Polis Analysis

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# Water for AI

## Permitting, Public Backlash, and the Politics of Data Centre Water Use

# Executive Summary

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Water is becoming a hard constraint on Artificial Intelligence (AI) infrastructure, and the industry is only beginning to reckon with it.

The public conversation about generative AI still centres on capability and productivity. Behind it, a quieter set of pressures is reshaping where AI infrastructure can be built, how it gets permitted, and who bears the cost. This report examines water use as an emerging binding constraint on data-centre expansion, and what that means for operators, investors, corporate clients, governments, and the communities hosting these facilities.

The scale of demand is the starting point. A large data centre can withdraw between one and five million gallons of water per day, comparable to a town of tens of thousands, with cooling processes consuming the majority through evaporation. That water is typically potable quality, diverted to prevent corrosion and biological growth in cooling systems. In water-stressed regions, this is not simply an environmental footnote. It is a distributional conflict between industrial demand and existing users, one that is increasingly visible in permitting rooms, planning hearings, and public protest.

Regulation is responding, but unevenly. In the United States, governance is fragmented across federal, basin, state, and local levels, and each layer is tightening in its own way. Basin commissions such as the Susquehanna River Basin Commission have established formal thresholds that pull hyperscale projects into stricter review. As of early 2026, only one project had been approved for water use within its jurisdiction. States are experimenting with divergent models: tax incentives tied to conservation spending, mandatory water appropriation permits, and in Minnesota's case, a direct state power to reject utility agreements for non-compliant projects. Local governments are embedding water scrutiny into planning approval pathways, requiring impact assessments, mitigation plans, and drought contingencies before projects can proceed.

Permitting outcomes are not foreordained, even in jurisdictions that welcome digital investment. The Apple Valley Technology Park proposal in Minnesota illustrated how local review can be protracted and multi-agency, with the final decision shaped by site-specific concerns rather than aggregate capacity. Elsewhere, ordinances mandate Water Use Agreements with real-time tracking and drought protocols, closed-loop cooling systems as a condition of approval, and annual water-use reporting backed by financial penalties. In the EU, Delegated Regulation 2024/1364 formalises data-centre reporting requirements at scale.

The stakeholder exposure is wide. Operators and developers face delays, redesigns, higher capital costs, and reputational damage where water plans are contested. Between 2024 and 2025, the value of data centres blocked or delayed in the US alone reached $64 billion. For investors and corporate clients, the risk runs deeper than project-level disruption. Around 40% of US data centres are already located in water-stressed regions, meaning existing capacity is exposed to future extraction restrictions, drought-related curtailments, and rising water costs, not just future builds. Communities are increasingly acting as a check on projects where transparency is limited, through litigation and public pressure alike.

Two international cases show how context shapes outcomes. Finland has leveraged its cold climate, cheap energy, and abundant freshwater into a comparative advantage for data-centre siting. Questions remain about the long-term cost of maintaining that water infrastructure and the sovereignty implications of selling excess heat back to local homes. Uruguay offers the inverse: acute drought and a declared hydraulic emergency made Google's projected demand, equivalent to the daily water consumption of 55,000 people, politically untenable in a country that was the first in the world to constitutionally enshrine water as a human right. Court-mandated disclosure and sustained public pressure ultimately forced a redesign toward air-based cooling and a revised permitting pathway.

The trajectory from here points to incremental tightening rather than a sweeping regulatory overhaul. With the IEA projecting global data-centre electricity consumption to roughly double to 945 TWh by 2030, the pressure on water resources will intensify alongside the build out. Standardised permit conditions, stronger reporting requirements, and drought-stage contingency protocols are becoming the norm. Over the next two to five years, water scarcity is likely to become an explicit input into siting decisions, accelerating the shift toward reclaimed and non-potable sources, closed-loop systems, and less water-intensive cooling, particularly where project clustering and climate stress are most acute.

Water governance is no longer a secondary consideration for AI infrastructure. It is a primary one.

# Background

Isha Agarwal

Deciphering the environmental footprint of AI use has been tricky in many ways. Researchers have now ascertained that AI data centres are hungry for energy, thirsty for water, and emit large amounts of carbon into the environment. The simplicity and widespread accessibility of AI obscure the complex and resource-intensive processes required to power a single search. In a public declaration, Open AI has relayed that ChatGPT receives over 2.5 billion prompts every day. According to experts, around 20–50 queries sent to an AI chatbot can use up to 500ml of water. When put together these numbers paint a clear picture of the water consumption in data facilities. This reality, however, fails to gain traction in common public discourse as the excitement around generative AI continues to overwhelm users. Low public awareness, limited corporate transparency, and the circulation of misinformation collectively sustain a discourse in which the material costs of AI use remain underexamined – an outcome that, whether by design or structural neglect, serves the interests of continued, unchecked expansion.

Among the environmental externalities of AI data centre growth is the increasing local water demand. AI technologies utilise water both directly and indirectly in their supply chains and creation processes. Water use cases in this context include the maintenance and cooling of AI systems, resource use in the AI model training phase, refinement of critical raw materials required in hardware, electricity generation to run AI data facilities and semiconductor manufacturing.

Industry estimates and reports of water use reveal that a large data centre can withdraw anywhere between 1–5 million gallons of water every day equivalent to a town of 10,000-50,000 people. By the time a cycle of cooling is completed, it is estimated that over 80% water is consumed in the processes, lost in evaporation through cooling towers. The remaining is either fed back into the source into municipal waste facilities. Moreover, the liquid cooling systems require clean water to prevent growth of bacteria, clogging, and corrosion in the system. Thus, the water quality required for these systems meets potable standards — meaning that, in resource-constrained contexts, data centre demand and drinking water provision potentially draw from the same supply.

AI data centres are increasingly harnessing clean surface and underground water sources. In the scarcity statistics of water availability, this relatively new demand category has the potential to upend an already exacerbated problem. In drought prone regions, this is not just an environmental issue but the beginning of a community crisis around drinking water access and allocation. Most cases of newer AI data centres are positioned in water stressed regions with cheaper energy prices to offset their carbon costs without reducing consumption. These regions are generally at risk of water scarcity or find themselves in drought risk conditions. Given the scale of water demand, these areas are presented with the risk of resource depletion and rising community backlash. This issue has given rise to a new version of the guns vs. butter dilemma where allocation depends on whose utility gets valued more. This has emerged as a political flashpoint especially in regions where project clustering has come into evidence.

This is an important moment for resource use appraisal in AI technologies as apprehensions around hidden costs reach the forefront and there is higher public scrutiny around AI transparency. Tighter water conditions and disproportionate demands of resource allocation have accelerated the need for intervention and policy assessment. While companies have projected potential targets to make data centres water neutral by 2030, water and resource pressure is at its height at the moment.

# Regulatory Frameworks

As is often the case with most regulatory issues, there is a multiplicity of actors who hold power over the approval and enforcement of data centre projects. Companies must adhere to rules and regulations set by bodies from the local to the international level.

## International-level

At an international level, the International Organization for Standardization published its first international standard on sustainable artificial intelligence in 2025 (ISO 20226). The standard included AI's water footprint as a key metric to measure sustainability.

## Federal-level

In the US, the federal government is pursuing policies in support of data centre projects, especially those relating to AI. However, there are constraints on data centre projects at the federal level, including in relation to water usage. For example, under the Clean Water Act, permits are required for any activity that may lead to discharge into navigable waters, or into wetlands. Restrictions may also apply under the Safe Drinking Water Act and the Coastal Zone Management Act. In addition, federal bodies exist to protect and manage bodies of water spanning several states. For example, the Susquehanna River Basin Commission (SRBC) manages 27,500 square miles across New York, Pennsylvania, and Maryland. Within its jurisdiction, any data centre withdrawing over 100,000 gallons per day (gpd) or consuming (i.e., not returning to the basin) over 20,000 gpd needs approval. Projects that reach these levels of usage are known as hyperscale data centres, and as of early 2026, only one project was approved for water use in the Susquehanna River Basin: Amazon Data Services in Luzerne County.

## State-level

Companies are often drawn to states like Arizona, California, Virginia and Texas to construct their data centres as these states offer low land costs, tax incentives, and renewable energy access. However, they often face water scarcity. Several states are now trying to regulate the environmental impacts of these projects, with water conservation a key priority. In 2025, state lawmakers put forward over 300 bills designed to tackle the new challenges presented by data centres.

In Arizona, House Bill 2893 would provide for certain revenue generated from tax relief programmes to go towards water conservation efforts and improving agricultural irrigation efficiency. While the bill received bipartisan sponsorship, it has seen little movement since it was introduced in February 2025. If passed, the bill would incentivise companies to construct data centres in Arizona while also trying to offset the environmental impacts of this through state-level action.

In California, Senate Bill 58 would have provided tax credit for data centres that adopt sustainable practices, for example switching to efficient cooling systems. The bill also tackles air pollution from hydrogen sulphide. After first being introduced in the Senate, the section concerning data centres was removed from the bill in its entirety and the bill that passed to the Assembly solely dealt with air pollution. While it may have been removed, this bill demonstrated an alternative approach to that of Arizona in which companies wishing to construct data centres are still offered tax incentives, but are expected to steward their own environmental practices, rather than providing for state action.

In Minnesota, House Bill 16 was introduced in a special session on 9 June 2025. This bill establishes new requirements for water appropriation permits for data centres expected to use 100 million gallons annually. Successfully passing both the State House and the State Senate, this bill was approved by Governor Tim Walz five days later. Unlike the two previously mentioned bills, instead of offering incentives to companies looking to construct data centres, this bill imposes firm limits, such as by imposing permitting conditions and by introducing a state power to approve or reject an energy supply agreement between a company and a public utility provider.

West Virginia House Bill 4683 takes a similar approach by imposing restrictions and penalties to protect groundwater supplies from depletion by data centres. It provides permitted cooling methods and water sources, prohibits certain practices and lays out penalties and monitoring requirements. Introduced in January 2026, the bill has been referred to committee. Notably, the wording of this bill recognises groundwater and aquifers as finite public resources that are essential to life.

## Local-level

The cities and counties in which data centres are to be constructed have a large degree of control of these projects. Local governments have expanded their oversight by requiring more rigorous scrutiny during permitting processes, often mandating detailed water usage projections, long-term water management plans, and environmental mitigation. An example of the local planning process follows.

### Approval and Planning Processes

Due to the large degree of control of local bodies over planning, variations in state-level organisations, and different political attitudes to data centres and AI, there is no 'typical' planning or approval pathway. We focus on Apple Valley because the public record includes unusually detailed documentation across multiple agencies, which provides a clear view of how water issues are evaluated within the approval process. On 26 March 2026, Apple Valley City Council in Minnesota denied a proposal by property developer Oppidan Investment Co to construct a technology park on a sand and gravel mining site owned by Rockport LLC. The project would have been made up of seven buildings – with five data centre storage facilities – sitting in a 1,050,000 square foot site. The denial of this project was not a quick rubber stamp; it was the culmination of a process that has lasted a little over a year and involved planning commission meetings, public hearings, and in-depth engineering and environmental analysis.

Some of the applications made by Oppidan as part of this project include an application to rezone 134 acres of land from Sand and Gravel to Mixed Use Business Campus, an application to split the land into four lots and two outlots, a Conditional Use Permit to allow data centre facilities as an approved use, and building plan authorisation for the five data centre buildings and the support buildings. Applications were made to the City of Apple Valley, to Dakota County, to the Metropolitan Council and Environmental Services, to the Minnesota Pollution Control Agency, to the Minnesota Department of Natural Resources and to the Minnesota Department of Health.

The application included various reports and documentation submitted to numerous agencies. This included a Site Plan, a Water System Analysis, and a Wastewater Sewer System Analysis. A second company had created its own versions of these plans, seemingly at the behest of the developer, to address apparent City concerns regarding peak flow and water storage, illustrating how the process can become iterative and documentation heavy once technical questions are raised.

An Alternative Urban Areawide Review (AUAR) prepared by planning and engineering consultants included sections on the permits and approvals required, fish and wildlife, water quality, surface water use, and lists all of the wells in the project area. It stated that the site isn't in a "federally designated wild and scenic river district" or a FEMA 100-year floodplain and acknowledges city ordinances and plans, demonstrating the various checks revolving around heritage and environmental designations the project had to pass.

While the City's engineering consultants found that the water system could provide an adequate supply for the data centre, the Council ultimately cited broader site related issues beyond water capacity. This presents that water adequacy may be necessary but not sufficient for approval when wider planning, land use, or community concerns remain unresolved.

### Permit Conditions and Enforcement

Permitting conditions and enforcement vary widely across jurisdictions. The examples below indicate the range of approaches now emerging.

In Iowa, the Linn County Data Center Ordinance imposes extra requirements on data centre construction projects, including conducting a water study during the planning process, explaining how the project could affect current water uses, showing where water will come from and how it will be used, and explaining how the facility will be cooled and the backup plans in case water supplies are interrupted. A Water Use Agreement with the county is required and will lay out how water use must be tracked and reported, steps to be taken during droughts or other emergencies, and what information must be shared with the county.

Round Rock, Texas, requires closed-loop cooling systems and water-wise landscaping to reduce the need for irrigation. Additionally, while some local governments may allow rezoning permits for the construction of data centres, like Apple Valley above, others only allow data centres to be constructed in industrial zones, such as Calvert County in Maryland.

The Maryland Department of Environment lists data relating to water usage online – including complaints, inspections, violations, and permits. Some states are looking to make this link clearer by introducing bills that would require data centres to report their water usage. For example, a bill in the South Carolina General Assembly would require data centres that consume more than three million gallons of water per month to report their water usage annually to the Department of Environmental Services with a penalty of $10,000 for inaccurate, misleading or false information.

| | What it controls: | Examples from this section: | Why it matters: |
|---|---|---|---|
| **International / regional standards** | Sustainability metrics, reporting expectations, and disclosure norms. | ISO/IEC TR 20226:2025; EU Delegated Regulation 2024/1364. | Creates common expectations for measuring and reporting water use, especially for operators active across multiple jurisdictions. |
| **Federal law** | Environmental permitting and water-related legal constraints. | Clean Water Act; Safe Drinking Water Act; Coastal Zone Management Act. | Can trigger formal permitting duties where projects affect navigable waters, wetlands, drinking water sources, or coastal zones. |
| **Basin regulators** | Withdrawal and consumption thresholds within shared watersheds. | Susquehanna River Basin Commission thresholds: over 100,000 gallons/day withdrawn or over 20,000 gallons/day consumed. | Pulls high-volume projects into stricter approval and compliance regimes where water use affects shared river-basin resources. |
| **State policy** | Permits, incentives, conservation requirements, utility agreement review, restrictions, and penalties. | Arizona HB 2893; California SB 58; Minnesota HF 16; West Virginia HB 4683. | Shows states testing different models, from incentive-based conservation to direct limits on water use and utility agreements. |

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| **Local planning and permit conditions** | Zoning, site approval, water studies, wastewater capacity, public hearings, cooling requirements, and Water Use Agreements. | Apple Valley review; Linn County ordinance; Round Rock closed-loop cooling rules; Calvert County industrial-zone limits. | Often determines whether a project can proceed in practice, even when broader policy is supportive of data-centre investment. |

*Data-centre water governance is fragmented across international and regional standards, federal environmental law, basin regulators, state policy, and local planning authorities. This creates overlapping approval and compliance risks for AI infrastructure projects.*

# Stakeholders

Devanshi Godbole

### Data centre operators

At the centre are the data centre operators themselves. Some data centres, identified as "hyperscalers", proactively scale up their operations to match growing demand. In the booming AI data centre gold rush, the top three hyperscalers emerge in both utility and water usage: Amazon Web Services (AWS), Google, and Microsoft Azure.

While companies are required to report on their water consumption and have made commitments towards addressing water scarcity, figures are often under-estimated and misrepresented and commitments rolled back. In the past year, AWS, the world's largest provider of "server farms" was accused of misrepresenting its total water usage by not reporting on indirect water usage. Google and Meta have also been found to use more water than planned estimates, or reported to government authorities.

### Architecture, engineering and construction (A/E/C)

Data centres are critical physical infrastructures, making builders and construction agencies (AEC) the second most important. Start-ups are innovating water consumption techniques through closed-loop systems for preventing evaporation, direct-to-chip cooling, and other water-preserving cool techniques. However, these solutions can often be more expensive to implement, especially when being retrofitted for already-built AI data centres.

### Water replenishment programs

Corporations that have the largest net negative impact on water security simultaneously possess the greatest potential to substantially uplift water security globally. As the majority of AI data centres are dependent on continuous access to water for functioning, operators have directed substantial amounts of funding towards water replenishment programs.

Water replenishment or stewardship programs introduced by Microsoft and Google are typically located in globally water-scarce areas and do not tend to neighbour the data centres. Amazon includes corporate clients that utilise AWS data centres in its 'water replenishment' portfolio through the 'Climate Pledge' program, making their direct contributions difficult to track.

Water stewardship programs face the same bottlenecks as offsetting mechanisms, as benefits are experienced downstream. Water insecurity is mitigated rather than reduced on-site, making access to drinking water near data centres a pressing concern.

The capacity to deliver water replenishment 'on-site' or neighbouring a data centre is dependent on local natural resources and legislative incentives. Currently, majority AI data centres are located in water-scarce regions to cut-down on land costs and water replenishment programs are primarily voluntary.

### Corporate clients

Hyperscalers are not only running AI data centres for their independent products but run them as "server farms". AWS service clients ranging from SMEs to large scale corporations including AirBnB, Anthropic, Disney, and Netflix. While not directly responsible for the AI data centres, demand generated on these platforms are a substantial contribution towards the growth of AI data centres.

### Watchdogs

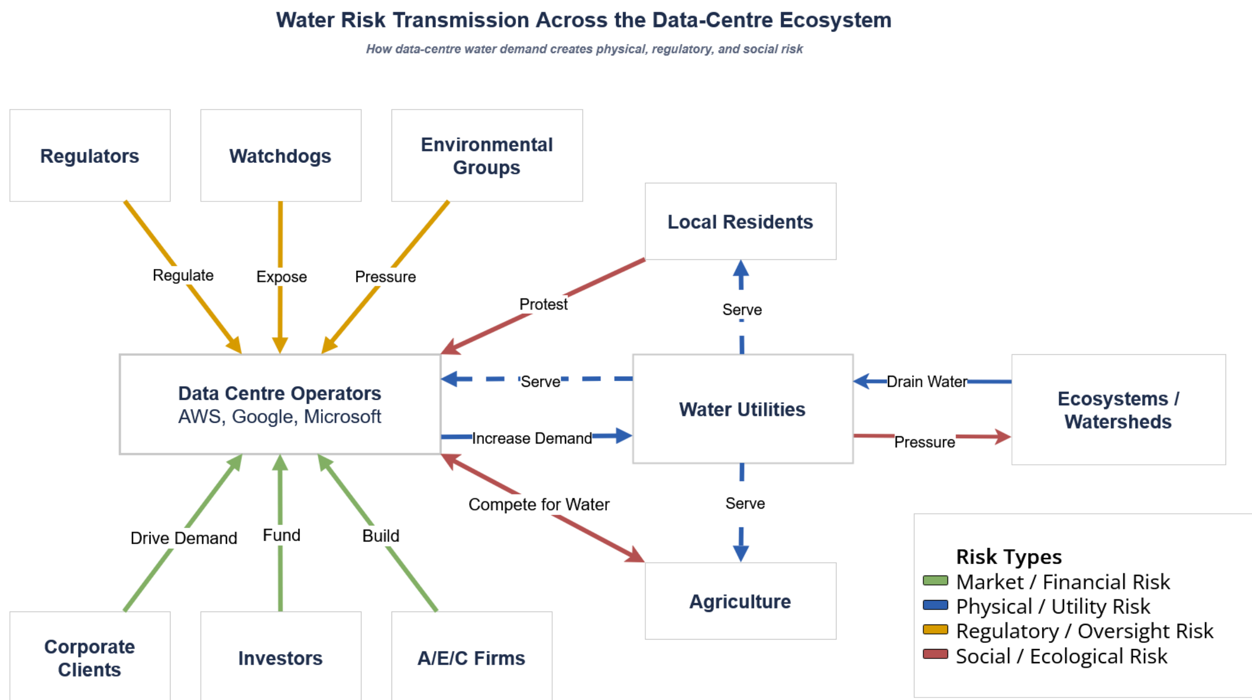
Rising scepticism towards AI data centres from residents in the US, UK, and EU have motivated increased reporting on this issue. Journalists and researchers have taken to using Geographic Information Systems (GIS) to identify data centres locations for calculating their impact on water resources. A similar exercise revealed that AWS owns the largest number of data centres, accounting for 105 in the US and, according to a leaked data report, 957 data centres globally.

Research considering water impact owing to data centres has also been critical for unpacking and challenging estimates set forth by governmental institutions and planned project partners. For instance, independent research found that annual water consumption by AI data centres was vastly underestimated by the International Energy Agency (IEA). Such investigations into water usage empower local community efforts, which in turn has motivated legislative control over water usage in data centres.

### Human impact

The average person is forced to bear the cost of data centres. Increase in intensive water usage translates into increased water utility bills, poor water supply, and costs of subsequent repairs. In the UK, ThamesWater already reports negative impact on water security, creating poor circumstances for the UK's future economic growth**.** In the US, states have turned to staff cuts for dealing with water pressure demands, but this has worsened state response to continuing water crises.

AI data centres also put pressure on local water supply systems, reshaping how communities provide water. Water access for regular users then becomes more inconsistent and insecure, especially in areas with ageing pipe systems, water treatment systems, and in regions prone to drought. Food productivity is also undermined by AI data centres as their intensive water usage and harmful pollutants damage the soil for future usage.




Caption: *Water risk is distributed across operators, clients, utilities, communities, regulators, and local industries, even when direct water use sits with the data-centre operator.*

# Risk Areas

Jaemal Fergus and Josie Partridge

## Economic Risk

Water constraints represent a major economic risk in the planning, construction, and operations of AI data centres, affecting operational timelines and cost structures. Recent reporting shows that hyperscale developments in the US Southwest has consistently encountered water permitting bottlenecks, delaying projects and forcing developers to consider alternative cooling systems at a higher price. For data centre developers and owners, setbacks and cancellation of water permission introduces significant uncertainties into timelines and can jeopardise billions of dollars in lost investment.

Limitations in water accessibility due to legal, community, or political red tape forces developers into redesigning data centres that use a less water intensive method for cooling such as dry or recycled-water cooling. This is occurring in parallel with a structural increase in water demand from other sources from thermoelectric power plants to agricultural uses, making water highly sensitive to local supply constraints. The average mid-sized data centre uses 1.4 million litres of water per day, which increases as the climate gets warmer. The intensity of water extraction raises concerns over the equity and long-term sustainability of local water resources for communities and other stakeholders. These concerns are likely to trigger regulatory intervention and community opposition which may result in expensive pushbacks, litigations, relocations, or delays. These kinds of delays have prompted redesign decisions.

A case study of this is the Microsoft data centre in Goodyear, Arizona, which had to redesign the internal mechanisms of the data centre so that it incorporated mechanical air cooling and expanded wastewater infrastructure. This reflects a shift to more expensive but less water intensive architectures and operations. A similar case in Tucson, Arizona, prompted nearby municipalities to implement rules that require conservation plans and public consultation for future data centres. Getting around water constraints, either through delays, redesigns, or legal proceedings directly translates into higher capital expenditure and further engineering complexity.

Regulatory pushback on water constraints could also lead to the risk of major investments of capital being stranded. In Chandler, Arizona, for example, a proposed AI data centre was outright rejected by local authorities, with water consumption proposals and limited local economic benefit cited as central concerns. Such sunk costs in planning and proposal may be a feature of many types of business, but are becoming increasingly expensive with less certainty of approval, increasing risks for investors. Similarly, in Oregon, Google's dispute with local authorities escalated into a long legal battle where they were forced to publicly disclose water usage data; what the company argues were "trade secrets". As such, water constraints in water scarce areas carry the risk of political and legal friction which increases the probability that capital already committed to land, permitting processes, early stage construction, becomes delayed, rescoped, or sunk completely.

For corporate clients of data centres, water constraints can directly translate into economic risks through physical capacity limitations. Since water availability increasingly shapes where data centres can be built, it effectively constrains the supply of new infrastructure in high-demand regions and determines where hyperscalers can expand capacity. This dynamic is observable in regions such as Amsterdam and Dublin, where moratoriums on hyperscaled data centres capped supply in a high demand market and forced prospective corporate clients to search elsewhere. This geographical mismatch between supply and demand has the risk of creating capacity bottlenecks, higher pricing and longer provisioning times for data services.

Concurrently, the existing water-footprint of data centres amplifies this risk. Since around 40% of US data centres are already located in water scarce regions, current and future capacities (and their clients) are therefore exposed to future tightening of water extraction policies, drought related restrictions, or rising water costs. Corporate clients would feel the direct impacts of this and would create medium to long term economic risks relating to service reliability and price stability during periods of intensified water scarcity. Even political or regulatory changes such as potential stricter permitting regimes, usage caps, or mandatory efficiency upgrades would increase operating costs for providers, likely to be passed to local consumers.

For established local industries and businesses, particularly those in water intensive sectors such as agriculture, food processing, and manufacturing, the introduction of AI data centres results in direct resource competition and therefore increased cost pressures for all stakeholders. The water intensity of the centres are a direct strain on the communal groundwater of aquifer water sources, often gaining priority in access which hampers the operability of other industries, and ultimately forces water authorities to upgrade the infrastructure to sustainably accommodate increased extraction. This is the case in The Dalles where, as of 2025, Google data centres represent 40% of the area's water supply, prompting water authorities to seek to acquire more land to divert more sources in the river basin. Debate and legal disputes have centred on if water resources are being prioritised for digital infrastructure, crowding out other economic activities. As water scarcity and water use increases, local businesses may experience higher input costs and reduced access to water which can lead to forced operational changes, and potentially economic displacement.

Similarly, local residents may also face significant economic risks through rising utility costs and an uneven distribution of local benefits. In the Dalles example, growing demand from data centres has placed sustained strain on the local water system, leading to residential water rates to double by 2036. While data centres are often promoted as drivers of local investment, employment, and tax revenue, the benefits do not always fully translate to substantial gains for local communities. In the case of Google, property tax incentives have reduced its effective contribution to the local government as its data centre operations enjoyed a 92% discount, paying only $7.3 million in 2025. At the same time, employment opportunities and impacts remain limited as data centres usually employ around 50 people; Google's operations in Dalles employ roughly 200 people. The imbalance highlights the fact that the economic benefits of data centres in water scarce, often rural areas, do not scale proportionally with their resource use intensity and secondary economic and environmental impacts. Whilst local residents bear the costs of their presence through higher bills, insecure future availability, and infrastructure strain, strategic and financial gains are mainly captured by the owners, scalers, and investors of data centres - all external stakeholders.

## Political risks

Political risks are also fraught for data centres in areas of chronic water insecurity, heightened in times of drought. The risks expose a mismatch between the rapid pace of both data centre investment and construction, and the capacity for public governance, as well as local community pushback. Recent expansion of hyperscale data centres has often proceeded ahead of comprehensive water-impact assessments, or community consultation, with limited transparency in the proceedings. In places like the South West that have experienced historic droughts, previous data centre projects have faced increased public pressure and scrutiny, causing the local government to retroactively implement water use regulations. The imposition of dynamic water allocation regimes during periods of elevated water risk introduces political volatility where approval granted under a previous set of environmental conditions is at risk of becoming politically untenable as scarcity intensifies.

Public backlash against water intensive data centres have emerged as the key mechanism that prompts political action for further technological environmental constraints. Communities and environmental activist groups are increasingly mobilising against data centre developments, predominantly motivated against the digital infrastructure's energy consumption, water usage, and limited local economic benefits. Data centres are one of the key Not In My Backyard (NIMBY) issues, with generally strong support for data centres as important digital infrastructure, yet community support for nearby geographical proximity is very limited. This public backlash and community organising manifests in lengthy lawsuits, deal renegotiations, and conflicts over zoning, ultimately resulting in delays, and at times relocations. This has tangible financial impacts: between 2024 and 2025, the value of datacentres blocked or delayed in the US was $64 billion. This is a trend occurring in many water scarce regions of the US and around the world.

A significant factor in the public backlash against the data centres, their developers, and owners, is the fundamental lack of transparency around water usage, which complicates public oversight and long term resource planning, while harbouring suspicion and prompting pushback. Data centre operators have previously treated water extraction and consumption data as commercially sensitive. This opacity becomes increasingly problematic as water demand scales up for all parties - projections indicate that US hyperscalers could consume up to 33 billion gallons of water annually in the US by 2028. In response, governments are beginning to treat water disclosure as a regulatory priority, with rising legal exposure tied to reporting requirements, environmental compliance, and community impact assessments. The lack of baseline transparency thus acts as a catalyst for stricter policy intervention once scarcity pressures become politically salient.

These pressures are now translating into formal policy responses designed to prevent environmental injustice, ranging from stricter permitting conditions to outright development pauses. In the US, despite the federal push for data centres, there is growing bi-partisan anxieties over the environmental footprints of data centres on a more local level. Democratic representatives have pushed for AI data centre moratoriums. At the state level, lawmakers are launching investigations and considering regulatory tightening in response to community backlash over water and energy impacts. For example, Governor Katie Hobbs' "Arizona First" plan imposes a higher water rate corresponding with their water usage to pay for the Colorado River Protection Fund. Internationally, similar dynamics are evident as countries such as the Netherlands have already implemented temporary bans on new data centres, while others are revising previous permits, instructing hyperscalers to revise their applications to further take into account local considerations and the future impact of climate change on water scarcity. These interventions reflect a broader shift toward more assertive governance of water-intensive digital infrastructure as legislation catches up with the speed of investment.

Public backlash against data centre development is increasingly emblematic of a broader imbalance of power between local communities and large corporations, often reinforced by governments seen to prioritise investment over local welfare. Limited public consultation, combined with incentives such as tax breaks and infrastructure support, has accelerated development in economically stagnant, often rural, regions that are already reliant on water-intensive industries like agriculture. This creates a perception that local economic and environmental outcomes are being determined externally, with extremely wealthy firms extracting resources while delivering limited, uneven benefits. In this framing, data centres become not just environmental stressors, but symbols of a system where profits are privatised while risks, such as price increases and environmental impacts, are shared locally. Consequently, in these affected areas, especially rural communities, water scarcity takes on heightened political meaning, becoming a visible expression of unequal power dynamics between global capital and local communities. This can erode trust in political institutions, particularly where projects proceed despite sustained opposition, reinforcing the belief that capital consistently overrides community interests. These dynamics align with broader populist narratives and may push future local political leaders toward more adversarial or protectionist positions on data centre development. The consequence may be a more volatile policy environment, characterised by hardening opposition, reduced scope for compromise, and a higher likelihood of abrupt regulatory shifts, including stricter permitting, removal of incentives, and a broader public resistance to AI infrastructure expansion.

Ultimately, these political responses feed directly into investment outcomes through delays, redesigns, and geographic reallocation of capital. As regulatory conditions tighten and public scrutiny increases, developers are being forced to adapt, forcing higher capital expenditures. This reinforces a feedback loop: drought and elevated scarcity trigger backlash which drives policy interventions which continually reshape under what conditions and permissions AI infrastructure can be built.

## Environmental risks

When data centres draw from local water supply, whether municipal, groundwater, or surface water, they compete with demands from agriculture, industry, residents, and ecosystems. Research shows that this competition is most acute in water-stressed regions, where baseline supply is already constrained and additional industrial demand can shift delicate water balances.

These pressures are compounded by clustering. Data centres are often concentrated in specific regions due to access to land, connectivity, and power infrastructure. Reports indicate that in established hubs across North America, Europe, and parts of Asia, multiple facilities drawing from shared water sources can create high levels of localised demand that are not always included in project-level assessments. This increases the risk that combined water withdrawals exceed sustainable supply.

Water demand for cooling is typically higher in hotter climates. Modelling of data centres in hot-arid climates such as Phoenix, Arizona shows that climate conditions significantly increase both energy and water requirements for cooling, with evaporative systems consuming large volumes to maintain safe operating temperatures. An analysis of data centre siting shows that many facilities globally are located in climates outside the optimal cooling range, including hundreds in persistently hot regions, increasing reliance on water-intensive cooling systems and placing additional strain on local water infrastructure.

Climate variability also compounds this risk. Studies suggest that warmer temperatures, reduced precipitation, and altered runoff patterns are contributing to declining aquifer recharge in many watersheds, undermining the capacity of these systems to sustain long-term extraction. In regions with chronic scarcity, such as the US Southwest and parts of southern Europe, clustered data centre can push aquifers toward depletion, prompting tighter regulatory constraints on extraction and intensifying stakeholder conflict.

In Phoenix and Arizona as a whole, groundwater aquifers are running dry due to prolonged drought, climate change, and over-allocation of limited supplies from the Colorado River. This has coincided with a rapid expansion of data centres in one of the nation's fastest-growing tech hubs, raising concerns that increased water demand for cooling infrastructure may exacerbate pressure on already stressed water resources. Proposed data centre developments in Chile have faced regulatory scrutiny due to concerns that their water demand could place additional pressure on already overexploited aquifers, highlighting the risk that such facilities may exacerbate existing groundwater depletion even in the absence of direct causal evidence. In the Netherlands, during periods of water scarcity freshwater is legally prioritised for essential uses such as drinking water over industrial uses like cooling water for data centres, reflecting concern that large-scale freshwater withdrawals by data centres could contribute to pressure on local water resources and groundwater reserves in times of drought.

Reduced river flows associated with high water withdrawals for industrial or cooling purposes can have significant effects on downstream ecosystems. Studies show that flow reductions lead to declines in invertebrate richness, altered food webs, and degraded water quality.  Wetlands are particularly vulnerable, as reduced inflows can lead to partial or complete drying, loss of habitat for birds, amphibians, and invertebrates, and impair natural functions like water purification and flood regulation. In Australia's Murray-Darling Basin, extensive water withdrawals have degraded floodplain wetlands and native fish habitats. Similarly, in northern Italy, withdrawals alter habitat suitability for fish and other aquatic species, illustrating how reduced flows cascade through ecosystems.

Data centres that use evaporative cooling systems can release small amounts of pollutants into local water systems. The most common pollutant in data centres is Biocides. Evaporative cooling systems create warm, moist environments that are ideal for the organic buildup. To mitigate this, data centre operators often use biocides such as chlorine dioxide or bromine to maintain system cleanliness and efficiency. Corrosion inhibitors, including various phosphates, are also used to protect metal components and maintain system integrity. Heavy metals, primarily copper, zinc, and occasionally lead, are released in trace amounts as metal parts degrade over time. When water from these systems is discharged, it can change the chemical balance of rivers and streams, potentially harming aquatic life, increasing metal levels, and disrupting ecosystems. Although the individual pollutants used in data centre cooling are generally minor, the sheer volume of water involved can lead to their accumulation over time, potentially resulting in long-term environmental impacts.

Thermal discharge from cooling systems can gradually raise river temperatures, altering flow patterns, reducing oxygen levels, and stressing aquatic ecosystems. Even where individual discharges meet regulatory limits, the cumulative impact of multiple facilities is poorly understood, and research on long-term ecological effects remains limited. Monitoring and enforcement vary across jurisdictions, leaving significant uncertainties about the broader environmental consequences.

Communities and environmental stakeholders are increasingly calling for enhanced monitoring protocols, including continuous temperature, chemical, and flow measurements, tied to public disclosure frameworks. These measures can help regulators and operators detect cumulative impacts before they cross ecological thresholds.

A critical dimension of long-term sustainability is that many water permits for data centre operations were issued under historical hydrological and climate conditions that no longer reflect present or future realities. Rising temperatures, shifting precipitation patterns, and declining aquifer recharge mean that allocations considered sustainable decades ago may now exceed the capacity of local water systems, particularly in arid and semi-arid regions. Without adaptive management, these legacy permits risk allowing cumulative withdrawals that stress both human and ecological water needs. This highlights the need for forward-looking regulatory frameworks that account for climate variability, ecosystem thresholds, and projected demand growth to ensure that water abstraction remains within genuinely sustainable limits.

# Case Studies

Devanshi Godbole and Isha Agarwal

Caption: *Finland and Uruguay illustrate opposite sides of the water-for-AI equation: geographic compatibility versus scarcity-driven political constraint.*

| **Factor** | **Finland** | **Uruguay** |
|---|---|---|
| Water Context | Abundant freshwater and cold coastal conditions support low-stress cooling. | Acute drought and stressed drinking-water systems made industrial demand contentious. |
| Political Context | Clear environmental regulation and permitting support responsible resource use. | Water-rights protections and public backlash constrained project design. |
| Cooling Approach | Seawater cooling with heat recovery. | Reconfigured from liquid cooling to air cooling. |
| Outcome | Expansion proceeded with strong sustainability framing. | Project was downsized and reformulated after opposition. |

Caption: *Finland and Uruguay illustrate opposite sides of the water-for-AI equation: geographic compatibility versus scarcity-driven political constraint.*

## Finland: Thirsty AI data centres meet renewable water systems

Finland is home to 39 AI data centres. Most notable amongst them is Google's AI data centre in Hamina, a town located on the coast of the Gulf of Finland. The data centre has been operational since 2009, and was converted from an old paper mill. In 2024, Google made an investment of EUR1 billion (£871,550,000) to further accelerate AI growth in Finland. The transition meant that the data centre was now heavily focused on GPUs, transitioning the 17-year-old data centre into an AI data centre.

### Water accessibility

Water activities undertaken by AI data centres need to be cognisant of local geographies to not only sustain their own productivity, but also encourage minimal risks to drinking water access locally. Finland's renewable water systems and sub-arctic temperatures make it ideal for directly countering the issue of cooling AI data centres without risking drinking water supply.

Finland is unique for its abundant freshwater resources. According to the UN Water Action Hub, the renewable water system provides each person with over 20,000 cubic metres worth of freshwater supply, well above the set water poverty threshold of 1,700 cubic metres per person. Renewable water systems and access to clean groundwater allows companies such as Google to comfortably utilise water resources for cooling without being concerned with relative water scarcity. As it stands, the largest consumer of freshwater in Finland are industries at 80%.

Google has employed a new technique known as Wet Surface Air Cooling (WSAC) in Hamina, allowing for the usage of seawater. Seawater is not generally used for reducing temperatures at AI data centres as corrosive materials such as salt are left behind as deposits during evaporation, which may damage the equipment. WASC allows for the salt deposits to be safely removed. Subarctic temperatures in the Gulf of Finland additionally cool down the water for usage and the close proximity of the data centre to the coast additionally reduced water stress on freshwater resources.

### Political incentive

Pre-existing robust regulatory frameworks operating within Finland, and rolled out by the EU, have prompted responsible water-usage amongst AI data centres. The European Climate Law sets out legally-binding legislation for how companies such as Google must plan their proposed water, energy and emission usage. In Finland, the Environmental Protection Act (2014) and the Water act (2011) are instrumental regulations as they provide permits that allow AI data centres to utilise water resources, both sea and freshwater, from the planning to implementation stages.

Alongside Google, all Finnish companies must work with municipal authorities to access freshwater resources and abide by set regulatory frameworks. A working paper evaluating how industry stakeholders responded to AI growth in Finland pointed out that data centre operators were interested in more formalised sustainability parameters for AI data centres to abide by.

### Overcoming future hurdles

Finland's experience with Google and vice versa spells a positive and ideal narrative surrounding water usage. As shown above, natural geographic compatibility and robust legislation and oversight remain critical to its success.

In reflection of this, proper upkeep of water restoration systems has been prioritised. The CEO of Finland's Water Utilities Association (FIWA), Riku Vahala, expects costs towards maintenance to exceed over EUR10 billion (roughly £8.7 billion) over the next two decades. However, the water restoration system that is already world-leading is also expecting innovative changes for reducing water risks by leveraging mobile technologies. As such, Valhalla's discussion into anticipated costs for future water security can be seen as a positive indicator of fiscal preparation to sustainably meet the AI 'water rush' demand in Finland.

## Uruguay: Where Data Centres Falter and Re-adapt

Google announced its data centre in Montevideo, the capital city of Uruguay, in 2023. First declared in 2020, the land acquired in 2021 within a tax-free zone met high public scrutiny given the disproportionate water demand projections. The project was approved by the local government to invite economic investment, advance technological infrastructure and position Uruguay as an AI and technology hub. What began as the plan to build two data centres quickly prompted social and environmental backlash leading to a significant pull back and reformulation.

## Water Constraint

In 2023, Uruguay experienced its worst drought in 74 years, prompting the government to declare a hydrological emergency. The cause of the water crisis was multifactorial:decrease in rainfall due to unprecedented climate change, exposed lack of investment in water storage, planning and reserves, and the drying up of the main reservoir in Paso Severino all played compounding roles. It was in this context of inaccessibility to potable water that Google's data centre project initially reached finalisation stages in November 2023. The project aimed to redirect an approximated 7.6 million litres of water per day from the already struggling public drinking system, equivalent to the domestic consumption of 55,000 people.

## Political Backlash

Through a constitutional reform passed in 2004, Uruguay became the first country in the world to declare access to water as a fundamental right for its citizens. In stark contrast to this institutional promise, the 2023 water scarcity crisis left people unable to access clean drinking water and having to drink saline water unfit for human consumption. A July 2023 UN report mentioned that the conditions in Uruguay are such that "Water for human consumption represents barely 5% of the total supply of drinking water." The announcement of the project in this backdrop led to widespread protests and public discontent. Representatives from the National Commission in Defence of Water and Life denounced the happenings through the slogan "This isn't Drought, It's Pillage" plastered across Montevideo.

In conversation with the Guardian, Paz Peña, a researcher with Mozilla Foundation, stated that NGOs and local residents approached Uruguayan courts to challenge the water demand of the data centre, raising the need for fair resource allocation. The government had denied information access concerning the quantified water demand on grounds of Google's corporate confidentiality. In response, highlighting the spirit of the Escuźa Agreement, an inter-American environmental agreement advocating for information transparency in matters of public concern - the court mandated the publication of data regarding water usage.

## Post-Protest Aftermath

The public outcry centred around water scarcity concerns pushed for the withdrawal of the initial project designed for Canelones Science Park. Google reformulated the project operations and applied for environmental permits to confirm the resumption of the construction. The project was downsized, reducing the planned 2 datacentres to a single facility and switched from liquid cooling to air-based cooling. As part of a series of permits Google submitted an Environmental Impact Study to obtain the Preliminary Environmental Authorisation on the project from the Uruguayan government.

After recalibration, the project was passed by the government in late 2024, in line with the environmental realities that dominate life in the region. Although speculations around restricted access to information and scrutiny remain, the project has been given a green light.

# Forecast

## Jason Dirks

Over the next few years, “water for AI” is likely to move from one-off local battles into a more repeatable governance pattern, particularly in water-stressed regions where drought restrictions are already politically sensitive. As data centre capacity expands, the core conflict will remain the same: new, concentrated demand arrives in places where water is finite, competing users already exist, and trust in decision-making can be fragile. The short-term response is therefore likely to rely on tools regulators and utilities already use rather than entirely new water laws, including tighter permit conditions, clearer enforcement expectations, and more public disclosure.

### Short Term

In the short term (6 to 18 months), the clearest change is likely to be stricter permit conditions and more structured “front-end” scrutiny, rather than a rewrite of statutory frameworks. Basin-level regulators already use threshold-based approval processes for high-volume water users. For example, SRBC’s data centre framework illustrates how projects can be brought into a stricter approval and compliance regime once they exceed regulatory limits. In practice, this will show up in more consistent use of caps and reporting requirements, alongside stronger contingency planning and restrictions that activate during drought stages. These tools are quicker to implement than expanding supply, and they are easier to defend politically when scarcity is visible.

Pressure to act more transparently is likely to build quickly as disclosure is increasingly becoming part of the governance toolkit rather than a voluntary corporate choice. In the EU, Delegated Regulation (EU) 2024/1364 sets out the information and KPIs to be communicated to the European database by data centre operators, providing a structured basis for reporting and comparison. In the US, state-level activity is also moving toward water-use reporting requirements backed by enforcement tools, including civil penalties for inaccurate or misleading reporting. The short-term point isn’t that every jurisdiction will adopt the same rules at the same pace. It’s that approvals based on minimal public information will become harder to defend politically in water-stressed communities.

## Medium/Long Term

In the medium/long term (2 to5 years), water scarcity is likely to become a more decisive factor rather than a secondary consideration because infrastructure buildout momentum is expected to be sustained. The IEA projects that global electricity consumption for data centres will roughly double to around 945 TWh by 2030 in its Base Case, with AI as a major driver, implying multi-year expansion rather than a short cycle. As growth continues, water constraints will increasingly shape where projects can proceed smoothly and where they face repeat conflict, redesign, or relocation. Over this horizon, design adaptation is likely to become more common as firms try to reduce permitting and operational exposure, including greater reliance on reclaimed/non-potable sources, stronger reuse systems, and cooling approaches that reduce consumptive demand.

### What to Watch

What to watch is whether today's mix of local rules and case by case approvals begins to translate into more formal and consistent standards across jurisdictions. A key question is how far this consolidation travels. This includes whether overarching frameworks, for example at EU level or through state and federal reporting requirements in the US, start to set common expectations, or whether outcomes remain dominated by local planning authorities, basin regulators, and utility agreements.

In practical terms, three areas are likely to be most important. First, watch whether water use disclosure requirements become more widespread and more detailed, since transparency often determines how quickly projects face scrutiny and how defensible approvals are in water stressed communities. Second, monitor whether drought stage restrictions and emergency contingency planning become routine features of permits and water agreements, because these clauses turn climate stress into direct operational constraints. Third, follow how pricing and cost recovery reforms develop, as the politics of who pays for peak demand and long term resilience will shape both project viability and public support as data centre clusters expand.

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