Water as a Critical Constraint in Data Centers & Semiconductors

Executive summary

Water is rapidly emerging as a critical constraint on growth and delivery across data center and semiconductor sectors. While demand continues to accelerate, project timelines are increasingly influenced by water availability, permitting complexity, and community acceptance.

Importantly, today's constraints are driven as much by public perception and social license as by physical water scarcity—requiring a shift in how organizations plan, design, and engage.

What's Changing

- **Water is moving from a sustainability issue to a delivery risk:** Affecting site selection, permitting timelines, and operational design
- **Infrastructure lag is creating bottlenecks:** Water systems (supply, treatment, reuse) are not scaling at the pace of digital infrastructure
- **Community acceptance is now a gating factor:** Public scrutiny and perception of water use are driving project delays globally

Where Constraints Are Showing Up Across the Value Chain

Siting: Increasingly influenced by basin-level water stress and long-term resilience

Permitting: Longer timelines due to regulatory scrutiny and public concerns

Ecosystem-wide: Constraints extend beyond operators to utilities, infrastructure, and supply chains

Design & Operations: Shift toward water-efficient or water-independent cooling systems

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Key insight:

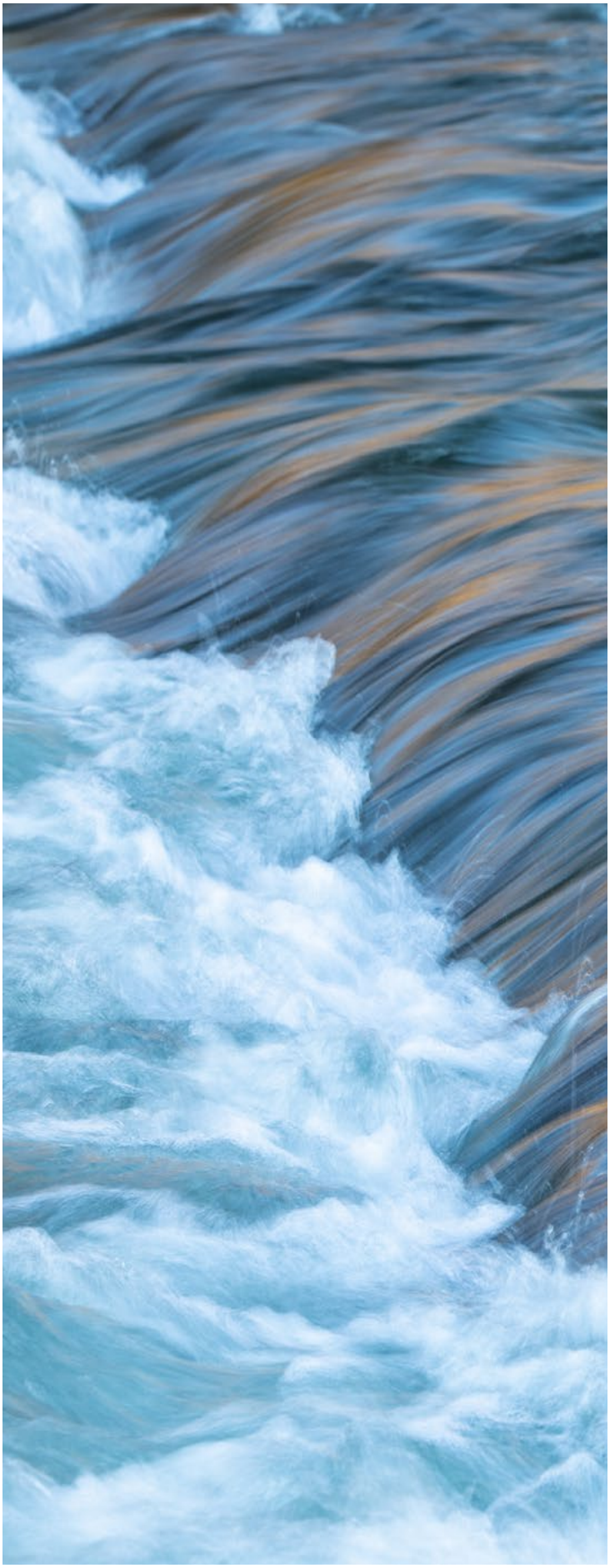
Current friction is often perception-driven rather than purely resource-driven, but impacts are real—causing delays, redesigns, and location shifts.

How Leading Organizations Are Responding

Operational and design optimization within the fence line can significantly reduce water intensity while maintaining performance and reliability. This includes improving cooling efficiency to lower overall water consumption, increasing on-site water recycling and reuse, and adopting non-evaporative cooling technologies such as liquid or direct-to-chip cooling. Organizations are also exploring alternative water sources, including non-potable supplies, to reduce reliance on constrained freshwater resources while continuing to support high-density compute environments.

Effective community and stakeholder engagement beyond the fence line is critical to enabling continued growth. This includes greater transparency around water use and potential impacts, proactive collaboration with regulators and local communities, and targeted investment in strengthening local water infrastructure resilience. By engaging early and working collaboratively—including across regional clusters to enable shared reuse or infrastructure solutions—companies can build trust, reduce friction, and create more durable pathways for expansion.

A strategic shift toward water stewardship moves organizations beyond reactive compliance to proactive, basin-level action. This approach focuses on understanding and managing shared water risks through data-driven assessment, active engagement at the catchment level, and collaboration with local stakeholders. Frameworks such as the Alliance for Water Stewardship (AWS) provide a structured pathway—combining rigorous analysis with third-party validation—to strengthen credibility, build social license, and support long-term, resilient operations in water-stressed regions.



Key Barriers & Trade-offs

Water vs. energy trade-offs are increasingly shaping cooling and design decisions. In parallel, many organizations still face a lack of standardized water accounting frameworks (for example, embedded water and Scope 3 considerations). Water is often undervalued in financial decision-making, which can delay investment in more resilient solutions. Finally, critical infrastructure timelines (such as reuse systems) often lag behind the rapid pace of data center deployment.

Critical Success Factors

Organizations seeing faster, lower-risk delivery are:

1

Treating water as a core strategic input early in planning—rather than as a late-stage constraint—enables faster, lower-risk delivery.

2

They also design systems aligned to local basin realities, reflecting long-term availability and resilience.

3

In addition, they prioritize transparency and trust-building with communities to strengthen social license.

4

And they take a value chain approach, working with utilities, regulators, and industry peers to address constraints at the system level.

Looking Ahead (5–10 Years)

Over the next 5–10 years, we expect greater standardization in water accounting and disclosure, increasingly similar to carbon reporting. This will likely include an expansion of Scope 1, 2, and 3 water management frameworks. We also anticipate increased adoption of alternative water infrastructure and reuse systems to reduce reliance on potable supply. Water considerations are expected to become more consistently embedded at board and executive decision levels. Finally, stronger alignment across industry, government, and communities should help unlock more durable, scalable approaches to water management.

Implications for Companies to Stay Competitive and Avoid Delays:

- Integrate water into early-stage site and design decisions
- Build proactive engagement strategies to secure social license
- Invest in future-proofed cooling and water solutions
- Collaborate across the ecosystem to unlock shared infrastructure solutions

Bottom line

Water is no longer a peripheral sustainability topic—it is a core determinant of speed, risk, and long-term viability in digital infrastructure development. Organizations that move early toward holistic water stewardship and transparency will unlock faster delivery and stronger community alignment.

From Insights to Impact

ERM supports companies across the data center and semiconductor value chain to sustain growth at pace while addressing constraints that increasingly threaten delivery. We help clients navigate water availability, streamline complex permitting pathways, and build community acceptance by integrating technical rigor with local insight and stakeholder engagement. By aligning infrastructure planning, environmental performance, and social considerations early in the lifecycle, ERM enables organizations to reduce risk, accelerate approvals, and scale responsibly—turning today's challenges into a foundation for long-term, resilient growth.

Explore What This Means for Your Organization.

Our team is available to discuss practical pathways forward.

Contacts

Ben Ludtke
Engagement Manager
ben.ludtke@erm.com

Susanne Baker,
Consulting Parter
susanne.baker@erm.com

Alison Drury
Senior Parter, Global Industry Leader (Technology)
alison.drury@erm.com

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