Unleashing Intelligence

Tackling the Blind Side —
Navigating Data Center Execution Risk

Jeff Johnston and Teri Viswanath

June 24, 2025

Speaker biographies

Jeff Johnston: As the **Digital Infrastructure Economist at CoBank,** I am responsible for identifying emerging technologies, business models, risks and opportunities within the telecommunications industry, and providing strategic analyses to both internal and external stakeholders. Formerly, I served as an equity analyst covering the tech, media and telecom sectors. I have also held various senior management positions in the telecommunications industry. On a monthly nationally syndicated podcast program, *All Day Digital*, I connect with communications executives and thought leaders to get their perspective on what's shaping our digital industry.

Teri Viswanath: In the role of **Energy Economist at CoBank** I focus on all aspects of the electricity industry, including the electric distribution, generation and transmission sectors. A former attorney and professional energy economist with more than two decades of research experience working with global energy companies and government officials. I am the co-host of the nationally syndicated podcast, *Power Plays*, where I showcase my deep knowledge of the power industry, engaging with guests on a wide variety of topics ranging from policy and energy transition to operational efficiency and power supply.
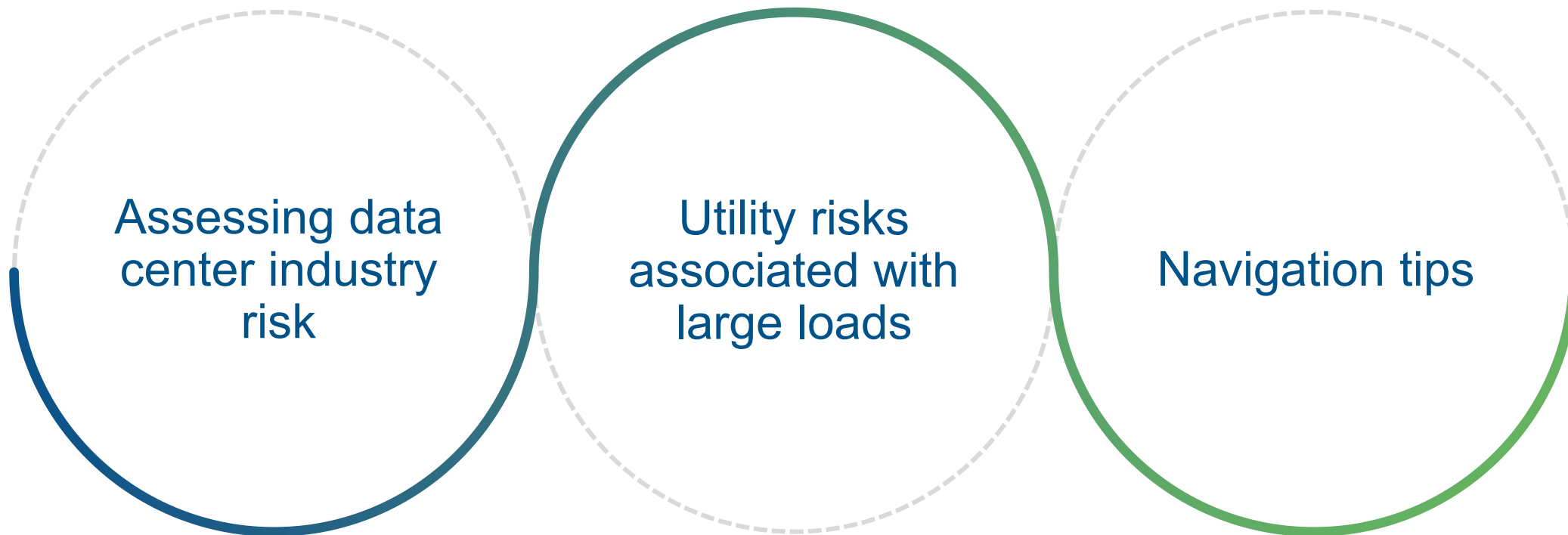
AI business model taking shape

Large load risks are better understood

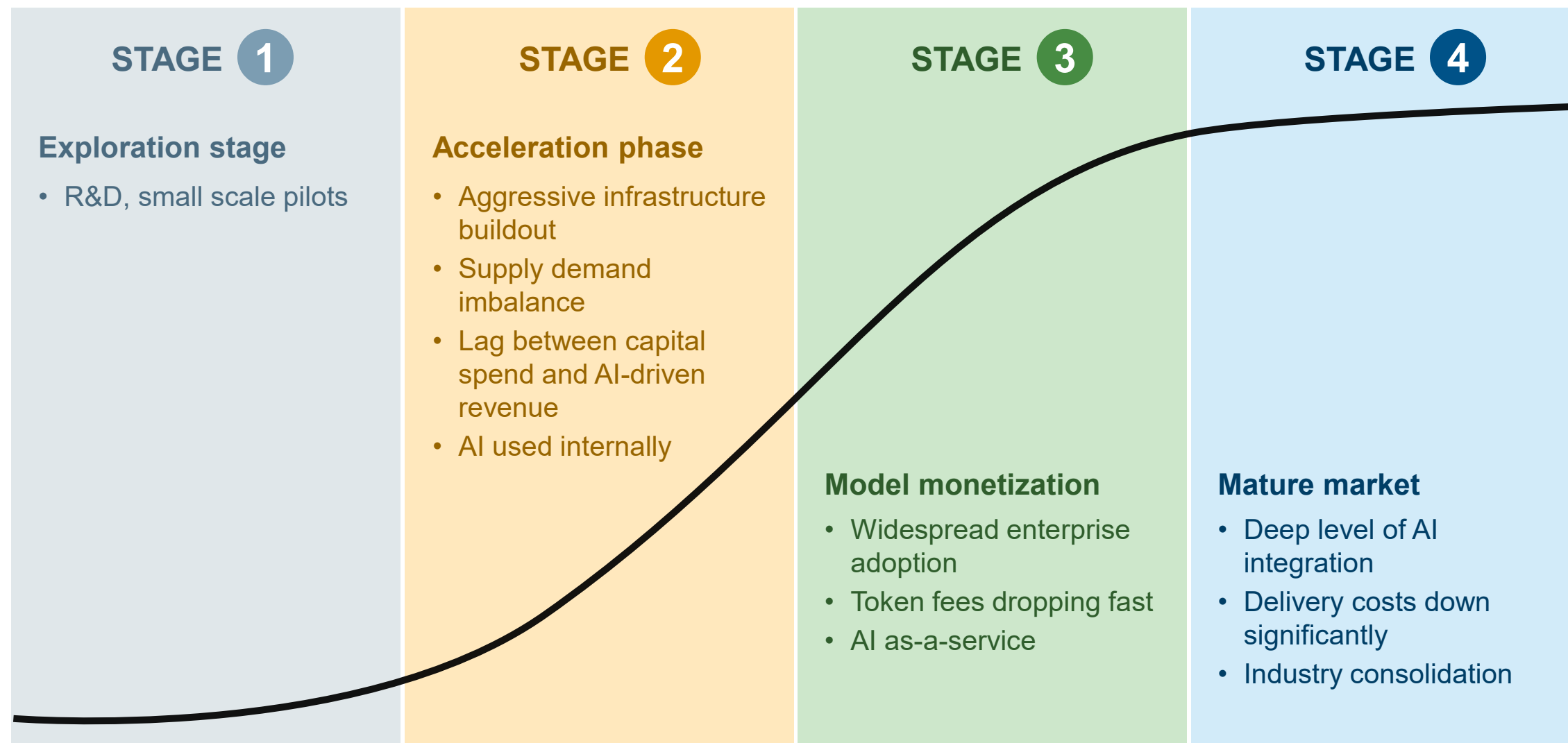Capital pool is expanding

Navigating data center execution risk

Assessing data center industry risk

Utility risks associated with large loads

Navigation tips

AI S-Curve

STAGE (1)

Exploration stage

- R&D, small scale pilots

STAGE (2)

Acceleration phase

- Aggressive infrastructure buildout
- Supply demand imbalance
- Lag between capital spend and AI-driven revenue
- AI used internally

STAGE (3)

Model monetization

- Widespread enterprise adoption
- Token fees dropping fast
- AI as-a-service

STAGE (4)

Mature market

- Deep level of AI integration
- Delivery costs down significantly
- Industry consolidation

Financing trends

Build-to-suit dominates – very little speculative building happening

Data center capital pool is expanding – investors want to gain exposure to the market

Data center expansion is expected to continue through at least 2028

Energy supply challenges will likely persist for the next ~5 years

Hyperscaler churn remains low and won't likely change

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AI adoption

AI is being adopted at an unprecedented scale and scope

There are **800 million weekly active users** using a leading U.S. LLM, up from 0 in 2022

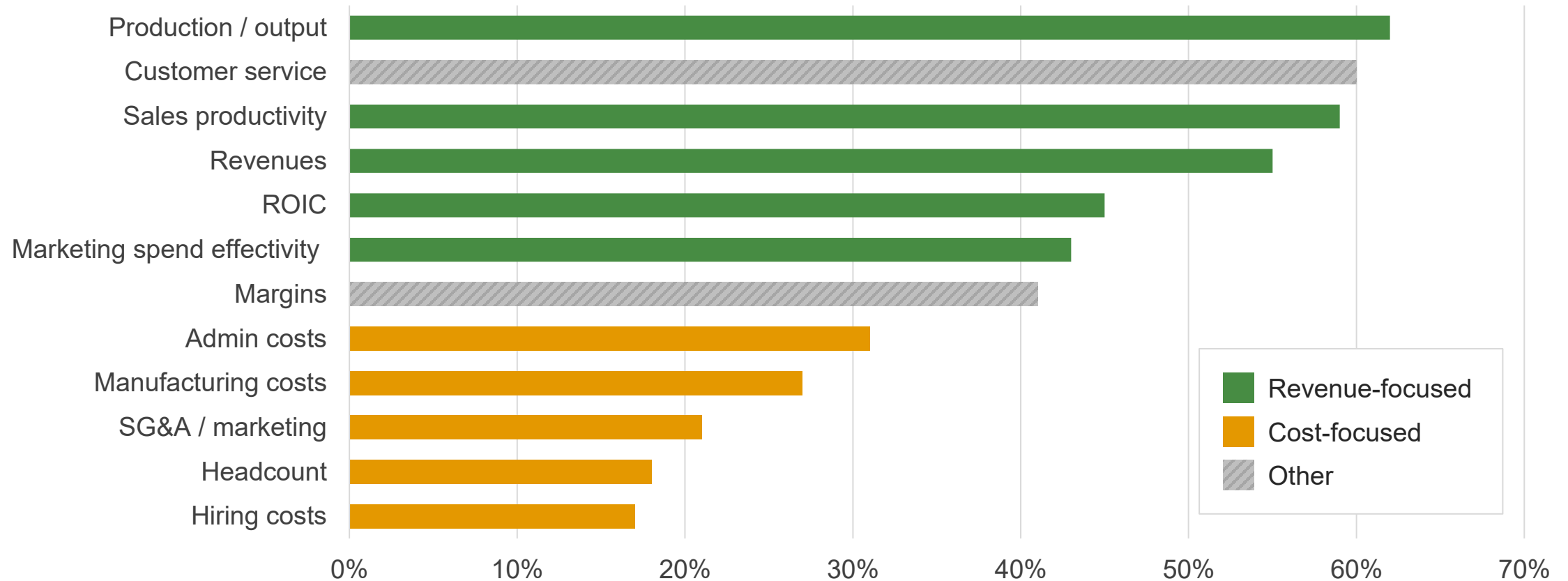U.S. hyperscaler 2025 capital expenditures could reach **$350 billion**, up from ~$235 billion in 2024

Compute cost per token are falling rapidly fueling AI developer growth

Enterprise adoption is critical for future AI growth

Enterprise AI strategy prioritizes revenue growth over cutting costs

AI improvements targeted for global enterprises over next two years
(percent of survey responses)

Category	Value
Production / output	~62%
Customer service	~60%
Sales productivity	~59%
Revenues	~55%
ROIC	~45%
Marketing spend effectivity	~43%
Margins	~41%
Admin costs	~31%
Manufacturing costs	~27%
SG&A / marketing	~21%
Headcount	~18%
Hiring costs	~17%

Legend:
- Revenue-focused
- Cost-focused
- Other

X-axis: 0% 10% 20% 30% 40% 50% 60% 70%

AI inference

An increasing percentage of new data centers are built for inferencing

Mix of edge and core / campus data centers – exact mix is TBD

AI inference power implications vary depending on the application

Today: 80% of power is for training, 20% for inference – by 2028 numbers will swap*

Rural implications: minor impact from urban edge locations, overall growth expected to remain robust

Too many LLMs?

▶ Training Large Language Models (LLM) is expensive with a massive cash burn rate

▶ LLM's are the foundation for inference, but will they become a commodity?

Open-source LLMs	Closed-source LLMs
• Will put downward pressure on the closed-source business model	• Benefits include ease-of-use, user experience, security
• Lack proper user experience, brand recognition and managed services	• Will the benefits justify the billions spent developing them?

China's DeepSeek (open-sourced) is competitive with popular U.S. based closed-source models

AI model performance by provider (artificial analysis quality index score)

Legend:
- **DeepSeek** OPEN
- **OpenAI** CLOSED
- **Anthropic** CLOSED
- **Meta** OPEN
- **Alibaba** OPEN

Categories: Coding, Reasoning and Knowledge, Quantitative Reasoning

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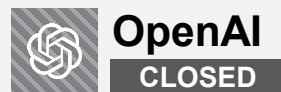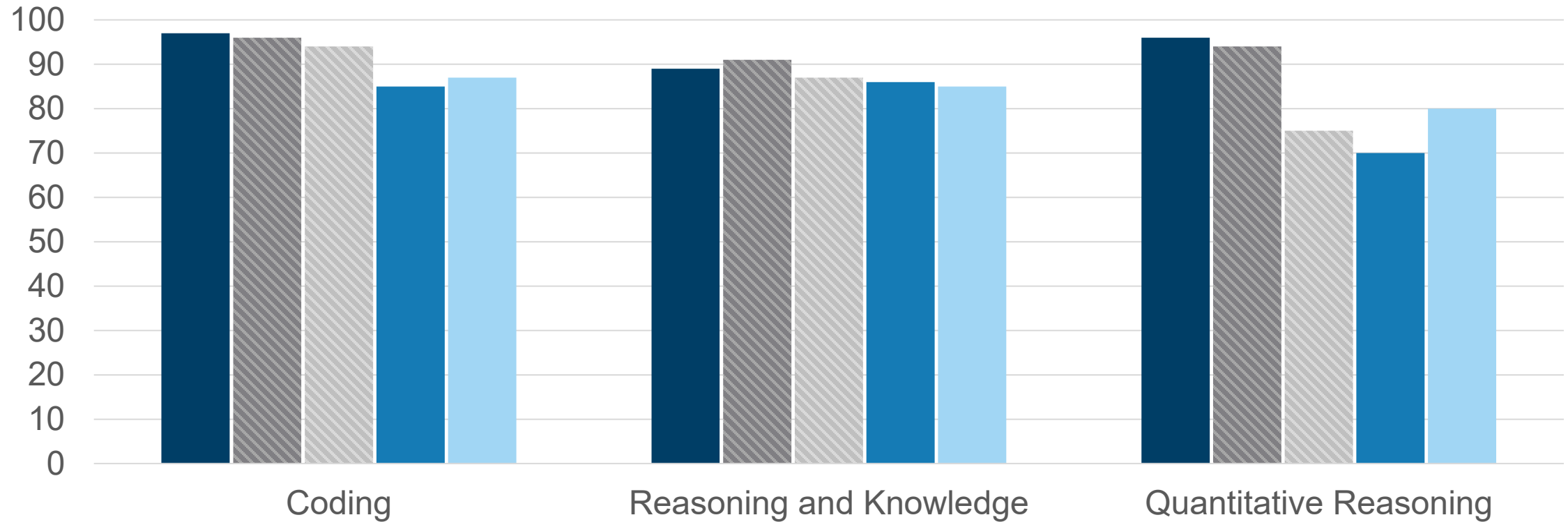
Global race

> **"Our space race, and the people we're discussing, especially China, are highly capable"**

Andrew Bosworth, Meta CTO, on current state of AI ∞ Meta

▶ The launch of China's DeepSeek model in January was a wakeup call for the U.S.

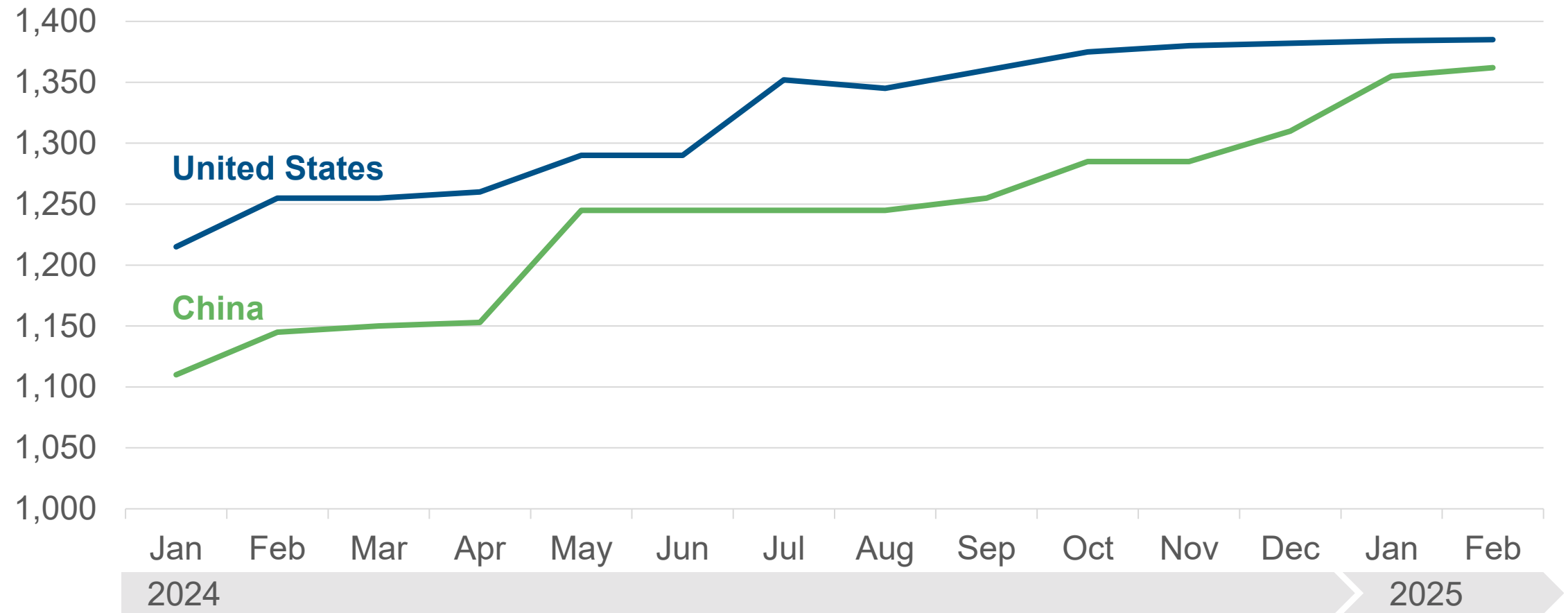▶ Differentiating in AI is difficult, there are no secrets. It's all about execution and building scale, fast!

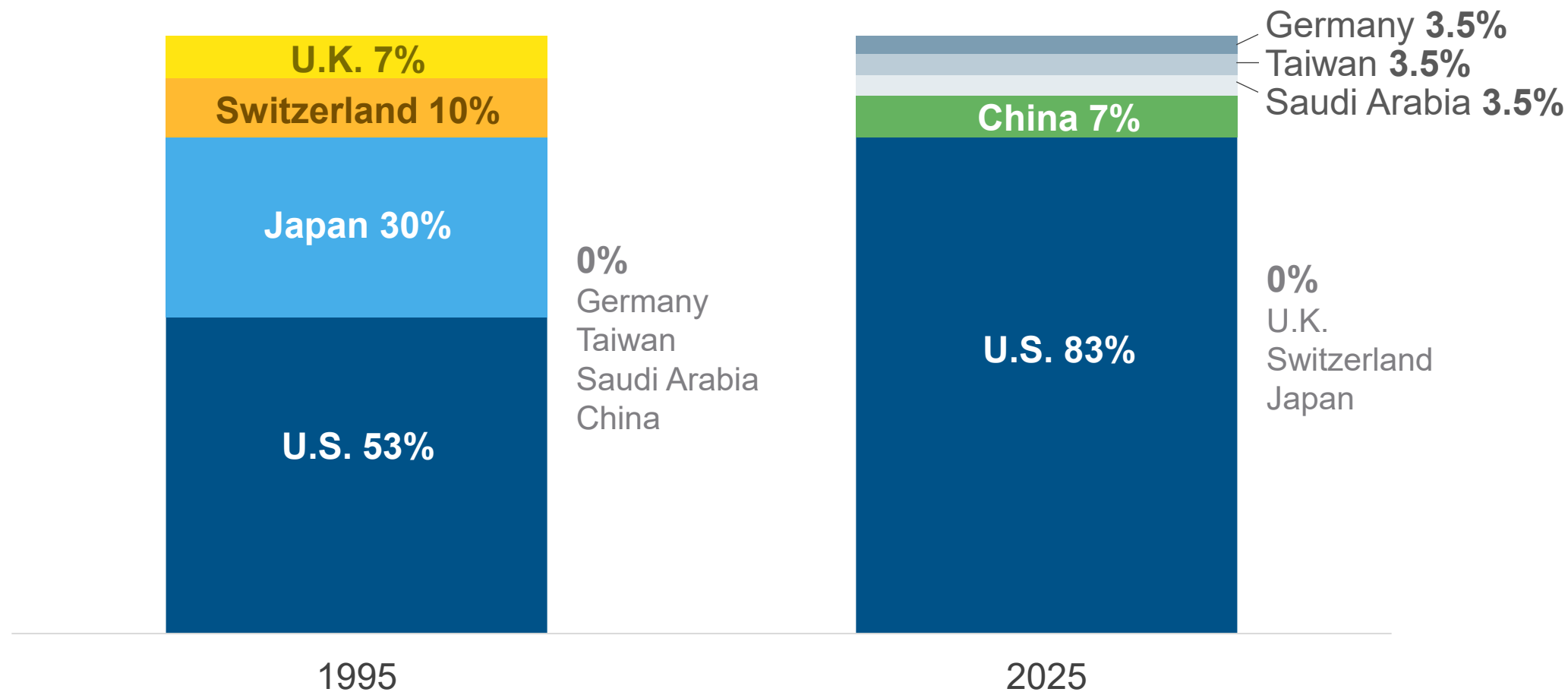# China has made significant progress developing large-scale LLMs

Cumulative LLMs by country
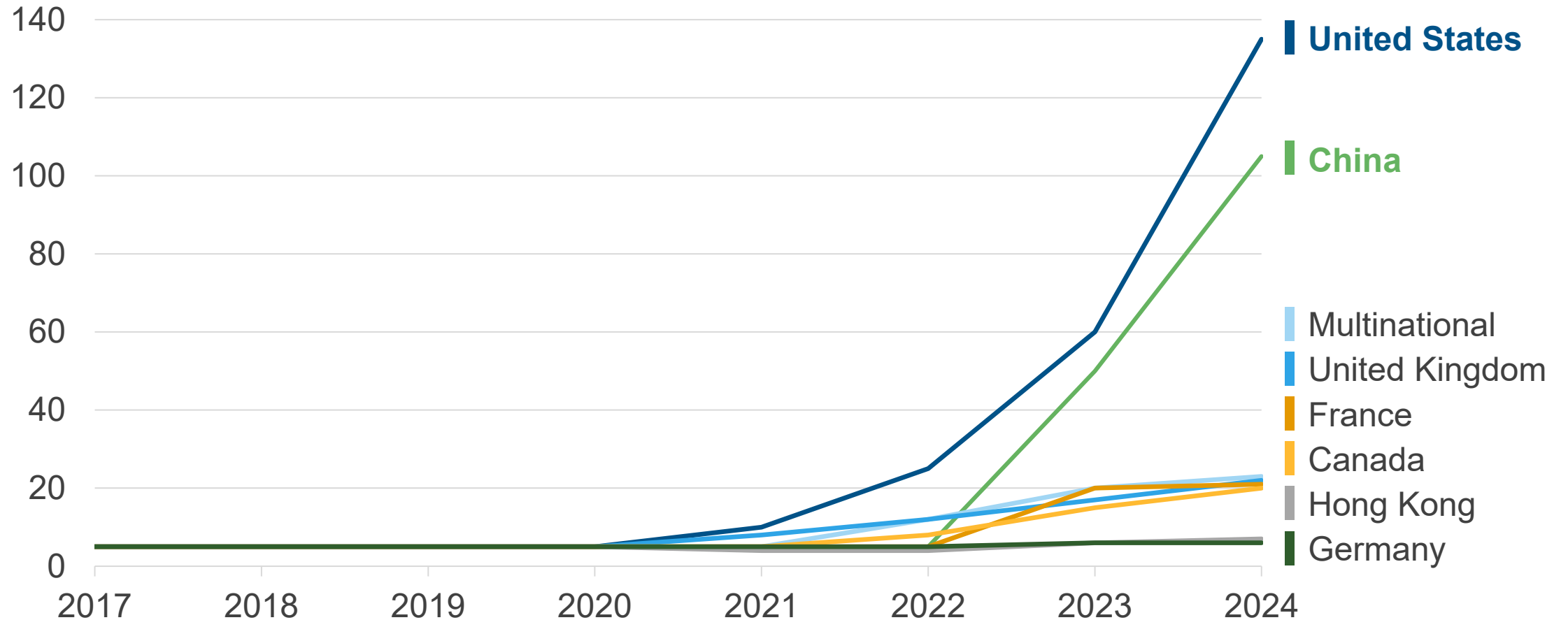
China's DeepSeek performance has validated their AI technical expertise

Performance scores of top-scoring U.S. vs Chinese AI models

Global conditions can change fast

Most valuable companies by country

1995
- U.K. 7%
- Switzerland 10%
- Japan 30%
- U.S. 53%
- 0% Germany, Taiwan, Saudi Arabia, China

2025
- Germany 3.5%
- Taiwan 3.5%
- Saudi Arabia 3.5%
- China 7%
- U.S. 83%
- 0% U.K., Switzerland, Japan

Assessing data center industry risk

Utility risks associated with large loads

Navigation tips

"Know your customer"

Load growth ahead led by large-load consumers

EIA annual energy outlook

Growth (2024-2050)	2023		2025	
Residential	0.7%		1.2%	
Commercial	0.4%		1.9%	
Industrial	0.6%		1.4%	
Transportation	9.7%		1.1%	
Total	0.7%		1.5%	
Direct use	3.1%		3.1%	
Total electricity use	**0.9%**		**1.6%**	

EIA forecast electricity demand

2025
1.6% per annum

2023
0.9% per annum

Changing characteristics of large loads coming to ERCOT

More

Sensitivity to price

Less

Short (<1 year) — **Time to interconnect** → **Long** (3+ years)
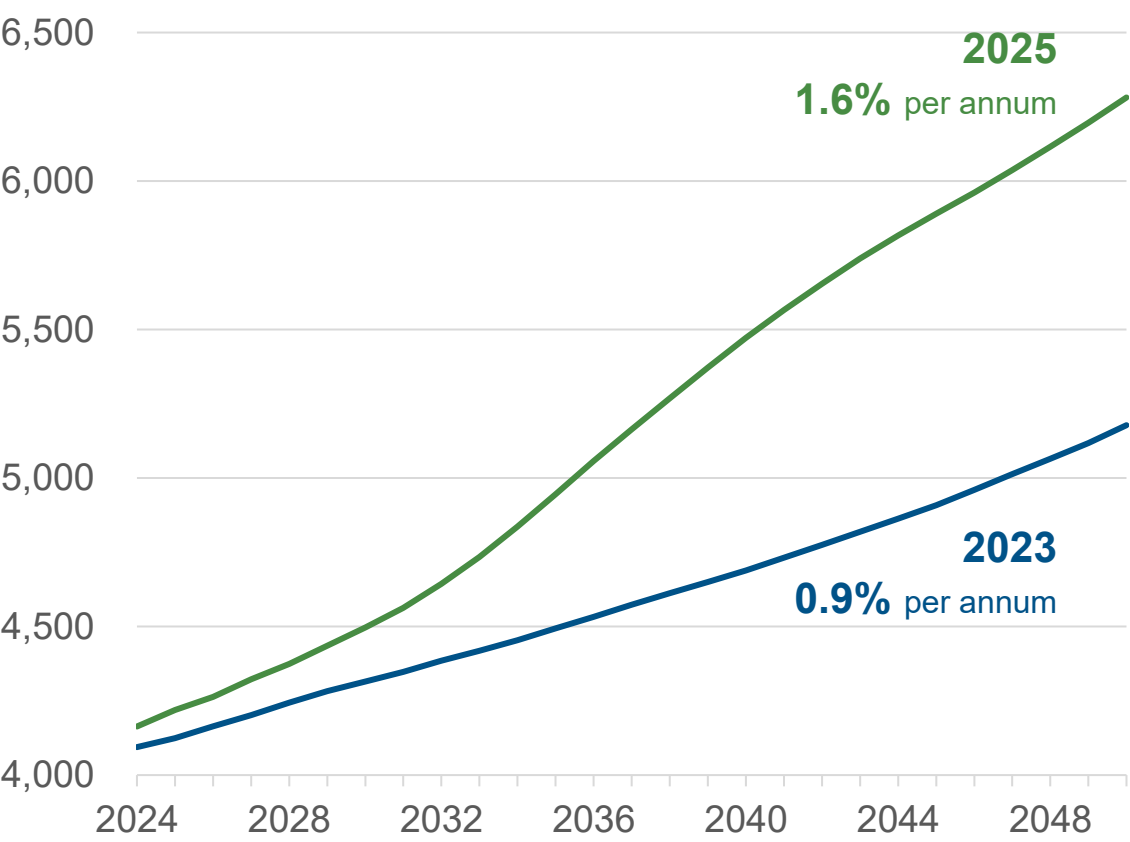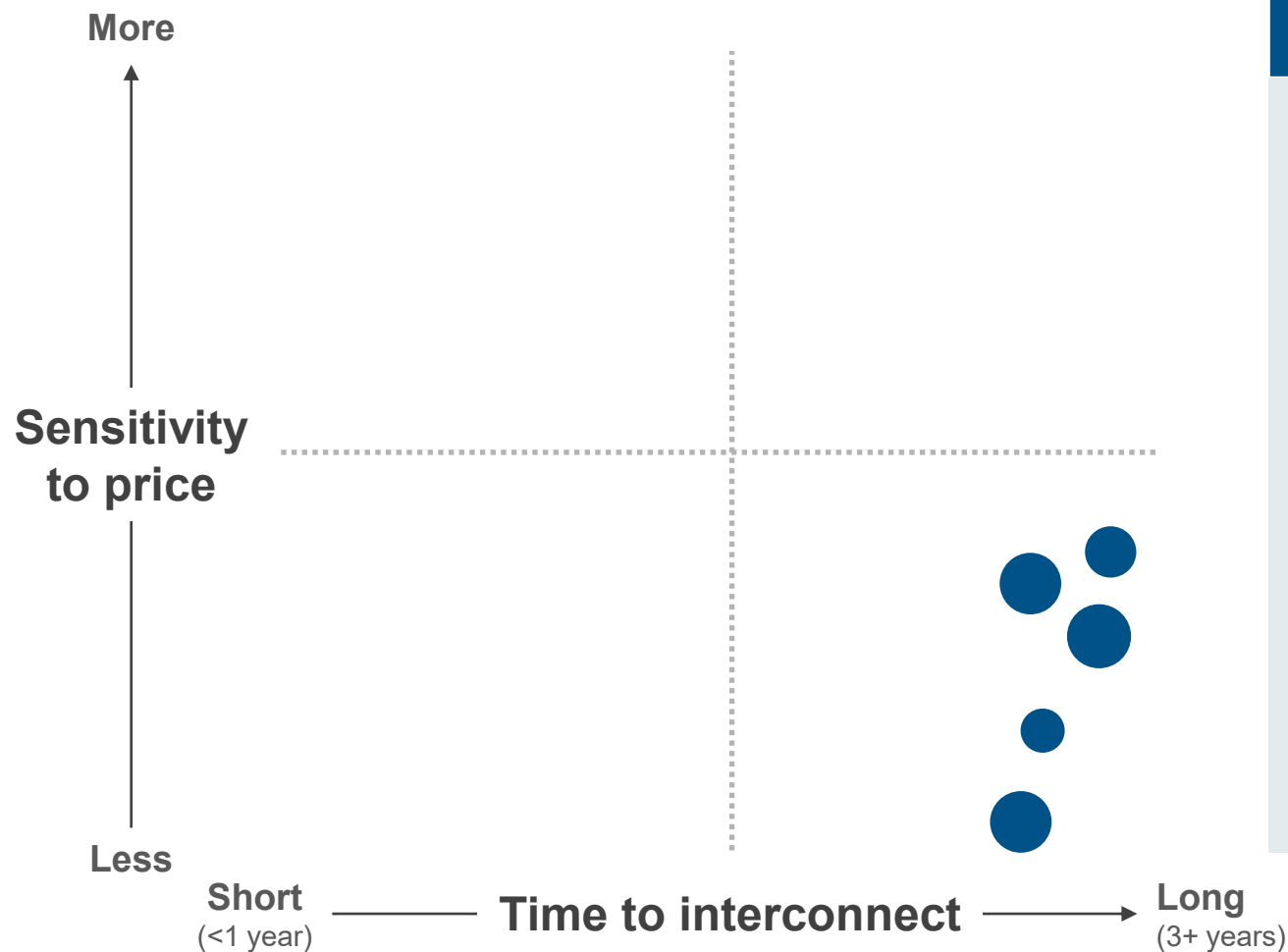
Historical | Current | Projected

- Typically industrial facilities

- Long timelines to interconnect can be studied by traditional planning processes

- Little price-sensitive behavior in real-time

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Changing characteristics of large loads coming to ERCOT

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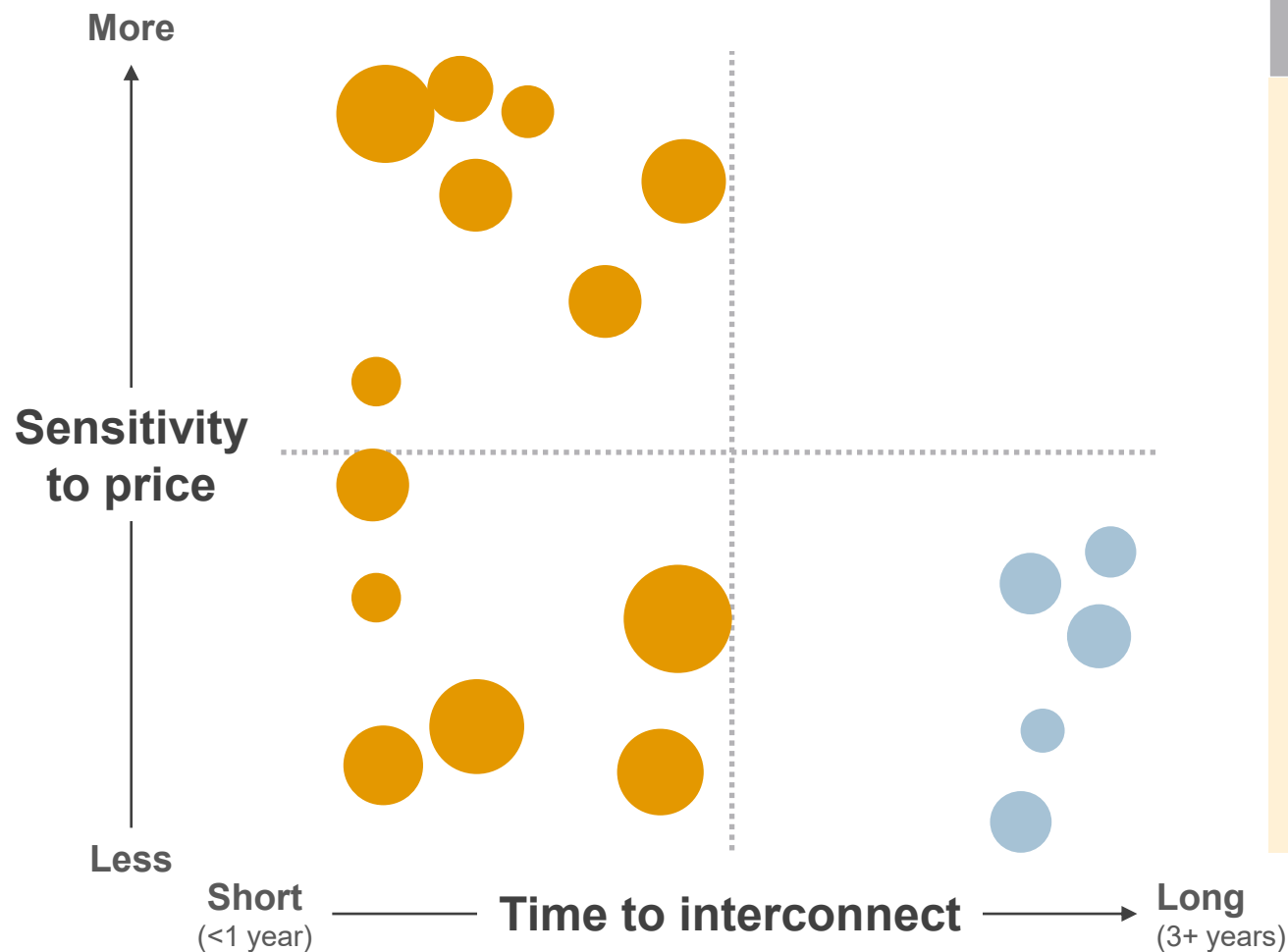
Historical | **Current** | Projected

- Mostly cryptomining, data centers (traditional and AI), some oil field load

- Much shorter timeline to interconnect (months rather than years)

- Some loads are extremely sensitive to price

Source: NERC Large Load Task Force, Large Loads in ERCOT – Observations and Risks to Reliability, Page 23, 8 October 2024

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Changing characteristics of large loads coming to ERCOT

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Sensitivity to price

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Short (<1 year) — Time to interconnect — Long (3+ years)
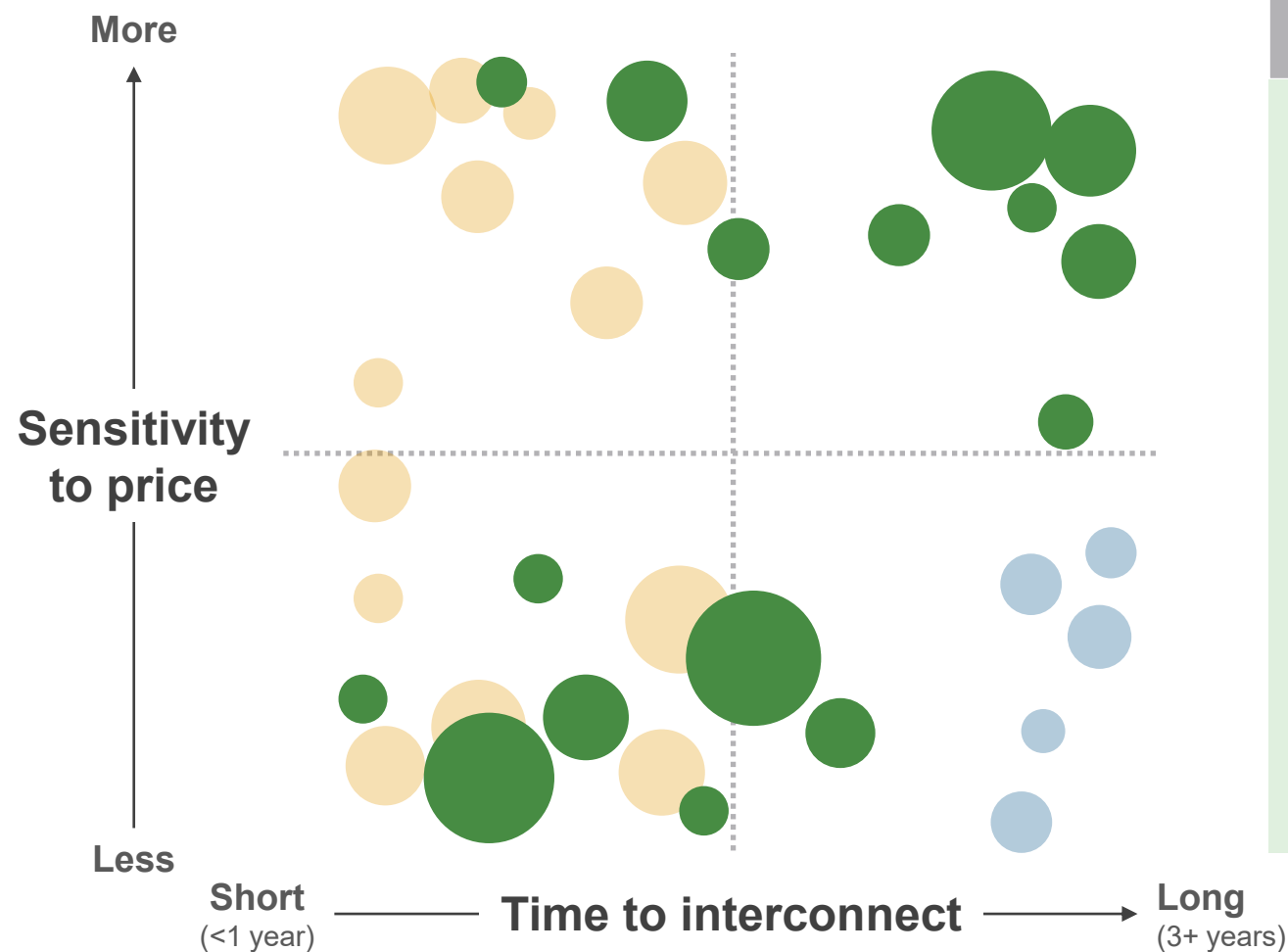
Historical → **Current** → **Projected**

- Hydrogen/electrofuel production, AI data centers, some cryptomining

- Range of interconnection timelines and price sensitivity

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Emerging large customers significantly add to peak load

EPRI's 2024 Utility Survey on Data Center Requests
(aggregated capacity as percent of utility peak load)

Existing data centers (already connected)

Requested data centers

Data center requests exceed current connections for all 22 respondents

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Emerging large customers significantly add to peak load

EPRI's 2024 Utility Survey on Data Center Requests
(aggregated capacity as percent of utility peak load)

10 reported total aggregate requests
≥50% of their present peak load

Existing data centers
(already connected)

Requested data centers
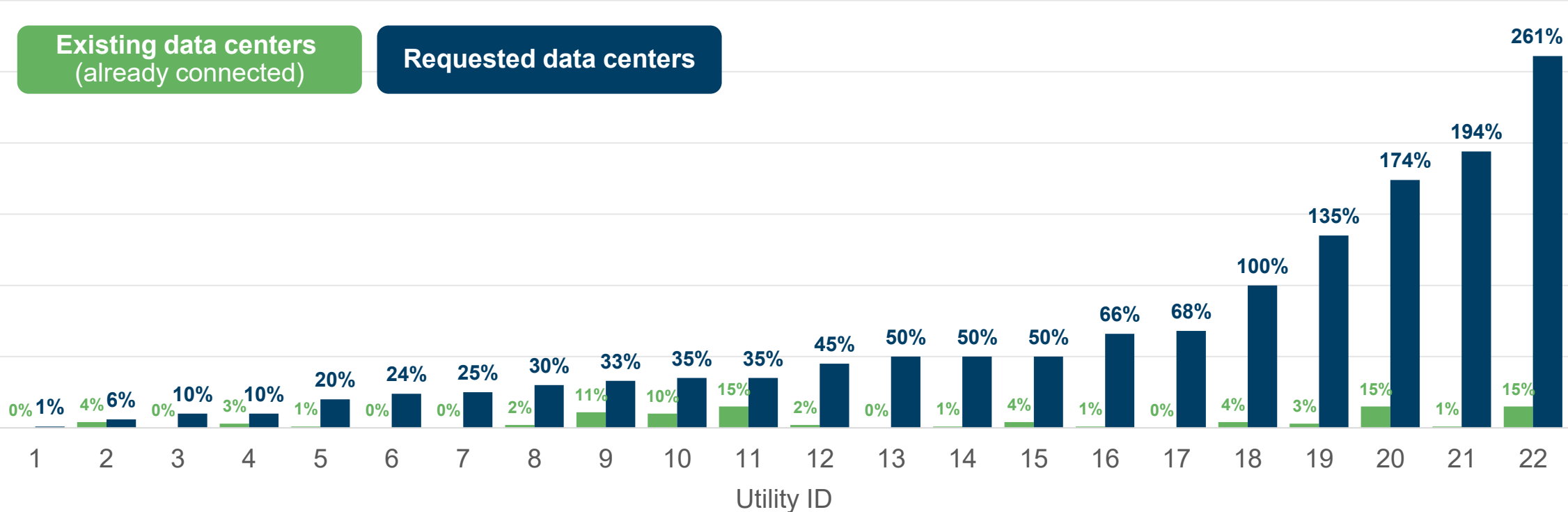
Data center requests exceed current connections for all 22 respondents

Emerging large customers significantly add to peak load

EPRI's 2024 Utility Survey on Data Center Requests
(aggregated capacity as percent of utility peak load)

23% reported total aggregate requests
≥100% of their present peak load

Existing data centers (already connected)

Requested data centers

Data center requests exceed current connections for all 22 respondents

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Assessing data center industry risk
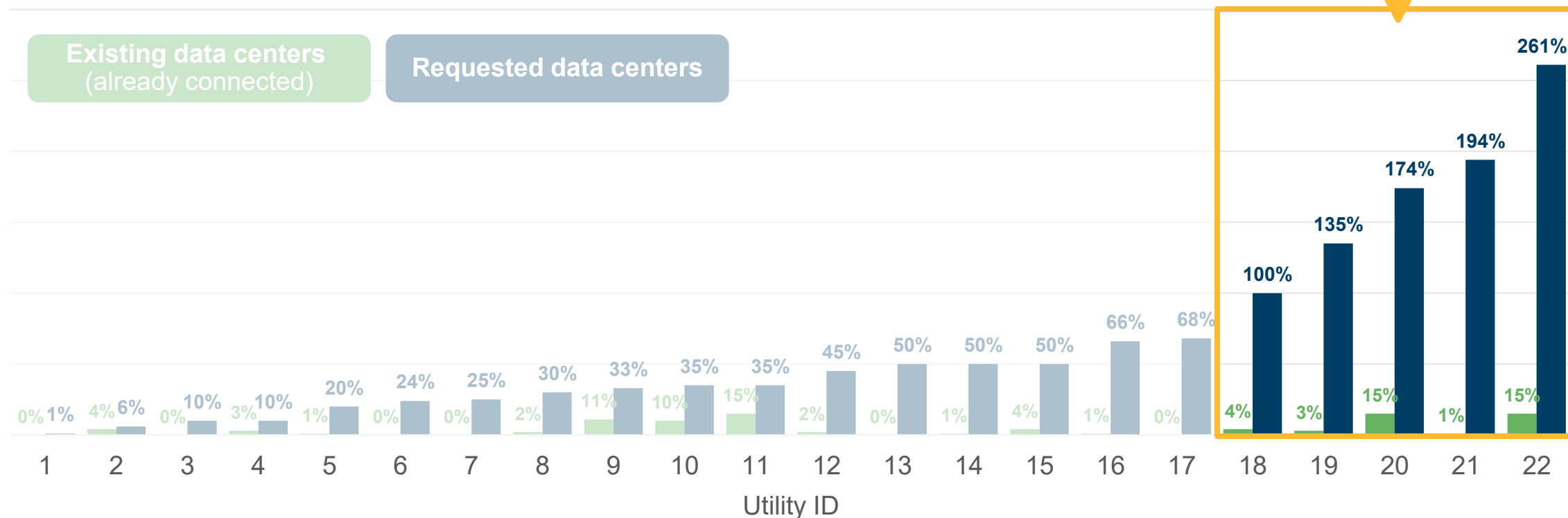
Utility risks associated with large loads

Navigation tips

Evolving practices and opportunities

Financial risks associated with serving large loads

1 Revenue concentration

2 Cost shifting

3 Stranded assets

4 Significant upgrades / costs

5 Local economic impacts

Financial risks associated with serving large loads

Revenue concentration	Cost shifting	Stranded assets	Significant upgrades / costs	Local economic impacts

Large loads are a significant revenue source for cooperatives

Mitigating factor

Large loads provide significant revenues but also incur hefty costs. Electric utilities are changing their billing practices with data centers, **often requiring deposits and exploring alternative billing frequencies** beyond the typical monthly in arrears.

Financial risks associated with serving large loads

Revenue concentration	Cost shifting	Stranded assets	Significant upgrades / costs	Local economic impacts

The risk that costs associated with serving large loads are unintentionally shifted to other customers.

Mitigating factor

Mechanisms such as rate structures specifically for large load members and service agreement provisions to include **minimum load factors and longer contract duration can protect other customer segments**.

Financial risks associated with serving large loads

Revenue concentration	Cost shifting	**Stranded assets**	Significant upgrades / costs	Local economic impacts

Risks associated with stranded assets from underutilized utility system investments.

Mitigating factor

Mechanisms such as a **securing power supply directly from ISO, dedicated power purchase agreement, cash reserves/collateral requirements and exit fees could be used** to protect the cooperative.

Financial risks associated with serving large loads

Revenue concentration	Cost shifting	Stranded assets	**Significant upgrades / costs**	Local economic impacts

Serving new large loads require substantial investment to upgrade the cooperative's distribution system.

Mitigating factor

Contributions in Aid of Construction can be used to ensure that costs to serve large loads are appropriately funded by those entities.

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Financial risks associated with serving large loads

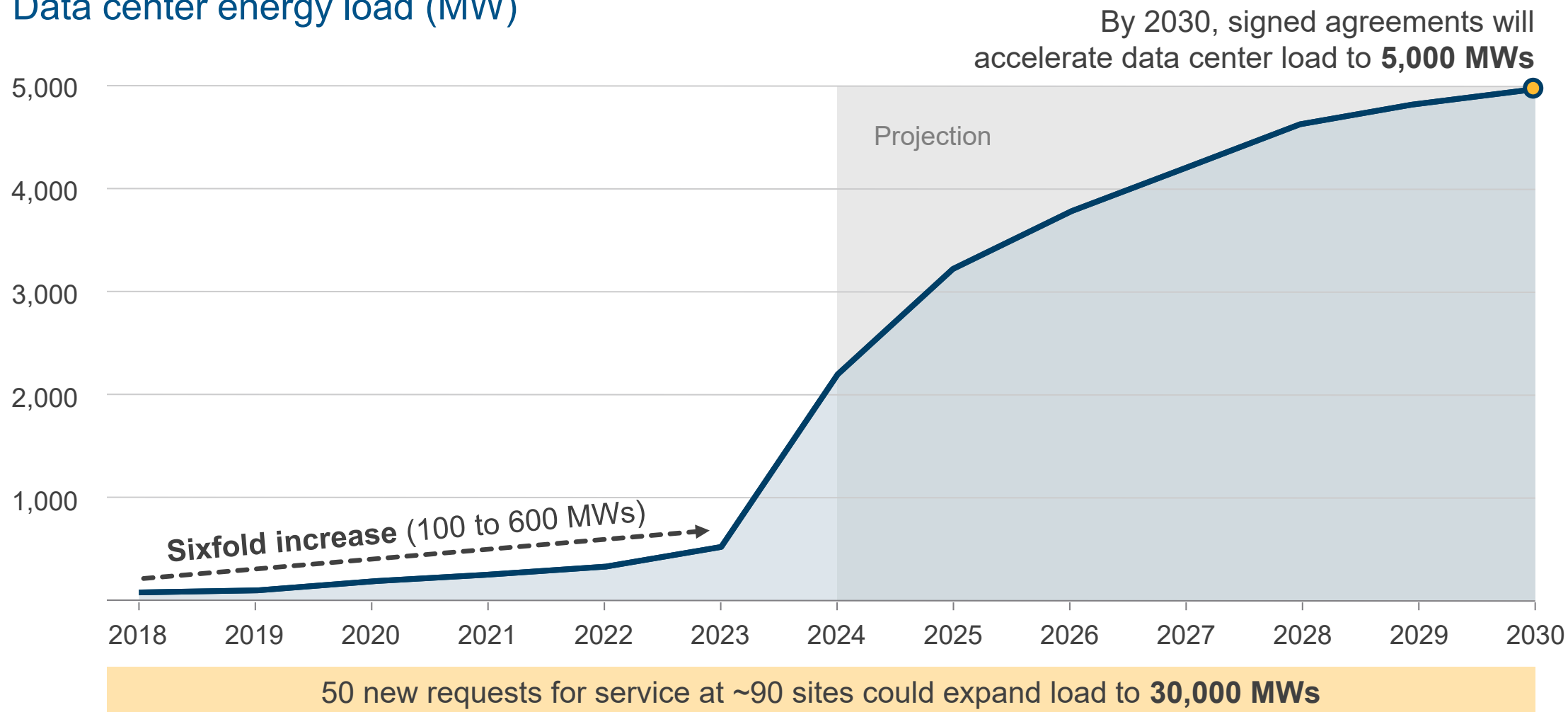| Revenue concentration | Cost shifting | Stranded assets | Significant upgrades / costs | **Local economic impacts** |

If the large load should cease operations, the local economy could be negatively impacted by a reduction in jobs and tax revenue.

Mitigating factor

In many cases, large loads are **required to support economic development as well as low-income programs** with direct payments to state or local governments.

Forecast electricity load from central Ohio data centers

Data center energy load (MW)

By 2030, signed agreements will accelerate data center load to **5,000 MWs**

Projection

Sixfold increase (100 to 600 MWs)

5,000
4,000
3,000
2,000
1,000

2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

50 new requests for service at ~90 sites could expand load to **30,000 MWs**

AEP Ohio revised data center rate proposal (rules of the road)

☑ Establishes new customer — data centers over 25 MW

☑ Establishes a uniform sign-up process for specified data centers

☑ Sets minimum demand charges (85% of contract capacity)

☑ Defines the load ramp parameters (take-or-pay provision)

☑ Establishes behind-the-meter generation limits and requirements

☑ Limits contract assignment (25%) and establishes upfront exit fees

Questions?

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Large load risks are better understood

Capital pool is expanding