DATA CENTRES

Water Resilience Guide

For data centre operators & facility managers, water resilience is about reducing risk, cutting operating costs, and staying ahead of regulation & environmental scrutiny.

Welcome to your guide on Water Resilience for Data Centres. As demand for digital services, cloud storage and AI continues growing, data centres are under pressure not just to use power efficiently, but to manage water use, especially in cooling, humidification, and boiler systems. This guide will help you understand where water is used, what the risks are, and what practical steps you can take to ensure resilient and sustainable operations.

Why Water Matters to Your Business, Right Now:

- Cooling and heat rejection systems can use tremendous volumes of water; misuse or inefficient design increases both cost and environmental impact. Both bad for your business and bottom line.
- Regulatory & environmental risk: water scarcity, higher tariffs, environmental licences, and policy attention on AI/data centre water use expanding.
- Reputation & ESG: operators seen as good water stewards attract investment, planning permissions, and favourable regulation. Demonstrating environmental awareness is a huge bonus.
- Real savings: switching cooling systems, improving efficiencies, recovering or reusing water can reduce water usage & associated energy costs significantly, improving margins.

Recent stats to note:

- A techUK / Environment Agency survey of 73 commercial data centres in England found 51% use waterless cooling systems, 64% consume less than 10,000 m^3 per year (i.e. many sites are lower water users). LINK
- Only 4% of them report using over 100,000 m^3/year. LINK
- There is increasing pressure to monitor, report and reduce water consumption, especially for cooling technologies. LINK

1. Your Water Footprint: Where It Goes & Why It Matters

Here are the key uses & proportions in typical data centre settings. These will vary by scale, location, cooling design etc.

Use Area	Approx Proportion & Key Drivers
Cooling / Heat Rejection (40–60%)	Cooling towers, open-loop or evaporative systems, water used for heat exchangers etc. If waterless or closed-loop cooling, this falls sharply.
Chilled Water / CRAH / CRAC / Air-Handling Units (10-20%)	Humidification, condensate, leakouts, top-ups.
Boilers, Steam Systems (if any)	In older or specialised DCs. Less common.
Fire Suppression & Safety Systems	Inspection, maintenance, testing (less frequent but important).
Facility Services / Sanitary, Kitchens, Offices	Staff facilities, cleaning, washrooms; much lower but still material at scale.
Leakage, Blowdown, Inefficiencies	Evaporation losses, blowdowns (in evaporative cooling), piping losses, poor controls.

*CRAH – Computer Room Air Handler / CRAC – Computer Room Air Conditioning

Knowing your usage breakdowns lets you target the biggest, most impactful efficiency measures first (cooling is usually the biggest impact factor for data centres). Consider how this heat can be redirected and reused.

2.Quick Wins: Immediate Savings, Minimal Effort

Here are relatively low-cost or behaviour / operational changes that can reduce water use quickly:

- Use water-efficient sensors / controls for top-ups, make sure no unnecessary overfilling.
- Ensure cooling system blowdown cycles are optimised (don't over-flush).
- Regular inspections for leaks in pipes, fittings, condensate lines, cooling towers.
- Clean heat exchange surfaces (condensers, evaporative pads) for efficiency (dirty surfaces increase water usage).
- Staff training for operations and maintenance to spot inefficiencies.

3. Smart Investments: Future-Proofing for Long Term Value

These require higher upfront cost or planning, but give more resilient savings over time:

- Switch to waterless or closed-loop cooling systems where feasible. The techUK survey shows many sites already doing this; scaling it is key. LINK
- Water reuse / recycling: Condensate capture, reuse of cooling blowdown water after treatment.
- Alternative cooling strategies: Free cooling (air), indirect evaporative cooling, heat-rejection systems that minimise water use.
- Monitoring & metering: High resolution metering on cooling towers vs other systems, real-time monitoring for anomalies.
- Design for resilience: Systems that can modulate depending on outside humidity/temperature, avoiding water cooling during times when ambient air cooling is sufficient.

4. Your Hidden Drain

These are the less obvious sources of water loss or waste:

- Cooling towers blowdown and drift losses especially in evaporative systems. These can be large if not optimised.
- Overcapacity: Cooling built for worst case may be oversized and inefficient in normal loads.
- Poor maintenance of pads, fill, piping etc leading to inefficiency.
- Infrequent cleaning of air-side heat exchangers.
- Unmonitored top-ups of cooling systems (often automated but sometimes set too generously).

5. Engage Your Team & Stakeholders: Build a Water-Wise Culture

- Embed water use targets in operations culture: KPIs for cooling efficiency, water per MW, etc.
- Use dashboards / visible metrics to show water consumption over time.
- Report proactively to stakeholders (clients, regulators, investors) about water use and reduction.
- Work with local water authorities / environment agencies on licensing, discharge permits, water availability risk.

6. Be Prepared: Manage Water Supply Risk

- Assess risk of supply failure, restrictions, drought (especially in regions with water stress).
- Backup supply options, or mitigations if cooling demand cannot be met as usual.
- Ensure your site design / emergency protocols account for cooling failure: redundancy, fail-safe mechanisms.
- Permitting and compliance for water abstraction, discharge, water quality (treated blowdown etc.).

7. Specialist Focus: Cooling Systems, Free Cooling & AI-Driven Demand

Because cooling is often the main water consumer, some focused areas that you can review and assess are:

- **Free Cooling / Ambient Air Cooling:** Exploit cool ambient temperatures to reduce reliance on evaporative/wetting systems.
- **Waterless Cooling Technologies:** Air-cooled chillers; liquid cooling with closed loop systems; maybe immersive cooling where feasible.
- **Adaptive Cooling Controls:** Systems that buffer for external temp/humidity; scale cooling system usage dynamically.
- **AI / Load-Aware Water Use:** Using predictive models to anticipate load, adjust cooling usage, reduce unnecessary water use.

Next Steps: Your Action Plan

- **Baseline: gather detailed data:** cooling water volumes, blowdown rates, evaporation / drift losses, sanitary usage.
- **Walkthrough:** inspect all water systems related to cooling, pipelines, disposal.
- **Prioritise:** quick wins first, then strategic capital investments.
- **Monitor:** put in place real-time metering and reporting.
- **Communicate:** publish or internally share water-use goals.
- **Seek expert help:** we can assist with audits, design of efficient cooling or alternative systems etc.

Supporting Research & Evidence

- The techUK / Environment Agency report "Understanding Data Centre Water Use in England" findings as above. LINK
- Savills report: projected average water usage in European data centres; targets proposed under the Climate Neutral Data Centre Pact (CNDCP) to reach ≤400 litres per MWh by 2040. LINK
- Academic: SHIELD framework (co-optimising carbon, water and energy costs for data centres) shows tools exist for load scheduling, geographic deployment etc.

Need Support? Let's Talk

Want support optimising your data centres water resilience?

We help sites cut consumption, reduce waste, improve compliance, and save money, without disruption.

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