



## Data Centers and Water: A Fluid Relationship

Industrial water use was once a niche topic to the public outside of major contamination events or regulatory crackdowns. However, coverage around data centers' water demand and subsequent community pushback has become a mainstay for news in recent years. This growing drumbeat has brought about new perceptions and misconceptions of one of the fastest-growing industries in the US. In today's newsletter, we're exploring data centers' relationship with water, covering the misconceptions in this space, and sharing what we're seeing in the field from both established and new players.

### The Evolution of Data Centers

The data center market as we know it began in the late 1990's, exploding over the next two decades to meet companies' growing demand for computation and data storage. Following the advent of cloud computing in the 2000's, the industry began shifting towards virtual computing and resource pooling. Now, with the rise in consumer-facing AI products, "hyperscale" data centers, usually defined as hosting over 5,000 servers, have become the dominant category for new builds [[Coresite](#)]. Such facilities often require the use of Graphic Processing Units (GPUs), generating more heat than traditional server racks. The combination

of pooled resources, higher compute power, and increased scale have led to the massive rise in water needed to cool and maintain the on-site infrastructure, a trend that has defined their public perception in recent years.

## Water: The Newest Feasibility Challenge

More than 3,000 data centers are planned or currently being built in the US, adding to the 4,000 already spread throughout the country [Axios]. This gold-rush style boom has led to an increase in density across existing hotspots like Northern Virginia and Texas. It has also driven expansion into new areas, building conflict as companies balance their desire for quick development with increasing feasibility testing requirements, scrutiny from regulators, and community pushback. Because of this, water has joined power and fiber as a primary consideration for site selection, given poor planning can create challenges down the road for operational and financial security.

For data centers using liquid-based cooling, treating their water is a fairly straightforward process. Influent treatment, when needed, typically includes filtration and chemical treatment to prevent mineral or microbial buildup. Effluent treatment focuses on treating direct byproducts like brine, refrigerants, metals, and PFAS, depending on permit requirements. In our conversations with data center teams, a common theme is that the biggest challenge is not the makeup of the water, but instead its availability, the efficiency of their usage and managing ever-shifting CapEx requirements.

## Resource-Intensive or Resourceful?

Current perception of data centers, especially hyperscale sites, centers on their immense water demands. While it is true that they consume large quantities (approximately 264 billion gallons in 2025 [Reuters]), these sites have always required significant quantities water. In fact, as utility costs rise and withdrawal limits tighten, modern data centers are driving innovation in their water usage vs. their predecessors. Now, many of the largest data centers are achieving Water Usage Effectiveness (WUE) rates unheard of a decade ago.

$$\text{WUE} = \frac{\text{Total Site Water Use (liters)}}{\text{IT Energy Consumption (kWh)}}$$

A basic formula used to determine a site's Water Usage Effectiveness

As water becomes an increasingly complicated factor in data center operations, WUE has become a standard metric in recent years [Introl]. WUE, commonly expressed in liters per kWh, illustrates the ratio of water consumed relative to IT energy consumption. This includes cooling tower makeup, indirect power plant use, humidification, and any other operational uses for water. WUE is a highly effective comparative metric when tracked with appropriate context. Though, as we will see, it is critical for facilities to have a comprehensive understanding of their water landscape, as unanticipated variables can easily obscure the real cost of water.

WUE tends to have an inverse correlation with Power Usage Effectiveness (PUE), a similar metric which focuses on the total ratio of energy consumption to output. For example, evaporation is a highly water-intensive cooling practice, but uses very little energy. Compare this to air-chilled data centers, which use next to no water, but are extremely energy-intensive. This trade-off is now a defining aspect of site planning, as resource availability and cooling technology have become make-or-break considerations for new and existing sites alike despite their omission from some cost calculations.



Public perception around data centers rarely accounts for their growing resource efficiency, which is often far higher than that of other water-intensive industries.

So, what does a good WUE ratio look like from an operational standpoint? The short answer: it depends. The slightly longer answer: the closer to 0, the better. The average, including many older colocated data centers, is 1.7 - 1.8 L/kWh [Equinix]. However, some of the most efficient sites are now operating far below that thanks to growing efforts to reuse the water from their operations, either through in-house treatment or secondary applications. Notably, while it is possible to improve WUE within an existing system by recycling water and

minimizing evaporative losses, the best sites achieve this through comprehensive up-front planning. It is essential to consider all relevant context when assessing this metric, as the source of the inefficiencies, and the capacity to solve them, can vary heavily.

For example, compare two planned data centers of similar sizes using evaporative cooling. Despite the similarities, their WUE can differ significantly based on a number of factors:

- 1. Region** defines the source, quality, and availability of their water, also determining any influent treatment needed.
- 2. Location** dictates their relationship with local communities, whether their municipality can handle their effluent, the source of their power and strength of the grid, as well as any local regulatory requirements.
- 3. Technology efficiency** determines the net value of their equipment and operations. While efforts like adding water reuse can provide a boost to WUE, poor maintenance can significantly hinder the lifespan of a treatment system and eat into a facility's bottom line.

## **Water: An Industry Theme**

The role of water in data center operations is a growing priority. As noted earlier, the sites with the best WUE ratios are those who plan for it from the beginning. At the 2026 Data Center World conference, Cambrian's Chief Revenue Officer, Christine Morris, spoke with other leaders in the water, energy, and technology spaces on this issue. The discussion underscored three trends that will define who sees the most success in the coming years:

**Water is more than a downstream detail.** As data center demand accelerates, water availability and permitting are becoming primary planning objectives. Once a secondary consideration, teams are now incorporating water into early resource feasibility planning alongside power and fiber to prevent unexpected constraints to construction timelines and capital planning.

**Scale is an organizational skill first, technical second.** The winners in this space are those who have planned for flexibility as a design requirement. Ever-shifting conditions like today require processes and organizational agility. The organizations that can thrive within these conditions will face fewer operational challenges from resource constraints and cost adjustments than those who try to have every detail in place before moving.

**Extended timelines can create discomfort. Plan for the long-term.** In a fast-shifting ecosystem, waiting for perfect information stalls progress. The leaders who succeed in this space are comfortable making decisions and adapting without precedent, keeping stakeholders aligned while the path is still being built.



Christine Morris, Chief Revenue Officer, speaking on a panel at the Data Center World Conference

## The Future of a Futuristic Industry

As noted above, data centers are beginning to see the value in comprehensive water planning. This has led them to engage with more 3rd parties early in planning to determine their options for site selection and technology used. Such partnerships have driven major innovations in the space recently. Data centers are now increasingly focused on maintaining high water effectiveness while minimizing environmental and community impacts. However, the demands for advanced water treatment and reuse technology have also created ballooning CapEx requirements and operational burdens, posing their own unique feasibility challenges for new site builds.

Cambrian's innovative partnership model helps facilities like data centers gain access to the technology and expertise needed to bring projects from theory to reality. Through our zero-CapEx model, we help even the largest organizations build operational resilience and cut water-related costs across the board. Our robust treatment and reuse systems make it easy for data centers to meet their water effectiveness goals and offer a cost-effective choice over managing it themselves.

**If you're treating water on site, you may be sitting on untapped value. Cambrian helps you unlock it, with no risk and no upfront cost.**

## **Let's Talk**

Whether you're exploring a new operational model or looking to upgrade without the capital, Cambrian is ready to partner for long-term success.

**Your next liquid asset is already on site. Let's put it to work.**

Schedule a conversation with Cambrian:

[www.cambrianinnovation.com/contact](http://www.cambrianinnovation.com/contact)