

Energy Transition in a Rapidly Changing Landscape

Affordable – Reliable – Resilient



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EPRI

Leading Global Collaborative Energy R&D

EPRI is advancing energy technologies and informing decision-making through
~\$450M in collaborative annual research
with more than 450 entities in 45 countries
– spanning the production, delivery, and
use of energy.

Independent

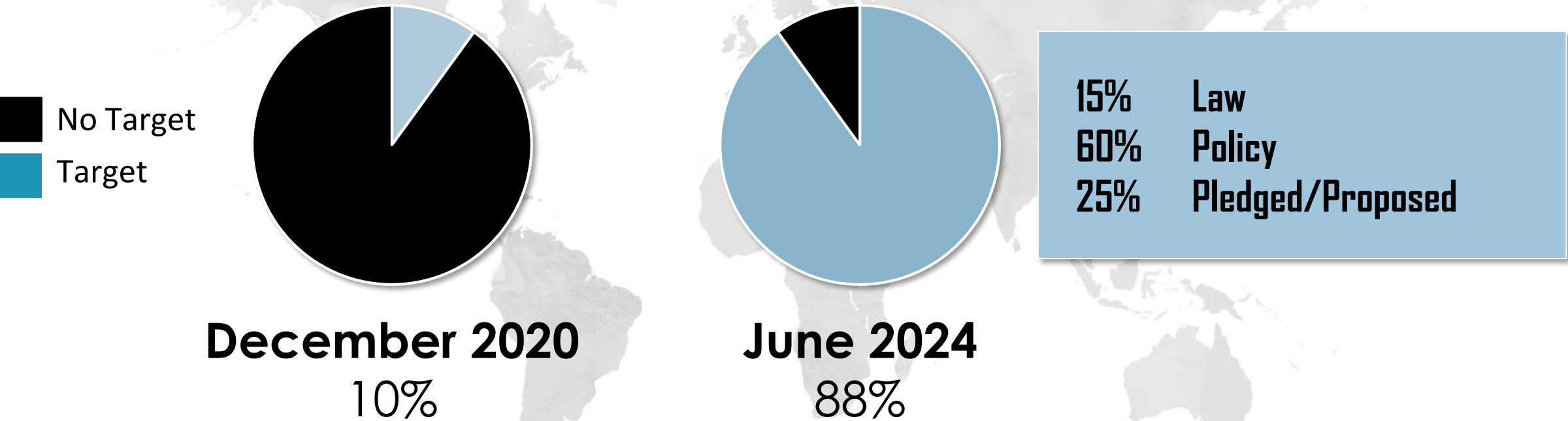
Non-Profit

Collaborative

www.EPRI.com

Net-Zero Targets

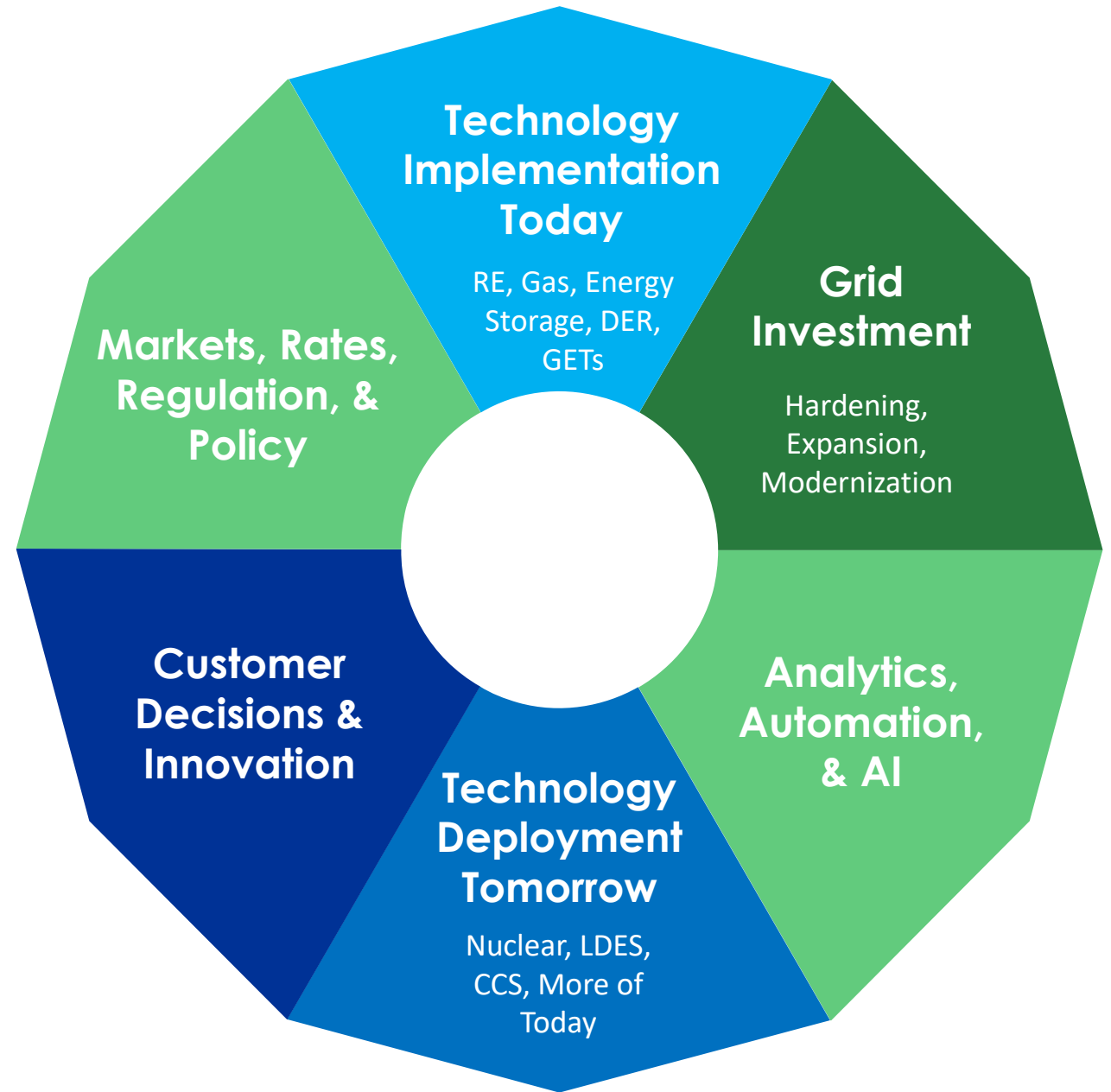
Global GHG Emissions Covered in National Targets



Data Source: [Net Zero Tracker](#)

No Single Solution

Many critical pathways
to enable an
AFFORDABLE, RELIABLE
energy transition



Demand



Supply



Weather



Urgency to Keep the Energy Flowing, Affordably and Reliably

Inflection Point: Energy Transition
becomes a Transformation

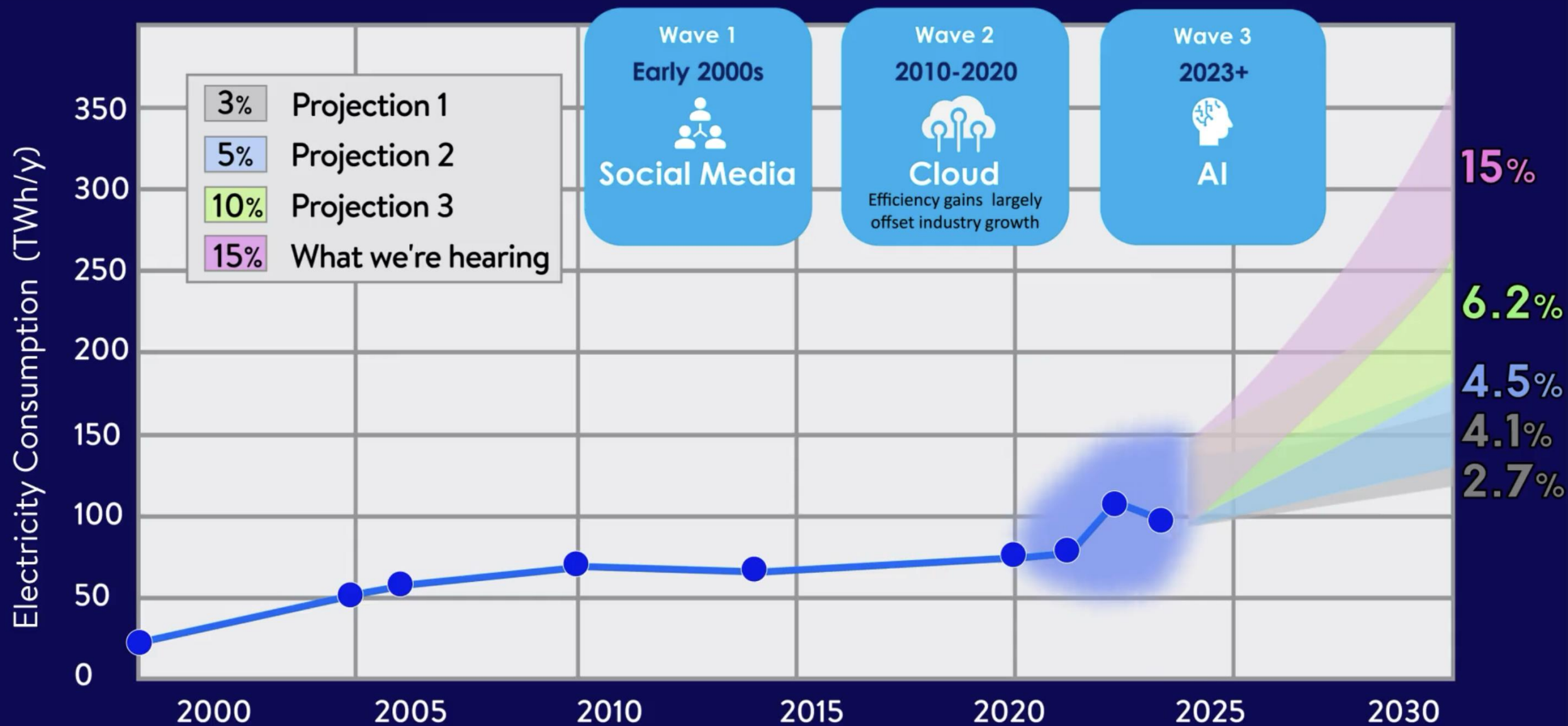
The AI Race is on



The AI Race has now become a
powering AI Race

Training & Querying the Brain has become the New Power Demand

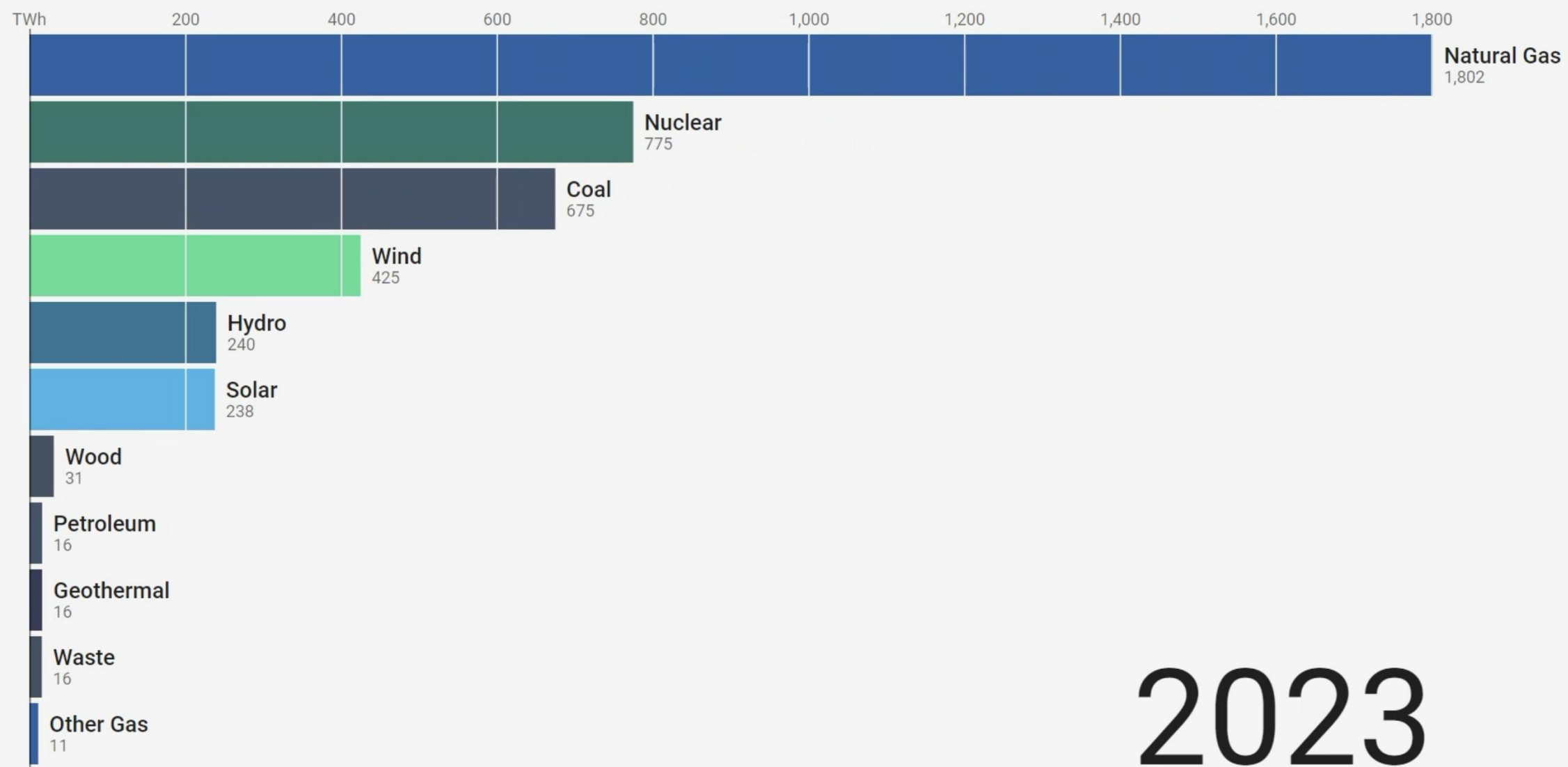
AI is Driving a Third Wave of Data Center Growth



Supply

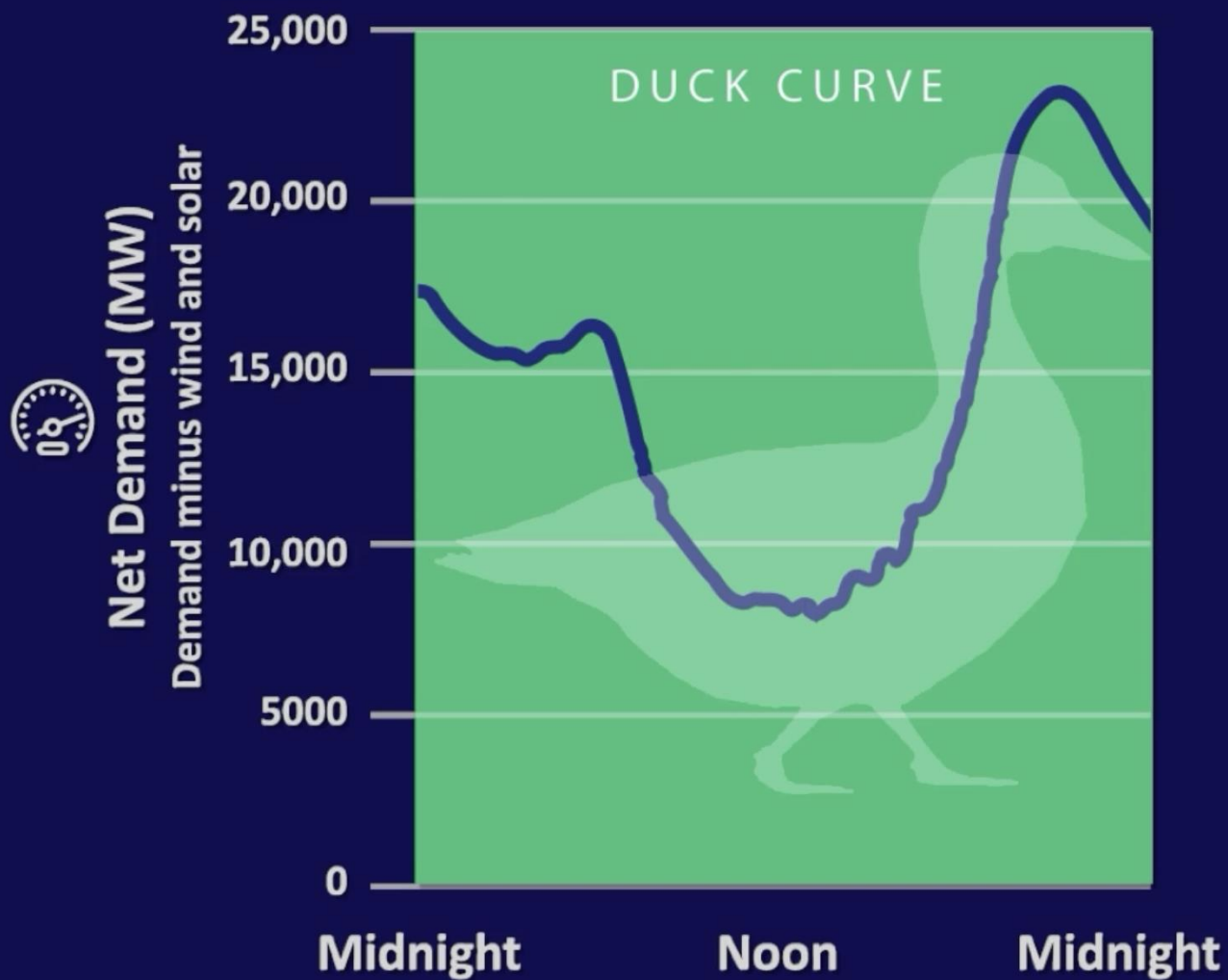


Annual U.S. Net Electricity Generation (TWh) by Fuel Source, 1949-2023



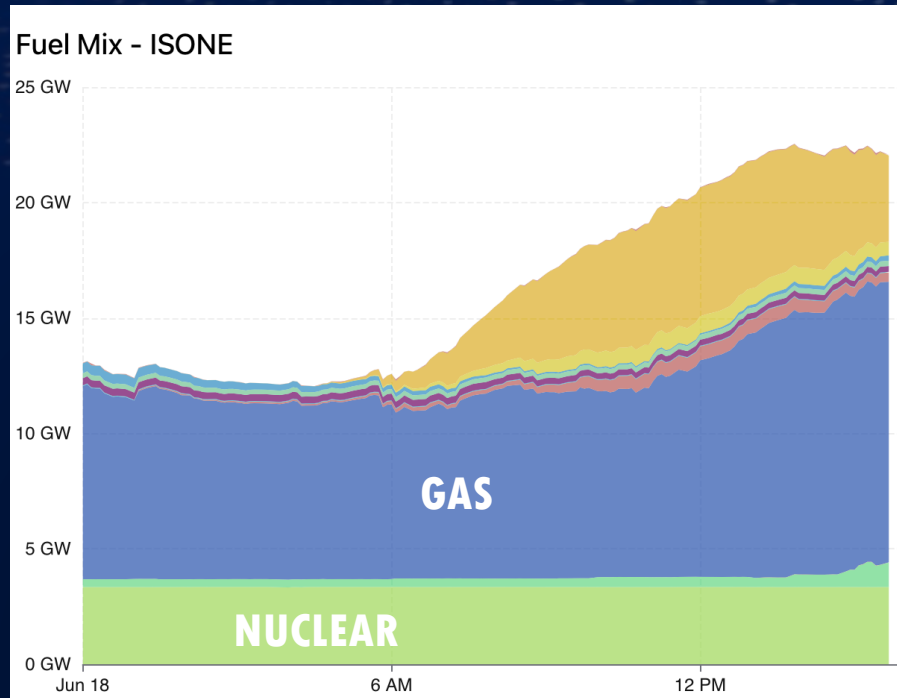
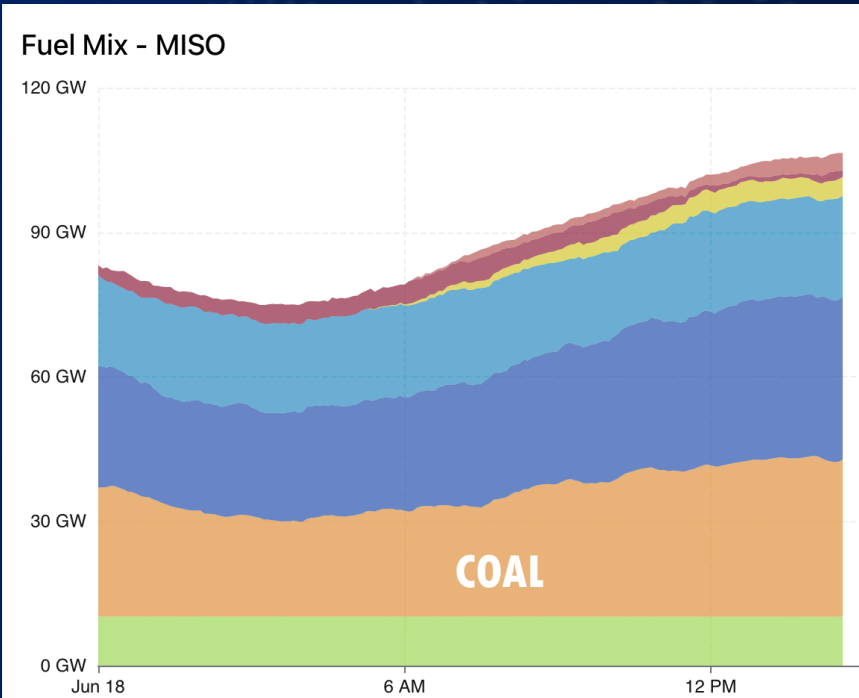
2023

Data source: U.S. Energy Information Administration (<https://www.eia.gov/electricity/data.php>) annual net electricity generation by type of energy source from all sectors (Table 7.2.A). "Hydro" represents conventional hydroelectric, excluding pumped storage. "Solar" includes utility-scale photovoltaic (PV), utility-scale solar thermal, and estimated small-scale PV (Table 1.1.A). Values are rounded to the nearest terawatt-hour (TWh) for each year indicated.



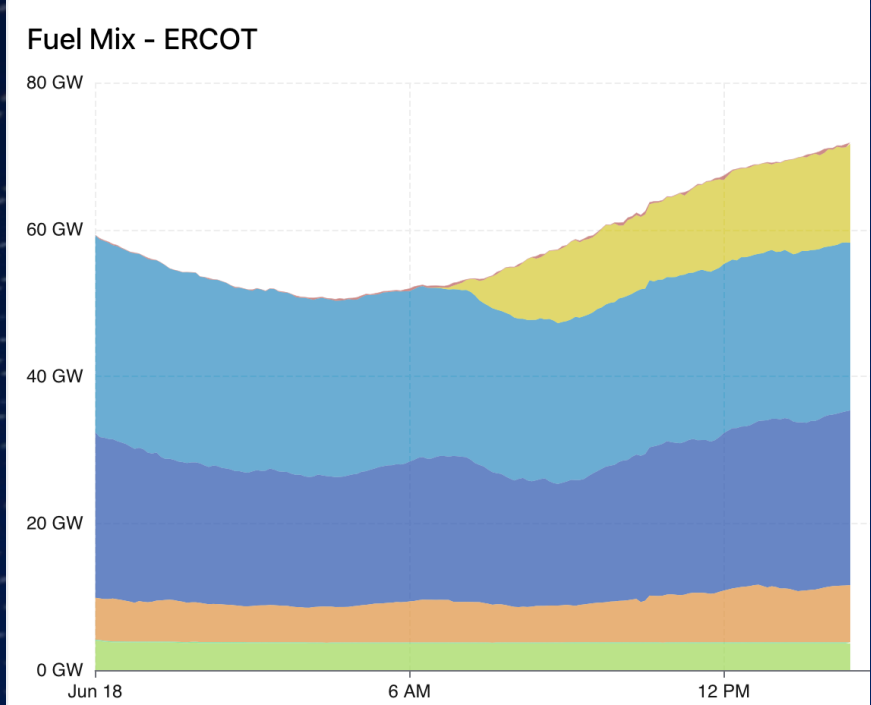
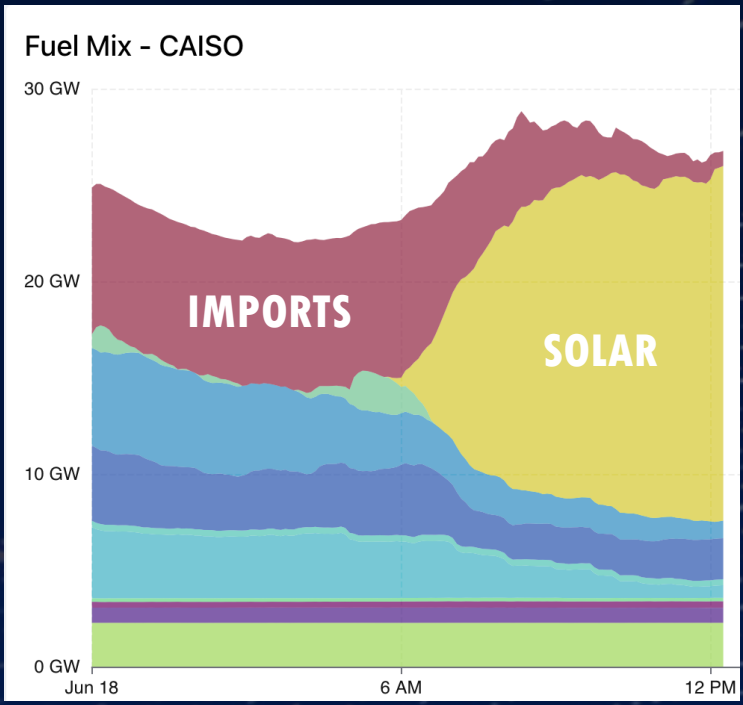
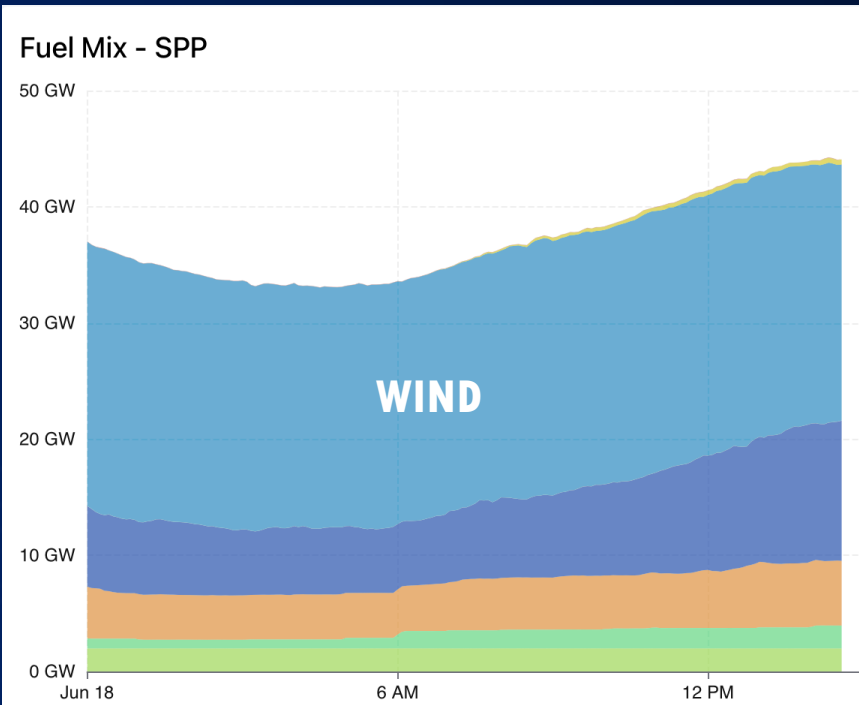
 ELECTRICITY DEMAND
(minus wind and solar)

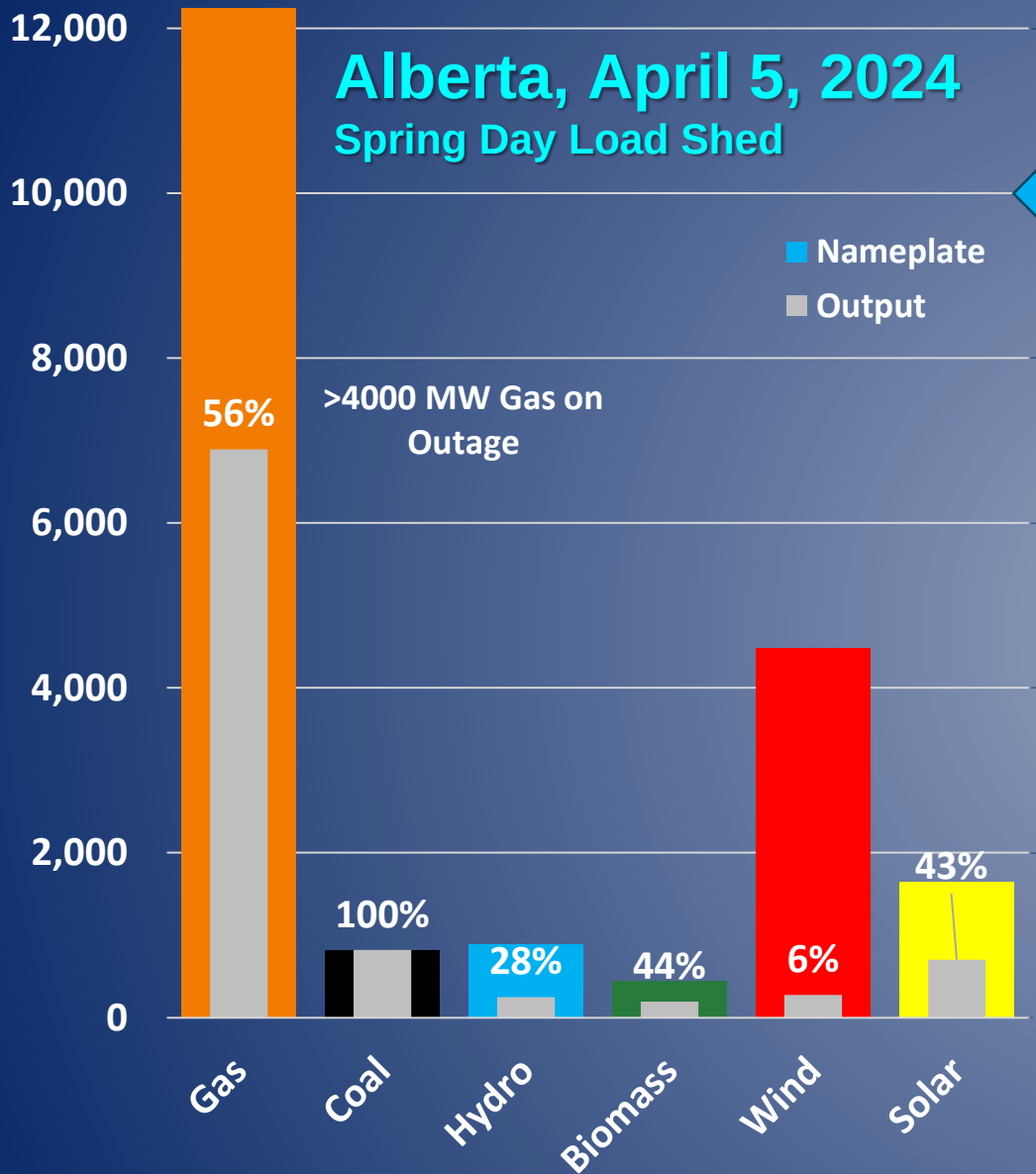




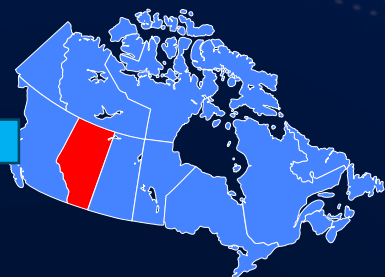
No One Size Fits All

data from June 18, 2024





Alberta Electricity System Operator's (AESO)
media briefing (<https://lnkd.in/teer2822U>)



CANADA April 5, 2024

Load shedding of approximately
250 MW for 20 minutes to
stabilize the supply-demand
balance



TEXAS April 30, 2024

ERCOT warns of deficient power
reserves and potential load
shedding



HAWAII April 15, 2024

Hawaii prepared to initiate
rolling blackouts due to
decreased wind and solar

Recently Finalized EPA Regulations

April 25, 2024



GHG Rule (111 b/d)

Existing Coal & New Gas

Existing Coal

- Operate beyond 2038 – CCS
- Operate thru 2038 – 40% NG Co-firing
- Control by Jan 1, 2032 (CCS) or Jan 1, 2030 (Co-firing)

New/Modified Gas

- Defined as Commencing construction after May 2023
- >40% Cap Factor - CCS
- 20%<CF≤40% - High Efficiency Req



Effluent Guidelines (ELG)

Existing Coal

Control No Later Than Dec. 2029

- Retire by 2028 – nothing additional

Zero Liquid Discharge (ZLD)

- FGD Wastewater
- All ash transport water

Landfill leachate

- Operate to 2034 – Hg & As limits
- Operate beyond 2034 – ZLD



Legacy CCR Impoundments

No Operating Unit Impacts

Inclusion of previously excluded inactive ash impoundments & landfills

Meet 2015 CCR Rule Requirements

- Inspections
- Groundwater Monitoring & Corrective Actions
- Closure & Post Closure Care
- Others

Additional Impoundment Closures / Remediation



MATS Risk & Technology Review

Existing Coal & Oil Fired

Lower filterable particulate matter (PM) standard

Lower Hg standards for lignite units

PM Continuous Emissions Monitoring (CEMs) required for compliance

Additional Continuous Emissions Monitoring

Isolated Unit-specific Controls Improvements

Anticipated Actions

Accelerated Coal Retirements

40% CF Caps for New gas

Significant Post-retirement Water Treatment

Decisions Will Need to be Made... TODAY

April 25, 2024

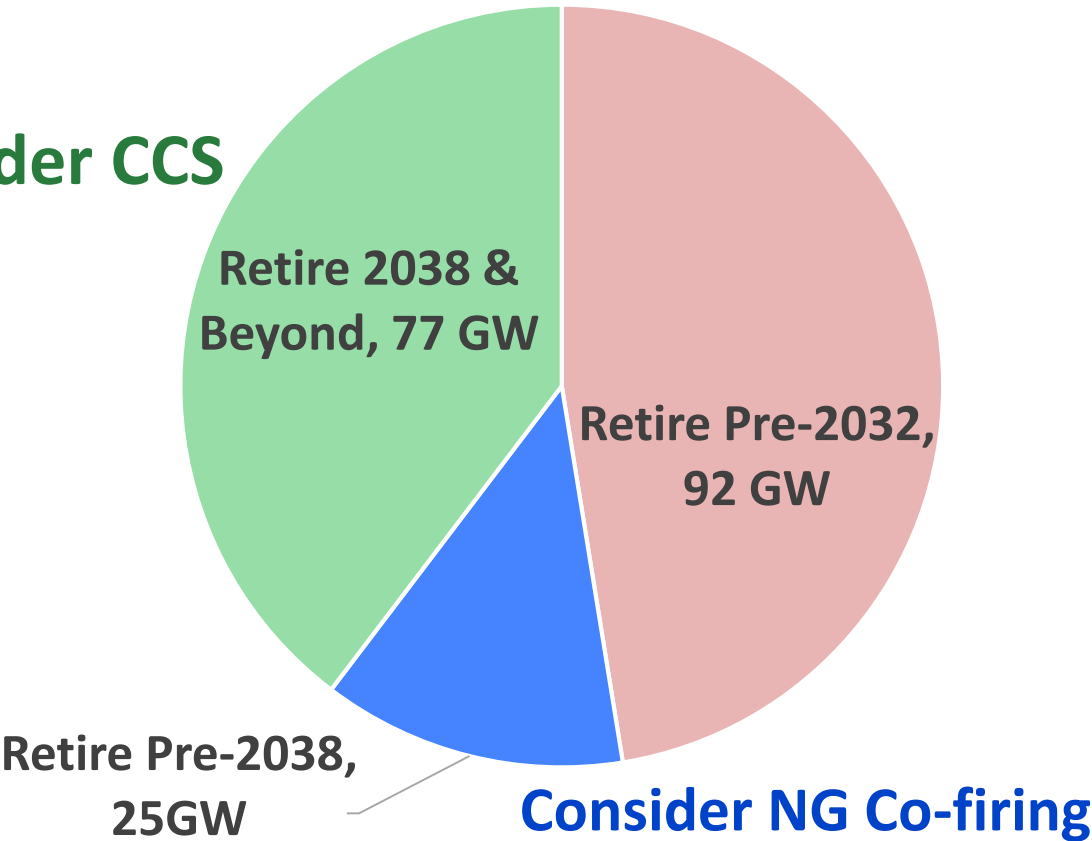


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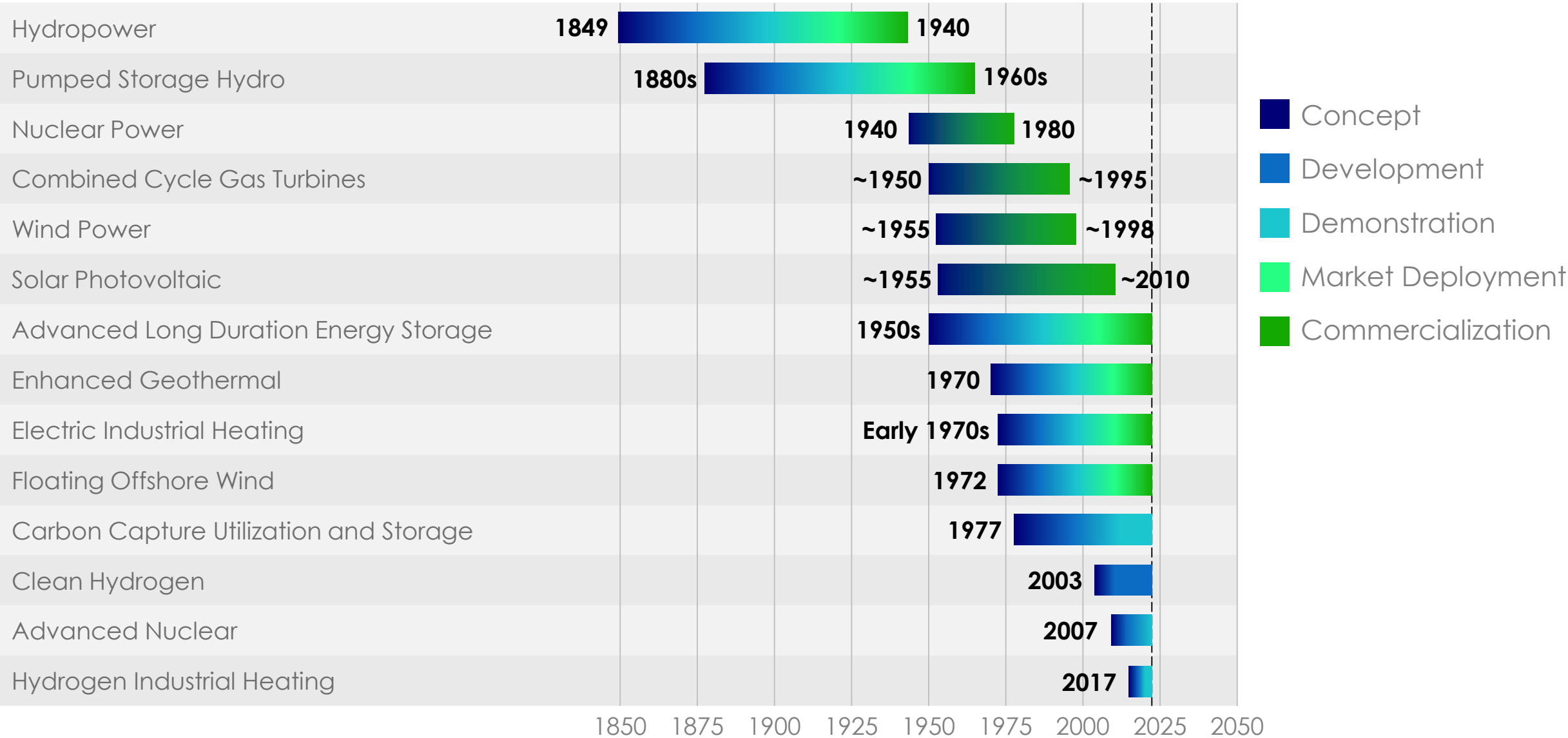
2024 U.S. Coal Capacity
194 GW based on announced retirements

Consider CCS

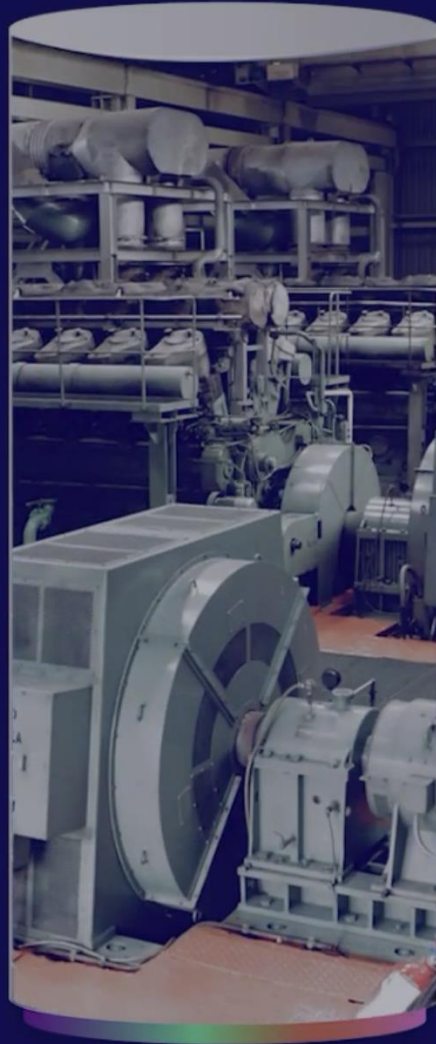


TECHNOLOGY

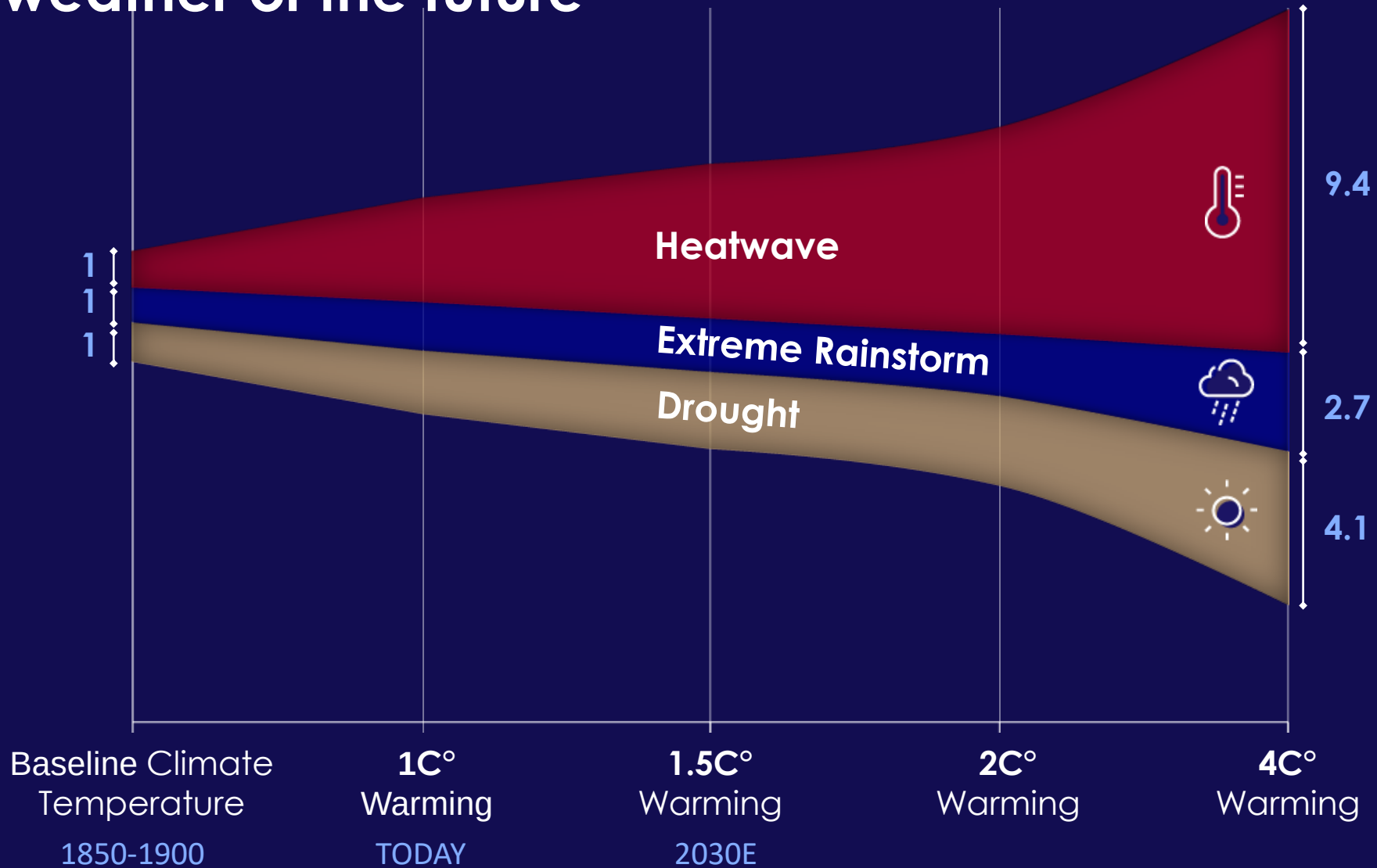
Decades of Effort From concept to commercialization



Weather



Grid of the future will need to be ready for the weather of the future



...weather of the future depends on how fast we decarbonize



**These changes require new
thinking in achieving a
net-zero future**

**Done RIGHT... We can make
this energy transformation
more affordable and reliable.**

Potential Pathways for Energy Storage

Define value through
use cases

Establish objective
evaluation criteria

Engage in demonstrations
& share learnings broadly



TOGETHER...SHAPING THE FUTURE OF ENERGY®