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DC Circuit Breaker - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2024 - 2029)

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Abstracts

The DC Circuit Breaker Market size is estimated at USD 4.93 billion in 2024, and is expected to reach USD 7.35 billion by 2029, growing at a CAGR of 8.32% during the forecast period (2024-2029).

Key Highlights

Over the medium period, factors such as the rise of an influx of renewable sources in the energy mix, rising adoption of HVDC transmission, and the upgradation and modernization of aging infrastructure are expected to drive the market in the forecast period.

On the other hand, a rise in the stability of electricity supply, thereby reducing the need for circuit breakers, is likely to restrain the growth of the DC circuit breaker market in the coming years.

Nevertheless, the focus has increased on investments in clean energy projects and the development of the renewable energy sector. As a result, the extensive development of new renewable projects and rising electricity usage is likely to create an excellent opportunity for the DC circuit breaker market in the future.

DC Circuit Breaker Market Trends

Solid-State Segment Expected to Dominate the Market

Solid-State DC circuit breaker replaces traditional parts of electromechanical circuit breakers with advanced software algorithms and semiconductors that may control

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power and interrupt power systems faster within a few microseconds than electromechanical ones that utilize a few milliseconds. In the case of internal fault, energy storage systems and electrical DC grid services are strongly affected by downtime. A solid-state DC circuit breaker may help disconnection of fault zones rapidly and prevent the system's shutdown.

In addition, a solid-state DC circuit breaker may interrupt DC current without generating an arc and is maintenance-free. The tripping and switch units are solid-state, which meets precise protection requirements, and it uses an emitter turn-off (ETO) thyristor as the switch, which contains a cathode, anode, and three gate electrodes.

The growth of renewable energy installations such as wind and solar power has driven the development of HVDC transmission. It is a crucial technology to connect various AC grids and economical transmission of large-capacity renewable energy over long distances, especially in remote areas.

According to the International Renewable Energy Agency, the world's total renewable energy installed capacity accounted for 3371.79 GW in 2022, an annual growth rate of 9.6% compared to the previous year.

Further, a DC short-circuit fault is a significant challenge to the HVDC transmission system as it may cause damage to the power converter and other electrical instruments, so a solid-state DC circuit breaker is used in these systems as a key technology so it may quickly switch off faulty lines and keep the voltage in acceptable ranges.

Moreover, the solid-state DC circuit breaker is faster, more flexible, and more continuous than the mechanical DC breaker, which costs less. It covers less topology than the hybrid DC circuit breaker.

Furthermore, a solid-state DC circuit breaker is also used in ships as the power supply is through DC grids in most marine vessels. A solid-state DC circuit breaker interrupts short-circuit current in microseconds, preventing arcing, and covers less topology.

Overall, the solid-state DC circuit breaker segment is expected to grow due to increasing investment in the HVDC transmission and distribution industry, primarily in regions with significant renewable energy adoption, such as Europe, North America, and Asia-Pacific, coupled with increasing power consumption among the marine industry.

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Asia-Pacific to Dominate the Market

The Asia-Pacific region is expected to witness substantial demand for DC circuit breakers, primarily due to the growth in electricity demand across the region and the related requirement of electrical infrastructure.

Environmental pollution is among the significant world concerns, and countries in Asia-Pacific such as China and India are among some of the largest producers of greenhouse gases across the globe.

Government bodies across countries in the Asia Pacific region have initiated numerous strategies to gradually reduce carbon emissions by increasing investments in the research and development of renewable energy sources. For instance, the installed solar capacity in Asia-Pacific grew from 96.66 GW in 2015 to 624.97 GW in 2020.

The rapid rise in the adoption of solar energy is attributed to the declining cost of solar energy equipment, which has been fuelled by continuous research and development initiatives and scaling of production activities in the region.

For instance, in February 2022, China's National Energy Administration announced that it had revised the target of increasing the share of renewable energy in China's energy mix to 25% by 2025, in line with the government's objectives to achieve carbon neutrality by 2060.

Numerous projects in China are being constructed and are expected to boost the country's demand for DC circuit breakers. For instance, In July 2022, the National Development and Reform Commission of China announced a plan for new-build public buildings and factories in towns and cities to be covered at 50% by solar panels by 2025, which is expected to be a significant driver for the solar energy market in the country.

In March 2022, the Chinese government announced that it is planning to construct numerous electric vehicle charging stations across the country to support the growing demand for electric vehicles across the country. For instance, in 2021, approximately 3 million new energy vehicles were sold and exported from China.

Further, the Government of India has also initiated numerous strategies to increase the

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adoption of renewable energy sources in the country.

For instance, to follow the green revolution in the country, the Indian government aims to 500 GW of installed renewable energy by 2030, which includes the installation of 280 GW of solar power and 140 GW of wind power.

Therefore, owing to the above points, Asia-Pacific is expected to dominate the market during the forecast period.

DC Circuit Breaker Industry Overview

The DC circuit breaker market is fragmented. Some of the key players in this market (not in any particular order) include ABB Ltd, Eaton Corporation PLC, Mitsubishi Electric Corporation, Fuji Electric Co Ltd, and Siemens AG., among others.

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