Data Centers: Promises vs Reality

Dr Luis Contreras-Vidal

6-17-2026

Outline

01

Background

Personal Background

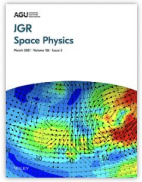
JGR Space Physics

Research Article | Free Access

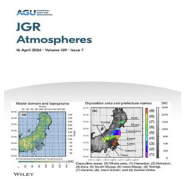
Relationship Between Sprite Current and Morphology

L. Contreras-Vidal, R. G. Sonnenfeld, C. L. da Silva, M. G. McHarg, D. Jensen, J. Harley, L. Taylor, R. Haaland, H. Stenbaek-Nielsen

First published: 15 February 2021 | https://doi.org/10.1029/2020JA028930 | Citations: 8



Volume 126, Issue 3
March 2021
e2020JA028930



Journal of Geophysical Research: Atmospheres

Spectral hardness of X- and gamma-ray emissions from lightning stepped and dart leaders

DOI: 10.1029/2023JD040397

Status: In Production

PAPER

Production of runaway electrons and x-rays during streamer inception phase

Luis Contreras-Vidal[2,1], Caitano L da Silva[1] and Richard G Sonnenfeld[1]

Published 28 December 2022 • © 2022 IOP Publishing Ltd

Journal of Physics D: Applied Physics, Volume 56, Number 5

Citation Luis Contreras-Vidal *et al* 2023 *J. Phys. D: Appl. Phys.* **56** 055201

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Socorro & Green Data Centers

El Defensor Chieftain

Data center company proposes large scale project in Socorro

Jason Bak, CEO of Green Data Centers gave a presentation to the Socorro Electric Co-op Board on April 2.

Jessica Carranza Pino
EL DEFENSOR CHIEFTAIN EDITOR/PUBLISHER

El Defensor Chieftain

Jackson appointed NMT president while data center concerns carry on in the hallways

El Defensor Chieftain

City to host public forum on data center proposal

El Defensor Chieftain

Data Center

County approves first step toward moratorium

Over 130 people attended the Socorro County Meeting on Tuesday night. Jessica Carranza Pino

Is Green Data Centers qualified to build a Data Center?

ECONOMY ENVIRONMENT & CLIMATE CHANGE GOV & POLITICS

A Canadian developer's New Mexico data center pitch may be dying. It wouldn't be the first time

Socorro County commission prepares to vote on data center moratorium as NM Tech backs off Green Data project

BY: **JOSHUA BOWLING** - JUNE 9, 2026 11:51 AM

By then, Bak was pitching another small town hours away on a data center development.

In 2021, the Northwest Herald reported that a Canadian firm known as Green Data Center Real Estate was making a bid to purchase part of a sprawling Illinois campus formerly owned by Motorola and convert a portion of the property into a "solar-powered data hub service."

That alarmed the Murphysboro mayor.

"They had not developed this project in Murphysboro and then one day I pick up the paper and Jason (Bak) is in Harvard, Illinois, saying that they're going to buy this hundreds and hundreds of acre Motorola campus and put a solar-powered data center in it," Stephens said. "I was like, what? You can't even keep the grass mowed here."

The Northwest Herald reported in 2022 that Bak's deal on the Motorola campus had fallen through. The Murphysboro project ultimately died in 2023.

"The track record that I can see is all style and no substance," Stephens said.

While the Illinois developments were on life support, Bak began looking for opportunities elsewhere and reached out to Spaceport America in southern New Mexico. After discussing possibilities for a data center there, Bak said Spaceport officials introduced him to New Mexico Tech leaders in 2024. A spokesperson for Spaceport told Source NM that introduction happened at Bak's request.

But a Source NM investigation has found that Bak and his company Green Data – which also identifies itself as Green Data Centers and Green Data Center Real Estate Inc. – have yet to successfully build a data center. Bak does not dispute this point.

(1) Several project photos used by Green Data Centers match images that also appear on other websites. Example (1a):

hyperscale campuses with 1000MW of potential capacity.

Key facts:

- Increasing solar resulting in negative midday pricing trough
- ge model via a single charging cycle to buy at noon and sell at evening
- easing renewable generation and strengthening grid near
- smooth the duck curve

NEW MEXICO

Developing data center and solar + storage projects for over 200M
Location: Southern New Mexico
Power: Grid power with solar and storage

Key facts:

- Development in partnership with a NM state entity
- Number of tenants on-site requiring secure data and compute power
- Developing solar generation and BESS to provide renewable power with backup to tenants and datacenter

https://www.greendatacenters.com/projects/

Note that the project is attributed to BlackRock not Green Data Centers.

BlackRock wins contract for big battery in Australia

BlackRock has won a contract to deliver one of the world's most powerful batteries – the New South Wales Waratah Super Battery in Australia, with an expected total capacity of 850 MW/1,680 MWh.

OCTOBER 18, 2022 BELLA PEACOCK

MARKETS | UTILITY SCALE STORAGE | AUSTRALIA

Image: Powin

https://www.pv-magazine.com/2022/10/18/blackrock-wins-contract-for-big-battery-in-australia/

Example (1b):

location. Proximal to existing or proposed substations, planned development of hyperscale campuses with 1000MW of potential capacity.

Key facts:

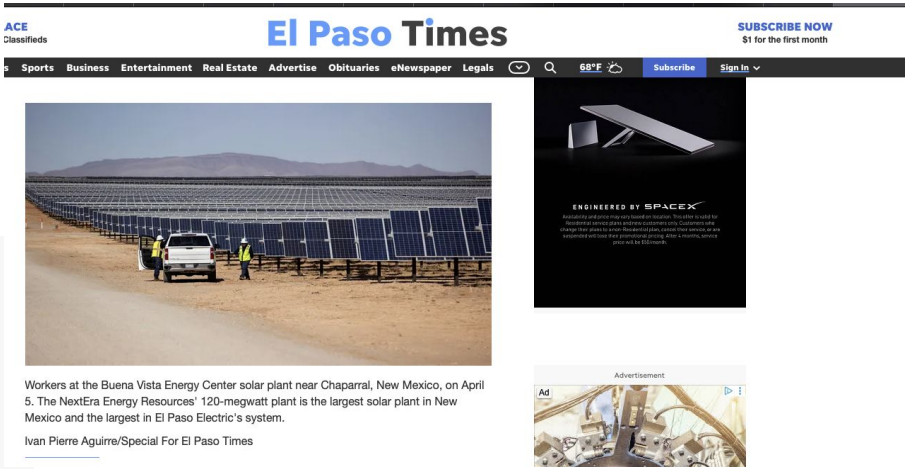
- Increasing solar resulting in negative midday pricing trough
- Arbitrage model via a single charging cycle to buy at noon and sell at evening peak
- Fundamental to increasing renewable generation and strengthening grid near population centers, helping smooth the duck curve

Developing data center and solar + storage projects for over 200MW.
Location: Southern New Mexico
Power: Grid power with solar and storage

Key facts:

- Development in partnership with a NM state entity
- Number of tenants on-site requiring secure data and compute power
- Developing solar generation and BESS to provide renewable power with backup to tenants and datacenter

https://www.greendatacenters.com/projects/



Workers at the Buena Vista Energy Center solar plant near Chaparral, New Mexico, on April 5. The NextEra Energy Resources' 120-megwatt plant is the largest solar plant in New Mexico and the largest in El Paso Electric's system.

Ivan Pierre Aguirre/Special For El Paso Times

https://www.elpasotimes.com/picture-gallery/money/2023/04/06/el-paso-electric-solar-portfolio-grows-nextera-energy-resources-buena-vista-energy-center-new-mexico/11612041002/

In this case the project is attributed to NextEra Energy not Green Data Centers

Example (1c):

location. Proximal to existing or proposed substations, planned development of hyperscale campuses with 1000MW of potential capacity.

Key facts:

- Increasing solar resulting in negative midday pricing trough
- Arbitrage model via a single charging cycle to buy at noon and sell at evening peak
- Fundamental to increasing renewable generation and strengthening grid near population centers, helping smooth the duck curve

Developing data center and solar + storage projects for over 200MW.
Location: Southern New Mexico
Power: Grid power with solar and storage

Key facts:

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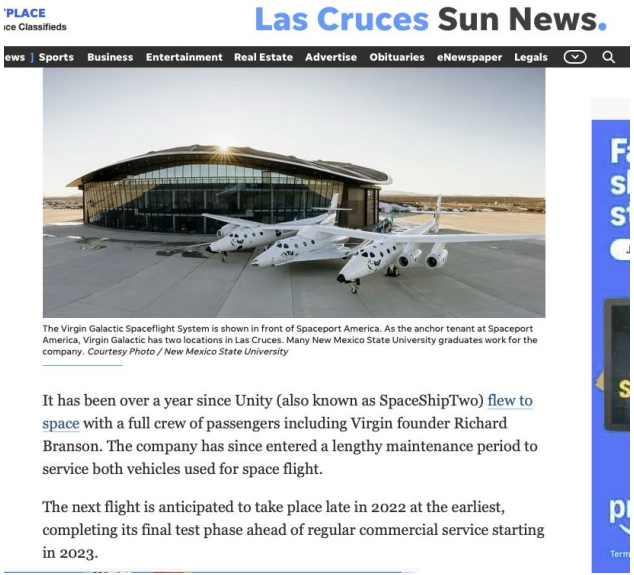
- Number of tenants on-site requiring secure data and compute power
- Developing solar generation and BESS to provide renewable power with backup to tenants and datacenter

https://www.greendatacenters.com/projects/

Construction of Space Port America is credited to Foster + Partners
Source:https://www.fosterandpartners.com/projects/spaceport-america



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The Virgin Galactic Spaceflight System is shown in front of Spaceport America. As the anchor tenant at Spaceport America, Virgin Galactic has two locations in Las Cruces. Many New Mexico State University graduates work for the company. *Courtesy Photo / New Mexico State University*

It has been over a year since Unity (also known as SpaceShipTwo) flew to space with a full crew of passengers including Virgin founder Richard Branson. The company has since entered a lengthy maintenance period to service both vehicles used for space flight.

The next flight is anticipated to take place late in 2022 at the earliest, completing its final test phase ahead of regular commercial service starting in 2023.

https://www.lcsun-news.com/story/news/local/spaceport/2022/08/02/virgin-galactic-building-guest-facilities-in-sierra-county-new-mexico/6538905000 7/

Example (1d):

https://www.greendatacenters.com/projects/

This photo is from Revelstok Dam built in 1983 by BC Hydro

Revelstoke Dam

9 languages

Article Talk | Read Edit View history Tools

From Wikipedia, the free encyclopedia

Coordinates: 51°02′58″N 118°11′38″W

Revelstoke Dam, also known as **Revelstoke Canyon Dam**, is a hydroelectric dam and gravity dam) spanning the Columbia River, 5 km (3.1 mi) The powerhouse was completed in 1984 and has an installe were installe initially, with one additional unit (#5) having come o the dam is named Lake Revelstoke.[3] The dam is operated by BC Hydro.

History [edit]

Construction of Revelstoke Dam started in 1978, and was completed in 1983.[4]

Areas inundated by the dam include the Dalles des Morts or "Death Rapids", which was the stretch of canyon just above the dam's location, and various small localities along the pre-inundation route of the Big Bend Highway, which was the original route of the Trans-Canada Highway until the building of its Rogers Pass section. Just below the dam was the location of La Porte, one of the boomtowns of the Big Bend Gold Rush and the head of river navigation via the Arrow Lakes and the Columbia River from Marcus, Washington.

Revelstoke Dam

Location within British Columbia

Location Revelstoke, Canada

Appearance hid

Text
- Small
- Standard
- Large

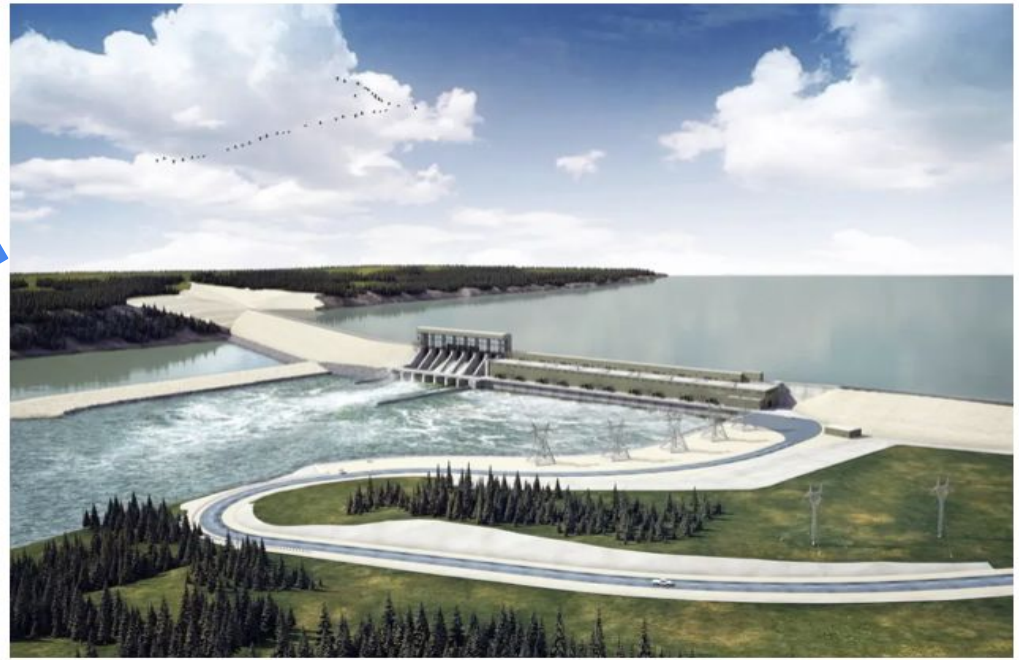
Width
- Standard
- Wide

Color (beta)
- Automatic
- Light
- Dark

Example (1e):

https://www.greendatacenters.com/projects/

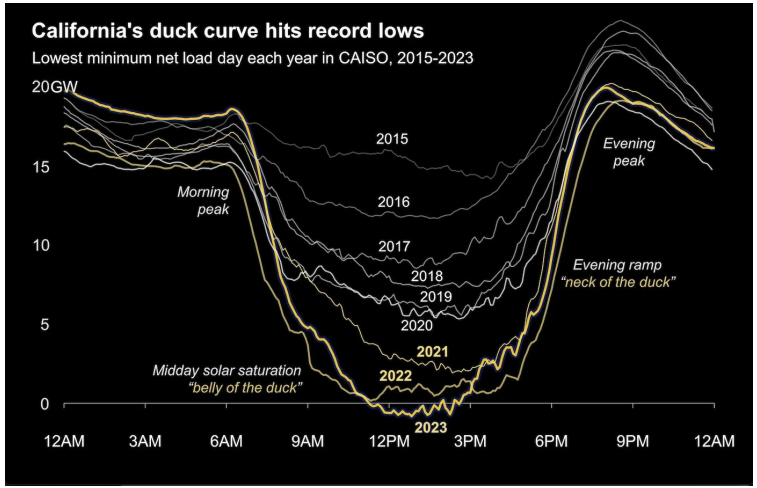
This is CONAWAPA Dam and this is and artist rendering from 2010 not even a built dam!

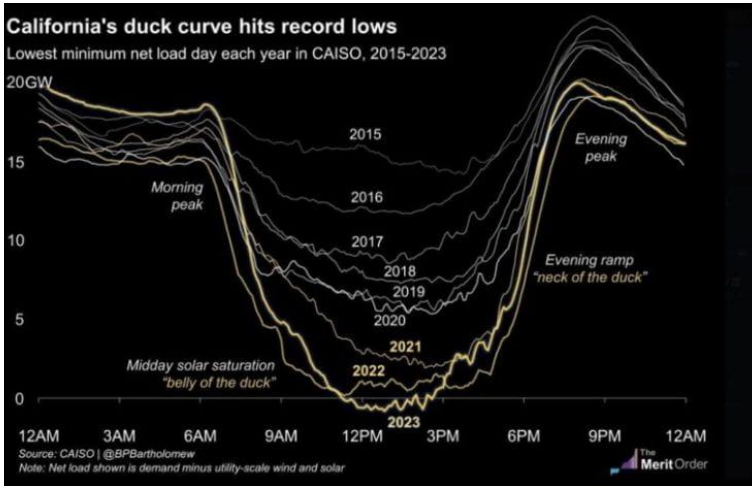


Manitoba Hydro/submitted
An artist's rendering of the proposed Conawapa hydroelectric dam from 2010.

Source:
https://www.winnipegfreepress.com/opinion/analysis/2025/10/06/the-case-for-restarting-the-conawapa-hydro-project

(2) What about the “data”presented in the Green Data Center website?





Left: the version of the plot shown on the website of Green Data Centers.
Right: The original version of the plot published in an article by the University of Washington in June 2023. Notice how the original article clearly credits the source of the image, while the version used by Green Data Centers appears to be cropped, removing the original attribution. The University of Washington article, *“How Would EV Charging Demands Affect the Electric Grid in California,”* was published on June 15, 2023.

02

Data Centers & back-of-the-envelope calculations

Examining Three Claims by Green Data Centers

KOAT | Updated: 11:18 AM MDT Jun 4, 2026 | Editorial Standards ⓘ

Sasha Lenninger

Reporter/Anchor

SOCORRO COUNTY, N.M. — New Mexico Tech announced it will no longer pursue the construction of a green data center in Socorro County, citing complex issues and concerns raised by residents during recent town halls.

The proposed facility would have generated 2 gigawatts of continuous power using solar panels and battery storage across 10,000 acres. However, many residents expressed concerns about the environmental impact of the project. 1

Q4. How much water will the data center use?

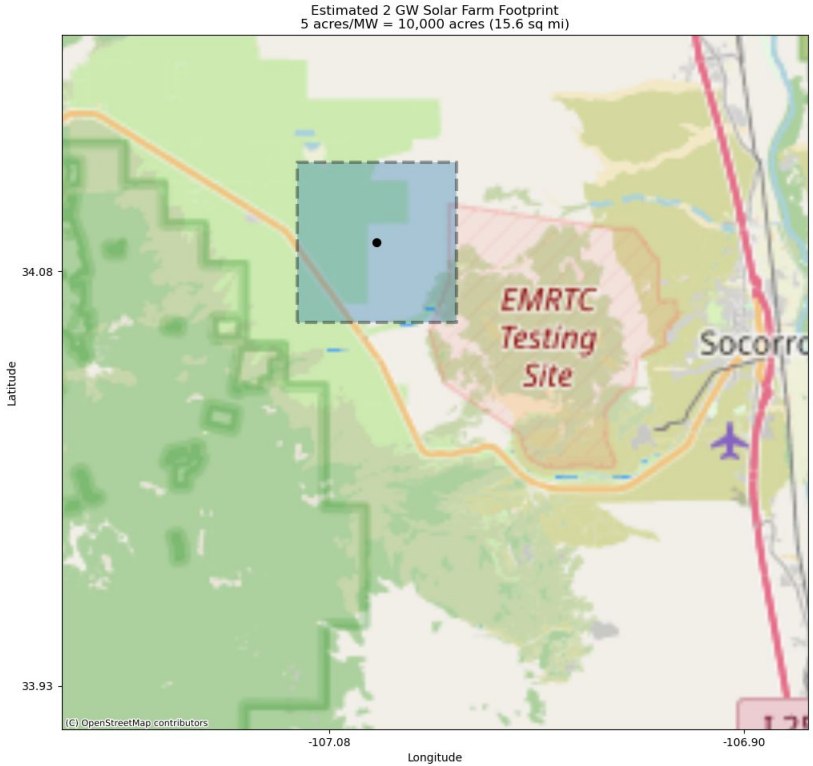
A. Based on current planning assumptions and capacity targets, we are evaluating water demand in the range of 6 million gallons in total to fill the data center over 7-8 years. As the design and engineering process progresses, this estimate will continue to be refined. For scale: a 10 MW building requires roughly a 30,000-gallon initial fill, and that water is then reused continuously over the course of the year. Thirty thousand gallons is approximately the volume used in a single August month to water the front and back lawn of a typical 0.25-acre residential home. 2

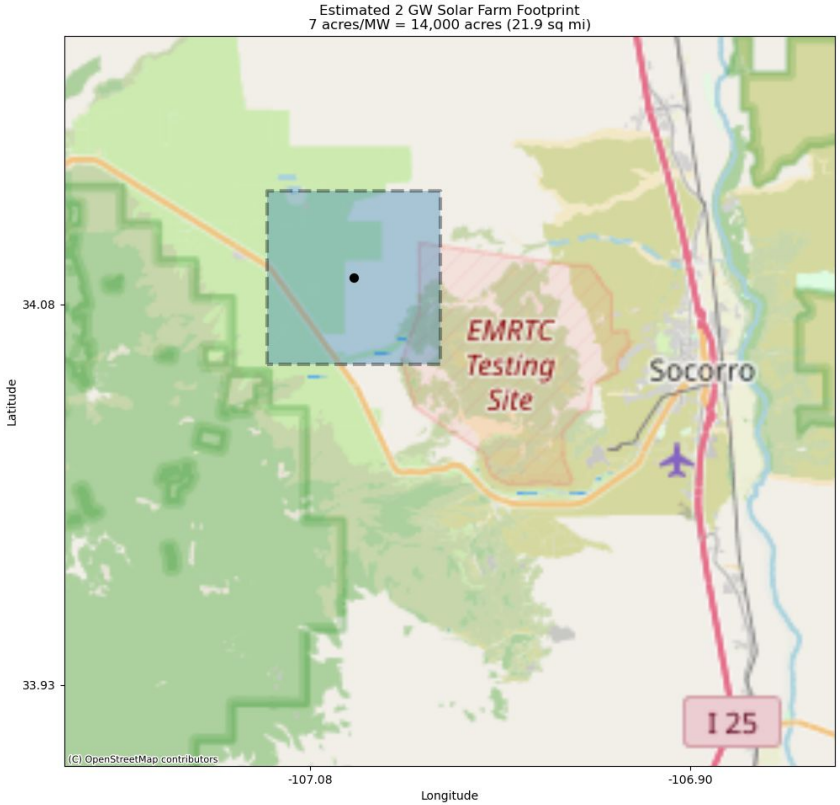
Our project is designed around on-site atmospheric water generation (AWG) and a closed-loop air cooling system. 3

Source: https://www.dchieftain.com/news/green-data-centers-socorro-community-faq-10/3040464

Land usage

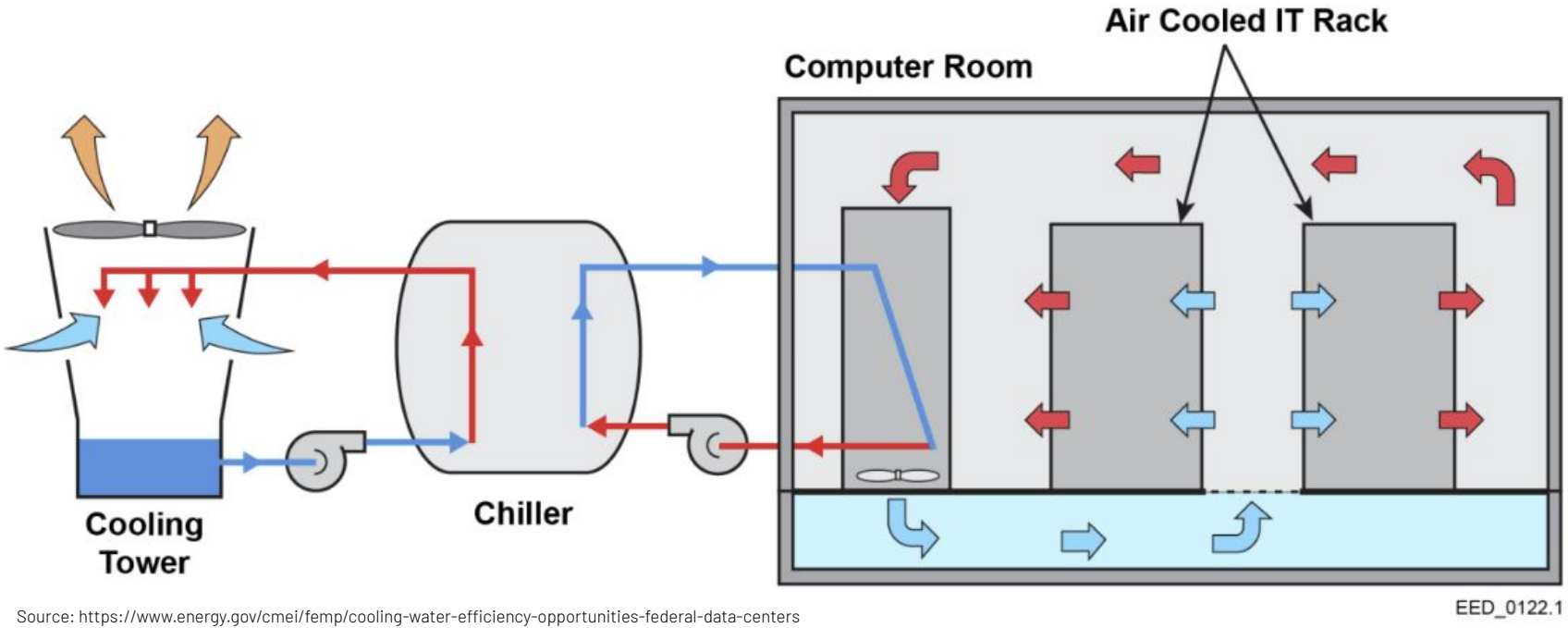
- Solar farms typically require 5–7 acres per MW [1].





[1] https://seia.org/initiatives/land-use-solar-development/

Water usage: Typical cooling system of a Data Center



Source: https://www.energy.gov/cmei/femp/cooling-water-efficiency-opportunities-federal-data-centers

Atmospheric Water Generation: Capacity

Assuming all electrical power is converted to heat and removed through water evaporation:

Latent heat of vaporization of water:

$L=2.26 \times 10^6$ J/kg

Power dissipated by data center:

$P=2 \times 10^9$ J/s

Water evaporation rate:

$m' = P \div L = (2 \times 10^9 \text{ J/s}) \div (2.26 \times 10^6 \text{ J/kg})$

= 885 kg/s

Convert to gallons:

885 kg/s ÷ 3.785 kg/gal

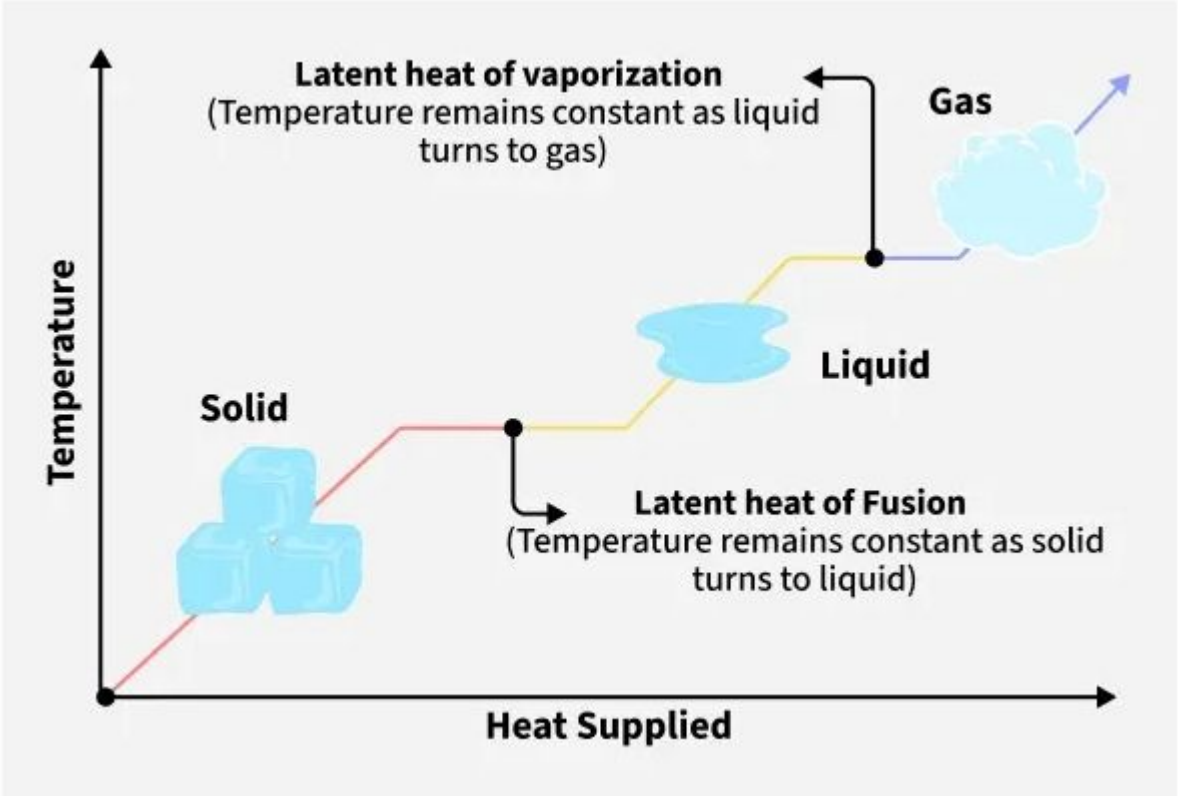
= 234 gal/s

Convert to daily consumption:

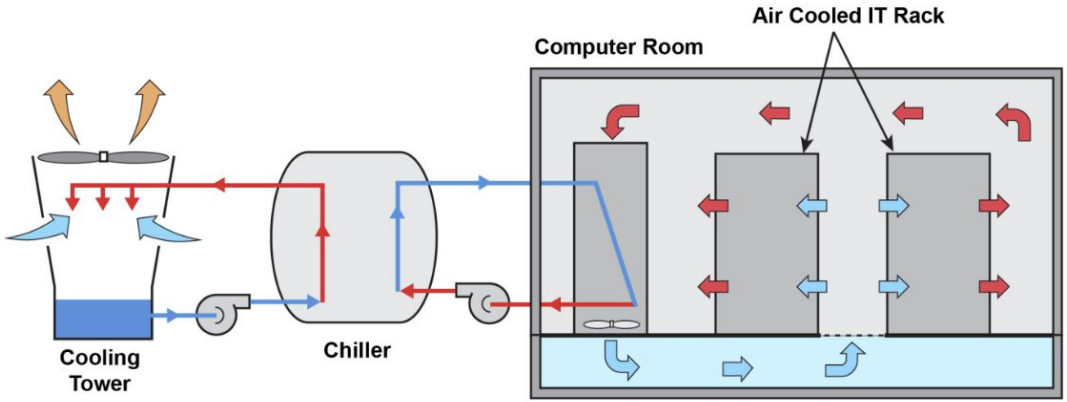
234 gal/s × 86,400 s/day

= 20 million gal/day (Albuquerque ~ 80 million gal/day*)

*https://uswateralliance.org/resources/one-water-spotlight-albuquerque-new-mexico/



Atmospheric Water Generation: Capacity



Other water consumption considerations

- Closed-loop cooling system fill volume
- Evaporative losses
- Blowdown and water treatment
- Leaks and maintenance refills

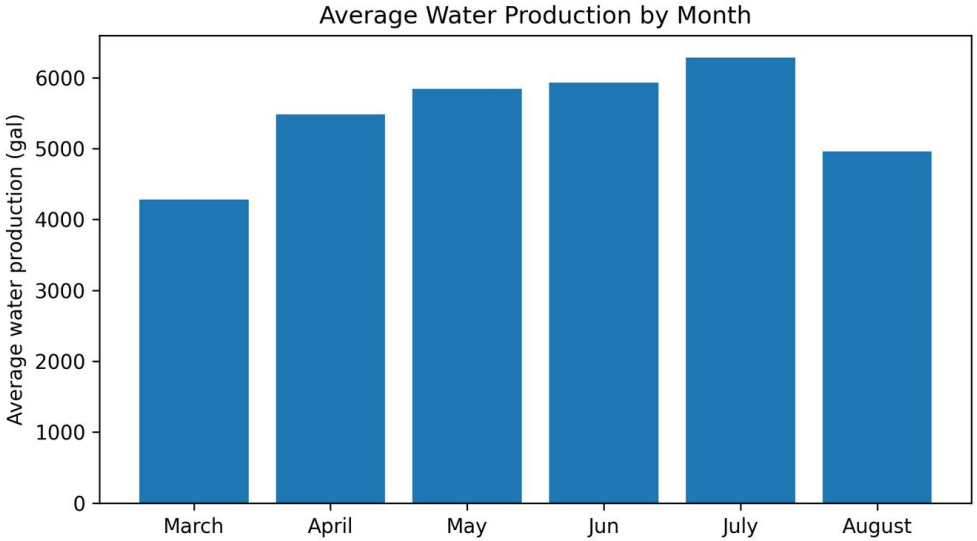
- The claimed 6 million gallons over 7–8 years corresponds to only ~2,000–2,400 gallons per day.
- Evaporating 2,000 gallons per day removes only about 0.2 MW (200 kW) of heat.
- Therefore, the claimed 6 million gallons appears more consistent with a cooling system that is significantly more water-efficient than pure evaporative cooling.
- However, improving water-use efficiency generally requires greater reliance on chillers, fans, pumps, and dry coolers, **increasing the facility's electrical power consumption and, consequently, the required solar array footprint.**

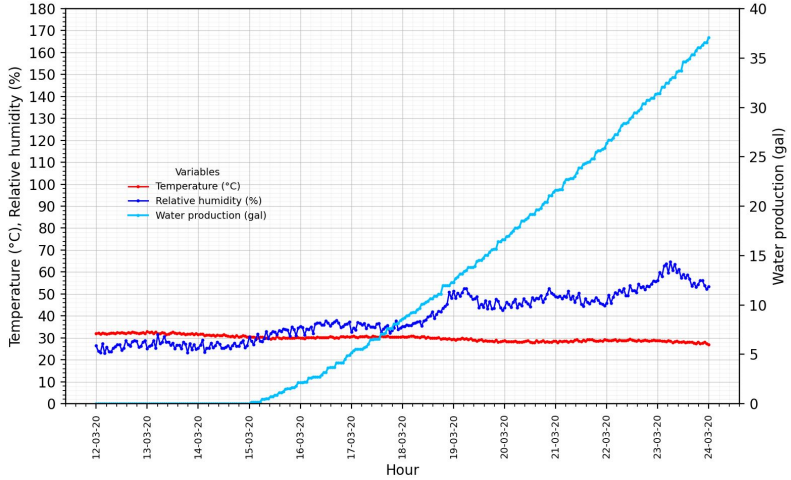
Q4. How much water will the data center use?

A. Based on current planning assumptions and capacity targets, we are evaluating water demand in the range of 6 million gallons in total to fill the data center over 7-8 years. As the design and engineering process progresses, this estimate will continue to be refined. For scale: a 10 MW building requires roughly a 30,000-gallon initial fill, and that water is then reused continuously over the course of the year. Thirty thousand gallons is approximately the volume used in a single August month to water the front and back lawn of a typical 0.25-acre residential home.

Our project is designed around on-site atmospheric water generation (AWG) and a closed-loop air cooling system.

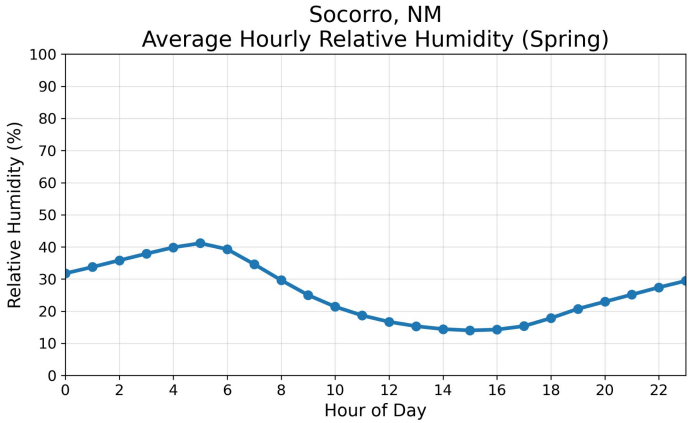
Atmospheric Water Generation

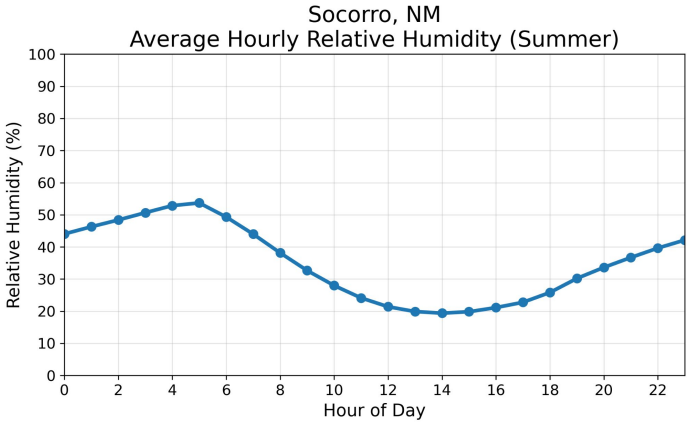


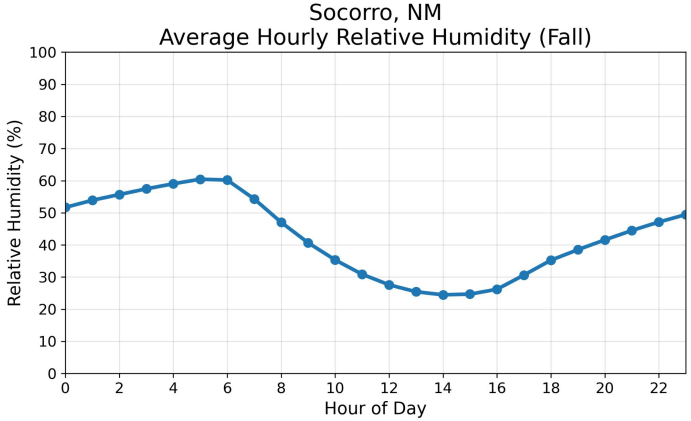


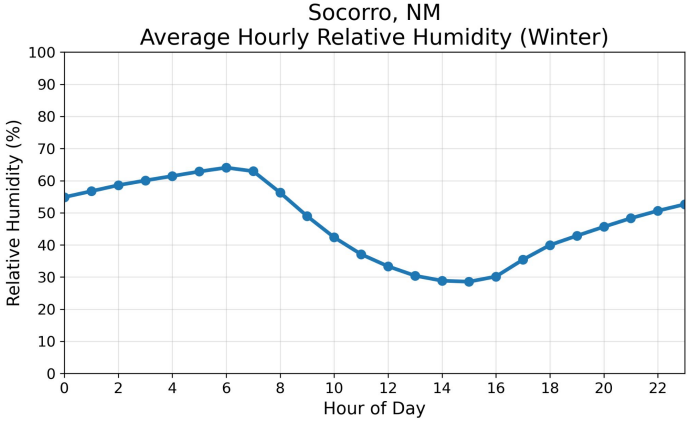
Credit: R. Oliveros-Villanueva, J. C. Velez and A. Gonzalez-Quiroga, "Enhancing Water Security in La Guajira, Colombia, through Atmospheric Water Harvesting," *2023 IEEE Colombian Caribbean Conference (C3)*, Barranquilla, Colombia, 2023, pp. 1-6, doi: 10.1109/C358072.2023.10436126.

Relative Humidity in Socorro



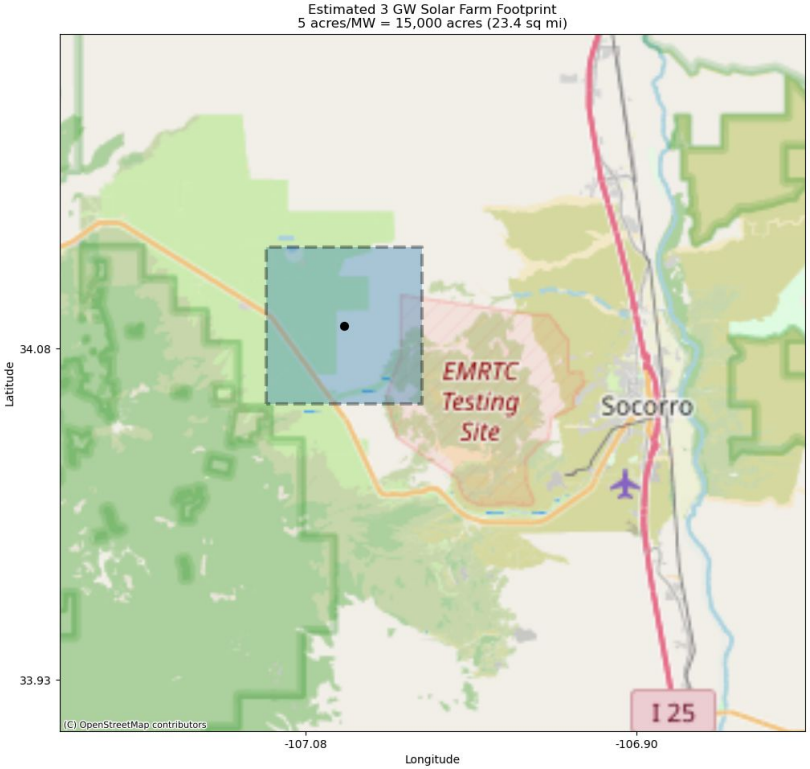






Data retrieved from:
https://www.ncei.noaa.gov/access/search/data-search/local-climatological-data

Atmospheric Water Generation



- Watergen GEN-L specifications: Produces up to 6,000 L/day (1,585 gal/day), consumes approximately 60 kW nominal power (90 kW peak), and requires about 350 Wh/L of water produced.
- Watergen units required for 20 million gal/day: ~12,600 GEN-L units.
- 20 million gal/day from AWG: ~1.1 GW continuous electrical load.
- AWG producing 20 million gal/day would increase the total load to approximately 3.1 GW.

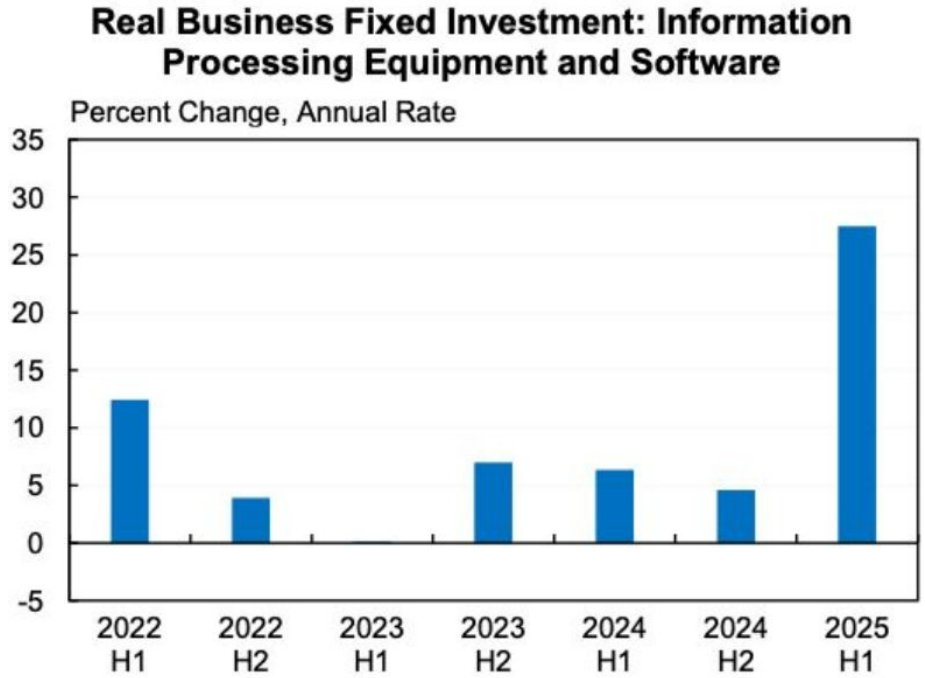
Credit: www.watergen.com

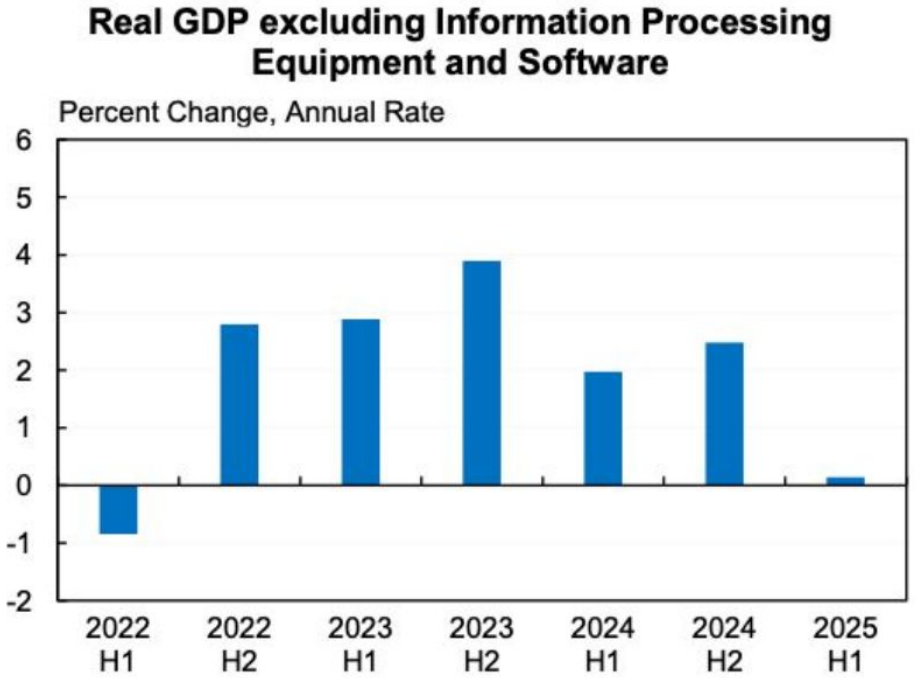
03

Data Centers & Finance

GDP Growth

Jason Furman (Harvard economist and former Chair of the U.S. Council of Economic Advisers) reported that information processing equipment and software represent 4% of GDP but accounted for 92% of GDP growth in the first half of the year. Excluding these sectors, GDP growth was only 0.1% in 2025

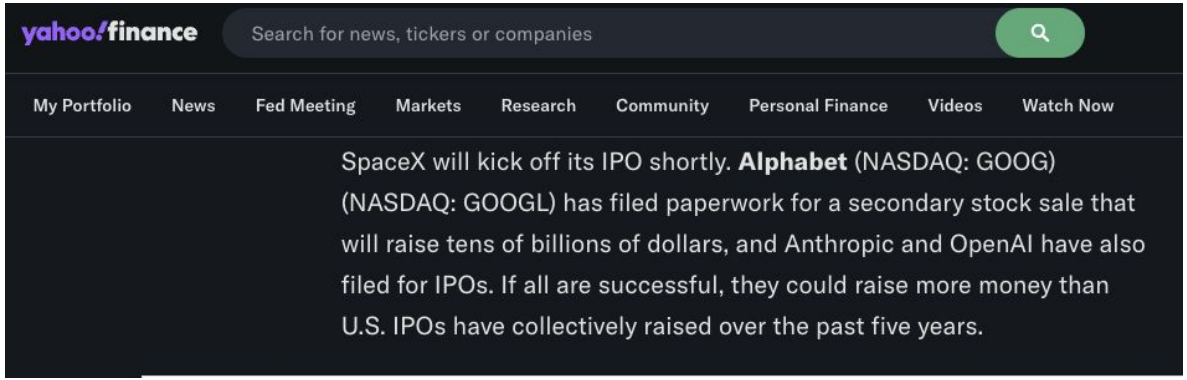




Credit: Professor Jason Furman

Why Are AI Companies Going Public?

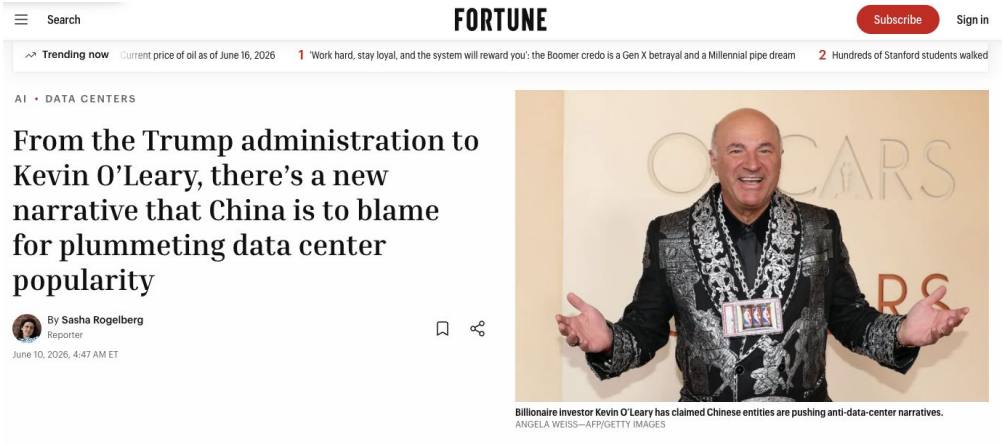
- AI companies require **billions of dollars** to build data centers and buy specialized computer chips.
- Many of today's leading AI companies are **spending more money than they earn** as they race to build more powerful AI systems.
- Going public allows them to **raise money from millions of investors**, not just a handful of private investors.
- Many Americans may become investors **without realizing it** through their **401(k)** or retirement funds.
- Large index funds automatically purchase shares of companies added to major stock indexes.
- Supporters argue this helps fund innovation and future economic growth.
- Critics argue it shifts more of the financial risk from private investors to the general public.



04

Data Centers & Ethics

AI Race against China



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AI • DATA CENTERS

From the Trump administration to Kevin O'Leary, there's a new narrative that China is to blame for plummeting data center popularity

By Sasha Rogelberg
Reporter

June 10, 2026, 4:47 AM ET

Billionaire investor Kevin O'Leary has claimed Chinese entities are pushing anti-data-center narratives.
ANGELA WEISS—AFP/GETTY IMAGES

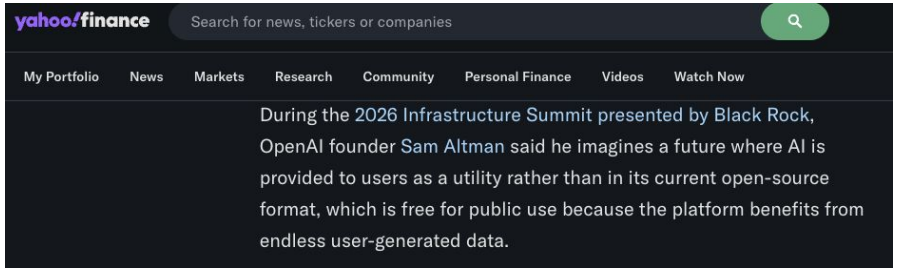
"I think this is insane. It's like selling nuclear weapons to North Korea and then bragging that Boeing made the casing." — Dwarkesh Patel, Independent Technology Journalist

Exclusive: US clears H200 chip sales to 10 China firms as Nvidia CEO looks for breakthrough

By Reuters

May 14, 2026 7:48 AM GMT+2 · Updated 2 hours ago

What have AI CEOs said?



TECH

A.I. may replace most of today's jobs, but this start-up investor sees global GDP increasing 50 percent a year within decades

PUBLISHED TUE, FEB 26 2019·12:09 PM EST | UPDATED WED, FEB 27 2019·11:12 AM EST

Matt Rosoff

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"Citizens will be on their best behavior, because we're constantly recording and reporting everything that is going on."
— Larry Ellison, September 2024

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AI

Jensen Huang says he would be 'deeply alarmed' if his $500,000 engineer did not consume at least $250,000 of tokens

05

Takeaways

Other Considerations

01 Noise Pollution

02 Light Pollution

03 CO2 Emissions

04 Long-term jobs

05 Water pollution

Takeaways

Technical Considerations	• Is the company an established operator, or mainly a real estate speculator? • Can the proposed numbers be backed up with a back-of-the-envelope calculation? • Is the company transparent enough to share basic technical specifications?
Financial Considerations	• Should our economy become so dependent on a single industry? • How can we better protect our retirement savings?
Ethical Considerations	• What kind of future do we envision?

Organize your community and encourage local officials to adopt responsable regulations that protect our future and our environment.