



Data Centers: Water and Wastewater Considerations

Climate Resilience and Sustainability Board Workshop



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What will be covered:

- Water considerations
 - Types of data centers
 - Cooling systems
 - Water use factors
 - Water consumption estimates
 - Corporate siting priorities
 - Wastewater concerns



Data Center Types

Typically <50-100MW energy demand

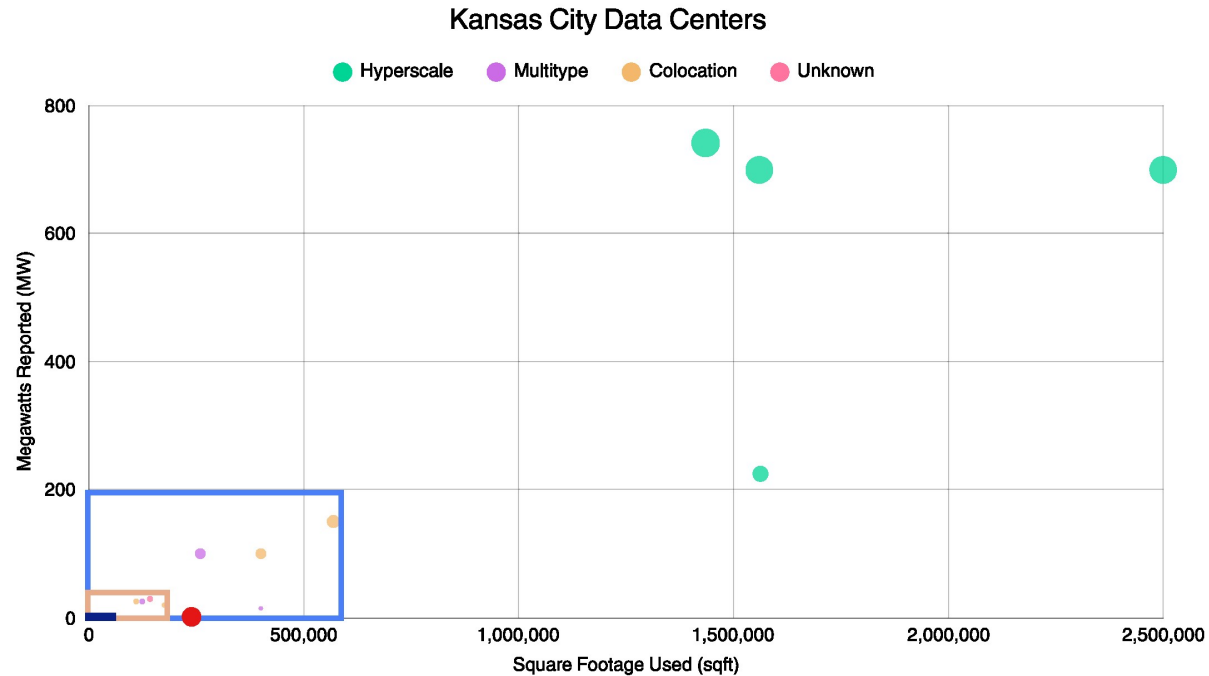
- **Colocation – Small/Medium Scale** = Data centers built by local colocation companies typically providing retail leasing at smaller scale, customer typically owns the hardware and software.
- **Colocation – Large Scale** = Data centers built by major colocation companies providing wholesale and retail colocation leasing at a larger scale, customer typically owns the hardware and software.

Typically >50MW energy demand

- **AI Inferencing** = Data centers that are facilities designed primarily to run trained AI models to generate outputs in real time such as answering queries, processing images, powering chatbots, serving recommendations, or enabling autonomous system decisions.
- **Hyperscale** = Data centers built by companies that deploy internet services and platforms at massive scale.
- **AI Training** = Data centers that are facilities purpose-built for training large AI models, such as deep learning and generative AI models (GPT-class systems). Training involves adjusting billions of parameters and performing massive parallel computations on extremely large datasets.

*There are a variety of data center types and sizes.
Important to consider unintended consequences to smaller types of data centers.*

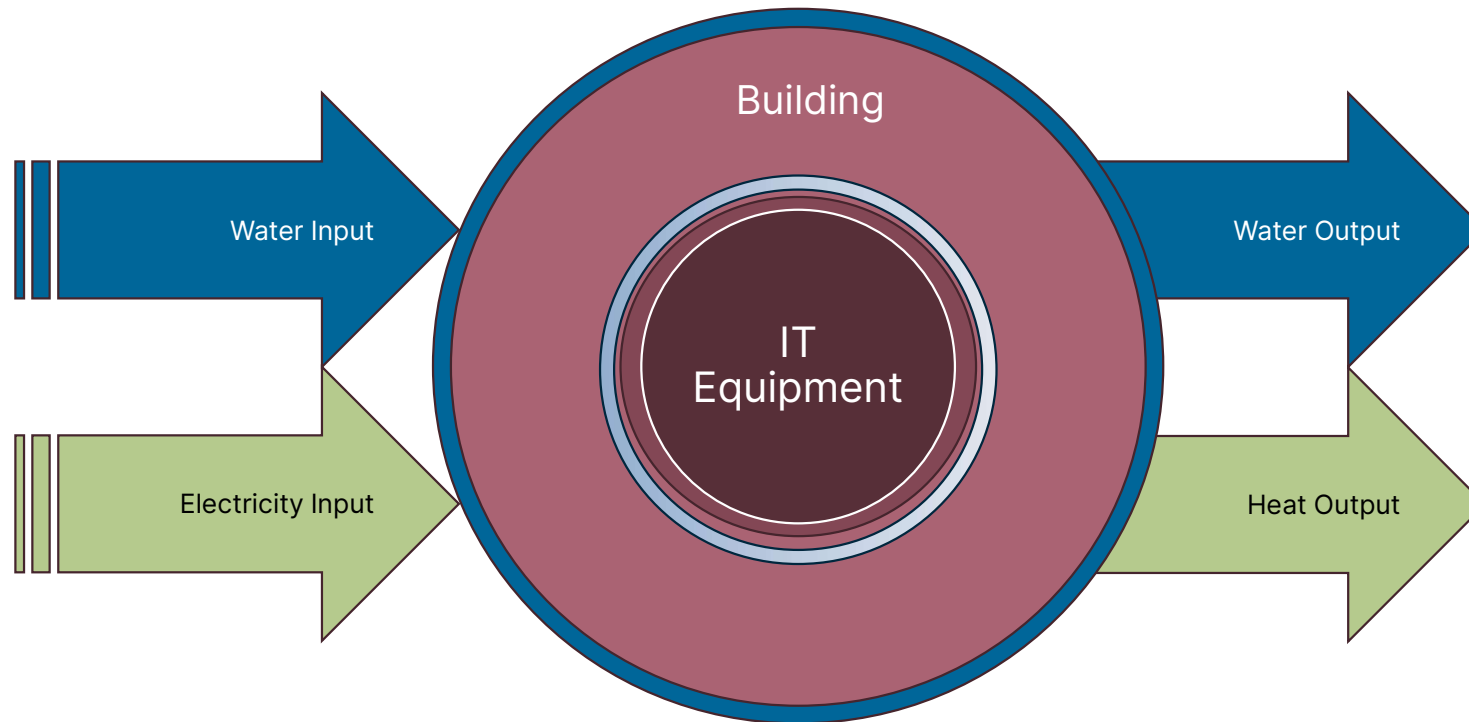
Data Center Facility Size Comparisons



[7-20-26 - Data Center and Complex Site Permitting - SMITH](#)

Hyperscale and AI datacenters are typically much larger than colocation data centers.

Water and Energy Inputs and Outputs

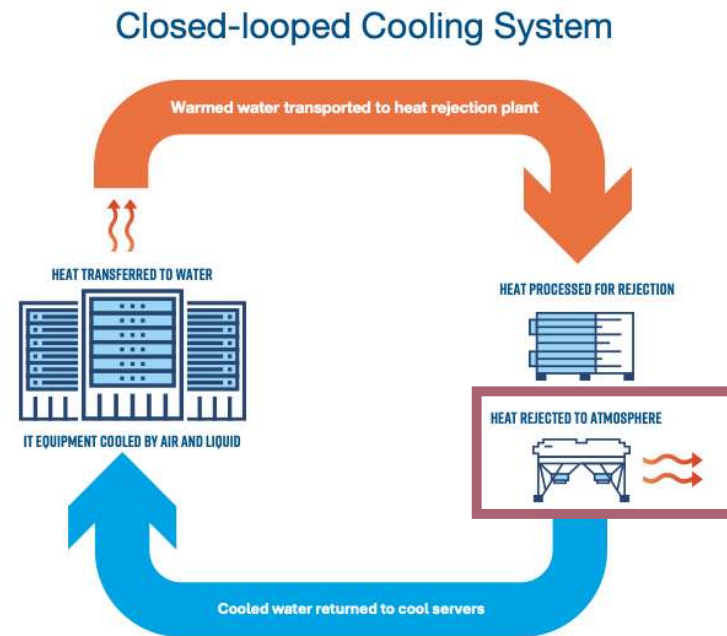


*Water and electricity inputs lead to water and heat outputs.
The heat needs to be mitigated by water and/or air.*



Cooling Systems

- IT equipment uses electricity to run processes and generates heat as a byproduct
- That heat must be rejected from the system somehow



<https://blog.vantage-dc.com/2026/04/22/cooling-without-the-drain-how-closed-loop-systems-cut-day-to-day-water-use/>

Closed-loop cooling refers only to how the IT equipment is cooled, not how the heat is rejected from the whole system.



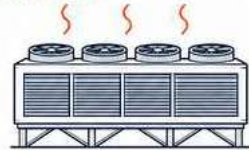
Heat Rejection Systems

How Heat Is Released from the Facility

Cooling equipment transfers heat. The facility must ultimately reject or reuse it.

DRY COOLING

Fans release heat to outdoor air.
Water use: Low



EVAPORATIVE COOLING

Water evaporation carries heat away.
Water use: High



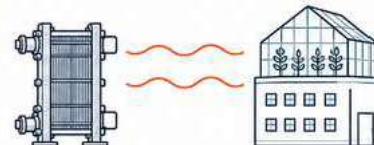
HYBRID WET-DRY

Runs dry when possible and uses water when needed.
Water use: Variable



HEAT REUSE

Recovered heat serves another useful demand.
Water use: System dependent

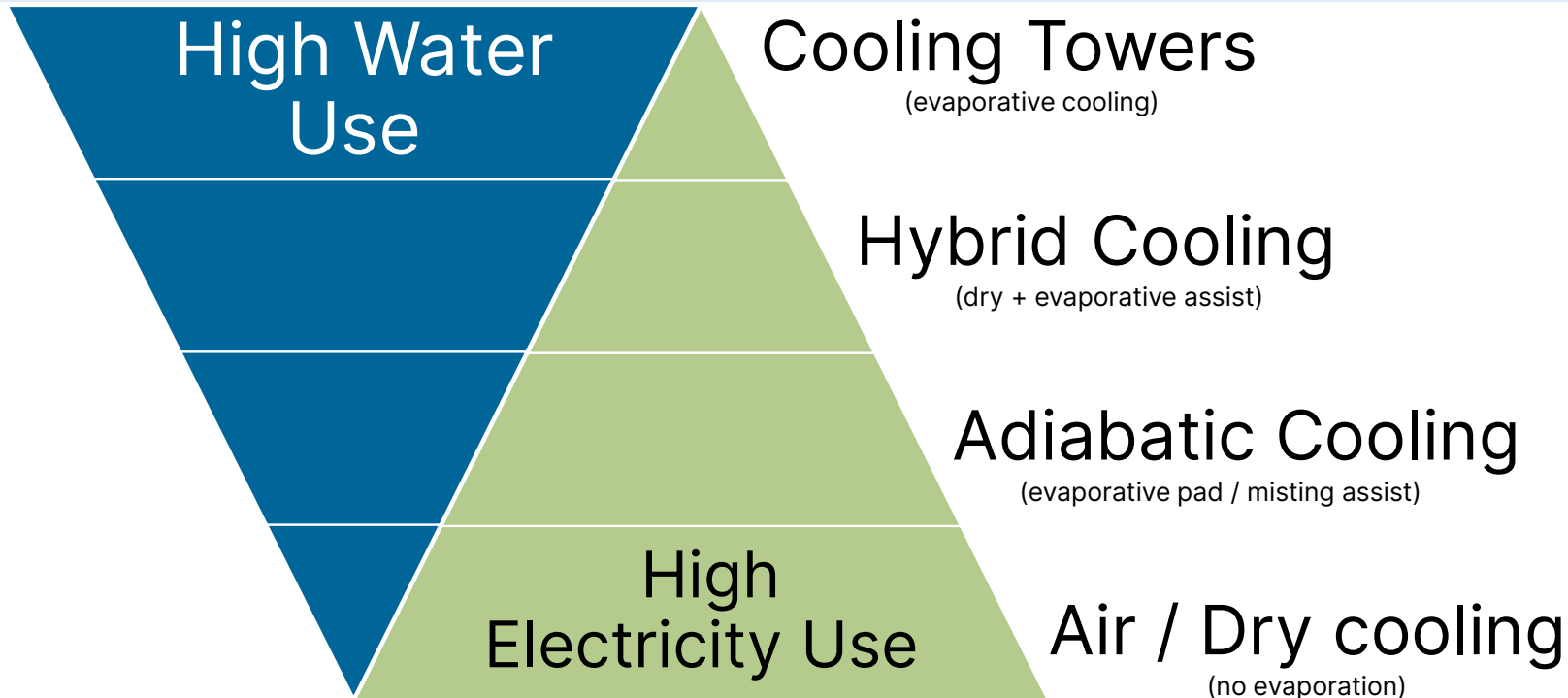


<https://cleanwatersocal.org/regulatory-updates/reports-presentations>

Water consumption is highly dependent on the type of heat rejection utilized.



Types of Heat Rejection

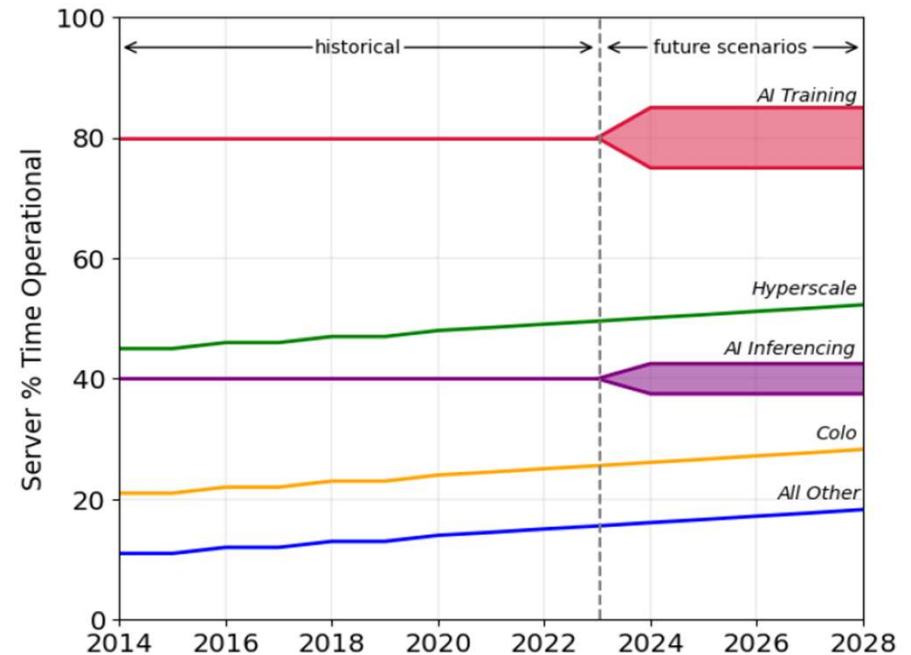


*Any evaporative cooling will lead to high water use.
Air cooling minimizes water use but increases electricity use.*



Factors Influencing Water Use

- Size of data center
- Type of data center workloads



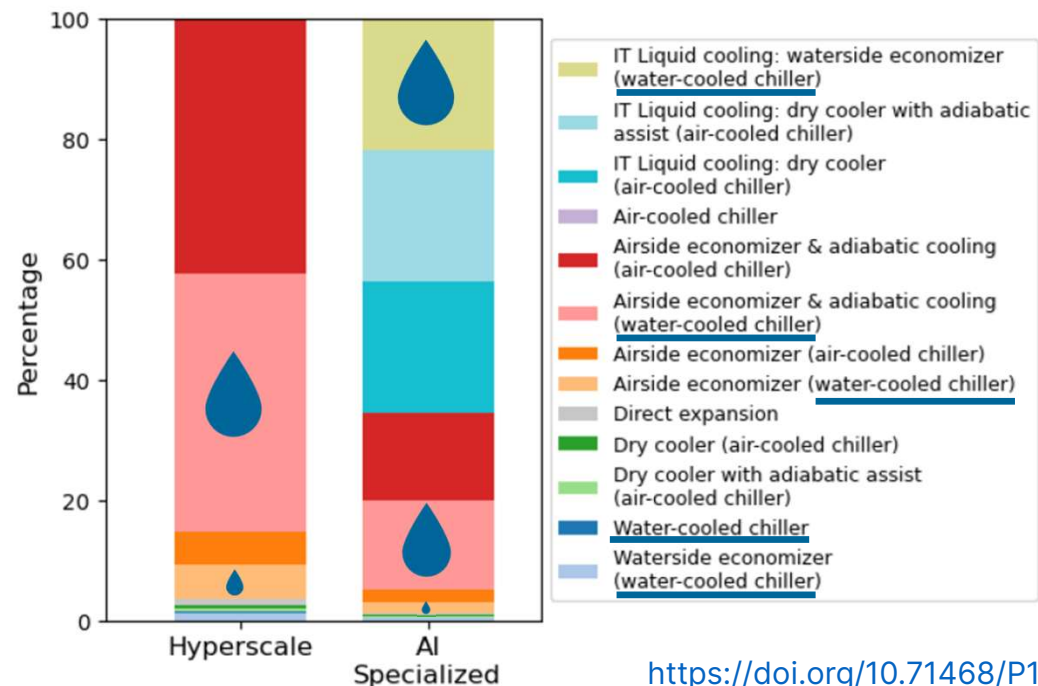
<https://doi.org/10.71468/P1WC7Q>

The type of data center workload directly impacts the electricity use and subsequent water-cooling needs.



Factors Influencing Water Use

- Computer equipment requiring cooling
- Heat rejection cooling type



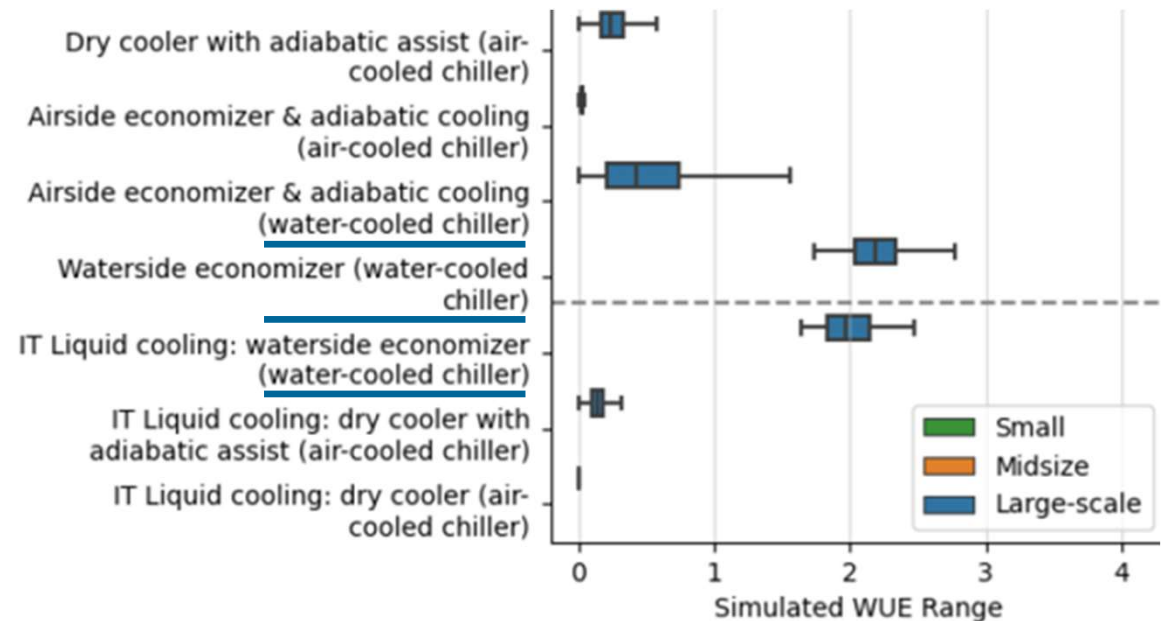
<https://doi.org/10.71468/P1WC7Q>

Water-cooled chillers still are part of around 40-50% hyperscale and AI systems and most air-cooled systems have some water cooling.



Water Usage Effectiveness (WUE)

- An **annualized** metric that measures how much water a data center consumes (primarily for cooling) per unit of IT energy use, usually expressed as **liters per kilowatt-hour (L/kWh)**.



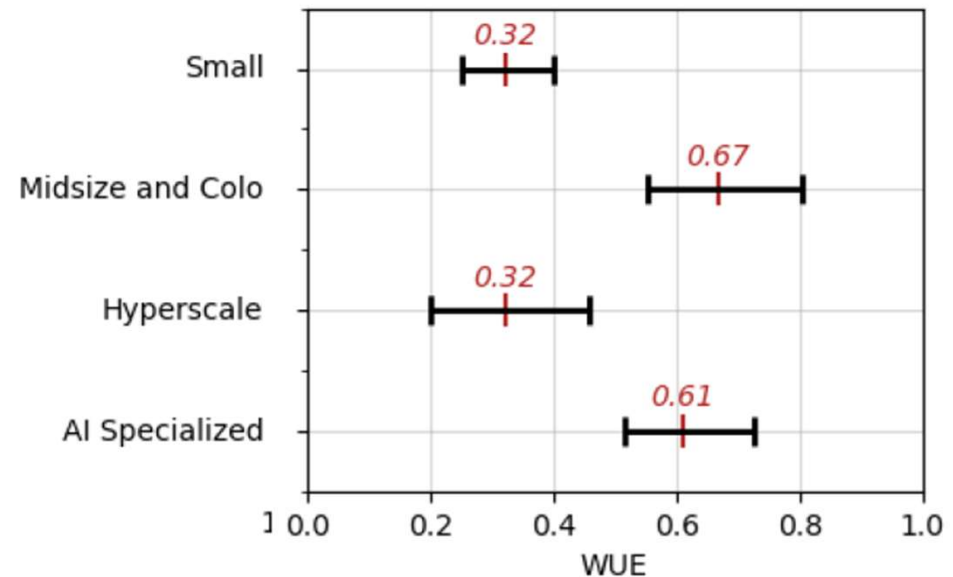
<https://doi.org/10.71468/P1WC7Q>

Different technologies can have a wide-ranging water usage effectiveness depending on how much water versus air cooling is involved with heat rejection processes.



Water Usage Effectiveness (WUE)

- **Hyperscale** facilities average around **0.32 L/kWh** annually.
- **AI Specialized** facilities typically employ more liquid cooling of equipment and average around **0.61 L/kWh** annually.



<https://doi.org/10.71468/P1WC7Q>

Annual figures hide the fact that most of the cooling water usage occurs in the summer months when air cooling isn't as effective.



Data Center Examples

- “**125 MW** in 2029 with room to expand to **500 MW** by 2032” - [Avista confirms negotiations with company seeking to build large data center - Spokesman Review](#)
- “Eventually seek **1,000 MW** of power” - [Spokane County leaders held unknown discussions with data center developer seeking massive facility on West Plains - Spokesman Review](#)

Estimates of energy demand can be used to estimate water consumption.

Inputs

Peak Electricity Demand
(MW)

1 125



Electricity Load Factor

1% 55%



Water Usage Effectiveness
(Liters/kWh)

0.01 0.32



Water Units

- ☒ Gallons
☐ Liters

Estimated Annual Water Usage

51M

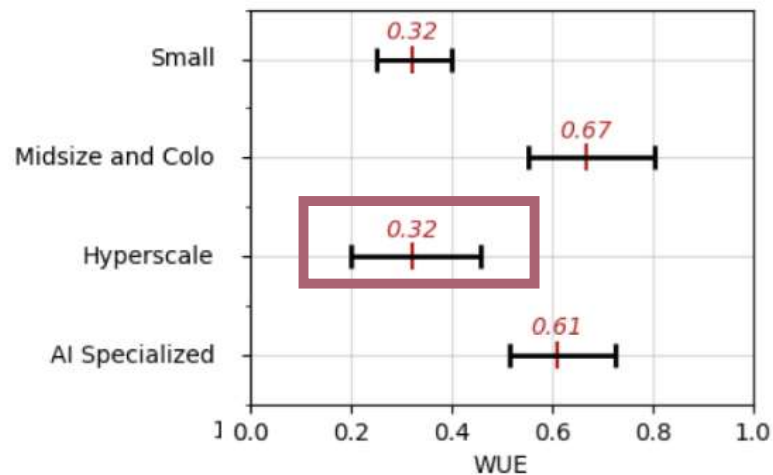
Gallons

Estimated Average Daily Water Usage

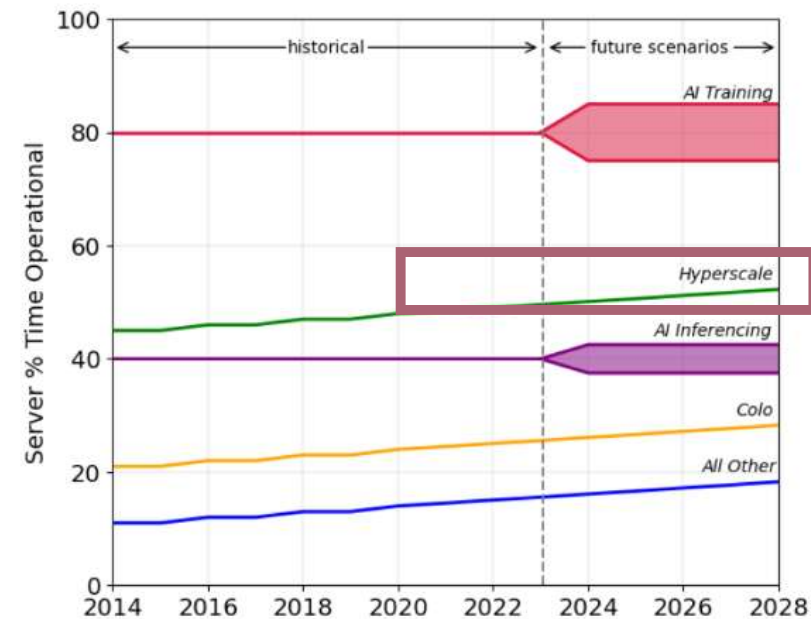
139K

Gallons

Reference Material for Assumptions:



"2024 United States Data Center Energy Usage Report." Lawrence Berkely National Laboratory, <https://doi.org/10.71468/P1WC7Q>.



Inputs

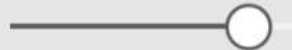
Peak Electricity Demand
(MW)

1 125



Electricity Load Factor

1% 80%



Water Usage Effectiveness
(Liters/kWh)

0.01 0.61



Water Units

- ☒ Gallons
- ☐ Liters

Estimated Annual Water Usage

141M

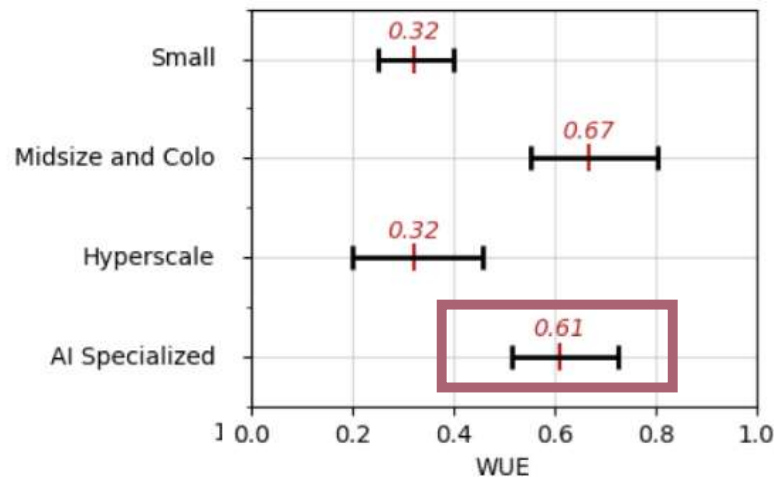
Gallons

Estimated Average Daily Water Usage

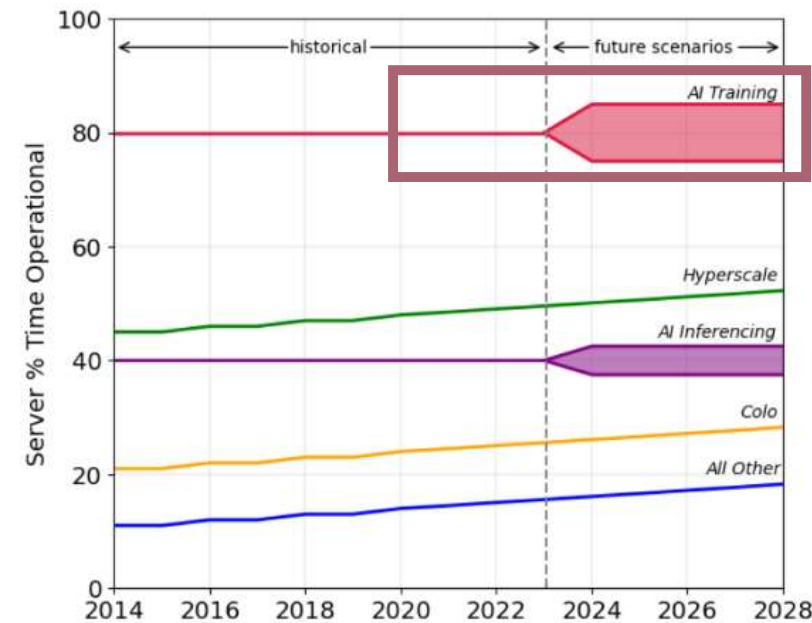
387K

Gallons

Reference Material for Assumptions:



"2024 United States Data Center Energy Usage Report" Lawrence Berkely National Laboratory <https://doi.org/10.71468/P1WC7Q>



Inputs

Peak Electricity Demand
(MW)

1 500



Electricity Load Factor

1% 55%



Water Usage Effectiveness
(Liters/kWh)

0.01 0.32



Water Units

- ☒ Gallons
- ☐ Liters

Estimated Annual Water Usage

204M

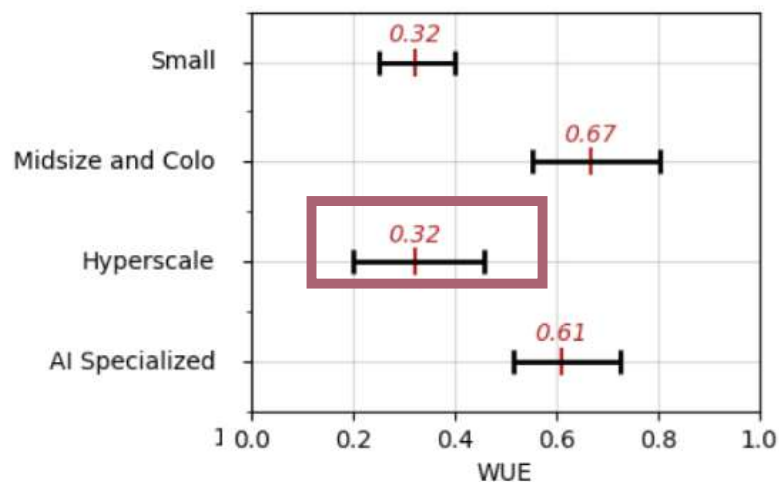
Gallons

Estimated Average Daily Water Usage

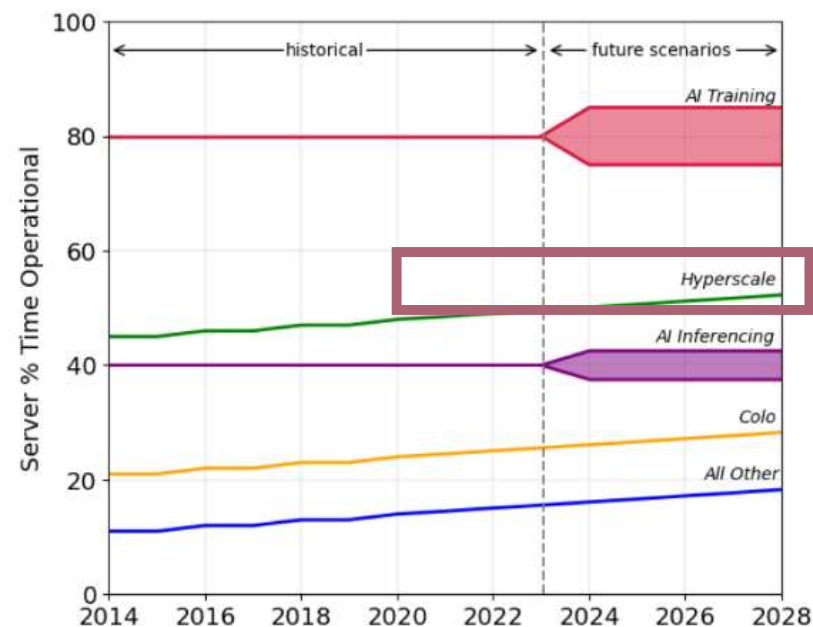
558K

Gallons

Reference Material for Assumptions:



"2024 United States Data Center Energy Usage Report." Lawrence Berkely National Laboratory. <https://doi.org/10.71468/P1WC7Q>



Inputs

Peak Electricity Demand (MW)

1 500



Electricity Load Factor

1% 80%



Water Usage Effectiveness (Liters/kWh)

0.01 0.61



Water Units

- ☒ Gallons
- ☐ Liters

Estimated Annual Water Usage

565M

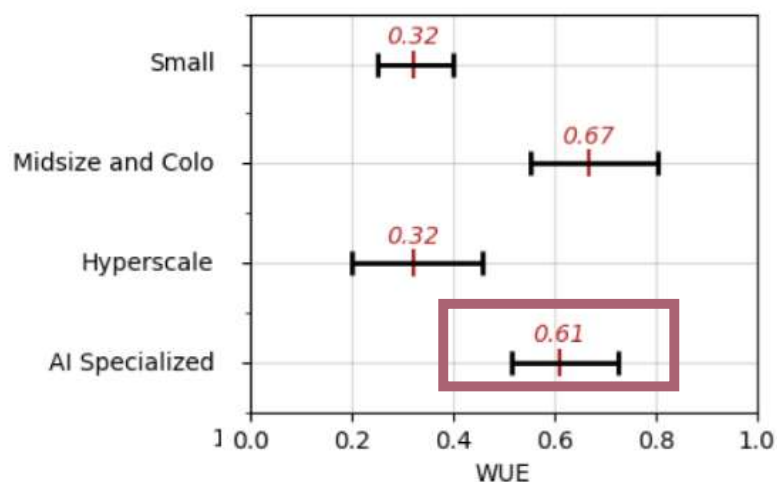
Gallons

Estimated Average Daily Water Usage

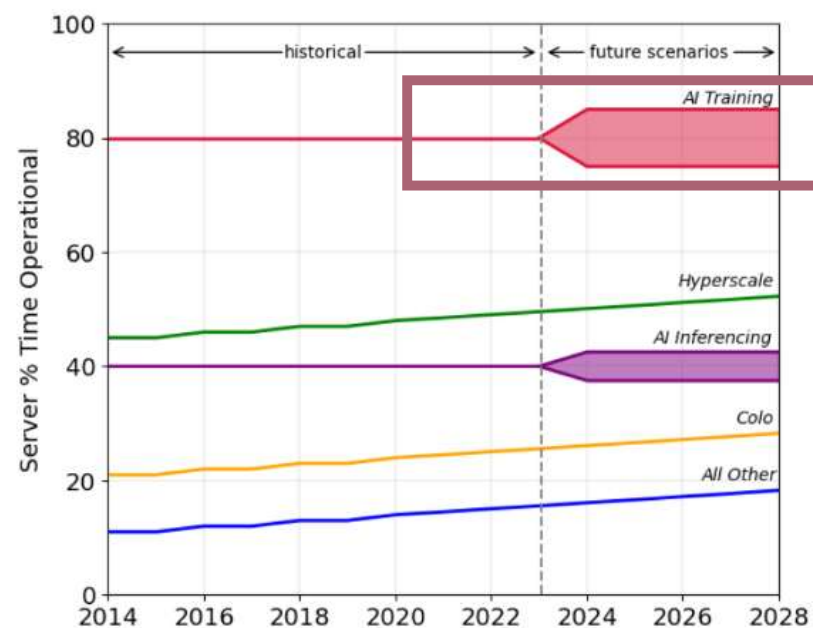
1,547K

Gallons

Reference Material for Assumptions:



"2024 United States Data Center Energy Usage Report." Lawrence Berkely National Laboratory. <https://doi.org/10.71468/P1WC7Q>



Inputs

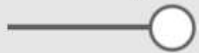
Peak Electricity Demand
(MW)

1 1,000



Electricity Load Factor

1% 55%



Water Usage Effectiveness
(Liters/kWh)

0.01 0.32



Water Units

- ☒ Gallons
- ☐ Liters

Estimated Annual Water Usage

407M

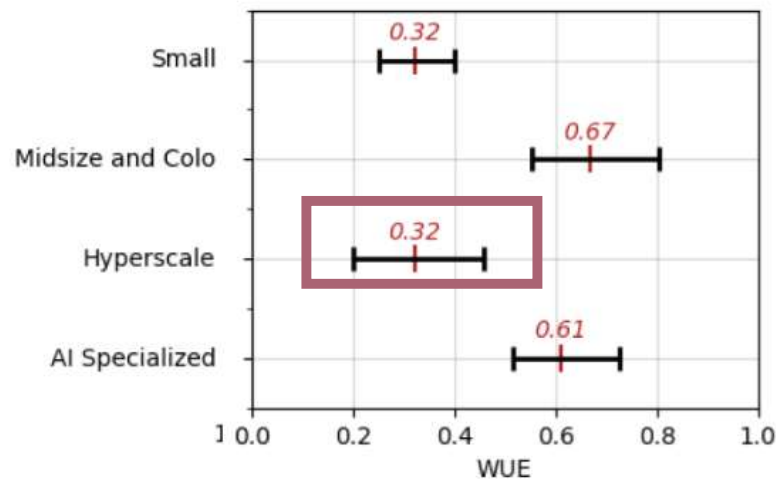
Gallons

Estimated Average Daily Water Usage

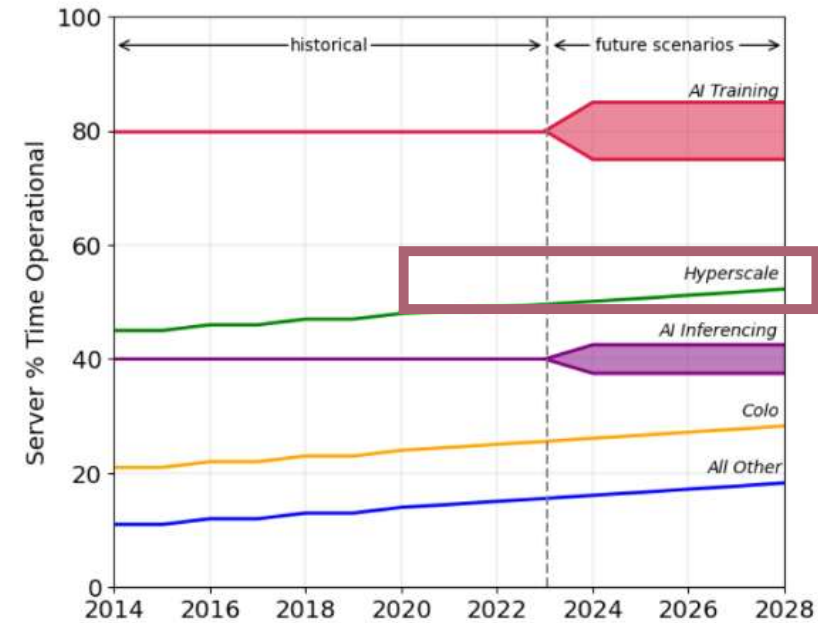
1,116K

Gallons

Reference Material for Assumptions:



"2024 United States Data Center Energy Usage Report." Lawrence Berkely National Laboratory. <https://doi.org/10.71468/P1WC7Q>.



Inputs

Peak Electricity Demand
(MW)

1 1,000



Electricity Load Factor

1% 80%



Water Usage Effectiveness
(Liters/kWh)

0.01 0.61



Water Units

- ☒ Gallons
- ☐ Liters

Estimated Annual Water Usage

1,129M

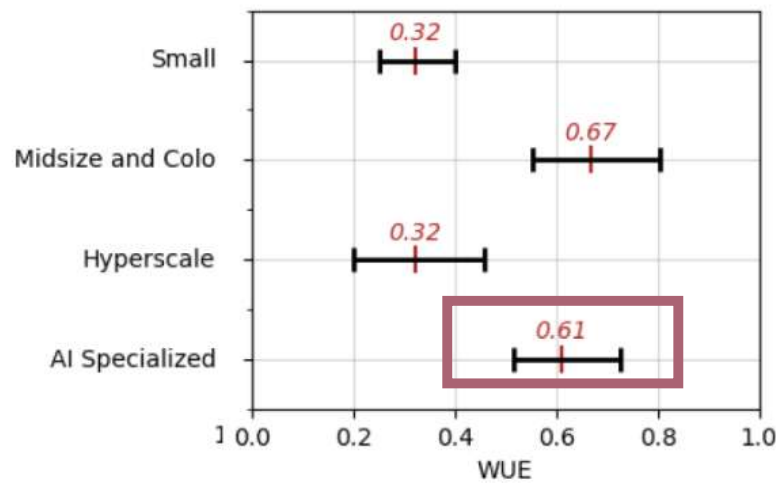
Gallons

Estimated Average Daily Water Usage

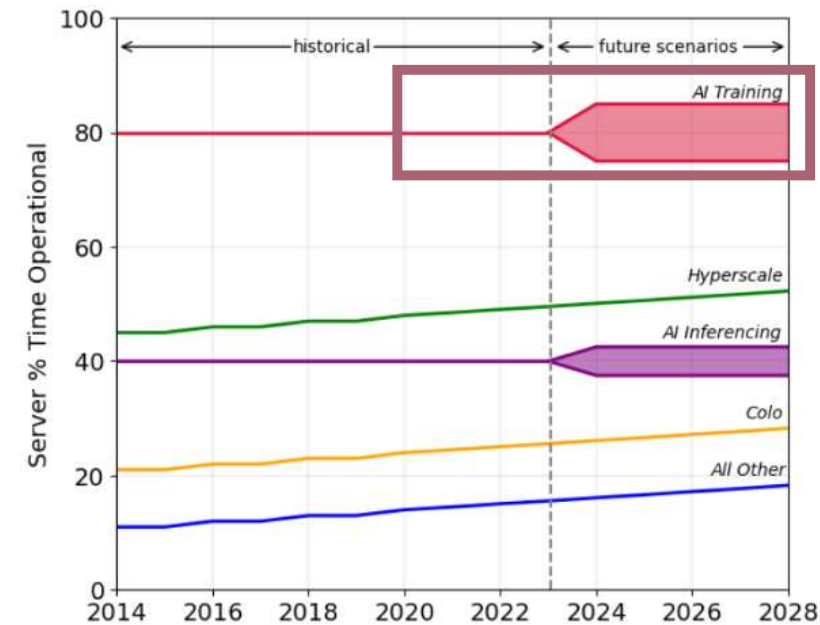
3,094K

Gallons

Reference Material for Assumptions:



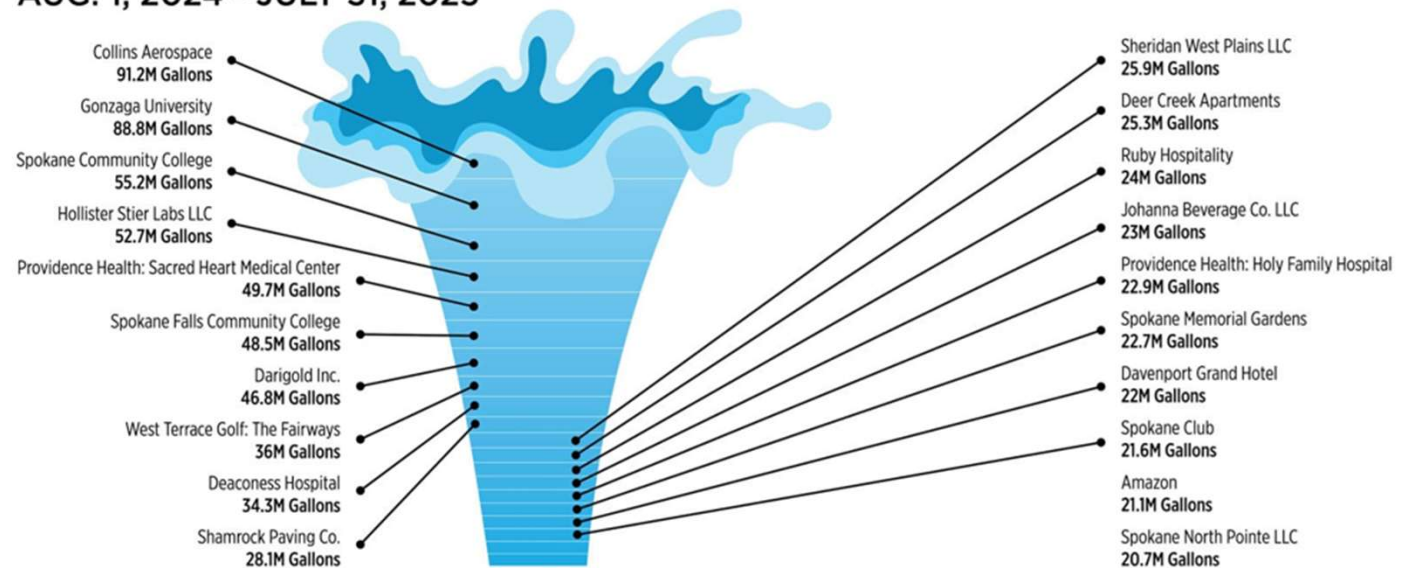
"2024 United States Data Center Energy Usage Report." Lawrence Berkely National Laboratory. <https://doi.org/10.71468/P1WC7Q>



Water Consumption Estimates

- Recently proposed data centers could likely consume between **50 million** and **1.1 billion gallons annually** depending on use and cooling technologies

TOP COMMERCIAL WATER USERS IN SPOKANE AUG. 1, 2024 - JULY 31, 2025



https://www.inlander.com/news/public-records-show-spokane-s-top-commercial-water-users-have-halved-their-usage-over-the/article_b834848f-791f-489e-9a2a-22be9eae5b3.html

A data center could be a top 10 user, or larger than all the other top 20 users combined.

Corporate Siting Priority Levels

- Power availability and price
- Community sentiment and permitting risk
- Fiber and network latency
- Climate and cooling economics
- **Water access**
- Land cost and condition
- Natural-disaster and long-term hazards
- Tax incentives and abatements
- Proximity to labor force
- Zoning and entitlement path

<https://gridmatch.ai/resources/data-center-site-selection-criteria>



Water access is often lower on list of considerations when siting, so our region is likely to be a prime area for exploration since it does well in other considerations.



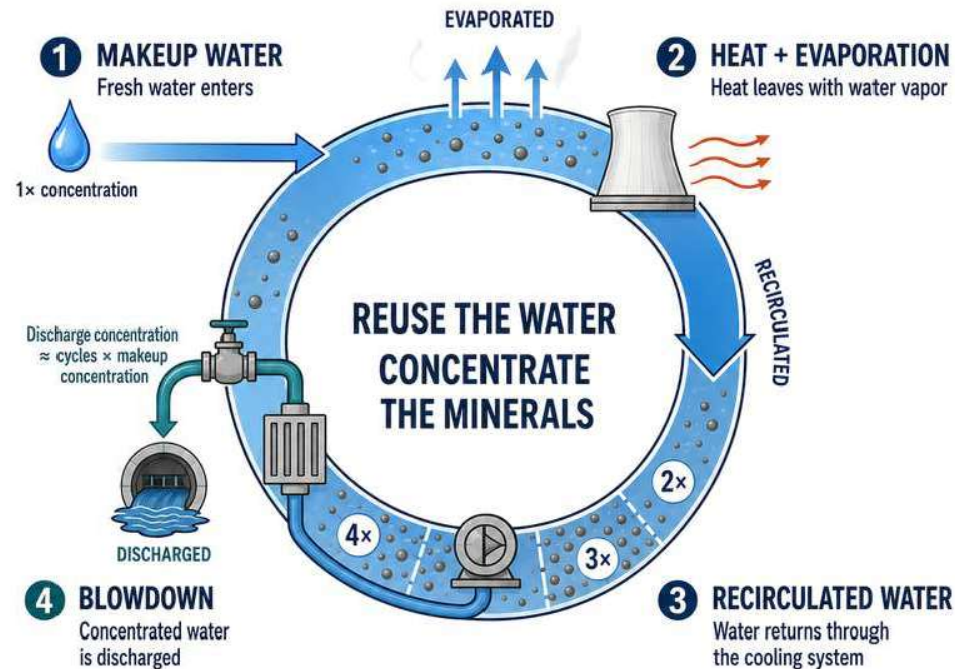
Water Impact Types

- **Direct water use:** evaporation through a chiller or cooling tower. New withdrawals occur to replace vaporized water with freshwater, recirculates.
- **Wastewater:** largely blowdown. Water removed from cooling supply to prevent excessive concentration of dissolved solids (biocides, corrosion inhibitors, heavy metals, total dissolved solids, etc.).
- **Stormwater:** these facilities lead to very large areas of buildings and impervious surfaces, increasing issues with stormwater quality and channeling.
- **Indirect water use:** at power plants for cooling increased energy generation.

Direct water consumption is just one element of the water considerations for data centers.



Mineral Concentration Cycle



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While recirculating systems can save water, they have the potential to concentrate minerals.



Additional Contaminant Issues

- **Biocides** (such as isothiazolinones and glutaraldehyde) which can cause allergies and skin irritation.
- **Corrosion Inhibitors** (like phosphates and molybdates) contribute to eutrophication and negatively affect marine life.
- **Heavy Metals** (including zinc, copper, and chromium) which are carcinogenic and can harm the skin, respiratory system, and kidneys.

Data centers present various other discharge risks like biocides, scale/corrosion inhibitors, metals, salts, bacteria, PFAS.



Changing Conditions

SAME SITE. CHANGING DISCHARGE.



[7-20-26 - Data Center and Complex Site Permitting - SMITH](#)

Testing and commissioning processes can create large discharge spikes, and facility plans often include potential phase 2 growth opportunities.



RPWRF Industrial Pretreatment Program



- **Delegated** by WA Department of Ecology **to implement** Federal, State, and local wastewater **regulations**.
- The City has the **legal authority to regulate flow rates and pollutant concentrations** from industrial dischargers, even outside our city limits, in the form of Wastewater Discharge Permits.
- Goal is to protect people, collection system, treatment plant, Spokane River, and biosolids.

The City has legal authority to regulate flow rates and pollutant concentrations from industrial dischargers.



Impact Concerns for a Community

- Water Consumption
- Water Discharge
- Stormwater
- Electronic Waste
- Air Quality
- Heat Island Effect
- Noise
- Fire Risks
- Energy Grid
- Low Job Density
- + more emerging issues



While water considerations are critical for our region, other impacts from data centers can also be challenging even when not sited directly within the city boundaries.

References

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 - <https://ketos.co/discharge-from-ai-data-centers-and-how-to-mitigate-contamination>
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 - <https://gridmatch.ai/resources/data-center-site-selection-criteria>
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 - <https://www.spokesman.com/stories/2026/jun/09/avista-confirms-negotiations-with-company-seeking-/>
 - <https://www.spokesman.com/stories/2026/jul/24/spokane-county-leaders-held-unknown-discussions-wi/>