# AI data surge exposes infrastructure gaps and sustainability risks



The rapid rise of Artificial Intelligence is driving an unprecedented explosion in data creation, with AI-generated content forecast to surpass human-generated data by a factor of up to 1,000. This surge, led by generative AI platforms such as ChatGPT, Gemini and DALL-E, is reshaping global data demands while placing immense pressure on infrastructure, sustainability and governance.

The global datasphere is expected to reach 170 zettabytes by 2025, fuelled by advances in computational power, algorithm design and AI’s capacity to generate unstructured content—including text, video, and synthetic data. Around 80% of this data is unstructured, adding complexity to storage and security. Synthetic data, which sidesteps privacy concerns, further increases volume.

This expansion is straining data centre infrastructure. AI workloads require up to three times more energy per square foot than traditional data use, with cooling and electricity demands set to account for nearly half of all data centre power consumption by 2024. The environmental footprint is now a critical concern, prompting calls for greener, more efficient designs.

Yet industry efforts to scale up face significant headwinds. A Hitachi Vantara survey found that 37% of US firms see data quality as a top barrier to AI success, while many still lack effective governance. The rise of data sprawl—uncontrolled storage growth—is worsening security risks, with poorly managed repositories becoming targets for breaches and ransomware.

Data centre operators are redesigning facilities for scalability and sustainability, but progress is hampered by regulation and a global talent shortage. Nearly 80% of operators report staff deficits. At the same time, AI workloads have surged by 42% in the past year alone, compounding pressures on outdated systems.

Hardware supply chains are also under strain. A global shortage of memory and storage components—especially NAND flash and DRAM—is driving prices higher, as demand outpaces supply. Geopolitical tensions and fabrication bottlenecks have made high-bandwidth memory a priority, further squeezing availability of key storage hardware.

Bain & Company estimates the AI industry will require $2 trillion in annual revenue by 2030 to maintain growth—$500 billion of which must be allocated to infrastructure. Without it, an $800 billion shortfall could stall expansion. Power requirements for AI data centres could hit 200 gigawatts by decade’s end, demanding sweeping upgrades.

Major players are responding. Nvidia and AMD are advancing AI-specific GPUs, while Google, Amazon and Microsoft are developing proprietary accelerators. On the storage front, firms like Hitachi Vantara and NetApp are rolling out AI-optimised, high-performance solutions. Future technologies such as Resistive RAM and Phase-Change Memory promise lower latency and energy use.

Longer term, quantum and DNA-based storage, as well as edge computing—expected to handle 70% of AI inference workloads—will reshape the data landscape. Meanwhile, sustainability is rising up the agenda, with infrastructure and algorithm design now focused on efficiency and environmental impact.

The risks, however, are not only technical. AI-generated data magnifies issues of bias, privacy and transparency. Poor-quality data can lead to flawed outputs and hallucinations, while the opacity of complex models makes these harder to detect. Strong governance and ethical oversight are urgently needed.

Despite the challenges, AI’s potential remains vast. By 2030, it is projected to add trillions to the global economy, transform industries and automate large swathes of work. Companies are investing in proprietary data and infrastructure as competitive assets, recognising that responsible AI growth demands a stable, scalable foundation.

The scale of AI’s data revolution presents both a transformative opportunity and a critical test. Success will depend on global collaboration across innovation, infrastructure and ethics to ensure that this new era of data can deliver on its promise while safeguarding the systems and societies it supports.

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## Bibliography

1. <https://markets.financialcontent.com/wral/article/tokenring-2025-10-21-ai-unleashes-data-tsunami-1000x-human-output-and-the-race-for-storage-solutions> - Please view link - unable to able to access data
2. <https://www.prnewswire.com/news-releases/us-data-concerns-soar-as-ai-surges--37-of-it-leaders-identify-data-quality-as-major-barrier-to-ai-success-302326975.html> - A survey by Hitachi Vantara reveals that 37% of U.S. companies view data as their primary concern in AI projects. Despite this, many IT leaders are not taking adequate steps to ensure proper data quality and management, jeopardising AI initiatives. The survey also highlights that data storage demands are expected to triple by 2026, underscoring the critical role of data infrastructure in AI success and revealing gaps in data governance, security, and sustainability.
3. <https://www.techradar.com/pro/ai-infrastructure-at-a-crossroads-why-holistic-data-center-design-cant-wait> - As AI rapidly transforms global industries, data centre infrastructure is under unprecedented strain, pushing operators to reassess their strategies. A surge in AI workloads has driven up demand by 42% over the past year, placing intense pressure on legacy power, cooling, and network capabilities. Operators are increasingly turning to holistic data centre designs—built for flexibility, scalability, and sustainability—to accommodate evolving workloads. However, progress is uneven, with some nations facing regulatory roadblocks, while others press ahead. Talent shortages are also delaying projects, with nearly 80% of operators reporting staffing shortages.
4. <https://www.techradar.com/pro/how-ai-resurrected-an-unsolved-security-problem-data-sprawl> - The rapid adoption of generative AI in enterprises has resurfaced the longstanding issue of data sprawl, now with greater urgency. AI not only consumes but also generates vast new quantities of data, including reports, logs, and metadata. Without structured governance, this data overload becomes a significant security risk, with attackers targeting poorly managed or forgotten data repositories. Survey findings indicate high incidences of data breaches and ransom payments due to inadequate AI security measures. The article advocates for automated, scalable data governance solutions to address this challenge.
5. <https://www.tomshardware.com/pc-components/storage/perfect-storm-of-demand-and-supply-driving-up-storage-costs> - A severe and growing global shortage in memory and storage components—particularly NAND flash, DRAM, and HDDs—is largely driven by skyrocketing demand from AI data centres and hyperscale cloud providers. Following a supply glut in 2022–2023 that drove SSD and RAM prices to all-time lows, manufacturers drastically cut output to stabilise the market. However, the AI boom reversed that trend, with large models requiring massive memory and storage resources. Prices for SSDs, DRAM, and even traditionally stable hard drives have increased sharply. Supply constraints are worsened by slow fabrication construction, geopolitical conflicts over rare earth elements, and global talent shortages in semiconductor engineering.
6. <https://www.teksystems.com/en-au/insights/article/overcoming-challenges-ai-powered-date-centres> - AI workloads are inherently compute-intensive, requiring specialised hardware such as GPUs and TPUs, which consume significantly more power than traditional CPUs. This leads to increased thermal output and higher cooling demands. As AI adoption scales, so does the energy footprint of data centres, making energy efficiency a critical design and operational priority. The challenge is compounded by the need to maintain performance while managing power density and thermal constraints. Traditional air-cooling systems are often insufficient for high-density environments, and the cost of energy continues to rise. Sustainability targets and regulatory pressures are pushing data centre operators to reduce emissions and improve energy efficiency.
7. <https://www.tomshardware.com/tech-industry/bain-says-compute-demand-is-outpacing-capital> - A new report from Bain & Company highlights a looming financial and infrastructural crisis in the artificial intelligence industry. To sustain current growth, the AI sector will need $2 trillion in annual revenue by 2030, driven by over $500 billion in yearly data centre investments. However, even optimistic projections reveal an $800 billion revenue shortfall. The report emphasises that demand for compute power is rapidly outpacing the supply of necessary infrastructure. By 2030, AI data centres may require 200 gigawatts of power globally—half in the U.S.—necessitating enormous upgrades to electrical, cooling, and silicon supply chains. Constraints in key components like high-bandwidth memory (HBM) and CoWoS packaging are already creating bottlenecks, while hyperscalers prioritise high-efficiency GPU platforms, potentially sidelining lower-volume or PC-based solutions.