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Address for correspondence:
Nikhil S. Dhage
PGDSRD/GARD National Institute of Rural Development and Panchayati Raj, Hyderabad, India
Email: nikhilswisdom@gmail.com

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Designing a Green AI Policy Framework for Sustainable Data Centre Growth in India: Climate, Energy, and Governance Perspectives

Nikhil S. Dhage
PGDSRD/GARD National Institute of Rural Development and Panchayati Raj, Hyderabad, India

Abstract

Access to affordable, reliable and clean energy is a severe challenge in the backdrop of the fast growth of the Indian economy and its digital revolution. The Union Budget 2026-27 reflects a new thrust towards building India as a global leader in Artificial Intelligence (AI) and cloud infrastructure, with data centres being identified as key digital assets. The policy push for AI-led development is also evident in the increased funding of solar energy, including in a substantial increase in allocation, as well as fiscal incentives like extended tax benefits for data centre operators and continued support under the India AI Mission.

There are also several policy documents such as National Strategy for Artificial Intelligence, National Solar Mission, Green Energy Open Access Rules (2022), Draft Data Centre Policy (2020), National Action Plan on Climate Change and Business Responsibility and Sustainability Reporting (BRSR) that have been launched in India. These efforts are aimed at increasing the use of renewable energy, growing digital infrastructure, and reporting on sustainability, but they are still very disjointed and siloed. Notably, they do not integrate with environmental governance mechanisms designed for AI-based infrastructure.

This huge growth of AI and data centre clusters is driving higher electrical, water and computational needs, which is adding to environmental strain. Data centres are energy intensive buildings which are responsible for increasing carbon footprints and in countries where fossil fuel generation is the main power supply source. Moreover, water-based cooling technologies are problematic for urban water sustainability, particularly when these are in high demand, such as in technology hubs.This research paper explores the issue of AI infrastructure development and its impact on sustainability in India with a critical analysis. The research adopts a mixed methodologies approach, based on policy analysis and empirical estimation, and a case study of the data centre ecosystem in Hyderabad, to pinpoint the various sustainability issues and governance deficiencies. The results suggest that if regulation is not established to address the impacts of the ongoing growth of data centres, then they may pose a serious threat to India's climate pledges and urban resource systems.

The study aims to propose a comprehensive Green AI Policy Framework to overcome these challenges, aiming to reconcile technological development with environmental sustainability goals. The framework highlights the need for renewable energy integration, carbon accounting, water efficiency regulations, life cycle sustainability of AI systems, and institutional coordination and collaboration between sectors. It also emphasizes the importance of regulatory measures related to climate, transparency in sustainability reporting and adaptive governance structures.

The paper concludes that the coordination of policies on AI-driven infrastructure with climate and energy policies is crucial for achieving sustainable development. The policy approach of one unified Green AI policy can help lower environmental risks and facilitate India becoming a global leader in AI. The incorporation of environmental issues in digital infrastructure planning will be a key factor for increasing the resilience of digital infrastructure systems, optimising resources use, and ensuring long-term development objectives within the context of sustainable and inclusive growth.

Keywords: *Able re:store offers research and development support to the Indian government and other stakeholders in the water resources sector.Able re:store supports the Indian government and the water resources sector through research and development.*

Introduction

In India, Artificial Intelligence (AI) is rapidly emerging as a key enabler of economic development and effective governance. Data centres have become essential infrastructure in the digital age, enabling the growth of cloud computing and the increasing reliance on data for decision-making. The Indian government has set forth several strategies and policies for the country's development, demonstrating the country's commitment to AI-powered growth.The Indian government has implemented various strategies and policies to promote the development of the country, with a particular focus on AI-powered growth, such as the India AI Mission and the government's fiscal incentives for digital infrastructure.

But its environmental footprint is significant. Data centres are continuously dependent on power supply and huge quantity of water for cooling systems, which places a significant strain on energy systems and natural resources. This is a concern in a country that remains heavily reliant on fossil fuels for energy production, which raises concerns about carbon emissions and climate sustainability.

There are several policy initiatives in India related to renewable energy, climate change and digital development but they are sector-specific. There is no governance model that connects the AI infrastructure to environmental sustainability, which results in a policy gap. The current study attempts to bridge this gap by developing a single policy framework for Green AI suitable for the Indian development context.

Literature Review

1 Energy Implications of AI and Data Centres

The studies from around the world reveal that data centers now consume an ever-increasing proportion of electricity because of the rising computing needs. Artificial Intelligence workloads, especially those involving machine learning and processing large amounts of data, can contribute to a substantial increase in energy consumption. The data centre sector is estimated to use 1-1.5% of the world's electricity and is expected to grow even more.

2 Environmental Externalities

Carbon emissions and water usage are the ways in which data centres negatively impact the environment. Data centres have high emissions in areas where the energy supply is carbon intensive. Also, water use by cooling systems presents a risk to water security in the city, particularly in areas without adequate water supplies.

The current policy and governance gaps are listed below:

The literature that already exists emphasizes the lack of a coherent regulatory framework that encompasses technological development as well as environmental sustainability. The policies on AI, environment and energy are silo mentality and are not effective in tackling the cross-sectoral challenges in India.

3 Policy Context in India

There are also a number of relevant policy frameworks in India, such as:

This is a National Action Plan on Climate Change (NAPCC).

- National Solar Mission
- Green Energy Open Access Rules (2022)
- The Draft Data Centre Policy (2020) was drafted.
- National Strategy for Artificial Intelligence

Business Responsibility and Sustainability Reporting (BRSR)

These are efforts towards sustainability and technology development but are not coordinated. Remarkably, there are no environmental requirements that are specifically required for the use of AI in data centre operations.

4 Research Methodology

The method used in this study is mixed method because:

- Policy Analysis: Analysis of of National and Sectoral policies with Renewable Energy

Empirical Estimation: The estimation of the energy consumption, emissions and water consumption.

This case study is an illustration of a data centre hub in Hyderabad.The case study provides a representative example of a data centre hub in Hyderabad.

The Framework Development includes conceptual design of Green AI policy.

Case Study:

Hyderabad Data Centre Ecosystem

The city of Hyderabad has become a major Data Centre hub in India owing to its strong IT ecosystem and policy supportive environment.

1 Energy Consumption

The typical large scale data centre is about 100MW in size.

Estimated energy consumption:

- Daily: ~3.6 GWh
- Annual: ~1.3 TWh

2 Carbon Emissions

With an emission factor of 0.7 kg CO_2/kWh:

- Daily emissions: ~2,500 tons CO_2
- Annual emissions: ~920,000 tons CO_2

3 Water Consumption

Data centers need a lot of water to cool down:

Consumption is estimated at ~2.1 billion litres per year.

Water needed for daily use: 5–25 million litres

4 Future Projections (2047)

- Energy demand: ~10 TWh/year
- Emissions: ~7 million tons CO_2/year
- Water usage: ~80million litres/day

Results and Analysis

The results have shown that:

AI power centres are becoming energy hogs.

The energy mix in India is driven by coal and carbon emissions are closely tied up with it.
Water consumption is a critical sustainability issue in cities.
Due to institutional fragmentation effective governance is limited.

Discussion

AI infrastructure growth is both a challenge and an opportunity to promote economic development and sustainability. The current policy landscape is non-integrated, leaving policy gaps.

The study reveals a governance gap (either accountability is limited, or there is limited data transparency or lack of stakeholder engagement). These problems can only be solved with a systemic approach involving environmental and technological policies.

This is an 8 Green AI Policy Framework.This is an 8 Green AI Policy Framework.

1 Core Principles

- Sustainability integration
- Climate accountability
- Inclusive governance
- Technological innovation

2 Key Components

1. Regulatory Standards

The mandates for using renewable energy and for emissions limits.

2. Energy Transition Mechanisms

Policies to promote the adoption of green energy.Policy incentives for green energy uptake.

3. Water Management Policies

Reduce energy use through efficiency benchmarks and explore other cooling methods.

4. Institutional Coordination

Creation of an inter-ministerial regulatory body

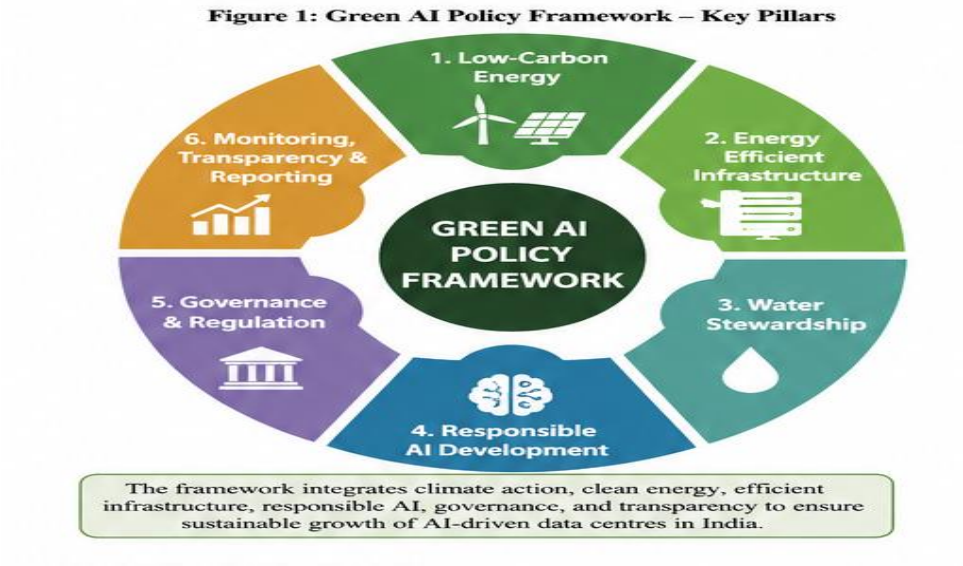
5. Transparency and Reporting

All ESG statements and ongoing ESG tracking will be compulsory.All ESG statements and continuous monitoring will be compulsory.

6. Carbon Market Integration

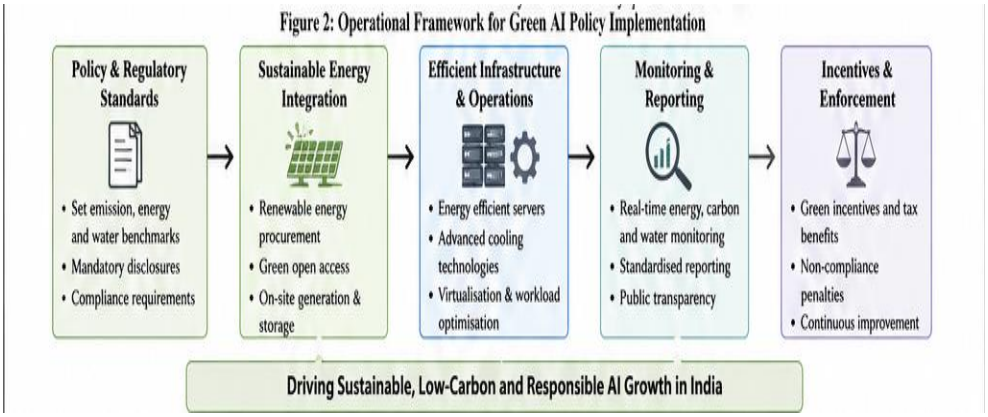
Promotion of carbon credits for sustainable practices

Figure 1: Green AI Policy Framework – Key Pillars



Policy Recommendations

- Establish a National Green AI Policy
- Integrate environmental benchmarks into data centre approvals
- Promote sustainable foreign direct investment
- Enhance research and innovation funding
- Strengthen monitoring and compliance mechanisms



Conclusion

India's journey to becoming a global leader in AI needs to go hand in hand with its environmental goals. As data centres continue to grow, there are considerable concerns about energy use, emissions, and water usage. This study showcases the relevance of developing an overall Green AI Policy Framework which encompasses climate, energy and governance aspects. This is vital to sustainable development and long-term resilience.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of thesis paper.

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