

Arcep's response to the European Commission's public consultation on the Strategic Roadmap for digitalisation and AI in the energy sector¹

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Artificial Intelligence (AI) offers significant economic and social opportunities. In the energy sector, while AI can be harnessed to benefit the European energy system, particularly for optimising its management and contributing to the decarbonisation of production means by promoting better integration of renewable energies, its development is accompanied by a number of questions about its own sustainability and challenges that need to be addressed. Arcep (the French regulatory authority for electronic communications, postal and print media distribution) wishes to highlight the importance of limiting the environmental impacts – in particular in terms of energy consumption – of artificial intelligence.

Several levers of action could be mobilised to address these issues and, in particular, within the context of the strategic roadmap for digitalisation and AI in the energy sector. The reduction of energy capacities required, thanks to the efficiency and sobriety of AI models, could also offer a competitive advantage to developed AI solutions and contribute to a greater EU sovereignty.

The fast development of AI goes hand in hand with an extremely rapid growth in the electricity consumption of data centres

There is consensus that electricity consumption linked to data centres will increase significantly in the coming years, driven in particular by the rise of AI. The International Energy Agency (IEA) showed in its latest report that global electricity consumption by data centres was 415 TWh in 2024, representing 1.5% of global electricity consumption². It estimates that global electricity consumption by data centres could more than double by 2030 to reach 945 TWh, mainly due to the growth of AI. This rapid development could therefore have an upward influence on energy prices, contradicting the European Commission's orientations on the need to reduce them³. Furthermore, at European level, the massive electrification of certain sectors such as transportation calls for anticipating the risks of conflicts of use with digital technology, whose electricity consumption is increasing, particularly due to AI, in order to avoid potentially undermining decarbonisation targets.

It is therefore necessary to anticipate the sustainable integration of data centres into the electricity system and the pressure they may exert on it. In this regard, the flexibility that data centres could provide to the electricity system is an example of an innovative service that remains, to date, largely untapped. The inclusion of demand-side flexibility in the European Commission's objectives, as outlined in its call for contributions, is therefore to be welcomed.

¹ Please note that this is a translation of the official version of Arcep's response, written in French and available on its website.

² IEA, [Energy and AI](#), p63, 2025

³ 2024-2029 political orientations of the European Commission.

The lack of transparency of AI models regarding their energy and resource consumption

The overall environmental impact of AI is still poorly assessed across the entire life cycle⁴ (from mineral extraction to end-of-life components), which hinders the monitoring and anticipation of these impacts.

Currently, there is little precise and reliable data on energy consumption and, more broadly, on the environmental footprint of models and their use, due to a lack of transparency from major players across the entire life cycle and various indicators. Of 754 models analysed, deployed between 2010 and the first quarter of 2025, 84% do not publish any environmental information related to these models, 14% do so indirectly (e.g., data on model training or size), and only 2% do so directly (e.g., energy consumption or carbon intensity measurements) as of May 2025⁵. While the available data remains fragmented, the results of existing studies, such as those by the IEA, demonstrate the importance of the issue.

Furthermore, these environmental impacts of AI already appear difficult to control. Major players such as Google and Microsoft acknowledged in 2024⁶ that their stated goal of carbon neutrality by 2030 had become unreachable due to the development of generative AI. This situation calls for rapid action across the entire ecosystem, particularly on major players, to reduce the energy impact and, more broadly, the environmental impact of AI, without waiting for all the data to be available.

Furthermore, the environmental impact of AI is not limited to energy: water consumption and the depletion of metals and rare earths used in server manufacturing are also issues that Europe must consider. In particular, limiting metal consumption also contributes to addressing the issue of European sovereignty in an uncertain geopolitical context. Indeed, Europe remains highly dependent on imports of some of these critical resources.

Solutions exist to minimise the energy impact of AI

Investigating: make the right diagnoses and anticipate the environmental risks associated with the growth in AI use

In order to establish a clear picture that allows the most relevant actions to be identified, **it is necessary to rely on robust and reliable methodologies and to improve the environmental transparency of AI models, particularly generative AI, throughout their entire life cycle.** In particular, **Article 40 of the AI Act⁷, which deals with standardisation, could be used to develop a common methodology.** In its recently published “Apply AI Strategy”, the European Commission announced the forthcoming adoption of a standardisation request, addressed to standardisation bodies, concerning common reporting and documentation processes relating to the impact of AI systems and general-purpose

⁴ Ligozat et al, “Unraveling the Hidden Environmental Impacts of AI Solutions for Environment Life Cycle Assessment of AI Solutions”, Sustainability, 14, pp. 51-72., 2022.

⁵ Luccioni A.-S, Gamazaychikov B. Alves Da Costa T. Strubell E., “Misinformation by Omission: The Need for More Environmental Transparency in AI”, 2025

⁶ [Technology Magazine, février 2025](#) ; [The Guardian, septembre 2024](#) ; [Forbes, juillet 2024](#) ; [Novethic, mai 2024](#).

⁷ Excerpt from Article 40 of the AI Act on harmonised standards and standardisation deliverables: “*The standardisation request shall also ask for deliverables on reporting and documentation processes to improve AI systems’ resource performance, such as reducing the high-risk AI system’s consumption of energy and of other resources during its lifecycle, and on the energy-efficient development of general-purpose AI models.*”

models on energy consumption⁸. This is a positive initiative that should be pursued and could include standards on principles and a common framework for measuring the environmental impact of AI systems. This work could, for example, draw on the General Reference Framework for Frugal AI⁹, which provides guidelines for a methodology based in particular on Life Cycle Assessment (LCA) to enable quantitative evaluation. A transparency requirement for the largest providers based on such a common methodology would thus enable comparability between models.

Arcep has been collecting environmental data for several years to track the environmental footprint of digital players in France. This data collection and measurement work, which is consistent with European legislation¹⁰, would benefit from being developed by other Member States. To this end, **consideration could be given to entrust national regulatory authorities (NRAs) with a legal mandate to collect environmental data in order to assess national specificities, in particular to monitor the electricity consumption of data centres, especially the share related to AI.**

Better addressing the electricity consumption needs of data centres

Electrification is one of the key factors in the success of European policies aimed at achieving the twin objectives of decarbonisation and reindustrialisation. It seems therefore essential to anticipate potential conflicts over the use of electricity resources through careful planning of the development of AI and the data centres that will support it in Europe. Indeed, the development of AI may compete with the electrification of other uses.

In addition, the European Union must ensure that it monitors the efficient use of resources (particularly electricity and water) by data centres. In this regard, Arcep welcomes the work carried out in this area with the revision of the Energy Efficiency Directive and the European Commission's Delegated Regulation (EU) 2024/1364¹¹. The analyses that can be performed using the data collected from data centres can help to achieve this objective of monitoring data centre electricity consumption.

Integrating environmental criteria into the design of AI services

Promoting eco-design requirements in artificial intelligence services could already help minimise the environmental impacts associated with its rapid development, complementing the levers for action on the infrastructure that supports and provides these services.

In this respect, the efficiency and sobriety of the models could offer a competitive advantage to the solutions developed, particularly by reducing the energy capacities they require. This could also be a differentiating factor for more virtuous players, especially European ones. To be at the forefront of more sustainable AI models (e.g., through energy efficiency or optimised use of resources) will allow to play a leading role on the global stage while reducing dependence on unsustainable supply chains and promoting European strategic autonomy¹². It is already possible to build on existing initiatives to develop more virtuous models, such as the General Reference Framework for the Eco-design of Digital

⁸ European Commission, « Apply AI Strategy », COM(2025) 723 final, 08/10/2025, Bruxelles, p.9, [Appliquer la stratégie en matière d'IA | Bâtir l'avenir numérique de l'Europe](#)

⁹ General framework for frugal AI - An AFNOR SPEC to measure and reduce the environmental impact of AI AFNOR SPEC 2314, juin 2024, [AFNOR Spec AFNOR SPEC 2314](#).

¹⁰ Such as the European Commission's Delegated Regulation (EU) 2024/1364 on data centres, for which Arcep was asked to contribute during consultative workshops due to its experience in collecting environmental data on data centres.

¹¹ [Delegated Regulation \(EU\) 2024/1364](#).

¹² See Arcep's response to the European Commission's public consultation 'Future of Cloud and AI Policies in the EU' of July 2025, https://www.arcep.fr/uploads/tx_gspublication/reponse-consultation-CE_Future-cloud-and-AI-policies-in-the-EU_july2025.pdf

Services (RGESN), which includes an Algorithmic component¹³, or the General Reference Framework for Frugal AI¹⁴.

Adapting AI tools and models to needs and use

Promoting the adoption of AI tools and models that are tailored and specialised to the needs they address could reduce the impact during the training and inference phases. The design and development of an AI service or model would also benefit from being objectified in relation to the needs they meet.

Ahead of the AI Action Summit in Paris in February 2025, the French National Institute for Research in Digital Science and Technology (Inria) published a white paper, one of whose main recommendations is to favour specialised models over generalist models. According to the research organisation, when a technology emerges, generalist tools tend to be favoured. However, specific models could be capable of reconciling environmental protection and innovation¹⁵.

Integrating decarbonisation challenges into public policies for AI development

Last but not least, from a public policy perspective, taking into account the environmental challenges associated with AI would make it possible to reconcile decarbonisation objectives with those related to competitiveness, defined as the first and second pillars of the European Union's competitiveness compass.

In particular, it would be relevant to integrate the environmental issues related to AI in the data center deployment strategies. This reflection must be carried out at various levels (European and national strategies, local acceptability, etc.).

At the same time, environmental issues must be integrated into policies supporting AI innovation, both at national and European level. To this end, several solutions can be considered to achieve this, such as requiring systematic assessment based on a harmonised methodology shared across the EU, and taking environmental issues into account in the overall assessment of projects.

Developing a data-sharing infrastructure to promote innovation in the energy sector

The digitalisation of the energy sector is a powerful driver of innovation, particularly in terms of network and production management and the integration of renewable energies. Energy-related data is at the heart of these transformations, as in many other sectors. For example, real-time electricity production and consumption data, combined with weather forecasts, electricity market prices and network status, as well as consumer and business preferences, with the necessary precautions regarding data confidentiality, could enable not only fine-tuned management of production, but also of consumption, in order to develop the flexibility of electricity system networks. As such, in order to

¹³ See section 9 (pp. 122–130) of the General Policy Framework for the Eco-design of Digital Services, which is available in [French](#) et [English](#). It was produced by Arcep and Arcom, in connection with ADEME and with the collaboration of DINUM, CNIL and Inria.

¹⁴ General framework for frugal AI - An AFNOR SPEC to measure and reduce the environmental impact of AI AFNOR SPEC 2314, juin 2024, [AFNOR Spec AFNOR SPEC 2314](#).

¹⁵ Varoquaux G., Luccioni S., Whittaker M., "Hype, Sustainability, and the Price of the Bigger-is-Better Paradigm in AI", 2024 ; The Shift Project, Intelligence artificielle, données, calculs : quelles infrastructures dans un monde décarboné ?, 1^{er} octobre 2025.

foster innovation and improve the effectiveness of public policies through data as part of its data strategy, the European Commission plans to support the development of European data spaces in several areas, including energy.

In this context, the development of a data-sharing infrastructure and associated data governance, bringing together multiple industrial and public partners within the Common European Energy Data Space, is a desirable prospect for Arcep. With this in mind, calling on neutral third parties such as data intermediation service providers¹⁶ could help to establish a framework of trust and ensure the development of such a data space.

¹⁶ This status, established by the European Data Governance Act (DGA), is dedicated to actors who organise connections between data holders and users and imposes obligations of diligence and commercial neutrality with regard to the data exchanged. Recital 26 of the DGA particularly encourages the use of these service providers in the context of European data spaces.