Immersion Cooling In Data Centers - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2024 - 2029)

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Abstracts

The Immersion Cooling Market In Data Centers Industry is expected to grow from USD 0.79 billion in 2024 to USD 2.52 billion by 2029, at a CAGR of 26.15% during the forecast period (2024-2029).

Owing to the increasing demand for this technology, companies such as Supermicro and Fujitsu offer several server lines ready for immersion cooling. Several hardware manufacturers are launching firmware and BIOS updates to inform servers that fans are not required in immersion-cooling-based installations, primarily indicating the industry's readiness to shift to hardware cooling technologies.

Key Highlights

The increasing carbon footprint of the data centers is another major issue leading to the increased adoption of advanced liquid cooling technology, such as immersion cooling. In a recent study conducted by company 3M, a prominent synthetic coolant provider in the immersion cooling market, it was identified that 38% of the electricity needed in data centers equipped with traditional air-based cooling technologies is utilized to cool the electronic components.

The developments in the IT structure in emerging economies, such as India and China, are expected to boost the demand for data centers favorably. The demand for data centers is anticipated to increase due to the increasing adoption of the cloud model, which has cost and operational benefits for the IT industry.

According to an NTT Ltd study, over half of the respondents stated that the cloud model

would have the most transformational impact on their organization's business operations. Therefore, the demand for the cooling of data centers is anticipated to increase, leading to the execution of liquid cooling methods based on end-user preferences.

Uptime launched its recent annual survey, which found that racks consisting of 20 kW and advanced are decreasingly deployed. On a time-over-year base, most respondents highlighted their highest density rack usage in the 10-19 kW range. Direct liquid cooling becomes more economical and effective when rack densities higher than 20- 25 kW are preferred.

For large enterprises, replacing failed servers more constantly than usual may be less expensive over time than operating a hyperscale facility at lower temperatures. Still, with the growing integration of GPUs in data centers urged by the need for better computing power, large enterprises must move toward an effective cooling technology.

The outbreak of COVID-19 posed further stress on multiple economies across various sectors. This shifted the focus toward a digital economy. China's top cloud computing provider, Alibaba Cloud, invests billions in building next-generation data centers to support digital transformation needs in a"post-pandemic world."Data center energy usage has been compounded due to increased teleworking and other virtual activities brought on by the COVID-19 pandemic. Thus, developments using sustainable cooling technologies are on the rise.

Data Center Immersion Cooling Market Trends

Edge Computing to Witness Major Growth

In the forecast period, organizations are expected to witness rapid growth in IP-connected mobile and machine-to-machine (M2M) devices, which handle significant amounts of IP traffic. The demand for faster Wi-Fi service and application delivery from online providers is expected to rise. Some M2M devices, such as autonomous vehicles, require real-time communications with local processing resources to ensure safety.

The deployment of edge data centers benefits many new technologies, including fifth-generation (5G) networks, IoT and IIoT devices, virtual and augmented reality, artificial intelligence and machine learning, data analytics, autonomous vehicles, and video streaming and surveillance.

The emergence of 5G wireless infrastructure has urged data center operators to opt for edge computing infrastructure to work with networks offering lower latency and higher resiliency. Multi-access edge computing (MEC) aids network services in connecting to users closely.

Hence, the demand for efficient edge data centers is expected to be augmented by many factors, including the introduction of 5G technology worldwide and the growing trend of autonomous or self-driving vehicles and smart cities. According to Intel, the projected global autonomous vehicle registration share in 2024 is 0.49%; by 2030, the registration share is expected to reach 12%.

However, a key requirement of large-scale edge computing roll-outs will be low operating costs. In edge deployments, immersive liquid cooling provides dramatic energy-saving benefits. The reliability and no-touch features of liquid cooling solutions will match the need for extended mean time to maintenance and longer intervention intervals for viable operation and management of remotely located equipment.

Artificial intelligence (AI), a part of the digital transformation for many enterprises, is anticipated to impact data center management, productivity, and infrastructure significantly. The global data center construction industry is also booming, as increasing cloud adoption fuels new opportunities in big data and IoT investment, leading to more hyper-scale data centers.

AI and big data analytics require a high cooling power, encouraging many liquid immersion and cooling vendors to partner with OEMs to improve their offerings. Enterprises must leverage their IT infrastructure strategically and creatively to gain a competitive advantage. Immersion cooling effectively reduces power consumption while maintaining performance across high-density workloads like AI applications.

North America to Hold Significant Market Share

The data center investors are investing in direct-to-chip cooling and liquid immersion solutions. The emergence of 5G networks worldwide facilitates the importance of edge data centers, and the United States is among the earliest adopters of the technology. Many operators in the United States, such as EdgePresence, EdgeMicro, and American Towers, have started investing in these centers.

The mobile data traffic in the United States increased considerably over the years, from 1.26 exabytes per month of data traffic in 2017 to 7.75 exabytes per month of data traffic by 2022, as reported by Cisco Systems. According to Ericsson, this data traffic is expected to triple further by 2030. Thus, the distributed cloud that may secure the low latency and high bandwidth required to easily connect at such a scale is coming into action.

The United States is witnessing a substantial increase in internet usage. The country is the largest data center operations market, and it continues to expand due to the higher data consumption by end users. The popularity of the Internet of Things (IoT) is driving the US hyper-scale data center market, leading to additional facilities that can support exabytes of data generated by business users and consumers.

Switch partnered with Dell and FedEx to deploy edge data center facilities in the United States. DataBank, a colocation service provider, invested USD 30 million in EdgePresence, an edge data center provider in the United States, to collocate their customer workloads to edge centers to reduce latency in their services.

According to the Site Selection Group, a global location advisory provider, economic incentive, corporate real estate services, and air-cooled systems, it reached its maximum economic cooling capability in the region. As more data centers aim to pack racks to capacity, liquid cooling becomes a more viable solution.

Data Center Immersion Cooling Industry Overview

The market studied reflects high competitiveness and is expected to intensify further during the forecast period. Key players, including Fujitsu Limited, Green Revolution Cooling Inc., Submer Technologies SL, Liquid Stack Inc., and Asperitas Company, employ strategies like partnerships, collaborations, and acquisitions to fortify their product portfolios and secure sustainable competitive advantages.

November 2023 - Liquid Stack announced its new range of universal coolant distribution units (CDUs), which can be configured to support the most commercially available direct-to-chip (DTC) solutions. Suitable for AI, HPC, and advanced cloud computing applications, LiquidStack's universal CDU range delivers 800 kW to 1.5 MW of heat rejection and is designed specifically for DTC.

October 2023 - Intel and Submer collaborated in establishing a formidable foundation for single-phase immersion technology, which has achieved a groundbreaking advancement in the form of the Forced Convection Heat Sink (FCHS) package. Set to revolutionize data center cooling, the FCHS reduces the quantity and cost of components required for comprehensive heat capture and the dissipation of chips with thermal design power (TDP) exceeding 1000 W.

Additional Benefits:

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Contents

7 MARKET SEGMENTATION

7.1 By Type
  7.1.1 Single-Phase Immersion Cooling System
  7.1.2 Two-Phase Immersion Cooling System
7.2 By Cooling Fluid
  7.2.1 Mineral Oil
  7.2.2 Deionized Water
  7.2.3 Fluorocarbon-Based Fluids
  7.2.4 Synthetic Fluids
7.3 By Application
  7.3.1 High-Performance Computing
  7.3.2 Edge Computing
  7.3.3 Artificial Intelligence
  7.3.4 Cryptocurrency Mining
  7.3.5 Other Applications
7.4 By Geography***
  7.4.1 North America
  7.4.2 Europe
  7.4.3 Asia
  7.4.4 Australia and New Zealand
  7.4.5 Latin America
  7.4.6 Middle East and Africa

8 COMPETITIVE LANDSCAPE

8.1 Company Profiles*
  8.1.1 Fujitsu Limited
  8.1.2 Green Revolution Cooling Inc.
  8.1.3 Submer Technologies SL
  8.1.4 Liquid Stack Inc.
  8.1.5 Asperitas Company
  8.1.6 LiquidCool Solutions
  8.1.7 Midas Green Technologies
  8.1.8 Iceotope Technologies Ltd
  8.1.9 Wiwynn Corporation
  8.1.10 DCX Ltd

9 INVESTMENT ANALYSIS

10 FUTURE OF THE MARKET

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