Can the Grid Handle This?
Grid Impacts of the AI buildout

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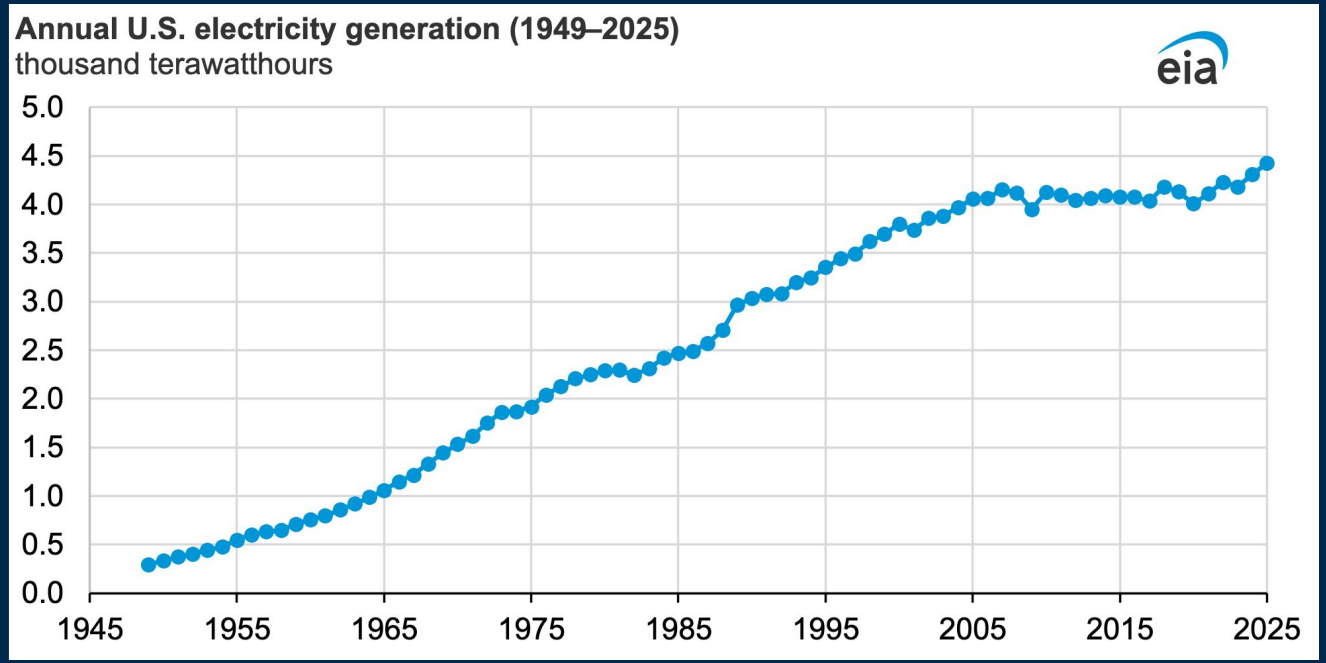
We are really good at growing the grid.



Source: EIA, https://www.eia.gov/todayinenergy/detail.php?id=67284

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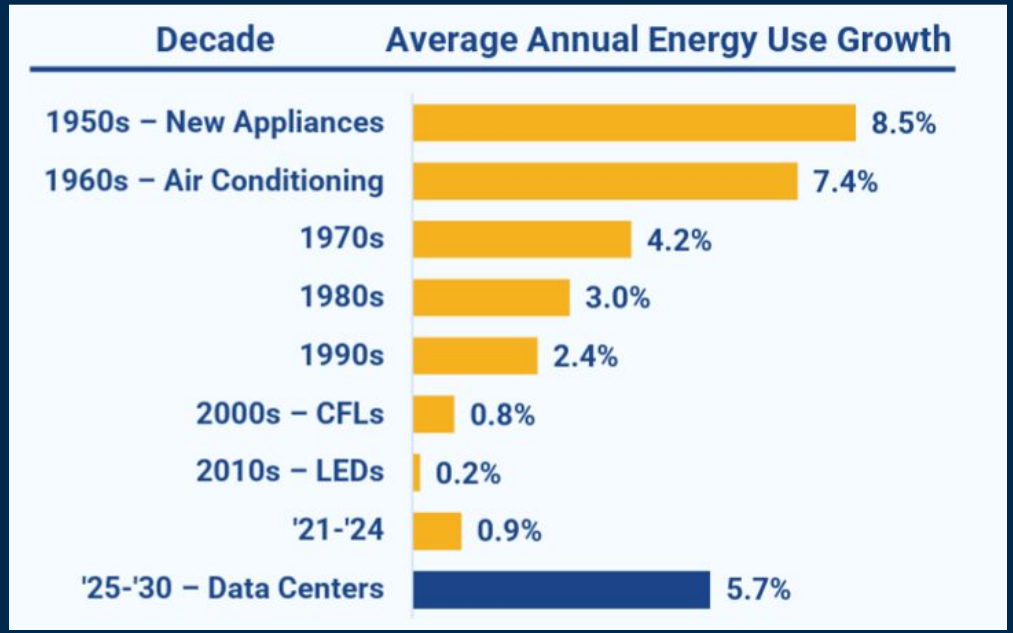
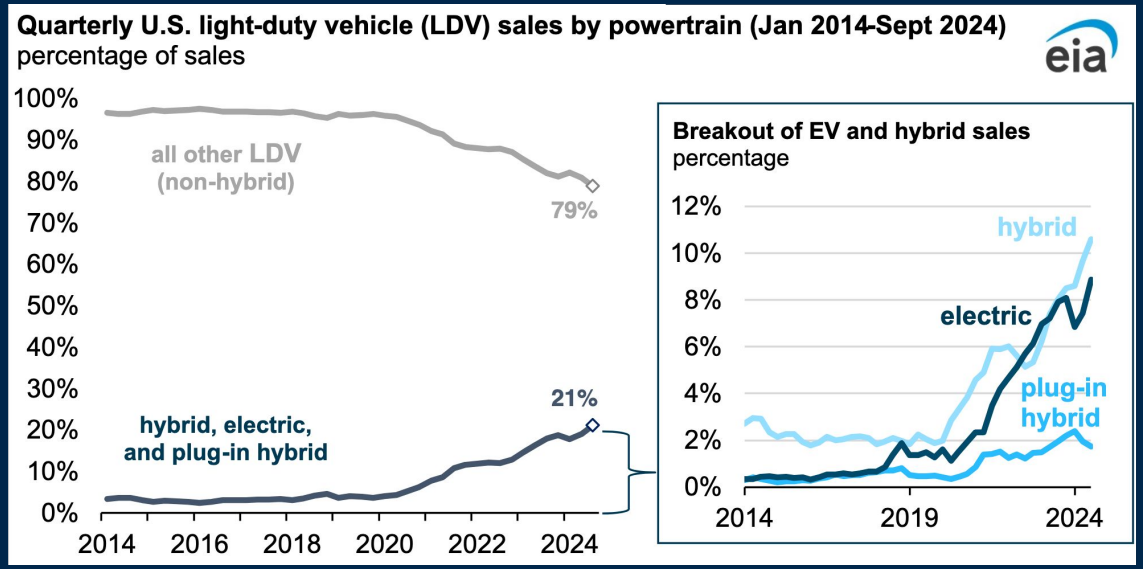


Source: J.D. Wilson, S. Meyer, Z. Zimmerman, and R. Gramlich, "Power Demand Forecasts Revised Up for Third Year Running, Led by Data Centers", GridStrategies, Nov 2025

We have been working to grow the grid for renewable energy and electrification.



Source: EIA, https://www.eia.gov/todayinenergy/detail.php?id=63904

The AI buildout is a little different.



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- Highly concentrated large loads with requirements for high power quality (like aluminum smelters?)
- Eventual move towards more distributed data centers?

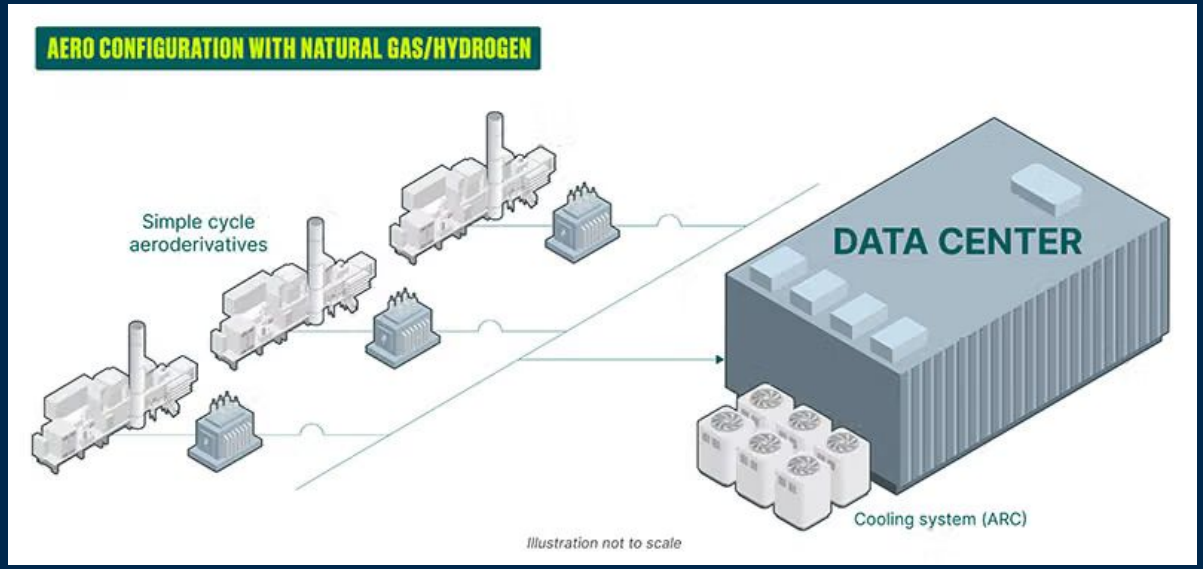
Why “Speed to Power”?

- **Speed to Power:** How fast can we get electric power capacity to data centers?
- Typical grid planning timelines are in the range of 2-10 years.
- AI companies want to move faster → behind-the-meter generation and storage

Why “Speed to Power”?

“Engine No. 1, Chevron to Power Data Centers with GE Vernova Gas Turbines”

James Cook, Jan 29, 2025



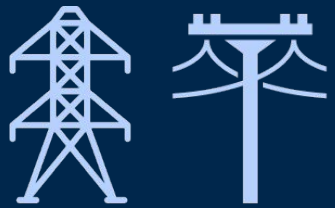
Source: https://www.turbomachinerymag.com/view/engine-no-1-chevron-to-power-data-centers-with-ge-vernova-gas-turbines

It's not just about electricity supply, but also the grid itself.

Powering data centers requires electricity generation, transmission capacity, and distribution infrastructure.



Generators



Transmission & Distribution Grids



Data centers

Power Grids 101

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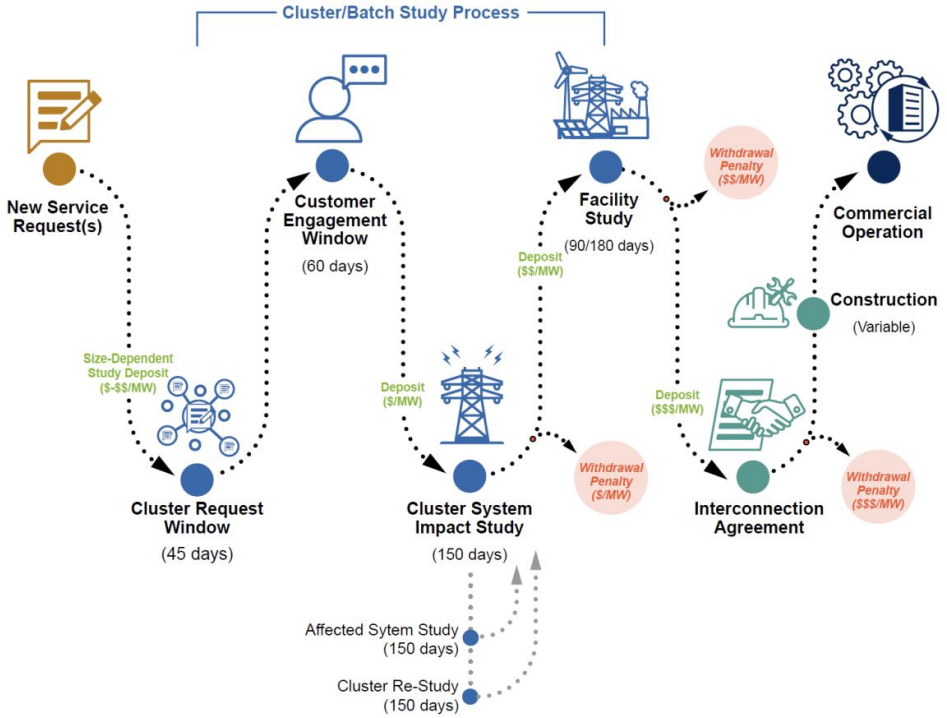
→ This is a huge messy optimization problem, and it is solved every 5-10 minutes.

Interconnection studies are important but slow the deployment of new generation and large loads.

Interconnection study: a technical evaluation conducted by a utility to determine how a new grid generator/load will impact the grid, and whether any grid upgrades are needed.

Typical Interconnection Study Process and Timeline

- A project developer initiates a new ***interconnection request (IR)*** and thereby enters the ***queue***
- A series of ***interconnection studies*** establish what new transmission equipment or upgrades may be needed and assigns the costs of that equipment
- The studies culminate in an ***interconnection agreement (IA)***: a contract between the ISO or utility and the generation owner that stipulates operational terms and cost responsibilities
- Most proposed projects are ***withdrawn***, which may occur at any point in the process
- After executing an IA, many projects are built and reach ***commercial operation***



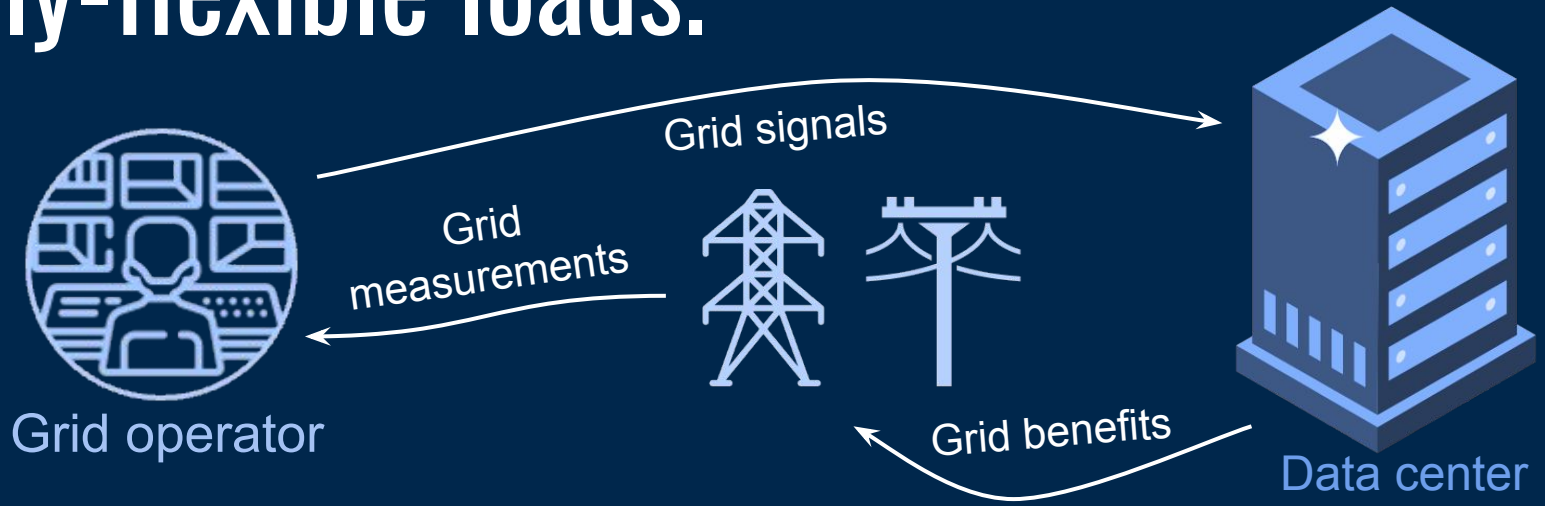
Note: These steps are in accordance with Federal Energy Regulatory Commission (FERC) pro-forma interconnection procedures as outlined in FERC Order 2023. Some ISOs already use a cluster-study approach. The data presented in this report pre-date Order No. 2023 implementation.

Source: Queued Up: 2024 Edition: Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2023 Rand et al. Lawrence Berkeley National Laboratory April 2024.

“Flexible interconnection” is an opportunity but requires policy change.

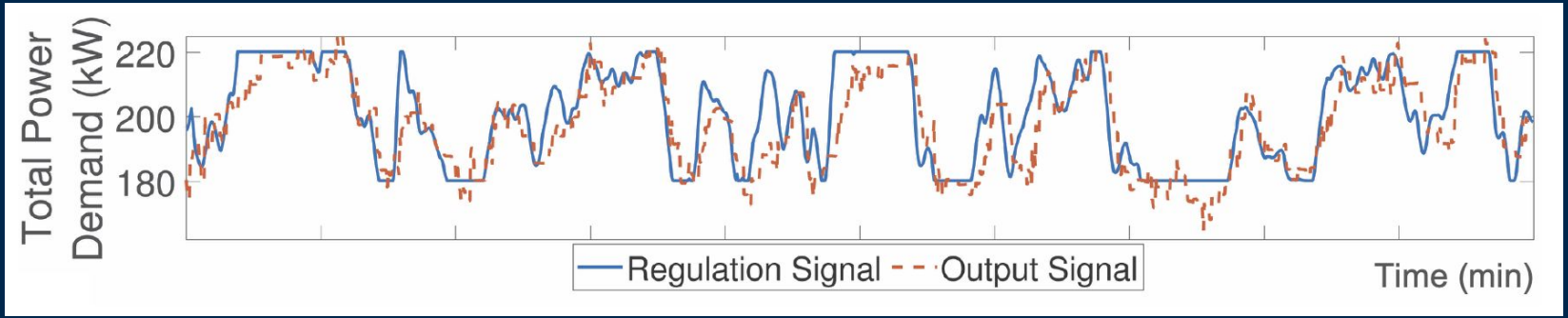
- **Firm interconnection:** grid can support the rated (peak) data center load 24/7/365
- **Flexible interconnection:** the data center and utility enter a contract enabling the utility to curtail data center load at critical times

We should do more than flexible interconnection → data centers as fully-flexible loads.



We can do a lot with flexible loads – they can mitigate their own grid impacts & support other grid resources.

My field data from a Virtual Power Plant demo in Austin, TX, 2023.



OPINION

The grid will fall short of AI's power needs. These 6 resources can close the gap.

No single option is fast, firm and large enough on its own, writes Simon Irish, CEO of Terrestrial Energy.

Published Nov. 18, 2026

Source: https://www.utilitydive.com/news/the-grid-will-fall-short-of-ais-power-needs-6-resources-close-the-gap/874125/

6 “Magic” Resources?

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- **Flexible demand**
- Existing nuclear plants
- Natural gas
- Wind, solar, and storage
- On-site generation
- Advanced nuclear

Takeaways

- We’re good at scaling the grid.
- The AI buildout is both a technical challenge and a technical opportunity for the grid.
  - However, the technical issues are intertwined with economic, regulatory, political, and social issues…
- Data center load flexibility is key.