
EPISODE
400
HOW HIGH WILL AI DRIVE POWER PRICES?
Nucleus
Wealth

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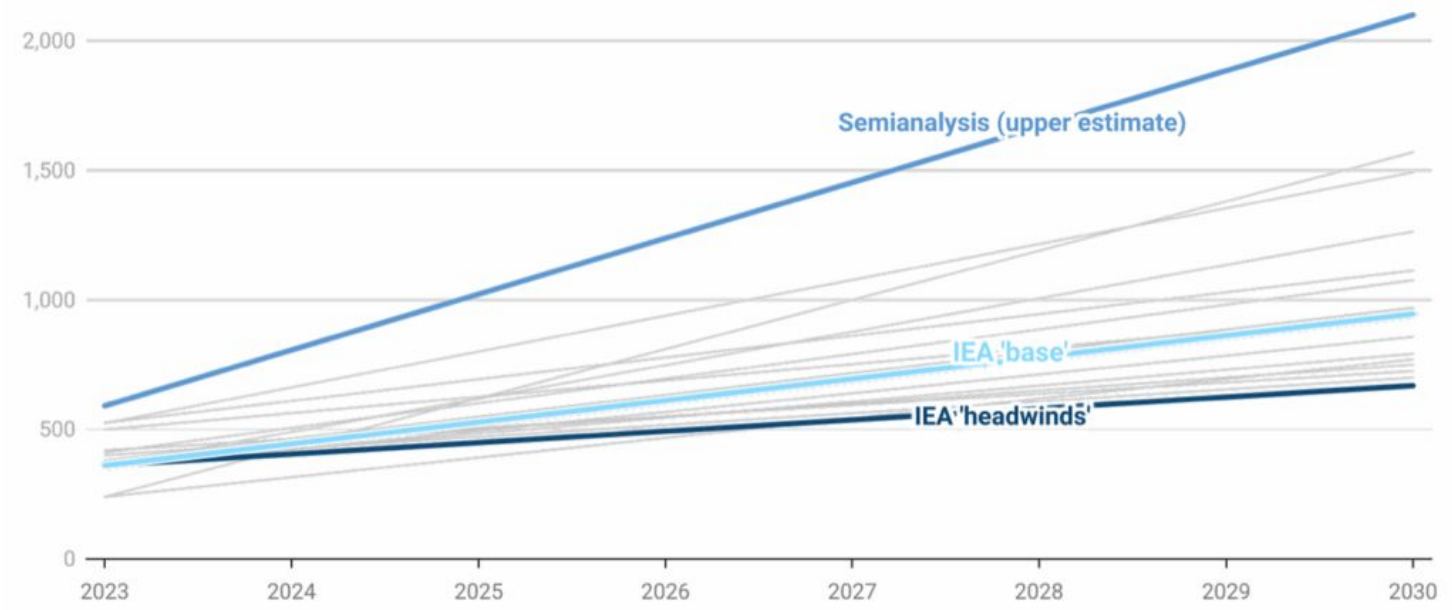
Agenda

- AI Power: State of play
- Grid connection delays
- Power Pricing
- AI BYO Power options
- Investment view: cannibalised sectors

Power

Some experts forecast a doubling of data-centre electricity demand by 2030 – while others predict a fourfold increase or more

Estimated date-centre electricity demand in 2023 and 2030, TWh, according to a range of analysts



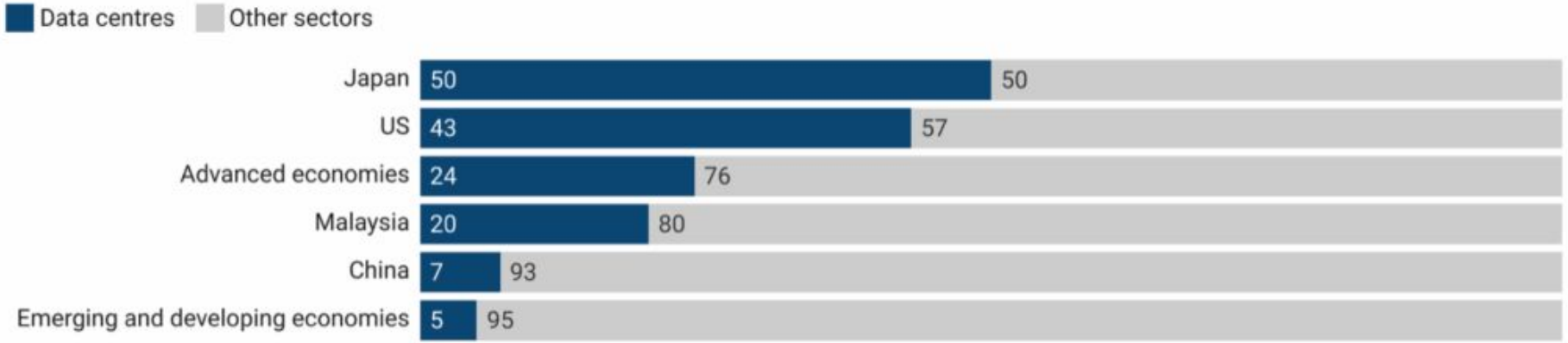
Source: IEA, Goldman Sachs, Deloitte, Boston Consulting Group, Gas Exporting Countries Forum, Liebreich Associates, Semianalysis, Schneider Electric, International Data Corporation, Jeffries (2024).

CarbonBrief
CLEAR ON CLIMATE

Power

Data centres are expected to be major sources of electricity demand growth in some countries

Data-centre share of electricity demand growth 2024-2030, %



Source: IEA

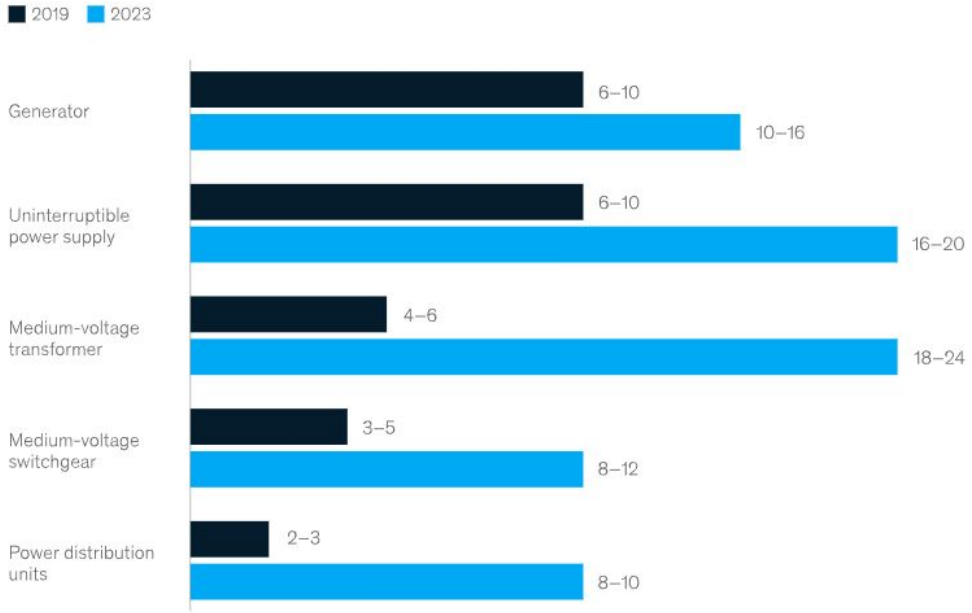
CarbonBrief
CLEAR ON CLIMATE

Power

Exhibit 2

Accelerated demand and supply chain constraints have increased lead times for equipment, resulting in project delays.

Lead time of major data center critical equipment, months



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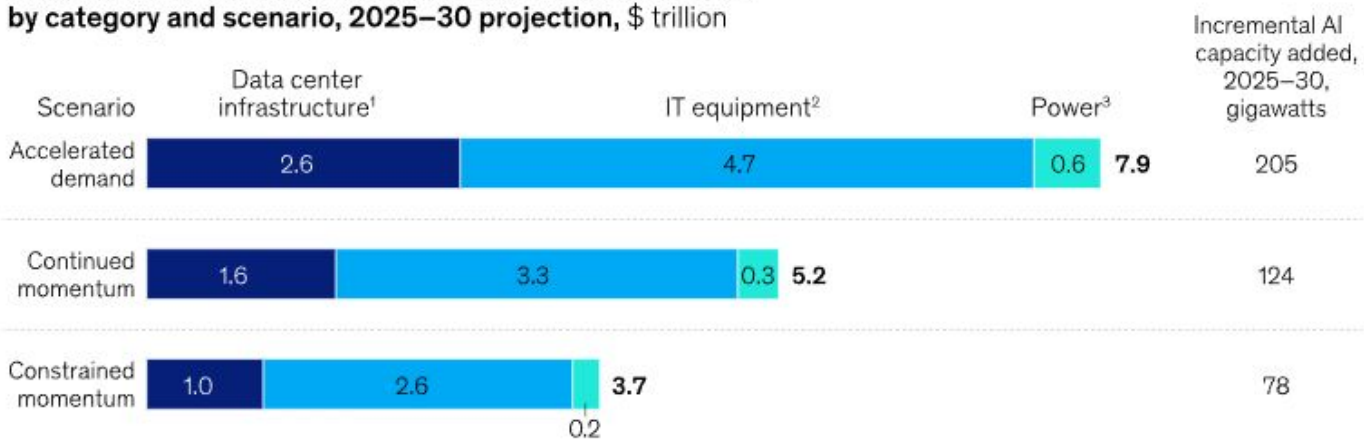
Power

- Datacentres have backups. Can help the grid
- Higher willingness to pay. Small overall input.
- Less benefit from efficiency. Lightbulb example
- Staffing? Harder to move. US has big advantages.

Power

Capital investments to support AI-related data center capacity demand could range from about $3 trillion to $8 trillion by 2030.

Global data center total capital expenditures driven by AI, by category and scenario, 2025–30 projection, $ trillion



Note: Figures may not sum to totals, because of rounding.
[1]Excludes IT services and software (eg, operating system, data center infrastructure management), since they require relatively low capex compared with other components.
[2]Includes server, storage, and network infrastructure. IT capex also accounts for replacing AI accelerators every 4 years.
[3]Assumes $2.2 billion–$3.2 billion/gigawatt (including power generation and transmission cost) to account for a range of power generation scenarios (eg, fully powered by gas, a combination of gas power and storage, and solar) and regional cost differences. Distribution cost is neglected, as most AI centers are expected to be >50 megawatt scale and connected to a transmission grid.
Source: McKinsey Data Center Capex TAM Model; McKinsey Data Center Demand Model

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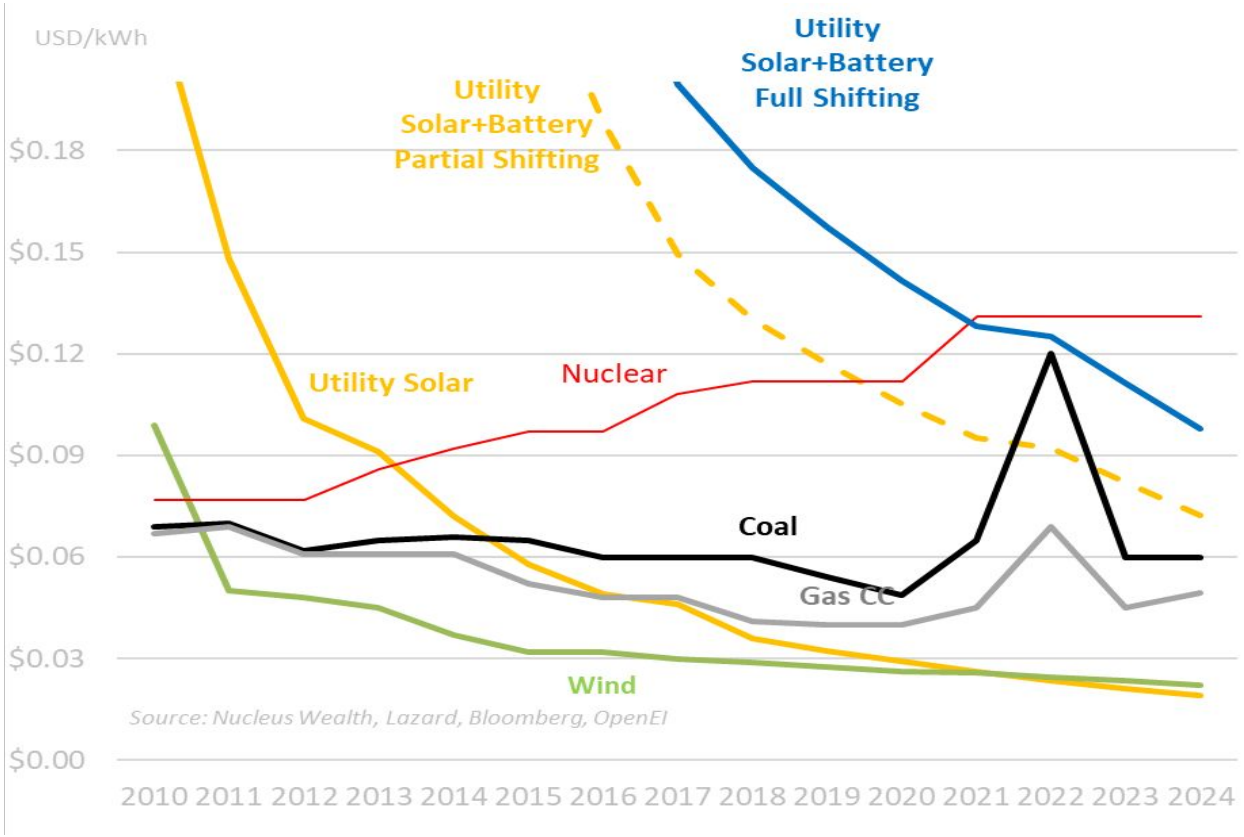
Pricing

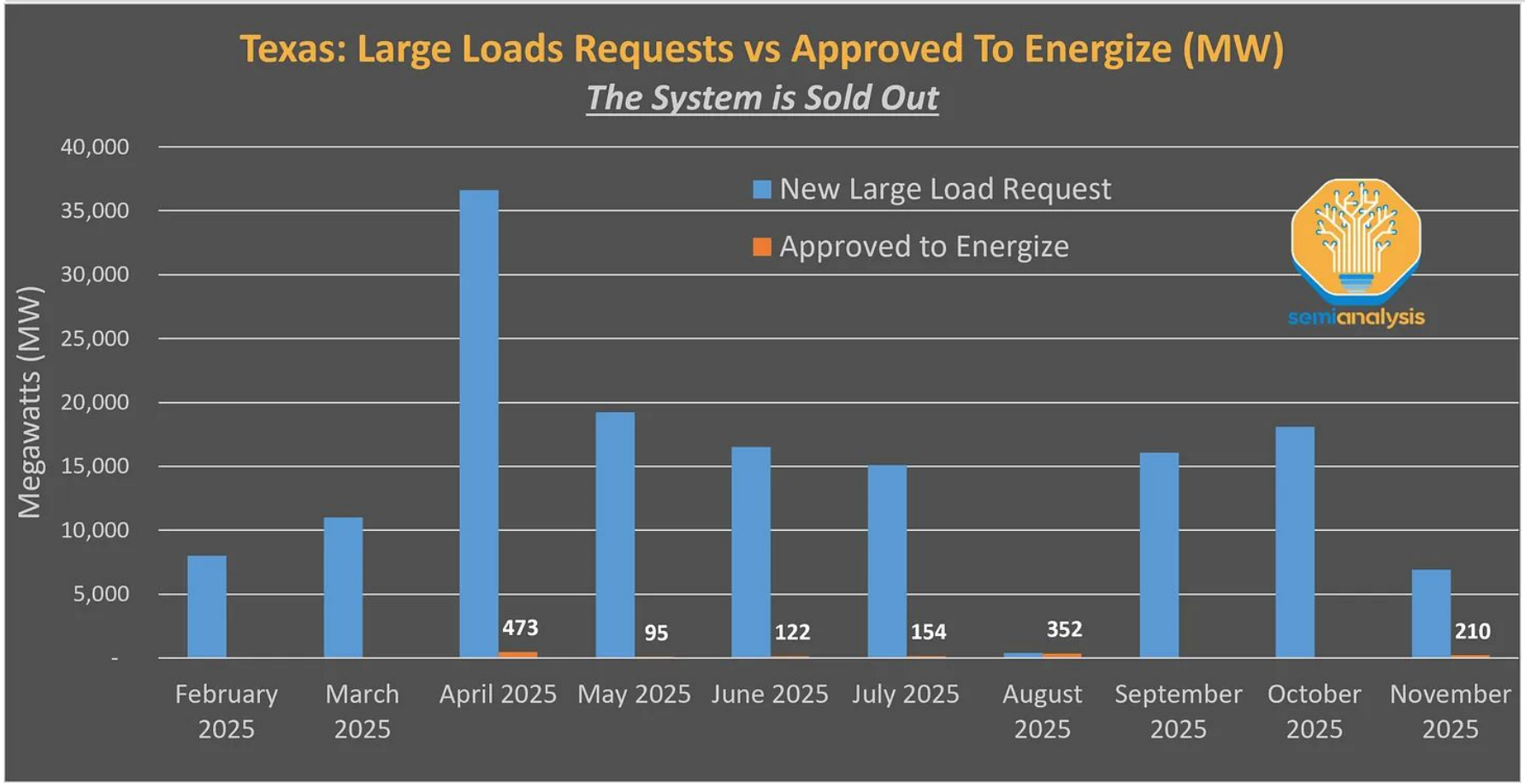

USD/kWh
Utility Solar+Battery Full Shifting
Utility Solar+Battery Partial Shifting
Utility Solar
Nuclear
Coal
Gas CC
Wind
$0.18
$0.15
$0.12
$0.09
$0.06
$0.03
$0.00
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
Source: Nucleus Wealth, Lazard, Bloomberg, OpenEI

Pricing

Cheapest:

- Solar/ wind already connected
- Nuclear already connected
- Fossil fuels already connected (depends where you are which is cheaper)
- Order then changes. Nuclear much more expensive
- Solar + batteries higher… but coming down quickly

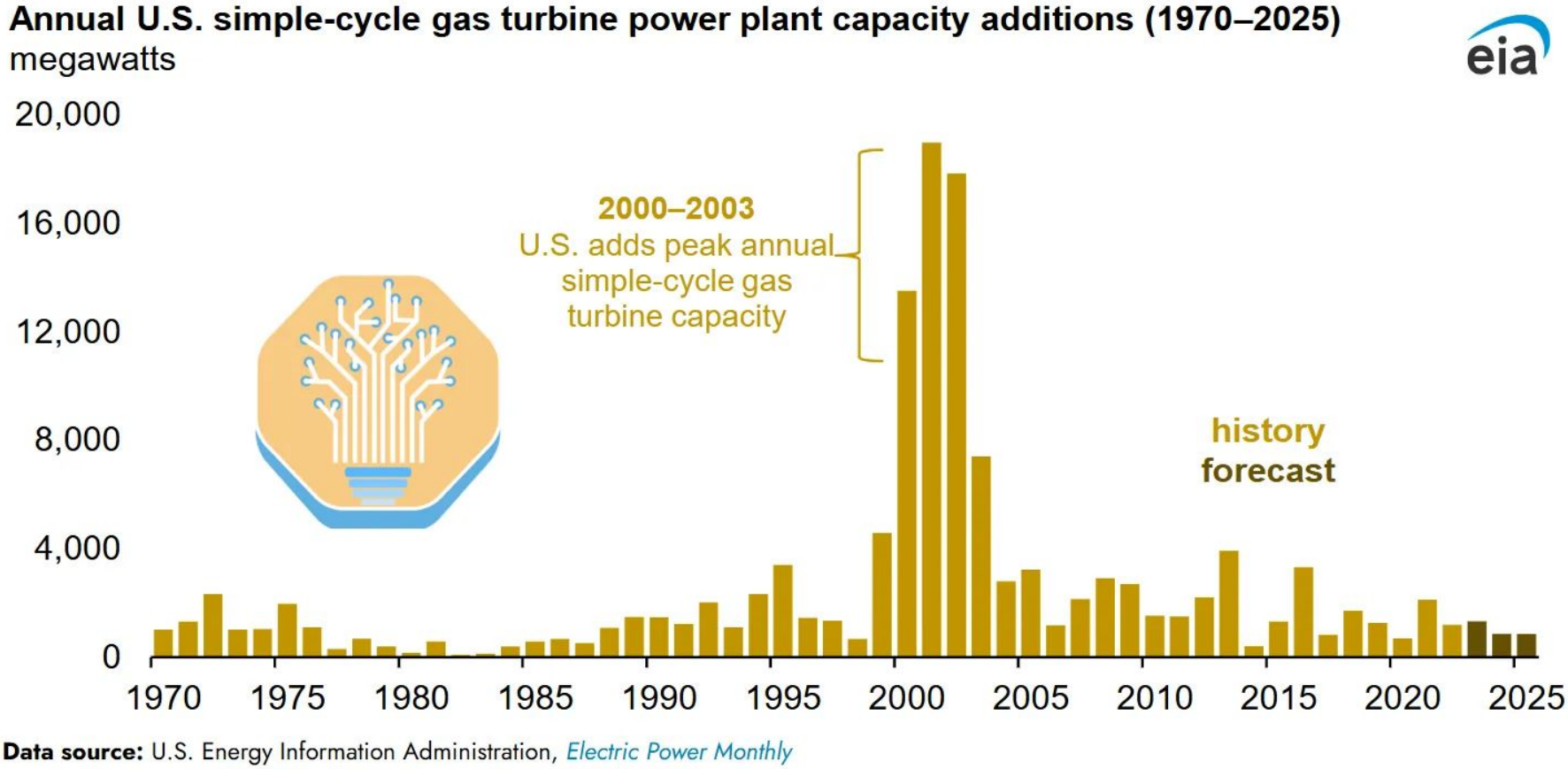
Time is of the essence



Time is of the essence

- Nuclear: 10–15 Years
- Grid Transmission: 7–10 Years
- Gas Peaker Plant: 3–4 Years
- Jet/Aeroderivative Turbine: <1 Year
- Bloom Box / Fuel Cell: 3–6 Months
- Local batteries & Solar: 3-6 months

Time is of the essence



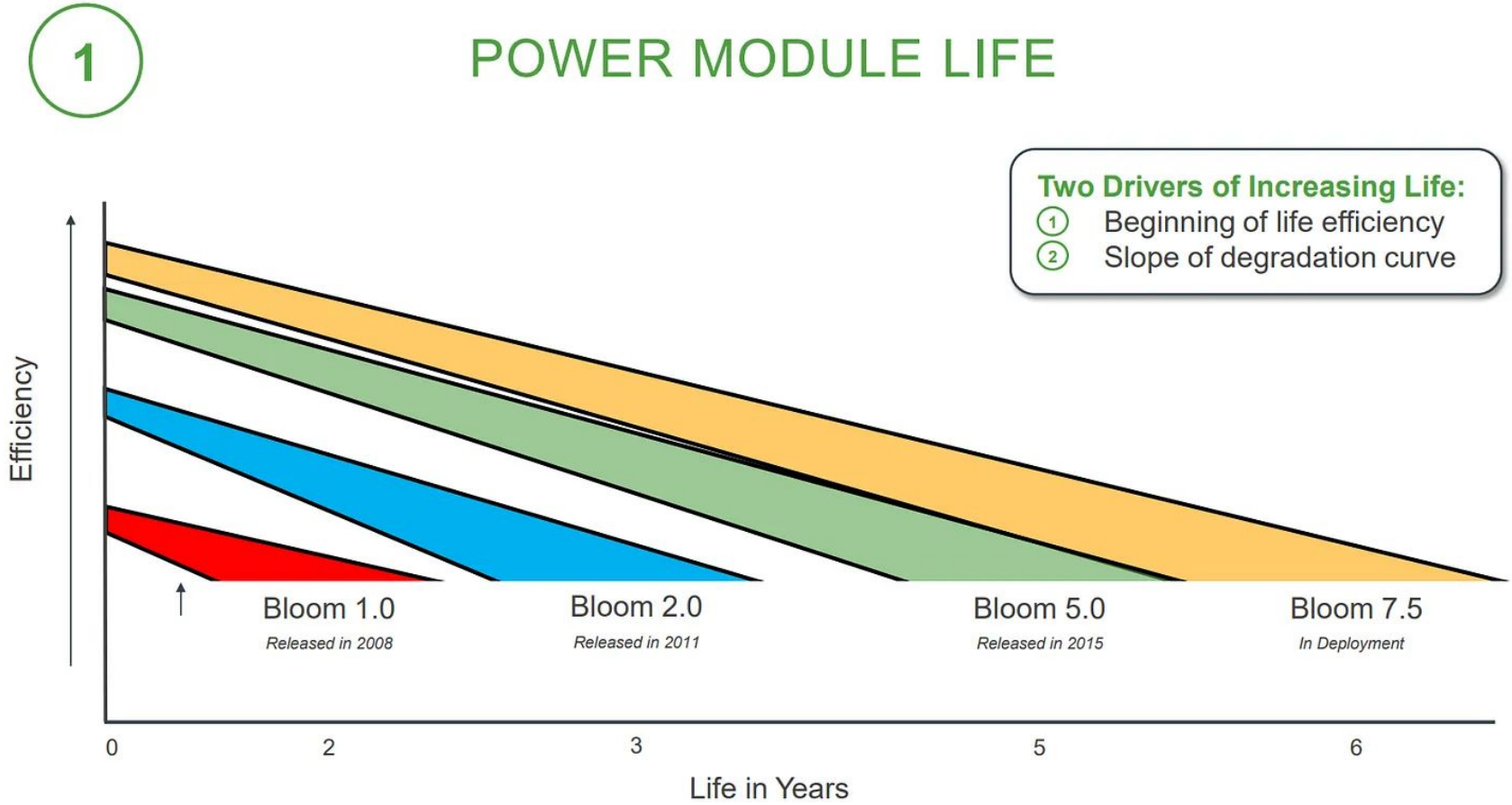
AI solutions

AI solutions

Tech	Size per Unit	Lead Time	Start Time to Full Load	Land Use	Electrical Efficiency	Est. LCOE w/ Maintenance
	MW	Months	Minutes	MW/acre	%	$/MWh
Aeroderivative GT	30-60	18-36	10	30-50	35-40%	80-130
Industrial GT	5-50	12-36	20-30	20-40	35-40%	65-110
Small CCGT	40-100	18-36	30-60	20-30	40-55%	85-160
Medium-Speed RICE	7-20	15-24	5-10	8-15	40-50%	80-150
High-Speed RICE	3-5	15-24	5-10	5-10	40-50%	120-200
Fuel Cells	0.325	3-4	Baseload	30-100	50-55%	100-200
H-Class CCGT	600-1000	36-60	30-60	20-30	50-60%	100-200

AI solutions

AI solutions



AI solutions: Overbuild

- Overbuild issues

Investment View

- Data centres will BYO.
- Batteries and engines / mobile power better than building a fully fledged power plant. Easier to permit, can move to grid interconnection later.
- Local power issues. Power prices will be driven up.
- Green transition will be delayed then accelerated. Batteries in particular will get a huge leg up.
- A range of other sectors will be hit

Investment View

- **Aviation:** competing for jet engines and maintenance.
- **Housing:** competing for transformers and switchgear
- **Industrial, Hospitals, Universities:** transformers and switchgear
- **Manufacturing:** Higher gas prices at the margin. Note US exports, Russian gas, energy transition delays more important.
- **Agriculture:** Water rights? Very localised, probably not significant
- **Green Industry:** Clear power contracts bid up
- **Crypto:** Grid connections - AI buying crypto mining sites

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