Facts About Water

Design, climate and workload determine demand and impact.

Bottom line: Data center water use varies widely. Evaporative cooling uses water, while newer closed-loop and air-cooled designs may use little or none. Climate, workload, facility design and reclaimed-water availability also matter, so project-specific information gives the most accurate local picture.

Four distinctions that prevent confusion

Withdrawal vs. consumption

Withdrawal is water taken from a source; consumption is the portion not returned, often through evaporation. Reports should specify which they use. [1]

On-site vs. indirect water

Cooling may use water on-site, while the power plants supplying electricity may use water elsewhere. An air-cooled site can have low on-site use but still carry an indirect water footprint. [2]

Potable vs. alternative supply

Drinking water, reclaimed wastewater and other sources have different infrastructure, treatment and drought implications.

Annual average vs. seasonal use

Use can vary through the year, especially with evaporative cooling in warm weather. Annual, monthly and peak-day estimates help utilities plan for the proposed system.

Cooling choices and water use

- **Evaporative cooling removes heat through water evaporation and can use less electricity than some mechanical systems. Cooling towers may also release blowdown, water discharged to keep minerals from concentrating.**
- **Closed-loop liquid cooling recirculates coolant and, depending on how heat is released, may use little or no added water after the loop is filled.**
- **Dry or air-cooled systems reject heat through air and use less on-site water, though electricity use and equipment needs can differ in hot weather.**
- **Direct-to-chip and immersion cooling bring liquid closer to the heat source. Overall water use depends on whether heat is released through air, evaporation or another system.**

How data center water use compares

Familiar user	Illustrative daily use	Important context
Data center with closed-loop, zero-water-evaporation cooling	No routine cooling-water consumption after the system is filled	Water may still be used for restrooms, kitchens and cleaning. Actual use depends on the full cooling design. [3]
Typical restaurant	About 5,800 gallons	Varies with customer volume, equipment and operating practices. [4]
18-hole golf course	Often hundreds of thousands of gallons per day in irrigation season	Varies by climate, acreage, rainfall and water source. [5]
1,000 U.S. homes	About 213,000 gallons	Based on EPA's average of 82 gallons per person per day and 2.6 people per household. [6]

What determines local impact

Source capacity Local impact depends on available supply, treatment, storage, pressure and competing users, not statewide rainfall averages.	**Wastewater capacity** With evaporative cooling, blowdown volume and chemistry, pretreatment needs and sewer capacity may matter.
Cooling-system design Evaporative, dry or hybrid cooling—and how often each mode runs—directly affects water demand.	**Growth and phasing** Infrastructure can be sized to the equipment in use and planned buildings, then expanded as needed.

Technology is reducing water demand

Data center cooling technology is evolving rapidly. Newer liquid-cooling systems can circulate coolant in a closed loop and avoid routine water consumption for cooling. Other facilities use outside air for much of the year and employ evaporative cooling only under certain temperature conditions. Because designs differ, the most useful water-use information is specific to the proposed facility rather than based on a broad industry average.

Good planning supports reliable water service

Water utilities routinely evaluate service capacity for large commercial and industrial customers. For a data center project, early coordination can help the utility and developer determine expected demand, identify any necessary improvements and align infrastructure with the project's development schedule.

- **Identify expected annual, seasonal and peak-day water needs for each phase of development.**
- **Confirm the appropriate water source. Depending on local conditions and facility design, a project may use potable water, reclaimed water or another approved source.**
- **Coordinate infrastructure investments. If additional pipes, pumps, storage or treatment capacity are needed, the utility and developer can agree on the schedule and funding arrangements.**
- **Track actual performance. Metering allows the operator and utility to compare actual water use with projections and identify opportunities for further efficiency.**
- **Infrastructure and service commitments can be phased as buildings become operational.**

Information that helps explain local water use

- The cooling design planned for the project, including whether it uses air, evaporation or a closed-loop liquid system
- Estimated annual, seasonal and peak-day water demand at each phase of development
- Whether the facility will use potable water, reclaimed water or another source
- How water use will be measured and coordinated with the local utility
- Any water or wastewater infrastructure improvements associated with the project and any plans to increase water efficiency as the facility expands

Sources

1. U.S. Geological Survey — Water Use Concepts and Terms — withdrawal, consumption and related definitions.
2. DOE/LBNL, 2024 United States Data Center Energy Usage Report — national direct and indirect water analysis and uncertainty.
3. Microsoft — Next-generation datacenters consume zero water for cooling — closed-loop cooling design and remaining administrative water use.
4. U.S. EPA — Saving Water in Restaurants — restaurant water uses and efficiency guidance.
5. GCSAA — Golf Course Environmental Profile — current national and regional water-use reports and irrigation benchmarks.
6. U.S. EPA WaterSense — Statistics and Facts — average daily residential water use per person.