THE RISE OF NUCLEAR POWER – SCIENCE & TECHNOLOGY

NEWS: Artificial Intelligence (AI) is transforming industries and everyday life, but this technological revolution comes with a significant hidden cost: **a massive demand for electricity**. This surge in energy demand is largely driven by **hyperscale data centers** operated by major tech companies like **Microsoft, Google, and Amazon**, which require substantial power for their operations.

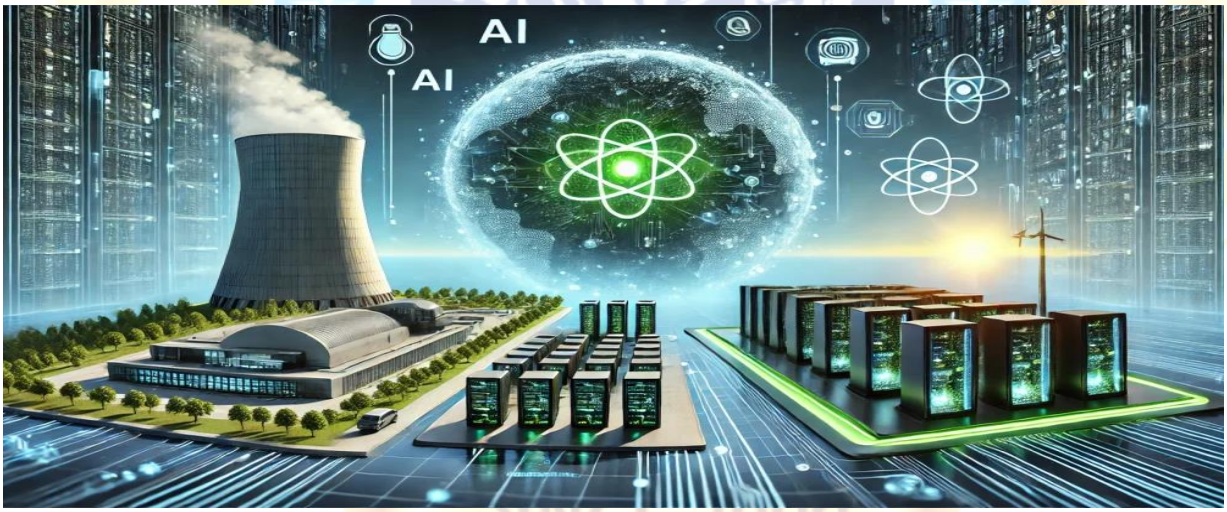
WHAT'S IN THE NEWS?

What is happening?

- Technology giants are turning to nuclear energy to power the energy-intensive data centers needed to train and run the massive artificial intelligence models behind today's generative AI applications.
- Microsoftand Google are among the firms agreeing deals to purchase nuclear power from certain suppliers in the U.S. to bring additional energy capacity online for its data centers.

The Role of Data Centers

- Data centers are facilities that house computer systems and related components. They are essential for storing, processing, and managing vast amounts of data, particularly for AI applications.
- These centers operate around the clock, generating heat that necessitates extensive cooling systems—akin to running a room full of ovens that need constant airflow and



temperature control.

Energy Consumption

- Currently, data centers account for 60-70% of the total energy used by the tech industry.
- With the anticipated tripling of energy demand for these facilities by 2030, tech companies are facing a dual challenge: **meeting energy needs while committing to sustainability and reducing emissions.**

Why there is a shift to Nuclear Energy?

Tech companies are under pressure to find energy sources to power data centers — a key piece of infrastructure behind modern-day cloud computing and AI applications. To address their growing energy demands and environmental responsibilities, tech giants are increasingly turning to nuclear power:

- **Reliability**: Nuclear power provides a consistent energy supply. Unlike renewable sources like solar and wind, which depend on weather conditions, nuclear reactors can operate continuously with high efficiency.
- **Cost-Effectiveness**: Over time, nuclear power can be more economical than relying solely on renewable energy, especially when factoring in the costs of energy storage systems like batteries.
- **Industry Examples**
- **Microsoft** is collaborating with partners to revitalize existing nuclear facilities to ensure a stable power supply for its data centers.
- **Google** is exploring partnerships to develop small modular reactors (SMRs), which are smaller and easier to build than traditional reactors.
- **Amazon** has committed $500 million to establish nuclear-powered data centers.
- **Global Trends:** The interest in nuclear power is not confined to the U.S.
    - **India, for example**, is planning to triple its nuclear capacity to 22,480 MW by 2032, aiming for 25% of its electricity from nuclear sources by 2050. Major investments are being made in nuclear projects, and collaborations are forming to develop new technologies.
    - Global electricity consumption from data centers, artificial intelligence and the cryptocurrency sector is expected to double from an estimated 460 terawatt-hours (TWh) in 2022 to more than 1,000 TWh in 2026 (International Energy Agency).

Challenges Ahead

- **Regulatory Hurdles**: Given the complex legal and safety regulations, there is need to navigate regulations before new projects can commence.
- **Public Perception**: Nuclear energy still faces skepticism from the public, stemming from past accidents and fears of safety risks.
- **Environmental Risk:** Nuclear energy isn't without its controversy. Many climate activists oppose such supplies, citing their hazardous environmental and safety risk
- **Investment Allocation**: There's a concern that focusing on nuclear might divert funds from developing renewable energy sources like solar and wind.

Small modular reactors (SMRs)

- **Small modular reactors (SMRs)** are **advanced nuclear reactors** that have a power capacity of up to 300 MW(e) per unit, which is about one-third of the generating capacity of traditional nuclear power reactors.
- SMRs represent a new wave of nuclear technology that aims to address safety and construction challenges. These reactors are designed to be built in factories and transported to sites, offering several advantages:
    - **Safety:** Smaller size reduces complexity and potential risks.
    - **Scalability:** They can be constructed incrementally, aligning with demand.

Source: https://www.theguardian.com/technology/2024/oct/15/google-buy-nuclear-power-ai-datacentres-kairos-power