TESTIMONY OF STEPHEN E. PETTY, P.E., C.I.H., C.S.P.

JUNE 1, 2026

My name is Stephen Petty. I wish to thank the committee and Stephanie Stock for the opportunity to support the proposed bill regarding Data Centers.

My remarks will briefly cover the following topics:

- Brief review of my Qualifications
- Data Centers – An Overview
- Water and Wastewater Sources and Discharges
- Chemical/Biological Emissions & Concentrations
- Closing Remarks

Qualifications:

- B.S. and M.S. Chemical Engineering (both with honors) & MBA (1st in Class)
- Sr. Research Scientist, Battelle & Columbia Gas (~10 years each)
- Founder and President of EES Group, Inc. (30 years).

I am a Certified Industrial Hygienist (C.I.H. – Health and Safety Expert); Professional Engineer in 6 states (OH, PA, KY, WV, FL, and TX) and a Certified Safety Professional (C.S.P. – OSHA Expert).

I have nine (9) US Patents and served as an Adjunct Professor at Franklin University teaching their environmental and geology courses.

I have sampled for legionella, mold, bacteria, nerve agent, biotoxins, asbestos, and dozens of organic chemicals. I even sampled the Columbus Blue Jackets locker rooms to determine why they were repeatedly getting sick.

I wrote Textbook on Forensic Engineering (2 editions – 2013 and 2023) for the insurance industry for disputed claims based on ~10,000 projects.

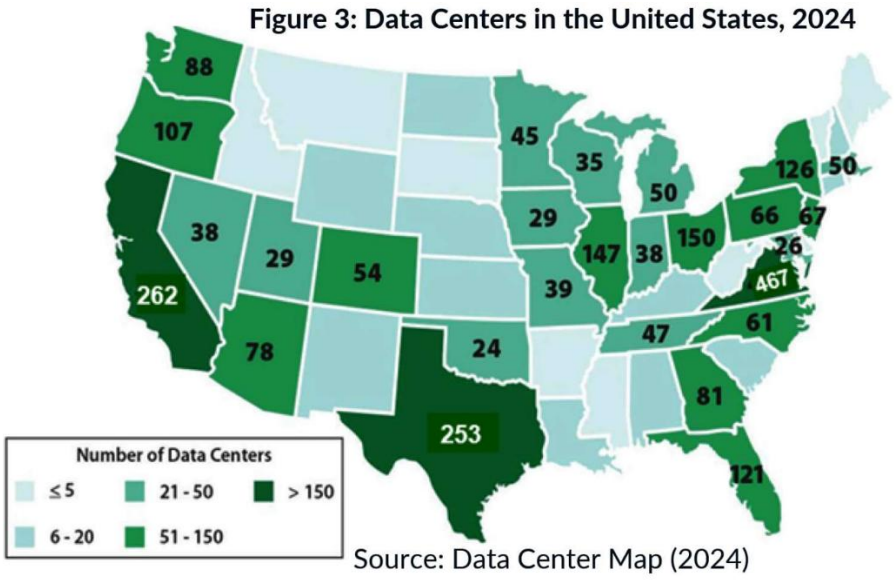
I have served as an exposure, warnings, and standard of care expert witness on nearly 400 cases (includes benzene, PFAS (forever chemical), C-8, silica, and most recently the ongoing East Palestine, OH derailment case.)

Data Centers:

There are many existing data centers and many more coming:

Map of Data Centers Across the US[1]

Data Centers – 2026 – 191 in Ohio



Data Centers – 2024 – 150 in Ohio

For Ohio, the number of Data Centers has increased from 150 to 191, an increase of 41, or 27% in 2 years.

While it is undisputed that these data centers will bring increased tax revenue and some jobs to communities, what is often lost is the downstream costs to these communities with regards to electricity, water, and wastewater costs, and potential damage to the environment.

Water Consumption:

These Data Centers Consume Lots of Water that is Needed to Cool Computer Chips & To Cool Electric Powerplants:

Using 3,000 as a lower bound for the total number of data centers in North America in 2024, this results in a total water consumption of *21 billion gallons of water* and a discharge of *about 6 billion gallons of wastewater into public waters*.

A *medium-sized data center* might consume on the order of +/- 100 million gallons per year for cooling (if the average American household uses *300 gallons/day*, a mid-size data center would require the equivalent of *~1,000 U.S. households annually*).

Large hyperscale facilities (think of the huge cloud data centers) can use 1 to 5 million gallons of water per day under peak conditions. At the upper end (*5 million gal/day*), that is as much water in a day as a town of 30,000–50,000 people would use.

Elephant in the Room:

Reality: *Water Quality* and *Wastewater* are the "elephants in the room."

While everyone talks about how many gallons, fewer talk about what's in the water and where it goes.

Data centers that use water for cooling, produce substantial wastewater – which can contain treatment chemicals (biocides, anti-corrosion agents), concentrated minerals (scale), and even heavy metals picked up from the system.

If this discharged water is not managed properly, it can pollute local waterways or overburden sewage treatment plants

Categories of Pollutants of Concern and their Concentrations:

Contaminant Category	Contaminants	Concentration Range	Health Impact	Reference
Biocides	Isothiazolinones, Glutaraldehyde	0.1-1.0 mg/L	Allergies, skin irritation	[6], [7]
Corrosion Inhibitors	Phosphates, Molybdates	0.5-10 mg/L	Eutrophication (affects marine life)	[6], [7]
Heavy Metals	Zinc, Copper, Chromium	0.05-2 mg/L	Carcinogenic, affects skin, respiratory system and kidneys	[8]
Total Dissolved Solids	Common dissolved minerals and salts	500-2000 mg/L	Kidney stones, organ stress	[8]

Plus: Legionella from cooling towers & thermally hot (86 F° to 104°F) discharged to streams, rivers, lakes, and wastewater treatment facilities. Plus, emissions from self-powering power plants.

Good News: The Ohio EPA will require permits to install (PTIs) and permits to operate (PTOs), based on Federal Standards, for both water and air emissions.

Bad News: For pollutants not regulated (e.g., Legionella, PFAs, thermal discharges), Ohio EPA will not regulate, and the community will be dependent on the good will of the applicant. History has shown this does not turn out well (e.g., PFAS, C-8, Legionella, bio-toxins, etc.). Thus, the need for regulations to cover these holes.

Potential Solutions: Many of these are reflected in this proposed legislation:

- Minimize community costs by requiring Data Centers to self-power, recycle water, and have their own wastewater treatment facilities.
- Use closed loop cooling cycles (2 for the data center and 1 for the power plant).
- Use air-to-air cooling towers rather than evaporative cooling where 70% to 80% of the water can leave as vapor.
- Utilized technologies such as activated carbon, ion exchange, and reverse osmosis for tertiary cleanup of metals and substances such as PFASs.

Closing:

Please see my attached presentation below for additional information and references.

Thank you for the time to speak and please consider this common-sense legislation to ensure our communities are not stuck with future downstream costs for electricity, water, wastewater, and pollution from unregulated substances and thermal loads.

Stephen E. Petty, P.E., C.I.H., C.S.P.

EES Group, Inc.

June 1, 2026

Primary Objectives of Trial Testimony

- Background and Qualifications – Brief CV
- Summary of Testimony
  - Data Centers – An Overview
  - Water and Wastewater Sources and Discharges
  - Chemical/Biological Emissions & Concentrations
- Questions?

Summary of Qualifications

- B.S. and M.S. Chemical Engineering
- Sr. Research Scientist, Battelle & Columbia Gas
- Certified Industrial Hygienist,
- Professional Engineer
- Certified Safety Professional
- Adjunct Professor, Franklin University
- Nine U.S. Patents

BACKGROUND

- President and Owner of EES Group, Inc. (Forensics Engineering & Expert Witness Company – Since 1996 – ~28 Years). Ohio and Florida Operations.
- Section Manager and Senior Research Engineer, Columbia Gas (10 years).
- Senior Research Engineer, Battelle (10 years).

Professional Organizations

- American Industrial Hygiene Association (AIHA)
- American Board of Industrial Hygiene (ABIH)
- American Conference of Gov. Ind. Hygienists
- American Institute of Chemical Engineers (AIChE)
- American Society of Refrigeration, Air Conditioning and Refrigeration Engineers (ASHRAE)

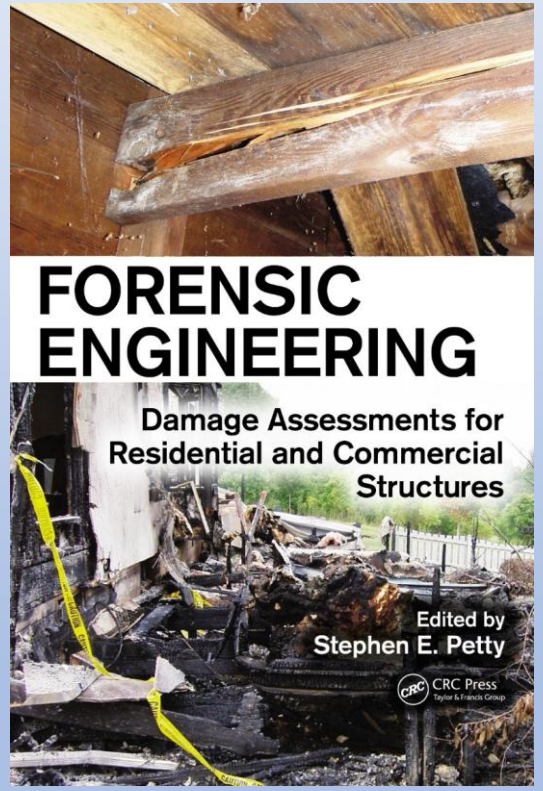
ABIH
american board of industrial hygiene

ACGIH®

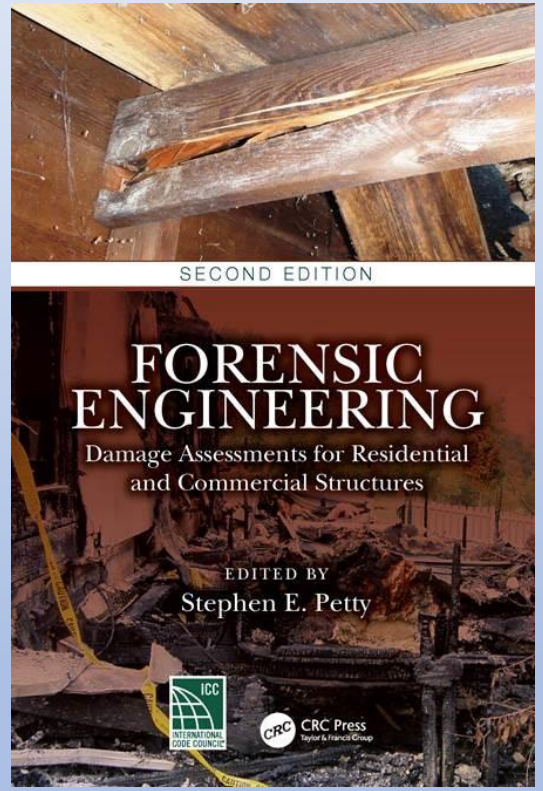
ASHRAE
Advancing HVAC&R to serve humanity and promote a sustainable world

Textbook Author

Wrote Textbook on Forensic Engineering based on 10,000 Projects



First edition (2013)



Second edition (2023)

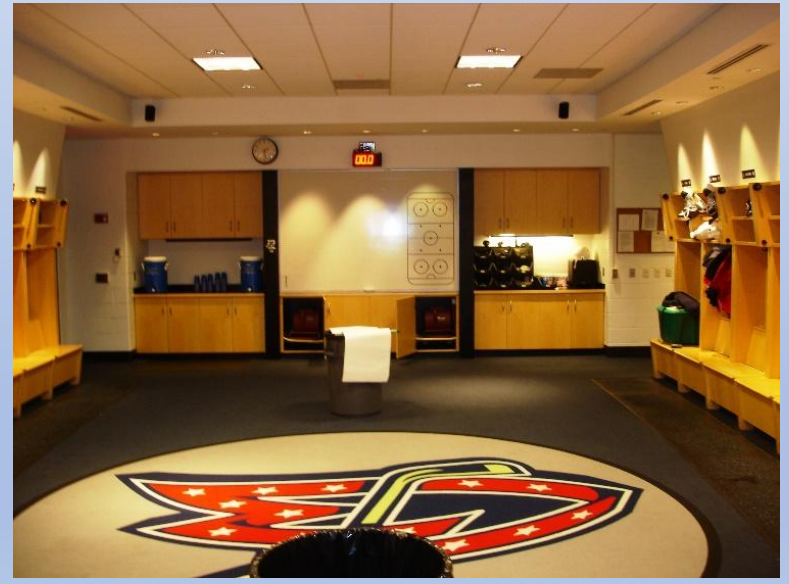
Expert Witness in Major Cases

- Expert Witness in About 400 Cases
- Warnings Opinions in Majority of these Cases
- ~65 Monsanto Roundup Cases
- 4 Forever Chemical Cases (PFAS) – 3M & AFFF Mfg. East Palestine Railroad Case (Dioxins, Furans, PAHs, VOCs)
- More than 100 Benzene Cases (Gasoline, Paints, Inks, Solvent Products)

Testimony Regarding Exposures

Selected to determine exposures and adequacy of warnings on hundreds of projects, examples:

- **Columbus Blue Jackets; Professional Hockey Team – Locker Room IEQ**
- **Allegany Ballistics Lab – Iraqi Docs – Biotoxins, Anthrax, Mold, Bacteria**
- **Columbus College of Art & Design**
- **Scotts Lawn Care Corporate Headquarters**



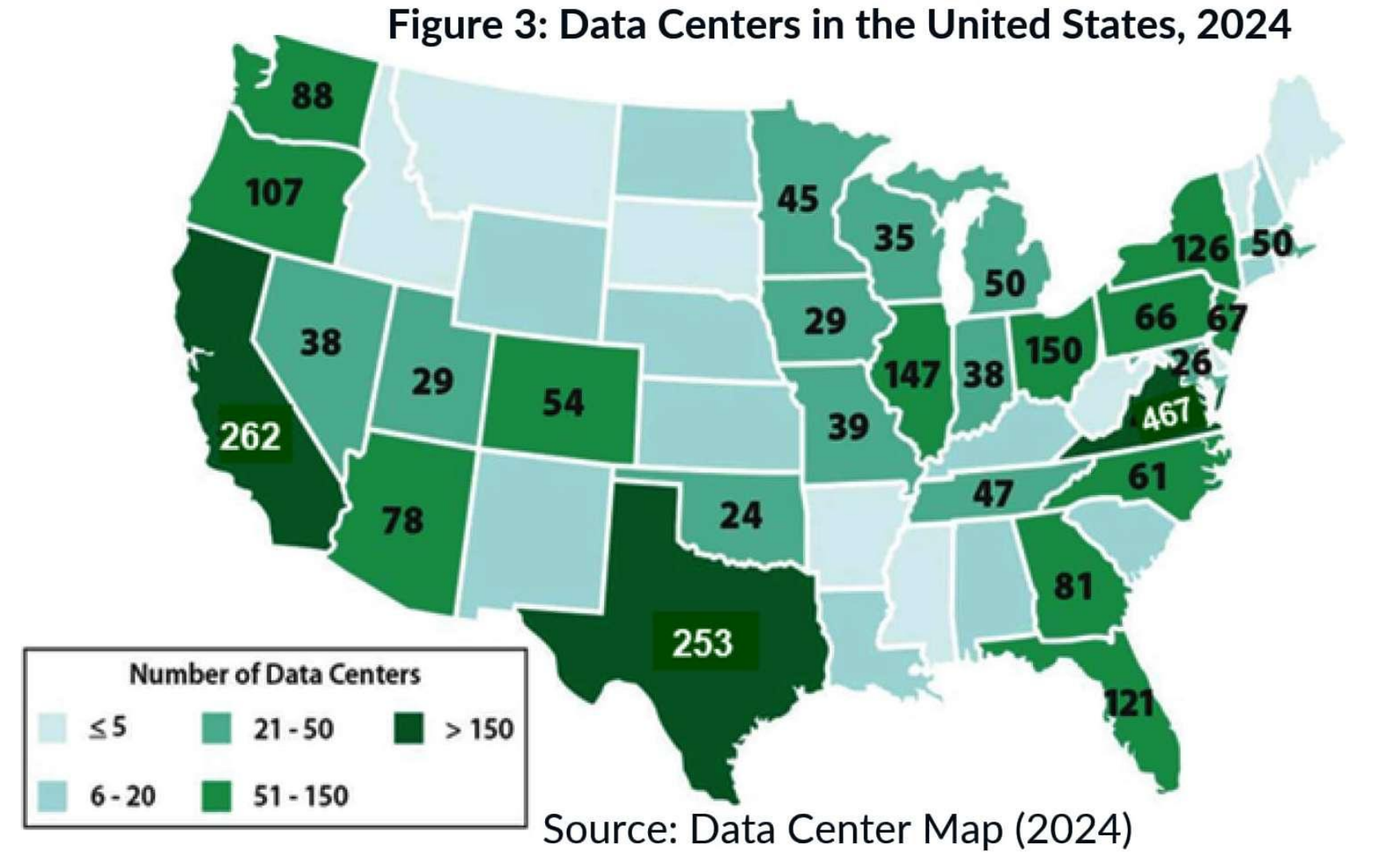
Data Centers

Many Present and Many More Coming

Data Centers – 2026 – 191 in Ohio

Map of Data Centers Across the US[1]

Data Centers – 2024 – 150 in Ohio



Estimate up 41 (150 to 191) in two years – Up 27%

Lots of Water Consumption –

Needed To

Cool Computer Chips &

To Cool Electric Powerplants

Two Areas of Water Usage in Data Centers

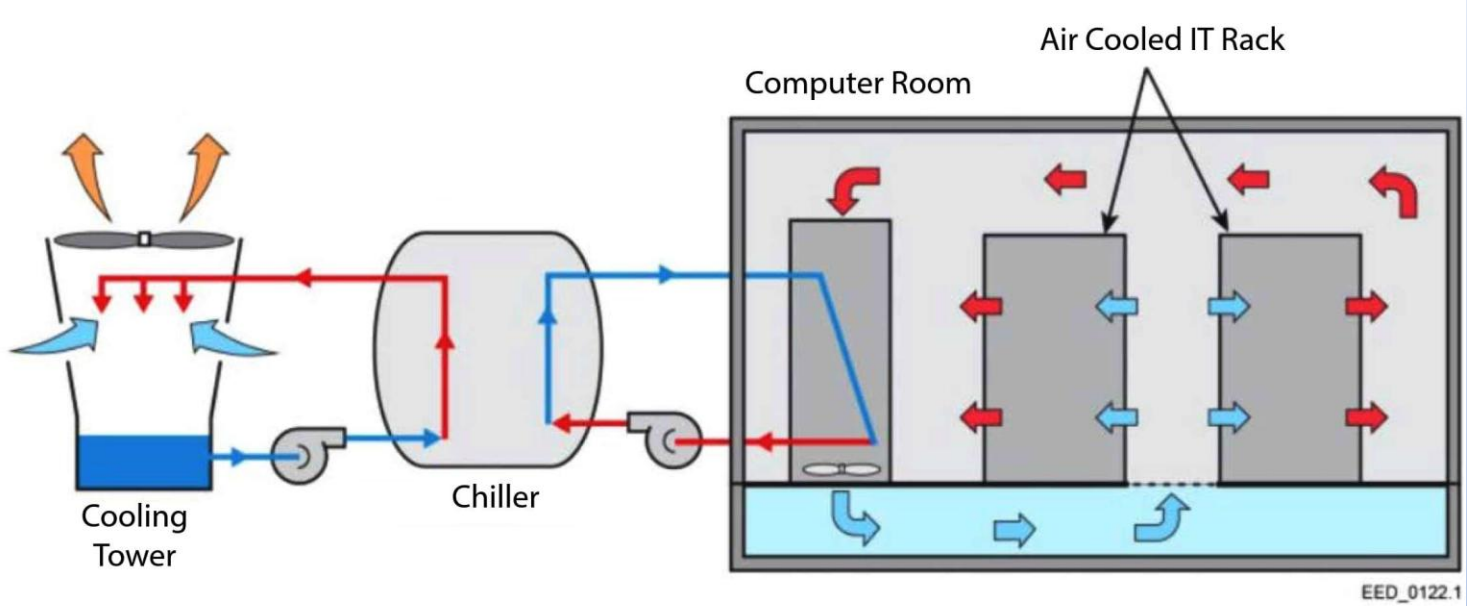
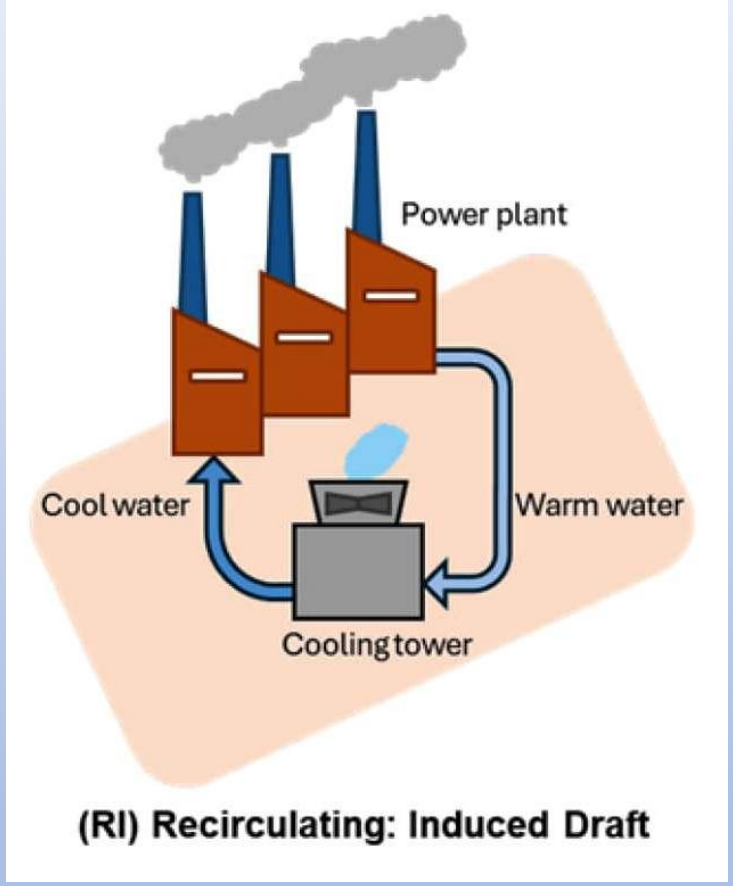


Figure 1: Schematic of a Typical Data Center Evaporate Cooling System
(Source: https://www.energy.gov/femp/cooling-water-efficiency-opportunities-federal-data-centers)

Cooling Chips



Cooling Electric Plant

Water Usage in Data Centers

Category	Details	Estimated Value	Units	References
Overall Water Consumption	Total annual water used by a typical data center	6,870,000	Gallons	Uptime Institue Blog [4]
Wastewater Discharge	Estimated wastewater generated by traditional cooling methods	1,370,000 - 2,060,000	Gallons	Uptime Institue Blog [4]

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Water Usage in Data Centers

A medium-sized data center might consume on the order of +/- 100 million gallons per year for cooling (If the average American household uses 300 gallons/day, a mid-size data center would require the equivalent of ~1,000 U.S. households annually).

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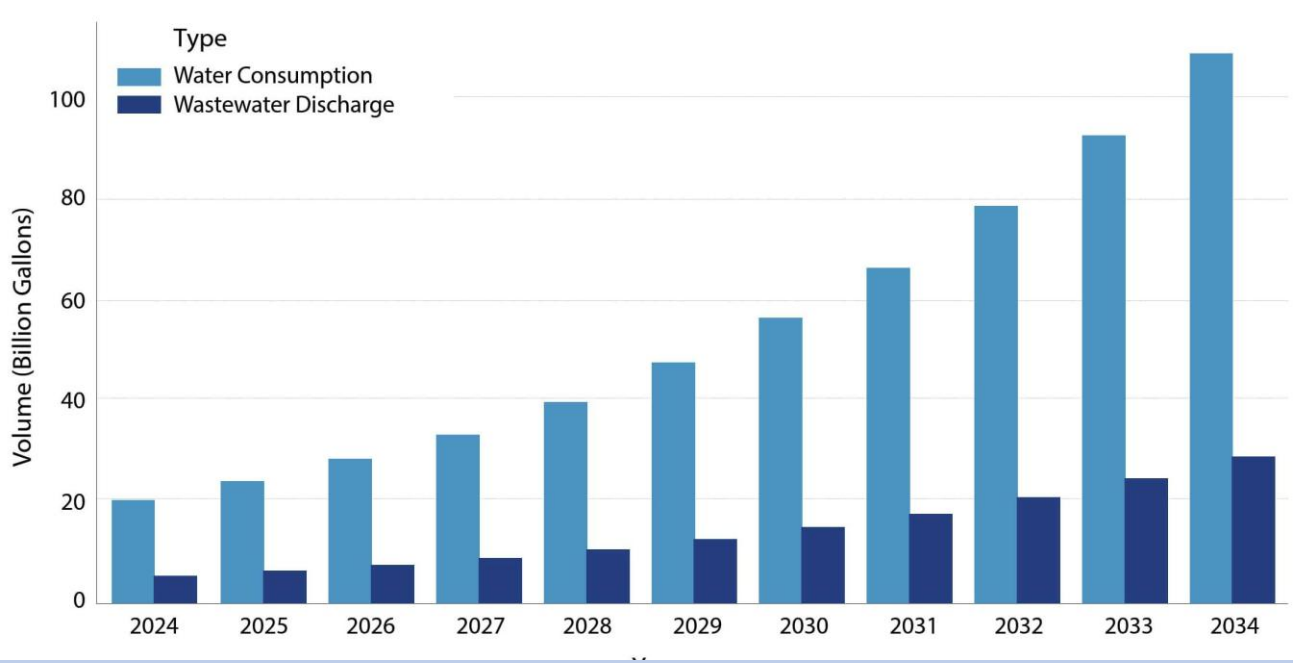

ELEPHANT IN THE ROOM

Reality: Water Quality and Wastewater are the "elephants in the room."

While everyone talks about how many gallons, *fewer talk about what's in the water and where it goes.*

Data centers that use water for cooling produce substantial wastewater – which can contain treatment chemicals (biocides, anti-corrosion agents), concentrated minerals(scale), and even heavy metals picked up from the system.

***If this discharged water is not managed properly, it can pollute local waterways or overburden sewage treatment plants*. In some cases, spikes in discharge from a data center have strained municipal water treatment capacity, raising concerns about water quality for the community downstream.**

CATEGORIES OF DISCHARGES AND POLLUTANTS

CATEGORIES OF POLLUTANTS & DISCHARGES

• **Biocides (i.e., to control Legionella):** These chemicals, such as isothiazolinones and glutaraldehyde, are used to prevent the growth of bacteria and other microorganisms in cooling towers. They can be toxic to aquatic ecosystems if improperly discharged. Legionella, uncontrolled, can itself be an issue.

• **Total dissolved solids (TDS):** The most common effluent from data center cooling systems is a high concentration of dissolved minerals and salts, like chlorides. This can put stress on local wastewater treatment plants, which are often not designed to handle a large volume of these concentrated pollutants.

• **Corrosion inhibitors:** These chemical additives protect cooling equipment but can pollute waterways. Examples include phosphates and molybdates, which contribute to the nutrient overgrowth of algae (eutrophication) and negatively affect aquatic life.

CATEGORIES OF POLLUTANTS & DISCHARGES

• Glycols: Some liquid-cooled systems use ethylene or propylene glycol as a coolant. Ethylene glycol is toxic and can cause serious environmental damage if it leaks or is disposed of incorrectly. This is basically like the antifreeze in your vehicles.

• Per- and polyfluoroalkyl substances (PFAS): Some advanced two-phase immersion cooling systems use refrigerants that fall under the category of PFAS, or "forever chemicals," which are persistent and bioaccumulative in the environment. Last over 1 million years!

• Heavy metals: These can leach from cooling equipment as it corrodes. Examples include zinc, copper, and chromium, which are harmful to both marine life and humans.

POLLUTANT CONCENTRATIONS

Contaminant Category	Contaminants	Concentration Range	Health Impact	Reference
Biocides	Isothiazolinones, Glutaraldehyde	0.1-1.0 mg/L	Allergies, skin irritation	[6], [7]
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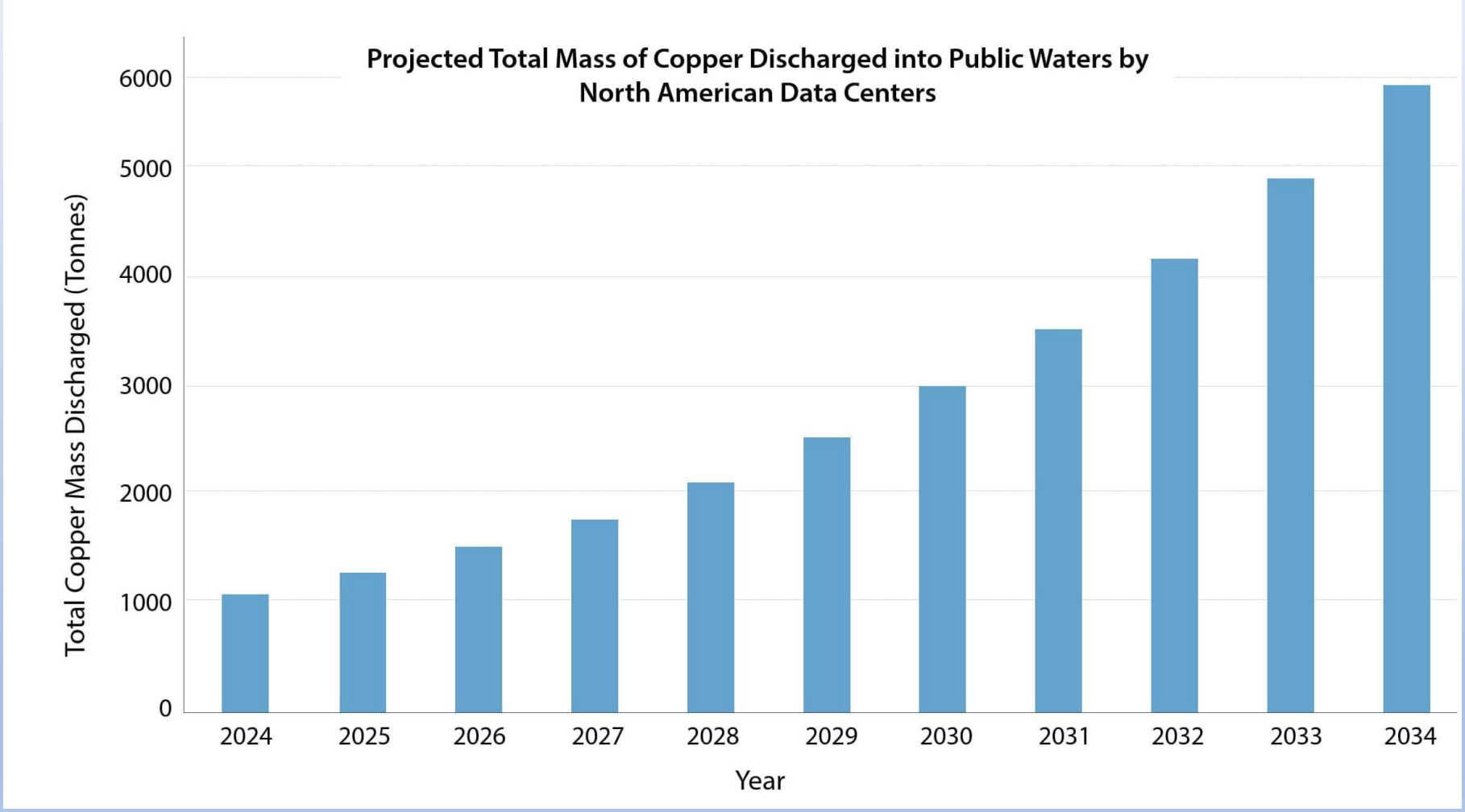
Total Dissolved Solids	Common dissolved minerals and salts	500-2000 mg/L	Kidney stones, organ stress	[8]

POLLUTANT CONCENTRATIONS – Cont.

Pollutant Category	Common Indicators	Typical Concentration Range in Blowdown
Mineral Salts	Total Dissolved Solids (TDS)	1,000 – 5,000 ppm
Scaling Agents	Calcium Carbonate ($CaCO_3$) & Silica (SiO_2)	350 – 800 ppm (Calcium) / <150 ppm (Silica)
Biological Control (e.g., Legionella)	Free Residual Chlorine / Bromine	0.2 – 1.0 ppm
Piping Protection	Total Phosphates	5 – 30 ppm
System Corrosion	Copper & Zinc (Metals)	0.05 – 2.0 ppm
Thermal Energy	Waste Heat	30°C – 40°C (Elevated above ambient) (86 F° to 104° F)

MASSIVE AGGREGATE RELEASES



Copper: Estimated 6,000 Tons Released by 2034.

ANOTHER ISSUE

Thermal Pollution: Data center effluent is usually discharged at a temperature of 30°C to 40°C (86°F to 104°F). If released directly into surface waters without cooling down, it decreases dissolved oxygen levels and harms local aquatic life.

SOLUTIONS

Key: Proactive Monitoring and Control of Emissions from Data Centers (e.g., to control Legionella).

Example Technologies for Water Cleanup:

i) **Activated Carbon**

ii) **Ion Exchange**

iii) **Reverse Osmosis**

THANK YOU

Questions?

References

https://www.datacenterknowledge.com/sustainability/4-strategies-for-eliminating-data-center-water-pollution.

https://ketos.co/discharge-from-ai-data-centers-and-how-to-mitigate-contamination.

https://www.brookings.edu/articles/ai-data-centers-and-water/.

https://www.google.com/search?q=data+center+water+pollutants&newwindow=1&sa=N&sca_esv=b1a695d422d02fcb&sxsrf=ANbL-n6L1YUUqqE3iaD…

Deep Data Center Fact Sheet, January 2026.

https://natureforward.org/data-centers-and-water-use/#:~:text=

https://www.sierraclub.org/sierra/data-centers-have-pfas-problem.

Big Data, Data Centers, and their Environmental Impacts, By: Jim Bowyer, Ph.D, Kathryn Fernholz, Ed Pepke, Ph.D., Harry Groot, and Sarah Harris – Updated 1/27/2026.

Missouri Coalition for the Environment.

https://www.fwpcoa.org/content.aspx?page_id=5&club_id=859275&item_id=130961.

https://www.facebook.com/groups/stopsail/posts/773910585569167/.

https://www.staxengineering.com/stax-hub/tag/quick-read/.

https://www.google.com/search?q=types+and+quantities+of+data+center+water+pollutants+pdf&newwindow=1&sca_esv=b1a695d422d02fcb&sxsrf=…

University of Texas – Austin, TX – COMPASS Program.