I Care by BearingPoint

Artificial Intelligence & Environment:

How to reconcile AI and CSR within organizations?

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Because our **impact** matters

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1 Introduction

Artificial Intelligence (AI) is becoming more and more integrated into everyday life, with nearly 40% of French people using Generative Artificial Intelligence tools, three-quarters of them on a weekly basis[1]. The very rapid adoption of these tools by the population has been facilitated by their accessibility, free availability, and the wide range of generative AI offerings. It is now a tool integrated into many everyday uses, such as social networks that distribute AI-generated content or even those dedicated to these formats.

This integration of AI-assisted functionalities into digital services (social networks, professional tools, software, etc.) is also found within companies and organizations. The deployment of AI agents is now accelerating the massification of its use. Its emphasis in tools (notification, interruption of journeys, etc.) associated with a graphic universe symbolic of magic and innovation[2] make it one of the most proactively advanced technologies, which reinforces this increase in uses.

The environmental and social impact of AI is proven and is driven by the dual trend of increasingly intense and increasingly frequent use. At a time when organizations need to reduce their environmental footprint, the race to develop AI use cases can undermine these efforts. Aligning sustainable transition and digital transformation is complicated by the lack of transparency surrounding this technology, its rapid development and evolution, and the absence of operational standards. However, companies can take action now to systematically integrate environmental issues into this development.

In this expert opinion, I Care by BearingPoint looks at the main environmental impacts of AI, and offers solutions to assess these impacts and take operational action to reduce them within organizations.

AI CONTRIBUTES DIRECTLY TO THE EVOLUTION OF THE ENVIRONMENTAL IMPACTS OF DIGITAL TECHNOLOGY AND INDIRECTLY TO THAT OF OTHER SECTORS

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In 2022, **before the arrival of generative AI for the general public, digital technology already accounted for nearly 3.5% of global greenhouse gas emissions**[3] and was growing at an alarming rate of more than 6% per year[4]. Although the sector has set a target of a 45% reduction by 2030 compared to 2020[5], the trend did not seem to be heading in that direction. The massive democratization of AI that began in 2022 was a turning point and launched an "AI race", further challenging the industry's goals of reducing impacts.

The rapid increase in AI offerings requires the construction of a large number of specific pieces of equipment such as neural network acceleration chips or specialized GPUs, and relies on the construction or reconstruction of many data centers. These projects require a rapid energy supply, sometimes based on fossil fuel production methods[6].

The Shift Project estimates that data center energy consumption increased by 7%/year between 2014 and 20197, and by 13% per year between 2019 and 2024. **GHG emissions from the data center sector could be multiplied by 2.5 in 2030 compared to 2020.**

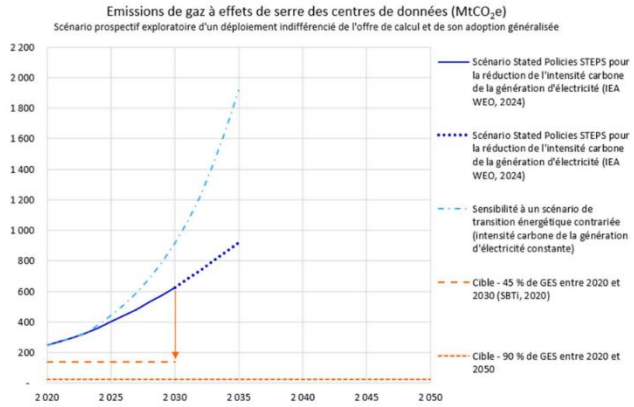

Figure 1 : Prospective Scenario of the Evolution of GHG Emissions from Data Centers, The Shift Project Microsoft Word - RF PIA

These environmental impacts are often put in the light of AI applications in a logic of balance between impacts and benefits. Use cases of AI for the SDGs and the environmental transition (AI for Green) existed before the Generative AI boom (e.g. satellite detection of GHG emissions, marine coral monitoring, fire monitoring, etc.) and others will most likely be developed. But these use cases hide the variety of

frameworks for using AI, some of which have proven negative environmental impacts:

- Replacing existing uses by an AI solution, such as the replacement of traditional search engines with LLMs, increases their impact.
- New uses are emerging that add environmental impacts to the digital sector, for example the generation of images and videos whose environmental impact is much greater than the generation of text[8].
- Finally, AI is a vector of acceleration for activities that are already highly impactful, and therefore reinforces environmental degradation, for example through oil extraction.[9]

Within organizations, generative AI disrupts processes, sometimes with the aim of reducing environmental impacts. However, the lack of questioning and evaluation of the net benefits and the direct and indirect impacts of these transformations leads to a high risk of rebound effect and an overall increase in environmental impacts.

In view of these challenges, it is essential for organizations to measure the impacts of their use of AI, to arbitrate on the use cases to be deployed and to question the design and use methods to meet their environmental commitments.

DESPITE THE LIMITATIONS TO MEASURING AND UNDERSTANDING THE ENVIRONMENTAL IMPACT OF AI, ORGANIZATIONS CAN TAKE A RESPONSIBLE AND OPERATIONAL APPROACH

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1. Given the lack of standards and transparency on the environmental impact of AI, organizations must measure the impact of their uses in line with the stakes of this measurement and the available data or hypotheses

Open AI, Mistral and Google have all shared metrics regarding the energy, water and CO2 consumption of their models. Although hailed as a first step towards greater transparency, these results are difficult to use, and even less comparable due to differences in indicators, scopes, methods, and, overall, a lack of transparency.

	Methodology	Type of query ?	Answer length ?	Energy/ query	Water/ query	CO_2e/query
OpenAI	Not provided	Not provided	Not provided	0.34 Wh	0.32176 mL	Not provided
Mistral	LCA	Text only	400 tokens	Not provided	45 mL	1.14 g
Google	Custom	Text only	Not provided	0.24 Wh	0.26 mL	0.03 g

Figure 2 : Comparison of the characteristics of results published by OpenAI, Mistral and Google, Sasha Lucionni What kind of environmental impacts are AI companies disclosing? (And can we compare them?)

Faced with this lack of standardization and transparency, Life Cycle Assessment (LCA) remains the best standard for organizations in measuring the environmental impacts of AI solutions. However, this is a costly approach in terms of time and resources. To ensure operational measurement, i.e. at a cost adapted to the stakes, and regular, it is essential to align the modelling methodology with the objectives and the level of availability of reliable data or assumptions.

Need	Objective of the measure	Method and tools
Raising employee awareness of the use of AI	Provide **orders of magnitude** of the impact of use and guide on **good practices** to be implemented	• Evaluation of different use cases according to the same methodology • Making conservative assumptions • Sensitivity analyses and transparent communication
Comparison of models for integrated use	Identify the **AI model** and **the conditions of use** to meet the need with a controlled impact.	• Definition of impact indicators allowing arbitration with regard to other criteria (e.g. performance, cost) • Comparison of models on the same methodological basis, with a critical look at publishers' announcements • Analysis of the functional characteristics of models (model size, hosting mode, etc.) with regard to their potential impact
Assessing the **net benefits** of a solution	Compare the environmental impacts of **several scenarios** and identify the **conditions for environmental profitability**.	• Qualitative analysis of direct and indirect impacts, including rebound effects to define comparison scenarios • Iterative evaluation of scenarios to obtain a degree of precision that allows us to conclude whether or not they are profitable • Definition of the conditions of use to ensure an environmental benefit

Table 1: Example of differences in needs, objectives and modelling methods

Mastery of environmental impact assessment by organizations and transparency in the assumptions made and key factors enable companies to make informed decisions about how to deploy and design AI in their processes.

Assessing the environmental impacts of AI will allow organizations to identify more and more levers to reduce them. However, some reduction levers are already known and can be implemented.

2. Despite uncertainties about the impact of AI, designers of AI or AI-based solutions can already work on known impact factors

Due to the rapid development of AI through numerous studies and actors, knowledge of the key factors and levers for reducing the environmental impacts of AI is continuously developing. It is essential that designers and users work to control their impact without waiting for a complete and in-depth knowledge of the mechanisms involved. In particular, some AI impact factors are already recognized and can be addressed by the different actors in the value chain.

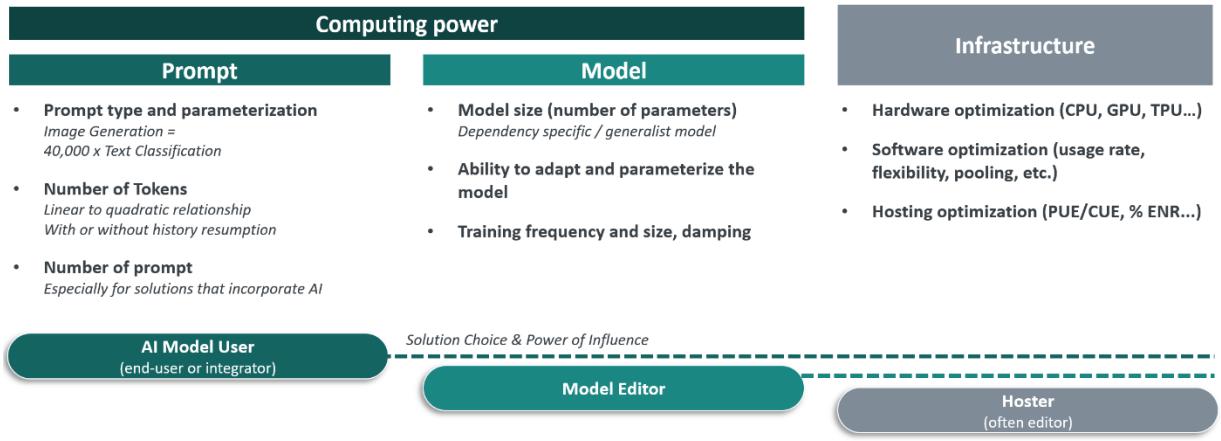

Figure 3 : Key impact factors to consider in the development, choice and use of AI

The computing power required in a use case is first of all correlated with the number and complexity of the queries involved. It is the responsibility of the model editor or integrator to implement frameworks and usage features that minimize these parameters. This responsibility is particularly key in the context of embedded or agentic/multi-agent AIs for which the user does not have control over the intermediate interactions or requests that will be carried out at his request or automatically. It is also proven that generation operations are more impactful than simpler operations such as classification or extraction. Finally, the number of tokens provided as input and received as output are also decisive elements on the impact and must be reduced, even if their influence is still poorly estimated (linear or quadratic relationship, procedures for reusing the history of a conversation, etc.).

Regarding the model used, eco-design actions are in the hands of the model editor, but the integrator is responsible for choosing between several models available on the market. The scientific literature and tools agree on the direct link between the environmental impact and the number of parameters of the model[10],

particularly higher for generalist models. Practices of simplifying generalist models (Adapters, Low-Rank Adaptation, Prefix-Tuning) or dynamic activation (Mixture of Experts) should be valued, but their benefit is complex to evaluate without transparency from the editor. The frequency and volumes of re-training data are also a key factor to consider that should be weighed against the amortizement of these training on inferences. In the context of refinement or retrieval-augmented generation (RAG), the integrator becomes directly responsible for the impacts and optimization of these drives.

Finally, the infrastructure in which AI is hosted must also be considered. The location of the servers, whether of the model editor, or of the organization itself if the AI is hosted internally, is a key element of impact related to the carbon intensity of the local energy mix . The efficiency of infrastructure, among other things characterized by Power Usage Efficiency (PUE), is also decisive in the impact of AI.

Given the large number of levers for action and questions to be addressed in the development and deployment of AI use cases, it is essential that companies implement an operational and systemic approach to eco-design.

3. Given the rapid development of AI use cases, organizations must integrate eco-design into their processes

To integrate environmental constraints, it is essential that they are considered in the same way as the other issues framing digital developments (quality of service, costs, development time, cybersecurity, etc.). This integration must take place at each phase of development.

First, upstream of the integration of an AI solution, by questioning the need and purpose of the project, its usefulness and the environmental costs and benefits. Questioning use cases in terms of their direct and indirect effects should make it possible to prioritize the portfolio of use cases, to decide whether or not to deploy these cases, and to define their framework of use.

When designing the solution, the reduction levers presented above must be the subject of formal trade-offs against the other criteria. Eco-design is not an additional step in a digital project but a consideration of environmental issues in every design choice.

Once the solution has been deployed, the solution integrator is responsible for its use within the framework defined upstream of the project, in order to limit its impacts through good use practices, and to control indirect rebound effects.

To be effective, eco-design must be operational, which involves:

- Raising awareness of these issues among project stakeholders, and advanced training for certain key roles (project managers, PMs, OPs in particular).
- The implementation of qualitative and quantitative eco-design indicators and criteria, beyond any environmental indicators, to operationalize efforts and facilitate trade-offs
- The integration of questionings into the processes and in the project comitology: deliverables for the framing of the use case, criteria for defining done, code reviews, etc.

More detailed eco-design measures are proposed by the General Standard for the Ecodesign of Digital Services[11] and the General Standard for Frugal Artificial Intelligence[12]. Their application in the operational framework of organizations is key to ensuring their effective deployment.

It is by integrating eco-design into existing processes that organizations will be able to control and reduce the environmental impact of their use of AI. This approach also brings co-benefits for organizations.

BEYOND THE ENVIRONMENTAL IMPACTS, INTEGRATING AN ECO-DESIGN APPROACH REDUCES RISKS IN TERMS OF RESILIENCE AND SOCIAL IMPACT.

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Digital technology, and AI in particular, are sectors based on a globalized value chain with many points of sensitivity, **questioning the resilience of organizations** based on these technologies.

Digital equipment and infrastructure supporting AI is based on **metals** whose complex value chain is subject to **geopolitical and social tensions**, **physical and transition risks**, and **physical limitations** on resource availability.

Rwanda accounts for 60% of the world's production of tantalum, a key material in the digital sector, while the country is one of the most vulnerable to climate change.

Similarly, the deployment of new data centers to meet the growing need for computing power also comes up against **problems of availability** of water, energy and land resources, including in Europe. Any organization that increases its reliance on AI through its integration into its activities, increases its sensitivity to these risks;

Water: Several countries in Europe have already identified public pressure against data center water consumption, such as Spain, Denmark and Ireland.

Energy: projects to connect to data center networks in France currently under negotiation or signed represent 12 GW[13] of capacity, or 20% of the electrical power of the French nuclear fleet[14]

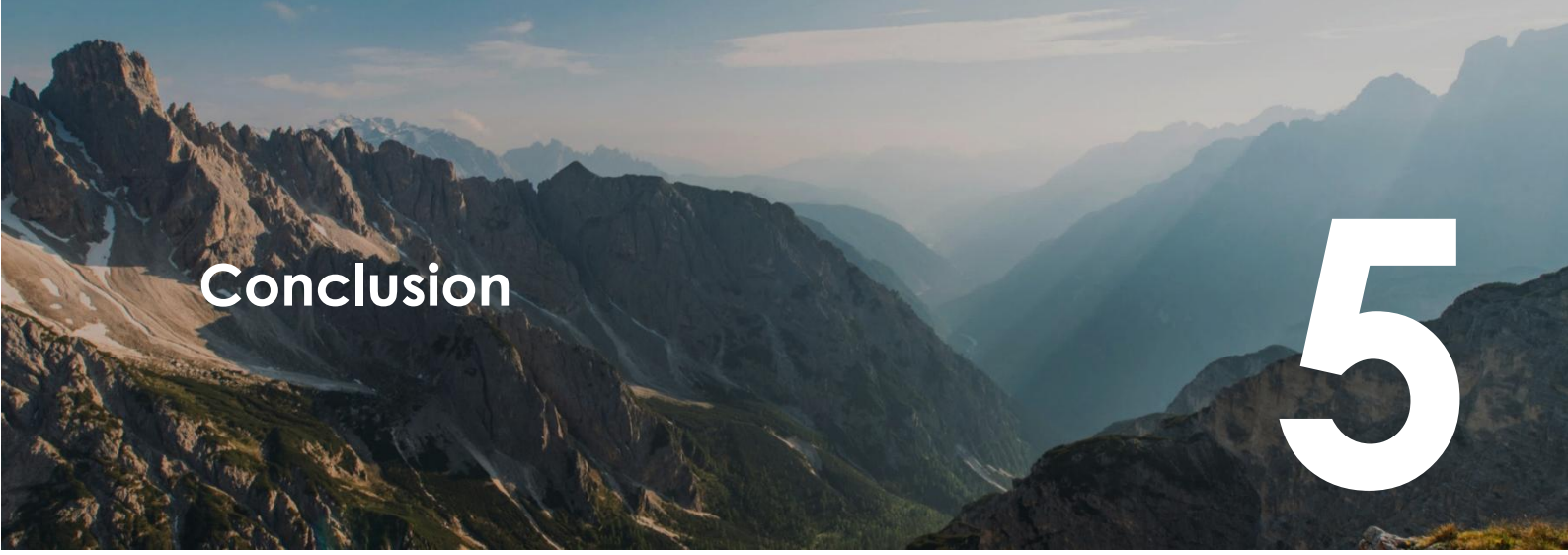
Land: In Île-de-France, Marseille and Rennes, data center projects are questioned or even refused for reasons of land under tension[15]

On AI solutions themselves, the strong presence of GAFAM raises questions about the **increased dependence of organizations on these players**. In addition, the question of the non-profitability of AI and the potential existence of an AI bubble should prompt organizations to **question the costs** of their use in the medium term.

Bank of America's October 2025 monthly survey shows that an "AI bubble" is now seen as the top tail risk to financial markets.[16]

Finally, the social footprint of AI is also alarming. It manifests itself through the social impacts on the digital manufacturing chain (child labour in mines, pollution and health risks), but also in professions reinforced by AI such as click workers, a cheap workforce in developing countries. By increasing their use of this value chain, organizations increase their exposure to the social issues it raises.

Faced with the risks of dependence on a sensitive, complex value chain with strong social impacts, organizations can see eco-design as a way to understand the associated risks and increase their resilience.



Conclusion

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The launch of a large number of Artificial Intelligence solutions on the market and their rapid evolution is now resulting in a race to deploy AI in organizations. In view of the environmental and social impacts and resilience issues raised by this technology, it is essential to take a step back and question the methods and frameworks of deployment.

While more transparency from the sector's players and the definition of standards would facilitate these considerations, organizations can then put in place eco-design practices and usage frameworks to limit their impacts. These practices must be operationalized in existing processes in order to allow effective trade-offs in the choices of deployment, design and use.

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ABOUT

I Care by BearingPoint, a leader in impact transformation, is BearingPoint's sustainability center of expertise.

From strategy to implementation, I Care's experts provide concrete and innovative transition solutions to companies, financial institutions and public organizations.

The ambition of I Care is twofold: to offer technical expertise on issues of environment, climate, biodiversity, social impact, circular economy and sustainable finance; and combine this expertise with transformational know-how to engage its clients in the evolution of their work and business models.

Because our **impact** matters

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