

Water Reuse Opportunities and Considerations for Data Center Cooling

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Agenda – Reuse Considerations for Data Center Cooling

- Data Centers Overview
- Data Center Cooling
- Considerations for reuse

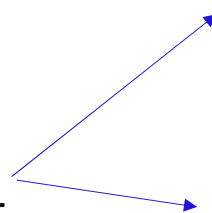


Data Centers Overview



Data Centers and Industrial Reuse

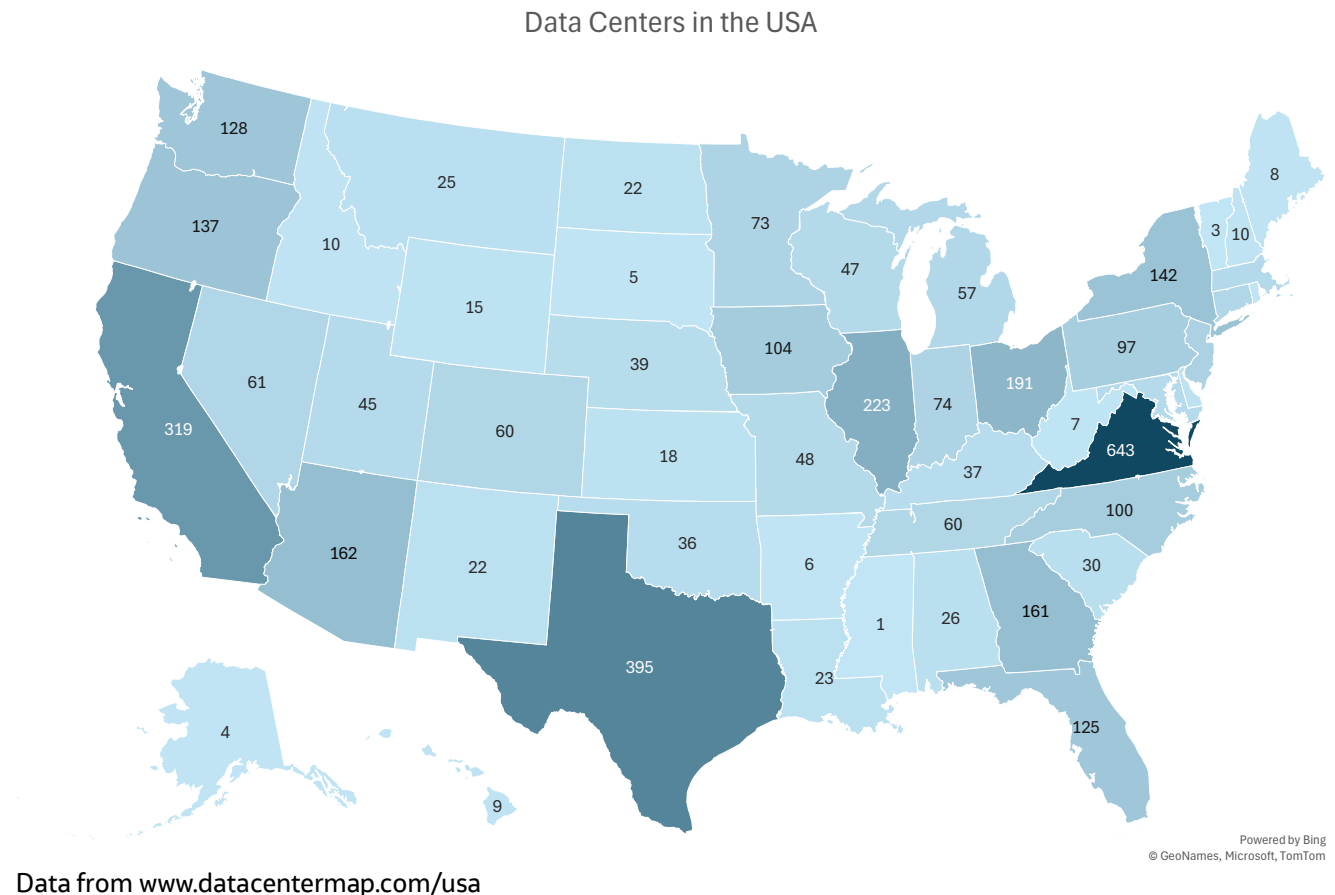
- Three general types of data centers
- Potential reuse application for cooling for hyperscalers or colocalers



Type	Description
hyperscale data center	Large facility designed to support massive computing workloads at global scale.
colocation data center	Shared facility where multiple organizations rent space, power, cooling, and network connectivity for their own IT equipment.
edge data center	Smaller, geographically distributed facility located close to end users or data sources.

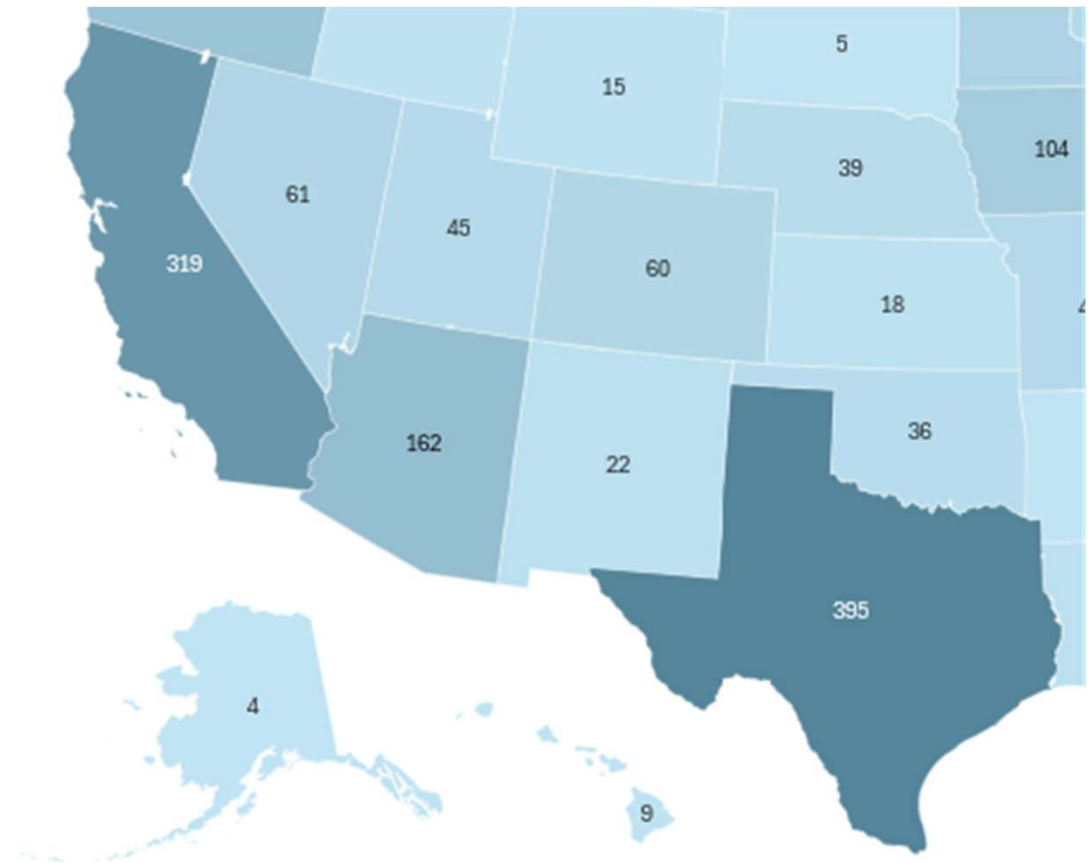
Data Centers

- An estimated 17 billion gallons of water for data center cooling in 2023
- Forecast estimates 170% increase in data center water demand by 2030
- Data center construction through October 2025 totaled \$43.8 billion,
- More than double the \$19.9 billion recorded in the same period of 2024.



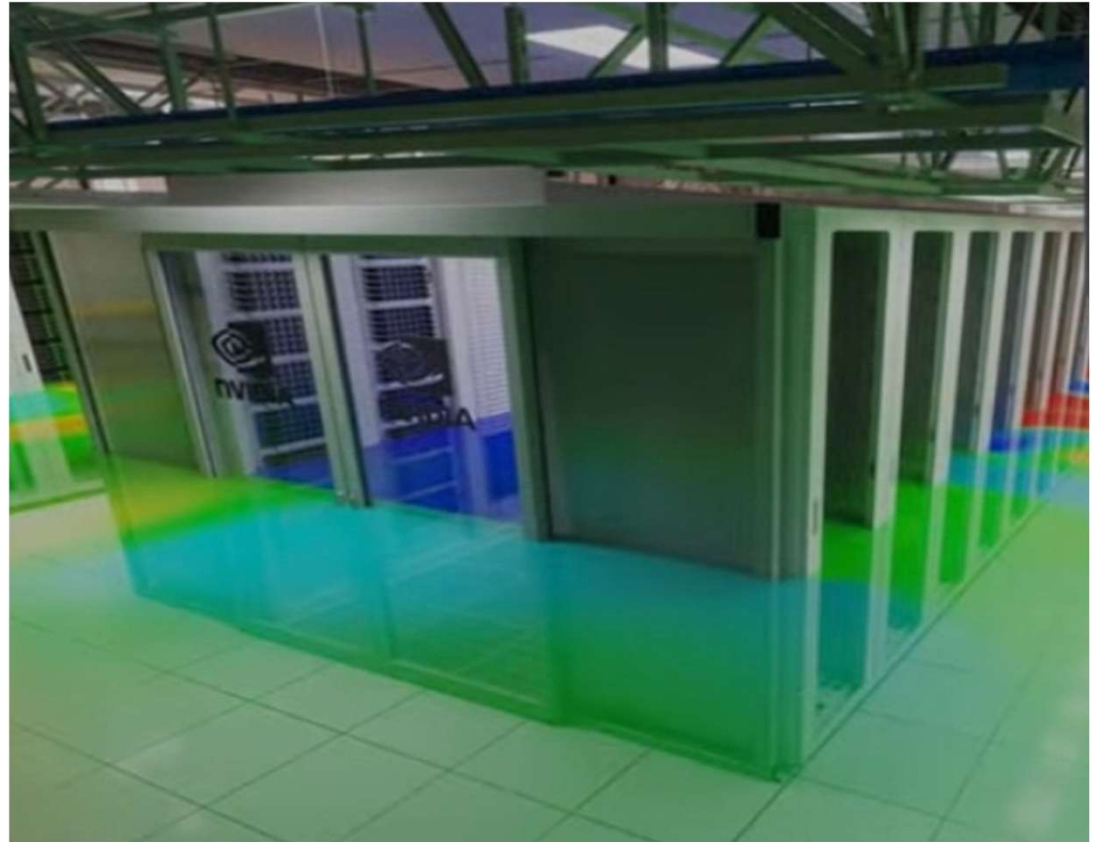
Drivers for reuse in data centers

- Locations with water scarcity; increase water supply reliability for operations
- Corporate sustainability goals
- Public perception, commitments to local environmental stewardship



Data Center Cooling

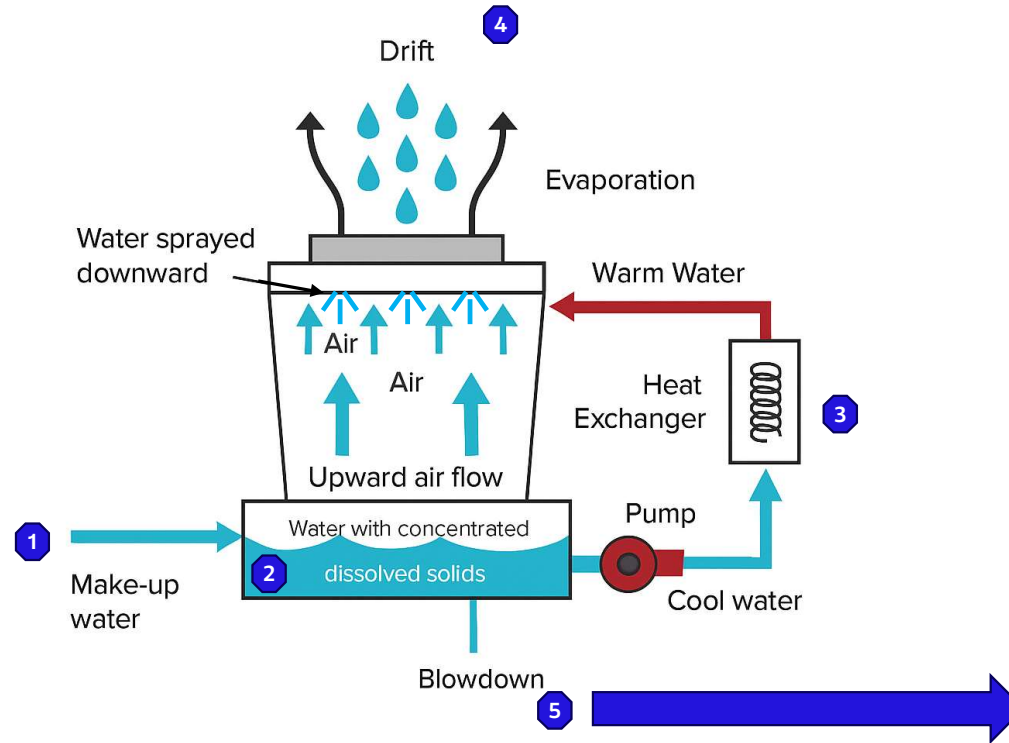
- Equipment uses electricity which produces heat resulting in the need to provide cooling
- Demand for data storage and processing and AI is driving the need for additional cooling water
- Variety of methods to provide cooling with the most common cooling towers using water



How Do Cooling Towers Work?

Source water:

- Potable Water
- Groundwater
- Surface water
- Storm water
- Reuse water



- 1 Make-up water replaces volume lost to evaporation and blowdown
- 2 Basin / Reservoir of water for recirculation
- 3 Heat Exchanger
- 4 Loss to evaporation and drift
- 5 Blowdown – water from basin is discharged based on conductivity/TDS and other parameters. Manual or automatic. Controls scale and corrosion and optimizes chemical usage.

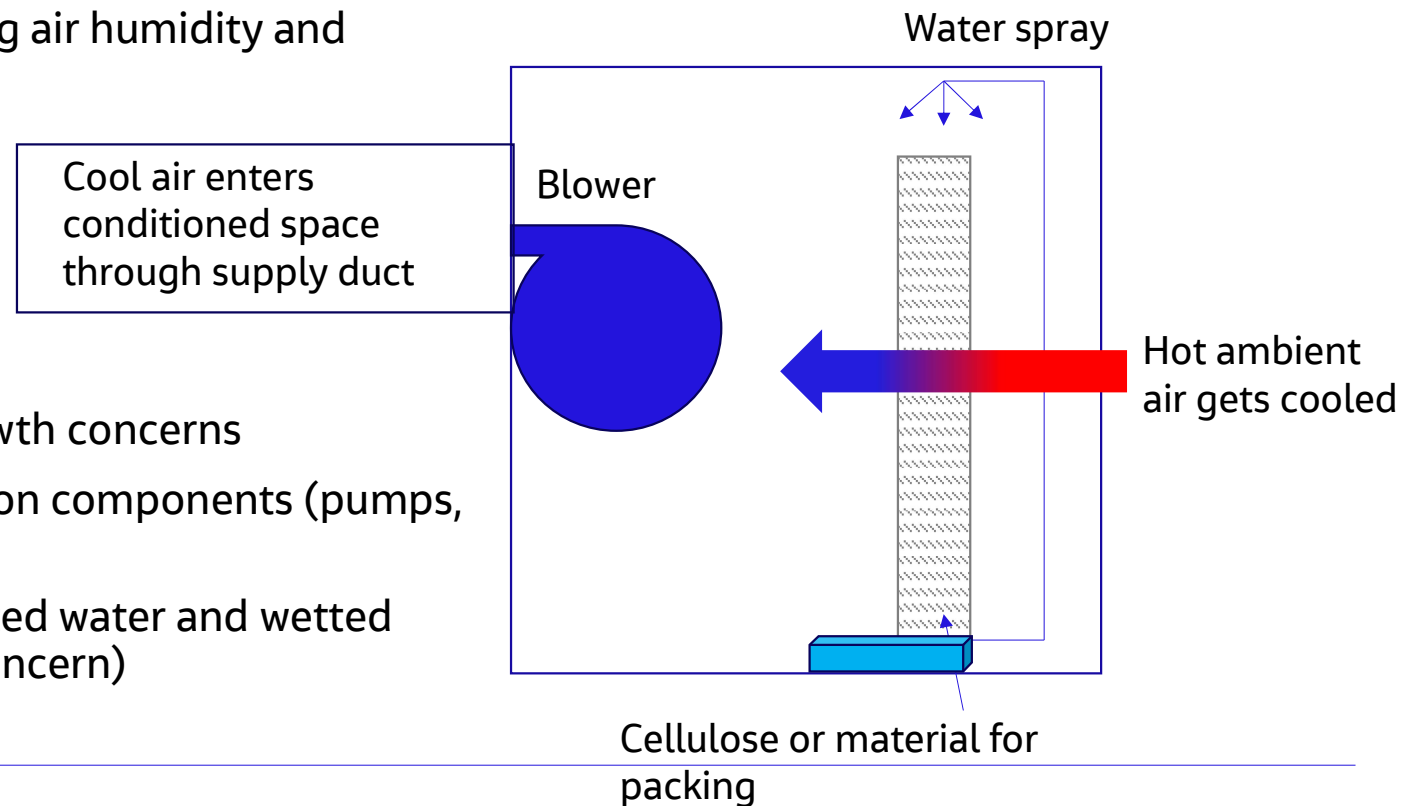
Disposal:

- WWTP
- WWTP Blending
- Direct discharge
- Zero liquid discharge
- UIC Injection
- Others

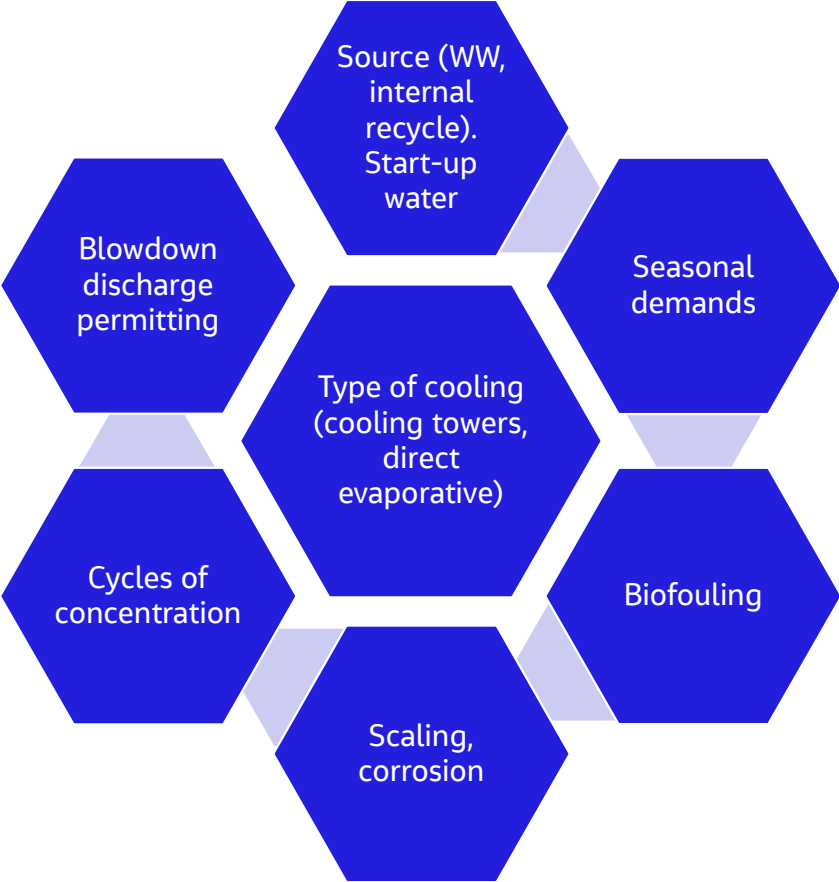
Adiabatic cooling

- Air is cooled by flowing ambient temp air over wetted, fluted media
- Water is evaporated, increasing air humidity and decreasing air temp

- Media scaling, biological growth concerns
- Corrosion of water recirculation components (pumps, piping)
- Microbial growth in recirculated water and wetted surfaces (*Legionella* major concern)



Considerations for reuse in data center cooling



Important water quality parameters

Turbidity

pH

Ca Hardness

Silica

Chloride

Ammonia

TDS

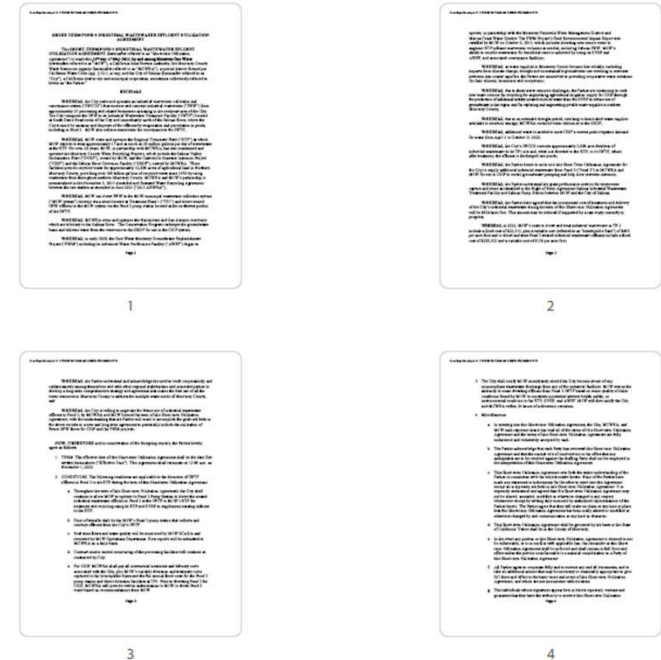
Alkalinity

Sulfides



Water User Agreement

- Contractual agreement – good tool for both the municipality and industrial user (shared understanding)
- Rates (water and wastewater)
- Length/term
- Standards
- Local limits requirements
- Should be reviewed by legal and technical advisors
 - ❖ Who covers up front capital and engineering costs?
 - ❖ How are latecomers treated?



Key considerations

- Continued growth, dedicated water system capacity
- Supply for bridging water
- Develop reuse system, maintain water & sewer commitments, IPP requirements
- Establish Reuse agreements, design standards, operations plan, rates
- Stakeholder engagement

A photograph of a server room with blue lighting. The room is filled with rows of server racks. The floor is highly reflective, showing the blue light. The ceiling has a complex network of pipes and cables. The overall atmosphere is futuristic and high-tech.

Questions

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