THEMATIC PULSE | NOVEMBER 2025

AI’s growing thirst for water

Christian Zilien, CFA
Product Specialist
Equity

Introduction

Artificial Intelligence (AI) has become one of the most transformative technologies of our time, but behind its rapid adoption lies a growing sustainability challenge: water consumption. Data centres powering AI models, electricity generation supporting their operations, and semiconductor fabs manufacturing the chips all consume vast amounts of water. While AI’s water footprint is modest compared to agriculture or industrial activity on a global scale, its local impact is acute, given that many AI infrastructure hubs are in water-stressed regions. The high-power consumption and extreme heat generation of the next generation of AI chips typically exceeds the capacity of traditional air cooling in data centres, which is why water-cooling has become a necessity to ensure reliability and performance.

AI’s expanding water footprint

According to Morgan Stanley Research AI data centres will consume 1,068 billion liters[1] of water annually by 2028 in its base-case scenario which represents an 11x increase from 2024 levels. This reflects not only increased demand for cooling but also indirect water usage from electricity generation. The firm models three scenarios:

Water consumption comes from three “scopes”:

1. **Scope 1 – Cooling:** On-site water uses in data centres, primarily for cooling towers and evaporative cooling systems.

2. **Scope 2 – Electricity generation:** The largest share, reflecting water used in thermoelectric power plants that generate electricity.

3. **Scope 3 – Manufacturing:** Semiconductor fabrication and server production, where facilities may consume up to 5 million gallons of ultrapure water (UPW) daily.

Semiconductor production is particularly water-intensive: producing 1,000 gallons of UPW requires up to 1,600 gallons of municipal water. The process involves multiple high-water-demand stages like oxidation, lithography, and chemical vapor deposition. Beyond consumption, semiconductor wastewater often contains toxic pollutants such as heavy metals and PFAS, adding risks to local ecosystems.

Localised risks of water stress

Although AI's water footprint is modest compared to global irrigation (which dwarves all other uses), the local impacts are severe. More than half of the world's top 30 data centre hubs face medium basin physical risk including limited water availability, recurring drought, or declining water quality.

Governments are pushing back against data centres' water use. Taiwan rationed supplies to chipmakers during its 2021 drought, while the Netherlands and Singapore placed temporary bans on new facilities. Even Google had to scale back in Chile, switching to air cooling after regulators raised climate and water concerns. A Schneider Electric survey found 73% of respondents believed water scarcity is slowing down data centre projects. This shows how water stress is becoming a bottleneck for AI expansion.

Water stress is expected to worsen. The IPCC's Sixth Assessment Report[2] confirms the water cycle has shifted, with terrestrial water storage in soil, snow, and ice declining. According to **the** World Resources Institute, an additional 1 billion people could face extremely high-water stress by 2050[3] even under optimistic scenarios. This intensifies risks for AI, as shortages could delay or cancel new data centre projects, disrupt semiconductor manufacturing and trigger regulatory restrictions and community opposition.

Cooling technologies: Trade-offs and innovation

Data centre cooling remains central to AI's water story. Different technologies carry trade-offs between water and energy efficiency:

- **Cooling towers:** High water use but relatively efficient.
- **Evaporative air cooling:** Moderate water use, climate dependent.
- **Dry coolers:** No on-site water use, but increase energy demand, shifting burden to electricity.

Emerging innovations include:

- **Microchannel cold plates:** Reduce coolant flow and water use by increasing surface area for heat transfer.
- **Seawater cooling:** Google's Hamina, Finland data centre uses seawater, cutting freshwater reliance while improving energy efficiency.

While these solutions are promising, adoption is uneven and often delayed due to infrastructure costs and technical risks.

Investment framework

The first idea is to invest in technology enablers the businesses creating smarter cooling systems, recycling solutions, and filtration tech that help data centres and chipmakers cut water use. The second is renewable energy. Since much of AI's hidden water footprint comes from electricity generation, cleaner power sources like wind and solar can indirectly slash water demand. The third is with water stewardship leaders' companies that take water seriously. They track how much they use, recycle where possible, and plan carefully if they operate in water-stressed regions. These firms are likely to stand out as AI continues to expand in a resource-conscious world. Companies demonstrating transparency and basin-specific water strategies may prove more resilient in the long term.

Conclusion

AI's rapid growth brings an underappreciated sustainability challenge: water. Morgan Stanley projects an 11x increase in AI-related water consumption by 2028, primarily from cooling and electricity generation. While the absolute numbers are modest globally, the localised impacts in water-stressed regions are severe, with climate change amplifying risks. For policymakers, this means balancing innovation with resource sustainability. For investors, it presents both risks (regulation, project delays, reputational damage) and opportunities (in enablers, renewables, and stewardship leaders).

Sources:

[1] Morgan Stanley Research

[2] United Nations IPCC Sixth Assessment Report 2021

[3] World Resources Institute Aqueduct Water Risk Atlas 2023

Securities mentioned in this document are for illustrative purposes only and do not constitute a recommendation or solicitation to buy or sell any particular security. These securities will not necessarily be comprised in the portfolio by the time this document is disclosed or at any other subsequent date.

The document is for use by qualified Institutional Investors (or Professional/Sophisticated/Qualified Investors as such term may apply in local jurisdictions).

This document or information contained or incorporated in this document have been prepared for informational purposes only without regard to the investment objectives, financial situation, or means of any particular person or entity. The details are not to be construed as a recommendation or an offer or invitation to trade any securities or collective investment schemes nor should any details form the basis of, or be relied upon in connection with, any contract or commitment on the part of any person to proceed with any transaction.

Any form of publication, duplication, extraction, transmission and passing on of the contents of this document is impermissible and unauthorised. No account has been taken of any person's investment objectives, financial situation or particular needs when preparing this content of this document. The content of this document does not constitute an offer to buy or sell, or a solicitation or incitement of offer to buy or sell, any particular security, strategy, investment product or services nor does this constitute investment advice or recommendation.

The views and opinions expressed in this document or information contained or incorporated in this document, which are subject to change without notice, are those of Allianz Global Investors at the time of publication. While we believe that the information is correct at the date of this material, no warranty of representation is given to this effect and no responsibility can be accepted by us to any intermediaries or end users for any action taken on the basis of this information. Some of the information contained herein including any expression of opinion or forecast has been obtained from or is based on sources believed by us to be reliable as at the date it is made, but is not guaranteed and we do not warrant nor do we accept liability as to adequacy, accuracy, reliability or completeness of such information. The information is given on the understanding that any person who acts upon it or otherwise changes his or her position in reliance thereon does so entirely at his or her own risk without liability on our part. There is no guarantee that any investment strategies and processes discussed herein will be effective under all market conditions and investors should evaluate their ability to invest for a long-term based on their individual risk profile especially during periods of downturn in the market.

Investment involves risks, in particular, risks associated with investment in emerging and less developed markets. Any past performance, prediction, projection or forecast is not indicative of future performance. Investors should not make any assumptions on the future on the basis of performance information in this document. The value of an investment and the income from it can fall as well as rise as a result of market and currency fluctuations and you may not get back the amount originally invested.

Investing in fixed income instruments (if applicable) may expose investors to various risks, including but not limited to creditworthiness, interest rate, liquidity and restricted flexibility risks. Changes to the economic environment and market conditions may affect these risks, resulting in an adverse effect to the value of the investment. During periods of rising nominal interest rates, the values of fixed income instruments (including short positions with respect to fixed income instruments) are generally expected to decline. Conversely, during periods of declining interest rates, the values are generally expected to rise. Liquidity risk may possibly delay or prevent account withdrawals or redemptions.

November 2025 LDS-250229

ADM-W5018156