



Keynote: The Path to Fusion Power Plants

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The 2nd IAEA Workshop on Fusion Enterprises

July 11, 2022

Scaling breakthrough scientific startups that impact billions of lives





Climate Change



Standard of Living



Energy Security

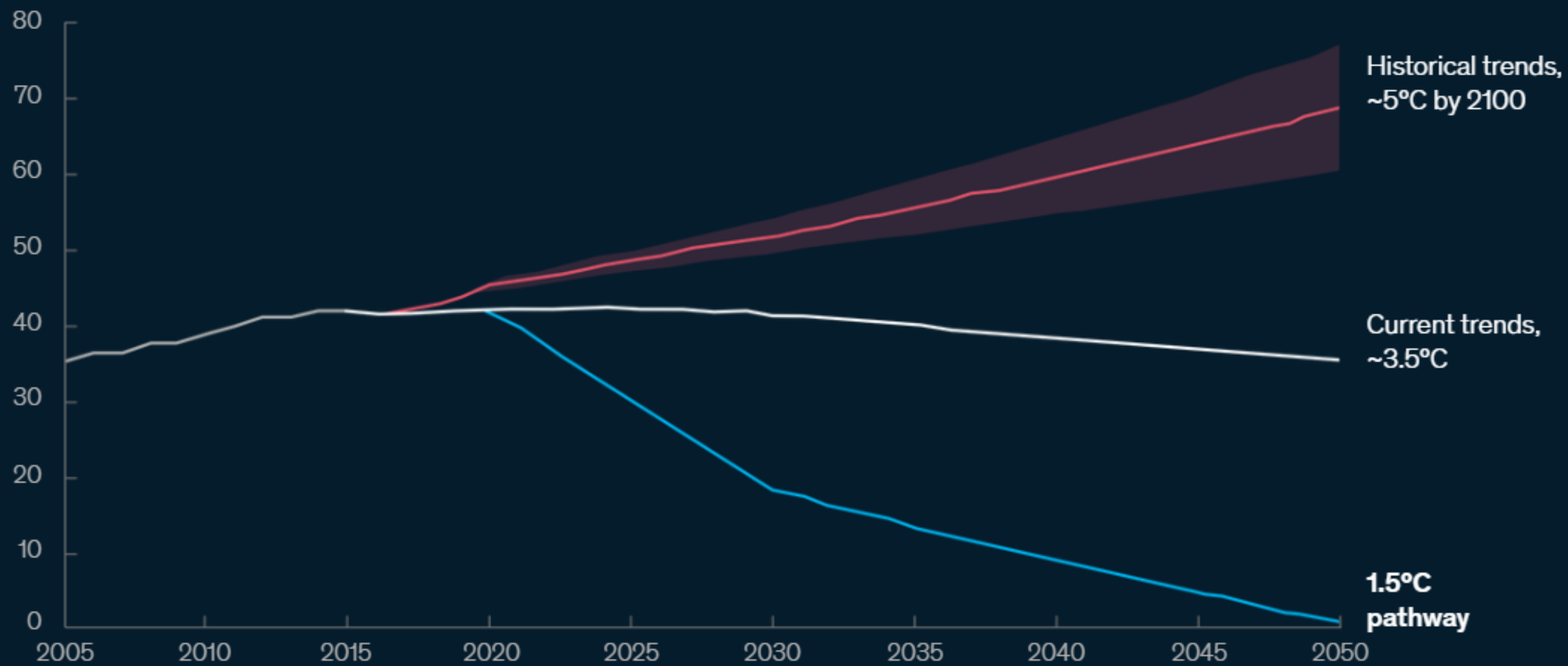


COVID-19

~~THE UPCOMING~~ ECONOMIC CRISIS

CLIMATE CHANGE

Projected global CO₂ emissions,
billion metric tons of carbon dioxide (GtCO₂) per year

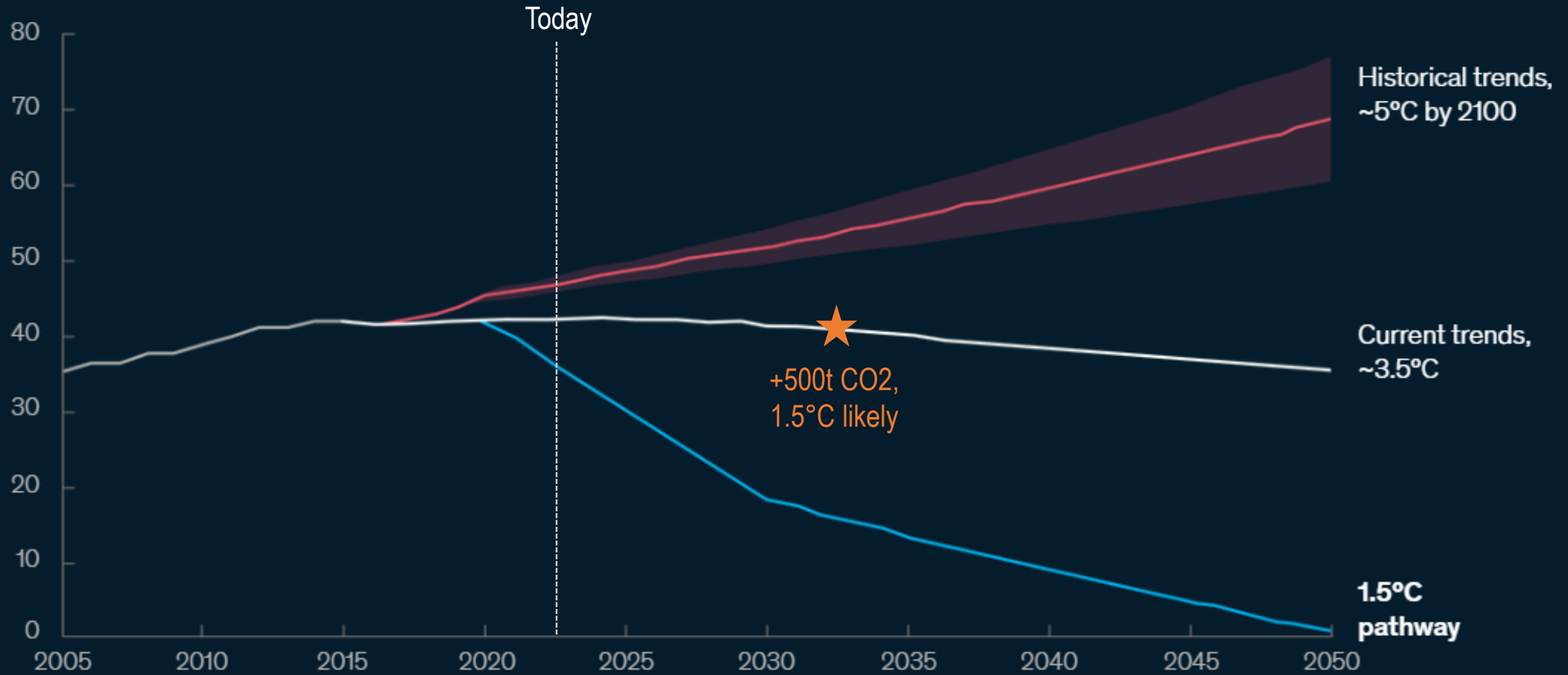


How much carbon budget do we have left?

To have a 50% chance of keeping global warming to 1.5 degrees Celsius above pre-industrial times, the planet can only take a cumulative 500 billion tonnes of CO₂.



Projected global CO₂ emissions,
billion metric tons of carbon dioxide (GtCO₂) per year



And global energy demand will increase...



Air conditioning



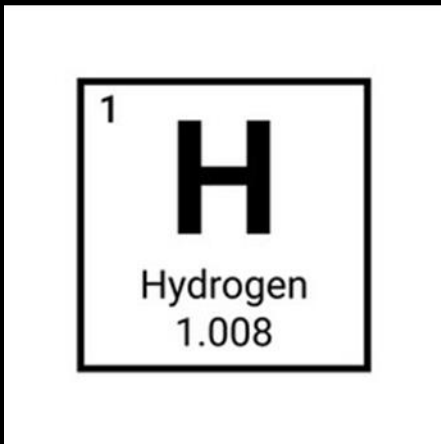
Data storage



Water supply



Waste management



Hydrogen production



CO2 Removal

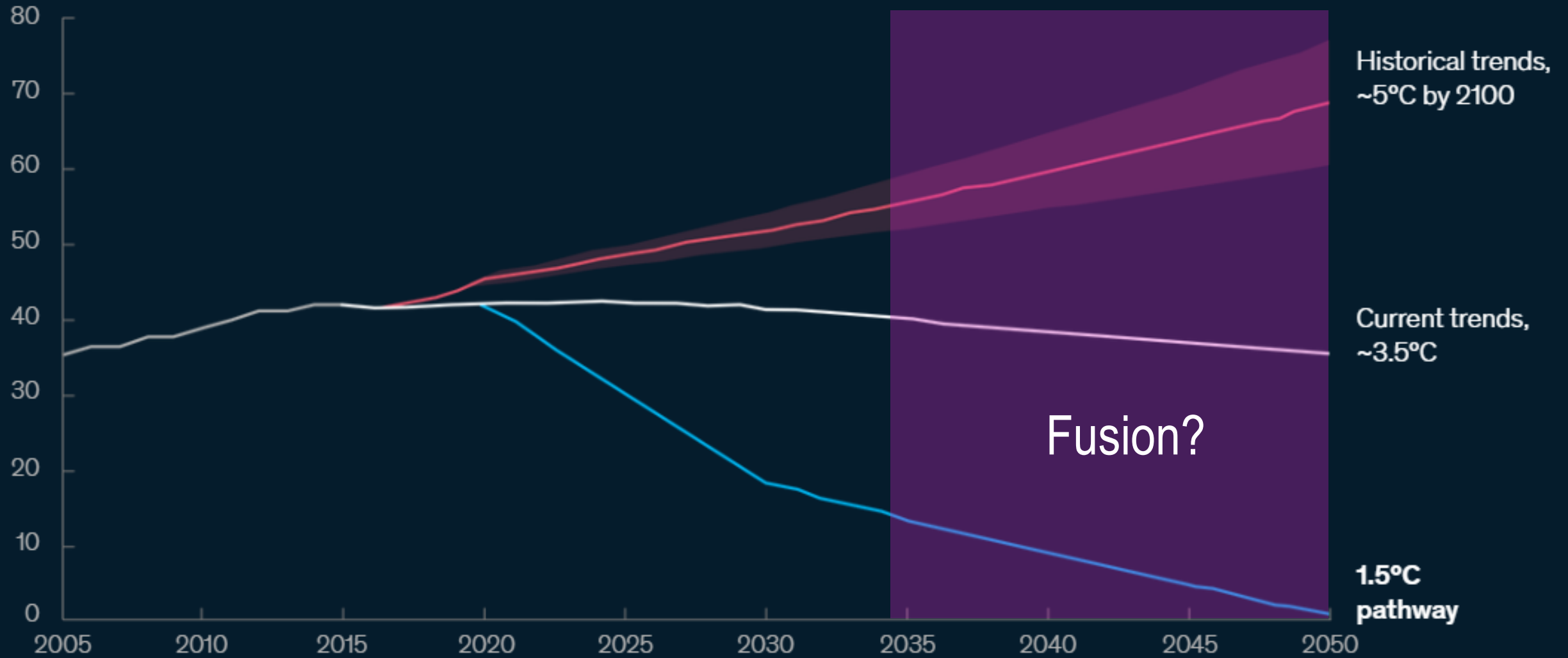


High density ag



Other

Projected global CO₂ emissions,
billion metric tons of carbon dioxide (GtCO₂) per year



Why Now?



Climate Change



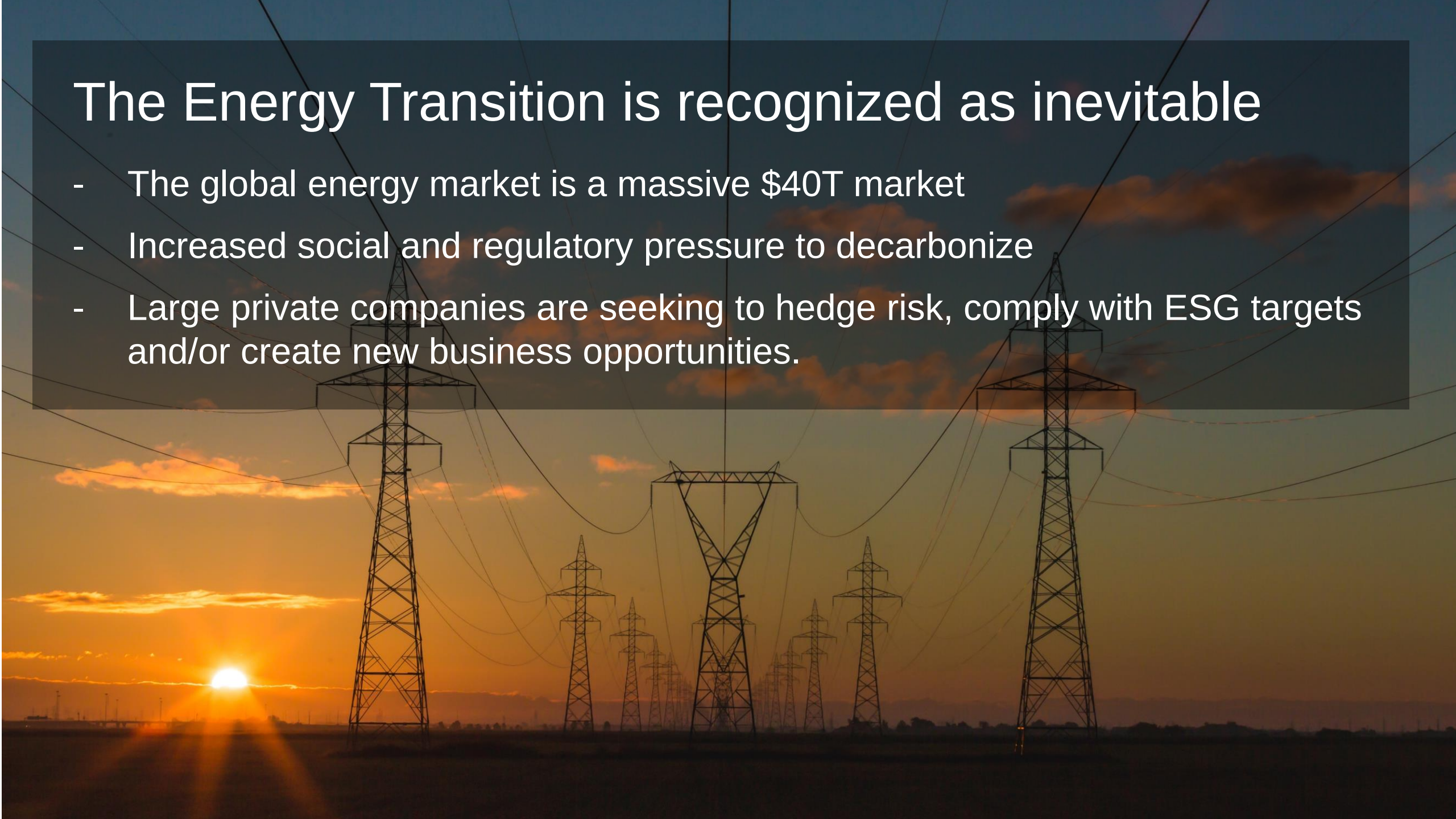
Standard of Living



Energy Security

The Energy Transition is recognized as inevitable

- The global energy market is a massive \$40T market
- Increased social and regulatory pressure to decarbonize
- Large private companies are seeking to hedge risk, comply with ESG targets and/or create new business opportunities.

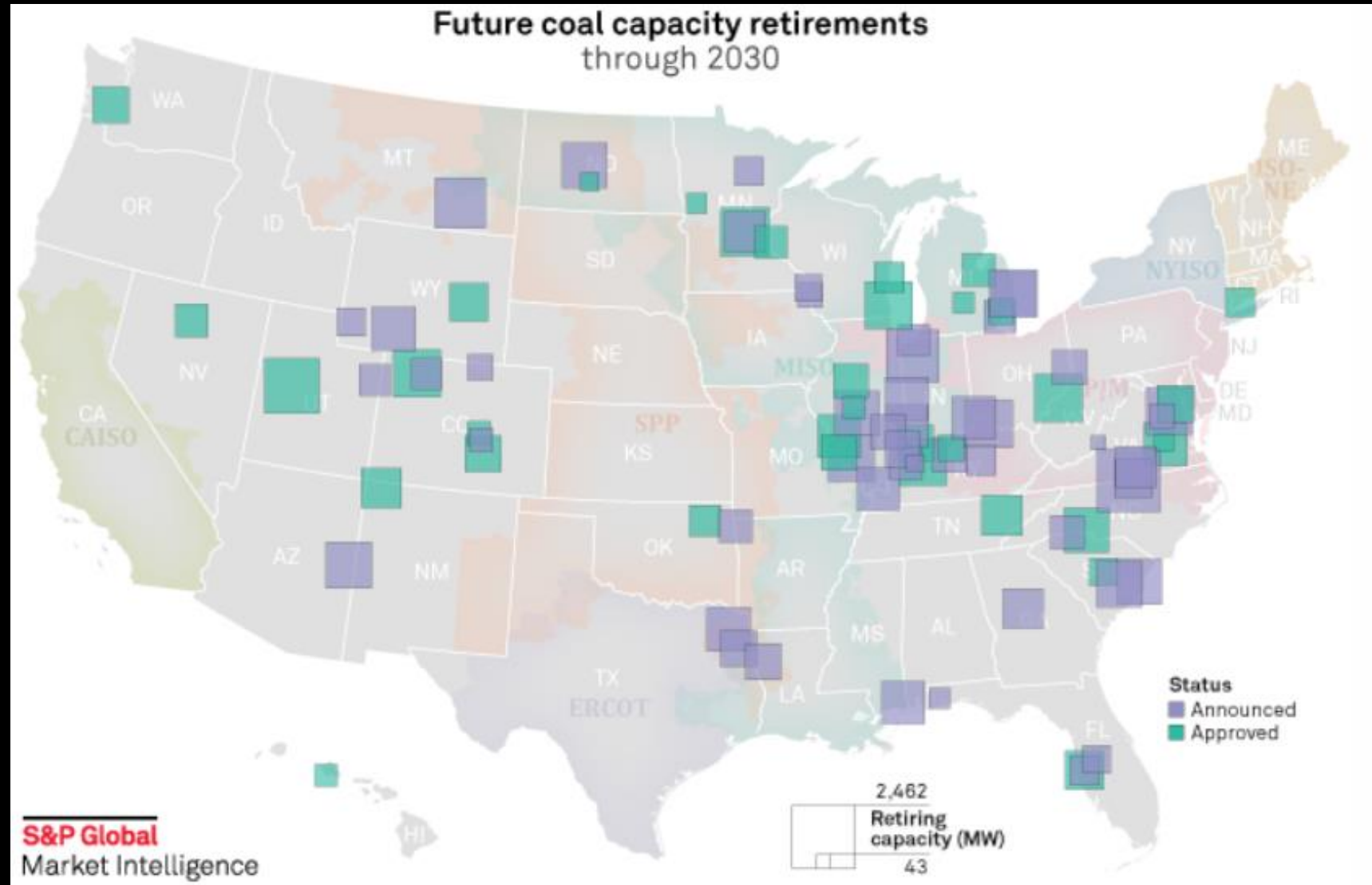


Within individual countries, this is a massive opportunity

Example:

The US has 229 GW of coal electric generation capacity.

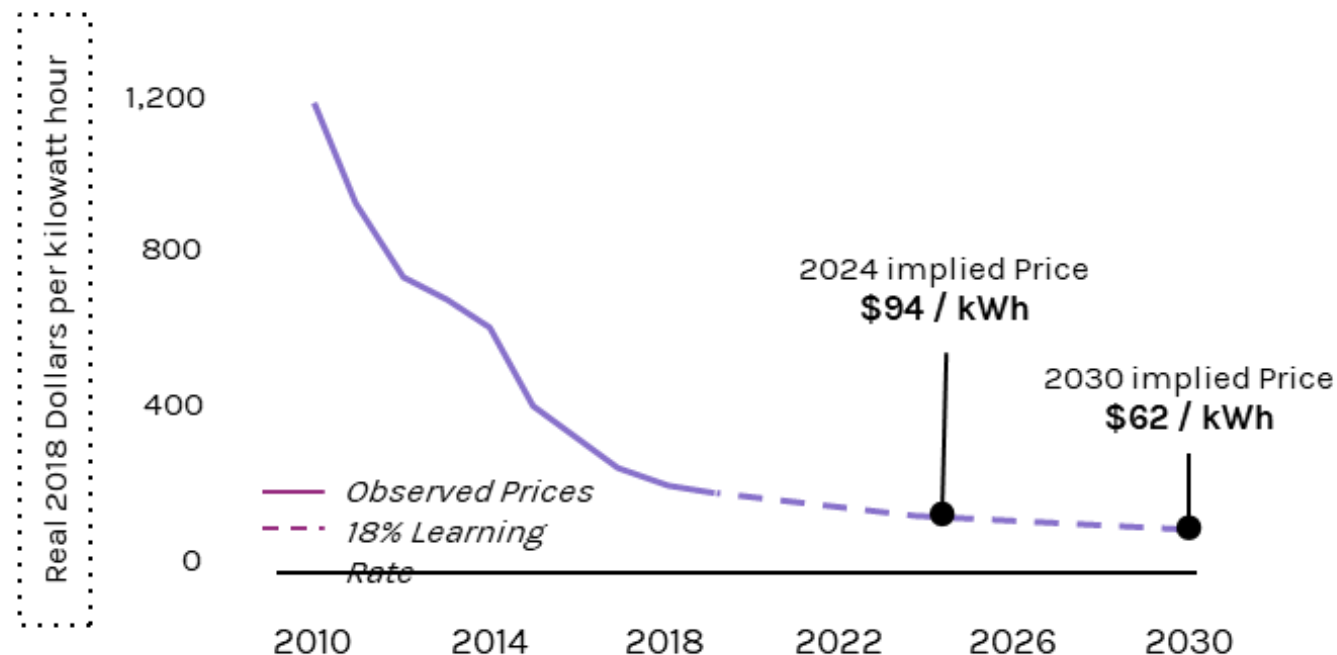
62 GW are set to retire between now and 2030.



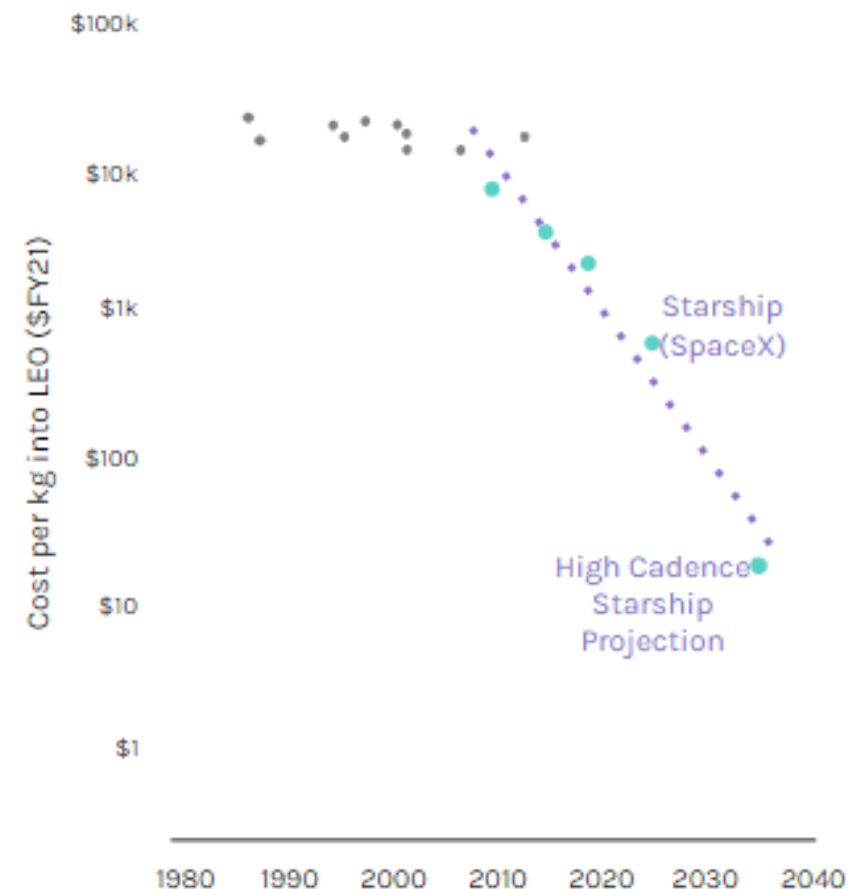
Why now for private capital?

- Success stories of “tough tech” ventures
- Falling costs of enabling technologies

Battery costs have fallen like solar



Exponential decrease in launch costs enables a new space economy



2021 was a big year for fusion.

- The Joint European Torus generated 59 MJ of energy, double it's previous record.
- The National Ignition Facility in Livermore, CA, set a new record for energy gain from inertial fusion energy, and generated a burning plasma.
- China's EAST tokamak sustained fusion reactions for 17 minutes at 126 million degrees.
- The first central solenoid magnet was delivered to ITER, a major manufacturing milestone.

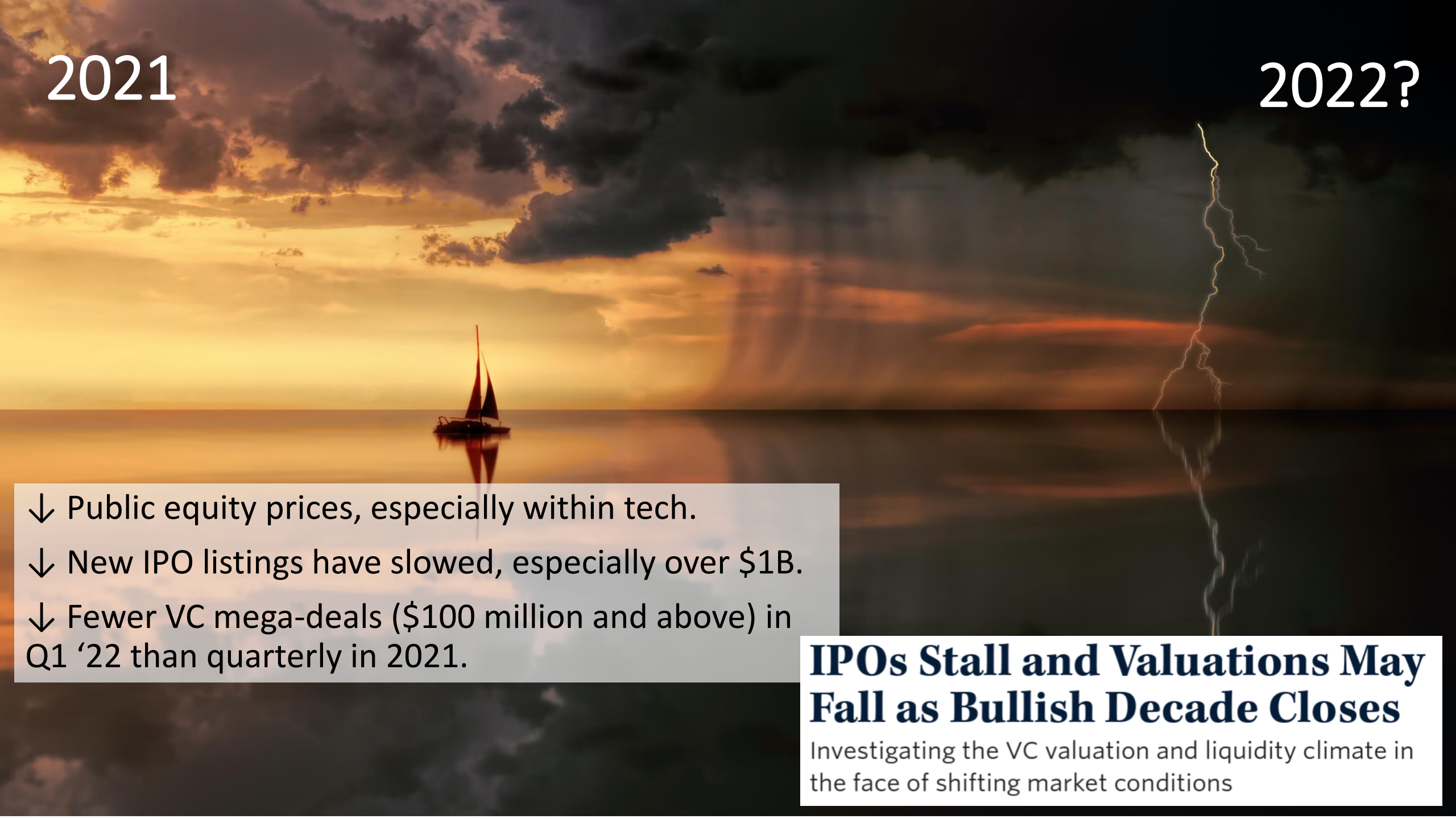


2021 was a big year for fusion.

- Private fusion companies continued to hit technical milestones, through publicly and privately funded efforts.
- Commonwealth Fusion Systems demonstrated its prototype 20 Tesla magnet.
- Private fusion companies raised a massive **\$3B of private capital in 2021.**



Image: New York Times, Decu Wu



2021

2022?

- ↓ Public equity prices, especially within tech.
- ↓ New IPO listings have slowed, especially over \$1B.
- ↓ Fewer VC mega-deals (\$100 million and above) in Q1 '22 than quarterly in 2021.

IPOs Stall and Valuations May Fall as Bullish Decade Closes

Investigating the VC valuation and liquidity climate in the face of shifting market conditions

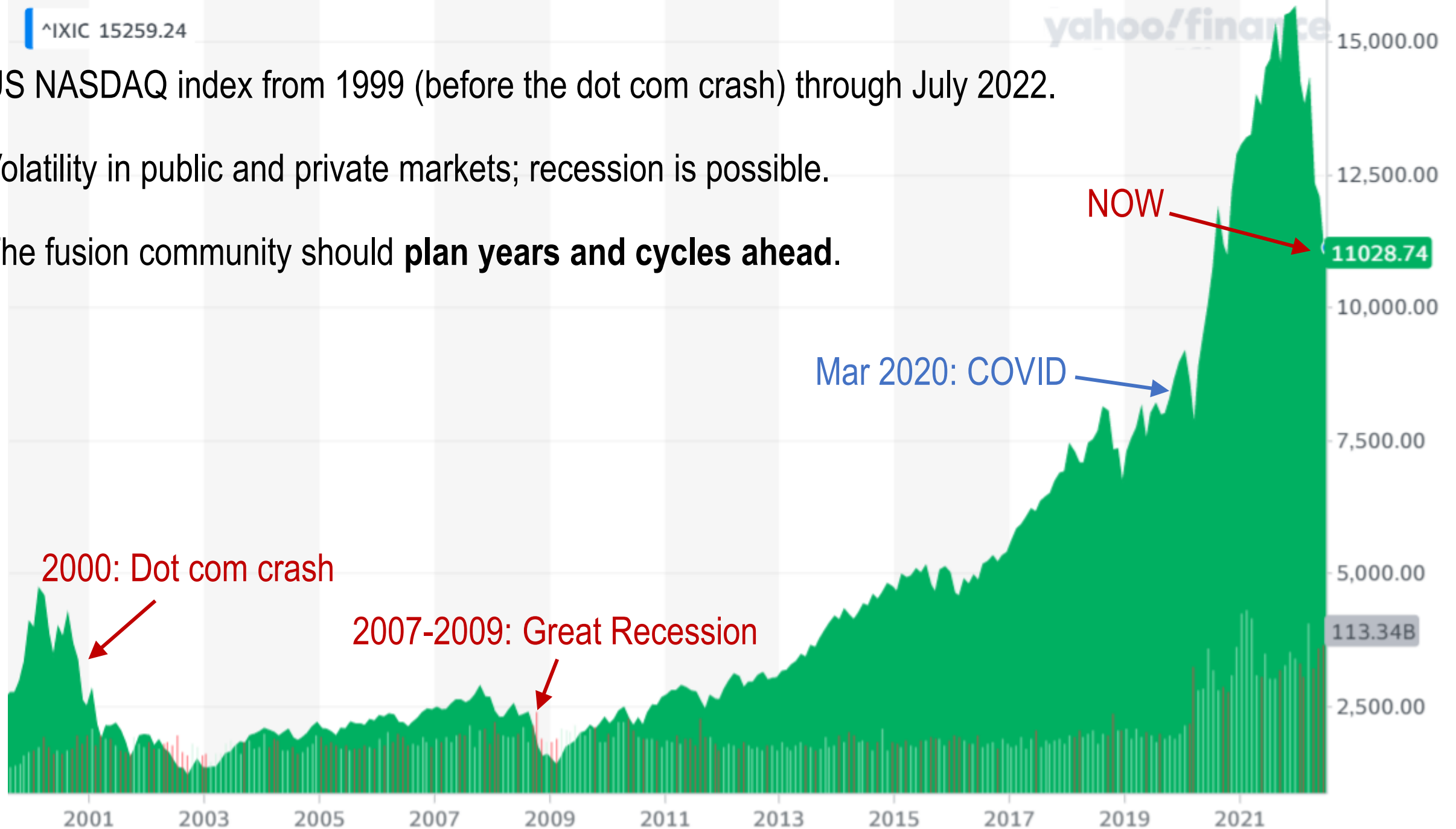
^IXIC 15259.24

yahoo!finance

US NASDAQ index from 1999 (before the dot com crash) through July 2022.

Volatility in public and private markets; recession is possible.

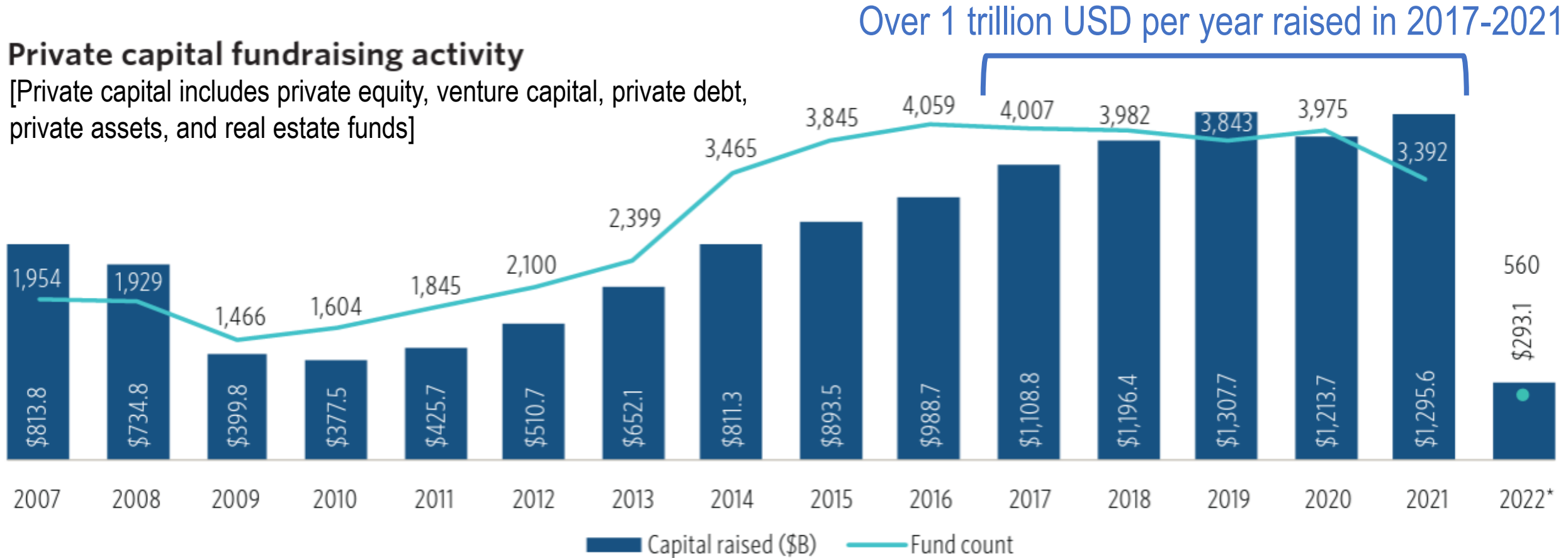
The fusion community should **plan years and cycles ahead**.



Good News: A lot of private capital was raised over the past five years.

Private capital fundraising activity

[Private capital includes private equity, venture capital, private debt, private assets, and real estate funds]

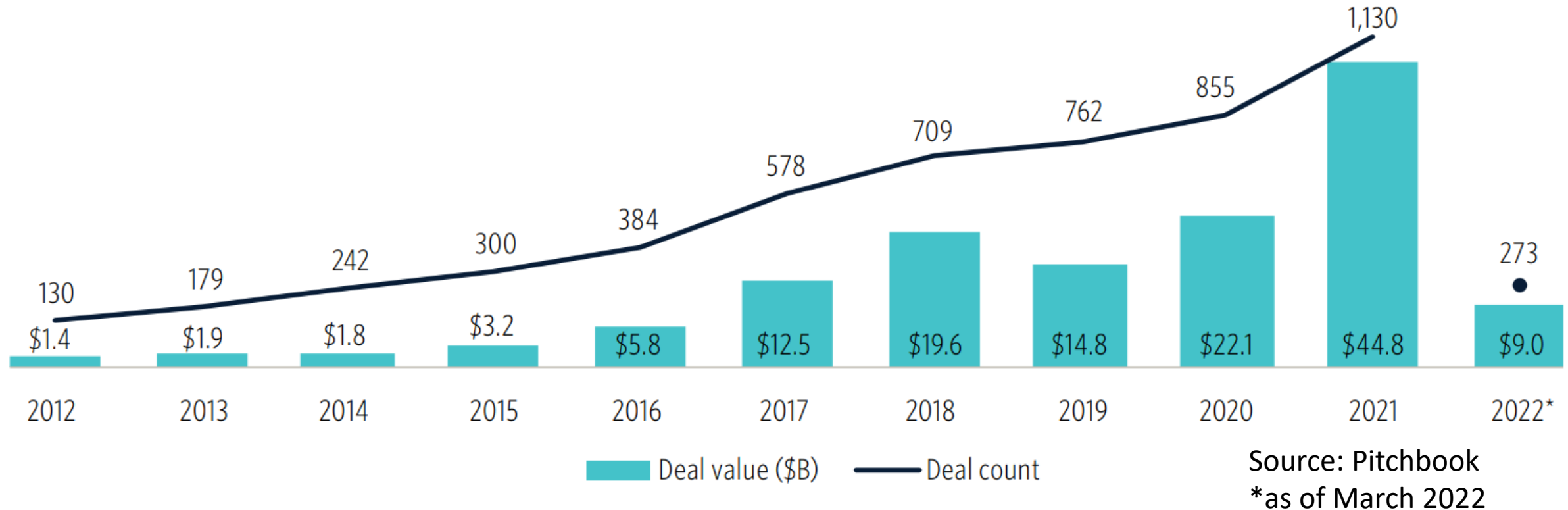


Source: PitchBook | Geography: Global

*As of March 31, 2022

Pitchbook estimates ~\$3.2 trillion of “dry powder” available

Climate Tech investment remains strong



- Between 2013-2019, Climate Tech investing grew at 5X the VC overall growth rate.
- Corporate investors have recently been more active in VC. Roughly 2,000 different CVCs participated in a venture deal in 2021, more than 400 higher than any previous year.



In the near term:

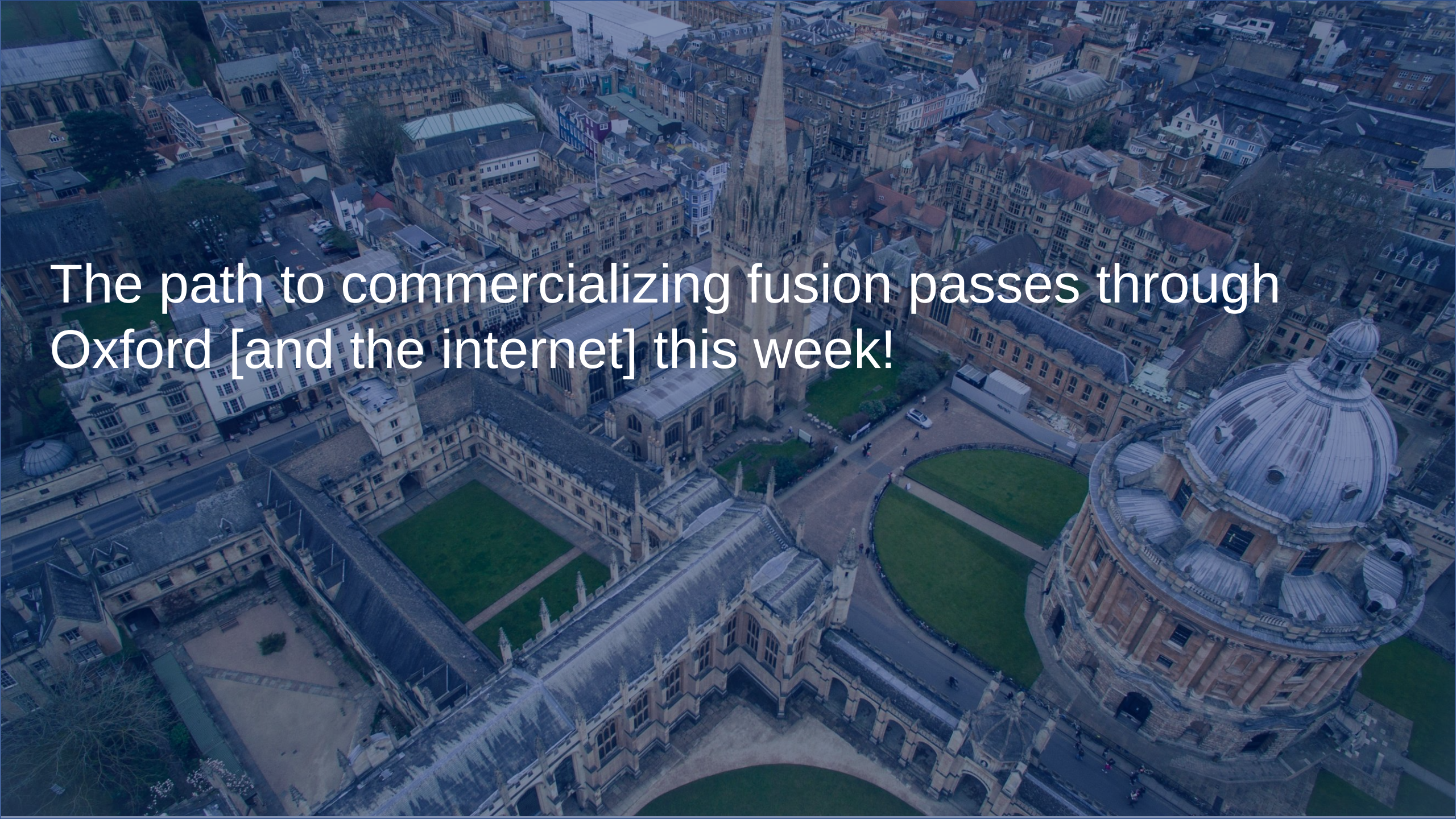
- Startups are negotiating with new valuation assumptions, even at the earliest investment stages. Public funding needs to consider this.
- Protectionist deal terms (understand 'pay-to-play' and convertible debt)
- Grow cautiously; especially if far from valuation inflection points, try to bring cash in the door with grants and side hustles.
- Build relationships with nontraditional sources of capital.
- Look for opportunities created by market conditions.



The path to fusion power plants requires...

- Innovation, policy, AND capital.
- Long-term, strategic thinking to accomplish the goal: fusion power plants producing energy in the 2030s.
- Retiring risk and parallel-tracking independent engineering efforts to reduce timelines.
- Rigorous financial analysis.
- Early attention to supply chains and workforce development.



An aerial photograph of Oxford, England, showing a dense cluster of historic buildings. The most prominent features are the tall, slender spire of Christ Church Cathedral in the center and the large, circular dome of the Bodleian Library in the lower right. Several green courtyards and squares are interspersed among the stone buildings. The text "The path to commercializing fusion passes through Oxford [and the internet] this week!" is overlaid in white, sans-serif font across the middle of the image.

The path to commercializing fusion passes through
Oxford [and the internet] this week!

Thank You



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