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Fuel Cell for Data Center Market Forecasts to 2030 – Global Analysis By Type (Solid Oxide Fuel Cells (SOFC), Proton Exchange Membrane Fuel Cells (PEMFC), Molten Carbonate Fuel Cells (MCFC), Alkaline Fuel Cells (AFC), Phosphoric Acid Fuel Cells (PAFC) and Other Types), Data Center Type, Capacity, Function, Fuel Type and By Geography

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Abstracts

According to Stratistics MRC, the Global Fuel Cell for Data Center Market is accounted for $187.30 million in 2024 and is expected to reach $492.93 million by 2030 growing at a CAGR of 17.5% during the forecast period. An energy generation device called a fuel cell for data centers generates electricity through electrochemical reactions; giving data centers a dependable and sustainable power source. Fuel cells provide a cleaner alternative to conventional diesel generators by converting fuels like hydrogen or natural gas into electricity with the by-products of heat and water. By providing both primary and backup power, these systems guarantee continuous service and lower the carbon footprint of data center operations, which is in line with the tech sector's sustainability objectives.

According to the Edge Delta, the amount of data generated is around 120 zettabytes, which includes 337,080 petabytes (PB) of daily data generation.

Market Dynamics:

Driver:

Growing demand for reliable power

Data centers are essential for supporting digital infrastructure, thus it's necessary to have a steady supply of power. Fuel cells are a desirable substitute for conventional power sources like diesel generators, which can be prone to malfunctions and inefficiency. Fuel cells offer consistent, dependable power with little downtime, which is essential for avoiding interruptions in cloud computing, telecommunications, and data storage. They are ideal for backup power since they also provide a greater degree of resilience against grid failures. Fuel cells are becoming more and more popular as the need for data centers grows worldwide because to its affordability, sustainability, and dependability in providing continuous service.

Restraint:

Lack of hydrogen infrastructure

Reliability of the hydrogen supply chain is essential for hydrogen fuel cells, a vital data center power source that is still in its infancy in many areas. The extensive use of hydrogen-powered fuel cells in data centers is constrained by the complicated and expensive distribution, storage, and transportation of hydrogen. Data center operators may also face logistical challenges if there are no refuelling stations or facilities for producing hydrogen. Fuel cells' cost-effectiveness and operating efficiency will be constrained until hydrogen infrastructure is expanded and made more widely available, which will prevent them from becoming a widely used power source.

Opportunity:

Increasing data center growth

The need for data storage, cloud services, and processing power is growing quickly due to the global acceleration of digital transformation, which is driving the development of additional data centers. To meet the constant need for electricity while preserving uptime and reducing carbon footprints, these facilities need strong, dependable, and energy-efficient power solutions. By offering on-site, sustainable power generation that reduces dependency on the grid and backup generators, fuel cells present an alluring alternative. Data centers are using fuel cells as part of their energy strategy due to the growing emphasis on sustainability and the demand for reliable power sources, which is propelling the market's expansion.

Threat:

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Fuel source dependency

The proper operation of fuel cells, especially those powered by natural gas or hydrogen, depends on a steady and dependable supply of fuel. This reliance can lead to operational concerns and possible disruptions in areas with inadequate hydrogen infrastructure or unreliable natural gas supplies. Furthermore, changes in fuel prices brought on by supply chain interruptions or geopolitical issues may raise operating expenses, which would reduce the appeal of fuel cells in comparison to alternative energy sources. The extensive use of fuel cells in data centers is constrained by this reliance on fuel sources, especially in regions where other energy sources are more affordable or widely available.

Covid-19 Impact

The COVID-19 pandemic had a mixed impact on the Fuel Cell for Data Center market. On one hand, the global disruption of supply chains and economic uncertainty delayed investments in new energy solutions, including fuel cell systems. On the other hand, the increased reliance on digital infrastructure during the pandemic heightened the demand for more resilient, sustainable, and reliable power sources for data centers. This shift has accelerated the adoption of fuel cells as data centers focus on ensuring continuous, eco-friendly power in a rapidly growing digital landscape.

The cloud data centers segment is expected to be the largest during the forecast period

The cloud data centers segment is estimated to be the largest, due to as cloud services expand globally, data centers face increasing demands for reliable, scalable, and energy-efficient power solutions. Fuel cells provide a sustainable alternative to traditional power sources, offering high reliability and low emissions. Their ability to run on renewable fuels like hydrogen and natural gas aligns with the green energy goals of cloud providers, pushing the adoption of fuel cell technology in these critical infrastructure facilities.

The biogas segment is expected to have the highest CAGR during the forecast period

The biogas segment is anticipated to witness the highest CAGR during the forecast period, due to the increasing demand for sustainable and renewable energy solutions. Biogas, derived from organic waste, offers an eco-friendly alternative to traditional fossil fuels, aligning with the data center industry's push toward reducing carbon footprints.

Fuel cells powered by biogas provide reliable, continuous power with minimal emissions, making them an attractive option for data centers aiming to enhance energy security while meeting environmental regulations and sustainability goals.

Region with largest share:

Asia Pacific is expected to have the largest market share during the forecast period due to the region's growing emphasis on sustainability. Countries like China, India, and Japan are expanding their data center infrastructure to support the demand for cloud services and big data. Fuel cells offer reliable, energy-efficient, and low-emission power solutions, aligning with the region's stringent environmental regulations and commitment to reducing carbon footprints. Additionally, government incentives for green technologies further promote fuel cell adoption in data centers across the region.

Region with highest CAGR:

During the forecast period, the North America region is anticipated to register the highest CAGR, owing to the increasing demand for dependable, affordable, and sustainable energy solutions. Reducing carbon footprints and adhering to strict environmental standards are top priorities as data center operations expand to serve cloud computing and digital infrastructure. An appealing alternative are fuel cells, which provide a clean, effective power source with little emissions and little maintenance. The emphasis on energy independence and government incentives also hasten the deployment of fuel cell technology in data centers across North America.

Key players in the market

Some of the key players profiled in the Fuel Cell for Data Center Market include Bloom Energy, FuelCell Energy, Inc., Ballard Power Systems, Plug Power, Doosan Fuel Cell, Hexis AG, SFC Energy, Ceres Power Holdings, Panasonic Corporation, Toshiba Corporation, McPhy Energy, Cummins Inc., Viessmann Group, AFC Energy, Nedstack Fuel Cell Technology, Nel ASA, PowerCell Sweden AB, Green Hydrogen Systems, and Smart Energies.

Key Developments:

In October 2023, Bloom Energy introduced its advanced solid oxide fuel cell technology for large-scale data centers, offering an energy-efficient solution to reduce carbon emissions while providing uninterrupted power. The new technology aims to meet the increasing demand for clean energy in data-intensive industries.

In July 2023, Plug Power unveiled its green hydrogen fuel cell solutions designed specifically for powering data centers. These systems offer high energy efficiency, lower emissions, and the ability to integrate with renewable energy sources, aligning with sustainability goals of major data center operators.

In April 2023, Doosan launched its Hydrogen and Biogas Fuel Cell Solutions targeted at powering data centers. The new fuel cells are designed to enhance power reliability, provide sustainable energy, and reduce operational costs for data centers.

Types Covered:

- Solid Oxide Fuel Cells (SOFC)
- Proton Exchange Membrane Fuel Cells (PEMFC)
- Molten Carbonate Fuel Cells (MCFC)
- Alkaline Fuel Cells (AFC)
- Phosphoric Acid Fuel Cells (PAFC)
- Other Types

Data Center Types Covered:

- Co-location Data Centers
- Corporate Data Centers
- Cloud Data Centers
- Telecommunication Data Centers
- Internet Service Providers (ISPs)
- Government Establishments

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Educational and Research Institutions

Server Farms

Other Data Center Types

Capacities Covered:

Small (Up to 100 kW)

Medium (100 kW to 1 MW)

Large (Above 1 MW)

Functions Covered:

Primary Power Source

Backup Power Source

Peak Shaving

Combined Heat and Power (CHP)

Fuel Types Covered:

Natural Gas-Based Fuel Cells

Hydrogen Fuel Cells

Biogas

Regions Covered:

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North America

- US
- Canada
- Mexico

Europe

- Germany
- UK
- Italy
- France
- Spain
- Rest of Europe

Asia Pacific

- Japan
- China
- India
- Australia
- New Zealand
- South Korea
- Rest of Asia Pacific

South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & 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 2022, 2023, 2024, 2026, and 2030
- 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

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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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Note: Tables for North America, Europe, APAC, South America, and Middle East & Africa Regions are also represented in the same manner as above.

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