Data Centers 101: Why We Need Them, and What China Is Doing

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What a data center is

A data center is a building full of computers that store data and run programs for everyone else. When you stream a video, send an email or ask an AI a question, the work happens in one of these buildings, not on your phone.

Every data center has four core parts:

- **Servers**: racks of computers that do the processing. AI data centers pack in specialized chips (GPUs) that run hot and draw far more power per rack.
- **Power**: a utility grid connection, backup batteries and diesel or gas generators so the lights never go out.
- **Cooling**: air conditioning, chilled water or liquid piped directly to chips. Cooling can use nearly as much energy as the computers themselves.
- **Network**: fiber-optic lines that connect the building to the internet and to other data centers.

Size is measured in **power**, not floor space. A typical enterprise data center draws 5 to 20 megawatts (MW). New AI campuses are planned at 1 gigawatt (GW) or more, roughly the output of a nuclear reactor or enough for about 750,000 homes.

Why we need them

Nearly everything digital runs through a data center, and AI is multiplying the demand. Worldwide, data centers used about 415 terawatt-hours (TWh) of electricity in 2024, roughly 1.5% of all power. The International Energy Agency projects that will more than double, to about 945 TWh, by 2030 (S&P Global on IEA).

What they make possible:

- **Everyday services**: email, banking, streaming, maps, online shopping and social media.
- **The cloud**: businesses, hospitals and governments rent computing instead of running their own server rooms.

- **Artificial intelligence**: training a large AI model takes thousands of chips running for months; answering millions of questions a day takes thousands more.
- **National security and research**: weather forecasting, defense systems, drug discovery and scientific simulation.

Whoever has the most computing capacity can build and run the most capable AI. That is why data centers are now treated as strategic infrastructure, like ports or power plants.

The costs and constraints

The hard limit on data centers today is electricity, not money or land. A single AI campus can need as much power as a mid-sized city, and new power plants and transmission lines take years to permit and build.

- **Electricity**: big users compete with homes and factories for grid capacity, which can push up local rates.
- **Water**: many sites cool with evaporating water, a concern in dry regions.
- **Land and zoning**: campuses cover hundreds of acres and often face local opposition over noise, traffic and tax breaks.
- **Chips**: the most advanced AI chips are scarce, expensive and subject to export controls.
- **Jobs**: construction employs thousands, but a finished data center runs with relatively few permanent staff.

What the U.S. is doing

The U.S. leads the world in data centers and AI chips, and its buildout is driven mainly by private companies. U.S. data centers used about 176 TWh in 2023, 4.4% of the nation's electricity, up from 58 TWh in 2014. The Department of Energy projects 6.7% to 12% by 2028 (DOE).

- **Who builds**: Amazon, Microsoft, Google, Meta, Oracle and OpenAI each spend tens of billions of dollars a year, competing with each other.
- **Where**: Northern Virginia is the world's largest hub; Texas, Georgia, Arizona, Ohio and the Midwest are growing fast because of cheaper land and power.
- **Chips**: U.S. firms, led by Nvidia, design the most advanced AI chips, and Washington limits what can be sold to China.

- **Power strategy**: companies are signing deals for natural gas plants, restarting or extending nuclear plants, and backing new small reactors, because the grid cannot add capacity fast enough.
- **Main bottleneck**: grid connections and permitting. Some projects wait years for a utility hookup.

What China is doing

China is building data centers through state planning: cheap power, government money and an order to use Chinese-made chips. Rystad Energy counts 32 gigawatts (GW) of capacity at the end of 2025, about 40 GW by end of 2026, and over 60 GW by 2030 (Rystad Energy).

- **East Data, West Computing**: launched in 2022, this national plan set up eight computing hubs. Data is generated in crowded eastern cities but processed in the west, in places like Inner Mongolia, Guizhou and Gansu, where land and power are cheap. Ulanqab in Inner Mongolia alone has about 10 GW of projects from 21Vianet, Huawei and ByteDance.
- **Power advantage**: China's grid is far larger and adds new generation faster, so data centers are a small slice of demand, about 1.2% in 2025 and a projected 2.3% by 2030 (Rystad).
- **Government money**: AI data center projects drew more than $100 billion in state funding from 2021 to late 2025, according to a Reuters review of tenders (The Standard/Reuters).
- **Home-grown chips**: with U.S. export controls cutting off Nvidia's top chips, Beijing reportedly told state-funded projects in November 2025 to use only domestic chips. Some provinces reportedly offered power discounts of up to 50% to sites that run Chinese chips from Huawei or Cambricon (TechRadar).
- **The trade-off**: Chinese chips still trail Nvidia's in speed and power efficiency. China makes up the difference by using more chips and more cheap electricity.

Chip export rules have shifted several times since late 2025, so check current news for the latest status.

U.S. vs. China at a glance

	United States	China
Who drives it	Private companies competing	Central government plan, carried out by state and private firms
Share of national electricity	4.4% (2023), heading to 6.7–12% by 2028	1.2% (2025), heading to about 2.3% by 2030
Biggest constraint	Grid hookups and permitting	Chip quality and supply
Chips	World's most advanced (Nvidia and others)	Domestic chips (Huawei, Cambricon), less efficient
Power strategy	Gas, nuclear restarts, new reactors, company by company	Build data centers where power is cheap; subsidize the electricity
Siting	Near users and existing hubs (e.g., Northern Virginia)	Moved deliberately to the western interior

The bottom line

The U.S. has the better chips but struggles to get them powered. China has abundant power but has to rely on weaker chips. Which country can fix its weakness faster will shape who leads in AI.

Sources

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- S&P Global: Global data center power demand to double by 2030 (IEA) (Apr. 2025)
- Rystad Energy: China's data center capacity set to top 60 GW by 2030 (2026)
- The Standard / Reuters: China bans foreign AI chips from state-funded data centres (Nov. 2025)
- TechRadar: China offers half-price data center energy for domestic chips (Nov. 2025)