Reducing Data Center Carbon Footprint with Carbon Capture and Storage

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Together…Shaping the Future of Energy®

Nonprofit

Chartered to serve the public benefit, with guidance from an independent advisory council

Thought Leadership

Systematically and imaginatively looking ahead to identify issues, technology gaps, and broader needs

Independent

Objective, scientific research leading to progress in reliability, affordability, health, safety, and the environment

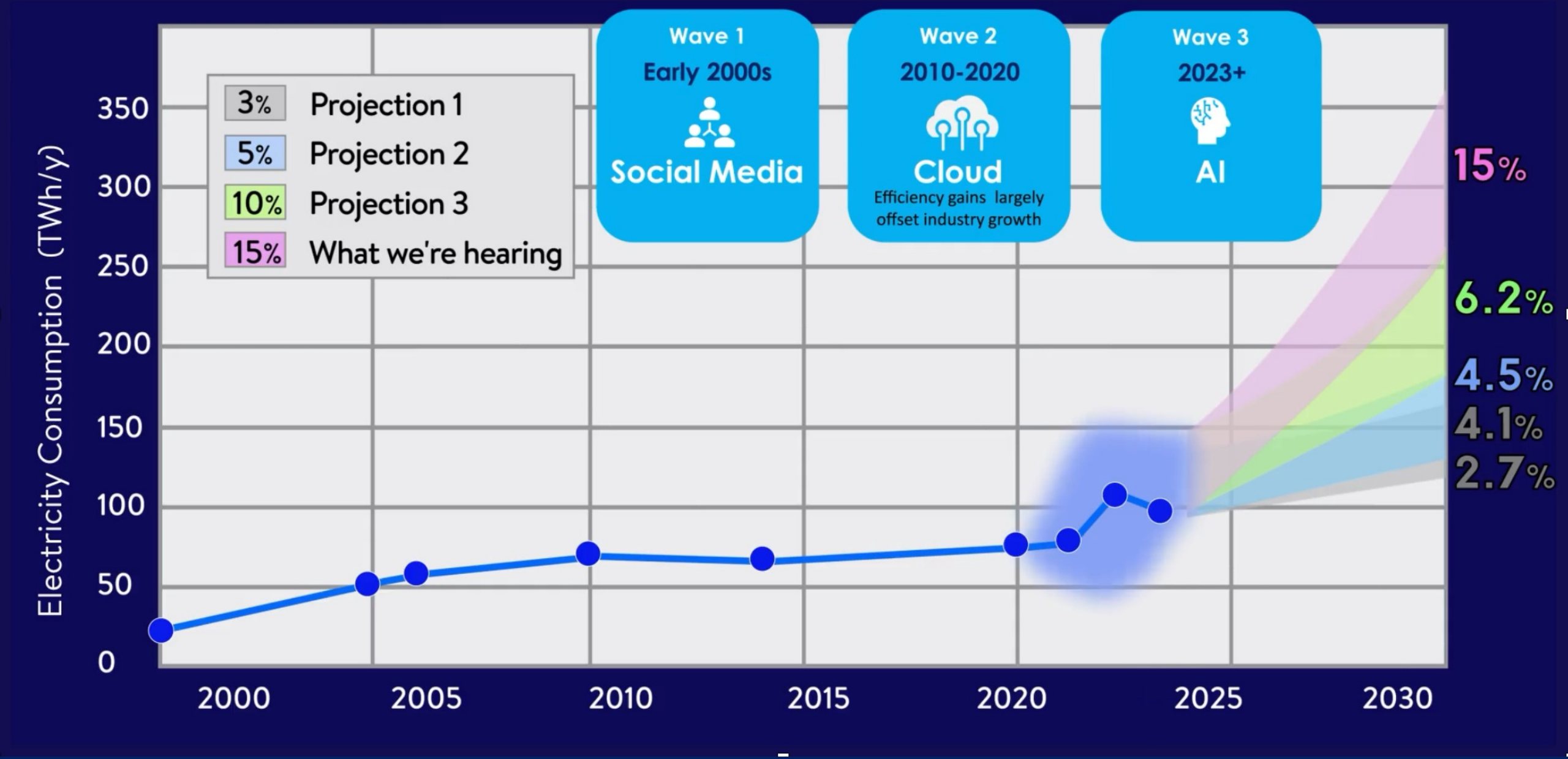
Scientific and Industry Expertise

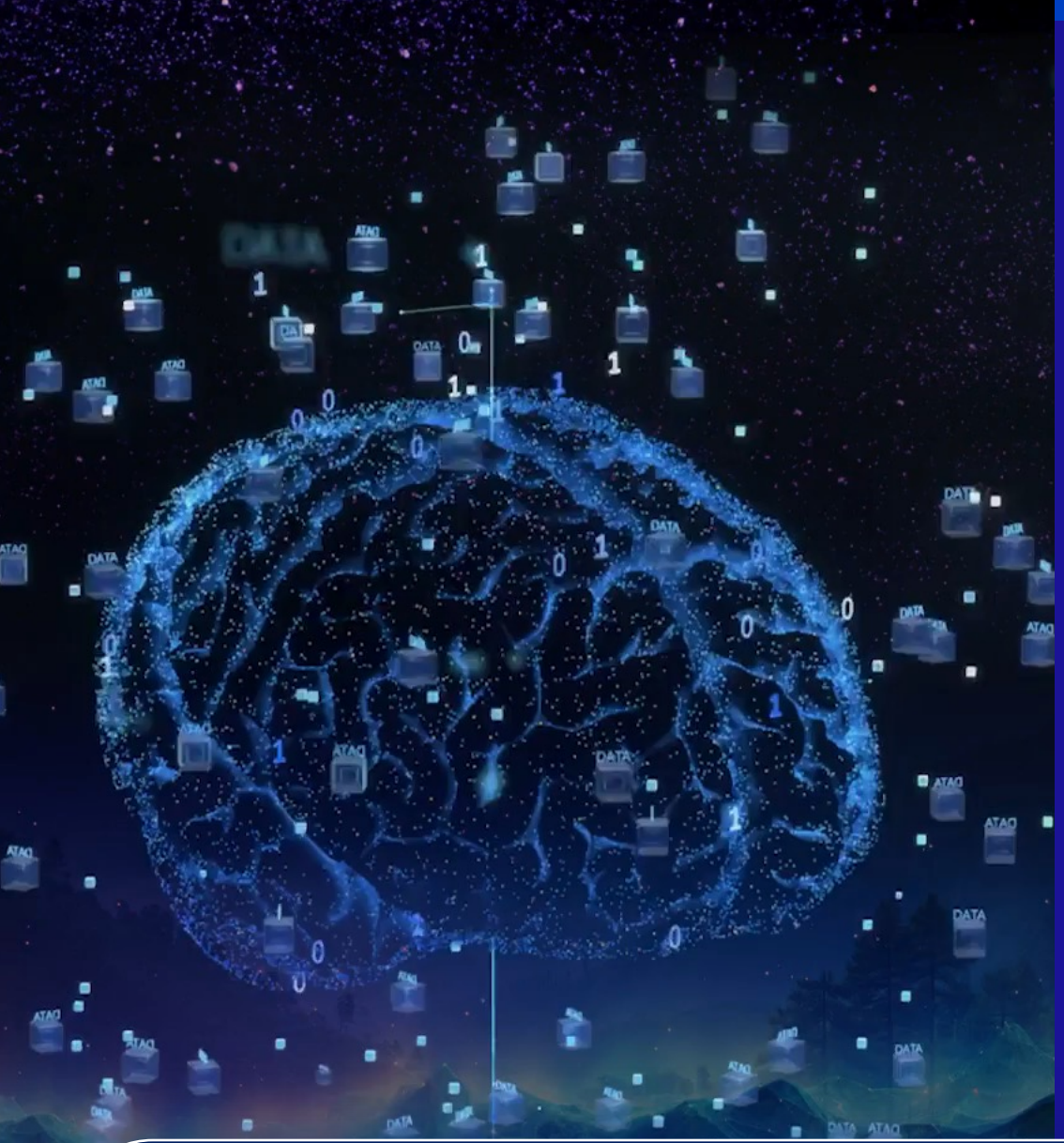
Provide expertise in technical disciplines that bring answers and solutions to make, move, and use energy

Collaborative Value

Bring together our members and diverse scientific and technical sectors to shape and drive research and development

AI is Driving a Third Wave of Data Center Growth



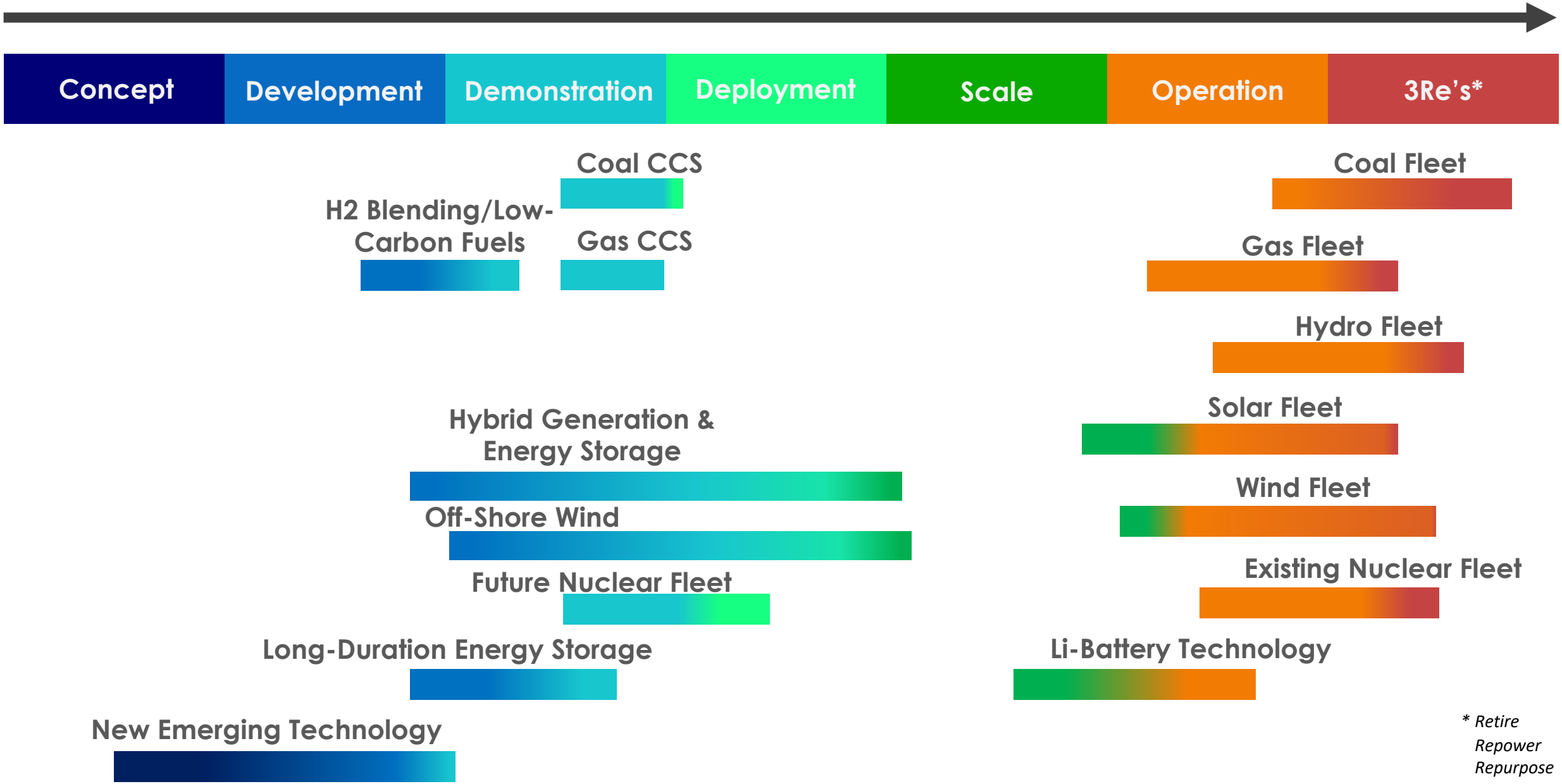


The AI race has now become a

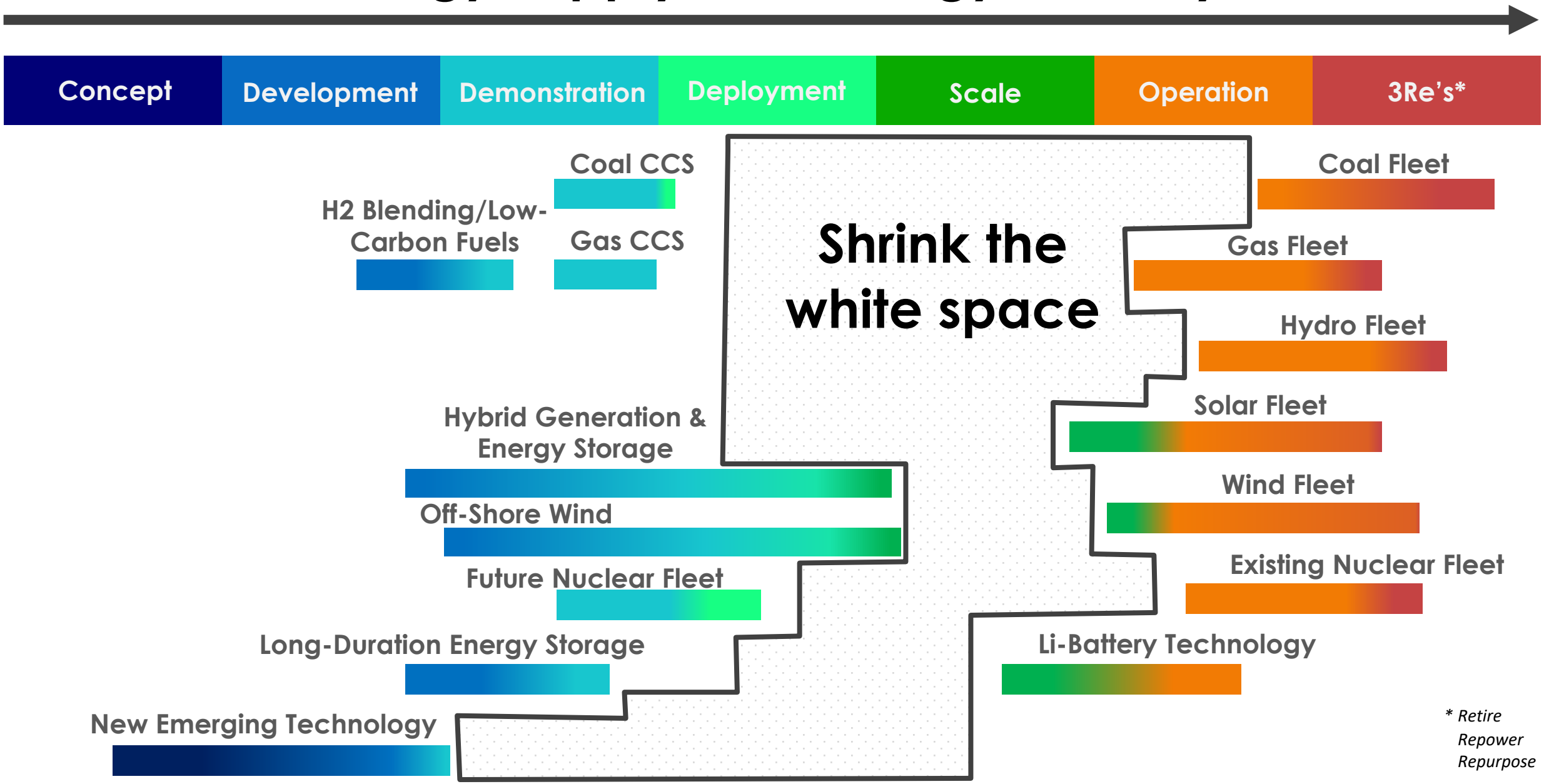
powering AI race

Training and Querying the Brain has become the New Power Demand

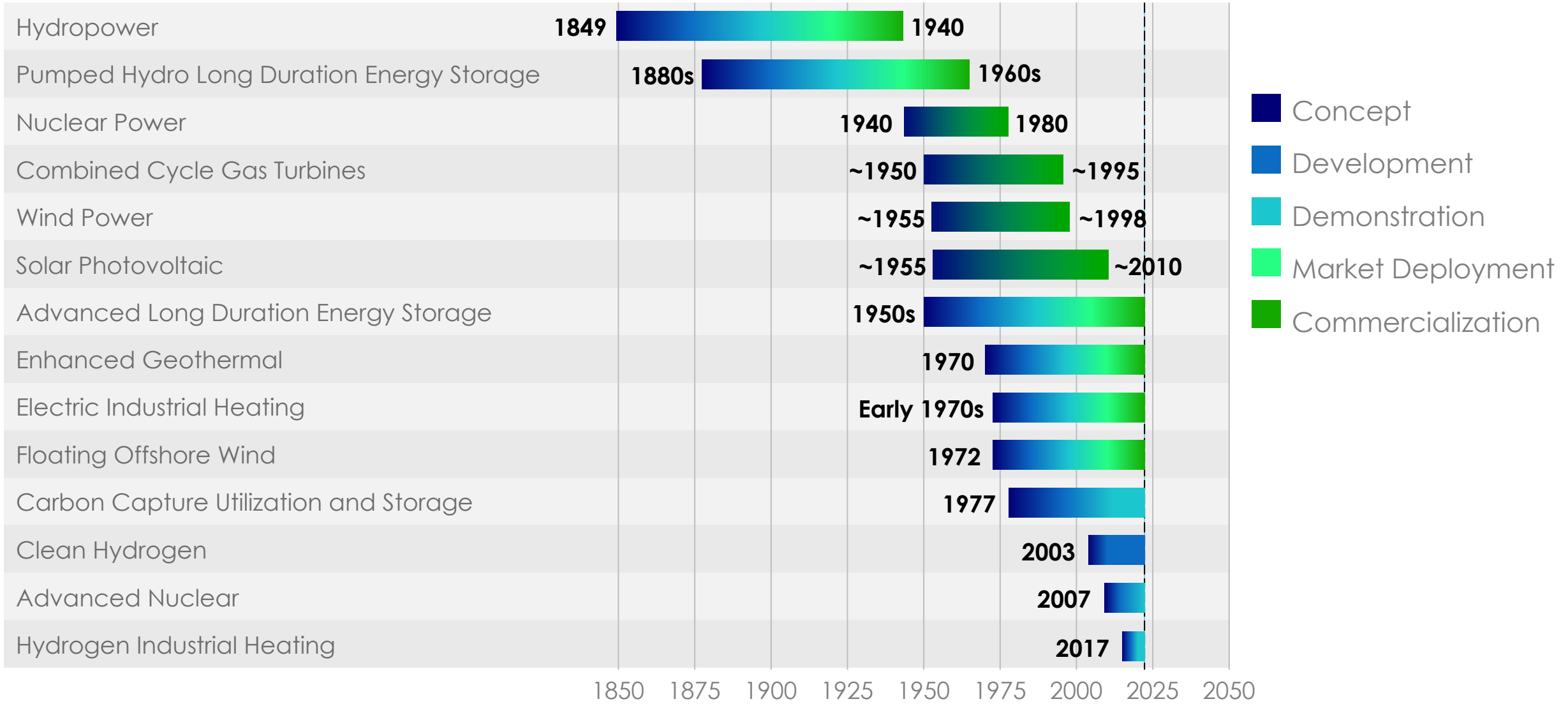
Energy Supply Technology Maturity



Energy Supply Technology Maturity



Decades of Effort to Commercialize Technologies

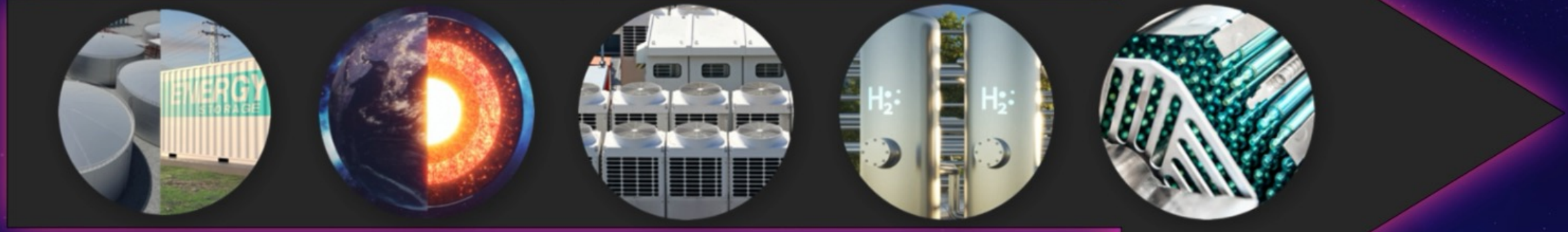


Urgent Need to Accelerate Emerging Low-Carbon Dispatchable Technologies

Long Duration Energy Storage

Hydrogen

Advanced Nuclear



Advanced Geothermal

Carbon Capture, Usage and Storage

First Movers Are Critical But We Have to Move From First of a Kind to Nth of a Kind

Carbon Capture Technology is a Cross-Cutting Solution

COAL

GAS

BIOMASS

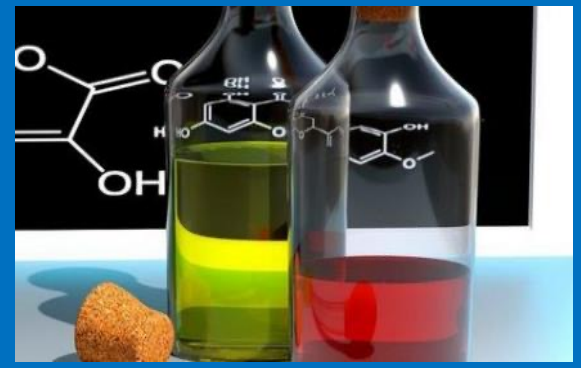
CONCRETE

STEEL

PETRO CHEMICAL

HYDROGEN

SYNTHETIC FUELS



Direct Air Capture

CCS in Power Generation

Boundary Dam
Sask Power in Saskatchewan, Canada

Source: SaskPower

Coal

2014 Commission

1M tons CO_2/yr

140 MWe slipstream (730 MWe net)

Petra Nova CCS Project at W.A. Parish
NRG Energy, Thompsons, TX

Source: NRG

Coal

2016 commission

2020-2023 offline | 2023 online

1.4M tons CO_2/yr

250 MWe gross (650 MWe net)

Taizhou Power Pant
China Energy, China

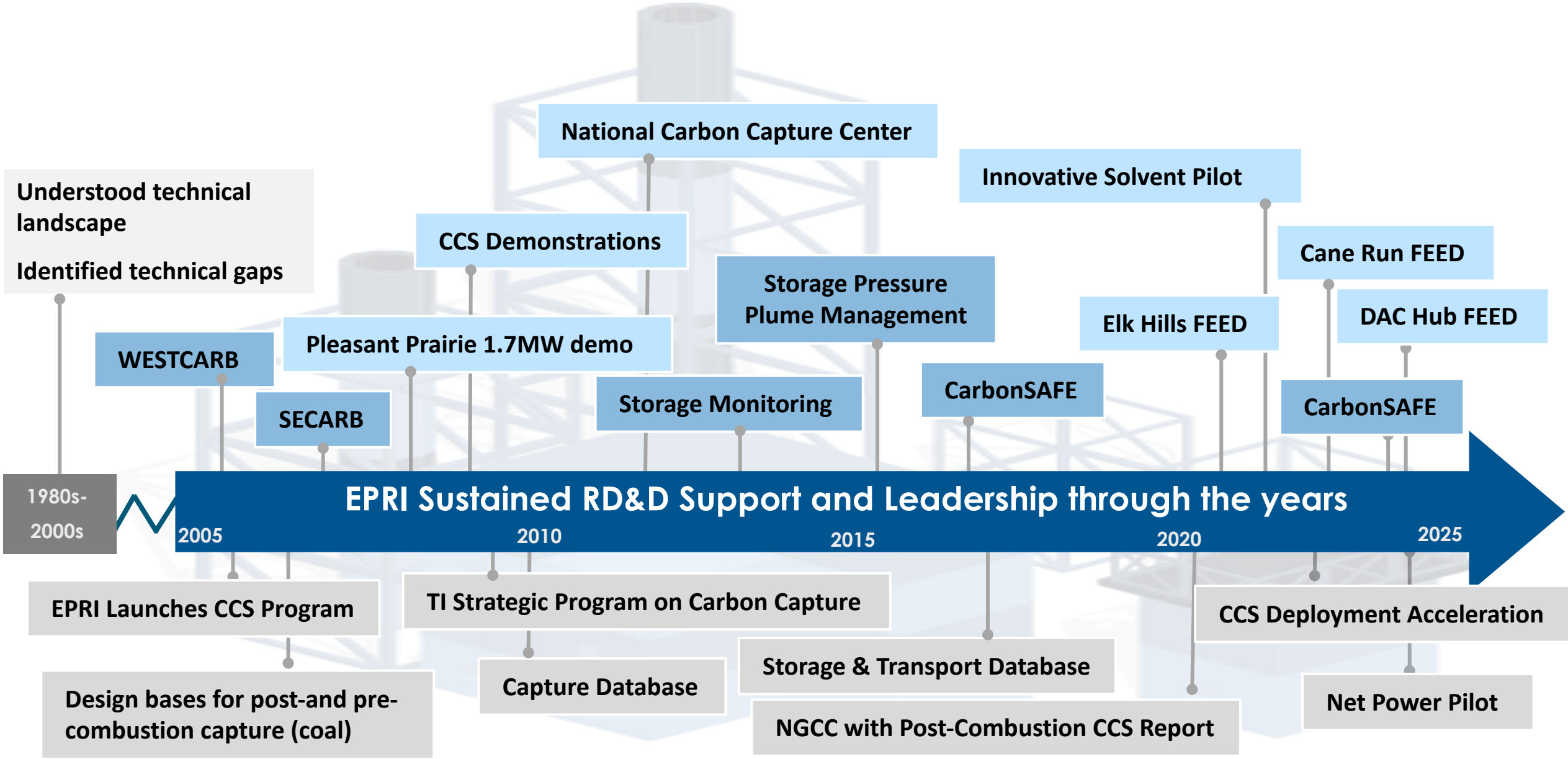
Photo credit: China Energy | Source: Global CCS Institute

Coal

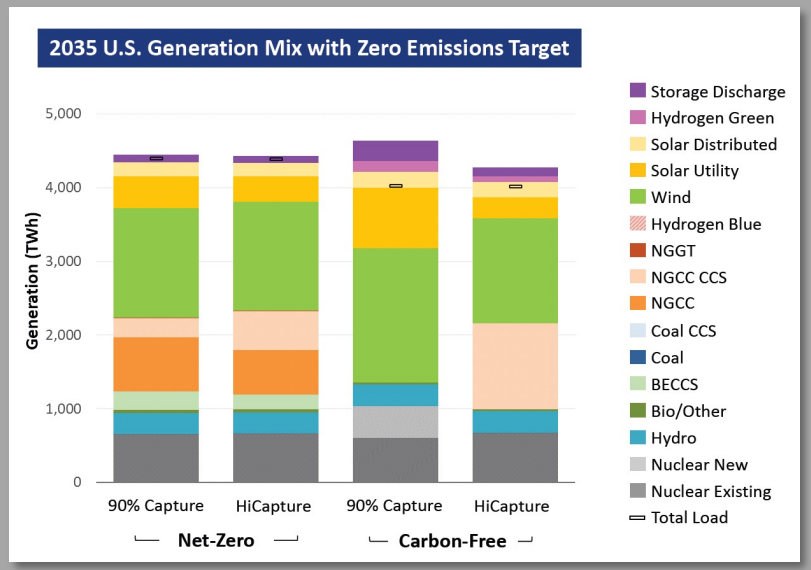
2023 commission

0.5M tons CO_2/yr

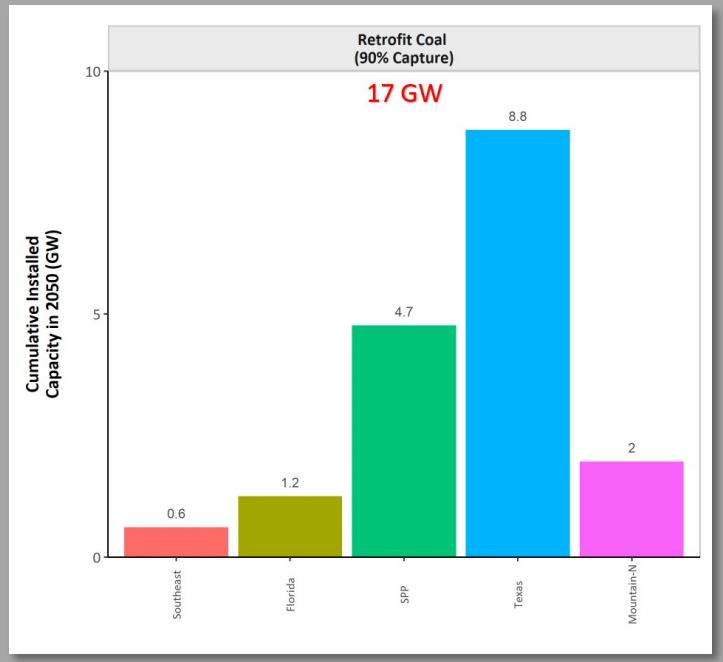
EPRI's Decades of Support for CCS Deployment



EPRI Economic Modeling of CCS Deployment



EPRI 3002021222



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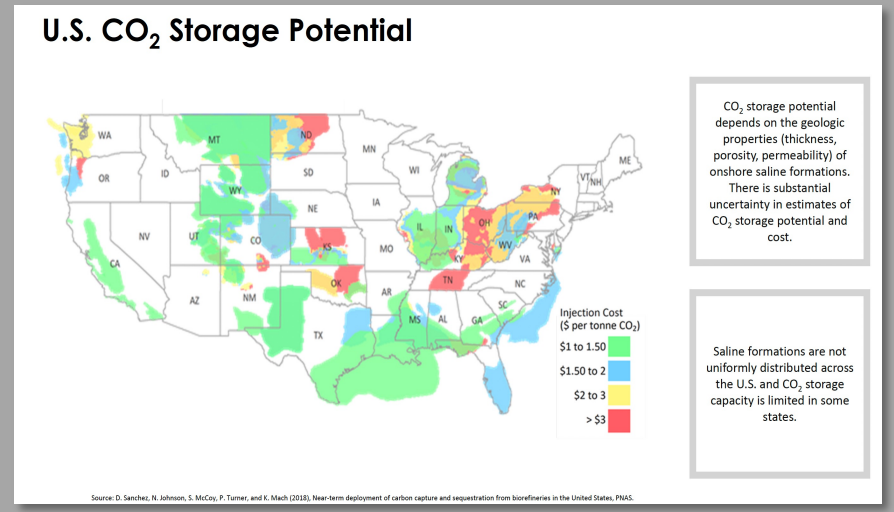

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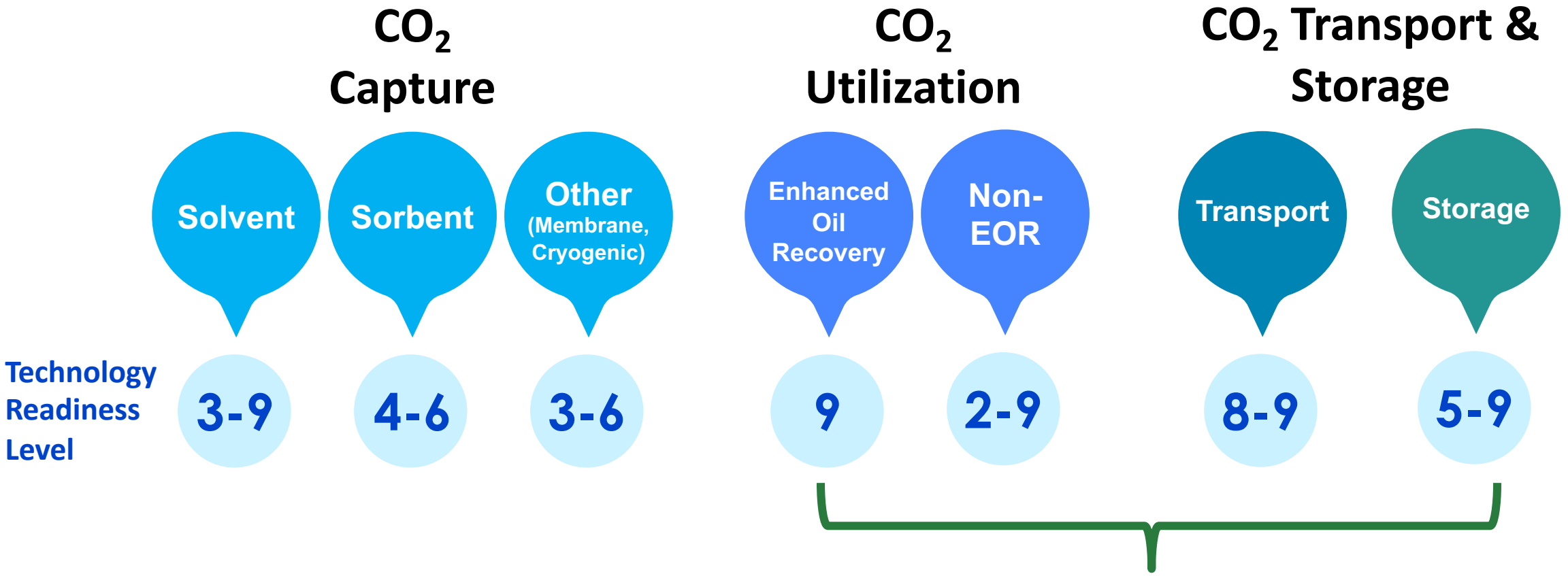
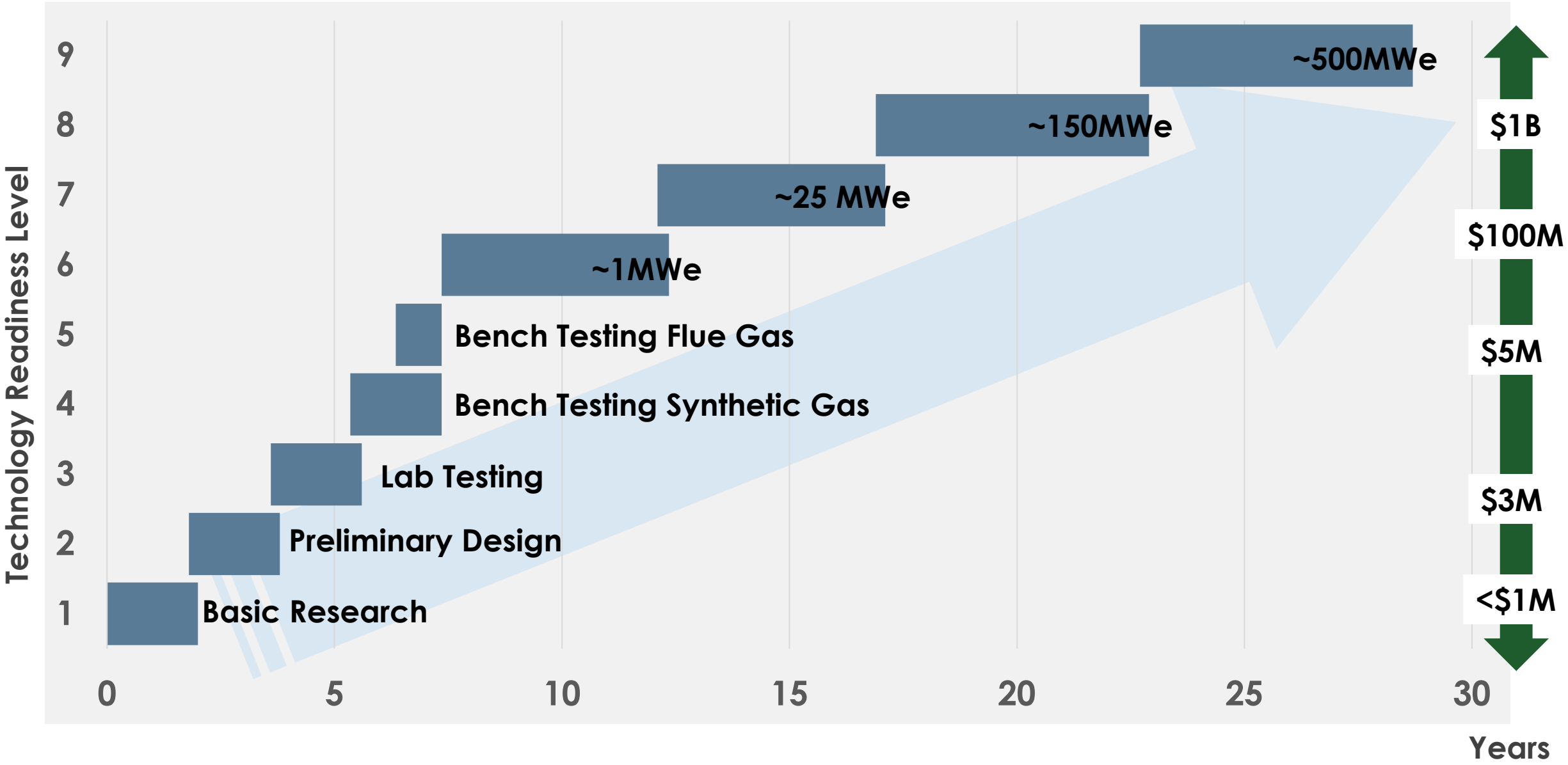
Decarbonization Targets | 45Q Incentives | Potential Policies | Reliability & Affordability Studies | Regional Drivers

Technology readiness varies for components of the CCS value chain

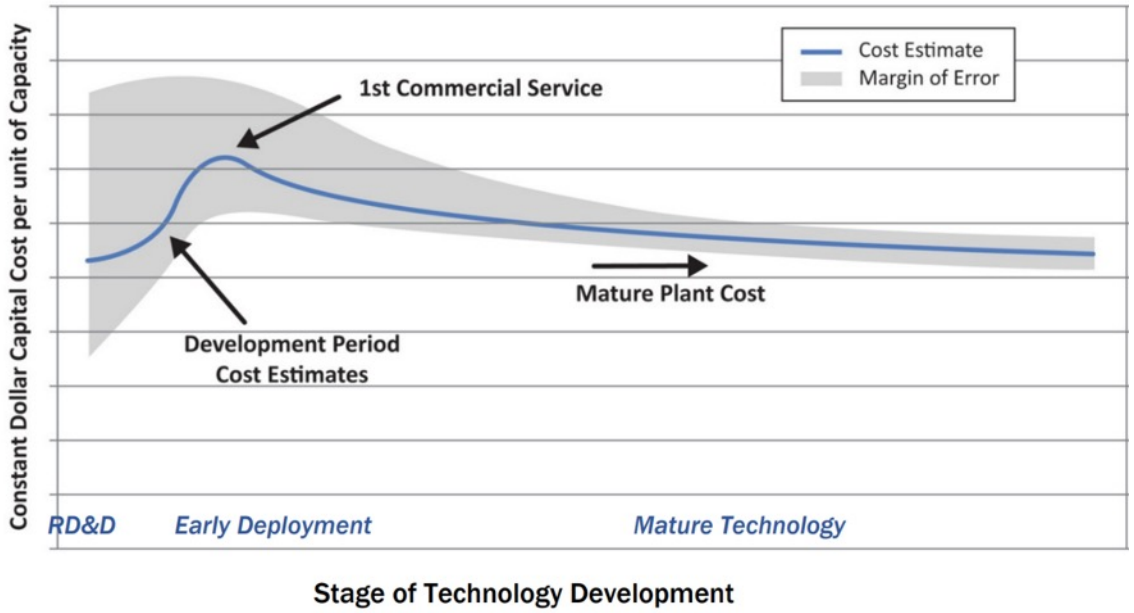


Technology Advancement takes Time and Investment



The Importance of Pilots and Demos

- Longest part of technology development timeline
- Opportunities to reduce deployment timeframe and costs
- Demonstration goals:
  - Lower cost capture (separation) technologies
  - Large-scale demonstrations for capture on power plants
  - Improve understanding of CO_2 storage management
  - Large-scale demonstrations for CO_2 storage
  - Non-technical, but critical: public engagement, acceptance, liability, etc.



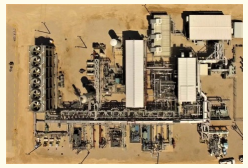
Test Facilities Accelerate Technology

NATIONAL CARBON CAPTURE CENTER

ITC WYOMING INTEGRATED TEST CENTER

TECHNOLOGY CENTRE MONGSTAD

Post-Combustion Capture on Power Plants: Large-Scale Pilots

Description	Size	EPRI Role
 American Electric Power (AEP) / Alstom at Mountaineer, U.S. (2009–11) On-site Storage	100,000 tonnes-CO_2/yr (20 MWe)	Data Collection Economics Monitor Storage
 Southern / Mitsubishi Heavy Industries (MHI) at Plant Barry, U.S. (2010–) Transport and Storage	500 tonnes-CO_2 / day (25 MWe)	Data Collection Economics Lead Storage
 TCM DA Mongstad, Norway (2012–) Catch-and-Release Refinery gas	500 tonnes-CO_2 / day (25 MWe)	Data Collection on baseline MEA, proprietary solvents
 NET Power in La Porte, U.S. (2021-) Catch-and-Release	80,000 tonnes-CO_2/yr (50 MWth)	Economics, data analysis, data sharing

Signifies project co-funded by U.S. Department of Energy

EPRI 2024 CCS Executive Roundtable

2024 CCS Executive Roundtable

Overarching Takeaways

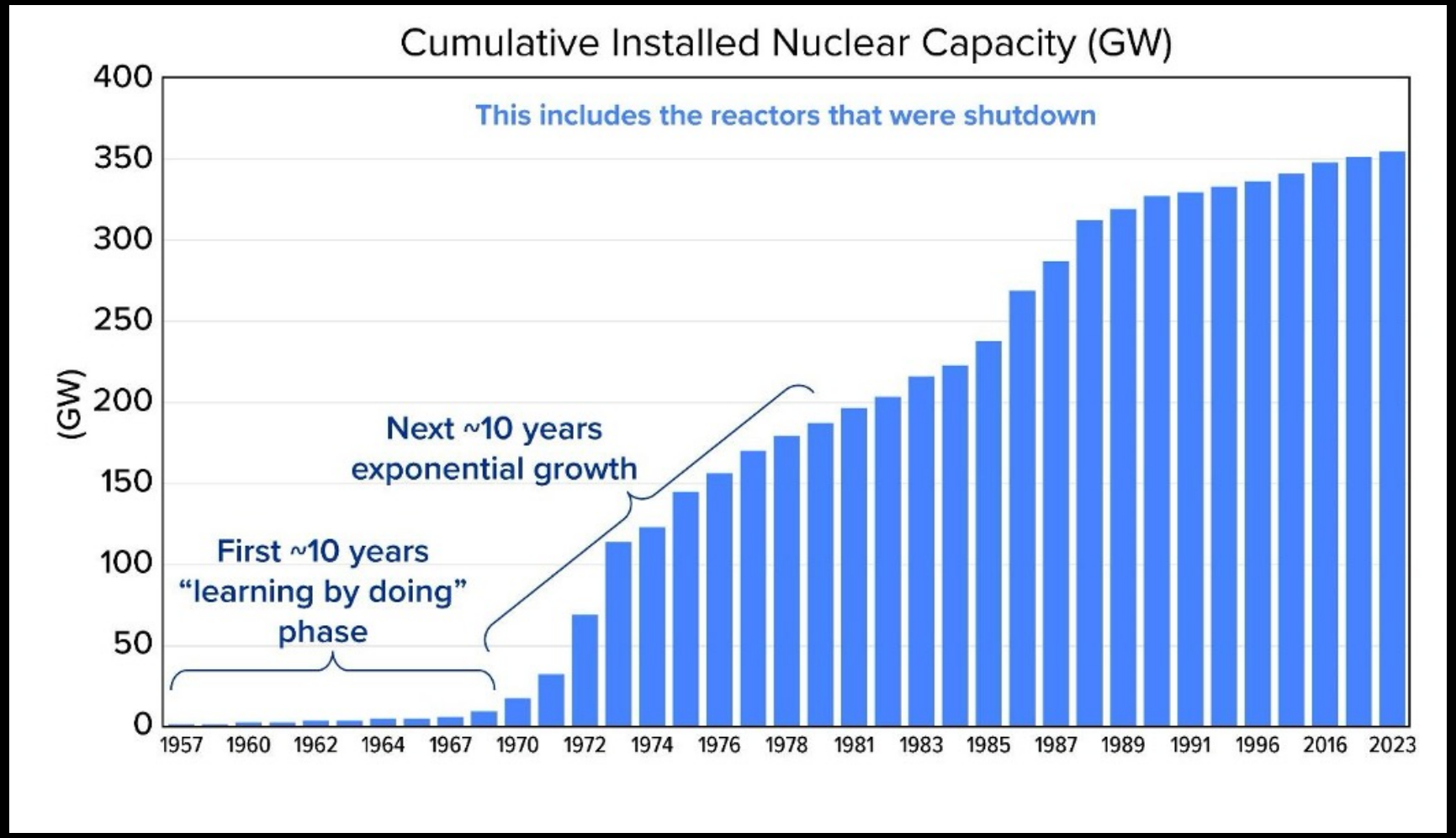
- Pilots and demonstrations enable effective deployment at scale
- Cost remains the biggest challenge, particularly without standardization
- Reducing construction risk is key to accelerating commercial deployment
- Maximizing incentives for CCS development means looking across the value chain
- Global collaboration is crucial to successful deployment

EPRI's Next Steps

- Update CCS roadmap for power generation
- Develop a CCS specifications framework
- Reconvene stakeholders for additional discussion

EPRI 3002031367

“NextGen10”



Advanced Nuclear/ SMRs

Long Duration Energy Storage (LDES)

Next Gen Geothermal

Natural Gas+ CCUS

Underpinning the importance of achieving 10+ full-scale deployments to share learnings, realize cost reductions, and establish supply chains