Make AI While the Sun Shines

- By Amitabh Kant

In the years following the COVID-19 pandemic, we have witnessed one of the most transformative revolutions in technological history: the emergence of useful, universal, and unlimited artificial intelligence (AI). The global race is on to secure the technology, infrastructure, and economic opportunities arising from this new AI era. As AI continues to transform industries and revolutionise our daily lives, the demand for energy-intensive AI processing is soaring. India, with its abundant renewable energy resources and growing AI ecosystem, is well-positioned to become a global leader in using green energy to power AI processing.

AI processing requires vast amounts of energy, with estimates suggesting that training a single AI model can consume up to 284,000 kilowatt-hours (kWh) of electricity in the data center. A single ChatGPT query uses nearly ten times as much energy as a typical Google search and as much energy as running a five-watt LED bulb for an hour. Additionally, data centers alone account for 1% of global electricity demand, highlighting the need for sustainable energy solutions. The energy requirements for AI computing necessitate the immediate establishment of large-scale data centers, known as hyper-scale data centers. These new hyper-scale data centers demand reliable green power at a scale and speed that many regions struggle to meet. Global data center energy needs are projected to reach 4,000 TWh by 2030, which would account for 5% of global electricity demand.

Renewable power plants have the quickest timelines for construction and startup because of their modular – using standardized units or sections – design. However, many regions find it difficult to keep pace with the rapid building of these plants, particularly in ensuring that there are enough transmission lines to deliver power to customers. India has set ambitious goals for renewable energy, aiming for 50% of its electricity to come from non-fossil fuels by 2030. With over 300 days of sunshine each year and strong wind speeds, India has a vast potential for solar energy that can be used to support AI processing.

India's true strength comes from its local green energy leaders in both the private and public sectors, who can implement large-scale, world-class energy projects. The renewable energy industry is backed by a modern national grid and an effective regulatory framework. At the same time, India's AI ecosystem is growing rapidly, with more than 1,000 AI startups in the country. Additionally, 20% of global AI talent is based in India, which makes it an attractive place for AI companies. The AI market in India is expected to reach USD 7.8 billion by 2025, driven by increasing demand for digital services, e-commerce, and cloud computing.

India's data center market is expanding quickly due to the rising demand for digital services, e-commerce, and cloud computing. According to a report by MarketsandMarkets, the market is expected to reach 1,432 MW of installed capacity by 2025, growing at a rate of 21.1%. By 2030, it is projected to reach 3,243 MW, with a growth rate of 15.6%. A recent article in the Financial Times suggests that India will become the top data center market in the Asia Pacific, led by hyper-scale data centers.

Data centers have specific needs that set them apart from other infrastructure projects. They are designed for high standards of reliability, security, modularity, and redundancy. Having backup power is essential for their success. While diesel generators are the main backup technology currently used, green options like batteries (providing 6 hours of backup) and hydrogen fuel cells (providing 48 hours of backup) are being explored by major tech companies to reduce carbon emissions. Water availability poses a challenge for expanding hyper-scale data centers, so integrating technologies like fuel cells, which produce water as a by-product, could be a promising solution.

Google's AI-powered data center in Hyderabad operates on 100% renewable energy, setting an example for sustainable AI processing. Microsoft's AI-powered data center in Pune utilizes solar power for its energy needs, highlighting the potential for green energy in AI. Additionally, the Indian government's "Make in India" initiative promotes the development of green data centers and AI infrastructure, providing a supportive framework for growth in this sector.

To succeed in the AI data center sector, India should develop a policy for net-zero hyperscale data centers. This means creating large data centers that do not contribute to greenhouse gas emissions. The country should identify key locations that can provide continuous green power along with reliable backup energy options. Additionally, India needs to attract and develop skilled workers who can build advanced data centres that are highly secure and efficient.

To promote innovation, the government should fund pilot projects to find ways to set up data centres that use less energy and water. It's also essential for India to build trust globally regarding data protection by implementing effective policies and regulations.

With its strengths in clean energy and a growing AI ecosystem, India is well-positioned to lead in green energy-powered AI processing. By taking advantage of its renewable energy resources and addressing the challenges faced by AI data centres, India can lower its carbon footprint, boost its reputation as a hub for sustainable business and innovation, and create jobs in the clean energy and AI sectors.

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