Baringa

How Water Resilience Will Shape the Future of Data Centres

November 2025

Foreword

Digital growth is colliding with water scarcity. The future of data centres depends on managing the water–energy trade-off, securing non-potable supply, and turning risk into resilience.

The industry recognises this challenge and is already making significant changes. Yet, as data centre water consumption is set to double by 2030, new facilities are still being built in water-stressed regions, and water risk remains challenging to prioritise in planning and investment. The risks of failing to secure reliable water supplies are significant. Without water, data centres cannot operate at full capacity, threatening the digital infrastructure that underpins economic growth. Water shortages can disrupt operations, lead to outages, and expose operators to reputational damage, regulatory intervention, and community opposition. As competition for water intensifies, the risk of project delays, stranded assets, and lost investments.

The next phase of digital growth will require treating water as a strategic asset, embedding it into site selection, permitting, and commercial models such as Water Purchase Agreements, to ensure both resilience and sustainable expansion.

Report Authors

James Piggott
Expert in Water
James.Piggott@baringa.com

Bridget Teirney
Bridget.Teirney@baringa.com

Ishita Aryan
Ishita.Aryan@baringa.com

Ana Laura Arriola
analaura.arriola@baringa.com

Expert contributors:

Greg Borel, Partner and Expert in Data Centres: Gregory.Borel@baringa.com

Nick Forrest; Partner and Expert in Regulation and Policy: Nick.Forrest@baringa.com

Simon Connell, Director and Expert in Nature Finance: Simon.Connell@baringa.com

Marcel Volkerts, Director and Expert in Energy Networks Marcel.Volkerts@baringa.com

The scale of the challenge

Data centres sit at the heart of the digital economy. Global capacity is set to triple by 2030, with hyperscale and co-location facilities expanding at 15–20% per year and capital investment projections reaching €3-4 trillion globally. This boom brings extraordinary scale and complexity, presenting opportunities but also challenges: data centres are driving unprecedented strain on both energy and water systems.

The energy footprint of data centres is well known: their share of global electricity demand is projected to rise from 2% in 2022 to 4% by 2026. The water footprint is less understood, but no less material. Our research shows:

- The global data centre sector already consumes more than 560 billion litres of water annually, projected to hit 1.2 trillion litres by 2030 — approximately 25% more than London's entire annual water consumption
- A single 100MW hyperscale facility using evaporative cooling can consume 2.5 billion litres of water each year — enough to supply more than 80,000 people.
- Cooling accounts for ~80% of water demand in most facilities, alongside ~40% of total energy use.
- 52% of global data centre hubs are already located in high water-stress regions, rising to 58% by 2050.

Water is no longer a hidden input. It is a strategic constraint.

Drawing on Baringa's Data Centre Market Attractiveness Index; which includes global water stress overlays (Aqueduct, WRI), our analysis highlights three critical findings:

Scale and siting amplify water risk

- Data centres cluster in water-scarce regions to tap city proximity and cheap renewables—showing how energy and connectivity were prioritized over water, a trade-off now reshaping future siting.
- The UK, Ireland, Spain and Southern US hubs show a sharp collision between digital growth and water limits.
- In Spain, Amazon's Aragon data centres requested a 48% increase in water use in 2024, triggering community opposition and regulatory pushback.

Cooling choice is decisive

- Evaporative cooling dominates today — but is highly water-intensive.
- Over 40% of new hyperscale capacity announced since 2023 is shifting to low- or no-water cooling (closed-loop, dry air, immersion) in response to regulation and community pressure—a positive trend, but one that trades water savings for higher energy use and leaves most existing capacity untouched.

- Retrofitting legacy sites remains a challenge, with space and cost constraints slowing adoption, meaning the bulk of water demand will persist for years.

Water is under-prioritised in investment and permitting

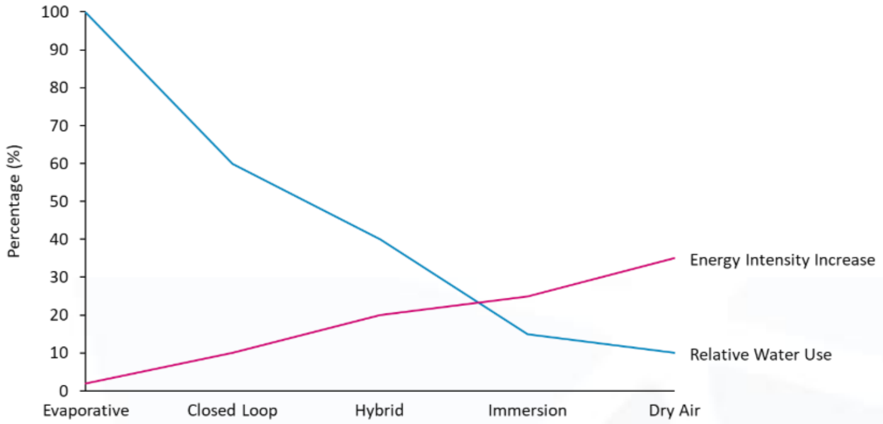
- Site selection is still driven by grid access, not water availability.
- Few operators disclose location-specific water withdrawals; investors lack transparency to assess exposure.
- Policymakers have yet to establish clear licensing thresholds for water use in high-stress basins.

The tricky trade-off: Water vs Energy

Cooling is the defining factor in a data centre's water footprint. But shifting away from water-intensive cooling comes at a steep energy cost. There are four main methods for cooling data centres:

- **Direct evaporative cooling:** lowest energy demand, but highest water use.
- **Dry air cooling:** cuts water use close to zero but increases energy consumption by 20–40% compared to evaporative systems. In hot, arid climates the uplift is closer to 40%.
- **Hybrid systems:** use air for most of the year and switch to water during peak heat — reducing both risk and cost, but still dependent on local water availability.
- **Immersion cooling:** an emerging option with low water use, but commercially viable only in specific workloads.

Cutting water use means higher energy bills: dry cooling can reduce water demand by ~95% but increase energy intensity by up to 40%. Water has historically been under-priced relative to energy, meaning that cost signals weakly favour water use. However, in water-stressed regions or under tightening regulation, water scarcity risk and future pricing trajectories make water-efficient cooling options more attractive.



Cooling Technology: Water & Energy Usage: *Cooling technologies involve a trade-off between water use and energy intensity. Data adapted from Mytton (2021), BoydCorp (2023), and IEA Annex 85 (2022).*

This creates a water–energy equation:

- Move to dry cooling and your **energy footprint can jump by up to 15 percentage points**, as cooling rises from ~40% of total facility energy demand to 50–55%. This makes it harder to meet net zero and sustainability targets.
- Stay with evaporative cooling and your **water footprint soars**, exposing you to regulatory, reputational and community pushback.

Cooling is no longer just an engineering choice — it is a strategic sustainability decision, with most data centres now adopting water-efficient methods and actively tracking water effectiveness.

Where Baringa helps:

We model the **water-energy trade-off** at site and portfolio level, stress-testing cooling options against local water availability, climate risk, and the full economics of power use (grid mix, costs, and connection constraints). This helps operators and investors choose technologies that minimise costs while staying within sustainability targets — and demonstrate to regulators and communities how they are securing reliable options against water scarcity, regulatory change and climate pressures.

Water as a strategic input: why we need alternative commercial models

Unlike electricity, where PPAs (Power Purchase Agreements) give operators long-term certainty of supply and price, water is still treated as abundant and cheap—an afterthought rather than a strategic input. That perception is exactly why overuse and scarcity persist.

Today, most data centres secure water through the same fragmented planning and permitting channels as a housing development. Even in the UK, where data centres are now classified as critical national infrastructure, there is still no dedicated planning framework to secure the water resources needed for sustainable growth, nor guidance on where development should (or should not) be prioritised. Long-term water resource management plans, on which the industry makes long-term infrastructure decisions, have little regard to new sources of water demand such as data centres.

The result?

- **No security of supply:** operators cannot guarantee the volumes or quality of water required for long-term resilience while households, farmers, and other industries face the same uncertainty.
- **Fragmented planning:** water allocation is managed piecemeal, without integration into regional or basin-level strategies. This means competing users draw from the same stressed sources without visibility of cumulative impact.
- **Increased risk and conflict:** data centres, municipalities, and communities are all exposed to scarcity, regulatory shifts, and rising opposition—eroding trust and making long-term planning harder for everyone. Ultimately, this conflict presents the risk of data centre curtailment and knock-on economic impacts.

This is exactly the challenge the UK business trade body, RWG found in the study of economic levers for business users to increase water efficiency highlighted: without clear frameworks to distinguish potable from non-potable water, and without proactive planning support, high-potential sectors like data centres face unnecessary risk while local communities are left to deal with the shortages and environmental impacts.

A "Water Purchase Agreement" could change this.

Much like a Power Purchase Agreement (PPA), which is a long-term contract where a company buys renewable energy at a fixed price without owning the source, a Water Purchase Agreement (WPA) could bring transparency, long-term planning, and investment into water sourcing—especially for non-potable supplies. WPA's should operate within a regulatory framework that ensures essential community and agricultural needs are met first, with data centres accessing surplus or non-potable water. The intent is to encourage data centres to invest in alternative sources like treated, easing pressure on potable supplies and supporting community resilience. Enabling co-investment in water infrastructure that benefits both data centres and the wider community.

What it could mean for data centres?

- Aligning site selection and permitting with **strategic water resource planning**, rather than leaving operators to navigate fragmented systems.
- Guaranteeing long-term access to sustainable, **non-potable supplies** (greywater, desalination, industrial reuse), reducing competition with communities and enabling re-investment into water infrastructure.
- Providing investors, regulators and communities with **clear signals of risk management and stewardship.**

Just as PPAs helped transform renewables from a niche option into a reliable infrastructure backbone, water PPAs could catalyse a similar shift.

Where Baringa helps:

We bring together expertise in **energy PPAs, water policy, and market design**. We work with regulators and utilities to make and adapt recommendations, such as potable/non-potable separation and demand-side obligations, into practical tools that secure both resilience and growth. At the same time, we support with investors channelling capital to the transition.

The UK's Planning Blind Spot

The UK is positioning to become a leader in AI and digital infrastructure, with nearly 100 new data centres planned in the next five years. These sites are now classed as critical national infrastructure, yet the water planning system has not kept pace.

By 2050, the UK faces a 5-billion-litre daily water deficit, before accounting for new data-centre demand. More than £14bn is being invested under the AI Action Plan, but over half of new facilities are planned for London and the South East — regions already classified as water-stressed. Over 60% of existing sites rely on evaporative cooling, which uses significant potable water. Current Water Resource Management Plans do not allocate supply for digital infrastructure, leaving operators to secure water through the same channels as housing developments. Critical national infrastructure is expanding without a secure or sustainable water strategy

Policy gap

- No framework distinguishing potable vs non-potable demand, or mandating reuse.
- No site-selection strategy linking data-centre growth to water-resilient locations.
- No Priority Planning Zones to align digital expansion with basin-level resilience.
- No planning or licensing pathway tailored to critical national infrastructure.

Recommendation: The UK needs to shift from fragmented permitting to a national, integrated approach — including PPZ-style zoning, potable/non-potable allocation rules, and proactive inclusion of data-centre demand in WRMPs — ensuring digital growth strengthens, rather than undermines, long-term water resilience. of data-centre demand in WRMPs — ensuring digital growth strengthens, rather than undermines, long-term water resilience.

Five strategic questions for a water-smart data centre industry

As AI adoption accelerates and water stress intensifies, data centres must shift from passive consumers to active stewards of water. Their long-term licence to operate, and the resilience of the digital economy, depends on answering five critical questions:

1. **Know your risks — site, portfolio, and basin.**
   Water risk is bigger than on-site consumption. Operators must factor in basin-level scarcity, seasonal variability, and competition with agriculture and communities.
   Recommendation: Embed site and portfolio-wide water risk assessments into investment screening, stress-testing availability and quality under climate scenarios. Act on these assessments, and communicate this to investors.

2. **Coexistence matters — how will you share water?**
   A 100MW facility can consume 2.5 billion litres annually — equivalent to the needs of 80,000 people. In stressed basins, clustering risks conflict with other users.
   Recommendation: Policymakers should set location-based thresholds, prioritise non-potable supplies, and condition permits on efficiency retrofits.

3. **Balance the equation — water saved vs energy spent.**
   Cooling drives ~80% of water demand and ~43% of energy use. Dry cooling cuts water use by 95%, but raises energy demand by 20–40%.
   Recommendation: Operators should adopt hybrid and intelligent cooling strategies that optimise both carbon and water resilience, using long-term cost forecasts.

4. **Governance is lagging — who secures the supply?**
   Despite critical status, data centres still navigate fragmented permitting akin to housing projects. There is no consistent framework for potable vs non-potable allocation or siting.
   Recommendation: Establish Priority Planning Zones, mandate harmonised reporting, and link financing to transparent disclosure.

5. **From consumer to enabler — can DCs build resilience?**
   Data centres can be anchors for reuse, desalination, and shared infrastructure, delivering benefits beyond their fence line.
   Recommendation: Regulators and utilities should embed partnerships into planning; operators should co-invest in water-positive solutions that strengthen local resilience.

Final words: the digital future must be water literate

The boom in AI and data centres will shape the next decade of economic growth. But without water, this future will not be sustainable.

Water has become a strategic asset— as fundamental as grid access or land availability. Operators, investors, and governments must treat it that way: embedding water into site selection, permitting, cooling choices, and financing.

The winners will be those who act early: understanding their risks, balancing the water–energy trade-off, and investing in circular solutions.

At Baringa, we partner with clients to:

- **Assess site-specific water risks** ensuring that capital expenditure incorporates these risks and supports long-term returns
- **Model cooling trade-offs** to optimise water and energy use.
- **Design water-smart strategies** — including reuse, desal, and Water PPAs.
- **Engage regulators and wholesalers** to secure licence to operate.
- **Link to power grid access**

Water literacy is no longer optional. It is the foundation of digital resilience.