

# **HVDC Converter Station Market – Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018–2028 Segmented By Configuration (Monopolar, Multi-Terminal, BI-Polar, Back-To-Back), By Application (LCC, VSC), By Power Rating (Below 500 MW, >500–1000 MW, >1000–1500 MW, >1500–2000 MW, Above 2000 MW), By Component (Valve, Others), By Region and Competition**

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## **Abstracts**

Global HVDC Converter Station Market is expected to thrive during the forecast period, 2024-2028 due to increase in renewable energy penetration into the grid.

HVDC converter station is simply called as converter station. This is a special type of substation that constitutes the terminal of a high voltage direct current (HVDC) transmission line. Its converts direct current to alternating current or reverse current. These conversion stations are primarily used to transmit more power over long distances and convert direct current (DC) to alternating current (AC) or vice versa. HVDC converter stations are commonly used for power transmission from sustainable energy sources such as wind energy. From remote areas to urban areas. Power losses associated with HVDC converter station during transmission are exceptionally low. Due to growing concerns about carbon emissions from power generation using conventional methods. This has increased the use of HVDC conversion stations.

The HVDC converter station uses thyristor valves to perform the conversion from AC to DC and vice versa. Valves are usually arranged as 12-pulse converters. The valve is connected to the AC network via a converter transformer. The valves are usually

located inside the building and the converter transformers are located outside. The power transmitted via HVDC transmission is controlled by a control system. By adjusting the trigger timing of the thyristor valves, a desired combination of voltage and current in the DC system can be obtained. A conversion station requires a few other devices such as circuit breakers, current transformers, transformers, surge arresters, etc.

HVDC converter stations are specialized substations that support the conversion of power from high voltage alternating current (AC) to high voltage direct current (HVDC) or vice versa and are key components for connecting discrete power systems. The HVDC project consists of two stations, Kiwatinok and Riel. Kiwatinok Station is located in the far north of Manitoba, about 45 kilometers north of Gillam, Manitoba. Riel Station is located on the outskirts of Winnipeg. The substation has a transmission capacity of 2,000 megawatts (MW), enough to meet more than 40 percent of the state's peak power demand. HVDC transmission has much lower power losses than conventional AC transmission, so power must be transported over long distances from remote areas where power is generated to urban areas and industrial centers where it is needed.

#### Wide Use is Expected to Drive the Global HVDC Converter Station Market

Power system stability in long-distance transmission has always been a major concern. Trends in the HVDC converter market show that disruptions caused by power outages can lead to economic losses and affect consumers' livelihoods. Due to various technological advances, HVDC technology is increasingly being used to transmit more power over long distances. The development of converters has improved the reliability of transmission networks. As a result, HVDC transmission lines cost less than HVAC transmission lines at the same transmission capacity.

HVDC systems connect continental and island regions (e.g. the UK and Europe) and offer the possibility of connecting regions separated by different power systems or large bodies of water. It is used to connect power grids that have different frequencies or that have problems maintaining frequencies. Reduced power loss in long-distance transmission - HVDC systems do not suffer from transmission line reactive power problems that limit transmission capacity in HVAC technology. It can transmit more power over long distances at a lower cost compared to AC high voltage power lines. Power generation from renewable generation areas is a great advantage of HVDC where this technology is used in offshore areas.

#### Latest projects fueling the Global HVDC Converter Station Market Growth

In 2023, Invenergy Transmission's project, Grain Belt Express, selected Siemens Energy to supply high-voltage direct current (HVDC) transmission technology for Phase 1 of its 800-mile project. Grain Belt Express will provide 100% clean, affordable home power to homes and businesses in Kansas, Missouri, Illinois, Indiana, and other Midwestern states. With a capacity of 5,000 megawatts, this line is the most powerful line ever developed in the United States, connecting regions of the grid that power 40 percent of US homes. Phase 1 of the project will include HVDC transmission lines extending approximately 530 miles between substations in Kansas and Missouri. Grain Belt Express Enables Transmission Lines and Renewable Energy Generation are expected to 22,300 direct jobs created during construction, representing a total of USD 20 billion in new infrastructure investment. Siemens Energy shall support the final integrated design of HVDC converter stations in Ford County, Kansas and Monroe County, Missouri under preferred supplier agreements. Grain Belt Express and Siemens Energy are partners in engineering, procurement, and construction of HVDC converter stations. Invenergy Transmission has already secured land control for substation packages in Kansas and Missouri. Grain Belt Express will be ready to begin its full construction of Phase 1 by the end of 2024, provided the conditions are met.

In 2021, Mersen has signed a contract worth more than USD 2 million with a Chinese company, RongXin HuiKo Electric (RXHK) for the Bay Area of the Guangdong-Hong Kong-Macau Large Power Supply Project. Mersen provided approximately 28,000 cold plates to protect the power modules integrated into two flexible high voltage HVDC converter stations. These new conversion stations are designed to connect the power grids of the Toko and Zengcheng districts and are believed to be the largest ever built station in the world. They ensure the security of the Greater Bay Area's power supply, thereby promoting the region's economic and social development. The group was selected after a month's long bidding process for the perfect guarantee of reliability required for this type of equipment used in particularly demanding environments and conditions. The delivery date was scheduled for March to October 2021.

On December 15, 2022, Aker Solutions signed a contract with Allseas for the transportation and installation of the Boreas high voltage direct current (HVDC) converter station. Aker Solutions and Siemens Energy will provide the grid connection infrastructure for the Norfolk Boreas offshore wind farm. Norfolk Boreas, 47 kilometers off the Norfolk Coast, is Phase 1 of the Norfolk Offshore Wind Zone in Vattenfall with a capacity of 1.4 GW. Allseas has transport and

installation capabilities for two of her similar HVDC platforms for the adjacent Norfolk Vanguard wind farm pending an investment decision from Vattenfall. When fully operational, the wind farm is expected to generate enough renewable electricity to power about 4.6 million homes and save about 6 million tons of CO<sub>2</sub>. The Boreas, Vanguard East, and Vanguard West platforms will be equipped with HVDC conversion technology. Tops weigh between 10,000 and 11,300 tons and jackets around 3,000 tons.

As part of the transmission solution for the Champlain Hudson Power Express (CHPE) HVDC interconnection between Quebec, Canada, and the New York City metro area, the United States, Hitachi Energy announced in 2022 that it had been chosen by Transmission Developers Inc. According to New York's Climate Leadership and Community Protection Act (CLCPA), which targets for the state to be powered by 70 percent renewable energy by 2030, the link will allow the transportation of clean, renewable hydropower between Canada and New York. CHPE is anticipated to reduce CO<sub>2</sub> emissions by an average of 3.9 million metric tonnes annually, which is the same as removing 44 percent of New York City's passenger automobiles. CHPE will transport up to 1,250 megawatts of electricity, which is sufficient to power 1 million homes in New York, using Hitachi Energy's HVDC Light® technology. The link will effectively transfer energy from Hertel, Canada, via Lake Champlain and the Hudson River to an HVDC converter station in Astoria, Queens, a distance of more than 600 kilometres (372 miles).

## Market Segmentation

Global HVDC converter station market is segmented based on configuration, application, power rating, component, and region. Based on configuration, the market is bifurcated into monopolar, multi-terminal, bi-polar, and back-to-back. Based on application, the market is further bifurcated into LCC and VSC. Based on power rating, the market is bifurcated into new below 500 MW, >500–1000 MW, >1000–1500 MW, >1500–2000 MW, and above 2000 MW. Based on Component, the market is bifurcated into valve and others. Based on region, the market is further bifurcated into North America, Asia-Pacific, Europe, South America, and Middle East & Africa.

## Market player

The major players in the global HVDC converter station market are Hitachi Energy Ltd,

Siemens Energy AG, Bharat Heavy Electricals Limited, GE Grid Solutions LLC, Mitsubishi Electric Corporation, Toshiba Corporation, NR Electric Co. Ltd, Crompton Greaves Ltd, C-EPRI Electric Power Engineering Co. Ltd, and ABB Ltd.

Report Scope:

In this report, the Global HVDC Converter Station Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

HVDC Converter Station Market, By Configuration:

Monopolar

Multi-Terminal

BI-Polar

Back-To-Back

HVDC Converter Station Market, By Application:

LCC

VSC

HVDC Converter Station Market, By Power Rating:

Below 500 MW

>500–1000 MW

>1000–1500 MW

>1500–2000 MW

Above 2000 MW

HVDC Converter Station Market, By Component:

Valve

Others

HVDC Converter Station Market, By Region:

North America

United States

Canada

Mexico

Asia-Pacific

China

India

Japan

South Korea

Australia

Europe

Germany

United Kingdom

France

Spain

Italy

## South America

Brazil

Argentina

Colombia

## Middle East

Saudi Arabia

South Africa

UAE

## Competitive Landscape

**Company Profiles:** Detailed analysis of the major companies present in the Global HVDC Converter Station Market.

## Available Customizations:

With the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

## Company Information

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