Immersion Cooling In Data Centers - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019-2029

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Report description:

The Immersion Cooling Market in Data Centers Industry is expected to grow from USD 0.78 billion in 2024 to USD 2.34 billion by 2029, at a CAGR of 24.42% during the forecast period (2024-2029).

Dealing with high-density power consumption drives the market, as many industry estimates put cooling costs at around 40% of the data center's energy consumption. The immersion cooling is able to reduce the data center's energy usage by over 60%, with some systems stating it could be as much aooling 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.
-Liquid cooling is another commonly used method for heat management in data centers, alongside air cooling. However, liquid cooling is considered more beneficial than air cooling, as water is more efficient than air as a heat removal medium and may reduce cooling power needs by 70%.
-Technological advancements have made liquid cooling simple to maintain, easily scalable, and affordable. They have reduced liquid usage by more than 15% for data centers in built-in hot and humid climates and 80% in cooler areas. The energy dedicated to liquid cooling may be recycled to heat buildings or water, effectively shrinking the carbon footprint of air conditioning due to advanced engineering coolants.
-However, as the liquid is both corrosive and conductive with electricity, any type of breach or risk in the data center liquid cooling system can be dangerous for the facilities and systems. This presents a major challenge for the data center liquid cooling sector in the market studied.
-The COVID-19 pandemic hastened the adoption of digital technologies, increasing the need for cooling systems and data centers. Following the pandemic, data center operators started to consider immersion coding technology because of its advantages for sustainability and energy efficiency. Immersion coding developed and became more important in the data center sector as a result of increased industry investments and innovations with a higher focus on residence and sustainability. The usage of these

technologies is anticipated to grow as the digital economy continues to develop.

Data Center Immersion Cooling Market Trends

Edge Computing to Witness Major Growth

- Growing research and development in edge computing are creating new opportunities for establishing new data centers worldwide. Edge computing is altering the data storage and processing fields, driving the demand for a new generation of edge micro data centers and thereby increasing the demand for immersion cooling for these data centers.
- Immersion cooling helps reduce energy consumption in high-performance edge computing data centers. Companies in the Asia-Pacific region, especially in developing economies such as India, carefully consider the technologies and methods of cooling for their data centers to operate more efficiently. The construction of large data centers nationwide has increased investment in single-phase immersion cooling backed by hybrid silicone-organic fluids. Mineral oil is expected to enhance the data center's performance with its cooling ability and high thermal conductivity.
- With a rising demand for artificial intelligence, higher computing densities are emerging. Liquid immersion cooling is becoming a suitable option for increasing demand for AI at the edge, where traditional air cooling has much lower thermal conductivity than liquid. To cater to this situation, vendors offer their best-in-class liquid cooling technology, the fastest and least disruptive way to adopt liquid cooling for AI and edge computing.
- Overall, the deployment of large-scale edge computing data centers to cater to the growing fifth-generation (5G) networks, IoT, industrial IoT (IIoT) devices, autonomous vehicles, virtual and augmented reality, artificial intelligence, machine learning, and data analytics, has urged data center operators to opt for immersive cooling solutions to provide dramatic energy-saving benefits, augmenting market demand.

North America to Hold Significant Market Share

- North America is anticipated to hold a significant share in the immersion cooling market for data centers as it is an early adopter of newer technologies and is increasingly investing in liquid immersion and direct-to-chip cooling solutions. The emergence of AI and edge computing has further augmented the demand for data centers in North America.
- The United States is the largest market in data center operations and is continuously growing due to the higher data consumption by end-users. The popularity of the IoT is a significant driver for the US hyper-scale data center growth. Similarly, Canada continuously enhances its data center infrastructure solutions due to the substantial increase in power density across the region. According to Natural Resources Canada, around half of the energy consumed in a data center is utilized by computing servers, with a further 40% being attributable to cooling these servers.
- Liquid cooling becomes a more viable solution as more data centers aim to pack racks to capacity. The US-based 3M Company is a prominent provider of fluids related to immersion cooling technology. 3M Fluorinert liquids are much better than air and have the highest dielectric strength and electrical resistivity of all organic fluids. Unlike hydrocarbon liquids, such as mineral oil, 3M Fluorinert liquids are entirely fluorinated.
- In July 2023, Texas-based Midas Immersion Cooling LLC, an industry player in immersion cooling technology solutions for Bitcoin miners and Data Centers with the largest deployed single-phase immersion cooling capacity, announced that it has entered into a long-term supply agreement with Riot Platforms, Inc., an industry player in BTC mining and Data Center hosting. Midas has secured an initial order of 200 megawatts (MW) of its latest generation of immersion cooling systems and has designed the ASICE 2.0 immersion cooling systems in Texas for manufacturers in North America.
- In November 2022, US-based One Stop Systems Inc., an AI Transportable solutions provider, and TMGcore Inc., an innovator in

immersion cooling technology solutions, introduced a two-phase liquid immersion-cooled technology. The solutions leverage non-conductive, chemically inert, non-corrosive fluids, and their boiling point properties efficiently remove the heat from the electronics. This helps provide high performance in small form factors for AI-based applications. The two-phase liquid immersion-cooled supercomputer for AI transportable applications represents a new level of operating efficiency, compactness, ruggedness, and performance.
- Overall, North American investors are growing interested in immersion cooling products. The rise of 5G, IoT, AI, and edge computing has further highlighted the significance of data centers in the United States. Canada is continuously growing and providing more data center infrastructure solutions due to increased demand for power density across the region. Such data suggest a positive growth in the market adoption in North America during the forecast period.

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, are actively employing strategies like partnerships, collaborations, and acquisitions to fortify their product portfolios and secure sustainable competitive advantages.

In March 2023, Green Revolution Cooling Inc. announced Castrol's participation in GRC's ElectroSafe Fluid Partner Program, aimed at advancing single-phase immersion cooling fluids' performance. GRC's ElectroSafe liquid coolant range, available globally and utilized in twenty-two countries with GRC immersion cooling systems, offers high-performance, eco-friendly synthetic coolants extensively tested for quality. Within the program, Castrol and GRC jointly assess and collect fluid test data through a specialized protocol to optimize material compatibility, safety, and thermal efficiency. This collaboration expands the choices of trusted fluids for GRC's global clientele, catering to diverse data center needs.

Simultaneously, Asperitas and Intel collaborated on immersion cooling solutions, enhancing their service offerings for customers utilizing Intel products. They recently convened a panel during a Data Center Dynamics (DCD) broadcast featuring esteemed partners like Shell and Boston Ltd. The discussion highlighted the intelligent and systematic implementation of immersion cooling systems in data centers. The panel emphasized that immersion technology can streamline cooling deployments while minimizing threats to current and future uptime. It emphasizes the importance of education, training, and knowledge regarding the tank and its IT infrastructure.

Additional Benefits:

- The market estimate (ME) sheet in Excel format
- 3 months of analyst support

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