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Artificial Intelligence-Driven Environmental Intelligence: Implications for Sustainable Business And Marketing

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Abstract
This paper investigates the concept of environmental intelligence, artificial intelligence and its relevance for sustainable business and marketing. It's a secondary-data based analytical approach that brings together the evidence from international energy agencies, consulting and technology research institutes, consumer analytics, market-intelligence reports and recent academic studies. The analysis indicates that AI is becoming more and more a tool for gathering environmental data, analysing it, verifying it and communicating it for emissions monitoring, resource optimization, climate-risk assessment, ESG reporting, green innovation and sustainability-related marketing. Concurrently, AI has engendered an environmental paradox-AI systems powering sophisticated models require significant and ever-increasing amounts of electricity and water. Let's look at evidence on consumer markets, which shows that sustainability-related claims can have a positive impact on sales performance and purchasing preference if they are credible. But this is subject to the trustworthiness, transparency and verifiability of sustainability information generated by AI, and the willingness of companies to consider the environmental impact of their own digital systems. The researchers of the study come up with a conclusion that AI shouldn't be regarded as a technology that is inherently sustainable. It relies on governance, measuring, institutional capacity, responsible deployment of models and synergy between environmental performance and marketing communication. Firms can only realize sustainable competitive advantage through AI's environmental intelligence when they recognize the energy and emissions advantages it brings to decision-making for sustainable operations while also accounting for the credibility and risk of environmental inaccuracies.

Keywords: Artificial intelligence; Environmental intelligence; Sustainable business; Sustainable marketing; Green innovation; Corporate environmental performance

1. Introduction

Until now, the growth and diffusion of artificial intelligence (AI) within companies, and the growing demands for companies to show credible environmental performance, have been researched separately. Such a division is no longer acceptable. On the other, regulators, investors and consumers are calling for the information they deem essential for emissions, resources consumption and the footprint on the supply chain, but in granular detail that standard environmental reporting is not capable of providing. AI technologies - machine learning, computer vision, natural language processing, and, more recently, generative AI - are being applied just to address this very data gap: to manage emissions in real time, to simulate the climate risk, to optimise resource and energy consumption in operations and supply chains, and to drive the marketing of sustainability claims that companies routinely make in their marketing. The present study refers to this convergence as “artificial intelligence driven environmental intelligence” (AI-driven environmental intelligence), and identifies the application of artificial intelligence systems (AI systems) to the collection and analysis of environmental data, as well as their actionable interpretation, for the support of the decision-making process of corporate sustainability (sustainable marketing strategy) (Sipola et al., 2023; Bergougui, 2026; Zhai & Huang, 2025; Gaur et al., 2023).

It is not a linear solution though: tech is not the answer to sustainability. AI systems, and generative AI models specifically, are a huge and rapidly increasing electricity and water consumer, and this is a real

paradox that lies at the heart of this study: The technology that is being used to improve sustainability is itself a major source of unsustainability, due to the energy and water required to power the data centres that operate it. Global data-centre electricity demand is currently high, and will more than double over the next decade, according to the International Energy Agency (IEA) forecast, which is dominated by AI workloads. Business and marketing decision makers are thus faced with the challenge of how to leverage AI environmental intelligence as a new opportunity and environmental liability, which has direct implications for the sustainability claims they make, verify, and communicate to their stakeholders (Liu et al., 2024; Chen & Jin, 2023; Tseng & Lin, 2024).

2. Background of the Study

In the last three to four years, there have been three developments, broadly in parallel, that have pushed the field of AI environmental intelligence to the forefront.There have been three major parallel developments of the past three to four years that have catapulted the field of AI environmental intelligence. First, global consulting and technology research firms are starting to systematically poll question the number of executives they encounter about their use of AI and generative AI for sustainability-related work, revealing some of the first large-scale, cross-industry evidence on the issue. Second, since 2024, the International Energy Agency has released separate insights on the electricity demand of AI and data centres, which supply a credible empirical foundation for the environmental footprint of AI itself. Third, market-research and consumer-analytics companies such as the newly formed McKinsey and NielsenIQ (NIQ) have now been able to calculate the commercial benefits of sustainability-linked positioning, and specialist market-intelligence companies have commenced measuring the hugely expanding market for AI-powered sustainability solutions. The sub-sections that follow collate the secondary evidence (where available) with respect to each of these strands.

3. Artificial Intelligence and the Corporate Sustainability Agenda

In a short period of time, the understanding of the business case for sustainability has come a long way from corporate recognition. A business case for sustainability is no longer in doubt, with the proportion of executives saying it is clear increasing from 21 per cent in the summer of 2022 to 63 per cent in 2023, a threefold increase in a year, according to the report, which cited record climate catastrophes and increasing regulatory pressure as the reason. In tandem with this change, the digital technology, in particular generative AI, has become the tool that companies are increasingly turning to to action sustainability commitments: 59 per cent of executives surveyed believe that generative AI will be a key part of their organization's sustainability transformation, while 57 per cent say that their organization is taking action to manage the environmental impact of the generative AI models it uses. The evolution of executive views on the business case for sustainability (Torrent-Sellens et al., 2025; Rammer et al., 2022; Hussain et al., 2024; Guo et al., 2025; Xia et al., 2025) is shown in Fig. 1.1.

Table 1.1: AI Adoption for Corporate Sustainability - Selected Global Indicators

Indicator	2022 / 2023	2025
Executives agreeing sustainability business case is clear	21% (2022) → 63% (2023)	-
Executives believing GenAI is key to sustainability transformation	59% (2023)	-
Organisations that have taken steps to manage GenAI's environmental impact	57% (2023)	-
Organisations integrating GenAI into most/all functions or locations	6% (2023)	30% (2025)
Businesses that increased AI investment since 2023	-	80%
Executives aware of the environmental impact of the GenAI they use	38%	-
Organisations that measure their own GenAI environmental footprint	12-20%	-

Source: Compiled by the researcher from Capgemini Research Institute, 'A World in Balance 2023'; Capgemini, 'Generative AI in Organizations' (2025); Capgemini sustainability-GenAI survey findings as reported by TechRepublic (2025).

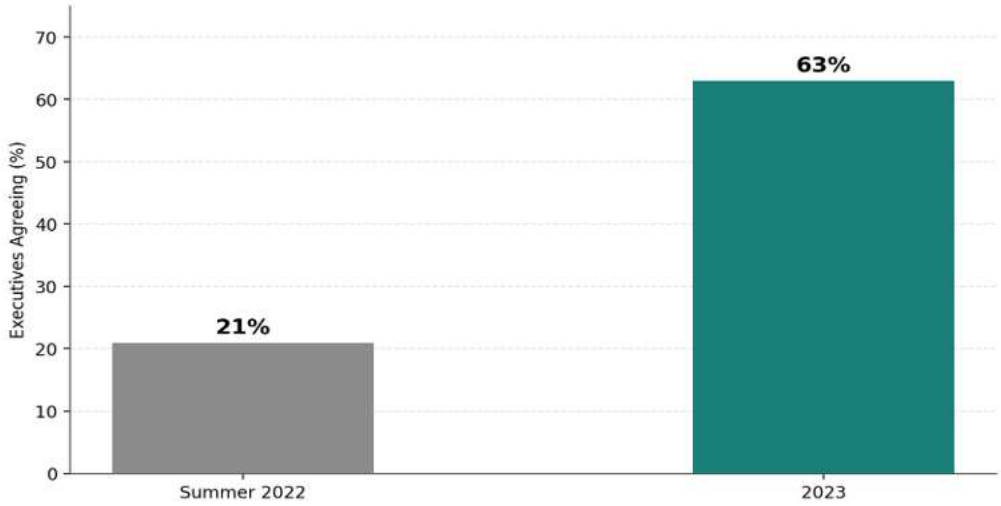

Figure 1.1: Executives Who Agree the Business Case for Sustainability is Clear (Global, 2022 vs 2023)

Source: Capgemini Research Institute, *A World in Balance 2023.*

Since then, the uptake of generative AI in organisations has picked up significantly. As 80 per cent of surveyed businesses reported increases in their overall investments in AI since 2023, the proportion of large organisations using generative AI in most or all of their functions or locations jumped from 6 per cent in 2023 to 30 per cent in 2025 (a fivefold increase), according to Capgemini's Generative AI in Organizations research series. These levels of adoption are directly applicable in environmental intelligence applications, as sustainability reporting, emissions estimation, supply chain risk monitoring and climate scenario modelling are some of the use cases that generative AI is being applied to. Table 1.1 presents the key signs of AI use for sustainability, based on the survey research carried out by Capgemini Research Institute (Bergougui, 2026; Liu et al., 2025).

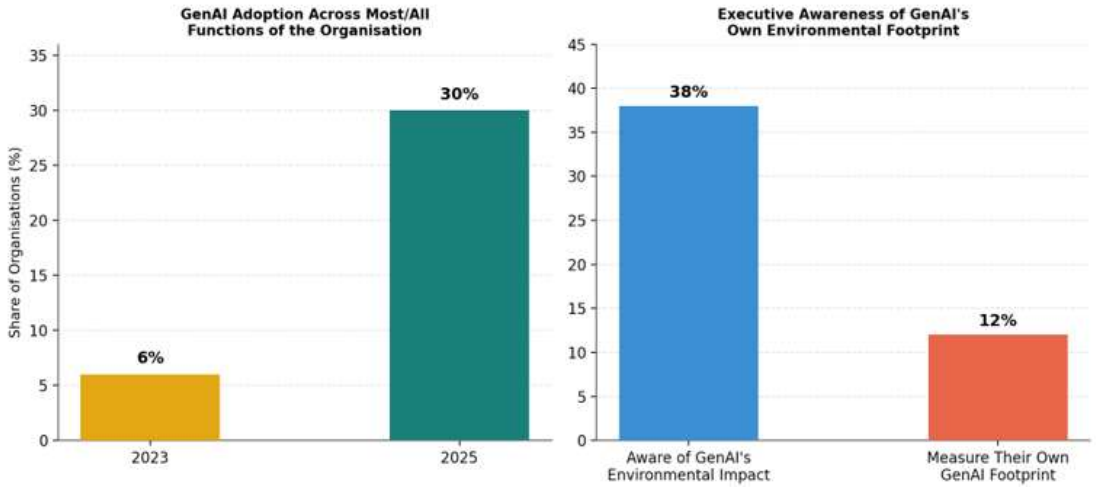

Figure 1.2: Generative AI Adoption Outpaces Awareness of its Own Environmental Footprint

Source: Capgemini Research Institute, *Generative AI in Organizations Report (2025); Capgemini Sustainability–GenAI Survey, as reported by TechRepublic (2025).*

4. The Environmental Footprint of AI: A Paradox for Sustainable Business

While businesses are using AI to further sustainability initiatives, the infrastructure powering AI – namely the data centres that process energy-hungry machine-learning training and inference workloads – is a rapidly expanding source of electricity consumption and, indirectly, emissions. International Energy Agency estimated the global data-centre electricity consumption at around 415 terawatt-hours (TWh) in 2024, which accounts for about 1.5 per cent of global electricity consumption, and has been increasing at 12 per cent per year over the last five years. The IEA's 'Base Case' central projection sees this increase to around 485 TWh in 2025, and to around 945-950 TWh by 2030-the equivalent of the current total electricity use of Japan-and almost 3 per cent of total global electricity use by then. Data

centre electricity consumption will increase by 77% during this time, with AI-focused data centres forecast to more than triple their power usage, rising significantly more than the overall data centre electricity consumption. This trend is shown in Figure 1.3 and the details of these figures are given in Table 1.2.

Table 1.2: Global Data Centre Electricity Consumption and Geographic Concentration

Indicator	Value
Global data centre electricity consumption	415 TWh
Global data centre electricity consumption (interim)	485 TWh
Global data centre electricity consumption (Base Case projection)	945-950 TWh
Data centres' share of global electricity consumption	1.5% → ~3%
Annual growth rate of data centre electricity demand	~12-15% per year
United States' share of global data centre power consumption	44% (~180 TWh)
China's share of global data centre power consumption	25% (~102 TWh)
Four major European economies' combined share	10% (~41 TWh)

Source: International Energy Agency (IEA), 'Energy and AI' (2025) and 'Key Questions on Energy and AI' (2026); country-level breakdown per Incorrys analysis of IEA data centre estimates (2025).

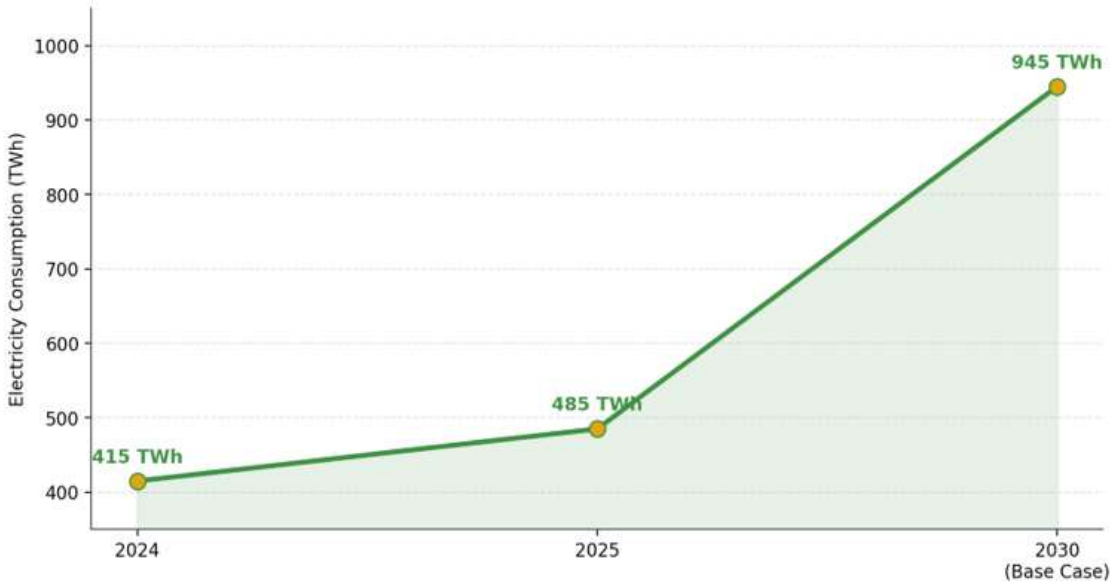

Figure 1.3: Global Data Centre Electricity Consumption, Actual and Projected

Source: International Energy Agency (IEA), *Energy and AI (2025)* and *Key Questions on Energy and AI (2026).*

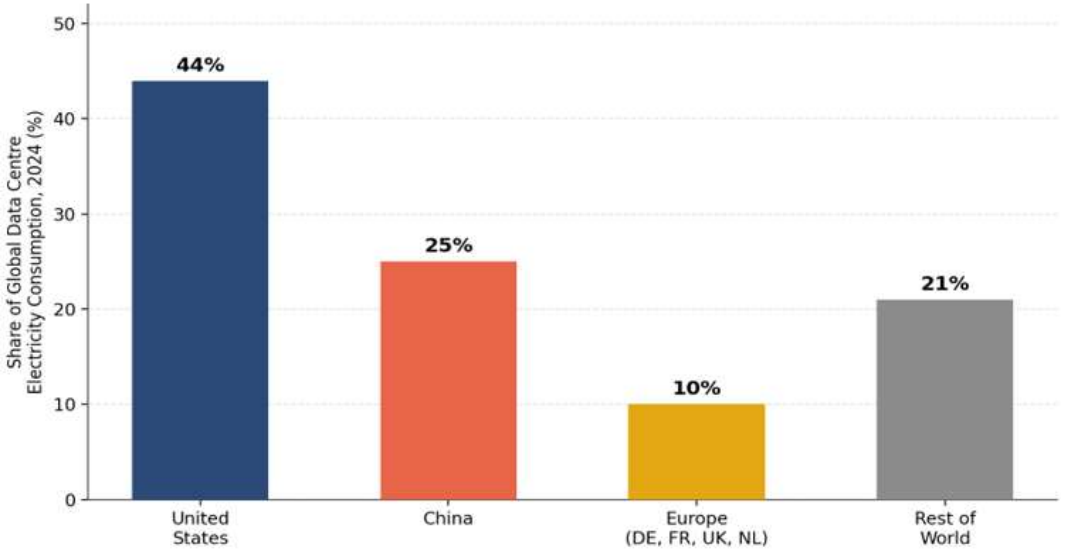

Figure 1.4: Geographic Concentration of Global Data Centre Electricity Consumption, 2024

Source: IEA Data Centre Estimates, as compiled by Incorrys Analysis (2025); total global consumption = 415 TWh in 2024.

This growth in demand is placed heavily geographically. The USA was responsible for around 44 per cent (180 TWh) and China for 25 per cent (102 TWh) of the estimated global data-centre electricity consumption in 2024, with the four major economies of Europe (Germany, France, the United Kingdom and the Netherlands) accounting for a further 10 per cent (41 TWh). The geographic concentration is shown in figure 1.4. The IEA also states that the energy consumption of newer, energy-intensive uses of AI, including those involving video generation and agentic reasoning tasks, can range from hundreds to thousands times greater than for text generation, indicating that the type of AI workloads, rather than just the quantity, will be a real driver of future energy use. This creates a real dilemma for companies setting AI as a sustainability enabler: only 38 per cent of executives are even aware of the environmental impacts of the generative AI their company uses, according to the findings mentioned in, and only between about one in eight and one in five (depending on the survey wave) measure the impact. In a separate report, Capgemini found 47 per cent of organisations which adopted generative AI for the majority or all of their processes have had to reassess their initial environmental goals due to the impact of the technology.

5. AI-Driven Environmental Intelligence and Sustainable Marketing

Another piece of the evidence is related to the "commercial return" of credible 'sustainability positioning,' which is the business justification to investing in sustainability-related AI-driven environmental intelligence to begin with. The study's findings, which examined five years of United States retail sales data (2017 to mid-2022) for 600,000 product SKUs from 44,000 brands across 32 food, beverage, personal-care, and household product categories, revealed a 28 per cent cumulative sales increase for products with environmental, social, and governance (ESG)-related claims compared with 20 per cent for products without such claims, a disparity of approximately 170 basis points of annual sales growth. The 56 per cent of the total category growth was driven by products with ESG related claims, which happened to be a higher share than they represented in the market at the outset. Separately, consumer research by NielsenIQ revealed that 78 per cent of the United States consumers feel that a sustainable lifestyle is important to them, while a previous consumer survey undertaken by McKinsey revealed that more than 60 per cent were willing to pay a higher price for a product packaged in sustainable materials (Zhou & Jiang, 2025; Sohaib et al., 2025).

Table 1.3: Market and Consumer Response to Sustainability-Linked Products and AI-Enabled Sustainability Solutions

Indicator	Value
Cumulative sales growth - products with ESG-related claims	28%
Cumulative sales growth - products without ESG-related claims	20%
Share of category sales growth from ESG-claim products	56%
US consumers stating sustainable lifestyle is important to them	78%
Consumers willing to pay more for sustainably packaged products	>60%
Global AI-in-Environmental-Sustainability market size	US$15.49 bn (2024) → US$53.90 bn (2031)
Global AI-in-ESG-and-Sustainability market size	US$1.24 bn (2024) → US$14.87 bn (2034)

Source: McKinsey & Company and NielsenIQ, 'Consumers Care About Sustainability - and Back It Up With Their Wallets' (2023); The Insight Partners, AI in Environmental Sustainability Market report (2024); Market.us, AI in ESG and Sustainability Market report (2025).

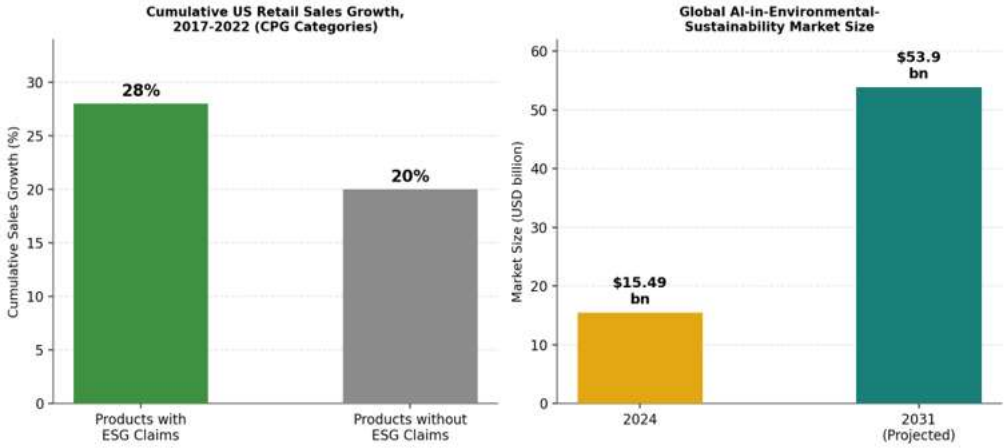

Figure 1.5: Market Validation - Sustainability Sells, and So Does AI for Sustainability

Source: McKinsey & NielsenIQ, *Consumers Care About Sustainability (2023); The Insight Partners, *AI in Environmental Sustainability Market Report (2024).*

The parallel and fast expansion of the market for AI-powered environmental-sustainability solutions provides a solid foundation for understanding the technology layer that lies behind data collection, emissions measurement and impact verification - the cornerstone of credible sustainability marketing claims. Industry estimates of the size and scope of the market for AI in environmental sustainability also vary a little by methodology and scope, but are directionally consistent: The Insight Partners valued the global market for AI in environmental sustainability at approximately USD 15.49 billion in 2024 and estimate it will reach USD 53.90 billion by 2031 at a CAGR of 19.5 per cent; meanwhile, Market.us estimated the global market for AI in ESG and sustainability reporting at USD 1.24 billion in 2024, up to USD 14.87 billion by 2034 at a CAGR of 28.2 per cent. The consumer facing and market facing evidence are collated in Table 1.3 and Figure 1.5.

Based on the evidence presented above, this study proposes that AI-driven environmental intelligence is the systematic use of AI techniques, such as machine learning, computer vision, natural language processing and generative AI, in the collection, analysis, verification and communication of environmental data (emissions, energy and resource utilization, impact on the supply chain and climate risk) to support two closely related organisational functions: sustainable business decision-making (operational efficiency, regulatory compliance and ESG reporting) and sustainable marketing (the substantiation and communication of environmental claims to customers and others). The concept is deliberately designed to cover both sides of the paradox it is meant to solve: AI-based environmental intelligence can help bolster the credibility and accuracy of sustainability statements, including the danger of "greenwashing", which occurs when sustainability claims are not independent and reliable; and at the same time, the use of AI has a footprint, in that the technology itself requires electricity and water. AI usage should not be considered a one-off sustainability benefit, but rather the answer to questions and trends that explore what the demand-side evidence of AI environmental intelligence solutions to sustainable business and marketing claims might look like, and what the supply-side reality of the environmental cost of generating that evidence might look like.

6. Discussion

The results show that AI-based environmental intelligence can enhance environmental monitoring, resource utilization, environmental reporting, environmental innovation, and sustainable business decisions (Sipola et al., 2023; Zhai & Huang, 2025; Guo et al., 2025). However, its effectiveness relies on institutional adaptability, the skills of employees, organisational innovation and collaboration between firms and knowledge institutions (Rammer et al., 2022, Hussain et al., 2024, Torrent-Sellens et al., 2025, Xia et al., 2025, Bergougui, 2026). Moreover, AI can aid in the measurement and cost reduction of carbon, especially with green innovation and proper environmental-management systems (Chen & Jin, 2023; Gaur et al., 2023; Tseng & Lin, 2024). However, its effects can be negative as growing computational needs, automation systems, and energy-intensive data centers can lead to higher electricity demand and environmental strain (Liu et al., 2024; Liu, Wang, & Song, 2025). In marketing, AI-generated environmental information can boost consumer interest and their purchase intentions in the context of transparency, credibility, and the presence of verifiable evidence (Zhou & Jiang, 2025; Sohaib et al., 2025). Thus, AI-enabled environmental intelligence can only provide sustainable competitive advantage if firms take into account both the operational and marketing advantages, as well as the energy

consumption, emissions, governance frameworks, and greenwashing risks associated with this technology.

7. Conclusion

This paper analysed the secondary evidence, which showed that AI-powered environmental intelligence holds significant potential to enhance sustainable business decision-making and marketing efforts by refining the collection of environmental data, the assessment of emissions, optimising resource usage, driving green innovation, reporting environmental, social and governance (ESG) metrics and verifying sustainability claims. It is supported by the fact that consumers are responsive to credible sustainability linked products and the market for environmentally friendly products with AI is growing rapidly. However, the benefits of AI for the environment are not guaranteed, as the rising electricity and water consumption of data centres, varying awareness of organisations, underdeveloped metrics for the environmental impact of generative AI, and potential for false AI-driven environmental claims, put AI use on the horizon of high operational and reputational risk. The central implication is that AI can support firms' environmental performance and sustainable competitive advantage only if they account for its total environmental footprint, choose energy efficient applications, exercise human and institutional control, acknowledge methodological drawbacks and limitations, communicate openly about their products, and provide evidence of their products' function from their operation. A responsible strategy should combine technological capacity with environmental governance, ensuring that the intelligence resulting from the AI delivers positive outcomes for sustainability not just in terms of sustainable stories.

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