Veralto™

Safeguarding the World's Most Vital Resources™

2025

Water sustainability in data centers

A Veralto paper developed in partnership with their Operating Companies

Contents

1.1 TO 1.74 TRILLION GALLONS

THE ANNUAL PROJECTED AMOUNT OF ON-SITE AND OFF-SITE WITHDRAWALS BY

2027 **TIED TO GLOBAL AI DEMAND,**

THE EQUIVALENT OF

4-6 TIMES DENMARK'S

TOTAL ANNUAL WATER WITHDRAWALS.[2]

Executive summary

Data center capacity is surging to meet rising global demand for data processing. As artificial intelligence (AI) accelerates this growth, water is emerging as a defining constraint.

Vast amounts of water are consumed in data centers to cool dense networks of servers and information technology (IT) equipment. In recent years, this consumption has surged as AI has entered the picture. Computationally intense AI workloads—combined with rising chip power densities—generate substantially more heat, driving cooling-related water demand higher. While on-site water use often receives significant attention, even more water is consumed indirectly to produce the electricity that data centers depend on.

These trends are occurring at a time when freshwater availability is already under mounting stress in many regions. As a result, data centers face growing water challenges, including reputational risks tied to their water consumption.

RESEARCH SUGGESTS
THAT ANNUAL WATER-RELATED CAPITAL AND OPERATIONAL EXPENDITURES COULD EXCEED
$797 MILLION

A 31% INCREASE BY 2030, OVER 2025 LEVELS IF ANNUAL GROWTH REMAINS AT 7.8%

The criticality of water is playing a larger role in site selection, design, and operations — driven in large part by AI, mounting local concerns over water availability, and the tech sector's urgent push to safeguard operational resilience amid growing environmental scrutiny.[3]

Yet, alongside these challenges comes a tremendous opportunity. Data centers can adopt a diversified water sustainability approach to reduce freshwater consumption, mitigate water-related risks, and build long-term resilience. This white paper explores the fast-changing landscape of data center development, examining the full arc of water use in these facilities and the actions companies can take to ensure a future that is both data-driven and water-conscious.

[2] Li, Pengfei et al. Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models. January 2025.
[3] Bluefield Research. U.S. Water for Data Centers: Market Trends, Opportunities, and Forecasts, 2025–2030. May 2025.

Introduction

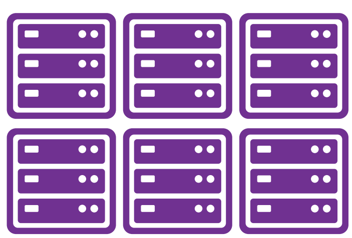
Data centers are the lifeblood of the digital era, storing vast amounts of information and enabling the digital services that underpin modern life.

In several countries, including the U.S., data centers are now considered critical infrastructure.[4] Globally, capacity is expanding rapidly, with new facilities being built at an unprecedented rate to accommodate surging digital workloads. To keep pace, hyperscalers like Amazon Web Services, Microsoft Azure, and Google Cloud are pouring billions into both new and existing campuses.[5]

This expansion is being driven in part by cloud computing, social media, e-commerce, streaming entertainment, and traditional AI applications—all of which demand efficient, highly scalable data processing. In the years ahead, however, generative AI (Gen AI) is projected to become the most significant driver of all.

According to McKinsey & Company, data center demand has already soared in response to the role data plays in modern life, but the emergence of Gen AI is poised to push it even higher. Between 2023 and 2030, global demand for data center capacity could grow annually by 19 to 22%, reaching an annual energy demand between 171 and 219 gigawatts (GW) by 2030. A less likely yet still possible scenario sees global demand more than tripling to 298 GW over the same timeframe.[6]

BY LATE 2025, AN ESTIMATED **6,111 DATA CENTERS** WILL BE OPERATIONAL **WORLDWIDE**



COMPRISING **5,544** COLOCATION SITES AND **567** HYPERSCALE FACILITIES.

This number is projected to increase by 37%, reaching 8,378 data centers by 2030.[7]

As data center capacity expands, mounting strain is being placed on energy grids and water resources. Addressing the water considerations of data center growth is increasingly critical for balancing performance demands with environmental responsibility.

[4] White & Case. Data centers and water: From scrutiny to opportunity. December 2024.
[5] ACN. Billions Pour Into Next-Gen Data Centers: How Meta, Google and Microsoft Are Powering the AI Revolution. January 2025.
[6] McKinsey & Company. AI Power: Expanding Data center capacity to meet growing demand. October 2024.
[7] ABI Research. How Many Data Centers Are There and Where Are They Being Built? July 2024.

BETWEEN 2023 AND 2030, GLOBAL DEMAND FOR DATA CENTER CAPACITY COULD GROW ANNUALLY BY

19% TO 22%

REACHING AN ANNUAL ENERGY DEMAND BETWEEN

171 GW AND **219 GW BY 2030.**

Understanding the water footprint of data centers

Data centers have a substantial water footprint, owing to the large volume of water used both directly for cooling and indirectly for electricity generation.

A data center designed to consume 15 megawatts (MW) of energy—a relatively small facility—can directly consume between 80 and 130 million gallons (302,832 to 492,103 m^3) of water annually, the equivalent of three hospitals or two 18-hole golf courses.[8] A 100 MW data center can use approximately 1.1 million gallons (4,164 m^3) of water per day,[9] equivalent to more than 400 million gallons (1.5 million m^3) per year.

IN 2014, DIRECT **WATER USEAGE BY DATA CENTERS** IN THE U.S. AMOUNTED TO **5.9 BILLION GALLONS**

On-site (direct) water consumption

Servers and IT equipment in data centers consume large amounts of electrical power, nearly all of which is converted into heat. To prevent overheating, this heat must be efficiently removed, a process that occurs in two stages. First, heat is extracted from the servers (server-level cooling); then it is expelled from the data center environment (facility-level cooling).

At the server level, cooling methods primarily rely on air circulation, though liquid-based cooling systems, which do not evaporate or consume water, are increasingly used in high-density, AI-driven server environments. At the facility level, various cooling methods are available, with water-intensive cooling towers and water evaporation-assisted air cooling among the most common.[10]

Evaporative cooling is by far the largest driver of water consumption in data centers.[11] To a lesser extent, water is also used on-site for humidity control to prevent electrostatic buildup, which can damage sensitive electronic components in dry environments.

In evaporative cooling systems, only a small fraction of the water is returned to the watershed. For example, research shows that about 70–80% of the water entering a cooling tower is lost to evaporation, leading to high demand for freshwater. The reliance of data centers on evaporative cooling can be problematic given that these systems are most effective in arid climates where water scarcity is often a concern.[12] Still, evaporative cooling remains the most thermodynamically efficient method of heat transfer/heat removal when compared to sensible heat transfer or radiant heat loss mechanisms.

Collectively, data centers are among the top ten water-consuming industrial or commercial industries in the U.S.[13] In 2014, direct water usage by data centers in the U.S. amounted to 5.9 billion gallons (22.32 million m^3). By 2023, total water usage had more than tripled to 17.4 billion gallons (65.84 million m^3), with hyperscale and colocation facilities accounting for 84% of the total.[14]

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[8] Asianometry. The Big Data Center Problem. November 2023.
[9] Shehabi, Arman et al. United States Data Center Energy Usage Report. Ernest Orlando Lawrence Berkeley National Laboratory. June 2016.
[10] Pengfei Li et al. Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models. January 2025.
[11] Equinix. How Data Centers Use Water, and How We're Working to Use Water Responsibly. September 2024.
[12] The Register. How datacenters use water – and why kicking the habit is nearly impossible. January 2025.
[13] Md Abu Bakar Siddik et al 2021 Environ. Res. Lett. 16 064017.
[14] Shehabi, Arman et al. 2024 United States Data Center Energy Usage Report. Berkeley National Laboratory. Dec. 2024.

Harnessing solar PV energy

Major data center operators including Amazon, Google, Meta, and Microsoft were the largest single driver of utility-scale solar PV PPA financing in the United States in 2024, demonstrating the industry's interest in robust, reliable solar PV power generation.[A1] Solar PV energy generation helps data centers meet increasing energy needs while driving down the carbon footprint associated with fossil fuel generation and mitigating indirect water consumption associated with traditional thermoelectric power generation technologies.

Off-site (indirect) water withdrawals

While the on-site water demand of data centers is large and rapidly increasing, the off-site demand for producing and supplying electricity is even greater. Estimates suggest that 75–83% of a data center's total water footprint comes from indirect water consumption associated with power generation.[15,16]

This shows that while switching from energy-efficient evaporative cooling to air cooling will reduce on-site water consumption, it will do so at the expense of a higher power draw, potentially increasing the overall amount of water consumed for data center operations.[17]

Water-energy relationship

A data center's cooling strategy lies at the heart of the water-energy relationship, which often involves either using more water with lower electricity consumption or relying on less water at the expense of higher energy use. Making the optimal decision requires careful evaluation of the local water context alongside other key factors such as the capacity of the local energy grid and the operational needs of the data center.

For example, a 1,000-ton air-cooled chiller can consume between 0.8 and 1.2 kW per ton of cooling, whereas a comparable water-cooled chiller will likely use 0.45 to 0.64 kW per ton. For a 100 MW data center requiring approximately 30,000 tons of cooling, an air-cooled system could consume up to 24,000 kW of power, while a water-cooled system may require 13,500 kW.

The water-energy relationship is typically concerned with on-site water and electricity usage only. When factoring in the scale of indirect water usage required to meet the electrical demand of data centers (as discussed above), these considerations become much more complex.

The 10,500 kW power difference from the above example has downstream consequences. According to the American Public Power Association, an average 11,857 gallons (44.89 m^3) of water was used per megawatt-hour of electricity produced in the U.S. in 2020. Applying that factor, the additional energy load from air cooling could indirectly result in the consumption of roughly 124,500 gallons (471 m^3) of water per hour at the power generation source. In regions where energy is more constrained than water, a strategy that involves consuming more water in data center operations may be preferable. As methods for auditing water and energy usage continue to evolve, future reporting standards will likely begin to reflect the true community impact associated with off-site power generation.

[A1] https://pv-magazine-usa.com/2025/04/14/data-centers-lead-global-growth-in-corporate-ppas/
[15] Shehabi, Arman et al. United States Data Center Energy Usage Report. Ernest Orlando Lawrence Berkeley National Laboratory. June 2016.
[16] White & Case. Data centers and water: From scrutiny to opportunity. December 2024.
[17] The Register. How datacenters use water – and why kicking the habit is nearly impossible. January 2025.

GLOBAL POWER DEMAND

FROM DATA CENTERS AS A RESULT OF RISING INTEREST IN GEN AI IS EXPECTED TO INCREASE BY **50% BY 2027**

AND COULD JUMP AS HIGH AS **165% BY 2030.**[20]

The impact of AI

Rapid adoption of AI, particularly Gen AI, is poised to accelerate the water- and energy-driven trends associated with data centers.

Unlike conventional computing, AI workloads demand substantially more power per operation due to the computational intensity of large AI models, which rely on advanced hardware such as graphics processing units (GPUs) and tensor processing units (TPUs).

AS A RESULT, **DATA CENTERS,** WHICH ACCOUNTED FOR APPROXIMATELY **1-2%** OF GLOBAL ELECTRICITY USAGE IN 2024, COULD SEE THEIR **SHARE RISE TO 3–4% BY THE END** OF THE DECADE.[18]

The power demands of AI-capable servers have surged, with average power densities more than doubling in just two years—from 8 kilowatts (kW) per rack (a standardized frame that houses servers and other computing equipment) to 17 kW—and are projected to reach as high as 30 kW by 2027 as AI workloads increase.[19] Global power demand from data centers as a result of rising interest in Gen AI is expected to increase by 50% by 2027 and could jump as high as 165% by 2030.[20]

Water consumption is also expected to rise sharply as AI adoption grows. By 2027, total on-site and off-site water withdrawals tied to global AI demand are projected to reach 1.1–1.74 trillion gallons (4.2–6.6 billion m^3) annually—equivalent to four to six times Denmark's total annual water withdrawals and nearly half of the United Kingdom's.[21]

Training large AI models can be particularly water intensive. For example, a roughly two-week training for the Generative Pre-trained Transformer 3 (GPT-3) AI program in Microsoft's state-of-the-art U.S. data centers consumed roughly 185,000 gallons (700 m^3) of freshwater onsite, about the same amount of water used to manufacture approximately 370 conventional fuel cars or 320 electric vehicles.[22]

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[18] Goldman Sachs. AI is poised to drive 160% increase in data center power demand. May 2024.
[19] McKinsey & Company. AI Power: Expanding Data center capacity to meet growing demand. October 2024.
[20] Goldman Sachs. AI to drive 165% increase in data center power demand by 2030. February 2025.
[21] Li, Pengfei et al. Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models. January 2025.
[22] University of California, Riverside. AI programs consume large volumes of scarce water. April 2023.

Trends and emerging strategies in cooling

While traditional water-intensive cooling systems remain the prevailing standard, the industry is in the midst of a transition. Due to the increasing size of data centers and heat loads, liquid cooling systems are gaining market share and are expected to reach nearly half of new builds by 2030, up from over one-third in 2025.[23]

Supporting this trend, Data Center Frontier in January 2025 published the results of a survey of 172 data center operators, revealing that the adoption of liquid cooling is on the rise and expected to grow significantly over the next three to five years. The survey cited energy efficiency, increasing rack densities, and the demands of AI as the most important drivers behind this shift.

At the server level, liquid cooling—primarily in the form of rear-door heat exchangers, direct-to-chip cooling, and immersion cooling—is better suited to absorbing and removing the heat produced by high-density AI servers. These servers consume large amounts of energy and generate substantial heat—so much so that air-based cooling systems, which circulate cold air around them, often can't keep up.[24] In the race to scale AI infrastructure, the thermal performance of liquid cooling at the chip level is increasingly recognized as not just advantageous, but essential. Importantly, a high level of circulating fluid quality and purity is paramount in these types of closed circuit cooling systems.

At the facility level, circular water cooling strategies are gaining traction as a sustainable alternative to evaporative cooling. By recirculating water in a closed loop, circular cooling offers a path to significantly lower water use while supporting the growing thermal demands of high-density computing environments.

One example is a closed-loop cooling system developed by Arcadis in collaboration with Tomorrow Water, which uses recycled water as the heat sink. The design promises to significantly reduce energy demand compared to air cooling while eliminating water losses associated with evaporative cooling. Recycled water, which replaces potable water in the cooling system, can be completely recovered and returned to the community for beneficial uses.[25] Another example is Microsoft's closed-loop liquid cooling design, optimized for AI workloads. The chip-level cooling system circulates water past heat-generating equipment and subsequently transfers thermal energy to chillers without any evaporative loss or need for a continuous freshwater supply.[26]

As with any solution, these types of approaches have tradeoffs. Closed-loop systems that rely on sensible heat transfer for conveying thermal energy to recycled water require high recirculation rates through the heat exchangers. These high flow rates demand more powerful pumps with higher discharge capacity, which in turn increases electricity use. As liquid cooling adoption grows, safe handling and disposal of spent fluids and system byproducts is essential for preventing potential environmental impacts.

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[23] Bluefield Research. U.S. Water for Data Centers: Market Trends, Opportunities, and Forecasts, 2025–2030. May 2025.
[24] McKinsey & Company. AI Power: Expanding Data center capacity to meet growing demand. October 2024.
[25] Arcadis. An innovative approach for water reuse and data center cooling. June 2023.
[26] Microsoft. Sustainable by design: Next-generation datacenters consume zero water for cooling. December 2024.
[27] Pool Horizons. Swimming pools and data centres, a sustainable symbiosis.

Harnessing waste heat for community benefit

An emerging opportunity contributing to sustainable data center operations involves repurposing server waste heat to support community needs—specifically for heating swimming pools. In the UK, Deep Green has demonstrated this concept in the town of Exmouth, where heat from a data center is captured and redirected to a public swimming pool, reducing the need for gas boilers. By using waste heat—which is typically released into the atmosphere—as a renewable resource, the approach reduces carbon emissions and lowers energy costs for the community. [27]

Navigating the local context of water

Water availability is inherently local, shaped by regional climate conditions, infrastructure, governance, and competing demands from communities, industries, and ecosystems. Data centers that rely on local water resources must account for these site-specific factors to ensure equitable and sustainable use.

According to digital infrastructure company Equinix, understanding the local water context, including water stress levels, is the foundation of its approach to using water responsibly. In 2023, the company designed a new data center in an area where the public had concerns about water stress. The facility originally intended to use evaporative cooling, but after completing an in-depth water stress analysis, Equinix instead elected to install an air-cooling system. Although the area was well prepared in the event of a drought, the switch was still made to proactively align with local concerns about water stress and reflect the company's commitment to minimizing impact.[28]

The Alliance for Water Stewardship (AWS), a global membership collaboration comprising businesses, non-government organizations and the public sector, notes that water risks for businesses are largely tied to the local catchment: the amount of water available, its condition, when it can be accessed, other uses, and the influence of various stakeholders. Sourcing water supplies of sufficient quality and managing discharge responsibly can pose operational challenges for data centers. Moreover, changes within the local catchment and fluctuating water needs can introduce additional water risks. As such, understanding the local context—who and what depends on the local water resource and its variability—is critical to maintaining operational continuity.[29]

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[28] Equinix. How Data Centers Use Water, and How We're Working to Use Water Responsibly. September 2024.
[29] Alliance for Water Stewardship. Water Stewardship In Data Centres. January 2025.

Supply source and water treatment evaluations should be performed early in the design stage of data center development to ensure new systems are set up optimally for water and energy efficiency. Decisions made during this phase—such as cooling system selection, reuse potential, pretreatment design, and cost-benefit analyses of alternate water supplies—will shape a facility's long-term sustainability and operational performance. Moreover, to best balance the tradeoffs between water and energy consumption, getting it right during the design phase is essential, as only incremental water efficiency improvements are possible once a data center is operational.[30]

Water balance study

A practical tool for aligning data center operations with the local water context is a water balance study, which evaluates a facility's total water inputs, outputs, and internal flows in relation to the availability of water resources and climatic conditions within its catchment area. The analysis supports informed decision-making about water sourcing, use efficiency, reuse opportunities, and discharge practices.

The water balance study should also consider data center design, cooling system options, local domestic and industrial water demand, and opportunities to treat and use reclaimed effluent or discharge water. Additionally, all possible water sources should be evaluated, including surface water, groundwater, brackish water, seawater, reclaimed water, rainwater, and other available sources.[31]

Operational best practices for cooling systems should also be part of the scope, as proper operation and routine maintenance will enhance both energy and water efficiency. Water balance studies at data centers have identified opportunities to improve Power Usage Effectiveness (PUE), a metric used to determine the energy efficiency of a data center. PUE is intrinsically linked to Water Usage Effectiveness (WUE), which is used to measure water consumption efficiency.

However, WUE does not capture a data center's true water footprint. By only accounting for on-site water use, WUE overlooks the substantial indirect water consumption for electricity generation, which often relies on water-intensive processes like steam production in thermoelectric power plants.[32]

[30] Equinix. How Data Centers Use Water, and How We're Working to Use Water Responsibly. September 2024.
[31] Ahmad, Rasheed. Engineers often need a lot of water to keep data centers cool. Civil Engineering Source. March 2024.
[32] Why circular water solutions are key to sustainable data centres. World Economic Forum. November 2024.

The role of water stewardship

Against the backdrop of mounting global water scarcity, roughly 20% of U.S.-based data centers rely on watersheds experiencing moderate to high stress from drought and other water-related pressures.[33]

The environmental impacts of data center development are drawing greater scrutiny from local communities, governments, and water activists alike.[34] As public awareness around data center water demand grows, these facilities are seen as competing for limited resources and risk losing their social license to operate[35]—especially in regions where water is already scarce.

To maintain public standing and reduce operational risk, data center operators can adopt responsible water practices that account for the shared and often limited nature of water resources. Recognizing water consumption as a critical challenge, many are setting ambitious water-positive targets (replenishing more than they consume), driving them to incorporate water management and efficiency measures into their standard operations.[36]

Data center operators are also forging partnerships with the communities in which they operate to promote equitable and sustainable use of local water resources. These efforts can include aquifer restoration, recharge and replenishment programs, and social outreach and engagement initiatives.[37]

A similar approach advocated by the Alliance for Water Stewardship is the AWS Standard—a globally endorsed process that any operational facility, such as a farm, factory, mine, or data center, can apply to assess and understand its reliance and impact on local water supplies, including effects on individuals, businesses, and ecosystems that share the same resource.

The AWS Standard is comprised of a five-step framework:

1. Gather and understand data
2. Plan and commit
3. Implement
4. Evaluate
5. Communicate and disclose

Water stewardship recognizes that water issues within a catchment are not the responsibility of any individual entity but must be addressed collectively. Businesses must engage in both on- and off-site actions to address their complex water challenges.[38] To that end, the AWS Standard provides a methodology through which companies can engage local stakeholders who share, and potentially compete for, water resources. By discussing water issues with stakeholders, companies can identify areas of overlap and begin to work toward collective action to address them.

Apple offers a leading example of the AWS Standard in practice, having implemented the framework across all of its owned and operated data centers. The company has also achieved AWS certification at many of its sites, both in the U.S. and internationally. Applying the framework has enabled Apple to identify site-specific water challenges and develop practical actions—both within and outside its facilities—to protect shared water resources and promote equitable access to water and sanitation.

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[33] Siddik, A. B. et al. The Environmental Footprint of Data centers in the United States. Environmental Research Letters. 2021.
[34] White & Case. Data centers and water: From scrutiny to opportunity. December 2024.
[35] Alliance for Water Stewardship. Water Stewardship In Data Centres. January 2025.
[36] Why circular water solutions are key to sustainable data centres. World Economic Forum. November 2024.
[37] White & Case. Data centers and water: From scrutiny to opportunity. December 2024.
[38] Alliance for Water Stewardship. Water Stewardship In Data Centres. January 2025.

A portfolio approach to sustainable water management

At the site level, data centers can implement a range of water efficiency measures along with system-level improvements to optimize water use. A portfolio approach to sustainable water management can include a diverse mix of technologies and strategies applied throughout the data center water cycle—often in collaboration with local water utilities and watershed managing authorities.

According to Bluefield Research, leading data center operators are moving away from passive consumption to active resource management as water stress and regulatory scrutiny intensify. As a result, reclaimed water use, especially in high-demand areas, has increased. On-site treatment systems are being developed to support reuse and compliance, and companies are also investing in advanced technologies—such as pumps, sensors, filtration, and pretreatment units—to enhance operational efficiency and resilience that holistically address the ecosystem.[39]

For example, Google aims to implement technologies and solutions that reduce freshwater consumption and use alternative sources such as reclaimed wastewater and even seawater in its data centers.[40]

Meta's water stewardship program focuses on minimizing data center water use by prioritizing on-site water efficiency while supporting impactful water conservation and restoration projects.[41]

At Microsoft's data center sites, the company works to minimize the amount of water required for cooling and conducts regular audits to identify inefficiencies and areas where design and day-to-day water use don't align.[42]

Water efficiency and optimization measures should be closely monitored to demonstrate sustainability gains and validate progress toward established water goals. To that end, technology companies are prioritizing data collection and analysis to accurately track water usage and measure their progress against publicized water-positive targets.[43]

A proactive water management strategy can provide data centers with a roadmap for sustainable water practices—essential for maintaining 24/7 uptime, optimizing water usage, and reducing water-related risks. A successful strategy should include setting benchmarks, managing costs, and tracking requirements. With a well-defined water use plan that involves tracking results, data centers are better positioned to make strategic, long-term decisions.[44] Regulatory and policymaking agencies play an important role by encouraging proactive water management strategies and supporting behaviors that promote sustainable water use.

Water's journey through a data center evolves over several stages and numerous processes where it is used, consumed, treated, and reused or discharged. Managing this journey involves multiple decision points, each with its own implications for the water sustainability of the facility. It is made up of many parts, which, taken together, can have a cumulative impact across the entire operation. Every instance where water comes into play should be viewed as an opportunity for incremental gains in water efficiency and performance.

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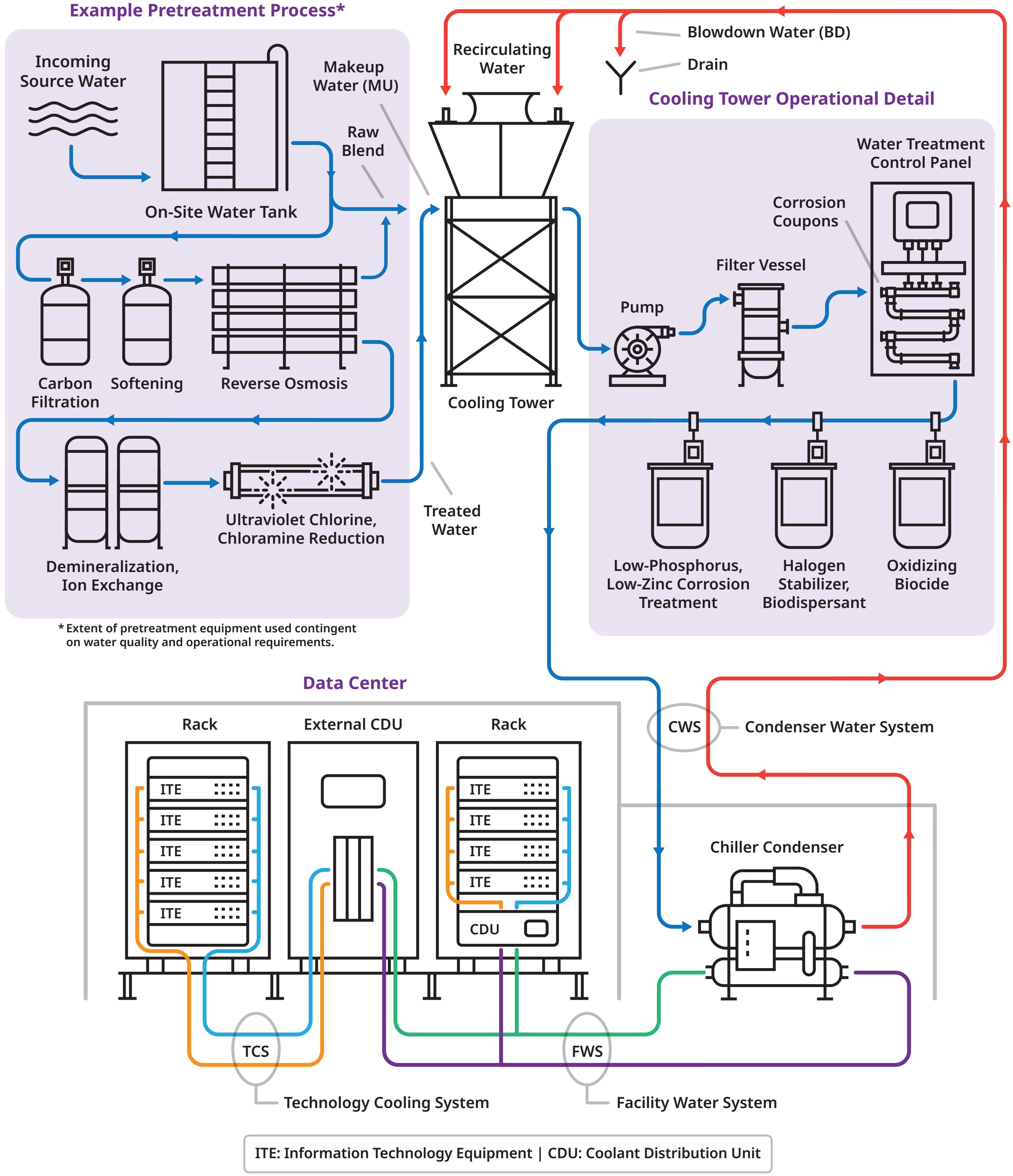
[39] Bluefield Research. U.S. Water for Data Centers: Market Trends, Opportunities, and Forecasts, 2025–2030. May 2025
[40] Google Sustainability. Water Stewardship.
[41] Meta. Prioritizing Sustainability
[42] Microsoft. Sustainable by design: Transforming datacenter water efficiency. July 2024.
[43] White & Case. Data centers and water: From scrutiny to opportunity. December 2024.
[44] Vincent, Mikeal. Water Efficiency Opportunities for Data Centers. Black & Veatch.

Data center system-level water optimization details



Drawing not to scale. For illustration purposes only.

Supply source considerations

The decisions that must be made about water begin well before it enters the facility. Operators must first determine the source that will supply their water needs. Available options vary depending on the region, regulatory oversight, and local water availability, and can include municipal potable water, surface water, brackish water, groundwater, reclaimed or recycled water, seawater, harvested rainwater, or atmospheric generated water.

Each source presents unique considerations for treatment requirements, cooling system performance, and the facility's overall water management strategy. For instance, the use of reclaimed water helps conserve freshwater resources, but can increase the risk of corrosion, scaling, and biofouling in equipment as compared to potable water, necessitating a higher level of water quality monitoring and treatment.[45] While tapping into alternative sources can promote sustainability, it often requires additional pretreatment or chemical conditioning to ensure compatibility with cooling systems.

Rainwater harvesting can offset a portion of the freshwater demand for evaporative cooling, particularly in regions with sufficient precipitation. By leveraging the expansive rooftop footprints typical of data center buildings, operators can collect rainfall using infrastructure such as drainage systems, storage tanks, filtration, distribution manifolds, and circulation pumps. This strategy should be implemented with the correct sustainability audits and harvest procedures in place to ensure the water loop remains optimal and microbe-free. While highly site-dependent, rainwater harvesting can reduce reliance on municipal supplies, supporting broader sustainability goals.

Examples of data centers utilizing non-potable water sources include:

- An Equinix data center in Toronto with a deep lake water cooling system that pulls cold water from the depths of Lake Ontario, allowing Equinix to reduce the facility's total energy needs by 50% without increasing water consumption.[46]
- Google's Hamina, Finland, data center that pumps non-potable seawater into its heat exchangers for cooling. The sea water is kept separate from the freshwater, which circulates within the heat exchangers. When expelled, the hot water is mixed with cold sea water before being returned to the sea.[47]
- A Google data center in Douglas County, Georgia, which uses recycled wastewater for cooling. Employing its own purpose-built system, Google further treats effluent from a local wastewater treatment plant and conveys it to the data center via a roughly two-mile pipeline.[48]

Source water quality also plays a crucial role in determining the quantity of water required in cooling systems. Higher-quality water—characterized by low levels of hardness, dissolved solids, and silica—enables more cycles of concentration within cooling systems, lowering makeup water needs. After a certain number of cycles, the water will reach a threshold concentration and will need to be discharged as blowdown before precipitation and scaling occur. The blowdown quality can vary significantly depending on the source water quality and the number of cycles of concentration within the system.[49]

[45] Vincent, Mikeal. Water Efficiency Opportunities for Data Centers. Black & Veatch.
[46] Equinix. How Data Centers Use Water, and How We're Working to Use Water Responsibly. September 2024.
[47] Mytton, David. Data centre water consumption. Nature Partner Journals Clean Water. 2021.
[48] Ahmad, Rasheed. Engineers often need a lot of water to keep data centers cool. Civil Engineering Source. March 2024.
[49] Maco, Rebecca et al. An industry in transition 1: data center water use. DCD. Nov. 2021.

Point-of-entry water treatment

Before water is used within a data center, it typically undergoes treatment at the point of entry—whether it originates from municipal supplies or lower-quality sources. Pretreatment is essential for addressing contaminants and conditioning the incoming supply to protect critical equipment and ensure cooling efficiency.

Water quality can vary considerably depending on the source, regional characteristics, and seasonal fluctuations. Even municipal supplies may contain residual chlorine, dissolved solids, or other constituents that can impact downstream systems.[50] To better understand the available water supply, facility operators should communicate with local water utilities about the results of seasonal sampling, pH levels, conductivity, total dissolved solids, chlorides, silicon, hardness, alkalinity, and microbial counts.[51]

Data centers should also establish communication protocols with local water utilities to receive advance notice of any planned changes to its raw water supply, as water source changes can produce significant swings in water quality, which may impact treatment processes and system performance. This includes confirming which form of disinfection is currently employed (whether chlorine, chloramine, or chlorine dioxide), as the disinfectant method can affect, and be affected by, the water chemistry of the cooling system. While such changes will most likely not result in significant operational issues, end-users should still be aware of what to expect based on the analytical results of water tests.

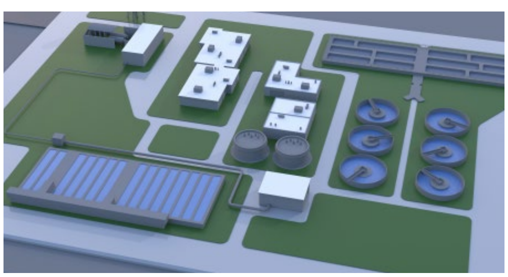
Point-of-entry treatment strategies include:

- Mechanical filtration to remove suspended solids that contribute to scaling and corrosion.
- Ion exchange to address hardness by removing calcium and magnesium ions that promote scale formation.
- Activated carbon filtration to remove chlorine and residual disinfectants that can corrode metal surfaces.
- Reverse osmosis (RO) for removing dissolved solids, minerals, organics, and bacteria that can cause scaling, corrosion, and other issues.
- Ultraviolet (UV) disinfection to control microbial growth and reduce biological fouling risks.

Monitoring strategies at the point of entry should also be established to track fluctuations and potential risks in real time. Key parameters to monitor include:

- Disinfectant level
- Microbial load
- Organics load
- Turbidity
- Hardness and alkalinity
- Nutrients

Without effective treatment, issues such as corrosion, scaling, fouling, and microbial growth can compromise heat transfer, reduce cooling efficiency, shorten equipment life, and drive up energy and maintenance costs.



Point-of-entry chemical treatment

Chemical programs at the point of entry help condition water before it reaches critical systems, addressing issues such as scaling, corrosion, and microbial growth. These applications are especially useful when source water originates from non-traditional supplies or the quality is variable.

UV AOP treatment for source water

The UV advanced oxidation process (AOP) is an effective, chemical-free method for disinfecting source water while simultaneously destroying trace organics, particularly when using lower-quality supplies with elevated microbial or organic content. After GAC, there is no disinfectant present, and microorganisms can colonize the carbon media and downstream piping. Adding a UV system after the GAC ensures continuous microbiological control, preventing bacteria and other pathogens from growing in the absence of chemical disinfectants.

[50] National Center for Biotechnology Information. Elements of Public Water Supplies
[51] Ahmad, Rasheed. Engineers often need a lot of water to keep data centers cool. Civil Engineering Source. March 2024.

Cooling system operations

Evaporative cooling systems, the largest source of water use in data centers, are a critical focus for water efficiency and optimization efforts. In open recirculating systems such as cooling towers, water consumption can be reduced by maximizing the cycles of concentration. However, achieving higher cycles is constrained by the quality of the makeup water and the system's water chemistry. Constituents such as hardness, dissolved solids, and silica pose the greatest limitations, as they increase the risk of scaling, corrosion, and fouling.

Closed-loop cooling systems, which circulate a fixed volume of water through a sealed system, minimize both evaporative losses and makeup water demand compared to evaporative systems. Although closed loops are more water-efficient, issues like corrosion, scaling, fouling, and microbial growth can be exacerbated if impurities from makeup water are not properly managed. This phenomenon is emblematic of systems that do not turn over or replace much of their total system volume.

Water consumption in evaporative cooling systems is directly tied to the thermal load generated by servers. Roughly one pound of water must be evaporated to eject every 1,000 BTUs of heat. For context, a 1,000-ton chiller operating at full capacity requires the removal of about 12 million BTUs per hour—translating to approximately 1,500 gallons (5.7 m^3) of water evaporated per hour. This calculation assumes the compressor's heat of compression is not included in the cooling tower load; if it is factored in, the evaporation rate increases to approximately 1,800 gallons (6.8 m^3) per hour.

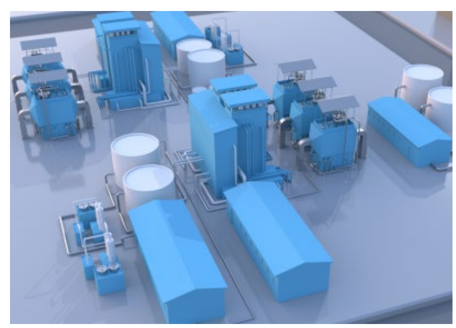
However, the total volume of water ultimately consumed through evaporation can vary greatly depending on the makeup quality and how well it is chemically treated and managed. When factoring in evaporative losses and makeup water needs, total water consumption can range from 1,700 to 3,000 gallons per hour (6.4 to 11.4 m^3) for every 1,000 tons of cooling, equating to an annual usage of between 15 and 26 million gallons (56,800 to 98,400 m^3). The lower end of this range would be typical of a water-optimized cooling tower with access to high-quality makeup water. Sites with only lower-quality supplies available would skew toward the higher usage, but investments in water treatment systems, such as RO, and chemical treatment programs can substantially narrow that gap—yielding potential savings of millions of gallons per 1,000 tons of cooling annually.

Chemical treatment for cooling systems

Chemical programs for cooling systems help control corrosion, scaling, and fouling—improving water efficiency, extending equipment life, and increasing the number of cycles of concentration.

Water quality monitoring in cooling cycles

Continuous monitoring of cooling system water quality and other key parameters in cooling water cycles help maintain optimal system chemistry and prevent scaling, corrosion, or biological activity—conserving water, reducing blowdown losses, and protecting equipment.



Flow monitoring for cooling water management

Accurate flow measurements are essential for managing water and chemical use in data center cooling systems, helping operators maintain efficient cooling operations while controlling water and treatment costs in areas where water comes from non-traditional sources or the quality is variable.

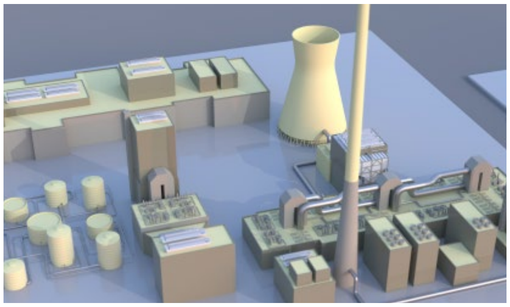
Wastewater treatment and recycling

Cooling tower blowdown—the primary wastewater stream generated by data centers—offers a significant opportunity for recycling and reuse. Rather than being discharged, blowdown can be treated using a combination of advanced technologies and recirculated as makeup water, thereby reducing reliance on municipal water supplies.

Blowdown streams can contain elevated concentrations of dissolved solids, hardness ions (such as calcium and magnesium), phosphates, chlorides, and organic compounds, including residual treatment chemicals. The characteristics of cooling tower blowdown—which are shaped by the cooling system type, source water composition, and chemical treatment regime—can play a pivotal role in selecting an appropriate treatment process.[52]

Technologies used in various combinations for blowdown recycling include RO, electrodialysis (ED), ultrafiltration (UF), nanofiltration (NF), electrocoagulation (EC), and membrane distillation (MD).[53,54] However, challenges can emerge depending on the blowdown water quality and the technologies selected.

In one pilot study that evaluated UF-RO for recycling cooling tower blowdown, concentrations of organics and phosphates were found to present a residual risk of biofouling on downstream RO membranes, necessitating the use of biocide dosing and additional treatment processes in full-scale applications. Despite these challenges, the pilot found that recycling cooling tower blowdown can reduce the water footprint of open recirculating cooling water systems while delivering both direct and indirect water savings.[55]



Chemical support for blowdown reuse

Chemical treatment programs tailored for blowdown streams help control scaling and biological fouling during reuse, improving the reliability and efficiency of recycling processes.

[52] Ahmad, S.T. et al. Recovery and treatment of cooling tower blowdown water: Challenges, recent advancement, and future perspectives. Journal of Environmental Chemical Engineering. 2025

[53] Ahmad, S.T. et al. Recovery and treatment of cooling tower blowdown water: Challenges, recent advancement, and future perspectives. Journal of Environmental Chemical Engineering. 2025.

[54] Soliman, M. et al. Treatment Technologies for Cooling Water Blowdown: A Critical Review. Sustainability. 2022.

[55] Ahmed, J. et al. A pilot study on recycling cooling tower blowdown water through ultrafiltration and reverse osmosis. Desalination and Water Treatment. 2023.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Veralto Company expertise drives sustainable outcomes

About Veralto

Veralto is a global leader in essential water and product quality solutions, committed to making an enduring positive impact on the world. With a portfolio of industry-leading companies and globally recognized brands, Veralto helps billions of people access clean water, safe food, and trusted essential goods. Veralto's Water Quality operating companies enable customers to safeguard precious water resources by managing water more responsibly and holistically and addressing challenges such as water safety and scarcity. Our global team of nearly 17,000 associates is united by a shared purpose: Safeguarding the World's Most Vital Resources™.

As AI and other demands on digital infrastructure grow and drive water needs higher, operators must adopt integrated strategies that reflect the critical nature of water and our shared obligation to manage it efficiently and responsibly. Delivering on that vision requires expertise throughout every stage of a data center's water cycle.

Veralto's Water Quality operating companies provide end-to-end support and operational insight across the full scope of water-related operations in data centers—delivering solutions that span source treatment, system monitoring, optimization, reuse, and more.

ChemTreat

ChemTreat supports proactive water management with tailored chemical treatment programs and dosing protocols that enable their customers to optimize water usage and improve operational efficiency.

The company's solutions address scaling, corrosion, and microbiological issues across data center water processes—helping facilities enhance performance, protect equipment, and ensure the reliability of cooling systems, blowdown reuse programs, and water treatment processes.

Chemical treatment at the point of entry

In many cases, chemical programs are introduced at the point of entry to enhance pretreatment processes and address specific water quality challenges. ChemTreat offers a comprehensive portfolio of solutions for data center water treatment, helping operators control scaling, corrosion, and microbial growth before water enters critical systems.

These treatments can address gaps or supplement treatments supplied by some, but not all, municipal water suppliers. Corrosion and scale inhibitors, polymeric dispersants, as well as microbial control agents are typically applied where determined to be most beneficial.

Chemical treatments can also include filter aid treatment and dechlorination chemicals. In filtration systems, ChemTreat solutions help improve media filter efficiency and ensure effluent meets desired specifications. This is particularly important in flows upstream of RO membrane systems.

Chemical programs also support effective membrane operation within RO systems, especially as source waters become more complex. Dechlorination prior to RO is a key step, as free chlorine residuals can destroy RO membranes (thin-film composite, in particular). ChemTreat offers dechlorination solutions that remove almost all free chlorine, regardless of the source.

Additionally, ChemTreat provides water softening chemical programs designed to minimize calcium and magnesium scaling on RO membranes, helping conserve energy, optimize flow rates, and reduce RO treatment costs.

Cooling system treatments

ChemTreat's proprietary chemical solutions for water cooling systems address corrosion, scaling, and fouling, assisting efforts to reduce water usage and increase cycles of concentration. From automated, hands-free chemical delivery to customized products for direct cooling methods, ChemTreat's site-specific strategies help extend equipment life and increase heat transfer efficiency by managing heat exchanger fouling.

In water-cooled chiller systems, energy efficiency is closely tied to the cleanliness of chiller tubes—the critical heat exchange surfaces that transfer thermal energy. Fouling, scaling, corrosion, and biological growth in heat exchanger tubes reduce thermal conductivity, requiring systems to use more energy to achieve the same level of cooling. These same conditions also increase the risk of under-deposit corrosion and microbially-influenced corrosion, both of which can lead to catastrophic failure of chiller condenser tubes, especially enhanced-surface tubes. ChemTreat's solutions are specifically designed to treat these surfaces, helping operators enhance heat transfer and reduce the power demand of chiller systems.

As direct-to-chip liquid cooling becomes essential for high-density AI workloads, ChemTreat provides liquid cooling expertise, proper system startup support, and advanced chemical treatment programs tailored to these closed-loop systems. Drawing from its work with a national laboratory managed by the Department of Energy, ChemTreat brings direct experience in developing proprietary protocols customized to the unique demands of direct-to-chip liquid cooling—effectively treating corrosion and microbiological activity to improve thermal efficiency.

Water quality monitoring for cooling systems

ChemTreat uses chemical tagging chemistry to accurately monitor active treatment components (scale inhibitors and polymeric dispersants), allowing fully automated control of chemical feed rates. This prevents both overfeeding and underfeeding of chemical treatments.

Chemical treatment support for blowdown reuse

ChemTreat offers specialized chemical treatment programs designed to optimize the reclamation and reuse of blowdown from cooling water systems, helping data centers reduce water consumption and minimize disposal costs.

Hach

Hach provides reliable, easy-to-use solutions that help industries and municipalities analyze water more efficiently and effectively. In data centers, Hach's real-time water quality monitoring and analytical instruments—available in both on-line and laboratory (off-line) configurations—can be applied across the full range of water processes. From incoming supply and cooling systems to blowdown and discharge, Hach's solutions help operators optimize treatment performance, minimize water losses, and detect early signs of fouling or contamination.

Water quality monitoring for cooling systems

To optimize cooling operations, Hach's water quality instruments and analytical tools deliver accurate, real-time monitoring of key parameters in cooling water cycles. With a comprehensive portfolio for cooling applications, Hach helps operators monitor critical indicators such as hardness, alkalinity, organics, nutrients, and pathogens to prevent scaling, corrosion, and microbial growth—supporting efficient system performance, reducing water consumption, and minimizing blowdown losses. By maintaining optimal water chemistry in both evaporative and closed-loop systems, Hach's solutions enable data centers to conserve water, extend equipment life, and enhance operational efficiency while helping to manage treatment costs.

Protecting RO membranes in treatment systems

Maintaining an optimal chlorine balance in RO systems is essential for protecting membrane integrity and preventing biofouling. Accurate low-level monitoring of chlorine residuals helps operators avoid both overfeeding and underfeeding dechlorinating agents—reducing the risk of both structural damage from excess chlorine and biofilm formation from insufficient disinfection. Hach's Ultra-Low Range chlorine analyzer uses colorimetric analysis to measure total chlorine residual with unparalleled accuracy—supporting the need to maintain disinfectant levels high enough to control biofilm growth, yet low enough to preserve RO membrane life.

Protecting cooling systems with TOC and VOC monitoring

Process organic breakthrough occurs when process fluids leak into cooling water due to failures in heat exchanger seals or components, leading to contamination that can compromise water quality and system performance. Monitoring total organic carbon (TOC) and fugitive volatile organic carbon (VOC) emissions early in the water cycle presents an optimal method to mitigate these potential problems and avoid unplanned downtime. Hach's BioTector B3500c analyzer provides highly accurate and reliable detection of low concentrations of organic contaminants, TOC, and VOC—enabling operators to identify issues before system damage can occur.

TROJAN
technologies™

Trojan Technologies

Trojan Technologies provides UV treatment and advanced oxidation process (AOP) solutions that help municipal, industrial, and residential users effectively treat microbial contaminants and trace micropollutants. In data centers, Trojan Technologies supports robust source and process water treatment—particularly valuable for facilities employing closed-loop cooling designs or relying on non-traditional sources such as recycled water.

UV treatment

To reduce microbial growth in downstream cooling and humidification systems, UV technology is employed to inactivate microorganisms. This is achieved using a closed-vessel reactor equipped with UV lamps that emit germicidal UVC energy into the water. UVC energy has a powerful bactericidal effect—it penetrates and disrupts the DNA of microorganisms, rendering them inactive.

Within seconds, viruses, bacteria, yeasts, and fungi are neutralized, effectively minimizing biofouling in the system. UV treatment is a proven, chemical-free, and environmentally sustainable solution. Importantly, microorganisms cannot develop resistance to UV radiation, ensuring long-term efficacy.

In certain applications, the combination of higher UV energy (i.e. UV doses) levels and an added oxidant enables UV-advanced oxidation processes (UV-AOP). This advanced treatment not only inactivates microorganisms and bacteria but also breaks down trace organic contaminants—particularly in lower-quality source waters with elevated pathogen and residual organic content. Trojan Technologies offers industry-leading UV-AOP solutions designed to target a broad spectrum of contaminants and pathogens, safeguarding infrastructure and supporting the expanded use of alternative water sources.

VIQUA, a Trojan Technologies brand specializing in low-flow UV devices, has deployed its UV equipment for biological control in data centers. Used by many top OEMs as a critical component in data hall air handling units (DAHU), VIQUA has thousands of units integrated into DAHUs across North America.

Aquafine is Trojan Technologies' flagship industrial brand, providing an alternative UV solution tailored for low- to mid-flow data center customers. It delivers reliable cooling water treatment while enabling safe and sustainable water reuse opportunities. Backed by decades of proven performance across industries such as microelectronics, pharmaceuticals, and food & beverage, Aquafine brings trusted expertise that is well-positioned to support the rapidly growing data center sector.

McCrometer

McCrometer provides precision flow measurement solutions for demanding liquid, gas, water, wastewater, and steam processes across a wide range of markets and manufacturing segments. In data centers, McCrometer's flow meters can monitor source water intake, chilled water loops, and cooling tower makeup and blowdown—delivering accurate data to optimize performance, control chemical use, and reduce water consumption.

Precision flow monitoring for effective cooling water management

Reliable flow measurement data is essential for chemical dosing in data center cooling systems. With cooling towers, flow meters are used to maintain proper design flow, ensure adequate cooling, and control chemical costs. McCrometer's high-quality, precision flow meters provide accurate flow readings from blowdown and makeup water lines to calculate rates of evaporation, cycles of concentration, and cooling water chemical treatment rates—information to quantify tower efficiency and effectiveness.

Flow data for optimizing water management

Water flow meters are crucial for accurately measuring both water consumption and wastewater discharge in data center environments, providing essential data for water management and ensuring regulatory compliance. Water flow data is directly tied to data center billing and provides key information for validating water conservation initiatives with local and state agencies. Automated flow meters reduce the need for manual meter reading, improving efficiency and reducing operational costs. McCrometer's full-bore magnetic flow meters with +/- 0.2% accuracy offer a reliable way to track water consumption in multi-tenant data centers and allocate water costs with precision.

Improving chiller performance with real-time flow insights

In chiller systems, flow meters integrated with building management systems provide real-time data on water flow and energy usage, enabling facility managers to quickly identify inefficiencies—such as suboptimal flow rates, low Delta T conditions, or excessive power consumption—and take prompt corrective action. McCrometer's highly accurate insertion-style mag meters deliver real-time flow data across a wide operating range, supporting system staging and helping reduce unnecessary chiller runtime and over-pumping. Improved flow management reduces energy consumption and avoids overwork of the primary chillers.

OTT HydroMet

Weather monitoring instruments for solar energy production

OTT HydroMet provides environmental monitoring solutions that enable decision-makers with vital weather insight across Hydrology, Meteorology, and Solar Power applications. For data centers, OTT HydroMet's comprehensive solar meteorological station solutions unlock site-level visibility, enabling operational efficiency and reducing the risk of damage to capital assets during extreme weather events.

Robust, reliable solar PV sites, whether on-site or grid-connected, allow data centers to meet demanding energy needs while eliminating the carbon footprint of fossil fuel-derived generation and mitigating the indirect water consumption associated with traditional thermoelectric power generation technologies.

High-quality, real-time data on key environmental variables including solar irradiance, temperature, wind speed, humidity, precipitation, and soiling is fundamental to optimizing the output of large commercial & institutional and utility-scale PV sites. This data supports real-time energy forecasting, optimized cleaning schedules, efficient maintenance planning, and portfolio-level performance benchmarking. Alerts to high wind events or heavy snow loads trigger panel stow procedures that can protect modules, racking, and tracker systems, ensuring site assets perform to nameplate standards over the course of their 20+ year lifecycles.

Conclusion: Meeting the water imperative for the future of digital infrastructure

Water is emerging as a critical strategic issue for data center operations—on par with energy, resilience, and carbon emissions. As AI workloads push the limits of high-density computing and cooling demand, and environmental regulations and public expectations evolve, operators must reimagine water management not as a support function, but as core infrastructure.

This white paper has explored the multifaceted water challenges facing the industry—from sourcing and treatment to real-time monitoring, reuse, and sustainability.

For data center owners and operators, water industry professionals, ESG leaders, and policy stakeholders, the path forward demands integrated, high-performance solutions grounded in both operational excellence and environmental responsibility.

Veralto, through its Water Quality operating companies—ChemTreat, Hach, Trojan Technologies, McCrometer, and OTT HydroMet—offers exactly this: end-to-end support across the full water lifecycle in data centers. These companies deliver advanced chemical treatment, real-time quality monitoring, closed loop cooling process technology solutions, UV and AOP disinfection technologies, precision flow measurement, and environmental data instruments. Together, they enable:

- **Smarter water sourcing and pretreatment,** including safe use of non-traditional sources and protection of critical RO membranes,
- **Reliable and efficient cooling** through tailored chemical programs, continuous quality monitoring, and early detection of system risks, particularly in emerging process applications,
- **Enhanced reuse and sustainability** supporting higher cycles of concentration, optimized blowdown recovery, and compliance with emerging standards,
- **Data-driven water stewardship** with flow and quality analytics that inform operational decisions and ESG reporting,
- **Environmental monitoring** powered by meteorological and hydrological instruments that help data centers manage solar energy production and mitigate climate-related water risks.

As water-related risks and costs grow in parallel with digital infrastructure, these capabilities are not optional—they are foundational. Addressing water holistically improves performance, reduces environmental impact, and strengthens long-term viability.

This white paper offers a framework for aligning water strategy with the demands of high-density computing infrastructure. By leveraging advanced water technologies and cross-disciplinary collaboration, stakeholders can drive meaningful progress toward sustainable, resilient, and future-ready data centers.

Focused on Desalination and Reuse®

IDRA

"The rapid growth of data centers, driven by AI and cloud computing, has made water a defining constraint for digital innovation. Veralto's White Paper highlights the urgency of addressing direct and indirect water footprints.

Desalination and water reuse offer scalable solutions to reduce dependence on scarce freshwater, ensuring resilient supplies while protecting communities and ecosystems. The data center sector can lead by integrating these approaches into design and operations, advancing resilience and sustainability.

IDRA welcomes this contribution and calls for stronger collaboration across technology, water, and energy sectors to align digital progress with sustainable water and energy management."

— Shannon McCarthy, Secretary General,
International Desalination & Reuse Association

NACWA

"The White Paper's findings are thoughtful and thorough. As the report notes 'the rapid adoption of AI, particularly Gen AI, is poised to accelerate the water- and energy-driven trends associated with data centers.' The National Association of Clean Water Agencies (NACWA) believes, as the report sets out, that the water utility and private sector must collaborate more closely to make thoughtful decisions about data center citing at the front end to smart, sustainable decisions about data center water use as data center water needs expand exponentially in the coming years. Water reuse and recycling from both the utility as a water provider, as well as circular recycling systems at the data centers themselves, must be core components of the inevitable data center expansion as discussed cogently in the paper."

— Adam Krantz, CEO, NACWA

The Water Center
University *of* Pennsylvania

"Climate change is disrupting traditional approaches to designing and managing sustainable water systems, driving a major shift in priorities and strategies. Encouragingly, the AI-data center industry is leading with innovative solutions to reduce its water consumption - advancements that could redefine industrial water reuse, enhance efficiency, and ease pressure on local water supplies worldwide."

— Howard Neukrug, Executive Director, The University of Pennsylvania

"As the rapid expansion of data centers continues around the world, fuelling the digital economy, their water dependencies and impacts are becoming better understood. Like all industries that require high volumes of water, data centers have direct and indirect water use. It is encouraging to see Veralto emphasising the importance of water stewardship to help address impacts of indirect water use in data centers. Water stewardship can help data centers become a driver for resilience, not just for the industry but for communities, other businesses and ecosystems who rely on the same shared resource.*

Through water stewardship, data center owners and operators can be at the center of revitalising the relationships between businesses and communities that underpin the potential for water to be a genuinely unifying force."

— Adrian Sym, Chief Executive, Alliance for Water Stewardship

"The AI revolution and corresponding growth in data centers will create water sustainability challenges that can be met in large part through greater recycling of water. We're pleased to see this white paper discussing ways in which reuse can be deployed in the context of data centers."

— Bruno Pigott, Executive Director, WateReuse

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