# AI surge forces data centres to adopt seawater cooling amid water scarcity



The burgeoning demand for artificial intelligence (AI) is triggering a reevaluation of how data centres operate, particularly concerning water consumption. With a surge in the complexity of AI models, like GPT-4, which requires an extensive array of GPUs running ceaselessly, the energy requirements have skyrocketed. The International Energy Agency has projected that global data centre energy demand could reach a staggering 1,000 terawatt-hours (TWh) annually by 2026, up significantly from 460 TWh in 2022. This increase underscores the dire need for innovative cooling methods, as traditional air-based systems become less viable.

The relentless growth of AI applications poses a significant challenge: water scarcity. A typical hyperscale data centre can consume millions of litres of freshwater daily, and this intense demand is unsustainable, especially in regions already grappling with dwindling groundwater supplies. Legislative measures are beginning to reflect these concerns; for instance, Virginia has mandated that data centres provide estimates of their water usage to mitigate the stress on local water resources. Companies such as Equinix are leading the charge by implementing cooling techniques designed to reduce water consumption, yet the sheer scale of the demand may call for more systemic changes to uphold sustainability.

Recognising the critical link between rising AI workloads and water usage, the industry is turning to liquid cooling solutions—particularly seawater cooling—as a promising alternative. This method leverages coastal proximity, drawing seawater to function as a heat sink rather than relying on increasingly scarce freshwater supplies. The potential market for liquid cooling systems is projected to grow to $48.42 billion by 2034, reflecting not only their effectiveness but also an urgent need for better resource management.

Liquid cooling operates on a straightforward premise: it utilises liquids to transfer heat away from data centre hardware directly. This method is significantly more efficient than traditional air cooling systems, reducing overall power consumption. Furthermore, liquid cooling systems can be designed to repurpose waste heat for secondary uses, such as heating nearby buildings or supporting agricultural initiatives. This dual-purpose approach not only lessens the environmental impact but also enhances the resource efficiency of data centres.

Despite its advantages, seawater cooling systems face considerable hurdles, particularly regarding regulatory compliance. Safe return of the treated seawater back into the ocean necessitates strict adherence to environmental standards, including monitoring temperature and chemical composition. Challenges related to site selection, infrastructure modification, and operational costs mean that while new-build campuses are most suited for such adaptation, retrofitting existing facilities remains complex.

As the world enters what is being dubbed the "Intelligent Age," AI-driven transformation is set to redefine various industries. The intersection of AI growth and sustainable data centre practices is crucial in navigating the environmental implications of this digital acceleration. Industry experts argue that while seawater cooling may not be a panacea, it represents a vital step towards minimising the ecological footprint of data centres.

In a rapidly evolving landscape, balancing performance with sustainability will become increasingly paramount. Companies, data centre operators, and regulators must collaborate to refine these technologies and establish best practices that not only prioritise energy efficiency but also ensure the responsible use of water resources. The stakes are high; the future of data centres, especially those utilising AI, hinges on their ability to scale innovative, sustainable cooling solutions to meet rising demands while safeguarding the planet's finite resources.

The transformation of data centre infrastructure must be at the forefront of this movement as society increasingly relies on AI for insights and operations. With advances in cooling technology and renewable energy sources, the next decade will likely see significant strides towards creating a more sustainable digital economy—one that is capable of meeting the challenges and demands of an AI-driven future.

### Reference Map

* Paragraph 1: [[1]](https://www.techradar.com/pro/seawaters-role-in-surfing-the-ai-wave)
* Paragraph 2: [[2]](https://www.ft.com/content/65fff689-bd47-4c15-bdb8-083e5ccd84dc)
* Paragraph 3: [[3]](https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/), [[4]](https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/)
* Paragraph 4: [[5]](https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/), [[6]](https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/)
* Paragraph 5: [[7]](https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/)

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## Bibliography

1. <https://www.techradar.com/pro/seawaters-role-in-surfing-the-ai-wave> - Please view link - unable to able to access data
2. <https://www.ft.com/content/65fff689-bd47-4c15-bdb8-083e5ccd84dc> - This article discusses the increasing water consumption of data centers due to the rising demand for AI tools, including generative AI. It highlights concerns about water scarcity and legislative actions in Virginia requiring data centers to submit water use estimates. The piece also mentions that AI processing is projected to heavily consume global water by 2027 and notes that companies like Equinix are adopting cooling techniques to reduce water use, though innovation alone may not suffice. Regulatory measures and thoughtful site selection are suggested to mitigate the strain on local water supplies.
3. <https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/> - This article explores how liquid cooling can address the water crisis in data centers driven by AI workloads. It explains that traditional air-based cooling systems consume significant amounts of water, which is unsustainable as AI applications increase. Liquid cooling, which uses liquids to transfer heat directly from hardware, is presented as a more efficient and water-saving alternative. The piece also discusses the potential for liquid cooling systems to repurpose heat for secondary uses, such as heating nearby buildings or supporting agriculture, thereby reducing overall resource consumption and environmental impact.
4. <https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/> - This article discusses the challenges posed by traditional air-based cooling systems in data centers, particularly in the context of AI workloads. It highlights the unsustainable water consumption associated with these systems and presents liquid cooling as a more efficient and water-conserving alternative. The piece also explores the potential for liquid cooling systems to repurpose heat for secondary uses, such as heating nearby buildings or supporting agriculture, thereby reducing overall resource consumption and environmental impact.
5. <https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/> - This article examines the impact of AI workloads on data center water consumption and presents liquid cooling as a sustainable solution. It explains that traditional air-based cooling systems are water-intensive and unsustainable as AI applications grow. Liquid cooling, which uses liquids to transfer heat directly from hardware, is highlighted as a more efficient and water-saving alternative. The piece also discusses the potential for liquid cooling systems to repurpose heat for secondary uses, such as heating nearby buildings or supporting agriculture, thereby reducing overall resource consumption and environmental impact.
6. <https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/> - This article explores the challenges posed by traditional air-based cooling systems in data centers, especially with the increasing demands of AI workloads. It highlights the unsustainable water consumption associated with these systems and presents liquid cooling as a more efficient and water-conserving alternative. The piece also discusses the potential for liquid cooling systems to repurpose heat for secondary uses, such as heating nearby buildings or supporting agriculture, thereby reducing overall resource consumption and environmental impact.
7. <https://www.datacenterdynamics.com/en/opinions/how-liquid-cooling-can-address-ais-water-crisis-in-data-centers/> - This article examines the impact of AI workloads on data center water consumption and presents liquid cooling as a sustainable solution. It explains that traditional air-based cooling systems are water-intensive and unsustainable as AI applications grow. Liquid cooling, which uses liquids to transfer heat directly from hardware, is highlighted as a more efficient and water-saving alternative. The piece also discusses the potential for liquid cooling systems to repurpose heat for secondary uses, such as heating nearby buildings or supporting agriculture, thereby reducing overall resource consumption and environmental impact.