Redrawing the not-so-pretty energy footprint of AI

The Hindu 06.05.2025

Generative Artificial Intelligence (AI) has undoubtedly eased access to art and reduced the time and the effort required to complete certain tasks. For example, ChatGPT-4o can generate a Studio Ghibli-inspired portrait in seconds with just a prompt. But this ease comes at a significant energy cost that is often overlooked – one that has even led to Graphic Processing Units (GPUs) melting. As AI tools advance, this environmental impact will continue to become more detrimental, making this an unsustainable technology. How can AI be developed sustainably? And can leveraging nuclear energy, specifically Small Modular Reactors (SMR), be a possible alternative?

AI is not free. Every time one uses ChatGPT or any other AI tool, somewhere in the world, there is a data centre chugging electricity, much of which is generated from fossil fuels. "It's super fun seeing people love images in ChatGPT, but our GPUs are melting," tweeted Sam Altman, CEO of OpenAI. Projections indicate that these data centres could account for 10% of the world's total electricity usage by 2030. Though these estimates mirror worldwide energy trends, it is necessary to highlight that India currently has sufficient capacity to generate electricity for its own domestic AI needs. Yet, with increasing adoption and ambitions, proactive planning is imperative.

Training an AI model, whether it is a conversational tool such as ChatGPT or an image-generator tool such as Midjourney, can generate the same amount of CO_2 as five cars running continuously across their life. Once deployed, AI tools continue to draw immense power from data centres as they serve countless users around the globe. This resource consumption is staggering, and it is becoming more unsustainable as AI adoption grows.

To start with, AI companies need to be transparent about their energy consumption. Just as some regulations mandate the disclosure of privacy practices surrounding data usage, companies must also be mandated to disclose their environmental impact – first, how much energy is being consumed? Second, where is it coming from? Third, what steps are being taken to minimise energy consumption? Such data would provide further insights on where energy is being used the most and encourage research and development to create a more sustainable model of AI development.

Anwesha Sen

is with The Takshashila Institution

Sourav Mannaraprayil

is with The Takshashila Institution

Small modular nuclear reactors could be the energy answer to support booming AI and data infrastructure

Advantages of SMRs

Another, perhaps controversial, solution would be to address the energy source behind all of this technological growth. It is time nuclear energy, particularly SMRs, is discussed seriously. While this is often a subject of heated debate, it is also a powerful potential solution to the energy demands created by AI and other emerging technologies. The AI boom is happening fast, and the current energy infrastructure will just not be able to keep up.

SMRs present a transformative opportunity for the global energy landscape to support booming AI and data infrastructure. Unlike traditional large-scale nuclear power plants that demand extensive land, water, and infrastructure, SMRs are designed to be compact and scalable. This flexibility allows them to be deployed closer to high-energy-demand facilities, such as data centres, which require consistent and reliable power to manage vast amounts of computational workloads. Their ability to provide 24X7, zero-carbon, baseload electricity makes them an ideal alternative to renewable sources such as solar and wind by ensuring a stable energy supply regardless of weather conditions.

The benefits of SMRs extend beyond just energy reliability. Their modular construction reduces construction time and costs when compared to conventional nuclear plants, enabling faster deployment to meet the rapidly growing demands of AI and data-driven industries. Additionally, SMRs offer enhanced safety features, with passive safety systems that rely on natural phenomena to cool the reactor core and safely shut down, reducing the risk of accidents. This makes them more acceptable and easier to integrate into regions where large-scale nuclear facilities would face opposition. The ability of SMR to operate in diverse environments, from urban areas to remote locations, also supports the decentralisation of energy production, reducing transmission losses and enhancing grid resilience.

Some of the challenges

However, the adoption of SMRs is not without challenges. Significant policy shifts will be required to create a robust regulatory framework that addresses safety, waste management and public perception. There is also the matter of substantial upfront investment, as the technology is still maturing and may face issues of cost competitiveness when compared to established energy sources. Additionally, coordinating SMR deployment with existing renewable energy initiatives will require careful planning to maximise synergies while minimising redundancy. In India's case, despite these challenges, the cost of electricity from SMRs is predicted to fall from ₹10.3 to ₹5 per kWh after the reactors are functional, which is less than the average cost of electricity.

In conclusion, a public-private partnership model presents a realistic solution to the challenges of sustainable AI development. By leveraging the strengths of both sectors, this model can facilitate the efficient development of SMRs alongside other forms of renewable energy to support advancements in AI.