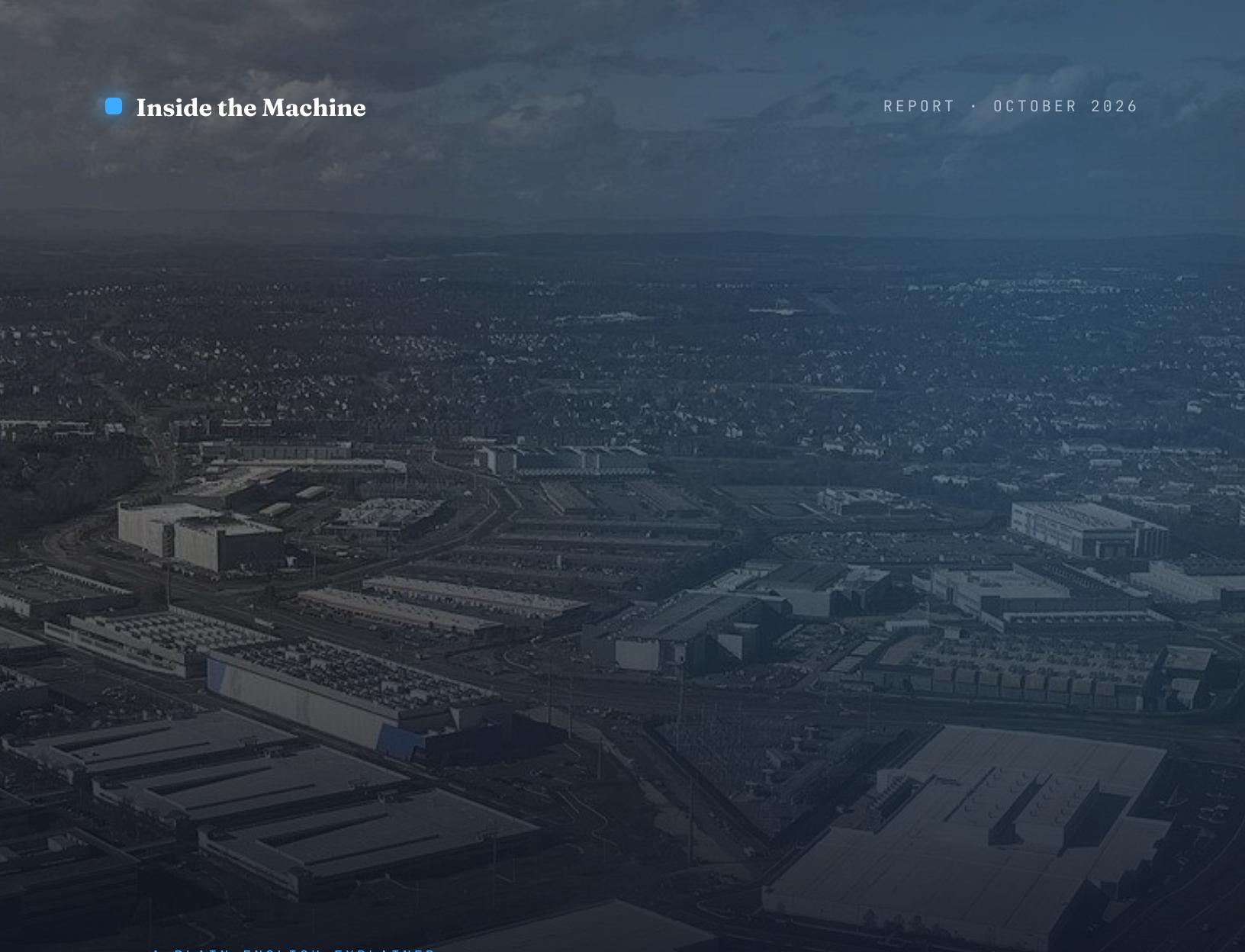

A PLAIN-ENGLISH EXPLAINER

AI data centers, without the hype or the panic.

Power, water, money and the evidence. Numbers first, then context, with the strongest case on each side and a source for every major figure.

Both sides, steelmanned | **40** annotated sources | **12** viral claims checked | Key numbers re-checked **Oct 15, 2026**

Cover: data centers in Ashburn, Virginia · Theodore Christopher, CC0 (Wikimedia Commons)

Companion to the “Inside the Machine” web explainer

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HOW TO READ THIS REPORT

`✓ re-checked` We re-read this figure in the original source or an official summary on Oct 15, 2026.

`from brief` From our research notes and cited, but we did not re-open the source.

`calc` Our own arithmetic from cited inputs. Treat it as an estimate.

`contested` Credible sources disagree, or the figure leans heavily on assumptions.

`[7]` Bracketed numbers point to the numbered Sources appendix.

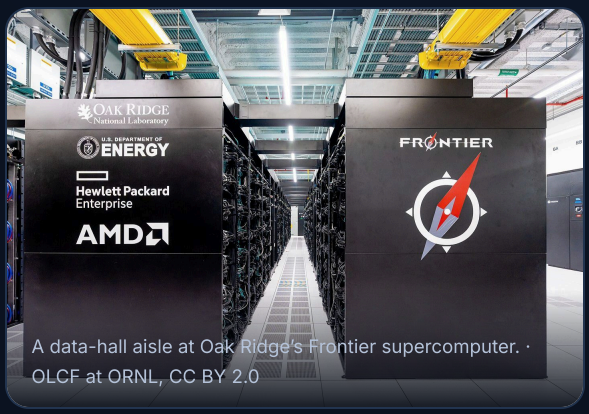
Often cited by supporters · Often cited by skeptics

VERDICT BADGES

VERIFIED The claim holds up as stated.

MISLEADING Contains a kernel of truth but leaves the wrong impression.

CONTEXT-DEPENDENT True in some places, framings or boundaries; false in others.



A data-hall aisle at Oak Ridge's Frontier supercomputer. · OLCF at ORNL, CC BY 2.0

WHY THIS MATTERS NOW

Small nationally. Huge locally.

AI data centers are being proposed in farm fields, office parks and river towns across the country. Each raises the same questions: How much power? How much water? Who pays, and who benefits?

Worldwide, data centers use about **1.5% of electricity** [1]. In the United States the share is **4.4%** and could reach **6.7–12% by 2028** [2, 3]. The national share is modest, but the buildings are packed into a handful of regions, and one AI campus can need as much power as a mid-sized city.

That is why the debate feels so different depending on where you stand. Nationally, alarm about the grid or water supply is often overstated. In a single county, the effects on electricity bills, water systems, tax revenue, noise and land can be large, and they can cut *either way* depending on how the deal is written.

Six numbers to start with

CONTEXT

415 TWh

Electricity used by the world's data centers in 2024 — about 1.5% of all electricity. [1]

Data centers are poorly metered; this is a modeled estimate. Growth has been ~12% a year since 2017. ✓ re-checked

CONTEXT

4.4 %

Share of US electricity used by data centers in 2023 (176 TWh), up from 1.9% in 2018. [2, 3]

LBNL's 2028 range is 6.7%–12% depending on how many AI servers ship and how hard they run. ✓ re-checked

OFTEN CITED BY SKEPTICS

~½

Share of all US electricity-demand growth to 2030 that the IEA expects to come from data centers. [1]

Globally, data centers are only ~one-tenth of demand growth — less than air conditioning, EVs or industrial motors. The US is the outlier. ✓ re-checked

OFTEN CITED BY SUPPORTERS

$875 M

Data-center tax revenue collected by Loudoun County, Virginia, in fiscal year 2024. [10, 11]

Atypical. Virginia taxes the computer equipment inside, and Loudoun is the densest market on Earth. Where taxes are abated, revenue can be far smaller. ✓ re-checked

OFTEN CITED BY SKEPTICS

30–50 jobs

Typical permanent staff at a finished data center; large campuses reach ~200. [13, 15]

Construction can employ hundreds to thousands, but usually phase by phase. From the research brief; not re-checked by us. from brief

OFTEN CITED BY SUPPORTERS

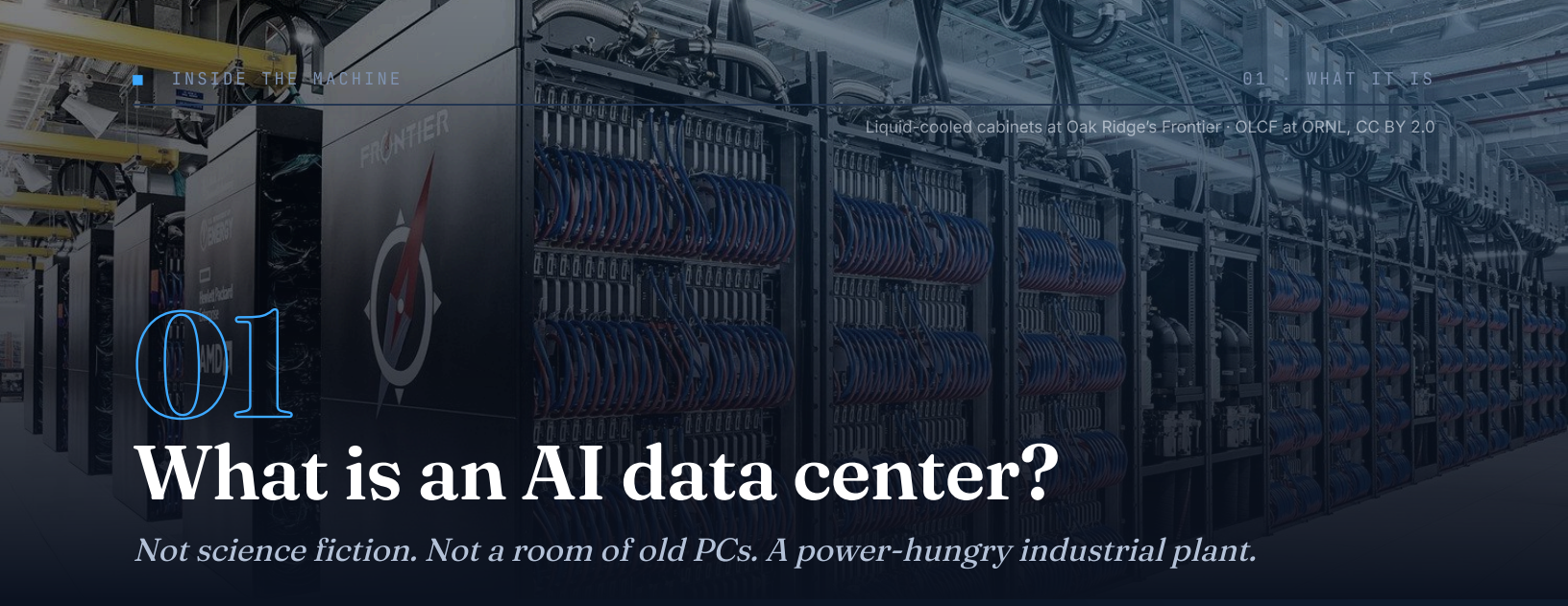
1.4 %

Vacancy in North America's eight primary data-center markets at end of 2025 — a record low. [27]

Covers primary markets only. Full buildings today say nothing certain about demand in 2030. ✓ re-checked

A NOTE ON UNCERTAINTY

Data centers are poorly metered, and most big numbers in this debate are modeled estimates or scenarios. Forecasts for 2028–2035 vary by a factor of two or more. We say where a figure is our arithmetic, where it is contested, and where we did not re-open the original source.



Liquid-cooled cabinets at Oak Ridge's Frontier · OLCF at ORNL, CC BY 2.0

01

What is an AI data center?

Not science fiction. Not a room of old PCs. A power-hungry industrial plant.

THE SHORT ANSWER

An AI data center is a large, specialized building full of fridge-sized cabinets ("racks") packed with GPUs. The newest AI racks each draw about **132 kW**, roughly 10–25 times a traditional server rack [19]. They run so hot that they need liquid cooling piped to the chips.

What's actually inside

Computers

Row after row of racks. In AI halls each server typically holds eight GPUs (NVIDIA, AMD, or custom chips like Google's TPU and Amazon's Trainium). NVIDIA's GB200 NVL72 links 72 GPUs in one rack so they behave like a single giant computer.

Networking

Thousands of GPUs must work in lock-step, which takes miles of fiber and copper and rooms of switches. Networking is a large share of the cost.

Electrical gear

On-site substations, large transformers, battery backup (UPS) and diesel or gas generators. The power equipment can take up more space than the computers.

Cooling

An NVL72 rack sends about 100 kW of heat into liquid through cold plates on the chips, and another 25+ kW into the air [19]. Outside, chillers, dry coolers or cooling towers reject that heat.

CONTEXT

132 kW

Rated power of one NVIDIA GB200 NVL72 AI rack (72 GPUs in a fridge-sized cabinet). [19]

A traditional rack draws roughly 5–15 kW. At ~1.2 kW for the average US home, 132 kW ≈ the average draw of ~107 homes calc. ✓ re-checked calc

CONTEXT

1.4 tonnes

Weight of a fully loaded NVL72 rack — more than a small car, on one floor tile. [19]

Floor loading is one reason older buildings can't simply be refilled with AI gear. ✓ re-checked

CONTEXT

~1 %

Share of data-center operators with any rack above 100 kW in Uptime's 2024 survey. [19]

Rising quickly as AI hardware ships. Most existing halls were built for far lower densities. ✓ re-checked

FIGURE 1 · HARDWARE

One cabinet, a street of houses



Figure 1. A traditional air-cooled rack vs. an NVIDIA GB200 NVL72 AI rack. Sources: Uptime Institute (2025) [19]; EIA (2024) [7]. Home equivalents are our arithmetic calc.

CHART · KILOWATTS

How much power, in one cabinet?



Average US home = 10,791 kWh/yr ÷ 8,760 h ≈ 1.23 kW (EIA 2022). Traditional rack shown at 10 kW, the midpoint of 5–15 kW. AI rack: NVL72 as rated [19, 7].

WEIGHT MATTERS TOO

A loaded NVL72 rack weighs about **1.4 metric tons**. Older halls designed for 10–14 kW racks often can't host AI hardware without being rebuilt, which is one reason so much is being built new [19, 12].

How AI differs from ordinary "cloud"

	WEB / ENTERPRISE HOSTING	AI TRAINING & INFERENCE
Work	Millions of small, independent jobs: serve a page, stream a video	One enormous synchronized job (training), or high-volume model answers (inference)
Chips	Mostly CPUs	Mostly GPUs and custom accelerators
Rack power	~5–15 kW	~40–132 kW
Cooling	Air	Liquid to the chip, plus air
Cost & life	Commodity servers	Millions of dollars per rack, replaced every ~3–5 years



From the road: blank walls and rooftop cooling, Ashburn, VA. · Vahurzpu, CC BY-SA 4.0

SCI-FI OR FACTORY?

The IEA compares an AI data center's electricity draw to that of an **aluminium smelter** [1]. The machines run software that companies choose to run, and they depend on power contracts, permits, water and constant maintenance. The serious concerns are about scale and money, not machines taking over.

02
Why build them?

A capital-spending race, driven mostly by businesses, not chatbots alone.

THE SHORT ANSWER

Generative AI is the main driver. The four largest cloud companies plan roughly **$630–700 billion** of capital spending in 2026, mostly AI-related [33] from brief. The buildings are bought and run almost entirely by companies: cloud giants, AI labs and enterprises. Consumer apps are one use among many.

JOB TYPE 1

Training: teaching the model

Frontier models are trained on clusters of 100,000+ GPUs running for weeks or months as one synchronized job. This favors very large, very dense campuses with cheap power, and they can sit far from cities.

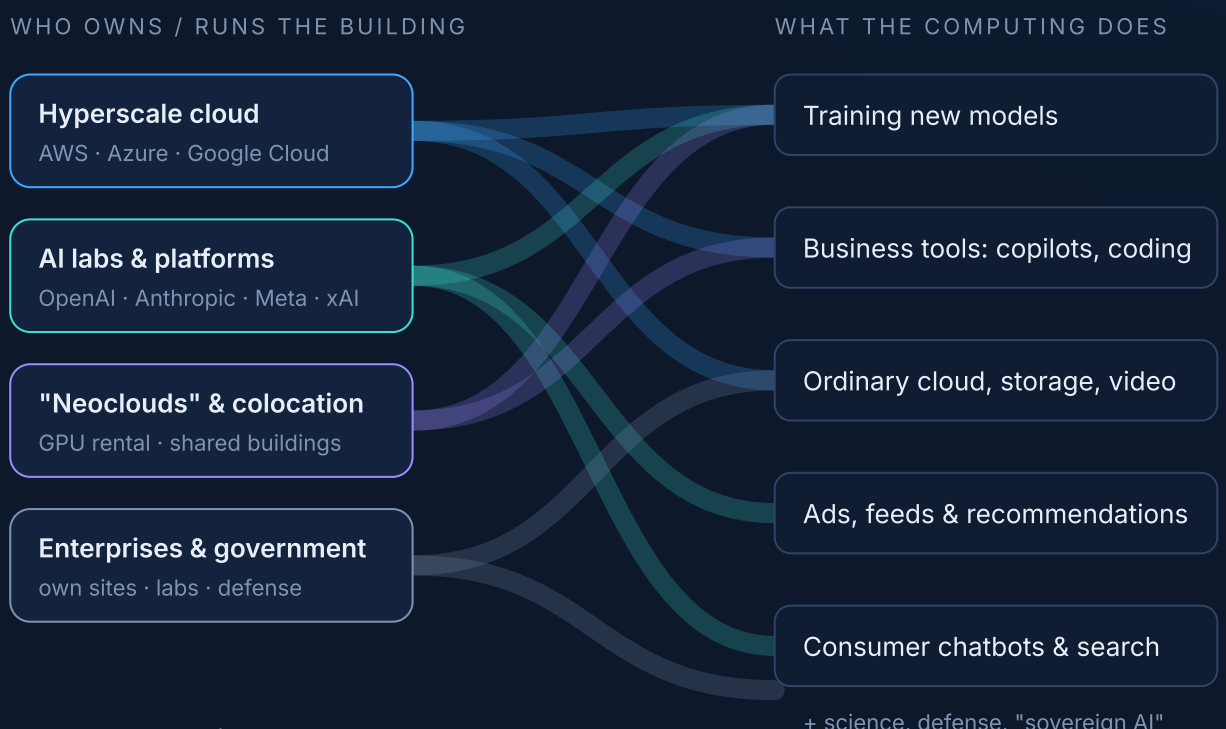
JOB TYPE 2

Inference: using the model

Every chatbot answer, code suggestion, ad ranking or search summary is inference. Deloitte forecasts inference will be about two-thirds of generative-AI computing in 2026, up from about half in 2025 [30]. Inference benefits from sitting closer to users, one reason sites are spreading to new metros [27].

FIGURE 2 · DEMAND

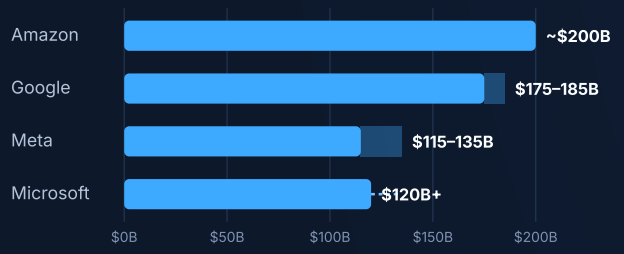
Who owns the buildings, and what the computing does



ILLUSTRATIVE: line widths are not proportional; no public consumer-vs-business split exists.

CHART · 2026 CAPEX

Who is paying for all this?



Planned 2026 capital spending, $ billions; lighter bar ends show guidance ranges. Source: CNBC (Feb 2026), from company guidance [33] from brief.

CONTEXT

$630–700 B

Planned 2026 capital spending by Amazon, Google, Meta and Microsoft combined, mostly AI-related. [33]

Company guidance, not audited spend. Gartner warns the pace may be unsustainable. Not re-checked by us. from brief

CONTEXT

~⅔

Share of generative-AI computing expected to be 'inference' (answering requests) in 2026, versus ~½ in 2025. [30]

Consultancy forecast. No public dataset splits compute by consumer vs. business use. from brief contested

About three-quarters of that spending is AI-related, and it is not all buildings: chips are a large share. The IEA notes an AI data center is **10 times more capital-intensive** than an aluminium smelter [1]. That is one reason operators resist turning servers off to help the grid when power is tight.

Is it a bubble?

DEMAND IS REAL TODAY

1.4%

Vacancy across North America's eight primary data-center markets at the end of 2025, a record low, even as supply grew 36% [27] ✓ re-checked. In mid-2025 about three-quarters of capacity under construction was already preleased [28].

and

FORECASTS MAY BE INFLATED

"Unsustainable"

Gartner warns the spending pace looks unsustainable, with write-down risk [38], and utility queues contain speculative "phantom" requests. If demand falls short, the risk is stranded power plants and transmission lines that ratepayers end up paying for.

BOTTOM LINE

Two things are true at once. The buildings are full now, and the 2030 forecasts could still be too high. Ask who carries the risk if they are: the company, or local ratepayers.

Ashburn, VA · Theodore Christopher, CC0

03 Electricity

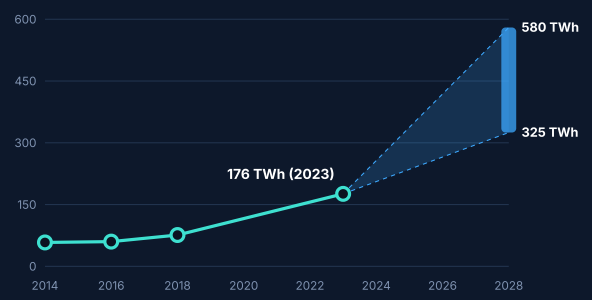
The national share is small, the local load is enormous, and the bill depends on the rules.

THE SHORT ANSWER

US data centers used **176 TWh in 2023**, or 4.4% of the country's electricity. Government researchers expect **6.7–12% by 2028** [2, 3]. Globally the figure is 415 TWh, about 1.5% [1]. Whether that raises your bill depends on whether your grid has spare capacity and who pays for upgrades.

CHART · TWH

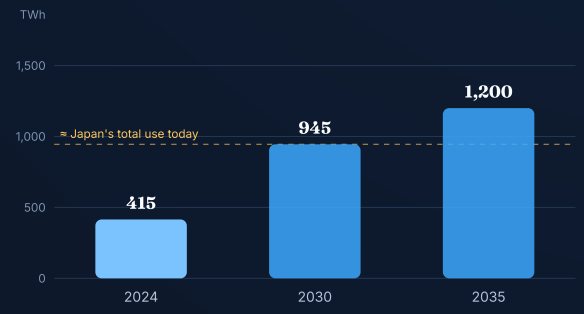
US data-center electricity, 2014–2028



LBNL for DOE (2024): 58 TWh (2014), ~60 (2016), 76 / 1.9% (2018), 176 / 4.4% (2023). Shaded band = 2028 scenario range (325–580 TWh; 6.7–12%) [2, 3] ✓ re-checked

CHART · TWH

Global: IEA projections



IEA *Energy and AI* (2025): 415 TWh (2024), ~945 TWh (2030, slightly more than Japan uses today), ~1,200 TWh (2035). Across scenarios, 2035 ranges 700–1,700 TWh [1] ✓ re-checked contested

FIGURE 3 · SCALE

From one house to a “city-sized” campus



Figure 3. Each gridline is 10× more than the last (log scale). Typical-AI-site and largest-site figures come from the IEA’s household comparisons [1]; MW and home conversions are ours calc.

CALCULATOR · AT 85% AVERAGE LOAD

How many homes is a proposed data center?



Homes = MW × 1,000 × 8,760 h × 85% load ÷ 10,791 kWh (EIA 2022 average) [7] calc. Compares annual energy, not peak demand. Towns also power shops, schools and industry, so “homes” is not the same as “a city.”

CONTEXT

100,000 homes

Electricity of a typical AI-focused data center, per IEA. The largest under construction will use 20 times as much. [1]

Household comparisons ignore that towns also power shops, schools and factories. ✓ re-checked

OFTEN CITED BY SKEPTICS

945 TWh

IEA base-case data-center electricity in 2030 — slightly more than all of Japan uses today. [1]

Scenario, not a prediction. By 2035, IEA's cases range from 700 to 1,700 TWh. ✓ re-checked contested

03 · ELECTRICITY, CONTINUED

Where does the power come from?

Both of these are true: tech companies are buying record amounts of clean power, and natural gas is a leading source of the new supply being built for them.

THE CLEAN-ENERGY CASE

≈ half

of global growth in data-center demand is met by renewables in the IEA base case, with renewable output for data centers growing by 450+ TWh to 2035 [1]. Tech companies are major buyers of new wind, solar, geothermal and nuclear, including reactor restarts and small modular reactor deals.

and

THE FOSSIL-FUEL REALITY

+175 TWh

of added natural-gas generation for data centers by 2035, "notably in the United States" [1]. Meta's Hyperion is planned around ~7.5 GW of new gas [34]; xAI ran unpermitted turbines in Memphis before receiving permits for 15 [36, 22]. Google's emissions are up 51% since 2019 [39].

OFTEN CITED BY SKEPTICS

+51 %

Rise in Google's 'ambition-based' carbon emissions since 2019, as AI demand grew. [39, 23]

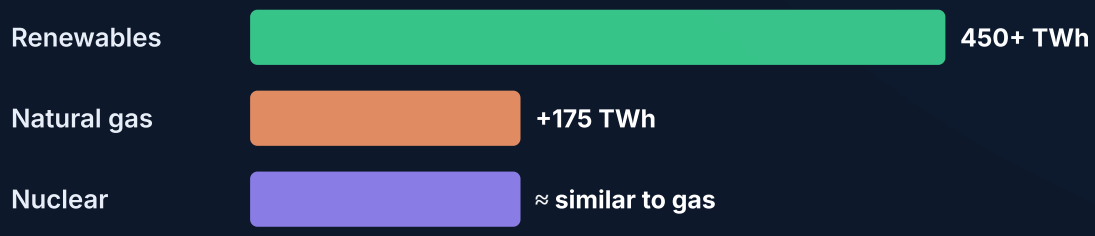
Google's data-center energy emissions fell 12% in 2024 thanks to clean-power deals; market-based accounting. ✓ re-checked

WATCH THE WORD "RENEWABLE"

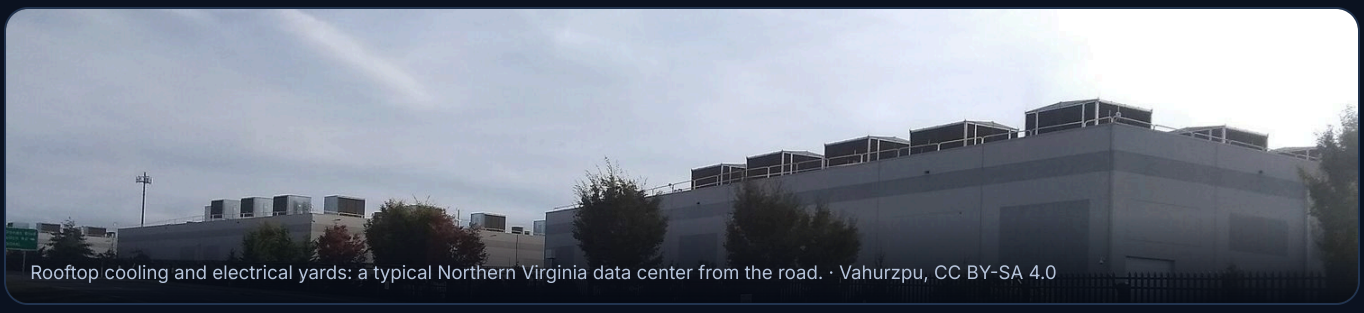
Corporate "100% renewable" claims usually rest on annual contracts (PPAs) and certificates, not hour-by-hour clean supply at the site. Efficiency, measured as PUE (total facility power ÷ computer power), has improved a lot: big operators report about 1.1, versus an industry average near 1.5. But PUE only measures overhead. It says nothing about whether the computing itself is worth the power.

CHART · IEA BASE CASE

Added electricity for data centers to 2035, by source



IEA *Energy and AI* (2025) base case [1] ✓ re-checked. Nuclear is described as adding "a similar amount" to gas; drawn equal for illustration. Global figures; the US leans more on gas.



Rooftop cooling and electrical yards: a typical Northern Virginia data center from the road. · Vahurzpu, CC BY-SA 4.0

03 · ELECTRICITY, CONTINUED

Will it raise my electric bill?

It already has in one large grid. Across states, faster growth has often meant lower prices. Both findings are solid. The difference is whether there was spare capacity.

YES, IN THE PJM GRID

$7.3B

The official PJM market monitor attributes $7.3 billion (82%) of the 2026/27 capacity-auction increase to data-center load, and $16.6B of $30.8B across the last two auctions [8, 31] ✓ re-checked. A consumer-advocate study estimated the 2025/26 auction alone adds ~**$10/month** (+9%) to the average Washington, DC household bill, for the whole auction, not only data centers [16].

but

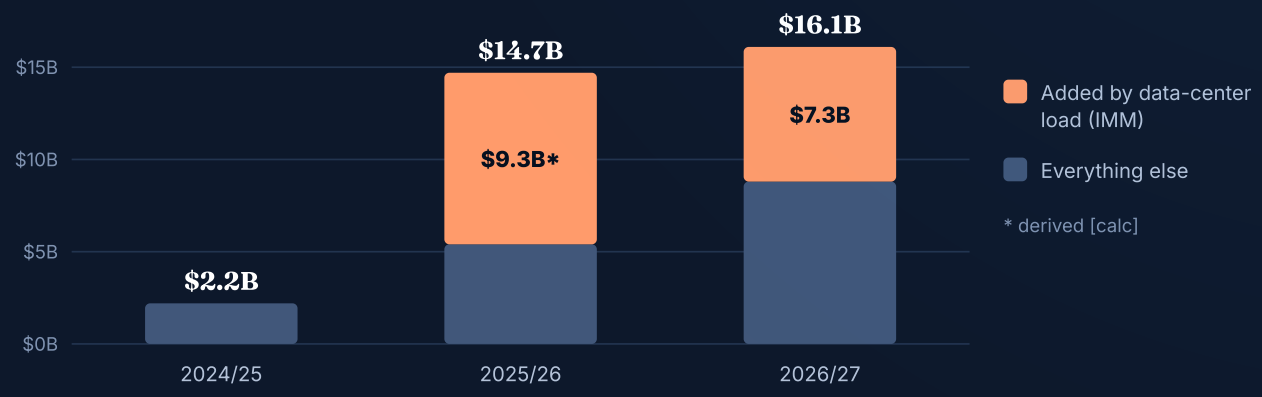
NO, ON AVERAGE, 2019–2024

−0.6¢

Berkeley Lab and Brattle found that a 10% rise in a state's electricity demand was associated with about 0.6¢/kWh *lower* average prices, because fixed grid costs were spread over more sales [5] ✓ re-checked. The authors caution this may not hold where capacity is tight.

CHART · PJM

PJM capacity auction costs: how much came from data-center load?



Totals: Synapse (2025) for 2024/25 ($2.2B) and 2025/26 ($14.7B); PJM/IMM for 2026/27 ($16.1B). Data-center portion: $7.3B in 2026/27 [8, 31]; the 2025/26 portion (~$9.3B) is our subtraction of $7.3B from the two-auction total of $16.6B calc. A price cap and floor applied to 2026/27. Auction revenue is not identical to what households pay [16].

THE POLICY LEVER

Large-load tariffs require big new customers to sign long minimum contracts, post collateral and pay for their own grid upgrades. They decide whether growth lowers or raises everyone else's rates. Pro-market voices such as AEI argue the deeper fix is faster, technology-neutral permitting and letting data centers bring their own power [17].

04 Water & land

Small national total, real local stakes. Most of the water is used at the power plant, not the data center.

THE SHORT ANSWER

US data centers consumed about **17 billion gallons** on site in 2023 [2, 6]. Power plants making their electricity consumed an estimated ~12× more contested. About **97%** of on-site water comes from public water systems, so the key question for a town is whether its utility has room on the hottest days [6].

FIGURE 4 · WATER

Two very different water footprints

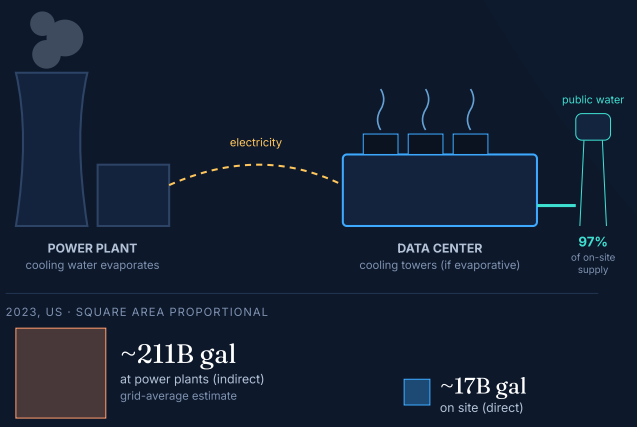


Figure 4. Arguments over "how much water AI uses" often disagree simply because one side counts the power plant and the other doesn't. Sources: LBNL (2024); CRS (2026) [2, 6]. Indirect figure contested: it ignores clean-power contracts.

CONTEXT

17 B gal

Water US data centers consumed on site in 2023, up from 5.6 billion gallons in 2014. [2, 6]

National total. A single site's impact depends on climate, cooling design and the local water system. ✓ re-checked

OFTEN CITED BY SKEPTICS

211 B gal

Estimated water consumed at power plants to generate data centers' electricity in 2023 — about 12× the on-site figure. [2]

Grid-average estimate that ignores companies' clean-power contracts. From the research brief; LBNL PDF blocks automated download, so not independently re-read. from brief contested

CONTEXT

2,600 households

Daily direct water use of a 100 MW US data center, per IEA (via CRS). [6]

Averaged across cooling types. An evaporative site in a hot climate can use far more; a closed-loop site far less. ✓ re-checked

CONTEXT

97 %

Share of US data-center on-site water supplied by public (municipal) water systems. [6]

So the real question is the capacity of your local utility, not the national total. ✓ re-checked

For scale, large evaporative sites can reach 1–5 million gallons a day at peak [40] from brief. A site's real impact depends on climate, cooling design and the capacity of the local water system on its hottest days.

04 · WATER & LAND, CONTINUED

Three ways to cool, three trade-offs

METHOD	WATER	ELECTRICITY
Evaporative towers	●●● Highest	● Lowest
Closed-loop liquid + dry coolers	● Near zero	●●● Higher on hot days
Outside-air "economizers"	● Low	● Low, cool climates only

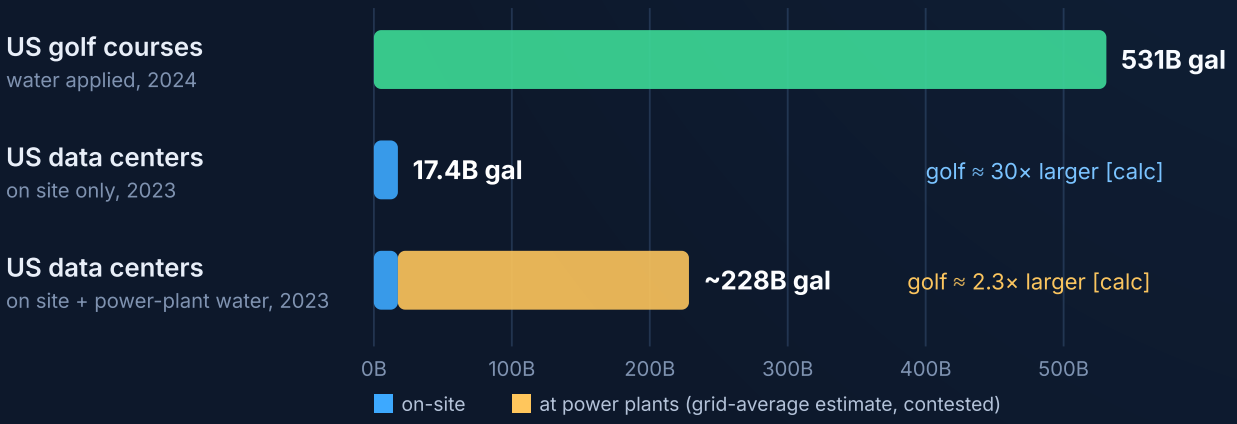
Saving water often costs electricity, and that electricity has its own power-plant water footprint [6]. Microsoft says its designs since August 2024 evaporate zero water for cooling, saving over 125 million liters per site per year, with pilots in 2026. That is a company claim, not yet verified at scale [25] from brief.

The golf-course comparison: watch the verdict change

CONTEXT-DEPENDENT

CHART · WATER

US golf vs. US data centers, billions of gallons per year



Golf: 1.63M acre-feet applied in 2024 × 325,851 gal ≈ 531B gal [29] ✓ re-checked. Data centers: 17.4B on site + ~211B indirect, 2023 [2]. Ratios are our arithmetic calc. A newsletter cross-check gets 24× and 1.9× with different inputs [21]. "Applied" irrigation water and "consumed" water are not identical measures. Golf water is falling (−31% since 2005); data-center water is rising.

Same gallon, different stakes

A gallon drawn from the Great Lakes is not the same as one drawn from the Colorado River system or a shrinking aquifer. A 2026 study counted **66 data centers** completed or under construction in Central Arizona, served by cities that rely heavily on Colorado River water [6]. In Utah, a proposed 40,000-acre "Stratos" project near the Great Salt Lake drew protests and a governor's executive order in May 2026 [37]. Construction can also send short, high-volume "slug" discharges to treatment plants [6].

Land: seen and unseen

Campuses range from a few acres to thousands; Meta's Hyperion is reported at ~2,250–2,800 acres [34]. In Loudoun County, data centers sit on **<3% of land** yet make up 75% of commercial assessed value ($42.4B) [10] ✓ re-checked. The bigger land impact is often transmission lines, with 100–180-foot easements across private property [12]. *Gap: no national dataset of data-center acreage exists.*

THE LOCAL WATER TEST

Because 97% of on-site water comes from public systems [6], the useful questions are local: **How many gallons per day at peak, in a heat wave?** Which source (river, aquifer, reclaimed wastewater)? Does the utility have headroom on its hottest days, and will the operator disclose actual use after it opens? A closed-loop design answers some of these, but shifts demand onto the grid.

05
Money & community

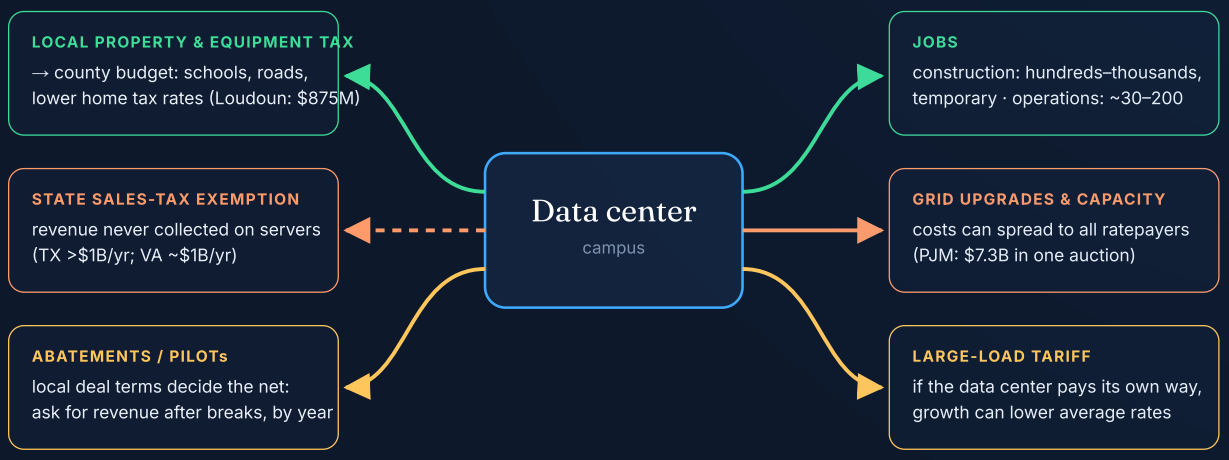
A tax windfall or a giveaway. The deal decides which.

THE SHORT ANSWER

Where the equipment is taxed, revenue can be huge: Loudoun County, VA collected **$875 million** in FY2024 [10, 11]. Where taxes are exempted or abated, states can lose **$1 billion a year** or more [14]. Permanent jobs are few, typically 30–50 per site. Neighbors' top complaints are noise, power lines and secrecy.

FIGURE 5 · ECONOMICS

Follow the money



Green = usually a benefit · Orange = usually a cost or risk · Amber = depends on the contract

Figure 5. Simplified economic flows. The same building can be a fiscal win or loss depending on tax treatment and who pays for grid upgrades.

OFTEN CITED BY SUPPORTERS

$0.04

County services a data center uses per $1 of tax it pays in Loudoun, vs. ~$0.25 for most businesses. [12]

From one supervisor's white paper citing the county's fiscal model; schools and traffic costs are low because few people work there. ✓ re-checked

OFTEN CITED BY SKEPTICS

>$1 B/yr

Annual cost of Texas's sales-tax exemption for data-center equipment (2025); Virginia's is ~$1B (2024). [14]

Advocacy research. Virginia argues it keeps a large local equipment-tax base. Not re-checked by us. from brief

OFTEN CITED BY SKEPTICS

$1–2.6 M

State subsidy per permanent job in deals Good Jobs First reviewed (e.g., Illinois avg. $1.4M). [13]

Advocacy research using state disclosures, which are often incomplete. Not re-checked by us. from brief

05 · MONEY & COMMUNITY, CONTINUED

Taxes: both stories are true

THE LOUDOUN WINDFALL

$875M

in FY2024 data-center tax revenue, $35M more than the county government's general operating budget [10] ✓ re-checked. The county credits it with the lowest real-property tax rate in Northern Virginia ($0.805 per $100) [9]. One supervisor's analysis says a data center costs $0.04 in services per $1 of tax, vs. ~$0.25 for most businesses [12]. Most of it comes from taxing the equipment inside at $4.15/$100, which is replaced every few years, and the county warns growth will plateau.

and

THE COST OF EXEMPTIONS

52–70¢

lost per $1 of sales-tax exemption in the states that measured it, according to Good Jobs First [13] from brief. It estimates exemptions cost Texas over $1B a year and Virginia about $1B [14], with subsidies of roughly $1–2.6 million per permanent job in deals it reviewed. Good Jobs First is a left-leaning watchdog and state disclosure is patchy. Virginia argues the local equipment tax more than compensates.

CHART · $ MILLIONS

Local revenue vs. state exemption costs



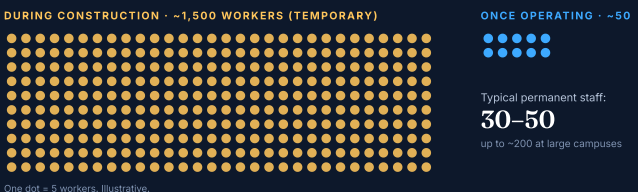
Not a like-for-like comparison: one county's collected revenue vs. two states' forgone sales tax. It shows the scale of what deal terms move. Sources: Loudoun EDA (2025) [10]; Turner/VACo (2025) [12]; Good Jobs First (2025) [14].

Jobs: lots to build it, few to run it

A finished data center is mostly machines. A typical facility employs **30–50 permanent staff**, and big campuses up to ~200; even the largest usually have fewer than 150 [13, 15]. Nevada, the only state that discloses wages, showed about $31/hour (~$65K/year) at subsidized centers in 2021–22. Construction can bring hundreds to thousands of workers, especially electricians, often for less than a year per phase.

Industry studies count 603,900 direct US jobs and 4.7 million "supported" [26]. Those are national supply-chain estimates, not jobs in your town.

CHART · JOBS (ILLUSTRATIVE)



Construction shown at 1,500 workers (mid-range "hundreds to thousands"); operations at 50 (top of typical 30–50). Ranges: Good Jobs First [13, 15].

05 · MONEY & COMMUNITY, CONTINUED

Living next door

🔊 Noise
A constant low-frequency hum from chillers and fans is a leading complaint in Loudoun and Prince William counties. Ask for dBA limits at the property line, and enforcement.

⛽ Backup generators
Banks of diesel generators need air permits and regular test runs. Some sites add on-site gas turbines. In Memphis, xAI ran turbines before they were permitted.

⚡ Transmission lines
New high-voltage lines with 100–180-foot easements can cross many properties far from the campus itself.

🏗️ Construction & looks
Years of trucks during construction. Afterward, blank warehouse-style walls and night lighting, but little daily traffic.

🚒 Fire & emergency
Lithium battery rooms and high-voltage gear need trained, equipped fire and EMS crews.

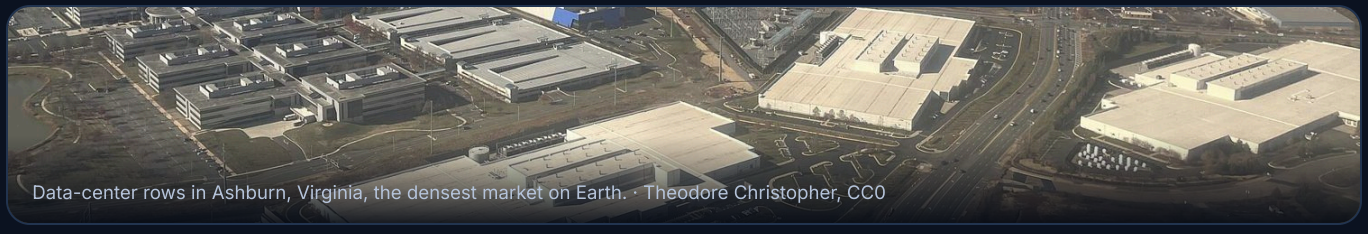
🤐 Secrecy
NDAs, shell companies and undisclosed end users at the approval stage are common, and many residents say that is the biggest reason they distrust these projects. CRS notes water deals can also limit disclosure.

On the plus side, operating data centers put few cars on the road and very few kids in schools [12] ✓ re-checked. Many bring upgraded fiber and grid service, and some fund community programs. We found no rigorous causal study of effects on local household incomes or housing costs.

FOR LOCAL OFFICIALS & RESIDENTS

Seven questions to ask before any vote

1. **How many megawatts, and who pays for grid upgrades?**
   Is there a large-load tariff with minimum payments and collateral?
2. **What cooling, and how much water at peak?**
   Gallons per day in a heat wave, the source, and whether reclaimed water is available.
3. **What is the net tax after abatements, year by year?**
   Including state exemptions and any PILOT schedule.
4. **How many permanent full-time jobs, at what wages?**
   Are there clawbacks if targets are missed?
5. **What noise limits apply?**
   dBA at the property line, day and night, and who enforces them.
6. **Backup power: what fuel, and how often is it tested?**
   Are there air permits, and is any on-site gas generation planned?
7. **Who is the end user?**
   Will the operator name the tenant before approval?



Data-center rows in Ashburn, Virginia, the densest market on Earth. · Theodore Christopher, CC0

06
Claim checks

Twelve things people say about data centers, checked.

Viral lines tend to be half-true. For each, we give the verdict, the evidence and the sources.

SCORECARD



Verdicts across the 12 claims checked in this report.

WATER

CONTEXT-DEPENDENT

“Golf courses use more water than data centers.”

True for on-site water today — by roughly 30×. Much closer (≈2.3×) if you count water used at power plants.

US golf applied about 1.63 million acre-feet of water in 2024, roughly 531 billion gallons (GCSAA, 2025). US data centers consumed about 17 billion gallons on site in 2023 (LBNL, 2024). On that basis golf is about 30× larger calc. An independent newsletter's version says 24×; the gap comes from different inputs.

Add the ~211 billion gallons consumed at power plants to make data centers' electricity, and the total is ~228 billion gallons: golf is then only about 2.3× larger calc. Golf water is falling (−31% since 2005); data-center water is rising. Some writers project the lines crossing later this decade — that is a projection, not a fact.

Most importantly, both are local questions. A golf course and a data center drawing on the same stressed aquifer in Arizona both matter; national averages tell you little about your watershed.

Sources [29, 2, 21, 37]

WATER

MISLEADING

“Every ChatGPT question drinks a bottle of water.”

Misleading. Even the study behind the line said one 500 mL bottle per roughly 10–50 responses — and company figures are far lower.

The phrase traces to a 2023 UC Riverside paper on GPT-3. It estimated that the model ‘drinks’ a 500 mL bottle for roughly 10–50 medium-length responses, depending on where and when it runs — counting both on-site cooling water and water used at power plants. That's ~10–50 mL per response, not a bottle.

In August 2025 Google reported that a median Gemini text prompt used 0.26 mL of water (about five drops) and 0.24 Wh of energy. That figure counts on-site water only, excludes training, and has not been independently verified.

The honest summary: per question, the water is small; across billions of questions and new campuses, the totals become a real local planning issue. The two camps are using different boundaries — be skeptical of anyone who doesn't say which one they use.

Sources [20, 24]

06 · CLAIM CHECKS, CONTINUED

POWER

VERIFIED

“One AI data center uses as much power as a city.”

True for the largest AI campuses. Not true of most data centers.

The IEA says a typical AI-focused data center uses as much electricity as 100,000 households, and the largest under construction will use 20 times as much. Meta's Hyperion campus in Louisiana was reported to need more than four times New Orleans' peak demand (WWL-TV, 2025).

A 1-gigawatt campus running at 85% average load uses roughly as much electricity in a year as ~690,000 US homes [calc, EIA]. Smaller enterprise or colocation sites (10–50 MW) are more like a large factory or a small town.

Sources [1, 35, 7]

POWER

MISLEADING

“Data centers will eat the whole grid.”

Misleading nationally; a real risk in specific regions.

Worldwide, data centers use about 1.5% of electricity today, heading toward ~3% by 2030 (IEA). In the US the share is higher — 4.4% in 2023, and 6.7–12% by 2028 in LBNL's range — and they account for nearly half of US demand growth to 2030.

The pressure is concentrated: nearly half of US capacity sits in five regional clusters. Loudoun County alone had about 4 GW of data-center load in 2024, and its local grid is described by one supervisor as ‘oversubscribed’. Local strain can be severe even when the national share looks modest.

Sources [1, 2, 12]

POWER

CONTEXT-DEPENDENT

“Data centers raise your electric bill.”

In the PJM grid, yes, measurably. Nationally from 2019–2024, growing states often saw lower prices. It depends on spare capacity and rules.

In the mid-Atlantic PJM grid, the official market monitor attributes $7.3 billion (82%) of the 2026/27 capacity-auction cost increase to data-center load, and $16.6 billion of $30.8 billion across the last two auctions. A consumer-advocate study estimated the 2025/26 auction alone adds about $10 a month to the average Washington, DC household bill (for the whole auction, not only data centers).

On the other hand, LBNL and Brattle found that from 2019–2024, states with more load growth tended to see lower average prices, because fixed grid costs were spread across more sales (≈ −0.6¢/kWh per 10% growth). That works when existing power plants and wires have room. When demand outruns supply, prices rise.

Large-load tariffs — minimum payments, collateral, and making big users pay for their own grid upgrades — are how regulators try to keep costs off households.

Sources [8, 31, 16, 5]

JOBS

MISLEADING

“They bring thousands of jobs.”

Thousands of construction jobs, yes — temporarily. Permanent jobs are typically dozens, not thousands.

A typical facility employs 30–50 permanent staff, up to ~200 at large campuses; reporting cited by Good Jobs First found even the largest usually have fewer than 150. Construction crews can number in the hundreds or thousands, often for months per phase, though multi-phase campuses can keep electricians busy for years.

Industry studies cite 603,900 direct US jobs and 4.7 million ‘supported’ (PwC for the Data Center Coalition). Those are national, multiplier-based totals across the supply chain — chips, construction, utilities — not jobs at the site down the road.

Sources [13, 15, 26]

06 · CLAIM CHECKS, CONTINUED

TAXES

CONTEXT-DEPENDENT

“They pay huge taxes and lower everyone else's.”

Verified in Loudoun County. Not true where the deal gives the taxes away. The contract decides.

Loudoun County collected $875 million from data centers in FY2024, and the county says this revenue helped it keep the lowest residential property-tax rate in Northern Virginia and fund schools and public safety. Most of it comes from taxing the computer equipment inside, which is replaced every few years.

Many states do the opposite with sales-tax exemptions: Good Jobs First estimates Texas forgoes over $1 billion a year and Virginia about $1 billion, and that states which studied the return lose 52–70 cents per dollar exempted. Both things are true at once. Ask for the net figure after abatements, and for how many years.

Sources [10, 9, 13, 14]

ECONOMY

MISLEADING

“They're mostly empty, speculative buildings.”

Not today: vacancy is at record lows. Whether 2030 forecasts are inflated is a fair, separate question.

CBRE reports vacancy fell to 1.4% across the eight primary North American markets at the end of 2025, even as supply grew 36%. In mid-2025 about three-quarters of capacity under construction was already leased.

The real uncertainty is the future. Gartner has warned that the pace of AI capital spending may be unsustainable, and utility interconnection queues include speculative requests that can overstate demand. Buildings can be full today and forecasts can still be too high.

Sources [27, 28, 38]

POWER

MISLEADING

“Data centers run on renewables.”

Misleading as stated. Big clean-energy purchases are real, but natural gas is a leading source of new supply.

The IEA expects renewables to meet about half of global growth in data-center demand, with natural gas expanding by 175 TWh to 2035 — notably in the US — and nuclear adding a similar amount. Meta's Hyperion campus is planned around ~7.5 GW of new gas generation (Fortune, 2026), and xAI ran unpermitted gas turbines in Memphis before receiving permits.

Corporate ‘100% renewable’ claims usually rest on annual contracts and certificates, not hour-by-hour clean supply. Google's emissions are up 51% since 2019 even as its data-center energy emissions fell 12% in 2024. Both facts matter.

Sources [1, 34, 36, 22, 39]

HARDWARE

MISLEADING

“They're just warehouses full of old PCs.”

No. Modern AI halls are dense, liquid-cooled industrial plants.

An NVIDIA GB200 NVL72 rack holds 72 GPUs, is rated at 132 kW, and weighs about 1.4 tonnes. Fans alone can't remove that heat: cold plates on the chips carry ~100 kW away in liquid, with air handling the rest (Uptime Institute, 2025).

Traditional server racks draw roughly 5–15 kW. The IEA compares an AI data center's power draw to an aluminium smelter.

Sources [19, 1, 12]

06 · CLAIM CHECKS, CONTINUED

HARDWARE

MISLEADING

“AI data centers are taking over the world.”

They're physical plants that depend on power contracts, permits, water and constant maintenance.

The machines run software that companies choose to run. They can't be built without land, grid connections, transformers (whose wait times have doubled, per IEA) and local approvals. The legitimate ‘big’ concerns are economic and physical: concentration of investment, strain on grids and water systems, and who pays.

Sources [1]

WATER

CONTEXT-DEPENDENT

“Data centers use 2% of US water.”

Unresolved — we don't use this number. The source chain doesn't trace back to the federal lab's data.

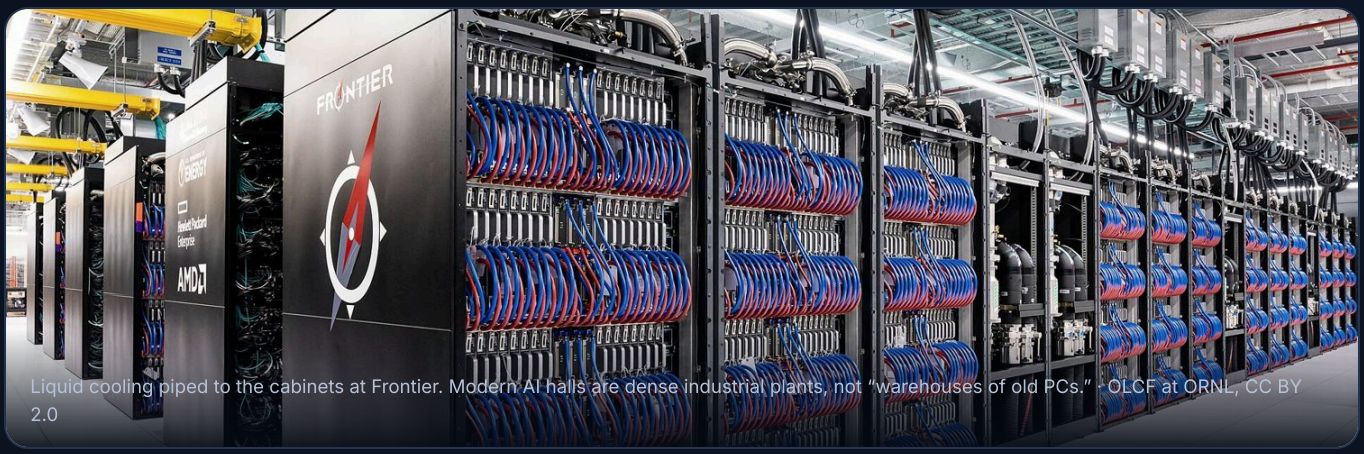
A 2026 Congressional Research Service FAQ says direct data-center water use is ‘approximately 2%’ of total US water consumption. We checked the footnote: it cites a 2025 water-utility association report (AWWA, ‘Cooling the Cloud’), not Lawrence Berkeley National Lab.

LBNL's own estimate is about 17 billion gallons of on-site use in 2023, which appears far smaller than 2% of national consumption. We could not reconcile the two, so this site does not use the 2% figure. If someone quotes it, ask what is being counted.

Sources [6, 2]

WHY WE DON’T USE “2% OF US WATER”

The CRS FAQ’s footnote cites a water-utility association report (AWWA, “Cooling the Cloud”), not Lawrence Berkeley National Lab. We could not reconcile it with LBNL’s ~17 billion gallons of on-site use, so this report, like the website, does not use the figure.



Liquid cooling piped to the cabinets at Frontier. Modern AI halls are dense industrial plants, not “warehouses of old PCs.” · OLCF at ORNL, CC BY 2.0

07
Pros & cons

The strongest case for building, and for slowing down.

Each side is presented the way its best advocates would put it. Neither side is hidden or shortened.

"Build them"

TAXES
A large tax base that needs few services. Loudoun collected $875M in FY24, and one supervisor's analysis puts services at $0.04 per $1 of data-center tax. The county kept the region's lowest home tax rate [10, 12].

JOBS & ECONOMY
AI and cloud infrastructure underpin productivity, research and national competitiveness. Pro-market groups (AEI, CEI) argue power and permitting, not money, are the binding constraint, and that the US should build faster [17, 18].

POWER & BILLS
Growth can lower average rates when it uses existing capacity and pays its way: about −0.6¢/kWh per 10% load growth, 2019–2024 [5].

CLIMATE
Tech firms are among the largest buyers of new renewables and nuclear, including restarts and SMR deals. The IEA finds broad AI adoption could cut emissions by more than data centers add, though it's "not a silver bullet" [1].

WATER
National water use is small: ~17B gal on site versus ~531B gal applied to golf courses. Closed-loop designs can cut cooling water to near zero [2, 29, 25].

JOBS & ECONOMY
Demand is real, not speculative today. Vacancy is a record-low 1.4% and most new capacity is preleased [27, 28].

COMMUNITY
Quiet neighbors compared with factories once built: few cars, very few schoolchildren, and upgraded fiber and grid service [12].

"Slow down, condition, or reject"

TAXES
Subsidies are expensive: an estimated $1–2.6M per permanent job, and states that studied it lose 52–70¢ per $1 exempted. Texas and Virginia each forgo ~$1B+ a year [13, 14].

POWER & BILLS
Local grids are strained and households are paying. In PJM, data-center load added $7.3B in one capacity auction, and DC households face ~+$10/month from the prior auction [8, 16].

CLIMATE
Gas is a leading source of new supply: +175 TWh for data centers by 2035, ~7.5 GW of new gas for Meta's Hyperion, and Google's emissions are up 51% since 2019 [1, 34, 39].

WATER
Local water risk is real in dry basins. Counting power plants, the footprint is ~12× the on-site figure, and peak-day demand can collide with residents' peak use [2, 6].

JOBS & ECONOMY
Few permanent jobs (typically 30–50), and wages where disclosed (~$65K in Nevada) fall below what companies advertise [13, 15].

JOBS & ECONOMY
Bubble risk: if AI demand falls short (Gartner warns spending is "unsustainable"), ratepayers could be left paying for stranded power plants and lines [38].

COMMUNITY
Noise, transmission corridors, environmental-justice harms and secrecy. Unpermitted turbines ran in Memphis, and NDAs often hide who the end user is until after approval [22, 36].

07 · PROS & CONS, CONTINUED

Where the evidence leans

Our reading of the evidence in this report. Where the facts clearly favor one side, we say so. No false balance.



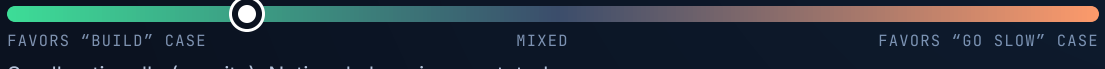
Taxes

Depends on deal structure. Loudoun shows the upside; exemptions show the cost. Ask for the net figure.



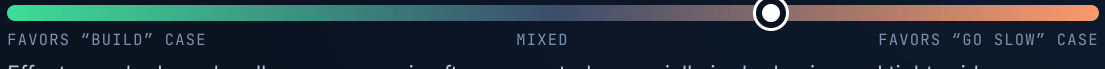
Permanent jobs

Consistently small. The evidence favors skeptics' framing of job claims.



National water share

Small nationally (on-site). National alarm is overstated.



Local water & power

Effects can be large locally, so concern is often warranted, especially in dry basins and tight grids.



Bills

Rising in PJM; falling on average elsewhere 2019–24. Tariff design decides.



"Empty racks" today

Vacancy is at record lows. The claim is false for now. The bubble risk is about the future.

The bottom line

WHAT'S OVERSTATED

That data centers will "eat the grid" nationally, that every chatbot question drinks a bottle of water, that the buildings are empty speculation, or that machines are "taking over." National shares of power and water are modest today.

WHAT'S UNDERSTATED

How concentrated the load is, how much of the bill risk lands on households in tight grids like PJM, how few permanent jobs a finished site supports, and how much gas is being built to power the boom.

THE ONE-SENTENCE VERSION

Whether an AI data center is a good deal for a community depends far less on the technology than on the contract: who pays for the grid, how the equipment is taxed, where the water comes from, and what is disclosed before the vote.

APPENDIX

Sources

Every source, annotated, including who produced it and which way it leans. ✓ re-checked = we re-read the key figure in the source (or an official summary) on Oct 15, 2026. Numbers match the bracketed citations in the text.

1 GOVERNMENT · 2025 ✓ re-checked
International Energy Agency (IEA), "Energy and AI (executive summary)." The most complete global model. 415 TWh in 2024, ~945 TWh by 2030, 700–1,700 TWh range by 2035. *Lean:* Intergovernmental; consulted tech firms. Critics say both too high and too low.
https://www.iea.org/reports/energy-and-ai/executive-summary

2 GOVERNMENT · 2024 ✓ re-checked
Lawrence Berkeley National Laboratory for US DOE, "2024 United States Data Center Energy Usage Report." Bottom-up model. 176 TWh (4.4%) in 2023; 325–580 TWh by 2028. Water figures are grid averages and ignore clean-power contracts. (Direct PDF blocks automated download; figures confirmed via DOE and CRS.) *Lean:* Neutral; mandated by Congress.
https://eta.lbl.gov/publications/2024-lbnl-data-center-energy-usage-report

3 GOVERNMENT · 2024 ✓ re-checked
US Department of Energy, "DOE Releases New Report Evaluating Increase in Electricity Demand from Data Centers." Confirms LBNL: 58 TWh (2014) → 176 TWh (2023) → 325–580 TWh (2028), 6.7–12% of US electricity. *Lean:* Government press release.
https://www.energy.gov/articles/doe-releases-new-report-evaluating-increase-electricity-demand-data-centers

4 GOVERNMENT · 2025 from brief
LBNL, "Data center modeling & forecasting update." Update reporting ~11.8% of US electricity by 2030 (range 9.5–15.3%). Not re-checked by us. *Lean:* Neutral.
https://datacenters.lbl.gov/modeling-forecasting

5 GOVERNMENT · 2025 ✓ re-checked
LBNL & The Brattle Group, "Factors Influencing Recent Trends in Retail Electricity Prices." 2019–2024: a 10% rise in statewide load was associated with ~0.6¢/kWh lower average prices. Authors flag capacity-constrained regions as a knowledge gap. *Lean:* Neutral; statistical, correlational.
https://eta-publications.lbl.gov/sites/default/files/2025-10/full_summary_retail_price_trends_drivers.pdf

6 GOVERNMENT · 2026 ✓ re-checked
Congressional Research Service, "Data Centers and Water: Frequently Asked Questions (R49057)." Published July 31, 2026. 97% of on-site water from public systems; a 100 MW site ≈ 2,600 households of direct water (IEA, averaged across cooling types). *Lean:* Nonpartisan research for Congress.
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7 GOVERNMENT · 2024 ✓ re-checked
US Energy Information Administration, "How much electricity does an American home use?." 10,791 kWh per residential customer in 2022. Used for our home-equivalent arithmetic. *Lean:* Federal statistics.
https://www.eia.gov/tools/faqs/faq.php?id=97&t=3

8 GOVERNMENT · 2025 ✓ re-checked
Monitoring Analytics (PJM Independent Market Monitor), "Analysis of the 2026/2027 RPM Base Residual Auction, Part A." Data-center load added $7.27B (82%) to 2026/27 capacity revenues of $16.1B. *Lean:* Official market watchdog for the PJM grid.
https://www.monitoringanalytics.com/reports/Reports/2025/IMM_Analysis_of_the_20262027_RPM_Base_Residual_Auction_Part_A_20251001.pdf

9 GOVERNMENT · 2026 ✓ re-checked
Loudoun County, VA, "Data Centers: Tax Revenues & County Budget." Real property rate $0.805/$100 (lowest in Northern Virginia); equipment taxed at $4.15/$100. County warns growth will plateau. *Lean:* Host county; generally favorable framing.
https://www.loudoun.gov/6409/Tax-Revenues-County-Budget

10 GOVERNMENT · 2025 ✓ re-checked
Loudoun County Economic Development, "Data Center Fact Sheet." FY24 data-center tax revenue $875M; $42.4B assessed value = 75% of commercial real estate; <3% of county land. *Lean:* Promotional (economic-development office).
https://23372029.fs1.hubspotusercontent-na1.net/hubfs/23372029/Website%20Files/Data%20Center%20Fact%20Sheet%20One%20Pager%205.1.25.pdf

11 GOVERNMENT · 2024 ✓ re-checked
Loudoun County, VA, "Popular Annual Financial Report, FY2024." Data-center computer-equipment tax beat budget by $123.9M in FY24. *Lean:* Primary fiscal report.
https://www.loudoun.gov/DocumentCenter/View/212105/Popular-Annual-Financial-Report-FY-2024

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https://www.vaco.org/wp-content/uploads/2025/11/Loudoun-County-Data-VERY-SHORT-Center-Brief-Oct-20-2025.pdf

13 INDEPENDENT · 2025 from brief
Good Jobs First, "Cloudy Data, Costly Deals: How Poorly States Disclose Data Center Subsidies." States that measured it lose 52–70¢ per $1 of sales-tax exemption; $1M–$2.6M per permanent job. Figures from research brief, not re-checked. *Lean:* Progressive anti-subsidy watchdog.
https://goodjobsfirst.org/wp-content/uploads/2025/11/Cloudy-Data-Costly-Deals-How-Poorly-States-Disclose-Data-Center-Subsidies.pdf

14 INDEPENDENT · 2025 from brief
Good Jobs First, "Which states are leading the data center race?." Exemptions cost Texas >$1B (2025) and Virginia ~$1B (2024). *Lean:* Progressive anti-subsidy watchdog.
https://goodjobsfirst.org/which-states-are-leading-the-data-center-race/

15 INDEPENDENT · 2025 from brief
Good Jobs First (citing Business Insider), "Big Tech promised jobs. Cities gave millions. Where are the workers?." Even the largest sites usually employ fewer than 150 permanent workers. *Lean:* Watchdog.
https://goodjobsfirst.org/big-tech-promised-jobs-cities-gave-millions-where-are-the-workers/

16 INDEPENDENT · 2025 ✓ re-checked
Synapse Energy Economics for DC Office of People's Counsel, "PJM Capacity Market report." 2025/26 auction ≈ +$10/month (+9%) for the average DC household. That covers the whole auction, not only data centers. *Lean:* Commissioned by a consumer advocate.
https://opc-dc.gov/wp-content/uploads/2025/05/PJM-Capacity-Market-Report-FINAL-OPC-Synapse.pdf

APPENDIX, CONTINUED

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https://www.aei.org/domestic-policy/technology-and-innovation/americas-ai-future-needs-faster-permitting/

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https://cei.org/studies/powering-intelligence/

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https://journal.uptimeinstitute.com/density-choices-for-ai-training-are-increasingly-complex/

20 INDEPENDENT · 2023 ✓ re-checked
Li, Yang, Islam & Ren (UC Riverside / UT Arlington), "Making AI Less "Thirsty"." Origin of the 'bottle of water' line: GPT-3 'drinks' 500 mL per roughly 10–50 responses, counting power-plant water. *Lean:* Academic.
https://arxiv.org/abs/2304.03271

21 INDEPENDENT · 2026 from brief
NapkinQuest (newsletter), "Golf uses more water than data centers — by 2× or 24×." Used only as an arithmetic cross-check (24× / 1.9×). *Lean:* Independent blog; unvetted.
https://buttondown.com/napkinquest/archive/golf-uses-more-water-than-data-centers-by-2x-or/

22 INDEPENDENT · 2025 from brief
Southern Environmental Law Center, "xAI built an illegal power plant to power its data center." Documents unpermitted gas turbines at xAI's Memphis site. *Lean:* Environmental law advocacy.
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23 INDUSTRY · 2025 from brief
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24 INDUSTRY · 2025 ✓ re-checked
Google, "Measuring the environmental impact of delivering AI at Google scale." Median Gemini text prompt: 0.24 Wh and 0.26 mL water (on-site), May 2025. Excludes training. *Lean:* Company study; not independently verified.
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25 INDUSTRY · 2024 from brief
Microsoft, "Sustainable by design: next-gen datacenters consume zero water for cooling." Closed-loop chip cooling; >125M liters/year saved per site; pilots 2026. Uses more electricity on hot days. *Lean:* Company design claim.
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Method & honesty notes

What we re-checked (Oct 15, 2026): IEA global totals and projections; LBNL US totals (via DOE and the LBNL abstract, because the PDF blocks automated download); Loudoun's $875M and tax rates; the PJM $7.3B (market monitor, Utility Dive); Synapse's $10/month; the golf water total (GCSAA); the NVL72 rack rating (Uptime); EIA home usage; CRS water facts; CBRE vacancy; Google's +51%; and both primary sources behind the "bottle of water" claim.

Corrections made: the NVL72 rating is 132 kW (not a range). Homes per GW is ~690,000 using EIA's 10,791 kWh. The "2,600 households" figure is IEA's average across cooling types. The $10/month estimate covers the whole PJM auction. The "$0.04 per $1" ratio comes from one supervisor's white paper, not an official county report.

Not used: the "2% of US water" figure. Its CRS footnote cites a water-utility association report, not LBNL, and we could not reconcile it with LBNL's 17B gallons.

Still flagged: capex totals (CNBC), Good Jobs First subsidy figures, Hyperion details (Fortune/WWL), Microsoft's zero-water claim, Deloitte's inference share, LBNL's 2030 forecast and indirect-water figure. All are cited, but not re-opened.

Credits: Aerial of Ashburn, VA: Theodore Christopher, CC0. Ashburn exterior: Vahurzpu, CC BY-SA 4.0. Frontier aisle & liquid-cooled cabinets: OLCF at ORNL, CC BY 2.0 (all via Wikimedia Commons, resized). Diagrams and charts are original, drawn from the cited data. Typefaces: Fraunces, Inter, JetBrains Mono (SIL OFL).

An independent, non-partisan explainer. Research current as of October 2026. Figures are estimates from the cited sources; forecasts are scenarios, not predictions.