Uptime Institute: Tier Standards Data Center Panorama

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Uptime Institute is the standard for digital infrastructure performance. Our Tier Standard has been used in the design, construction and operations in thousands of data center sites in more than 122 countries.

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Uptime Institute is the Global Digital Infrastructure Authority

Uptime Institute and its Tier Standard is the standard of digital infrastructure performance in design, construction and operations

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It’s all about Resiliency

Uptime Institute understands the need to increase the resiliency and reliability of your digital infrastructures across the globe. Today, protecting your data and keeping your systems up and running is more important than ever, and today’s critical facilities must be resilient in order to face any type of disruption, and to mitigate the risks of downtime and potential data loss.

We have the right expertise to help you make that happen. Count on Uptime.

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Tier Certifications & Awards

- Tier Certification of Design Documents
- Tier Certification of Constructed Facility
- Tier Certification of Operational Sustainability
- Uptime Institute Sustainability Assessment
- Management & Operations Stamp of Approval
- Tier-Ready/Edge
- Tier Gap Analysis

Intelligence & Network

- Research
- Global Community
- Best Practices Sharing
- Uptime Network Portal
- Largest Incident DB
- Latest Trends & Technologies
- Professional Development

Education

- Extensive Curriculum
- Expert Instructors
- Course offerings run through the entire career progression, from Data Center Fundamentals to the Masters Degree in Data Center Leadership Management

Operations, Risk & Management Services

- Infrastructure consulting
- Data Center Risk Assessment
- Data Center Cybersecurity Assessment
- SCIRA-FSI (Financial Sector)
- FMO Advisory
- DCIM Consulting
- Digital Resiliency Assessment

Energy & Sustainability

- Sustainability Strategy Gap Analysis
- Energy & Sustainability Consulting
- Accredited Sustainability Advisor & Certified Data Center Sustainability Professional Training Programs

AI & Custom Consulting

- AI Infrastructure Advisory
- IT Advisory

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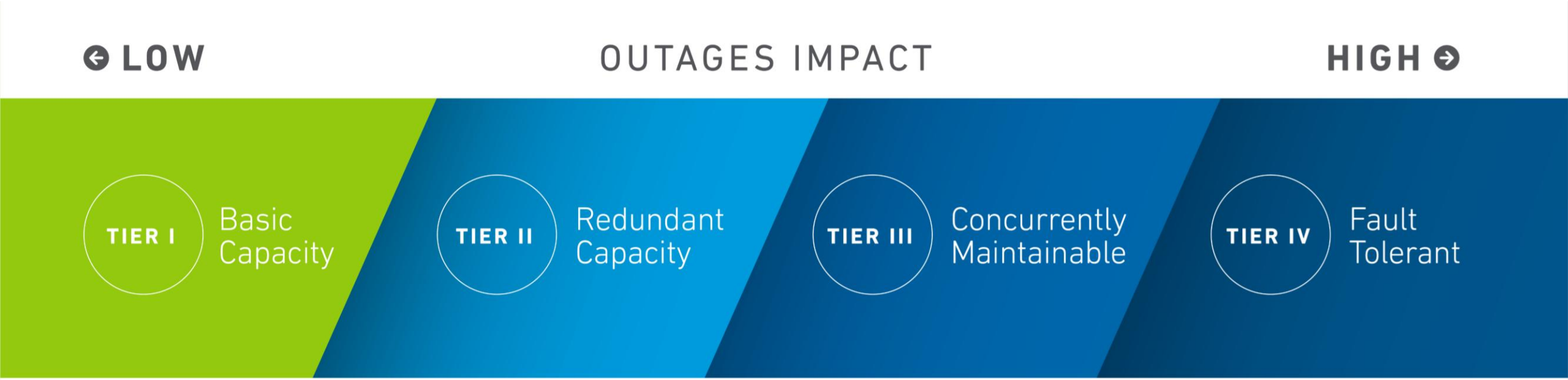
The Tier Classification System

The Tier Standard is the foundation of Risk Management and Resilience



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Data Centers in uncharted waters

Growth, innovation, uncertainty

AMPS conference, April 2026 London

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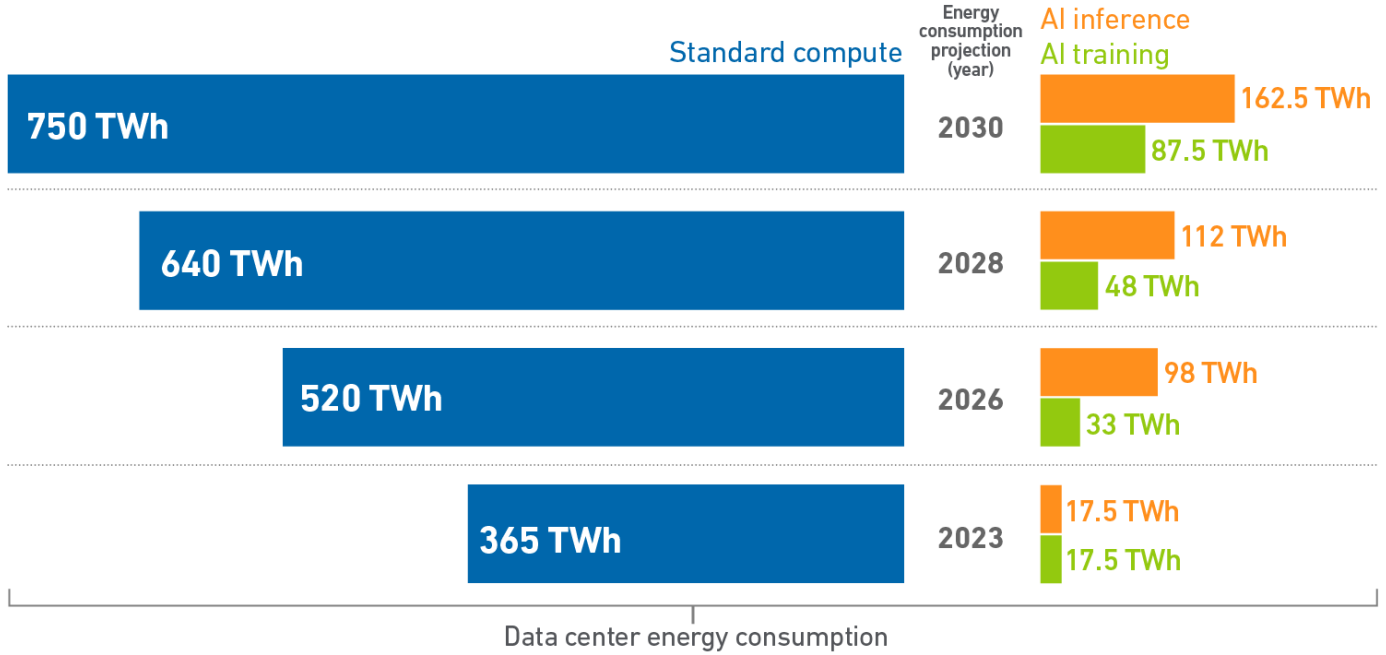
The data center industry is growing *very* fast – too fast?

- Construction of AI data centers has doubled the industry's capacity growth rate.
- Power generation and equipment manufacturing are struggling to keep up.
- Extremely large data centers are competing with utilities for limited equipment supply – making grid upgrades even more costly and drawn out.



DELOITTE INSIGHTS, ELECTRIC POWER RESEARCH INSTITUTE, GOLDMAN SACHS, MOODY RATINGS, LAWRENCE BERKELEY NATIONAL LABORATORY, SCHNEIDER, INTERNATIONAL ENERGY AGENCY, S&P GLOBAL

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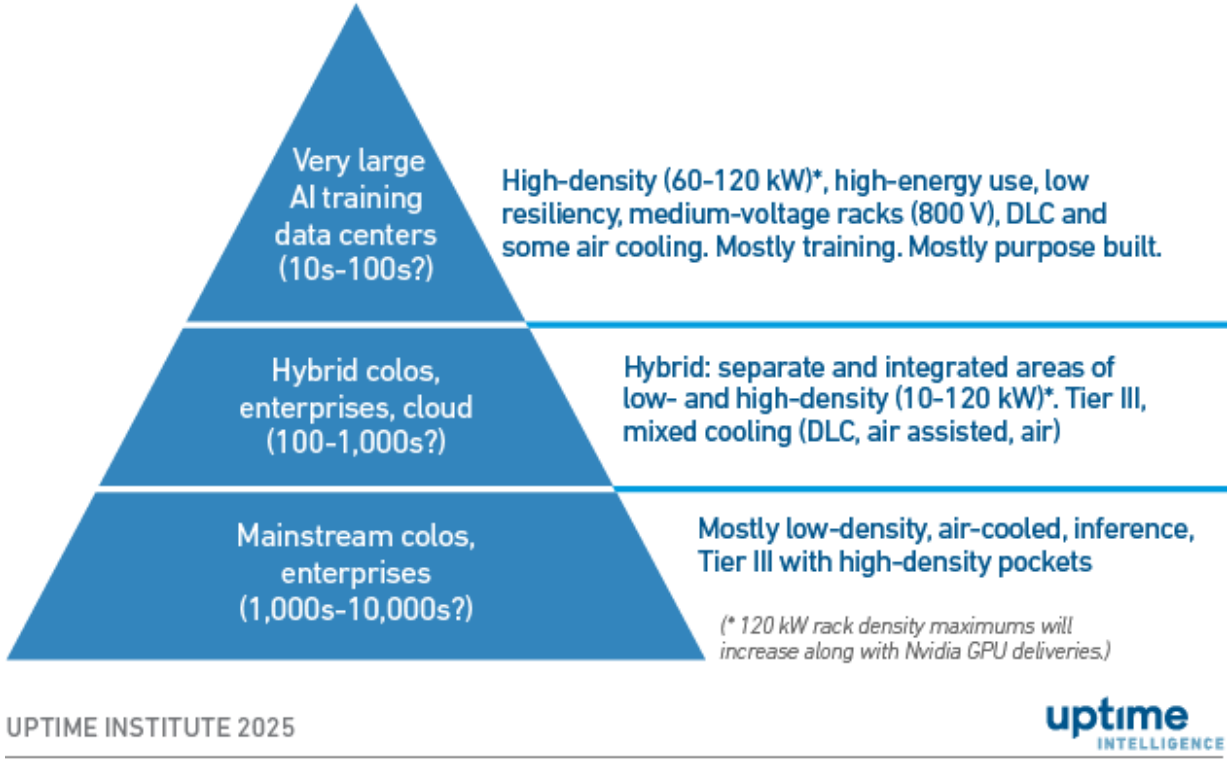
Giants, Supergiants and the rest: The AI ecosystem takes shape

- Most enterprises and IT service providers will limit investment to inference and only some will perform training .
- Most will rely heavily on cloud platforms and pre-trained models.
- Enterprise inference workloads are relatively lightweight, even very large use cases need only a few GPU-servers.



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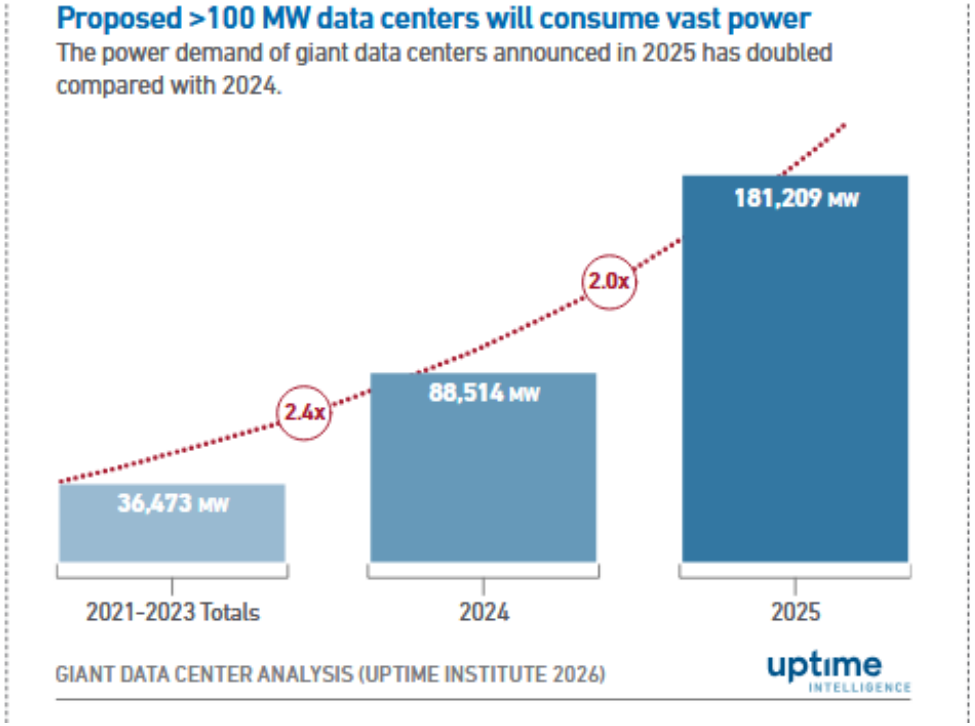
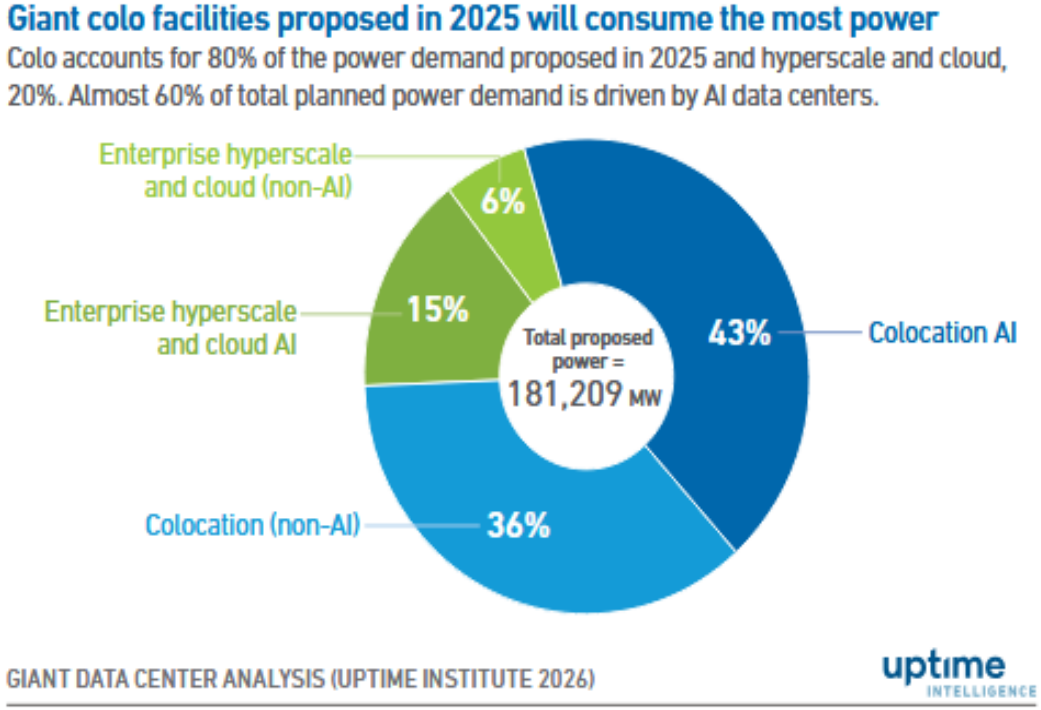
The supergiant AI build out continues





- Uptime data shows that demand from big new data centers will continue for many years, prolonging power shortages and leading to ever more creative, ambitious solutions.
- Biggest data centers are getting bigger…but fewer

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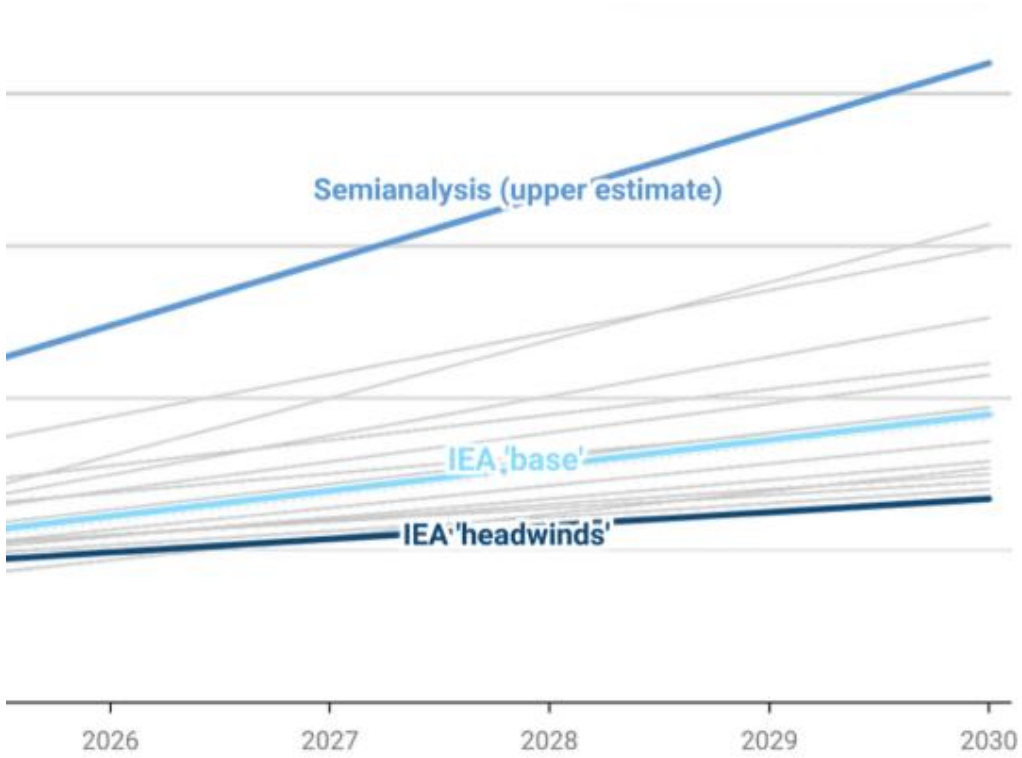
Data Center developers: Three big power problems



1. There is insufficient grid power. More is needed – and power suppliers require more interaction/guarantees.
2. High density above 200KW/rack will require higher voltage, DC, major equipment changes.
3. Resiliency is expensive and ever more difficult. Larger DCs will require huge amounts of battery, generators.

Secure, cost-effective (sustainable) Power is the industry's biggest problem

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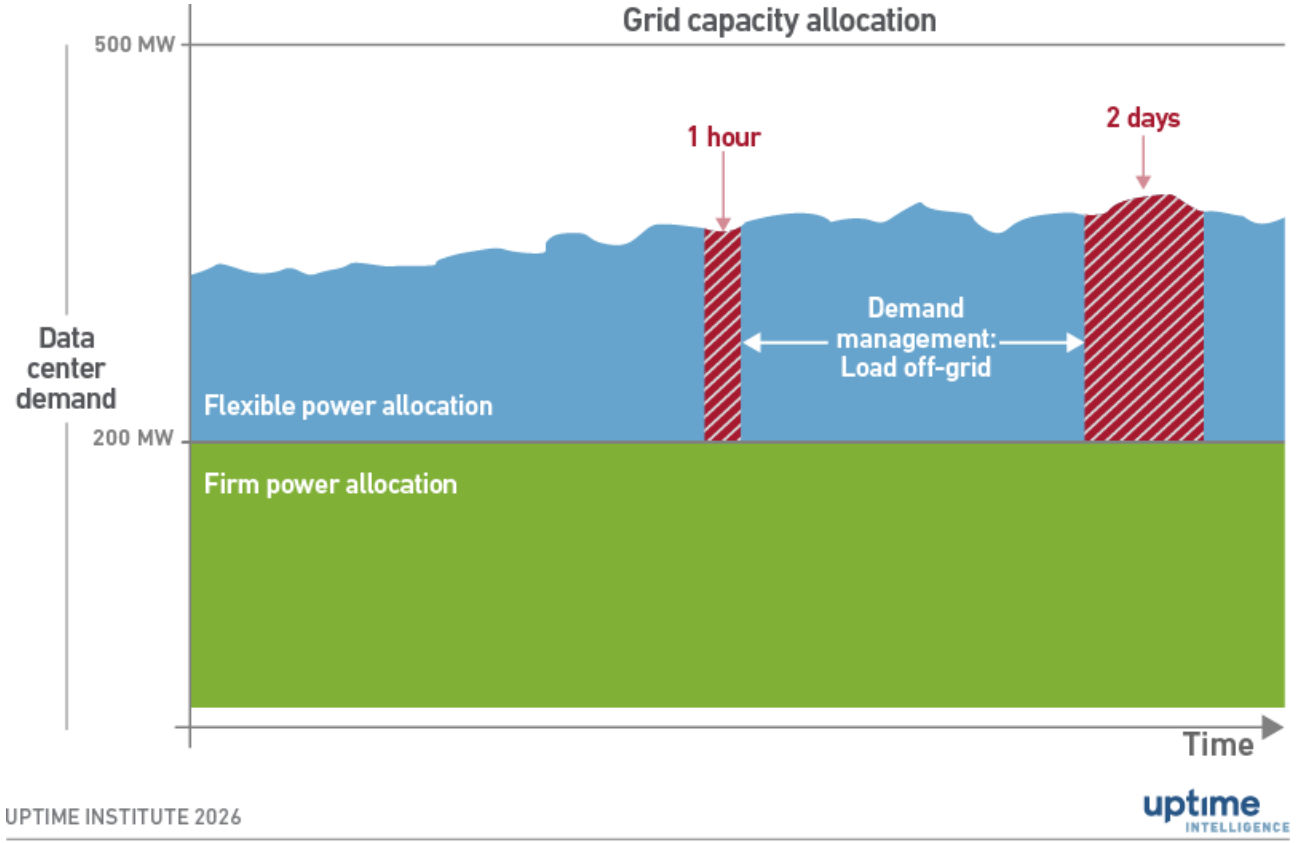
Data centers search for more power….

- Dedicated, captive generation: Bring Your Own Power
- Direct grid-power contract: new or existing
- Demand management agreements
  - Grid-capable ‘standby’ generation
  - Grid-scale battery storage
  - Demand reduction – workload shift
  - External demand management pools



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Dedicated DC Power Generation: Challenges

- Some grid regulations do not support “Bring your own power” (BYOP)
- DC: 10–20-year life, power generation 30–50-year life
- The generation ramp must match IT power fluctuations
- Securing sufficient fuel supply and siting storage capacity
- Management of reliability and maintenance windows for a large generator fleet
- Excess generation cannot be sold into the energy grid
- Permitting, local opposition, environment footprint
- Resiliency requirements require significant unused capacity

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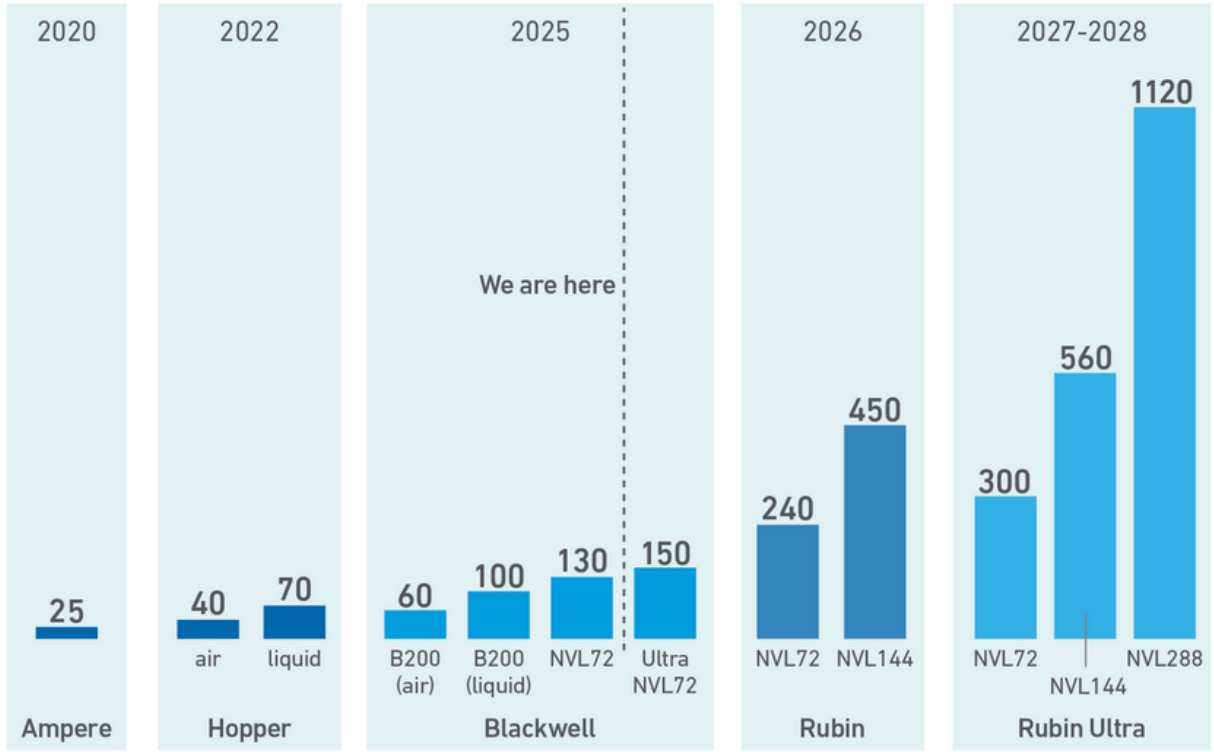
Stratospheric AI rack density disrupts designs, roadmaps, economics

- Industry average until 2024:
  - 6-8 KW a rack, rising from 4 over 10 years.
- CPUs developments push rack density towards 20KW a rack
- GPUs currently require 30-60KW and up.
- Nvidia roadmaps project 500KW to 1120 KW to a (redesigned) rack
- Higher densities require liquid cooling and higher voltages (800V) DC.

Figure 1 Estimates of high-density rack configurations across Nvidia GPU generations (unofficial estimates)



(Note: Names Ampere, Hopper, Blackwell and Rubin are Nvidia development codenames refer to generations of GPUs, not a specific product. The numbers in the NVL rack-scale system designations are kept consistent across generations to signify the number of GPU modules in the rack, deviating from Nvidia's official nomenclature.)

UPTIME INSTITUTE 2025 (VARIOUS INDUSTRY SOURCES)

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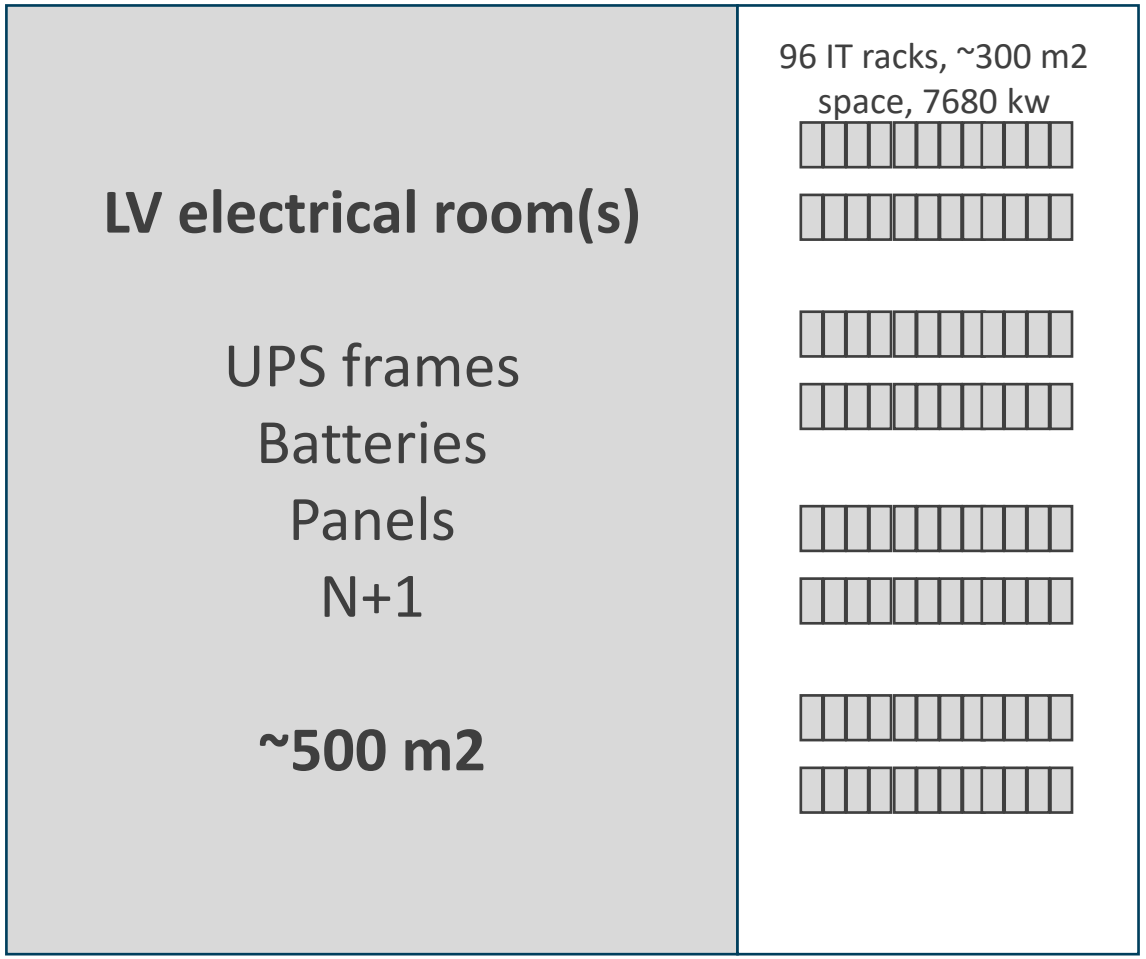
The real-estate flip: From 70% IT to 70% electrical

A large UPS system for every aisle of AI compute racks today, for every row tomorrow. Plus redundancy for concurrent maintainability.

Are data centers becoming large electrical plants?

A shift to medium voltage will be needed, creating a host of new challenges from equipment supply to skilled trade cost and availability for installation and maintenance.



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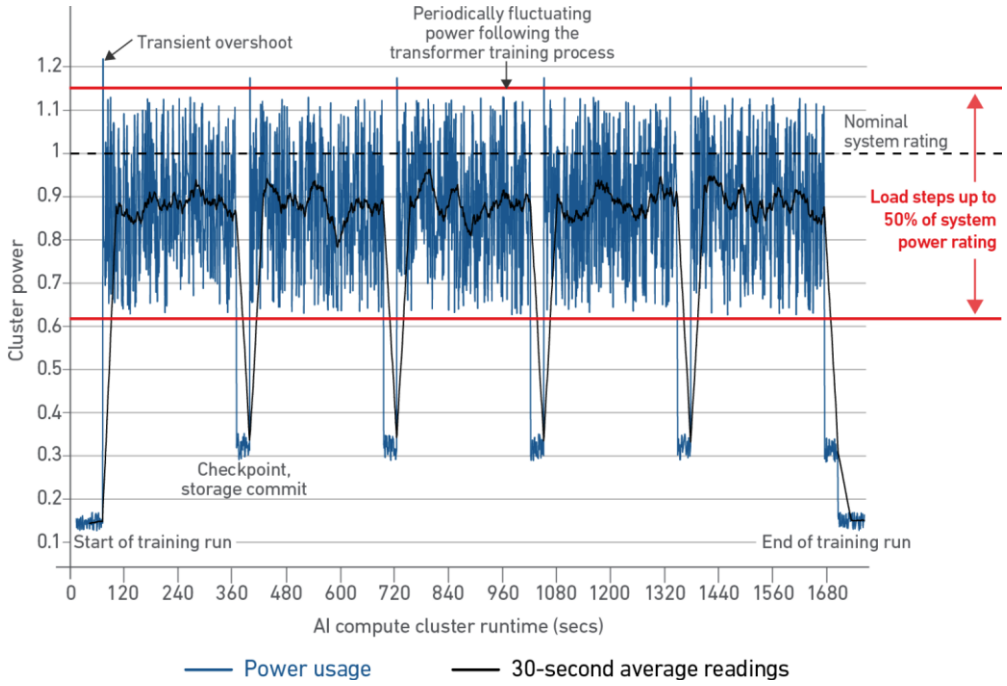
AI training power swings: No single solution

- Load diversity dilutes the effect.
- Nvidia *partial* solutions include:
  - Software fixes (performance affected)
  - GPU hardware fix (wastes power/may affect performance)
  - Energy in the racks
- Other existing or proposed mitigations include:
  - Capacitors, batteries upstream of UPS, flywheels
  - Software and policies
  - Power capping
  - Large batteries (BESS)



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Large loads and the Grid

- Data center operators acting in the same way destabilises grids.
- Transmission service operators introducing connectivity rules.
- TSOs/regulators in over 10 countries/regions planning new rules.
- Operators should expect policies, upgrades, rules governing grid/off grid switchover

such. #EnergyPolicy #ElectricGrid #AIInfrastructure #DataCenters #IndustrialPolicy

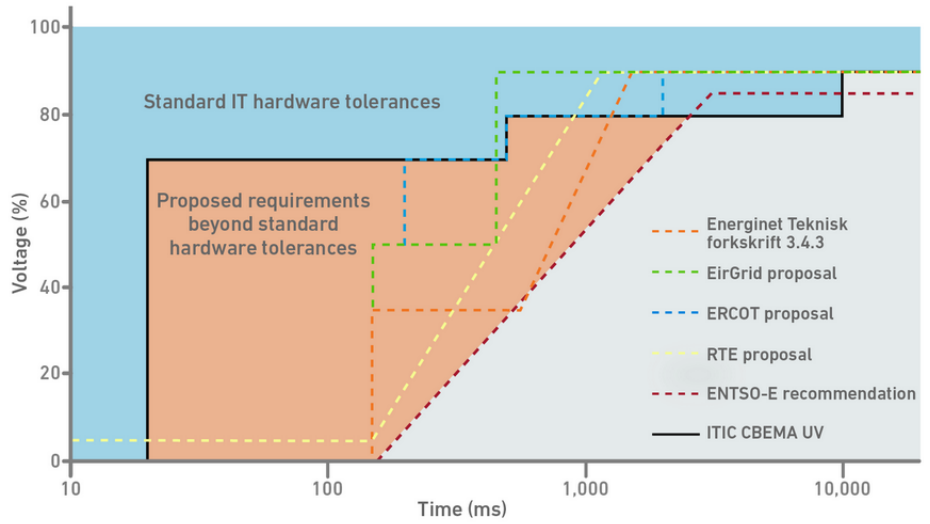
A New Threat to Power Grids: Data Centers Unplugging at Once

Dozens of data centers abruptly dropped off the power grid in recent Virginia incidents, forcing operators to take emergency action

THE WALL STREET JOURNAL.

is sometimes referred to by the name of ITIC's predecessor, CBEMA.

Figure 1 Proposed fault ride through requirements (source: Eaton)



SOURCE: EATON

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Algunos consejos.

1. El crecimiento se mantendrá, pero la escasez, los problemas logísticos, la volatilidad financiera y las dificultades de planificación se han subestimado enormemente.
2. El nivel de cambio e innovación no tiene precedentes. Los operadores adoptarán y adaptarán diferentes velocidades..
3. Todos los centros de datos eventualmente aumentarán su densidad y consumo de energía a medida que se generalicen las potentes GPU, CPU y la inferencia.
4. Estamos en el tercer año de una enorme revolución a largo plazo. Cabe esperar oleadas de cambios.

Visit www.uptimeinstitute.com for more information.

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