



India as Global Hub For Data Centres

For Prelims: Data Centers, [Artificial Intelligence \(AI\)](#), 5G, [Digital Personal Data Protection Act 2023](#), [Reserve Bank of India](#)

For Mains: India Initiatives related to data centres, Opportunities and Challenges in data centre industry, Way forward

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Why in News?

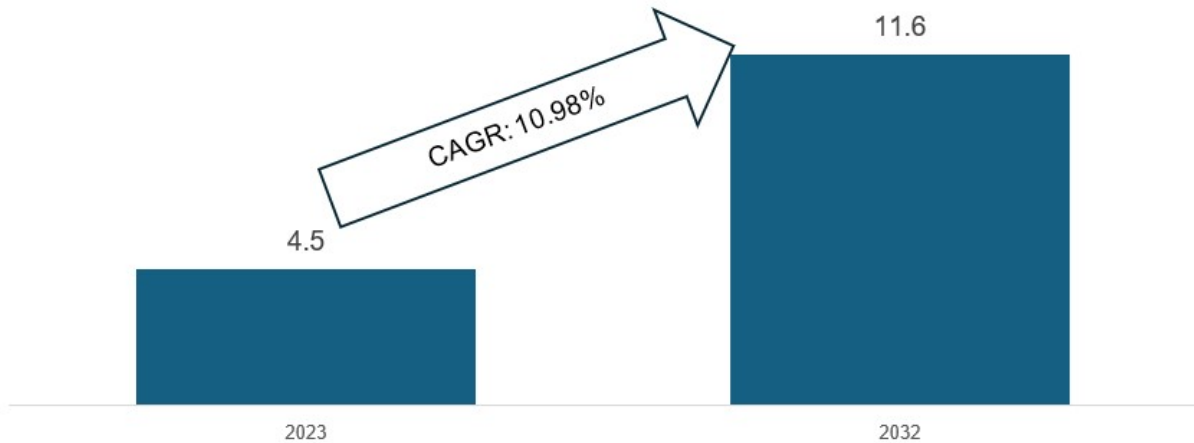
India's data centre sector is witnessing significant growth, projected to double its capacity by FY27, driven by digitalization, the adoption of [Artificial Intelligence \(AI\)](#), the rollout of [5G](#), and [data localization laws](#).

- However, challenges remain, such as infrastructure gaps, the need for sustainable power solutions, and competition from global players like China.

What are Data Centres?

- **About:**
 - Data centres are **specialized facilities used to store, manage, and process large volumes of electronic data**.
 - These centres house **critical [Information Technology \(IT\)](#) infrastructure**, including **servers, storage devices, and networking equipment**, along with systems for **cooling, power supply, and security**.
 - They are designed to **provide reliable and scalable solutions for data** storage, processing, and management.
- **Components of a Data Centre:**
 - **Servers and Storage Systems:** These are responsible for handling workloads such as **hosting websites, running applications, and managing cloud storage**.
 - **Networking Equipment:** [Routers](#), switches, and [firewalls](#) that facilitate communication between various servers and external networks.
 - **Power Supply Systems:** **Uninterrupted power supply (UPS)** and backup generators to ensure continuous power availability.
 - **Cooling Systems:** Since servers generate a significant amount of heat, efficient cooling mechanisms, such as **air conditioning or liquid cooling systems**, are crucial to prevent overheating and ensure smooth operation.
 - **Security Infrastructure:** Physical and cybersecurity measures to protect data and infrastructure from unauthorized access, data breaches, and other [cyber threats](#).
- **Current Status of Data Centres in India:**
 - **Growth Projection:** India's data centre market is forecasted to grow significantly, from USD 4.5 billion in 2023 to **USD 11.6 billion by 2032**, reflecting a **compound annual growth rate (CAGR)** of 10.98%.

India data centres market size (US\$ billion)



- **Global Data Share vs. Local Capacity:** While India accounts for **20% of global data production**, it currently holds **only 3% of the global data centre capacity**, showcasing a significant growth opportunity for the sector.
 - **Geographical Distribution of Data Centres:** Over **50% of India's data centre capacity is concentrated in Mumbai**, benefiting from its strategic location, reliable power supply, and cable landing stations.
 - Smaller cities such as **Ahmedabad, Pune, and Vizag** are also emerging as important hubs due to lower costs and improving infrastructure.
 - India hosts around 150 data centres, with prominent players like Amazon Web Services (AWS), Microsoft Azure, Google Cloud, CtrlS, Sify, and Yotta leading the market.

What are the Key Reasons for Growth of Data Centres in India?

- **Digitalization:** The increasing adoption of digital technologies, especially in **AI, cloud computing, and data storage**, has led to rising demand for **data processing and storage solutions**.
 - With **751.5 million internet users** and a **penetration rate of 52.4%** in 2024, India's growing reliance on mobile internet and digital solutions has driven the expansion of data centre networks to meet the rising demand for data processing and storage.
- **RBI Mandate on Financial Data Storage:** In 2018, the **Reserve Bank of India** issued a **data localization mandate** that required **all payment system data related to Indian customers to be stored in India** except in few cases, ensuring secure local storage and processing of sensitive financial data within India.
- **AI and 5G Rollout:** The surge in **AI and generative AI projects**, along with the nationwide **rollout of 5G networks**, is expected to increase data consumption and necessitate a corresponding rise in data centre capacity.
 - With the adoption of **5G, IoT, and AI**, data consumption is expected to triple.
- **Data Localization Laws:** India's data localization regulations mandate that certain types of data be stored within the country, creating further demand for local data centres. The key Legislation includes:
 - **Public Records Act, 1993:** **Public Records Act, 1993** prohibits the removal of public records from India, introducing the first local data storage requirement.
 - **Digital Personal Data Protection Act, 2023:** **Digital Personal Data Protection Act, 2023** establishes baseline privacy protections and allows for sector-specific regulations to impose stricter data localization requirements.

What is the Significance of Data Centres in India's Economic Growth?

- **Data Processing for Digital Economy:** Data centres are vital for **cloud services, data analytics, [artificial intelligence \(AI\)](#), and [machine learning \(ML\)](#)** offering the computational capacity for processing vast data.
- **Enabling Digital Services:** Data centres are the **backbone of digital services** such as **e-commerce, social media, banking, entertainment**, and communication. They ensure the smooth delivery of online services to billions of users worldwide.
 - Major cloud providers like **Amazon Web Services (AWS), Microsoft Azure, and Google Cloud** rely on data centres to offer scalable and reliable services to global businesses and consumers.
- **Supporting Critical Infrastructure:** In sectors like **healthcare, finance, and government**, data centres host critical systems that support **national security, emergency services, and financial transactions**.
- **Boosting Economic Growth:** The expansion of data centres contributes to **job creation, infrastructure development, and the growth of the digital economy**. The sector also attracts investments in technology, power infrastructure, and real estate.
 - As per Crisil Ratings, India's **data centre capacity is expected to double by FY27**, creating significant investment opportunities and potentially generating over Rs 50,000 crore in economic activity.
- **Reducing Latency with Edge Computing:** The rise of **IoT and real-time applications** has increased the demand for **edge data centres**, which minimize latency by processing data closer to users.
 - The **rollout of 5G** is expected to further boost this trend, enhancing application speed and reliability.

What are the Key Challenges Hindering the Growth of India's Data Centre Sector?

- **Infrastructure Constraints:** Infrastructure deficits, including **unreliable power supply and limited connectivity, increase costs and risks for data centres**, especially in non-metro areas. High capital investment such as in cooling systems, particularly for smaller businesses, hampers growth.
 - Although relatively cost-effective compared to countries like Japan and Singapore, **substantial investment (Rs 55,000-65,000 crore) is needed for land acquisition, building construction, and power equipment over the 3 three years**.
 - Also, meeting **stringent regulations and safeguarding sensitive data** require constant investment in advanced security systems, adding to operational costs.
- **Regional Disparities:** Large metros like Mumbai dominate the market, while smaller cities lack adequate investments in infrastructure and power supply, leading to an **uneven distribution of data centres** across the country.
- **Environmental Sustainability:** Data centres are **energy-intensive**, contributing to **carbon emissions**. The industry faces pressure to adopt **renewable energy sources** and energy-efficient technologies to minimize environmental impacts.
- **Skill Shortages and Competition:** A lack of skilled professionals in data centre management and operations hampers sectoral growth.
 - Countries like **China**, with advanced data centre capacity, present significant competition.
- **Cybersecurity Threats:** As data centres handle vast amounts of sensitive information, they are **prime targets for cyberattacks**. Robust cybersecurity measures are essential to safeguard personal and corporate data.
- **Scalability:** As demand grows, scaling infrastructure to meet requirements while maintaining efficiency and cost-effectiveness remains a challenge.

Initiatives to Promote the Data Centre Ecosystem in India

- **Digital India (2015):** **Digital India scheme** aimed at **enhancing online infrastructure and internet connectivity**, fostering the growth of digital services across the country.
- **National Informatics Centre (NIC):** **NIC** established advanced **National Data Centres** to

support government initiatives and digital infrastructure.

- **Infrastructure Status for Data Centres:** The government has granted [infrastructure status to data centres](#) with an **IT load of more than 5 MW**, facilitating easier access to financing and incentives.
- **State-Level Policies:** Policies like **Maharashtra's IT and ITES Policy 2023** offer targeted benefits and incentives to the data centre industry, promoting regional development.
- **Hyperscale Data Centres:** India's **first hyperscale data centre, Yotta D1**, has been set up in Greater Noida, Uttar Pradesh, marking a significant milestone in India's data centre capacity.

Way Forward

- **Infrastructural Improvements:** To become a global hub, India must **invest in upgrading its power infrastructure**, including renewable energy solutions, to provide reliable, cost-efficient energy to data centres.
- **Policy Support:** India should continue to **develop and refine policies** to facilitate the growth of the data centre industry, including **easing land acquisition processes** and providing **incentives for infrastructure development**.
- **Regional Development:** Encouraging the **growth of data centres in non-metro cities** by improving local infrastructure and offering incentives can help reduce regional disparities and foster more equitable growth.
- **Human Resource Development:** There is a need for **cooperation and collaboration with global companies and nations** for **technology transfer and investment** for enhancing human resource skills through training and international partnerships to support sustainable growth.

Conclusion

India has significant potential to become a global leader in the data centre market, driven by digital growth, rising data consumption, and advancements in AI and 5G. However, addressing challenges like infrastructure gaps, competition from China, and the need for investments in power and cooling solutions is crucial. With supportive policies and infrastructure development, India can emerge as a prominent data centre hub in the near future.

Drishti Mains Question:

Discuss the growth, challenges, and opportunities in India's data center sector and its role in advancing the country's digital economy.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. With the present state of development, Artificial Intelligence can effectively do which of the following? (2020)

1. Bring down electricity consumption in industrial units
2. Create meaningful short stories and songs
3. Disease diagnosis
4. Text-to-Speech Conversion
5. Wireless transmission of electrical energy

Select the correct answer using the code given below:

(a) 1, 2, 3 and 5 only

(b) 1, 3 and 4 only

(c) 2, 4 and 5 only

(d) 1, 2, 3, 4 and 5

Ans: (b)

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