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Data Center Thermal Management Market by Solution (Hardware, Services), Component, Data Center Type (Hyperscale, Enterprise, Colocation Providers), End-use Industry, Technology, Type of Cooling (Air, Liquid), and Region - Global Forecast to 2032

https://marketpublishers.com/r/DAF87F382532EN.html
Date: August 2026
Pages: 357
Price: US$ 2,970.00 (Single User License)
ID: DAF87F382532EN

Abstracts

The data center thermal management market is projected to grow from USD 13.24 billion in 2026 to USD 32.38 billion by 2032, at a CAGR of 16.1% during the forecast period. The increasing adoption of artificial intelligence (AI), generative AI, high-performance computing (HPC), and cloud computing is the primary driver of the global data center thermal management market. AI servers equipped with advanced GPUs and accelerators from companies such as NVIDIA, AMD, and Intel generate substantially higher heat loads than conventional server architectures, pushing rack power densities from traditional 5–15 kW to 50–100 kW and, in some AI deployments, beyond 150 kW per rack. These elevated thermal loads require advanced thermal management solutions that can efficiently dissipate heat while ensuring continuous system reliability and performance.

“By component, liquid cooling systems is the largest segment of the data center thermal management market, in terms of value, during the forecast period.”

Liquid cooling systems are expected to be the largest segment, by value, of the global data center thermal management market during the forecast period. This trend is driven by the increasing deployment of artificial intelligence (AI), high-performance computing (HPC), cloud computing, and large-scale analytics. These workloads require advanced thermal management solutions capable of handling much higher heat loads than traditional air-cooling methods. As server processors and AI accelerators continue to draw more power, liquid cooling systems are becoming essential investments for data

center operators aiming to enhance computing performance, ensure greater equipment reliability, and improve overall operational efficiency.

Liquid cooling systems tend to have a higher market value primarily because the associated hardware costs are elevated, and the installation process is more complex. These systems include cooling distribution units (CDUs), pumps, cold plates, manifolds, heat exchangers, piping networks, as well as monitoring systems and control software. Although these integrated setups require a larger upfront capital investment compared to conventional air cooling systems, they offer significant long-term benefits, such as lower energy consumption, improved Power Usage Effectiveness (PUE), higher rack density, and reduced day-to-day operational costs. Consequently, hyperscale cloud providers, colocation operators, and enterprise data centers are now allocating more budget toward liquid cooling infrastructure to build AI-ready facilities, often ahead of schedule.

“By data center type, the hyperscale data centers are the fastest-growing segment of the data center thermal management market during the forecast period.”

The hyperscale data center segment is expected to experience the highest CAGR in the data center thermal management market during the forecast period. This growth is primarily driven by the rapid expansion of hyperscale cloud infrastructure, along with the development of AI training clusters, high-performance computing (HPC), and large-scale colocation setups. Hyperscale cloud providers and digital infrastructure companies are increasingly constructing large data centers to accommodate the significant rise in artificial intelligence, generative AI, big data analytics, and cloud-based services. These facilities typically house thousands of high-performance servers and AI accelerators, which lead to increased power consumption and heat output. As a result, advanced thermal management is essential for maintaining optimal operating conditions and preventing service interruptions.

To achieve this, operators of hyperscale data centers are investing substantially in next-generation cooling techniques. These techniques include direct-to-chip liquid cooling, immersion cooling, precise air conditioning, computer room air handlers (CRAHs), computer room air conditioners (CRACs), coolant distribution units (CDUs), heat exchangers, smarter airflow control systems, and AI-driven thermal monitoring platforms. Together, these strategies facilitate efficient heat removal, manage high-density rack configurations that can exceed 100 kW, enhance the reliability of the overall facility, and reduce energy consumption associated with cooling.

“By end-use industry, the government & defense segment is the fastest-growing segment of the data center thermal management market during the forecast period.”

The government & defense segment is expected to have the highest CAGR in the global data center thermal management market over the forecast period, mainly because more investments are going into secure digital infrastructure, defense modernization programs, and growing artificial intelligence (AI), cybersecurity, and mission-critical computing use cases. Government agencies and defense organizations are also expanding their data center abilities for intelligence gathering surveillance, command and control systems, geospatial analytics, and classified cloud environments. And of course, these types of workloads need high-performance computing (HPC) infrastructure that produces a lot of heat, so there’s a strong demand for advanced thermal management solutions that can keep everything running without interruption, protect system reliability, and uphold data security. A lot of today’s defense applications autonomous systems, real-time battlefield analytics, satellite communications, and cyber defense operations are built around high-density computing, and it means thermal management must be efficient. Because of this, government agencies are more deploying liquid cooling systems, precise air conditioning, smarter airflow management, and mixed cooling architectures, so equipment stays at its best while energy consumption and day to day operating costs get pushed down a bit.

“North America is projected to be the largest data center thermal management market, in terms of value, during the forecast period.”

North America is expected to be the largest market for data center thermal management by value during the forecast period. This growth is primarily driven by its established digital infrastructure, a significant presence of hyperscale cloud providers, and the rapid increase in artificial intelligence (AI) and high-performance computing (HPC) workloads. The US and Canada continue to experience significant investment in hyperscale, colocation, and enterprise data centers. Companies like Amazon Web Services (AWS), Microsoft, Google, Meta, Oracle, and CoreWeave are expanding their AI-ready infrastructures. As more high-density server racks and GPU clusters are implemented, thermal loads are increasing, which in turn raises the demand for enhanced thermal management solutions across the region.

Moreover, this area is at the forefront of developing next-generation cooling technologies. These include direct-to-chip liquid cooling, immersion cooling, precision air conditioning, computer room air handlers (CRAHs), computer room air conditioners (CRACs), coolant distribution units (CDUs), heat exchangers, and smart thermal monitoring systems. With these advanced tools, data center teams can improve cooling efficiency, maintain optimal temperatures, reduce energy consumption, and achieve better Power Usage Effectiveness (PUE) outcomes, all while managing the growing demands of power-hungry AI applications.

Profile break-up of primary participants for the report:

By Company Type: Tier 1 – 45%, Tier 2 – 22%, and Tier 3 – 33%

By Designation: C-Level Executives– 50%, Directors– 10%, and Others – 40%

By Region: North America – 17%, Asia Pacific – 17%, Europe – 33%, Middle East & Africa – 25%, and South America – 8%

Leading players operating in the data center thermal management market include Vertiv Group Corp (US), Johnson Controls, Inc. (US), Schneider Electric (France), Carrier (US), Daikin Industries Ltd. (Japan), Mitsubishi Electric Corporation (Japan), Super Micro Computer Inc (US), Modine (US), Trane (Ireland), Lenovo (China), STULZ GMBH (Germany), Sugon Information Industry Co., Ltd. (China), Munters (Sweden), Delta Electronics Inc. (Taiwan), CoolIT Systems (Ecolab) (Canada), Baltimore Aircoil Company, Inc. (US), Eaton (Ireland), Rittal GmbH & Co. KG (Germany), DCX Liquid Cooling Systems (Poland), Taisol Electronics Co., Ltd. (Taiwan), Alfa Laval (Sweden), Green Revolution Cooling Inc. (US), Flex Ltd (US), Koari Heat Treatment Co., Ltd. (Taiwan), GIGA-BYTE Technology Co., Ltd. (Taiwan), Legrand (France), Submer (Spain), Inspur Co., Ltd. (China), Asperitas (Netherlands), Zutacore Inc. (US), and others. These key players are significant contributors to the data center thermal management market. These players have adopted various strategies, including agreements, joint ventures, and expansions, to increase their market share and business revenue.

Research Coverage:

The report defines, segments, and projects the size of the data center thermal management market based on component, data center type, end-use industry, service, technology, type of cooling, and region. It strategically profiles the key players and comprehensively analyzes their market shares and core competencies. It also tracks and analyzes competitive developments, such as expansions, partnerships, and acquisitions undertaken by them in the market.

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Reasons to Buy the Report:

The report is expected to help market leaders/new entrants by providing them with the closest approximations of revenue numbers for the data center thermal management market and its segments. This report is also expected to help stakeholders gain a deeper understanding of the market's competitive landscape, acquire valuable insights to enhance their business positions, and develop effective go-to-market strategies. It also enables stakeholders to understand the market's pulse and provides information on key market drivers, restraints, challenges, and opportunities.

The report provides insights into the following pointers:

Analysis of drivers (Need for improved efficiency in data centers, Significant growth in number of data centers), restraints (High capital investment, Requirement of specialized infrastructure), opportunities (Emergence of liquid cooling technology, Growing requirement for modular data center cooling), and challenges (Cooling challenges during power outages, Necessity of reducing carbon emissions) are influencing the growth of the data center thermal management market.

Product Development/Innovation: Detailed insights into upcoming technologies and research & development activities in the data center thermal management market.

Market Development: Comprehensive information about lucrative markets – the report analyzes the data center thermal management market across varied regions.

Market Diversification: Exhaustive information about new products, various types, untapped geographies, recent developments, and investments in the data center thermal management market.

Competitive Assessment: In-depth assessment of market shares, growth strategies, and product offerings of leading players such as Vertiv Group Corp (US), Johnson Controls, Inc. (US), Schneider Electric (France), Carrier (US), Daikin Industries Ltd. (Japan), Mitsubishi Electric Corporation (Japan), Super Micro Computer Inc (US), Modine (US), Trane (Ireland), Lenovo (China), STULZ GMBH (Germany), Sugon Information Industry Co., Ltd. (China), Munters

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15 COMPETITIVE LANDSCAPE

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List Of Tables

LIST OF TABLES

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List Of Figures

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