India Data Centre Cooling Market By Cooling Technology (Air-Based Cooling, Liquid-Based Cooling), By Type of Data Center (Hyperscaler, Enterprise, Colocation), By End-User Industry (IT & Telecom, Retail & Consumer Goods, Healthcare, Media & Entertainment, Federal & Institutional Agencies, Other), By Region, Competition, Forecast and Opportunities 2020-2030F

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Abstracts

India Data Centre Cooling Market was valued at USD 2.1 billion in 2024 and is expected to reach at USD 7.13 Billion in 2030 and project robust growth in the forecast period with a CAGR of 22.4% through 2030. The India data center cooling market is experiencing robust growth, driven by the surge in data center infrastructure expansion and the escalating demand for efficient cooling solutions. As digital transformation accelerates across various sectors, including IT, telecom, and finance, the need to manage heat generated by increasingly powerful servers and equipment has become critical. Efficient cooling systems are essential to maintaining optimal performance, reducing energy consumption, and ensuring the reliability of data centers. The market is characterized by the adoption of advanced cooling technologies, such as liquid cooling, immersion cooling, and high-efficiency air cooling systems, which offer enhanced thermal management and energy efficiency. Additionally, regulatory pressures for energy conservation and sustainable practices are pushing data center operators to invest in innovative cooling solutions that align with environmental standards. The growing prevalence of cloud computing, big data analytics, and the Internet of Things (IoT) further fuels the demand for scalable and reliable cooling systems. Key players in the market are focusing on technological advancements and strategic partnerships to

address the evolving needs of data center operators and to capture a significant share of this expanding market.

Key Market Drivers

Rapid Data Center Expansion

The exponential growth in data generation and consumption is driving the rapid expansion of data centers across India. As businesses increasingly rely on digital platforms, cloud computing, and big data analytics, there is a heightened demand for scalable data storage and processing facilities. This expansion necessitates advanced cooling solutions to manage the heat generated by high-density servers and other critical infrastructure. Efficient cooling systems are crucial for maintaining optimal operational temperatures, preventing equipment overheating, and ensuring system reliability. As new data centers are established and existing ones are upgraded to handle greater workloads, the need for innovative cooling technologies becomes more pronounced. The drive towards larger and more sophisticated data centers underscores the importance of investing in effective cooling solutions that can support high-capacity operations while optimizing energy usage and operational costs.

Rising Energy Efficiency Regulations

In response to growing environmental concerns and energy consumption, the Indian government and regulatory bodies are implementing stringent energy efficiency regulations. These regulations aim to reduce carbon footprints and promote sustainable practices within the data center industry. Data centers, known for their significant energy usage, are particularly affected by these regulations, which mandate the adoption of energy-efficient technologies and practices. Cooling systems, being a major component of data center energy consumption, are a focal point for regulatory compliance. As data center operators strive to meet these regulatory requirements, there is an increased emphasis on adopting advanced cooling technologies that enhance energy efficiency, such as liquid cooling and high-efficiency air conditioning systems. Compliance with these regulations not only helps in reducing operational costs but also in achieving sustainability goals and improving corporate social responsibility.

Growing Demand for Cloud Computing and Big Data

The surge in cloud computing and big data analytics is significantly influencing the data center cooling market in India. As enterprises and service providers increasingly shift to

cloud-based infrastructure and leverage big data for decision-making, the demand for data centers with robust cooling systems has escalated. Cloud computing requires large-scale data processing and storage capabilities, leading to the establishment of expansive data centers that house numerous high-performance servers. Similarly, big data analytics involves processing vast amounts of data, which generates substantial heat. To ensure efficient operation and prevent overheating, these data centers need advanced cooling solutions capable of managing high thermal loads. The growth in cloud services and big data applications is thus driving the need for scalable, efficient, and reliable cooling systems that can support the evolving demands of modern data centers.

Increased Focus on Sustainability and Green Data Centers

There is a growing emphasis on sustainability and the development of green data centers in India, driven by both environmental concerns and corporate sustainability goals. Data center operators are increasingly adopting practices and technologies that minimize environmental impact, such as reducing energy consumption and employing eco-friendly cooling solutions. Green data centers aim to achieve high levels of energy efficiency, utilize renewable energy sources, and implement advanced cooling systems that reduce carbon emissions. The adoption of energy-efficient cooling technologies, such as free cooling, chilled beam systems, and heat recovery systems, aligns with the broader goal of creating more sustainable and environmentally responsible data centers. This focus on sustainability is not only a response to regulatory pressures but also a strategic move to enhance brand reputation and appeal to environmentally conscious stakeholders. The shift towards green data centers is a key driver of the demand for advanced cooling solutions in the Indian market.

Key Market Challenges

High Initial Capital Investment

One of the significant challenges in the India data center cooling market is the high initial capital investment required for advanced cooling systems. Implementing state-of-the-art cooling technologies, such as liquid cooling or immersion cooling, involves substantial upfront costs for equipment, installation, and integration. These advanced systems are designed to handle the high thermal loads and operational demands of modern data centers but come with a hefty price tag. For many data center operators, especially smaller enterprises or those with constrained budgets, the financial burden of such investments can be a substantial barrier. Additionally, the integration of these

cooling solutions often requires significant modifications to existing infrastructure, further increasing the cost. While these technologies can offer long-term savings through improved energy efficiency and reduced operational costs, the initial investment poses a significant challenge. Addressing this issue requires a careful evaluation of return on investment (ROI) and potential financial incentives or subsidies that could help offset the initial expenditure, allowing operators to adopt advanced cooling solutions without compromising financial stability.

Complexity of Integration with Existing Infrastructure

Integrating new cooling technologies into existing data center infrastructure presents a considerable challenge. Many data centers operate with legacy systems that were designed with traditional cooling methods in mind, such as air-based cooling systems. Introducing advanced cooling solutions, like liquid cooling or immersion cooling, often necessitates significant alterations to the existing setup. This integration can be complex and may involve redesigning cooling layouts, updating power systems, and ensuring compatibility with current equipment. Additionally, the transition period can result in temporary disruptions to data center operations, which can affect service delivery and operational continuity. Ensuring a smooth integration process requires careful planning, expert consultation, and potentially a phased approach to minimize disruptions. Operators must also address potential compatibility issues between new cooling systems and existing hardware to avoid inefficiencies and ensure optimal performance. Overcoming these integration challenges involves balancing the benefits of advanced cooling solutions with the practical considerations of modifying existing infrastructure.

Maintenance and Operational Complexity

The maintenance and operational complexity of advanced cooling systems pose a significant challenge in the data center cooling market. Cutting-edge cooling technologies, such as liquid and immersion cooling systems, often require specialized knowledge and skills for maintenance and operation. These systems are more complex than traditional air-based cooling solutions, and their upkeep demands a higher level of technical expertise. Data center operators must invest in training for their staff or hire specialized personnel to manage and maintain these advanced systems effectively. Additionally, the complexity of these cooling technologies can lead to increased risks of operational issues or failures if not managed properly. Ensuring reliable performance requires regular monitoring, preventive maintenance, and prompt troubleshooting, which can be resource-intensive. The need for specialized maintenance and operational

procedures can add to the overall cost and complexity of running a data center, making it essential for operators to develop robust maintenance strategies and ensure that their teams are adequately equipped to handle the demands of advanced cooling systems.

Environmental and Regulatory Compliance

Navigating environmental and regulatory compliance is a significant challenge for the data center cooling market in India. As data centers are major consumers of energy and resources, they are subject to stringent environmental regulations aimed at reducing their carbon footprint and energy consumption. Compliance with these regulations requires adopting cooling technologies that meet specific efficiency and sustainability standards. Additionally, regulations regarding refrigerants, waste management, and emissions can impact the choice and implementation of cooling solutions. Adapting to evolving environmental policies and ensuring compliance can be both challenging and costly for data center operators. Non-compliance can result in fines, penalties, and damage to the company's reputation. To address this challenge, operators must stay informed about current and upcoming regulations, invest in compliant cooling technologies, and implement comprehensive environmental management practices. Balancing the need for efficient cooling with regulatory requirements involves strategic planning and ongoing monitoring to ensure that all aspects of cooling operations align with environmental standards and contribute to sustainable practices.

Key Market Trends

Growing Adoption of Liquid Cooling Systems

The India data center cooling market is witnessing a significant shift towards the adoption of liquid cooling systems. This trend is driven by the increasing density of servers and the need for more efficient thermal management solutions. Liquid cooling offers superior heat dissipation compared to traditional air-based systems, making it an attractive option for high-performance data centers. Unlike air cooling, which relies on airflow to dissipate heat, liquid cooling directly transfers heat away from the components using specialized coolants. This method enhances cooling efficiency and allows for higher density server configurations, which are essential for meeting the demands of modern computing applications. Additionally, liquid cooling systems can contribute to lower energy consumption and operational costs by reducing the reliance on air conditioning units. As data centers expand and require more robust cooling solutions to manage increased thermal loads, the adoption of liquid cooling systems is expected to grow. This trend reflects the industry's ongoing pursuit of advanced technologies that

offer better performance, efficiency, and scalability.

Increased Focus on Energy Efficiency and Sustainability

Energy efficiency and sustainability are becoming central themes in the India data center cooling market. As data centers account for a substantial portion of global energy consumption, there is a growing emphasis on adopting cooling technologies that reduce energy usage and minimize environmental impact. Companies are increasingly investing in energy-efficient cooling systems, such as high-efficiency air conditioning units, free cooling systems, and advanced thermal management solutions. These technologies not only help in reducing energy costs but also align with regulatory requirements and corporate sustainability goals. Data center operators are exploring innovative cooling methods that utilize renewable energy sources, such as solar or wind power, to further enhance their sustainability efforts. The focus on energy efficiency is also driven by the need to meet stringent environmental regulations and achieve green certifications. As environmental concerns and regulatory pressures mount, the drive towards energy-efficient and sustainable cooling solutions is expected to continue shaping the market.

Emergence of Edge Computing and Its Cooling Implications

The rise of edge computing is significantly influencing the data center cooling market in India. Edge computing involves deploying data processing and storage closer to the data source, reducing latency and improving performance for applications such as IoT and real-time analytics. This decentralization of data processing leads to the establishment of smaller, localized data centers or edge nodes, which have specific cooling requirements compared to traditional, centralized data centers. Edge data centers typically need compact and efficient cooling solutions that can handle varying thermal loads in diverse environments. The trend towards edge computing drives the demand for innovative cooling technologies that are adaptable, scalable, and capable of maintaining optimal performance in smaller, distributed settings. As edge computing continues to gain traction, the market for edge-specific cooling solutions is expected to expand, reflecting the evolving needs of distributed data infrastructure.

Integration of AI and IoT in Cooling Management

The integration of Artificial Intelligence (AI) and Internet of Things (IoT) technologies is transforming the data center cooling landscape in India. AI and IoT enable advanced monitoring, control, and optimization of cooling systems, leading to more efficient and

adaptive cooling management. AI algorithms can analyze data from various sensors to predict cooling needs, optimize energy usage, and identify potential issues before they escalate. IoT devices provide real-time data on temperature, humidity, and equipment performance, allowing for precise control and adjustments. The use of AI and IoT in cooling management helps data center operators enhance operational efficiency, reduce energy consumption, and extend the lifespan of cooling equipment. This trend reflects a broader movement towards smart data center management, where technology-driven insights and automation play a crucial role in maintaining optimal conditions and achieving cost savings. As AI and IoT technologies continue to evolve, their integration into cooling systems is expected to drive further innovation and efficiency in the market.

Adoption of Modular and Scalable Cooling Solutions

The India data center cooling market is increasingly adopting modular and scalable cooling solutions to address the dynamic needs of modern data centers. Modular cooling systems offer flexibility by allowing data centers to incrementally scale their cooling capacity as their requirements grow. This approach is particularly beneficial for managing the fluctuating thermal loads associated with expanding data center operations. Modular systems can be easily expanded or reconfigured to accommodate new equipment or changes in data center design, reducing the need for extensive retrofitting or over-provisioning. Scalable cooling solutions also support the efficient deployment of resources, allowing data centers to optimize their cooling infrastructure based on current and future demands. This trend is driven by the need for adaptable and cost-effective cooling solutions that align with the evolving nature of data center environments. As data centers seek to balance growth and efficiency, the adoption of modular and scalable cooling systems is expected to gain momentum, reflecting the industry's shift towards more agile and responsive infrastructure solutions.

Segmental Insights

Type of Data Center Insights

The Hyperscaler data center segment emerged as the dominant force in the India data center cooling market and is expected to retain its leading position throughout the forecast period. Hyperscaler data centers, characterized by their vast scale and capacity, are operated by major technology and cloud service providers who manage extensive infrastructure designed to support high-density computing, large-scale data processing, and robust cloud services. These data centers generate significant amounts

of heat due to their high-performance servers and extensive operations, necessitating advanced and efficient cooling solutions to maintain optimal performance and reliability. The dominance of hyperscalers is driven by the rapid growth of cloud computing, big data analytics, and AI-driven applications, which require extensive and scalable cooling systems to handle the substantial thermal loads and ensure continuous uptime. While Enterprise and Colocation data centers also play significant roles in the market, their cooling needs are relatively less demanding compared to hyperscalers. Enterprise data centers, which serve individual organizations, often have more specific and varied cooling requirements based on their scale and operational needs, whereas Colocation data centers offer shared infrastructure to multiple clients, resulting in a different cooling dynamic. Nonetheless, the scale and intensity of operations within hyperscaler data centers, coupled with their expanding footprint, continue to drive the market for high-efficiency and scalable cooling solutions. As the demand for cloud services and large-scale data management grows, hyperscaler data centers are expected to sustain their market dominance, further influencing the development and adoption of advanced cooling technologies in the Indian data center cooling market.

End-User Industry Insights

The IT & Telecom sector dominated the India data center cooling market and is projected to maintain its leadership throughout the forecast period. The IT & Telecom industry, which includes major technology companies, cloud service providers, and telecommunications operators, drives the highest demand for data center cooling solutions due to its vast and rapidly expanding infrastructure. This sector's substantial and growing data processing needs necessitate high-density data centers equipped with advanced cooling systems to manage the significant thermal loads generated by powerful servers and networking equipment. The relentless growth in cloud computing, data storage, and network services further accentuates the need for efficient and scalable cooling solutions to ensure optimal performance, reliability, and energy efficiency in data centers. While other industries, such as Healthcare, Media & Entertainment, and Retail & Consumer Goods, also contribute to market demand, their cooling needs are generally more specialized and less extensive compared to the IT & Telecom sector. For instance, Healthcare facilities require cooling solutions for critical data systems and medical imaging equipment, while Media & Entertainment focuses on high-performance computing for content creation and streaming. However, the scale and intensity of operations within IT & Telecom data centers, coupled with the sector's rapid growth and innovation, position it as the dominant driver of data center cooling market trends. As data consumption and digital transformation continue to accelerate across various industries, the IT & Telecom sector's influence on the cooling market is

expected to remain strong, driving ongoing advancements and investments in cooling technologies to meet its evolving needs.

Regional Insights

The Western region of India emerged as the dominant in the data center cooling market and is expected to retain its leading position throughout the forecast period. This dominance is primarily attributed to the presence of major commercial hubs and technology centers in cities like Mumbai, Pune, and Ahmedabad, which are pivotal in driving data center infrastructure growth. The Western region's economic vitality, coupled with its robust IT and telecommunications sector, creates a high demand for data centers equipped with advanced cooling systems to manage the substantial thermal loads associated with high-density computing and extensive data processing operations. The region's strategic importance as a financial and technological powerhouse attracts significant investments from both domestic and international data center operators, further bolstering the demand for sophisticated cooling solutions. Western region's well-developed infrastructure, including reliable power supplies and connectivity, supports the efficient operation of large-scale data centers, reinforcing its position as a market leader. While other regions, such as the Northern and Southern regions, also contribute to the overall market, their data center cooling needs are relatively less pronounced compared to the Western region. The Northern region, with key cities like Delhi and Noida, and the Southern region, with prominent centers like Bangalore and Hyderabad, are experiencing growth in data center establishments, but they do not match the scale and intensity seen in the Western region. As data center expansion continues and the demand for high-performance computing and cloud services increases, the Western region's strategic advantages and concentration of major technology and business operations are expected to sustain its dominance in the India data center cooling market, driving ongoing investment and development in advanced cooling technologies.

Recent Developments

In March 2023, STULZ, a Hamburg-based leader in mission-critical air conditioning solutions, announced that its CyberAir 3PRO DX series units now support the low-global-warming-potential (GWP) refrigerant R513A. This advancement highlights STULZ's commitment to sustainability by incorporating eco-friendly refrigerants across its product range.

In June 2024, Perstorp, a prominent global specialty chemicals company under

PETRONAS Chemicals Group Berhad (PCG), partnered with Intel's Open IP Advanced Liquid Cooling team to develop an advanced synthetic thermal management fluid designed for immersion cooling in data centers. Intel's SuperFluid technology, which utilizes air as a lubricant, significantly enhances cooling capacity from the traditional 500 W per chip to an impressive 800 W.

In January 2024, Modine, a leading provider of thermal management solutions, acquired the intellectual property and select assets of TMG Core, a specialist in liquid immersion cooling technology. This acquisition strengthens Modine's position in the data center sector, particularly for high-density computing applications such as generative AI, 5G, and machine learning, as noted by Modine's President and CEO, Neil Brinker.

Key Market Players

Vertiv Holdings Co

Stulz GmbH

Schneider Electric SE

Alfa Laval India Private Limited

Kirloskar Chillers Private Limited

Johnson Controls International plc

Mitsubishi Electric Corporation

Eaton Corporation PLC

Rittal India Pvt. Ltd.

Hitachi Energy Ltd.

Report Scope:

In this report, the India Data Centre Cooling Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

India Data Centre Cooling Market, By Cooling Technology:

Air-Based Cooling

Liquid-Based Cooling

India Data Centre Cooling Market, By Type of Data Center:

Hyperscaler

Enterprise

Colocation

India Data Centre Cooling Market, By End-User Industry:

IT & Telecom

Retail & Consumer Goods

Healthcare

Media & Entertainment

Federal & Institutional Agencies

Other

India Data Centre Cooling Market, By Region:

North India

South India

West India

East India

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the India Data Centre Cooling Market.

Available Customizations:

India Data Centre Cooling Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

Contents

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