpower
Mechanisation

Age of steam and rail
2nd wave

Steam engines
Steam power
Rail

Age of steel and electricity
3rd wave

Electricity
Steel
Heavy engineering

Age of oil and mass production
4th wave

Mass-produced automobiles
Cheap oil
Petrochem

Digital Age
5th wave

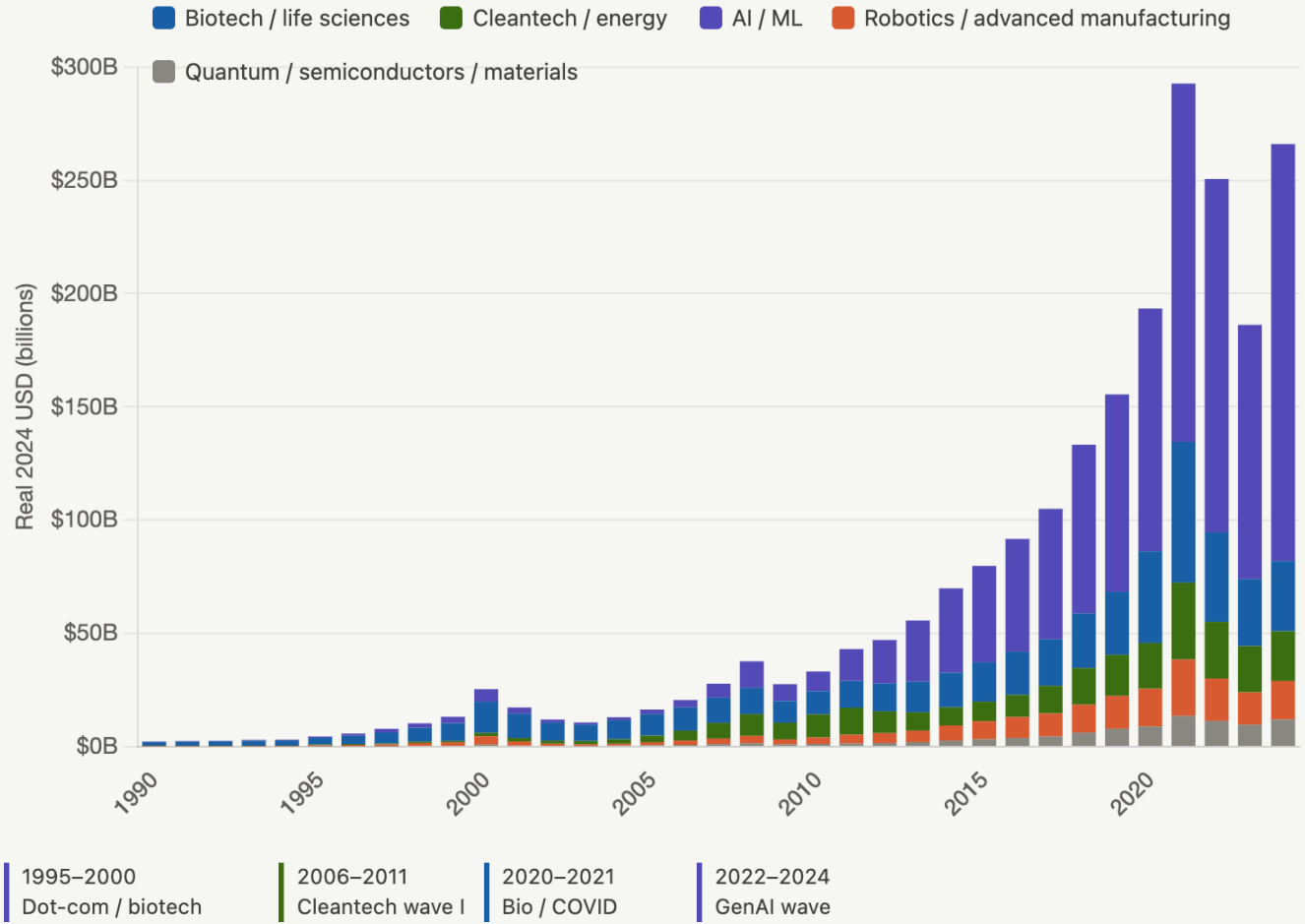
Information technologies
Telecoms
Software

Electrotech Age
6th wave

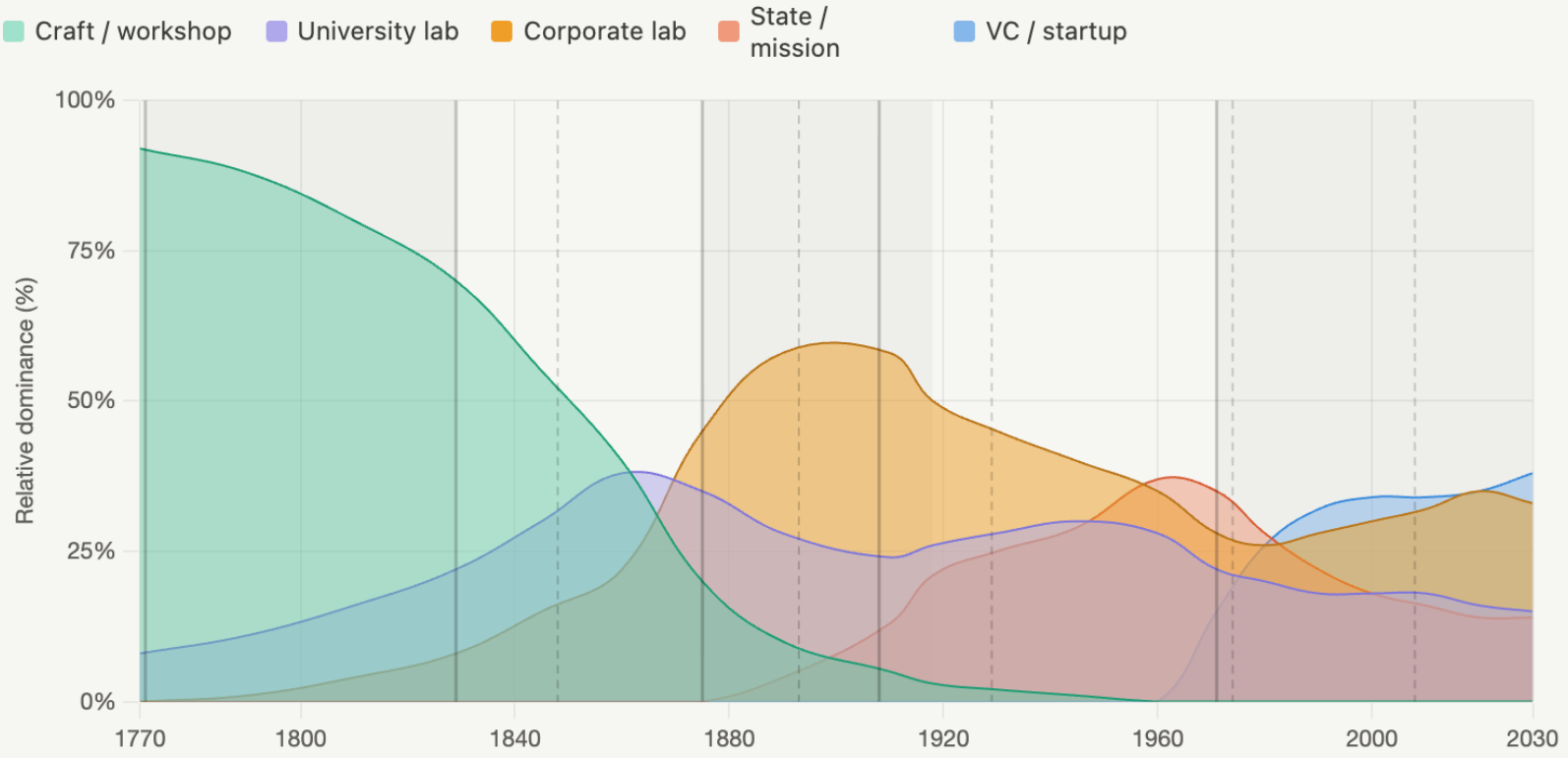
Renewable energy
Electrification
AI

[1]**The electrotech revolution, Ember 2025** link

The growth of venture capital in deeptech



The emergence of the startup ecosystem



P1 · Industrial rev.
1771–1829
Water power, textiles, iron

P2 · Steam & railways
1829–1875
Steam engine, coal, rail

P3 · Steel & electricity
1875–1918
Heavy engineering, chemicals

P4 · Oil & automobiles
1908–1974
Mass production, petrochems

P5 · ICT & beyond
1971–present
Microelectronics, AI, bio

The largest energy shock in history?

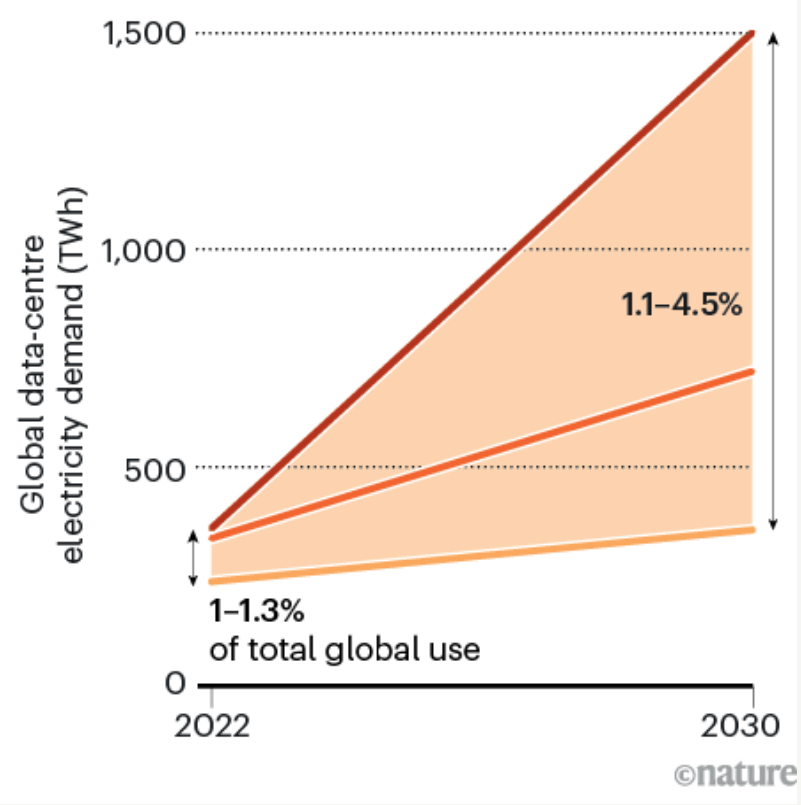
More frequent energy shocks

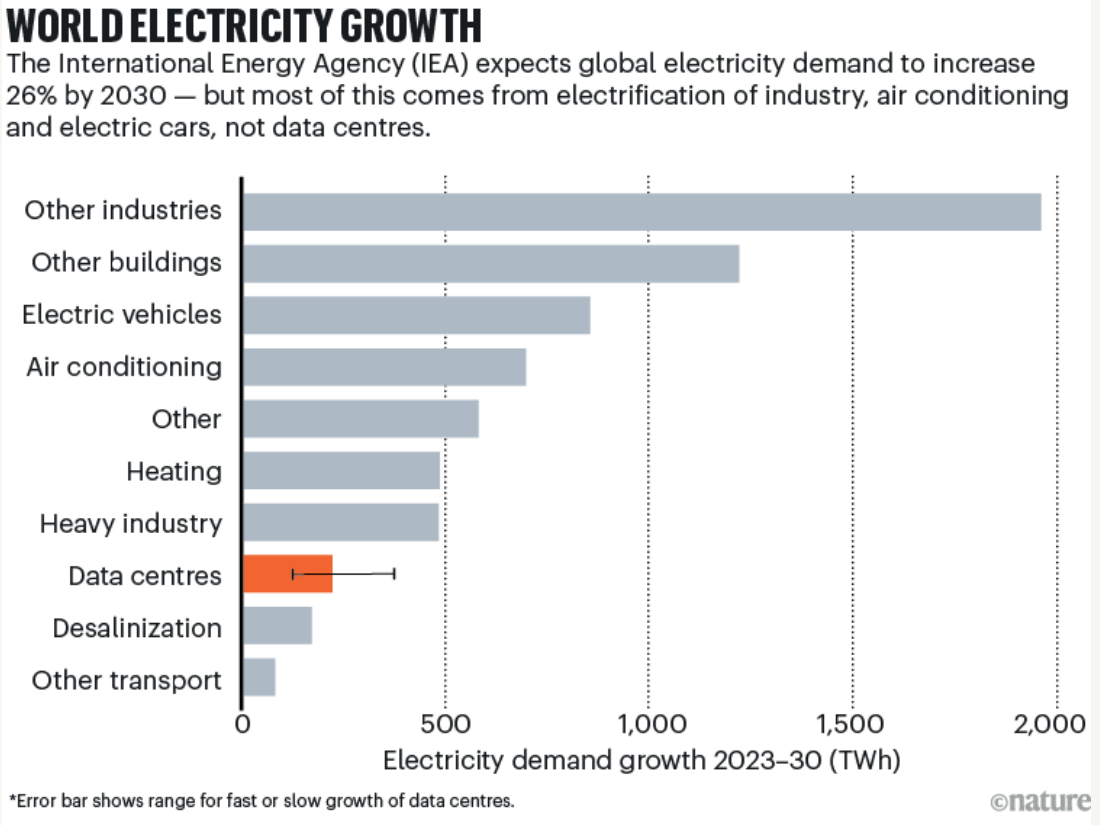
The world has experienced three major external energy shocks this decade

Note: Brent oil price in $ per barrel

Source: LSEG | Ron Bousso

The largest energy shock in history?





[1]**How much energy will AI really consume? The good, the bad and the unknown, Link**

Climate tech has become a thing

A wide range of solutions in various activity sectors and at diverse levels of maturity

Energy

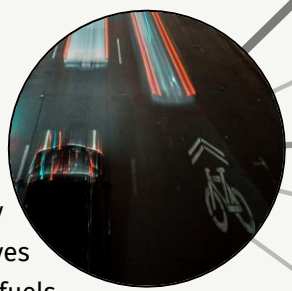
renewable energy
nuclear power
grid infrastructure
energy storage
green hydrogen
energy management

Food & Agriculture

energy efficient equipment
land use management
sustainable agricultural practices
urban farming
alternative foods

Industry

low-carbon metallurgy
low-carbon chemicals
low-carbon cement
material efficiency
waste management
circular economy



Mobility & Transport

batteries
hydrogen/fuel cells
micro-mobility
travel alternatives
low-carbon fuels

Buildings

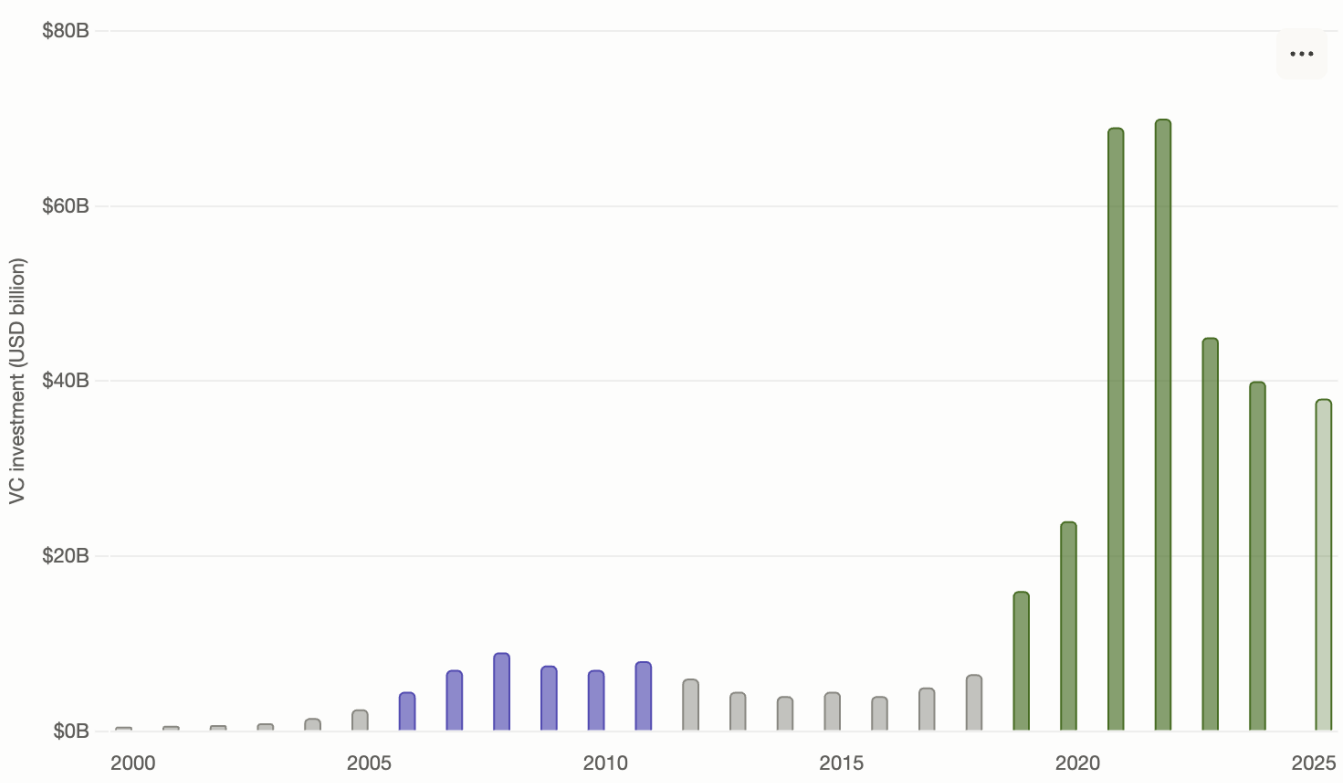
heat pumps
smart devices
efficient urban spaces
new building techniques/materials

Carbon

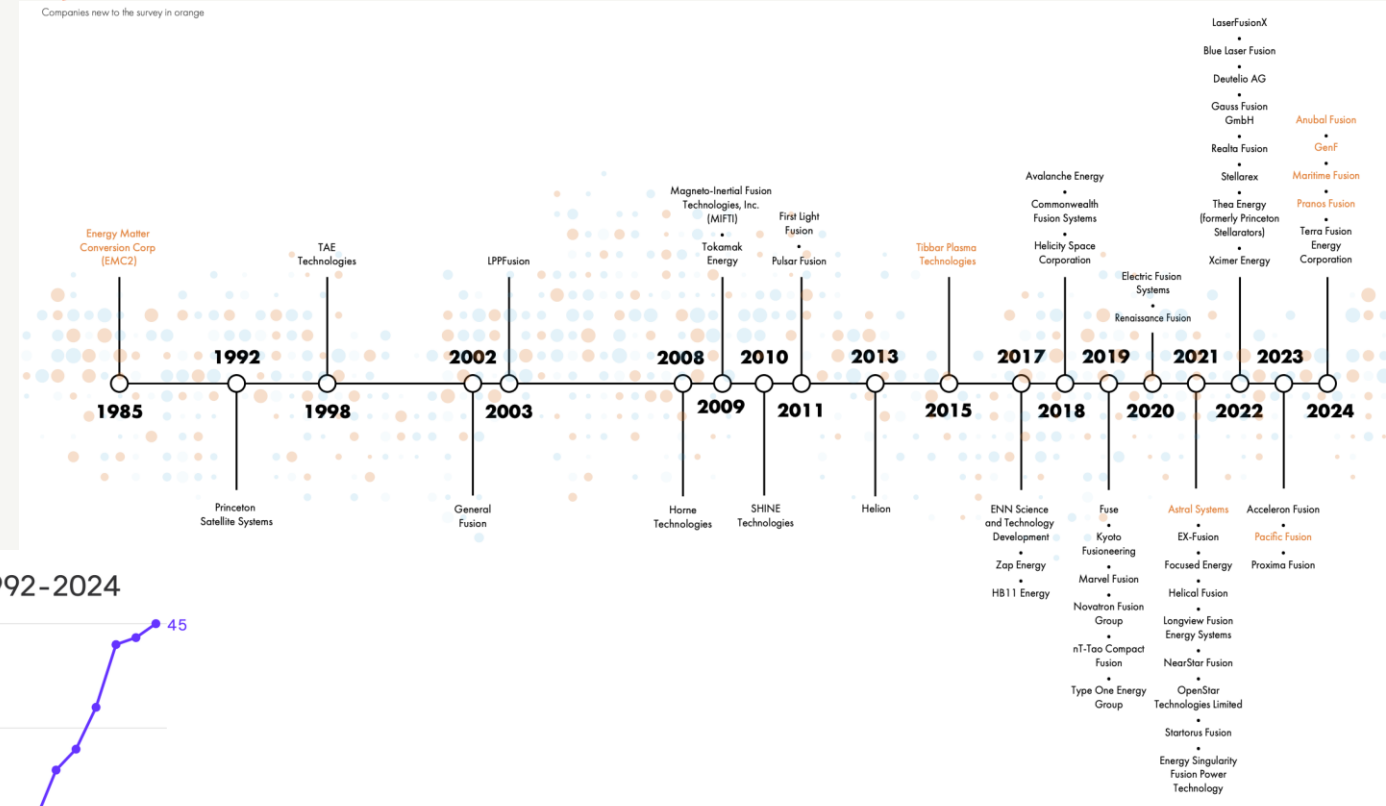
carbon dioxide removal
carbon capture, utilization and storage
GHG accounting

Source

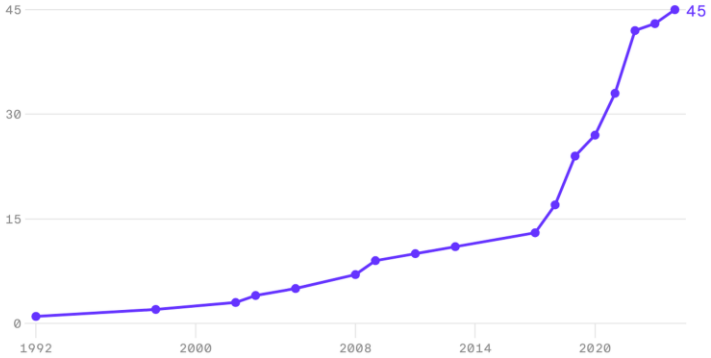
The cleantech bubble and the climate tech era



The “Cambrian explosion” in fusion



Number of private fusion companies, 1992-2024



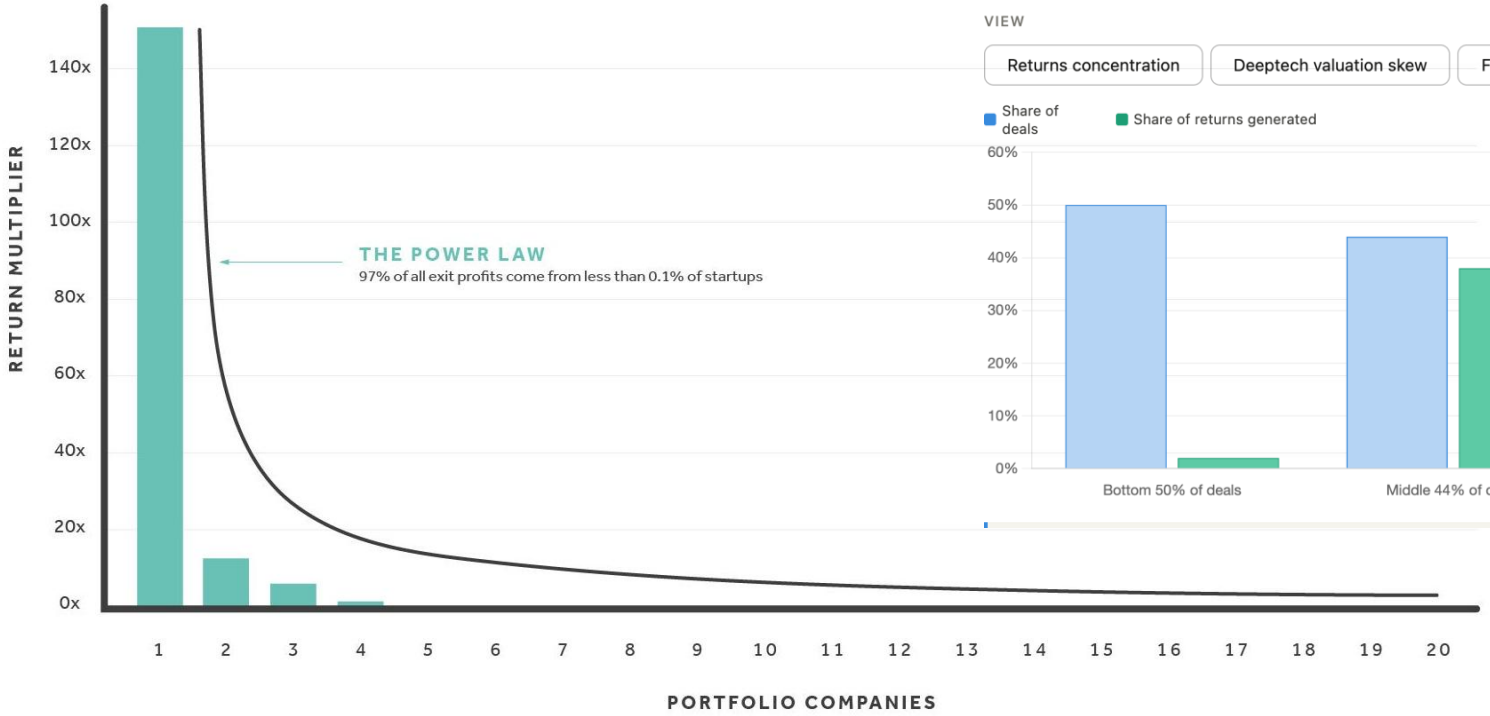
Source

How does venture capital think and work?

KEY EMPIRICAL DATA POINTS

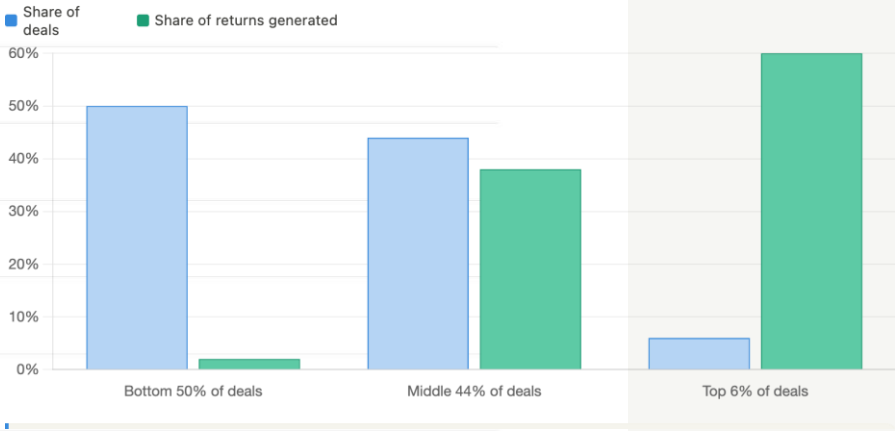
6%	1.1%	90%	25–30
of US VC deals generated 60% of all returns (1985–2014)	of 11,350 startups returned the entire invested fund	of funds with 3x+ returns had at least one "fund returner"	companies per year generate >50% of total VC exit value globally
Horsley Bridge	VenCap (1986–2018)	VenCap analysis	David Clark, VenCap

THE VC POWER LAW



VIEW

Returns concentration | Deeptech valuation skew | Fund performance distribution



Source

Who is investing?

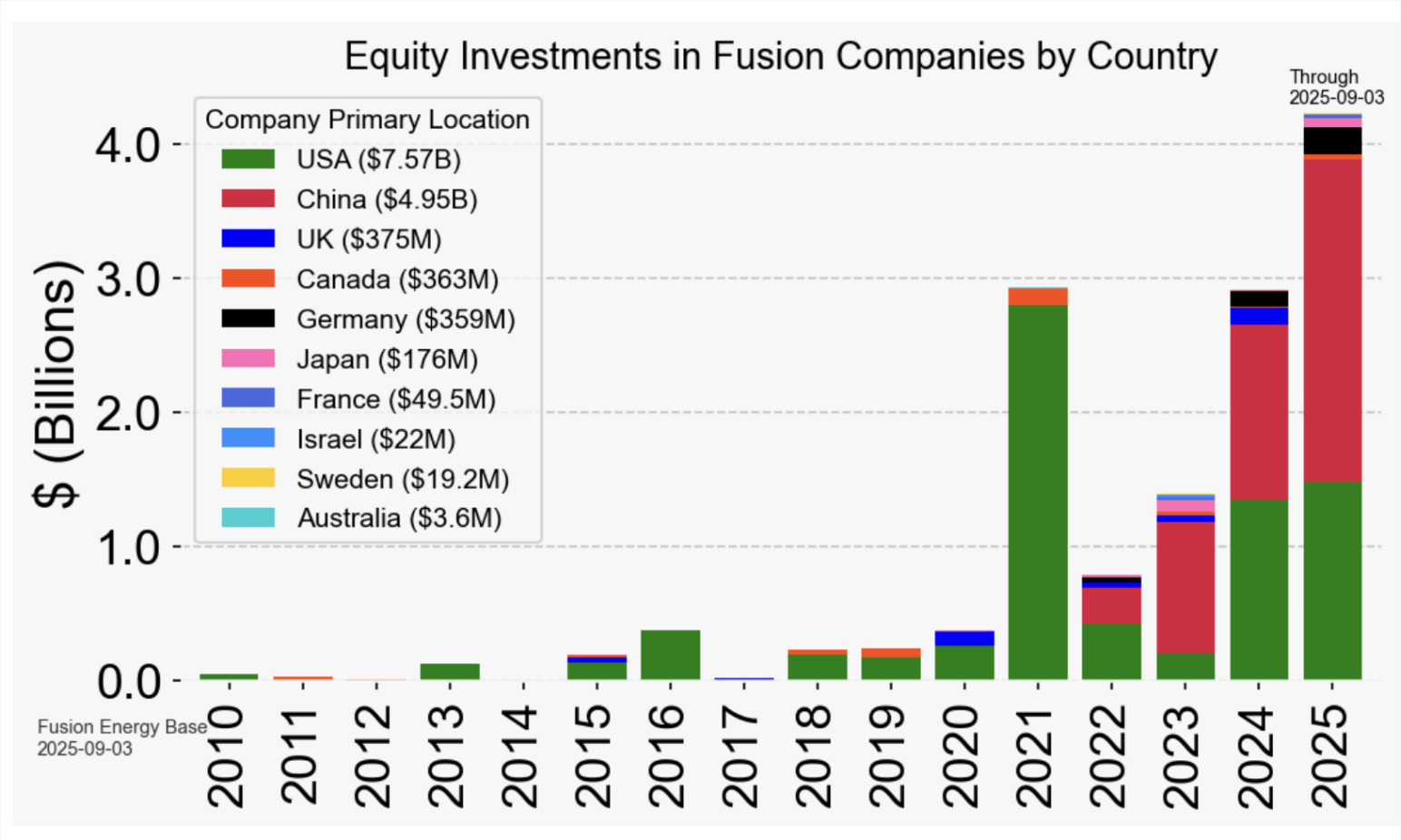
3. Selected* investors in fusion

Addition
Art Samberg
Bezos Expeditions
Breakthrough Energy Ventures
Capricorn Investment Group (Jeff Skoll)
Cenovus Energy
Charles Schwab
Chevron Technology Ventures
David Harding (CEO of Winton Group)
Dr Hans-Peter Wild (Owner of Capri Sun)
Dusting Moskovistz
Energy Impact Partners
Eni
Equinor
GA Capital
GIC
Google
Grantham Foundation for the Environment
IP Group
Khazanah Nasional
Khosla Ventures
Kuwait Investment Authority
Legal and General
Lowercarbon Capital
Lukasz Gadowski
Mithril Capital (Peter Thiel)
Oxford Sciences Innovation
Reid Hoffman
Sam Altman
Temasek
Venrock
Vulcan Capital
Wellcome Trust
Y Combinator

*All of these investors have been publicly identified in previous publications. The FIA and the UKAEA are not responsible for the responses listed in this report from survey participants and do not intend to disclose any proprietary information.

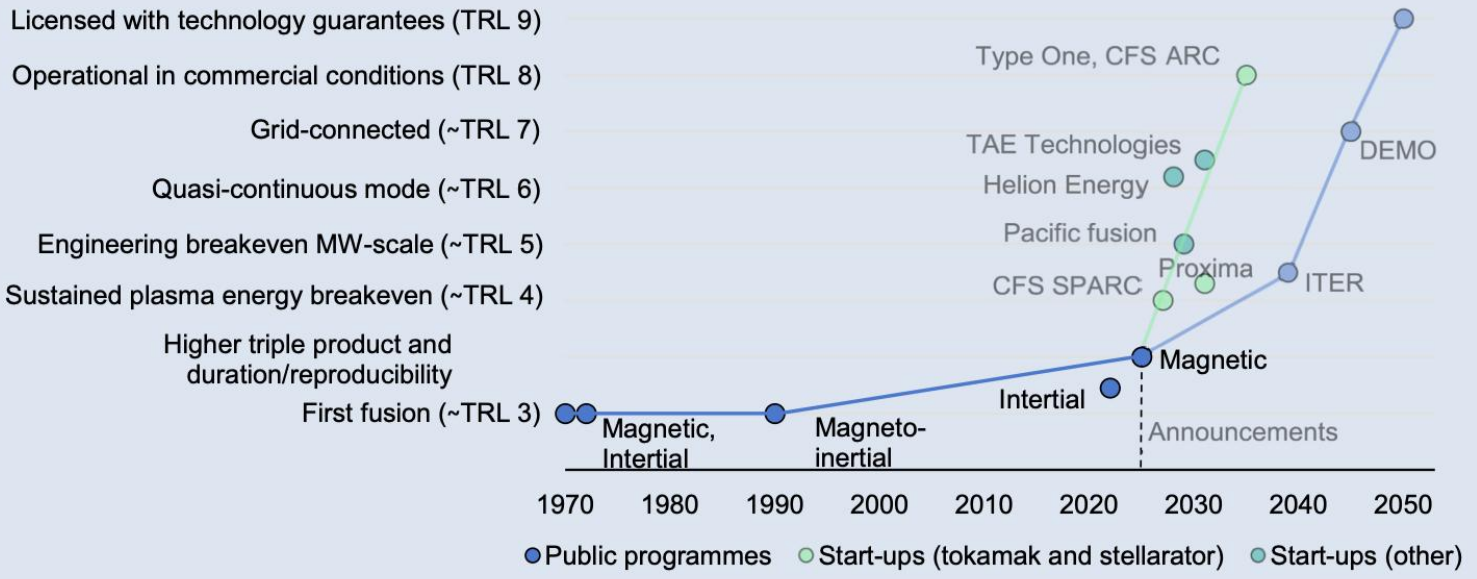
Source

Investments are focused geographically



Source

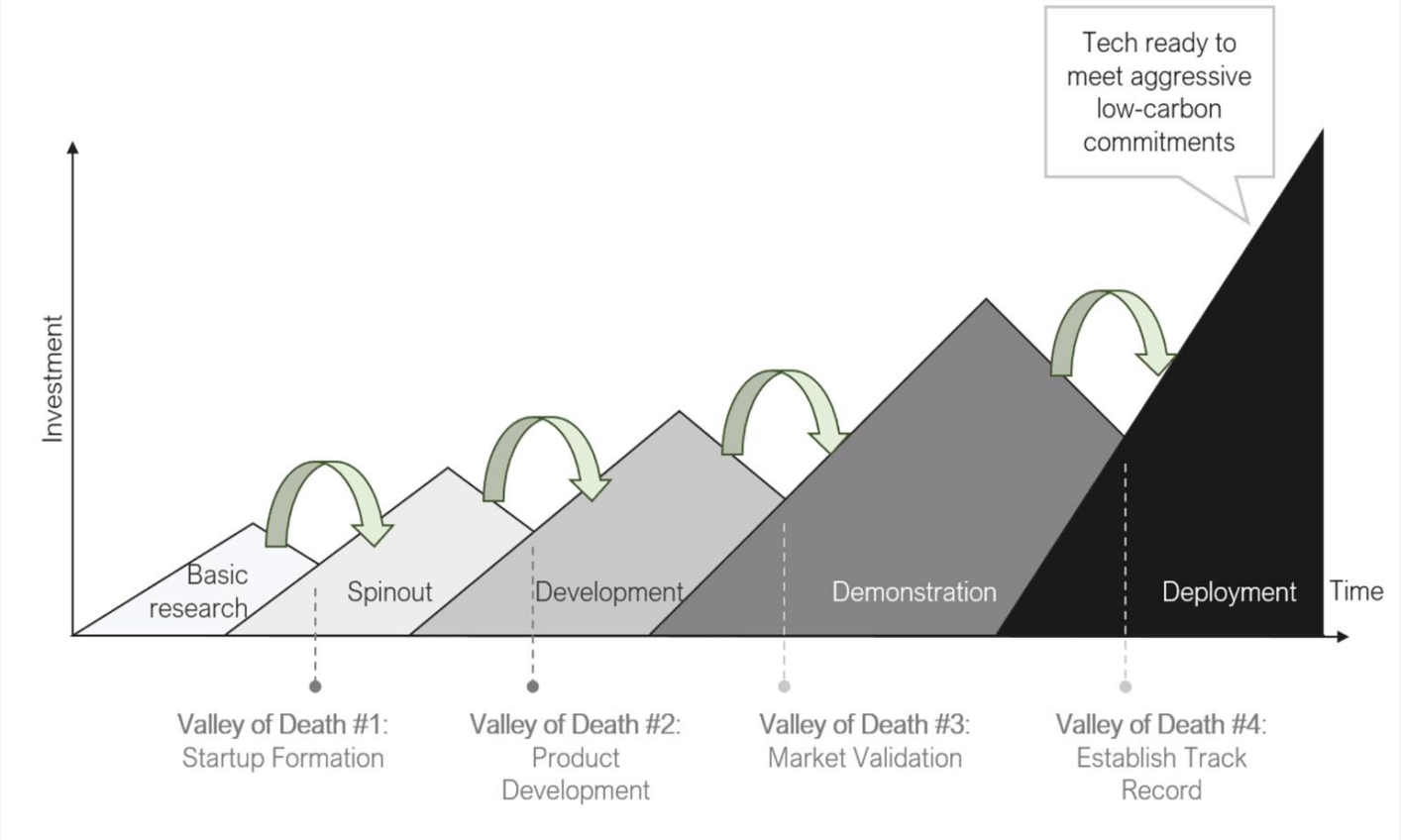
Fusion is still at low TRL



Notes: TRL = technology readiness level. CFS SPARC and CFS ARC are projects of the Commonwealth Fusion Systems company. ITER is a project funded by an intergovernmental consortium. DEMO refers to a set of proposed projects by governments as successors to ITER. TRL values are given as illustrative but may not be match the stages precisely.

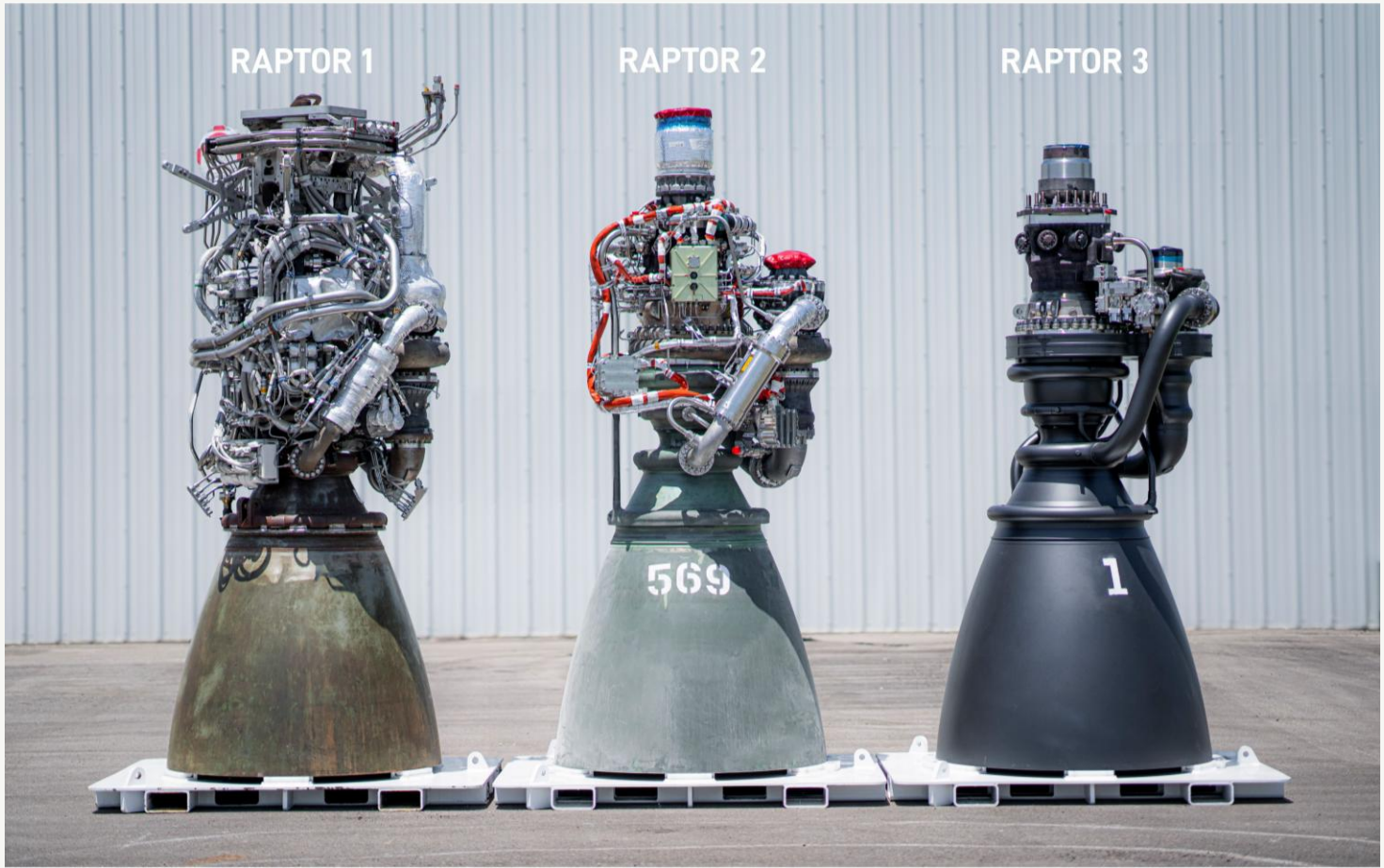
Source

Deeptech goes through successive derisking



[1] **Third Derivative,** Link

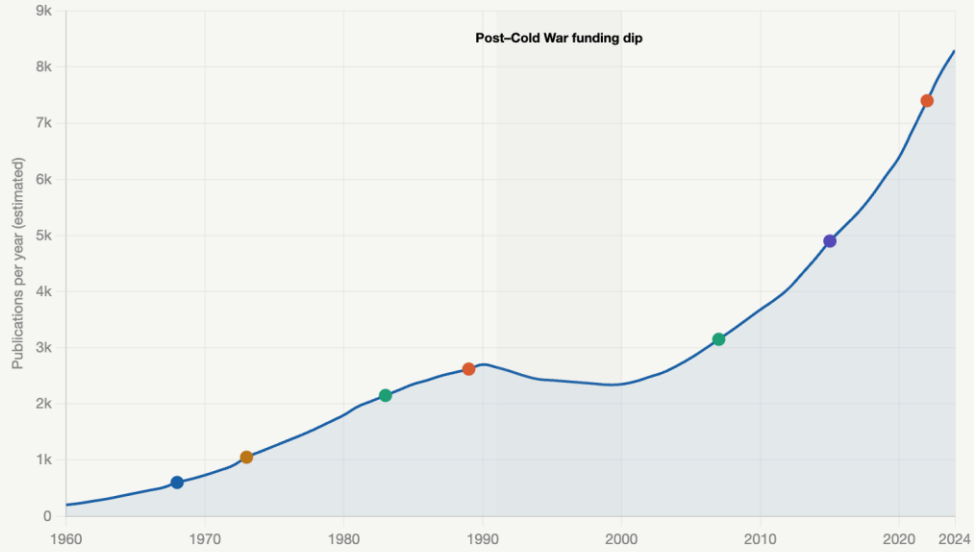
“Move fast and break things” (sometimes)



A culture shock: IP versus open publications

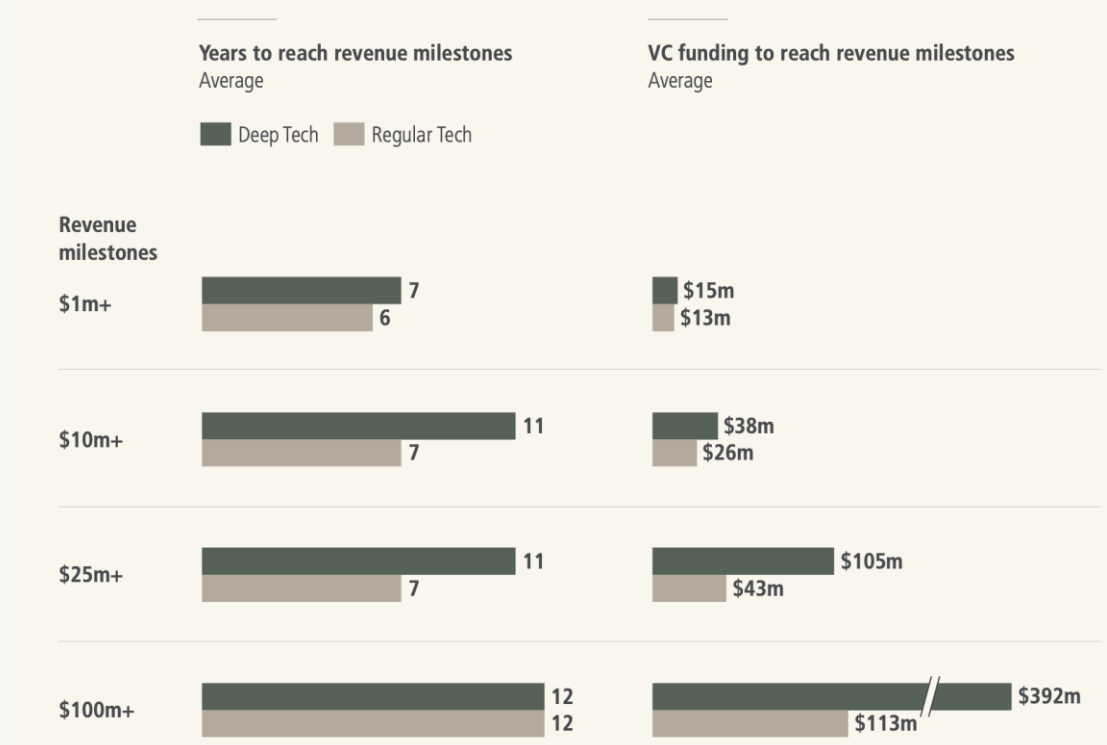
IP Strategy for Deep Tech Startups

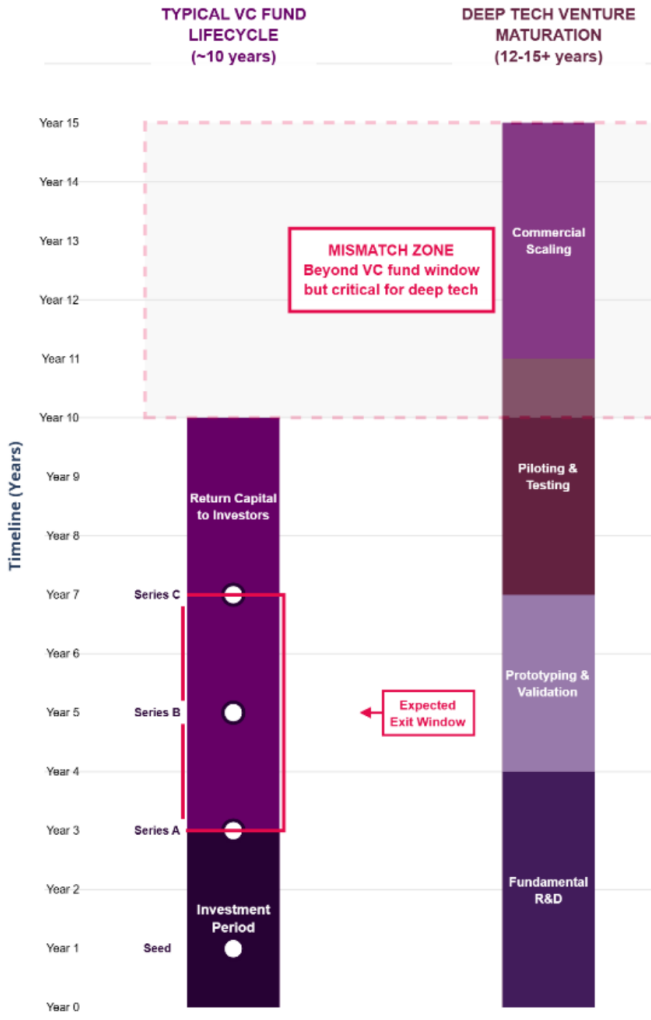
Estimated global publications per year · Sources: Scopus, Web of Science, IAEA bibliometric data, Nuclear Fusion journal records



Note: Counts are estimates reconstructed from multiple bibliometric sources (Scopus "nuclear fusion" topic search, Web of Science, IAEA, Nuclear Fusion journal). Exact counts vary by database and search scope. The trend and inflection points are well-evidenced; precise yearly figures should be verified against full Scopus/WoS exports.

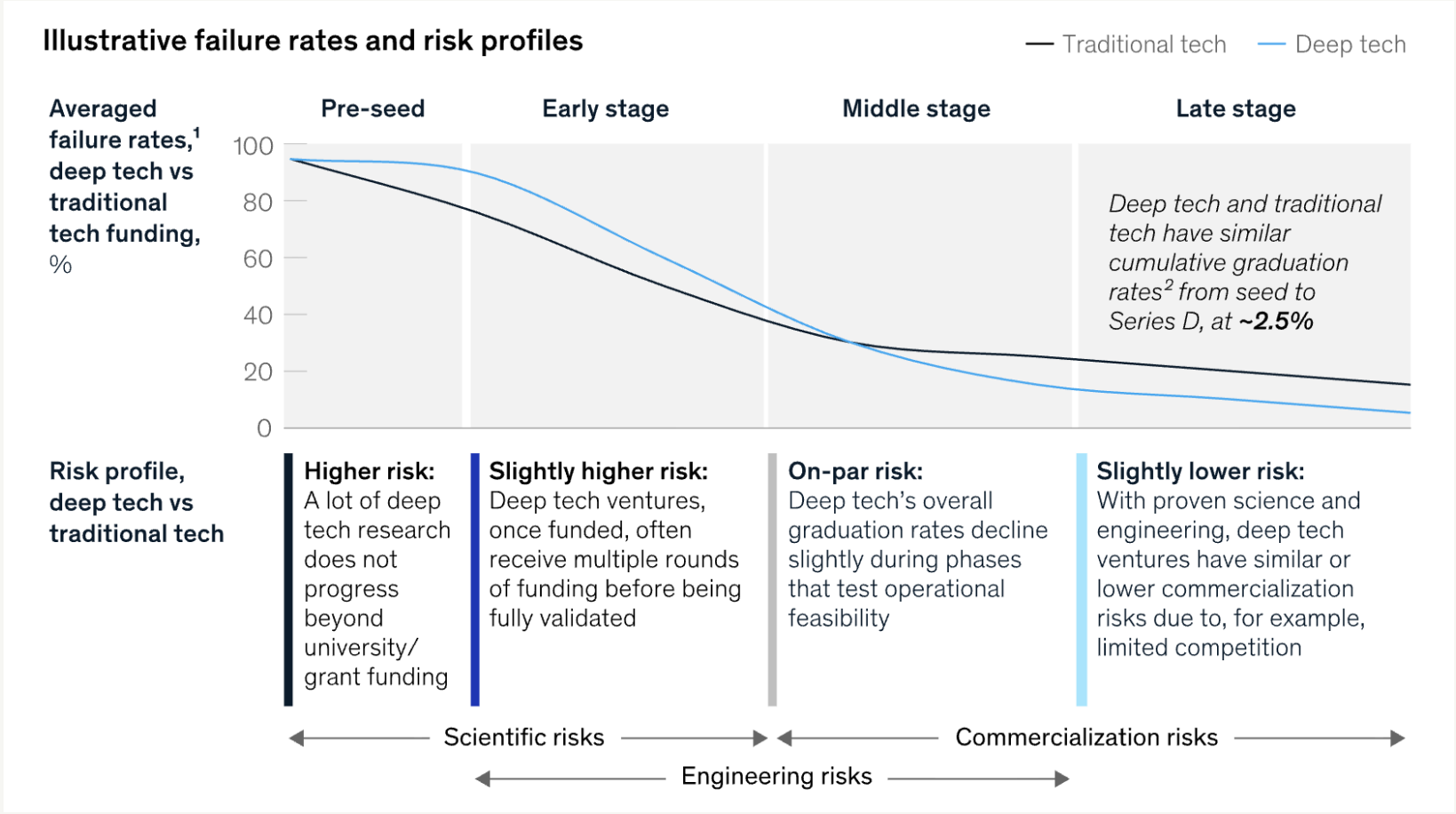
The funding timeline mismatch





[1] EU Deeptech report 2026, Link
[2] Beyond Venture Capital 2026, Link

Startups fail... some fusion startups will fail...



Source

A maturing market?

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

By **Dharna Bafna**

January 22, 2026 6:58 PM GMT+1 · Updated January 22, 2026

CLIMATE

Trump Media is merging with fusion power company TAE Technologies in $6B+ deal

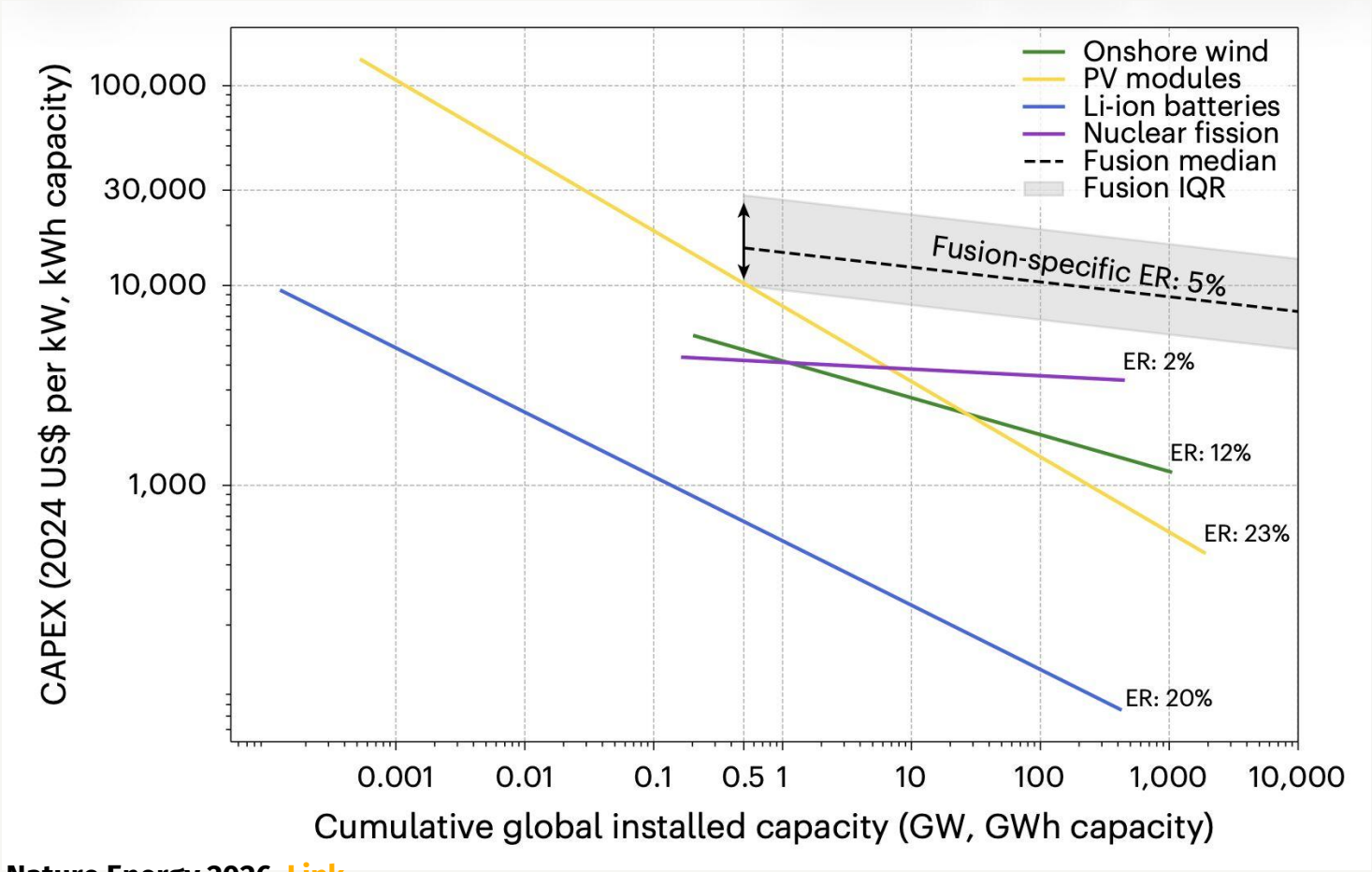
Tim De Chant, Amanda Silberling

9:05 AM PST · December 18, 2025

Technology

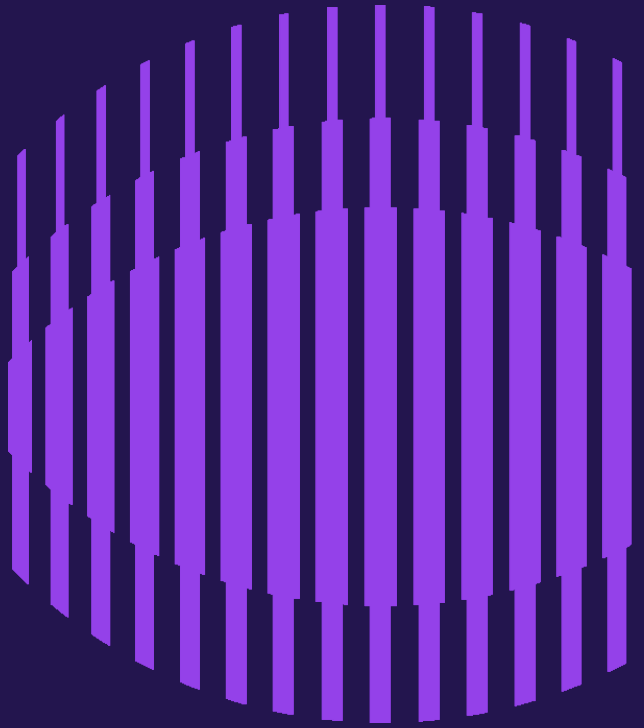
Everett fusion startup Zap Energy names new CEO as it expands into fission technology

Can fusion compete?



[1] L. Tang, et al, Nature Energy 2026, Link

What’s next?



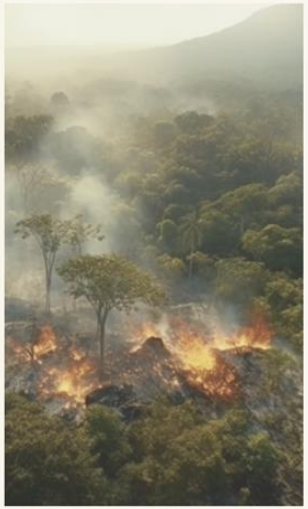
Societal challenges require breakthrough solutions

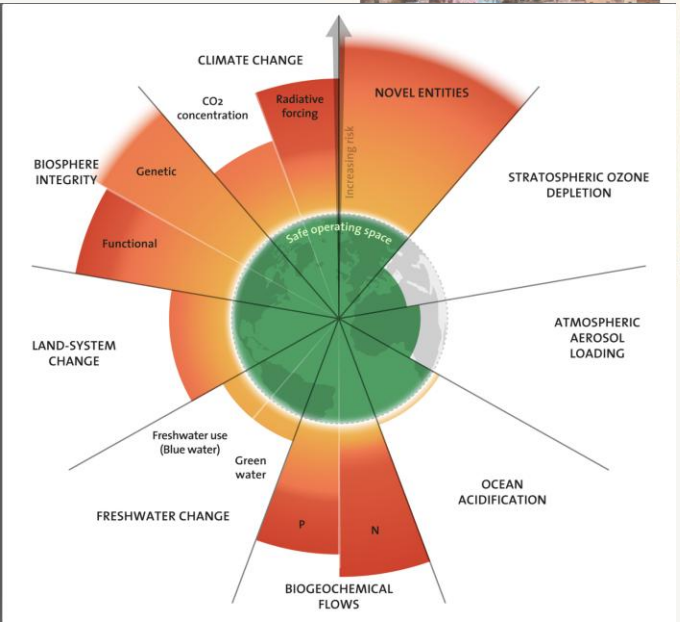
POVERTY & INEQUALITY

RESOURCE SCARCITY

PHYSICAL & MENTAL HEALTH

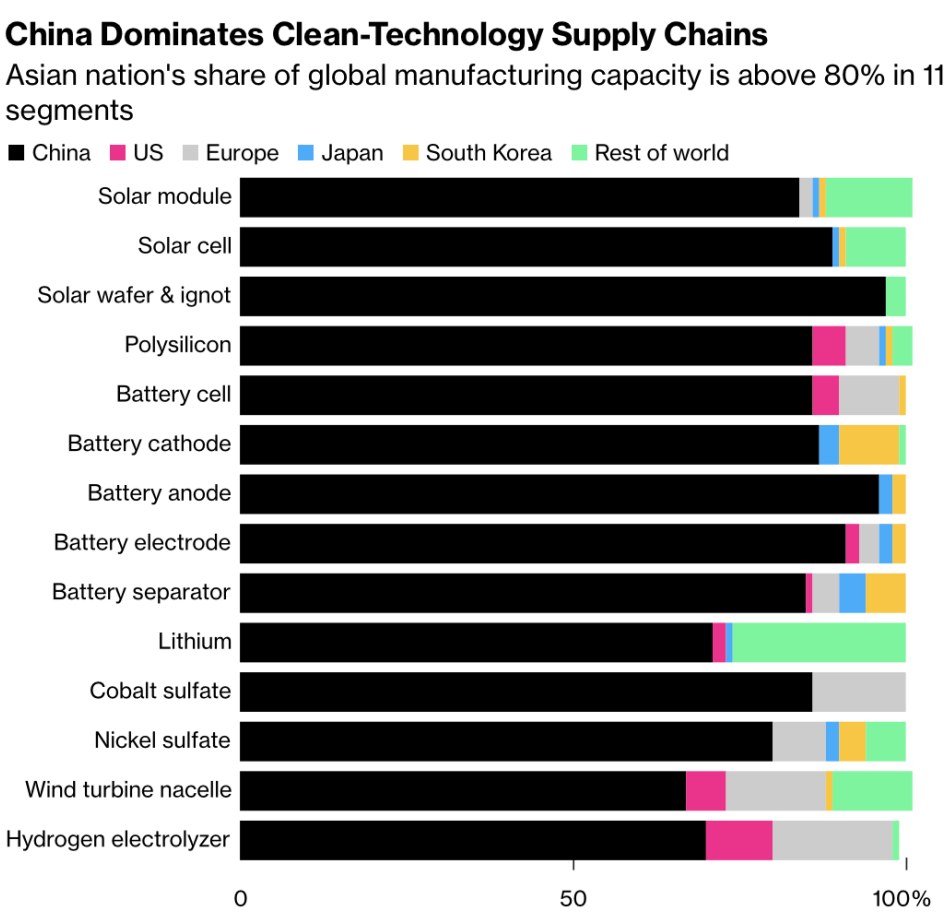
CLIMATE CHANGE

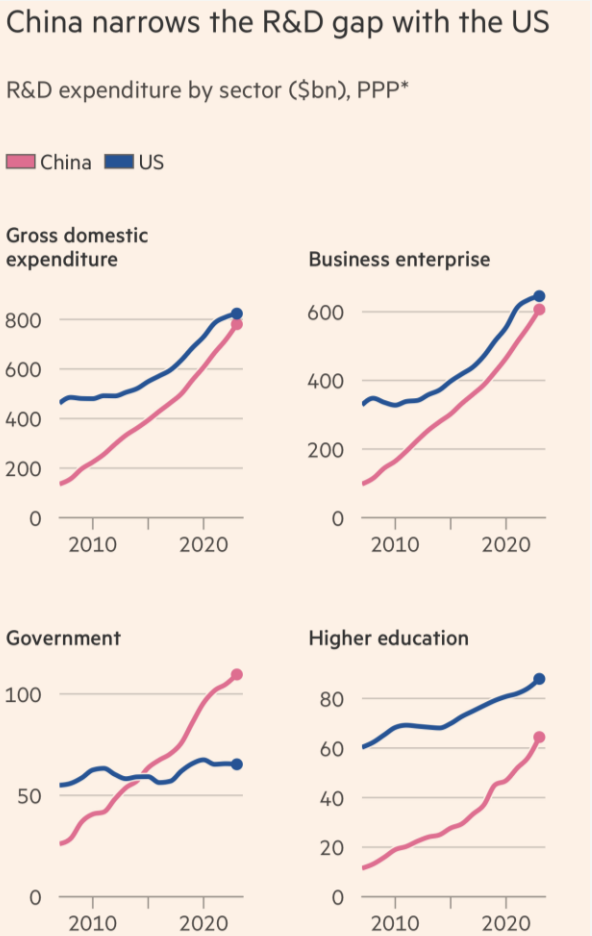




[1]2025 EU Deep Tech Report link
[2]Planetary health check 2025 link

Societal challenges require breakthrough solutions





[1] link
[2] link