

Green Data Center Technologies Market Forecasts to 2034 – Global Analysis By Component (Cooling Solutions, Power Systems, Servers and Storage, Networking Equipment, and Monitoring and Management Software), Technology Type, Data Center Type, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Green Data Center Technologies Market is accounted for \$39.8 billion in 2026 and is expected to reach \$121.4 billion by 2034 growing at a CAGR of 15.0% during the forecast period. Green Data Center Technologies are energy-efficient infrastructure, systems, and operational practices designed to reduce the environmental impact of data centers while maintaining high computing performance. These technologies include advanced cooling systems, renewable energy integration, efficient power management, virtualization, and optimized hardware utilization. By lowering electricity consumption, reducing carbon emissions, and improving resource efficiency, green data center solutions enable organizations to run more sustainable IT operations while also decreasing operational costs and supporting long-term environmental sustainability goals.

Market Dynamics:

Driver:

Rising energy consumption and operational costs in data centers

Enterprises are increasingly adopting green technologies to reduce power usage effectiveness (PUE) and comply with corporate sustainability mandates. Traditional

cooling methods consume nearly 40% of a facility's energy, pushing operators toward liquid immersion and free cooling solutions. Government regulations targeting carbon emissions are further accelerating this transition. As hyperscale and edge data centers proliferate, the need for energy-efficient infrastructure becomes critical. This driver is compelling investments in AI-based energy management and renewable integration to lower both costs and environmental harm.

Restraint:

High initial capital expenditure for green retrofitting

Implementing green technologies such as liquid immersion cooling, advanced power systems, and renewable energy storage requires substantial upfront investment, which deters many operators. Existing brownfield data centers face particularly high retrofitting costs, including facility redesign and equipment replacement. Small and medium-sized enterprises struggle to justify these expenses despite long-term operational savings. The lack of standardized metrics for ROI on green investments further complicates decision-making. Additionally, integrating new technologies with legacy infrastructure can lead to downtime risks and compatibility issues. These financial barriers slow down the widespread adoption of sustainable solutions, especially in price-sensitive emerging markets.

Opportunity:

Expansion of AI-based energy management systems

Artificial intelligence is revolutionizing data center energy optimization by enabling predictive cooling, dynamic workload distribution, and real-time power adjustments. AI algorithms can analyze thousands of operational data points to reduce energy waste without compromising performance. This technology offers a significant opportunity for operators to achieve sub-1.1 PUE levels while extending equipment lifespan. As chip densities increase, traditional cooling fails, making AI-driven direct-to-chip cooling highly attractive. Major cloud providers are already deploying these systems, creating a blueprint for colocation and enterprise centers. The growing availability of AI-as-a-Service platforms lowers entry barriers, accelerating adoption across all data center types.

Threat:

Supply chain vulnerabilities for critical components

Green data center technologies rely on specialized components such as high-efficiency power semiconductors, advanced coolants, and rare earth metals for renewable energy systems. Geopolitical tensions and trade restrictions have disrupted the availability of these materials, leading to price volatility and extended lead times. The global shortage of microchips has particularly affected AI-based management controllers and smart sensors. Natural disasters and logistics bottlenecks further exacerbate delays in deploying green infrastructure. Without diversified sourcing strategies and localized manufacturing, operators face project postponements and increased capital costs. This threat undermines the rapid scaling needed to meet sustainability deadlines.

Covid-19 Impact

The pandemic accelerated digital transformation, boosting demand for cloud services and data center capacity while simultaneously disrupting supply chains for green components. Lockdowns delayed the installation of renewable energy systems and cooling retrofits in colocation facilities. However, remote work increased the urgency for energy-efficient operations as data traffic surged. Operators fast-tracked AI-based energy management to optimize loads with reduced onsite staff. Regulatory bodies temporarily relaxed compliance reporting, allowing faster testing of green innovations. Post-pandemic strategies now emphasize supply chain resilience, modular green designs, and edge data centers with integrated renewable microgrids.

The cooling solutions segment is expected to be the largest during the forecast period

The cooling solutions segment is expected to account for the largest market share during the forecast period, due to its critical role in reducing data center energy consumption, which traditionally accounts for up to 40% of total facility power. Advanced liquid immersion cooling and direct-to-chip technologies are replacing inefficient air-based systems, enabling higher rack densities and lower PUE ratings. Hyperscale operators are investing heavily in free cooling and rear door heat exchangers to meet sustainability targets. Rising chip thermal design power (TDP) from AI processors demands innovative thermal management.

The edge data centers segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the edge data centers segment is predicted to witness the

highest growth rate, driven by the proliferation of 5G, autonomous systems, and real-time analytics requiring localized processing. Edge facilities demand compact, modular, and highly efficient green technologies due to space and power constraints. Liquid cooling and AI-based energy management are being miniaturized for deployment in remote or urban edge locations. The rise in latency-sensitive applications like connected vehicles and smart manufacturing is boosting edge infrastructure investments. Emerging trends include prefabricated modular cooling units and renewable-integrated microgrids.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share, supported by aggressive sustainability pledges from hyperscalers and strong R&D in AI-based energy management. The U.S. and Canada are pioneering smart grid integration and direct-to-chip cooling innovations for high-performance computing. Regulatory bodies are offering tax incentives for green retrofits, encouraging faster commercialization. Major cloud providers are deploying free cooling and renewable microgrids across their data center fleets. The region also benefits from a mature venture capital ecosystem funding green tech startups.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR, fueled by rapid digitalization, hyperscale data center construction in China, India, and Southeast Asia, and government mandates for energy efficiency. Countries like Singapore and Japan are enforcing strict PUE regulations, accelerating green cooling adoption. Local manufacturing of energy storage systems and renewable integration is expanding. The region is also witnessing massive investments in colocation facilities with liquid immersion cooling.

Key players in the market

Some of the key players in Green Data Center Technologies Market include Schneider Electric SE, Vertiv Group Corp., Eaton Corporation, Siemens AG, Huawei Technologies Co., Ltd., Delta Electronics, Inc., Green Revolution Cooling (GRC), Asetek, Inc., Munters Group, Rittal GmbH & Co. KG, Johnson Controls International plc, Cooltera, Alibaba Cloud, Microsoft Corporation, and Google LLC.

Key Developments:

In March 2026, Schneider Electric in collaboration with NVIDIA and industrial software leader AVEVA has announced key advancements in designing, simulating, building, operating and maintaining the next generation of AI data center infrastructure during NVIDIA GTC in San Jose. They include a new NVIDIA Vera Rubin reference design that validates power and cooling for the latest NVIDIA rack-scale architectures, integration of advanced digital twin capabilities within the NVIDIA Omniverse DSX Blueprint and ecosystem, and early testing of agentic AI for data center alarm management services using NVIDIA Nemotron open models.

In March 2026, Siemens and Rittal have entered a strategic partnership to jointly develop future-proof, sustainable solutions for more efficient data center power distribution in the IEC market. The standardized infrastructure is intended to accelerate the construction of high-performance data centers, minimize time-to-compute, and address the rapidly increasing power densities of AI applications.

Components Covered:

Cooling Solutions

Power Systems

Servers and Storage

Networking Equipment

Monitoring and Management Software

Technology Types Covered:

Virtualization and Cloud Computing

Liquid Immersion Cooling

Direct-to-Chip Cooling

Rear Door Heat Exchangers

Free Cooling and Airside/Economization

Renewable Energy Integration

Energy Storage Systems

AI-Based Energy Management

Data Center Types Covered:

Hyperscale Data Centers

Colocation Data Centers

Enterprise Data Centers

Edge Data Centers

End Users Covered:

IT & Telecom

BFSI

Healthcare

Government & Defense

Retail & E-commerce

Media & Entertainment

Other End Users

Regions Covered:

North America

United States

Canada

Mexico

Europe

United Kingdom

Germany

France

Italy

Spain

Netherlands

Belgium

Sweden

Switzerland

Poland

Rest of Europe

Asia Pacific

China

Japan

India

South Korea

Australia

Indonesia

Thailand

Malaysia

Singapore

Vietnam

Rest of Asia Pacific

South America

Brazil

Argentina

Colombia

Chile

Peru

Rest of South America

Rest of the World (RoW)

Middle East

Saudi Arabia

United Arab Emirates

Qatar

Israel

Rest of Middle East

Africa

South Africa

Egypt

Morocco

Rest of Africa

What our report offers:

Market share assessments for the regional and country-level segments

Strategic recommendations for the new entrants

Covers Market data for the years 2023, 2024, 2025, 2026, 2027, 2028, 2030, 2032 and 2034

Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)

Strategic recommendations in key business segments based on the market estimations

Competitive landscaping mapping the key common trends

Company profiling with detailed strategies, financials, and recent developments

Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

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