Global Data Center Cooling Market Landscape 2024-2029

Market Report | 2024-08-22 | 262 pages | Arizton Advisory & Intelligence

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Report description:

The global data center cooling market by investment is expected to grow at a CAGR of 10.63% from 2023 to 2029.

KEY TRENDS

Rising Adoption of AI will Drive Demand for Advanced Cooling Technologies.

-The global data center cooling market is experiencing significant growth due to the adoption of advanced technologies such as AI and ML. Worldwide, people are increasingly embracing AI for various operations.
-In August 2023, according to Vertiv, with the growing use of AI and HPC, data centers are now being designed to handle a massive 100 megawatts of power and pack as much as 30 kW of computing power into each rack. This challenges data center buildings to maximize their available space while catering to customers with larger workloads. These data center buildings are evolving in various ways to cope with the increasing demands, such as handling heavier racks and improved cooling solutions. This includes the introduction of robotics in construction and advanced cooling methods such as direct-to-chip cooling.
-AI expansion brings profound changes across sectors, promising convenience and improved functionality in finance, healthcare, and more. In data centers supporting AL and ML workloads, liquid-based cooling is the preferred technology due to its ability to handle the high heat generated by powerful computing devices such as TPUs.

Growing Rack Power Density

-Rack power density is critical in data center design, capacity planning, cooling, and power provisioning. Over the past few years, there has been an unprecedented rise in IT equipment rack power density. The adoption of compute-intensive workloads such as AI, IoT, Augmented and Virtual Reality, and the popular cryptocurrency mining trend have increased data storage and processing requirements, necessitating high-density racks.
-The surge in demand for HPC, led by the adoption of converged and hyper-converged solutions and virtualization, will contribute to the rise in rack power density to an average of 10 to 12 kW during the forecast period. Consequently, hyperscale facilities with

a power capacity that exceeds 15 MW will witness significant growth.
- The increasing rack power density has made innovative and flexible facility designs imperative, along with the adoption of rack-level UPS solutions and diverse electricity feeds for racks. Many large and mega data centers have power infrastructure supporting a rack density of up to 50 kW.
- In August 2023, Digital Realty introduced a new high-density colocation service to accommodate up to 70nkW per rack. The company deployed rear door heat exchangers on the racks to facilitate high-density workloads.

Innovations in Data Center Cooling Techniques

- Immersion cooling, a liquid-based cooling technique, regulates data center equipment temperature by submerging it in cooling fluid. This method helps dissipate heat and ensure optimal performance of components such as CPUs. Compared to traditional cooling methods, such as computer room air conducting (CRAC), immersion cooling is more efficient due to liquid's higher thermal conductivity than air.
- According to the Uptime Institute, enhancing data center cooling is the primary contributor to overall colocation sustainability. The data center can effectively manage dense and high-performance server clusters by adopting direct-chip-liquid-based cooling while simultaneously curbing power and water consumption.
- In January 2024, Aligned Data Centers launched DeltaFlow~, a new liquid-based cooling system and technology designed to support high-density computing requirements and workloads of up to 300 kW per rack.
- In November 2023, LiquidStack, a cooling company, launched a single-phase cooling system for AI workload in data centers.
- In October 2023, ServerDomes announced its partnership with LiquidCool to use immersion cooling techniques in data centers.

Adoption of Liquid-Cooling Techniques

- In December 2023, Equinix announced plans to expand its support for liquid-based cooling technology, including direct-to-chip cooling, to over 100 International Business Exchange (IBX) data centers across more than 45 metro areas globally. Locations set to support direct-to-chip liquid-based cooling include London, Silicon Valley, Singapore, and Washington DC.
- In August 2023, Digital Realty launched a high-density rack that supports up to 70 kW per rack over 28 locations across North America, EMEA, and APAC. The company said this is possible due to the latest technologies in cooling systems, such as Air-Assisted Liquid Cooling (AALC) technologies.
- In January 2023, NTT DATA deployed its first liquid immersion cooling and direct contact liquid-based cooling technology in India in the Navi Mumbai Data Center.

SEGMENTATION INSIGHTS

- The global data center cooling market is witnessing significant advances in cooling technologies to enhance energy efficiency and reduce environmental impact. Implementing water-side economizers and various evaporative cooling systems is gaining traction, particularly in regions with colder climates.
- The demand for reliable and eco-friendly data storage and processing continues to grow, and the adoption of innovative cooling solutions is expected to further expand in the global data center cooling market in the upcoming years.
- Countries like the US, Germany, France, the UK, and several central and eastern countries with supercomputing facilities and high rack power density exceeding 100 kW have emerged as major adopters of direct-liquid-based cooling solutions and liquid immersion solutions.
- Free cooling has emerged as a highly adopted approach, particularly in regions such as Western Europe, the Nordics, APAC, North America, and others. Here, ambient temperatures are favorable for utilizing outside air to cool data centers throughout the year, eliminating the need for traditional chillers.
- The market is witnessing ongoing innovations in the free cooling space, including developing free cooling chillers that operate without water and indoor CRAC units that optimize cooling efficiency. For instance, CyrusOne's Amsterdam I data center facility

has an N+1 free cooling air-cooled chiller and CRAH units with N+25% redundancy.

GEOGRAPHICAL ANALYSIS

-In the global data center cooling market, North America dominated the market in terms of investment, with a market share of around 41% in 2023, followed by APAC and Europe (Western Europe, Nordics, and Central & Eastern Europe).
-The North American data center cooling market is expected to witness significant growth in terms of investment, with a growth rate of around 51% between 2023 and 2029. In North America, the U.S. witnessed the highest investment, around 95% share in 2023, followed by Canada.
-In the Latin American data center cooling industry, Brazil witnessed the highest market share in 2023, followed by Mexico, Chile, Colombia, and the rest of Latin America.
-In Europe, Germany dominated the data center cooling market with a market share of around 16% in 2023, followed by Ireland, the UK, France, Norway, Denmark, Spain, Switzerland, the Netherlands, Belgium, Finland, Iceland, Russia, Poland, and other European countries.
-In the Middle East & Africa, South Africa dominated the data center cooling market share in 2023, and Saudia Arabia, UAE, Israel, Nigeria Kemya, Egypt, and other countries followed it.
-APAC was the second-largest data center cooling industry by investment globally in 2023. China was the largest market in APAC, followed by Australia, India, Hong Kong, South Korea, New Zealand, and the rest of the APAC countries.

Segmentation by Geography

-North America
oThe U.S.
oCanada
-Latin America
oBrazil
oMexico
oChile
oColombia
oRest of the Latin American Countries
-Western Europe
oThe U.K.
oIreland
oGermany
oFrance
oItaly
oSwitzerland
oSpain
oNetherlands
oBelgium
oOther Western European Countries
-Nordics
oSweden
oDenmark
oNorway
oFinland & Iceland
-Central & Eastern Europe

o Russia
o Poland
o Other Central & Eastern European Countries
- Middle East
o UAE
o Saudi Arabia
o Israel
o Other Middle Eastern Countries
- Africa
o South Africa
o Kenya
o Nigeria
o Egypt
o Other African Countries
- APAC
o China
o Japan
o India
o Hong Kong
o South Korea
o Taiwan
o Australia
o New Zealand
o Rest of APAC
- Southeast Asia
o Singapore
o Indonesia
o Malaysia
o Thailand
o Philippines
o Vietnam
o Other Southeast Asian Countries

VENDOR LANDSCAPE

- The global data center cooling market hosts various active vendors offering different solutions. Those vendors that provide innovative and advanced technologies stand a better chance of securing a larger market share throughout the forecast period.
- Some of the prominent cooling infrastructure providers operating in the data center cooling market include 4energy,3M, Asetek, Black Box, Carrier, Condair, Daikin Applied, Delta Electronics, Johnson Controls, Mitsubishi Electric, STULZ, Schneider Electric Rittal, Vertiv, and others.
- Globally, many colocation operators in the global data center cooling market are adopting advanced cooling technologies in their data centers. This new technology involves submerging computer servers in a special liquid that helps keep them cool. This will lead to increased opportunities for vendors offering advanced cooling solutions to increase their revenue share in the industry. In January 2024, STACK Infrastructure announced that it had expanded its data center with AI technologies and a high-density rack to fulfill the demand for ML workloads. It is installed directly to chip cooling and supports 300 kW or higher per immersion cooling technique in the future.
- In May 2024, STULZ announced its partnership with Dutch Immersion cooling firm Asperitas to create a modular data center

solution integrating immersion Cooling for indoor and outdoor use. The collaboration has produced a module capable of supporting an IT load of up to 20 kW using Asperitas? immersion cooling technology.
-In February 2023, Castrol, a lubricant manufacturer, obtained approval for its cooling fluid to be utilized in Submer's data center immersion tanks. Submer conducted a compatibility study on Castrol's ON Immersion Cooling Fluid DC 20 and approved it, allowing the fluid to be used in summer equipment without voiding the warranty.

Prominent Cooling Infrastructure Providers

-Airedale
-Rittal
-Schneider Electric
-STULZ
-Vertiv
-3M
-4Energy
-AAON
-Alfa Laval
-AIRSYS
-Aqua Cooling
-Aquila
-Asetek
-Asperitas
-Austin Hughes
-Canovate
-Carrier
-Chilldyne
-CITEC International
-ClimateWorx International
-Cooler Master
-Condair
-CoolIT Systems
-Daikin Applied
-DCX LIQUID COOLING SYSTEMS
-Degree Controls
-Delta Electronics
-ebm-papst
-EMICON
-ENVICOOL
-FlaktGroup
-Fuji Electric
-Green Revolution Cooling
-HiRef
-Huawei
-Iceotope Technologies
-ION UPS
-Johnson Controls
-Kelvion

-Kyoto Cooling
-Legrand
-Lennox International
-LiquidCool Solutions
-LiquidStack
-Menerga
-Midas Immersion Cooling
-Minkels
-Motivair
-Munters
-Nortek Air Solutions
-nVent
-OceanAire
-QCooling
-Renovo Zhuhai
-Shanghai Shenglin M&E Technology
-SPX Cooling Tech
-Stellar Energy
-Submer
-Swegon
-SWEP
-Systecon
-Trane
-United Metal Products
-Upsite Technologies
-Vigilent
-Wakefield Thermal

KEY QUESTIONS ANSWERED:

1. How big is the data center cooling market?
2. What is the growth rate of the data center cooling market?
3. Which region holds the most significant data center cooling market share?

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