Powering and Cooling the AI Boom in the United States

Physics, Politics, and Tradeoffs

Gabriel Collins, J.D. | 17 September 2026

Baker Institute | Center for Energy Studies

GC1

IMPORTANT NOTICE

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This presentation is provided for information and discussion purposes only. Consumers of the information and analysis contained in it make investments and take other actions at their own risk.

I am not a hydrologist, geologist, or engineer, and am not offering advice on technical aspects of any assets which may be discussed in this analysis. The information and opinions contained in, and expressed by, this analysis are based on sources I deem to be reliable. However, no warranty, assurance, or guarantee, express or implied, is made about the completeness, reliability, or accuracy of this content. Likewise, nothing in this presentation or the accompanying discussion creates an attorney-client relationship between us. I serve as a strategic advisor to Revive Water Resources, LLC.

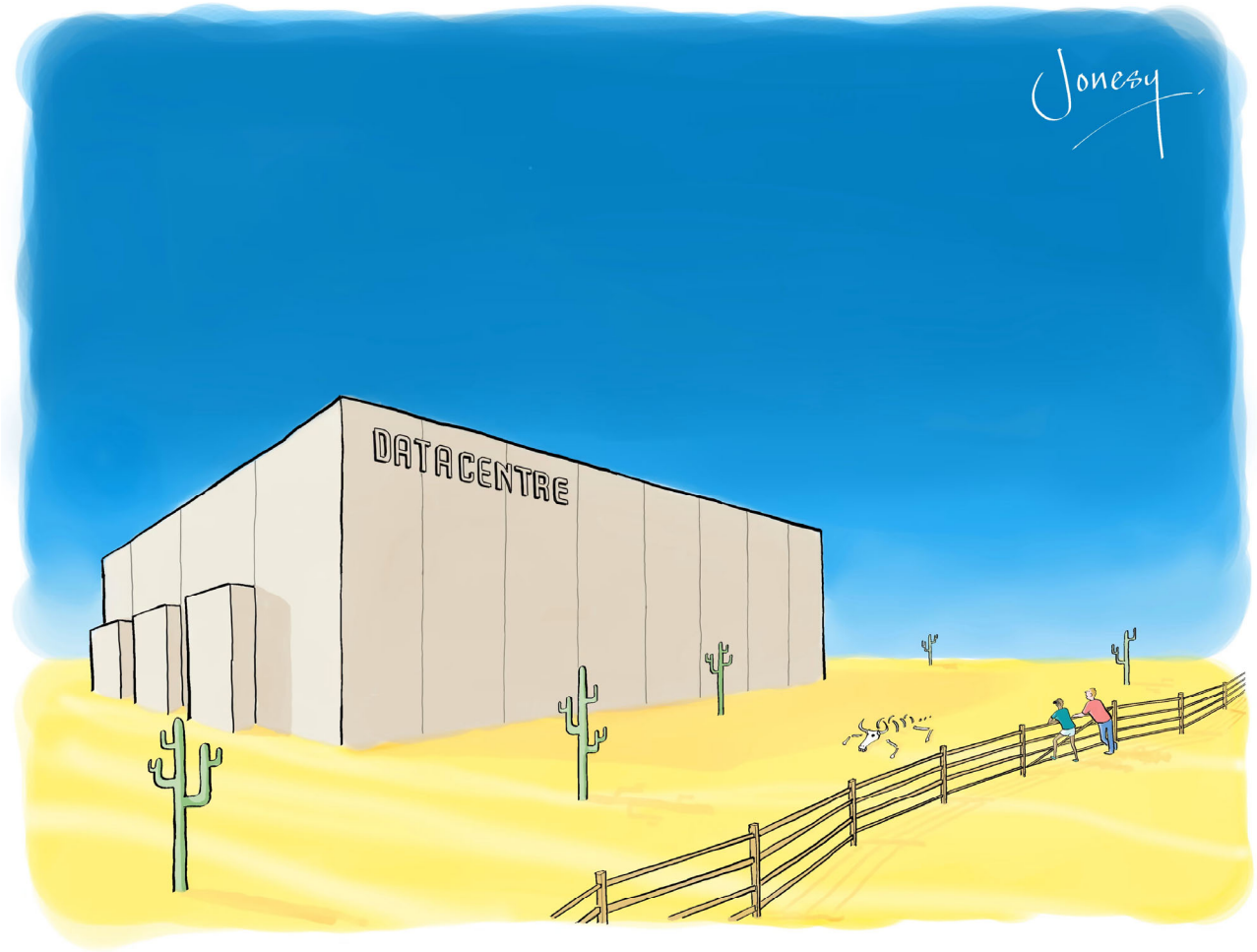
I have used Anthropic's Claude and OpenAI's ChatGPT to collect data and adversarially test my ideas and visually format the slides and Google's Gemini to create some images.

The views expressed herein are my own interpretations as of the date of presentation, are made in my personal capacity, and are subject to change without notice.

Slide 2

GC1 Change date to 17 September 2026
Gabriel Collins, 2026-09-05T19:55:16.790

AI and Water



“Of course I miss water, but at least I don’t have to think for myself any more...”

Source: Steve Jones, *The Guardian*, 12 September 2026

https://www.theguardian.com/commentisfree/picture/2026/sep/12/steve-jones-pros-cons-ai-datacentres-cartoon

01

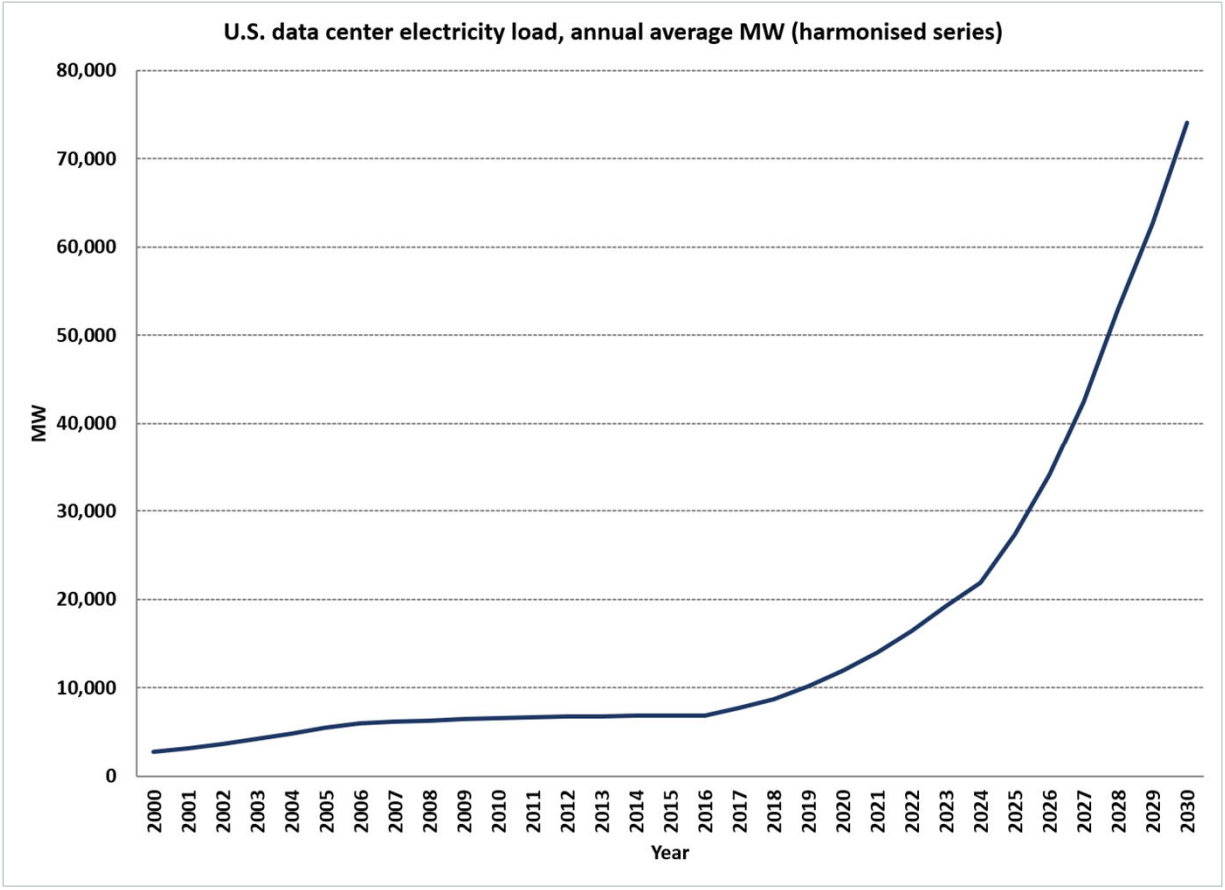
The AI Boom: Historical Perspective and What Likely Comes in the Next 5 Years

ELECTRICITY

U.S. Datacenter Electricity Use, 2000–2030

60+

2030 AI-driven power use could equal the output of more than 60 AP1000 nuclear reactors



Sources: Koomey (2011); U.S. EPA (2007); Shehabi et al. (2024), LBNL-2001637; Smith et al. (2026), LBNL-2001758 (Reference Case, 2025–2030); IEA (2025, 2026) and EPRI (2026) for cross-checks. Intermediate years interpolated; 2025–26 estimates, 2027–30 forecasts; author's calculations.

BUILDOUT VELOCITY

How Do Hyperscale Datacenters Compare to Other Industrial Assets?

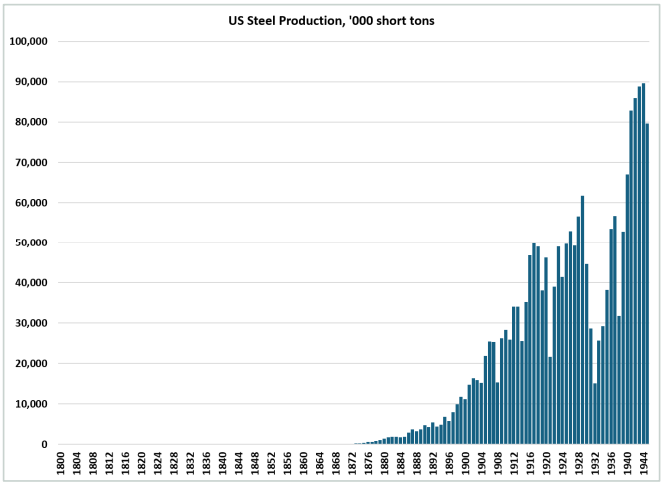
Booms don't usually accelerate as they near their peak. But datacenters are doing just that—and we do not even know where the peak might be.

10%
Steel production
CAGR, 1870–1944

6.1%
Railroad mileage
CAGR, 1840–1916

9.6%
Datacenter capacity
CAGR, 2000–2025

- Datacenter capacity shows big acceleration toward the back end of the curve, with capacity potentially doubling again between 2026 and 2030.
- The World War II steel surge relied heavily on capacity built 15–20 years prior that was underutilized during the Depression, then surged during World War II.



U.S. steel production, 1,000 short tons.

Methodology: starting point is a judgment call on when true "industrial scale" development commenced; endpoint is the all-time historical peak figure.

Sources: U.S. Census Bureau (Hist. Stat. 1975, 1949); NBER/FRED (2026); USGS (Data Series 140, 2024); AISI (Ann. Stat. Rep.); U.S. Dept. of State (1814); Swank (1881, 1902); Fishbein (NARA, 1973); Kennedy (1859); Allen (JEH, 1979).

SILICON VALLEY'S OWN FORECAST

Can We Solve the Resource Input Problem With Algorithms and Efficiency?

Kind of…But Not Enough to Obviate Power & Cooling Needs

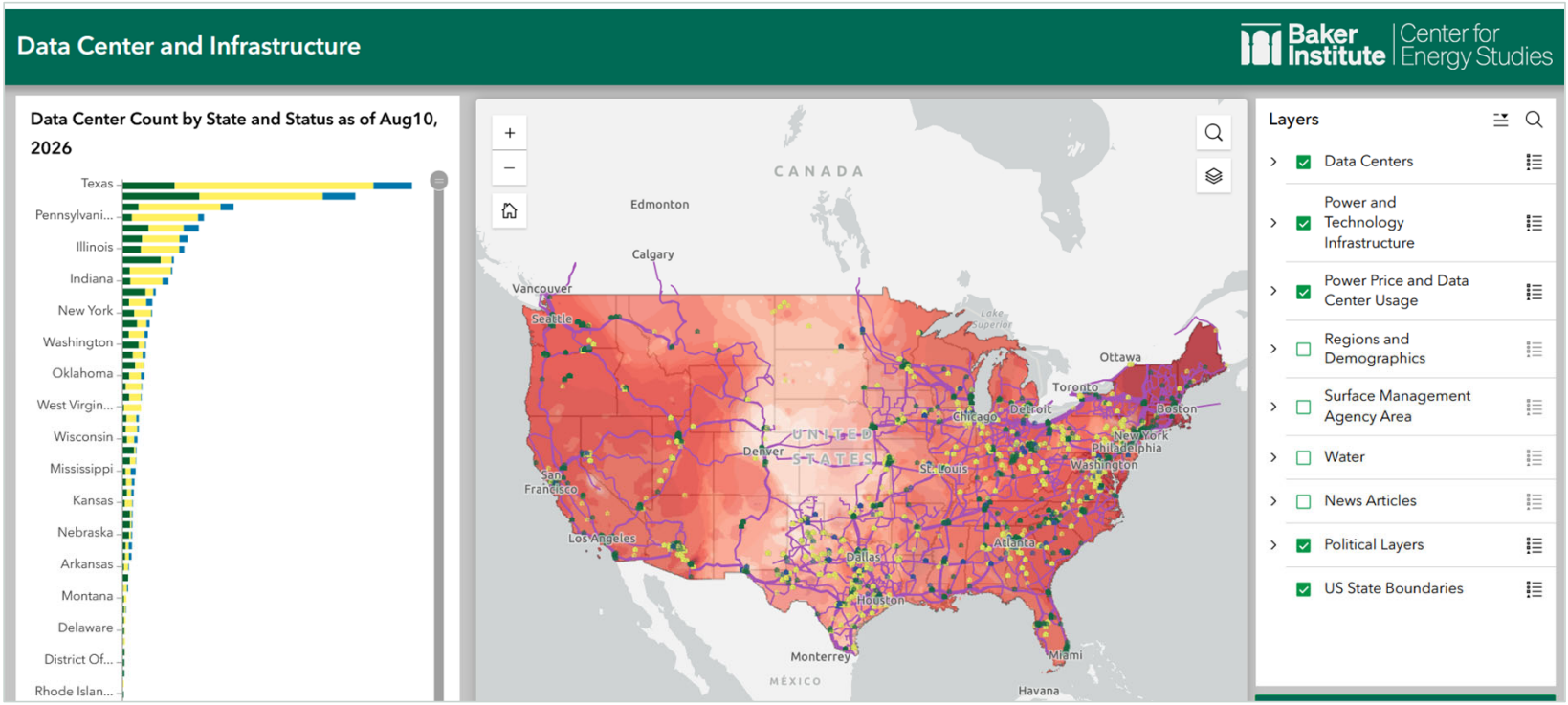
"We conjecture that in five years 10,000x more AI inference will be done worldwide, with these gains hypothetically coming from multiplicative progress of 50x in AI algorithms, 50x in system/hardware optimization/specialization, and 4x from further data center growth."

50× AI ALGORITHMS × **50×** SYSTEM / HARDWARE × **4×** DATA CENTER GROWTH = **10,000×** MORE AI INFERENCE BY 2031

— Computing Research Association Ideas Dinner, 27 April 2026

https://cra.org/industry/2026/04/27/how-ai-will-reshape-computer-systems-by-2035-a-jeffersonian-dinner-in-san-francisco-about-our-10000x-future/

Datacenters Are Located Throughout the U.S., But Are Likely to Cluster



Source: Baker Institute Center for Energy Studies, U.S. Data Centers and Infrastructure dashboard — https://www.bakerinstitute.org/dashboard-us-data-centers-and-infrastructure

02

AI Skepticism and How That Feeds Into Water and Electricity Concerns

CAPABILITY TRAJECTORY

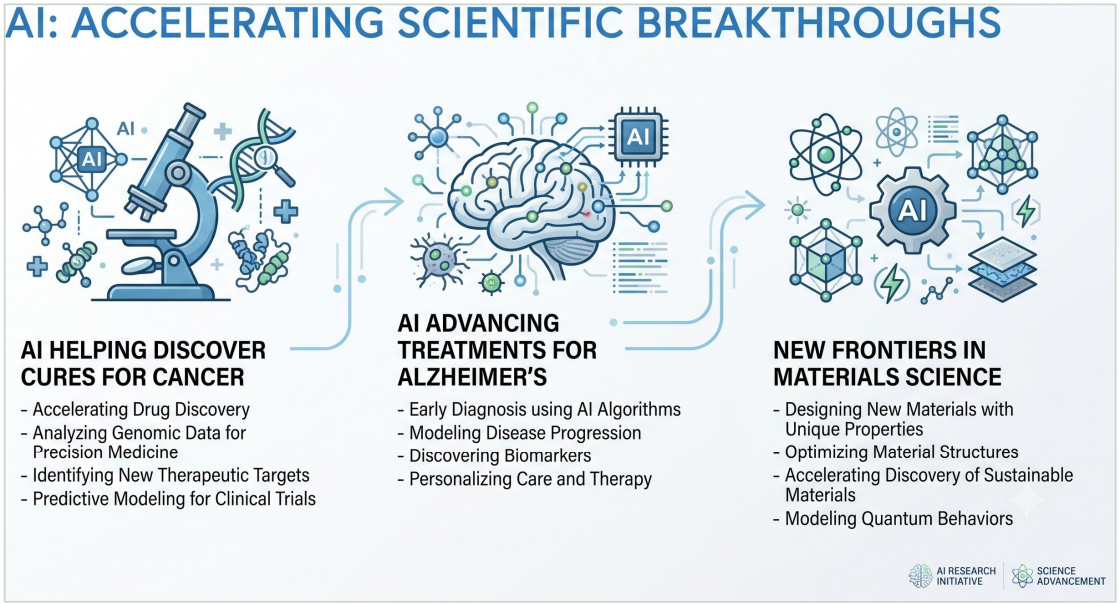
What Has AI Done For Me Lately? And What Could It Do Tomorrow?

NOW

Google
OpenAI
ANTHROP\C

Frontier models in production, and inference already riding in the vehicle.

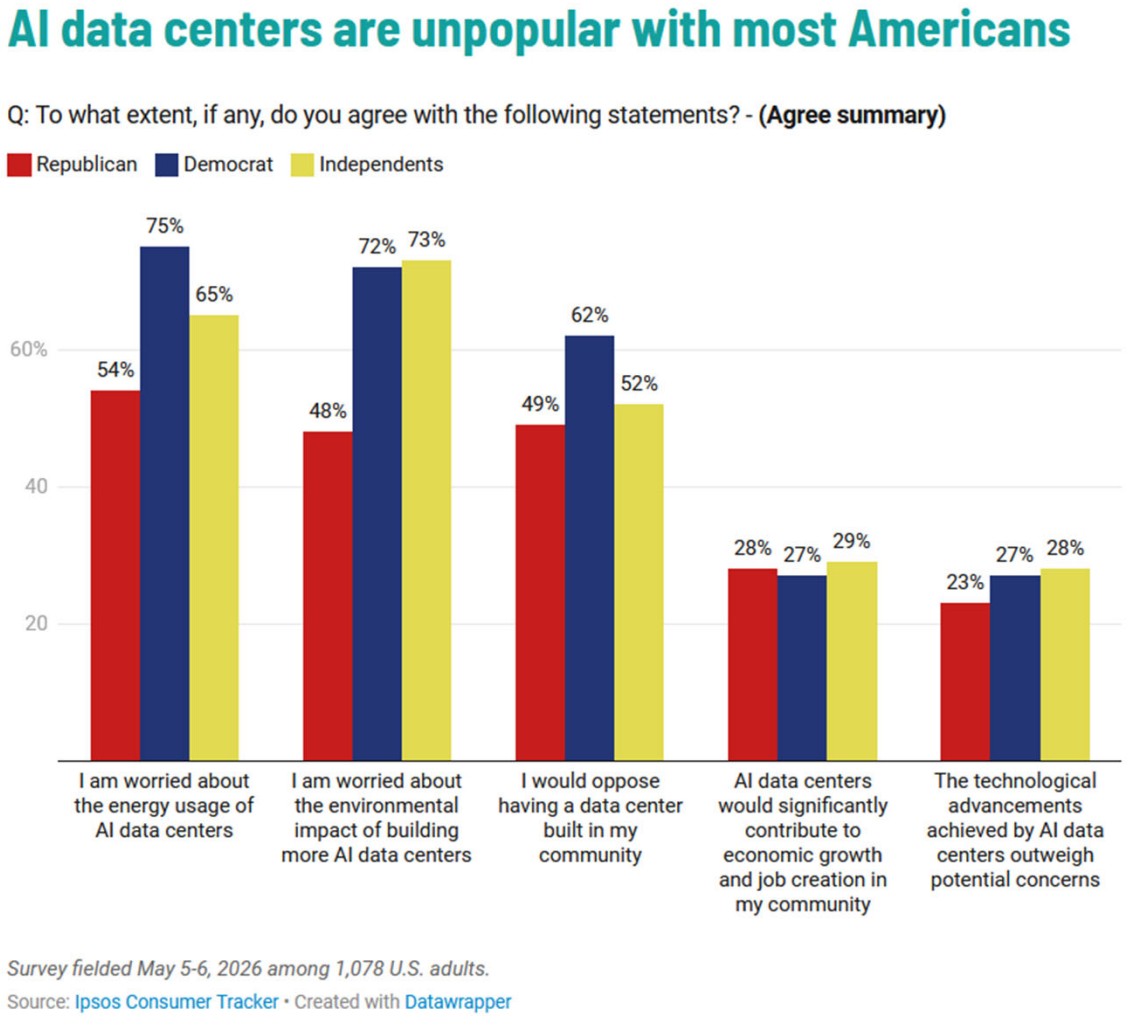
NEXT



Next: discovery, diagnosis and materials science at machine speed.

PUBLIC OPINION

A Population Increasingly Skeptical—And It's Remarkably Bipartisan



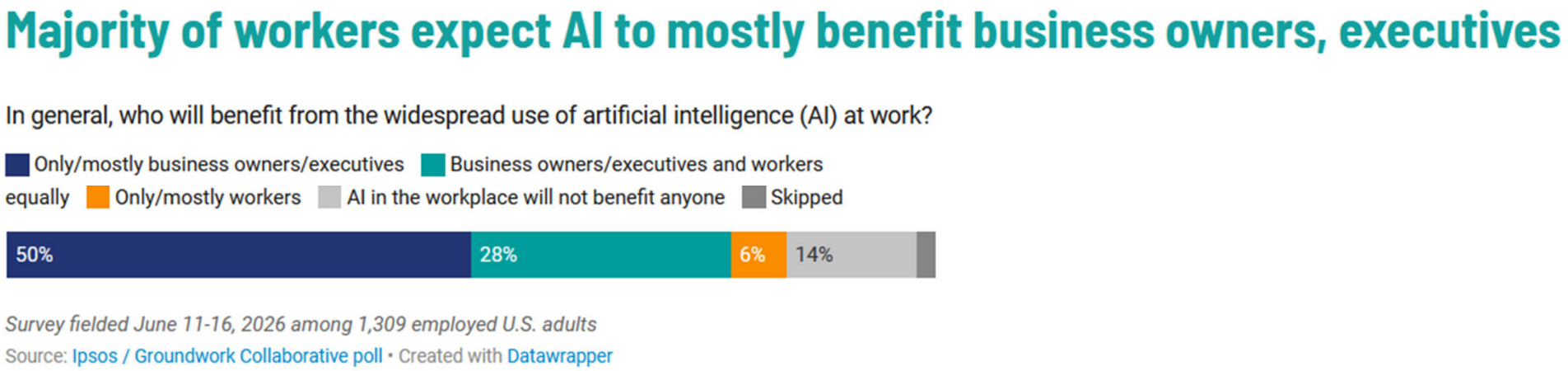
Source: Ipsos, Artificial Intelligence: Key Insights, Data and Tables

https://www.ipsos.com/en-us/artificial-intelligence-key-insights-data-and-tables

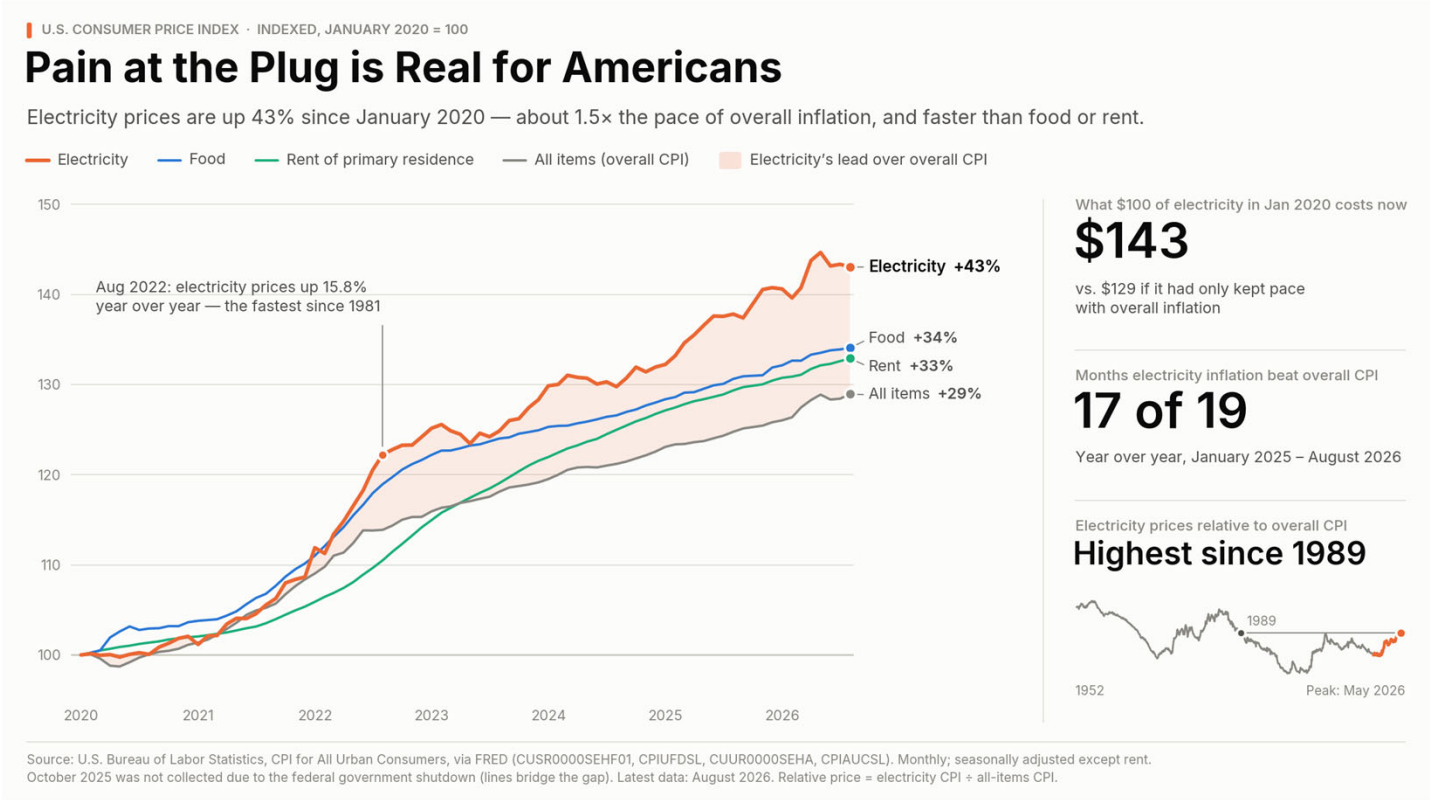
Gabriel Collins · 17 September 2026

PUBLIC OPINION

Perception of Skewed Benefits May Amplify Salience of Environmental Concerns



Source: Ipsos, Artificial Intelligence: Key Insights, Data and Tables — https://www.ipsos.com/en-us/artificial-intelligence-key-insights-data-and-tables



Big jumps pre-dated the AI boom but psychologically, causation and correlation will be blurred and given the AI buildout trends, folks will assume the worst about coming power bills

03

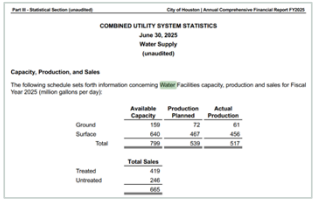
What Does Datacenter Water & Power Usage Actually Look Like?

POWER AND WATER

Key Hyperscale Operators' Global Water Withdrawals

11×

In FY 2025, the City of Houston sold 11 times as much water as the biggest hyperscalers withdrew globally.



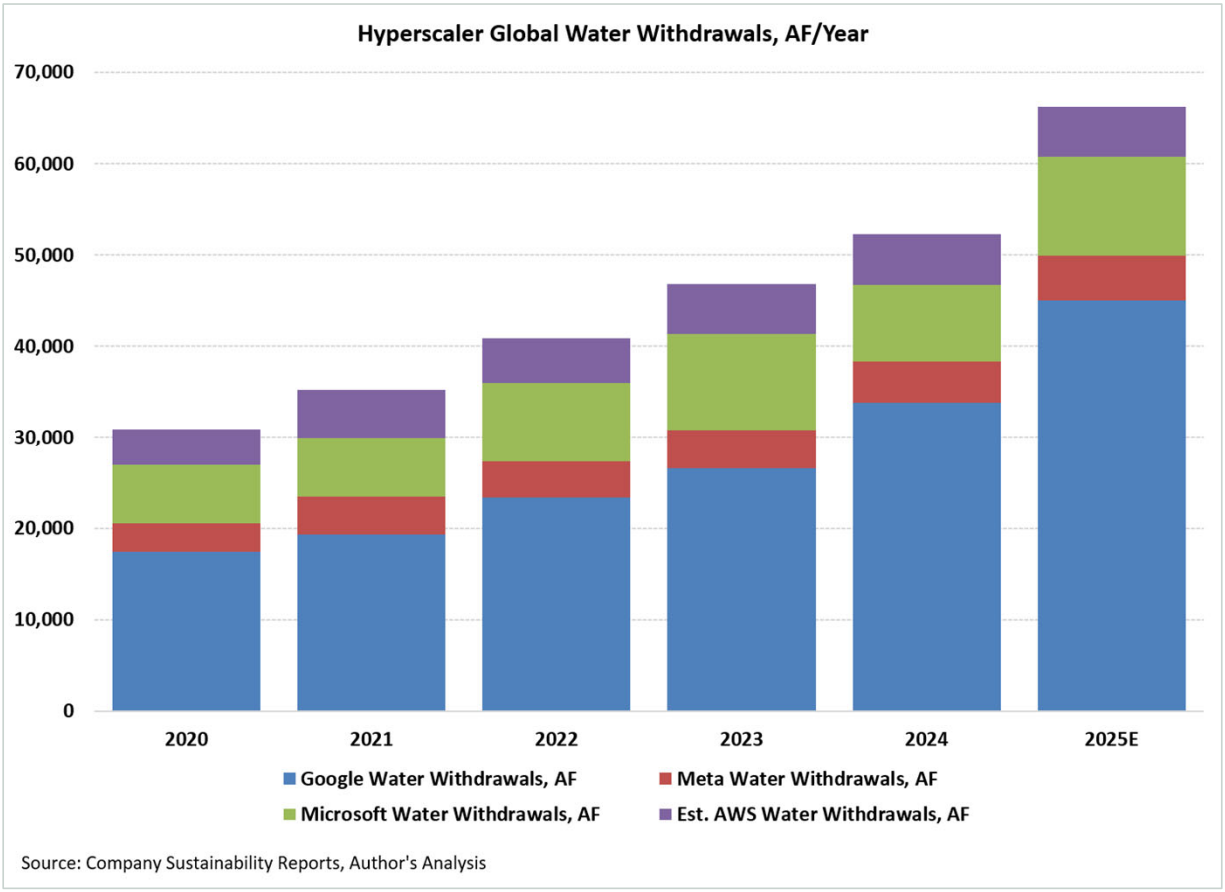
COMBINED UTILITY SYSTEM STATISTICS
June 30, 2025
Water Supply
(unaudited)

Capacity, Production, and Sales

	Available Capacity	Production Planned	Actual Production
Ground	159	72	61
Surface	640	467	456
Total	799	539	517

Total Sales	
Treated	419
Untreated	246
	665

Source: City of Houston ACFR FY2025, https://houstontx.gov/controller/acfr/acfr-fy2025.pdf



POWER AND WATER

A Key Hyperscaler's Water and Electricity Intensity vs. The Value of Water

	Google Electricity Use, MWh	Google Water Withdrawals, AF	Google Cloud Revenue, Million USD	MWh / Million $	Gal / Million $
2020	15,138,543	17,459	$13,059	1,159	435,638
2021	18,058,300	19,325	$19,206	940	327,866
2022	21,586,400	23,324	$26,280	821	289,193
2023	24,994,000	26,555	$33,088	755	261,515
2024	31,713,900	33,792	$43,229	734	254,713
2025	**43,586,600**	**45,079**	**$58,705**	**742**	**250,217**

Source: Company Sustainability Reports and Author's Analysis

TRANSLATION: WHAT AN ACRE-FOOT OF WATER UNDERPINS

$1.3 million
in revenue: what every acre-foot of water use now underpins

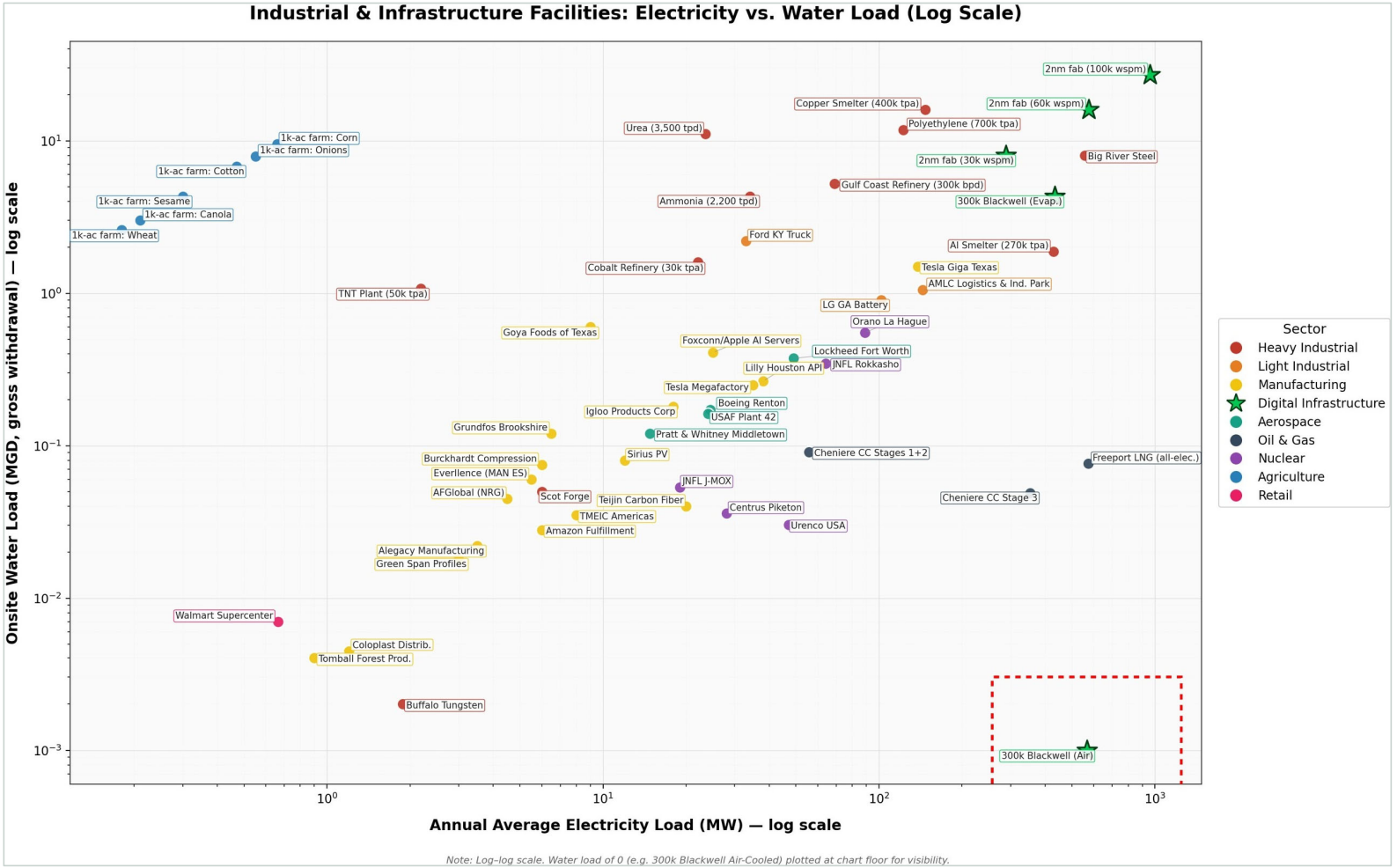
~$300,000
in economic activity per acre-foot fed into the City of Houston

< $500
generated per acre-foot used on a farm, in most cases

POWER AND WATER

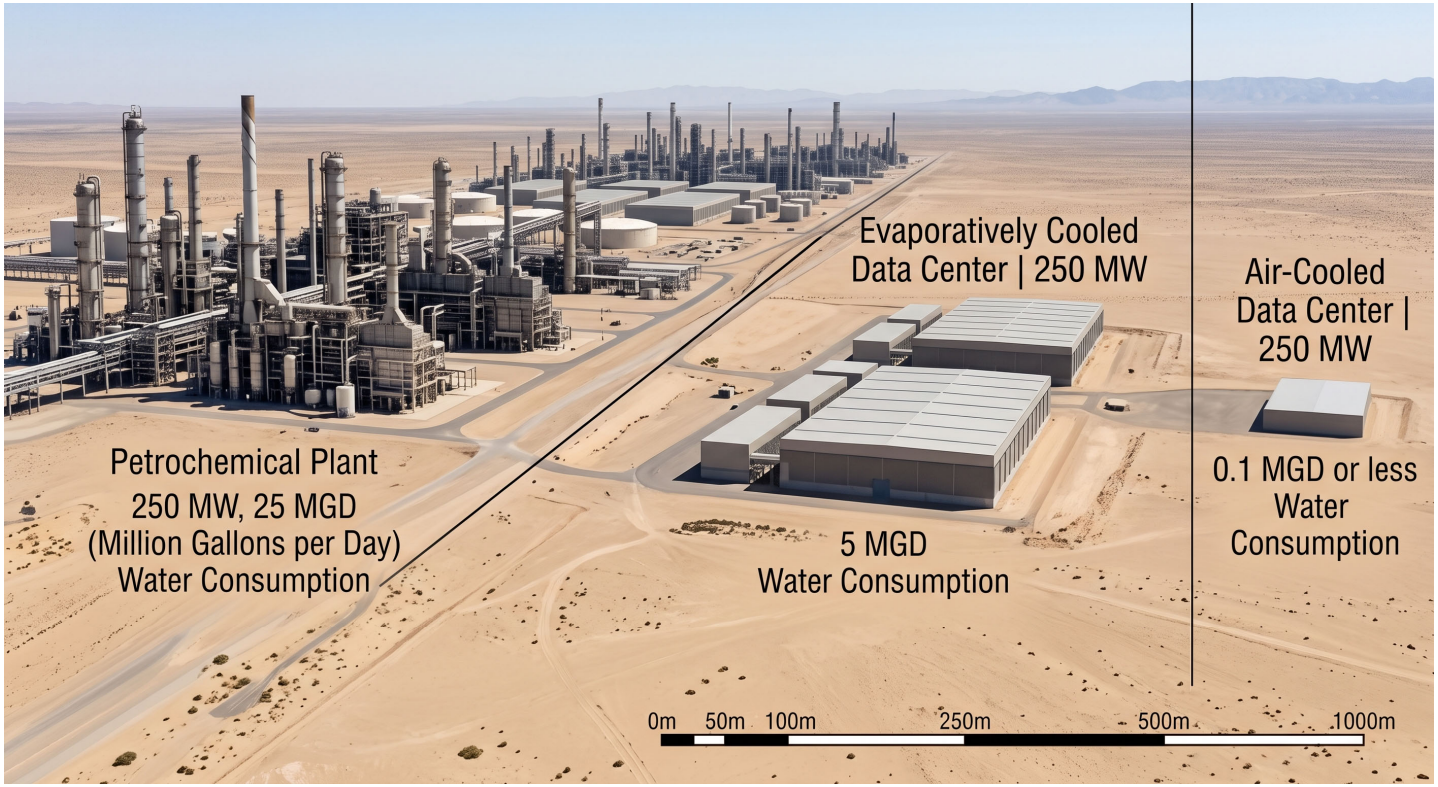
How Do Hyperscale DCs Compare to Other Industrial Assets?

Industrial and infrastructure facilities: electricity load vs. water load, log scale.



PERSPECTIVE

Datacenter Approximate Power and Water Needs Versus Petrochemical Plants

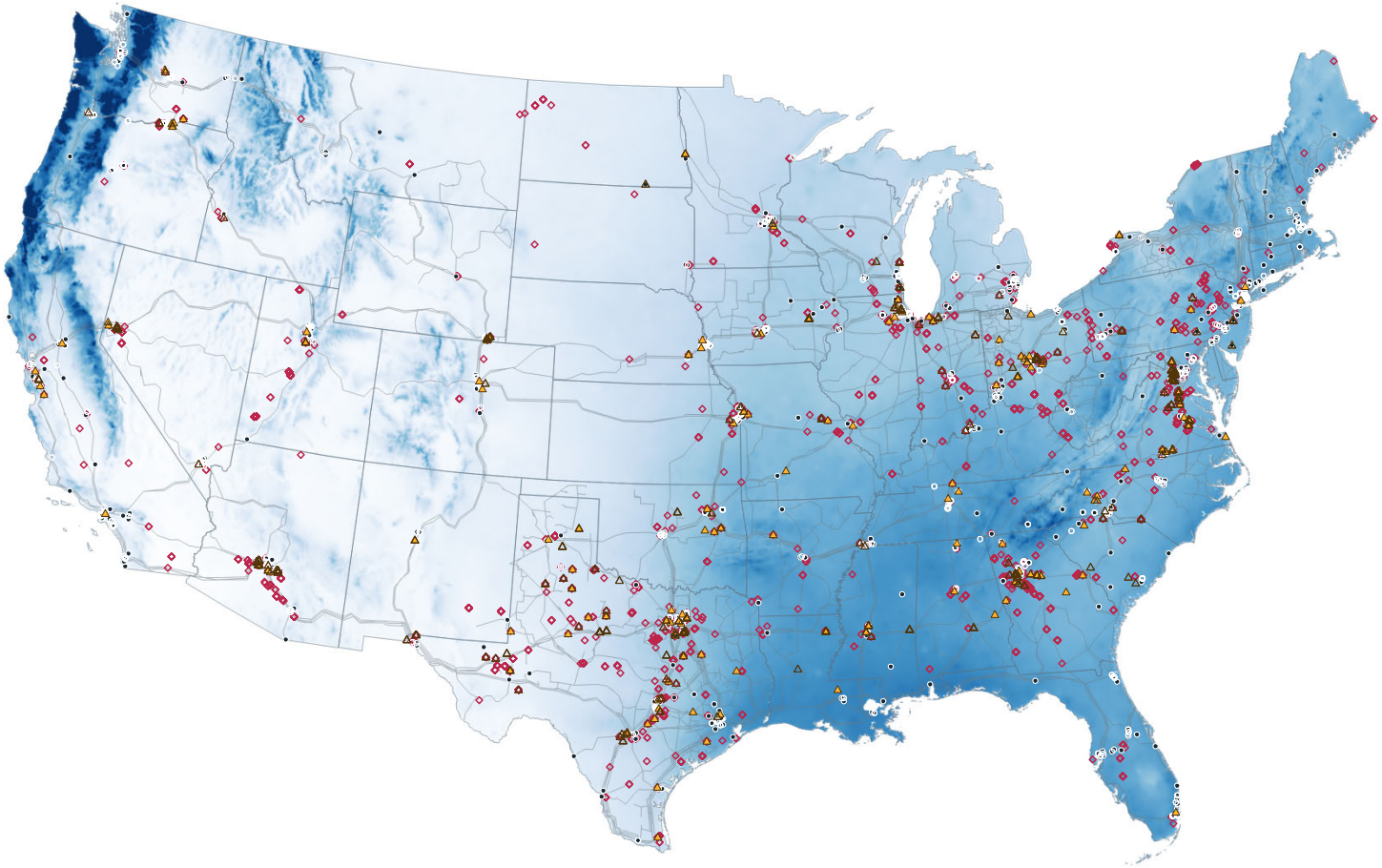


04

Water and Power Can Trade Against Each Other

Climate Will Fundamentally Impact Cooling Choices…

6,834 building records mapped • August 2026 inventory • Contiguous U.S.



DATA CENTER STATUS

● Active	**2,054**
▲ Construction	**809**
◇ Announced	**3,971**

Building records, not campuses.
Co-located buildings overlap.

— Fiber-optic network

ANNUAL PRECIPITATION

1991–2020 normal • inches/year

0 20 40 60 80 100+

Climate context—not water supply.

Baker Institute / Aterio · PRISM, OSU

Sources and methods in slide notes. Excludes Alaska, Hawaii and one record without coordinates. Extracted 5 Sep 2026.

Even Wetter Climates Can Still See Adverse Impacts From Large, Hyperlocal Users

Sipriano v. Great Spring Waters of America, Inc., 1 S.W.3d 75 (1999)

42 Tex. Sup. Ct. J. 629

KeyCite Yellow Flag

Declined to Follow by Spear T Ranch, Inc. v. Knaub, Neb., January 21, 2005

1 S.W.3d 75

Supreme Court of Texas.

Bart **SIPRIANO**, Harold Fain, and Doris Fain, Petitioners,

v.

GREAT SPRING WATERS OF **AMERICA**, INC. a/k/a Ozarka Natural **Spring Water** Co. a/k/a Ozarka **Spring Water** Co. a/k/a Ozarka, Respondents.

No. 98–0247.

|

Argued Nov. 19, 1998.

|

Decided May 6, 1999.

Synopsis

Property owners sued bottler for negligently draining their **water** wells. The 392nd Judicial District Court, Henderson County, John L. McGraw, J., granted bottler's motion for summary judgment. Owners appealed, and moved to strike appendix to bottler's brief. The Tyler Court of Appeals, 973 S.W.2d 327, granted motion and affirmed judgment.

Supreme Court would not substitute rule of reasonable use of groundwater for current common law framework applying rule of capture, which essentially allows landowner to pump as much groundwater as desired without liability to neighbors who claim that such pumping has depleted their wells, in light of constitutional amendment expressly making groundwater regulation a duty of Legislature and recent amendments to **Water** Code and other statutes to make groundwater conservation districts more effective in **water** management process. Acts 1997, 75th Leg., p. 2610, ch. 1010, § 1.01 et seq.

9 Cases that cite this headnote

Attorneys and Law Firms

***75** Richard E. Swift, Jr., Pamela Rea, Palestine, for Petitioners.

Boris A. Hidalgo, Christopher Paul Hanslik, Houston, for Respondents.

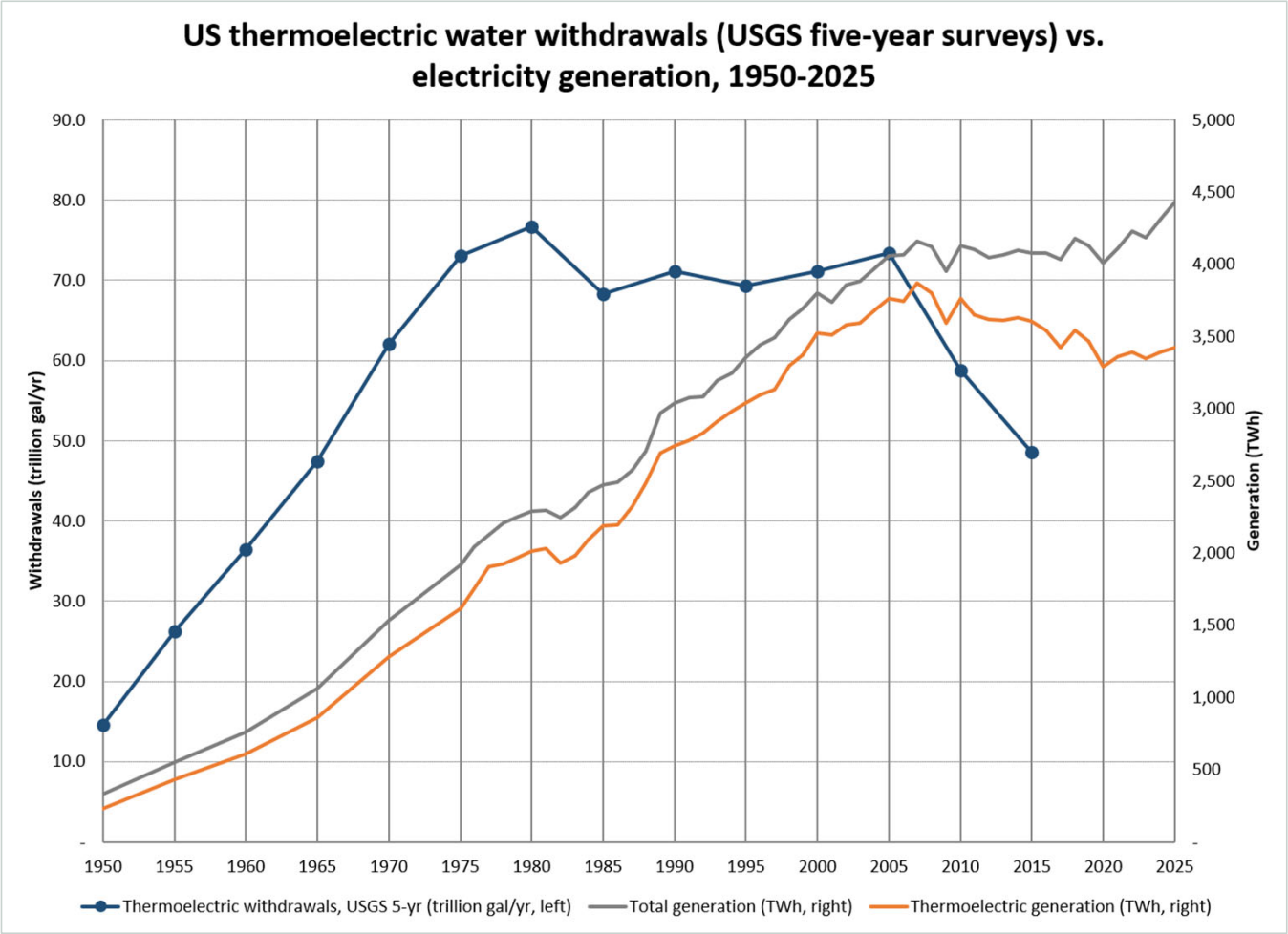
Opinion

Justice ENOCH delivered the opinion for a unanimous Court.

05

If I Air-Cool a Datacenter, Am I Just Displacing Water Use Onto The Grid?

What About The Water Footprint of Electricity Upstream From Datacenters?



Source Note: Water use, withdrawal, and consumption estimates are compiled from the U.S. Geological Survey (USGS Circulars 1268, 1344, 1405, 1441; Fact Sheet 2018-3035; SIR 2019-5103; Professional Paper 1894-D; Galanter et al., 2023; Harris et al., 2025; Skinner et al., 2025) and the National Renewable Energy Laboratory (Macknick et al., 2011, NREL/TP-6A20-50900). Historical and projected net electricity generation, fuel-mix transitions, and cooling-water data are drawn from the U.S. Energy Information Administration (EIA Form-923 Schedule 8, 2014–2024; Today in Energy briefs, 2018–2023; Annual Energy Review 2011; Electric Power Annual 2024; Monthly Energy Review, Aug 2026; Short-Term Energy Outlook, Sep 2026; and Annual Energy Outlook 2026).

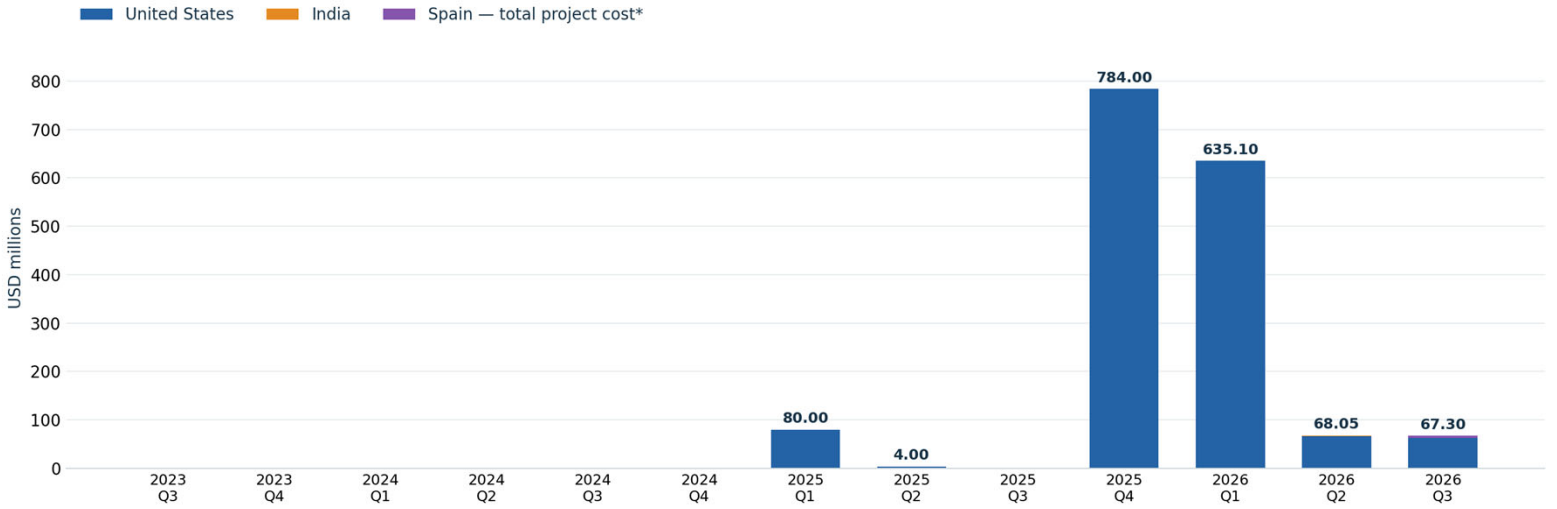
06

Moving Toward Solutions

Datacenter Developer Investments in Water Systems

Quarterly inventory of disclosed water investments

Latest known values assigned to first identified disclosure quarter • Nominal USD millions



Country	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1	2025 Q2	2025 Q3	2025 Q4	2026 Q1	2026 Q2	2026 Q3
United States	—	—	—	—	—	—	80.00	4.00	—	784.00	635.10	67.00	63.00
India	—	—	—	—	—	—	—	—	—	—	—	1.05	—
Spain	—	—	—	—	—	—	—	—	—	—	—	—	4.30
Total	**—**	**—**	**—**	**—**	**—**	**—**	**80.00**	**4.00**	**—**	**784.00**	**635.10**	**68.05**	**67.30**

Total reference value: $1,638.45m | Developer-attributed component: $1,634.15m | Separate Spain project total: $4.30m

— = no usable disclosed amount, not no investment. Partial quarters: 2023 Q3 begins 16 September; 2026 Q3 ends 16 September.
Massaponax: latest $480m estimate restates the 2025 Q4 cohort. Google: $77m split into $17m in Q2 and $60m in Q3 2026.
* Spain: total irrigation initiative cost; AWS funding share is undisclosed. Small India and Spain amounts are shown precisely in the table.

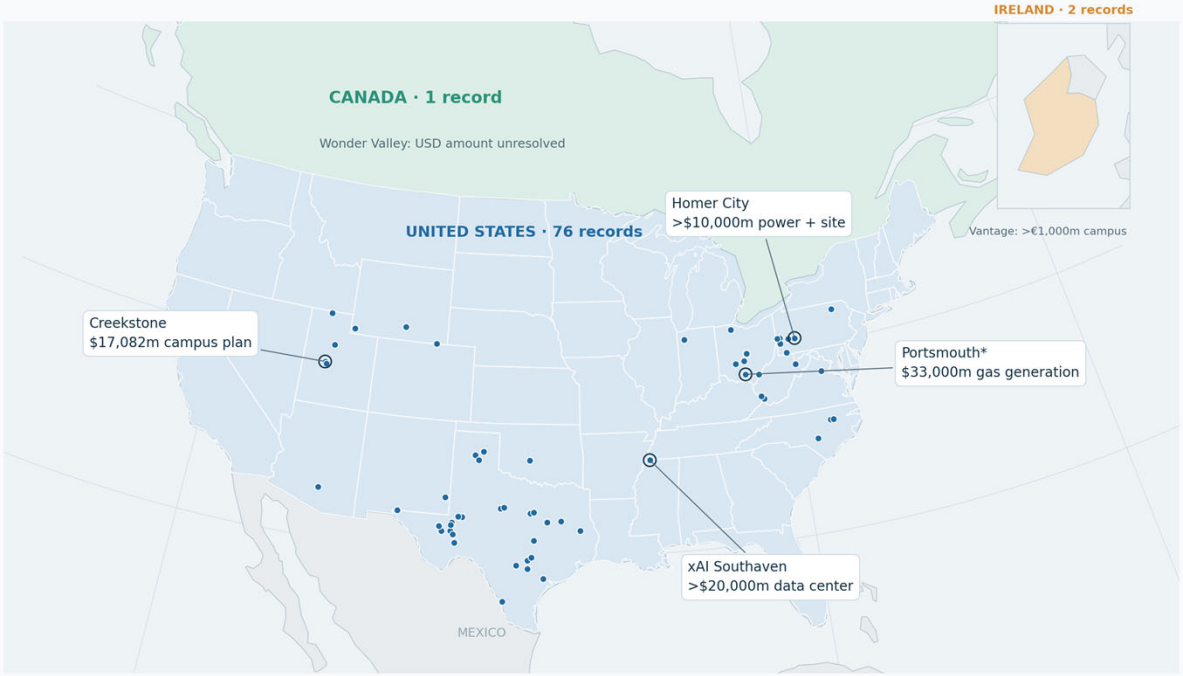
Source: accompanying workbook, including row-level citations, FX rates, exclusions and qualifiers. Values are pledges / project costs, not quarterly cash outlays.

The Money Is Going to Power More Than Water

Data centers & dedicated power

BEHIND-THE-METER INVENTORY / 79 PROJECT RECORDS / REVIEWED 17 SEPTEMBER 2026

Country colors identify inventory coverage. Points mark documented coordinates, not investment size.



VERIFIED FINANCING COMMITMENT

$5,340m

Williams–Blackstone consortium [1]

Includes $4,400m toward growth capex;
the remainder is transaction consideration.

One disclosed portfolio commitment.
An all-project financing total is not established.

BROADER ANNOUNCED PLANS

≈$90,800m

Six USD project / portfolio disclosures [1–6]

≈$53,700m power-related plans
≈$37,100m whole-campus plans

Mixed budgets, pledges and derived capex.
Includes an inferred Williams total.
Not a measure of financed or spent capital.
Do not add the two headline amounts.

READING THE TOTALS

All USD amounts are nominal. Unknown costs are missing, not zero. Non-USD and unresolved-currency amounts are excluded.
*Portsmouth remains in the baseline inventory; current grid-connected plans require a fresh behind-the-meter classification.
The inventory includes proposed and operating projects. It is a sourced screening dataset, not a verified global census.

Sources: [1] Williams (13 Jul 2026); [2] Homer City (Apr 2025); [3] PORTS-Pike project website; [4] Bloom Energy (Jul 2026);
[5] Utah Governor's Office (9 Apr 2026); [6] Mississippi Governor (8 Jan 2026). Full citations and calculation bridge accompany this map.
Locations: existing 79-project workbook, primarily Environmental Integrity Project baseline. Boundaries: Natural Earth; PublicaMundi US states.

Where Might My Analysis Be Wrong?

1. **Recursive training and learning**—will the machines find a better way to train and run models than the brute force model we've been using for LLMs?

2. **How will machines talk**—will talking through mathematical weights be more efficient than using text and words?

3. **Distributed AI**—how might power and water use impacts change if more people use open-weight models and work on their own premises?

Thank You

Gabriel Collins, J.D.

Baker Institute for Public Policy
bakerinstitute.org/expert/gabriel-collins

The Sinews of Civilization
gabrielcollins.substack.com

17 September 2026

Further Reading

Are Data Centers Just Another Industrial Asset? 26 Aug 2026
Slides, AAPL West Texas Energy Institute · https://collinsresearchportal.com/2026/08/28/are-data-centers-just-another-industrial-asset/

What Happens to US LNG Exports if the Permian AI Build Really Takes Off? 20 Aug 2026
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/permian-ai-datacenter-gas-lng-exports

Datacenters Are Like Onions 6 Aug 2026
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/ai-datacenters-power-water-policy-solutions

The Data Center Industry Needs Its Own FracFocus-Style Transparency Initiative 2 Jul 2026
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/data-centers-fracfocus-transparency-computefocus

AI vs. Heavy Industry: How Do Datacenter Electricity and Water Loads Actually Compare? 13 May 2026
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/ai-datacenter-electricity-water-heavy-industry

When AI Data Centers Become Drone and Missile Targets 2 Mar 2026
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/when-ai-data-centers-become-drone

Texas AI Data Centers: Electric Grid Capacity Is a Bigger Challenge Than Water 19 Feb 2026
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/the-real-bottleneck-for-ai-infrastructure

Further Reading

In the Permian, Oil and AI Will Compete for Electricity 13 Feb 2026
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/in-the-permian-oil-and-ai-will-compete

The AI Race Is More Physical Than You Think 31 Dec 2025
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/the-ai-race-is-more-physical-than

AI Geoeconomics: The Case for Bundling American Chips with Secure Electricity 19 Dec 2025
The Sinews of Civilization (Substack) · https://gabrielcollins.substack.com/p/ai-geoeconomics-the-case-for-bundling

AI Geoeconomics: Allied Electricity and Secure Data Centers 18 Dec 2025
Baker Institute working paper, with Christopher Bronk · https://doi.org/10.25613/T8RH-7H63

Recycled Water for Texas Data Centers: A Model Supply Agreement 12 Dec 2025
Texas Water Intelligence · https://texaswaterintelligence.com/2025/12/12/recycled-water-for-texas-data-centers-a-model-supply-agreement/

Could the Permian Basin Become America's Next AI Data Hub? 15 Aug 2025
Baker Institute working paper · https://doi.org/10.25613/CDF1-4006