

transpower – pioneer in transport
of wind energy at sea

Throughout Germany, the percentage of electricity generated from renewable energy sources is supposed to reach 25 to 30 by the year 2020. This is where wind energy from offshore wind farms is expected to contribute substantially. Since December 2006, transpower has been legally required to construct and operate grid connections for offshore wind farms. In 2007, the subsidiary transpower offshore gmbh was founded specifically for this purpose. It plans, creates and maintains the necessary grid connections in the German North Sea and in parts of the Baltic Sea. Then, the transpower stromübertragungs gmbh again takes on both the feeding of wind energy into the German extra-high voltage grid and the network control.



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Grid connection of wind farms
in the North Sea and Baltic Sea

transpower provides
connection

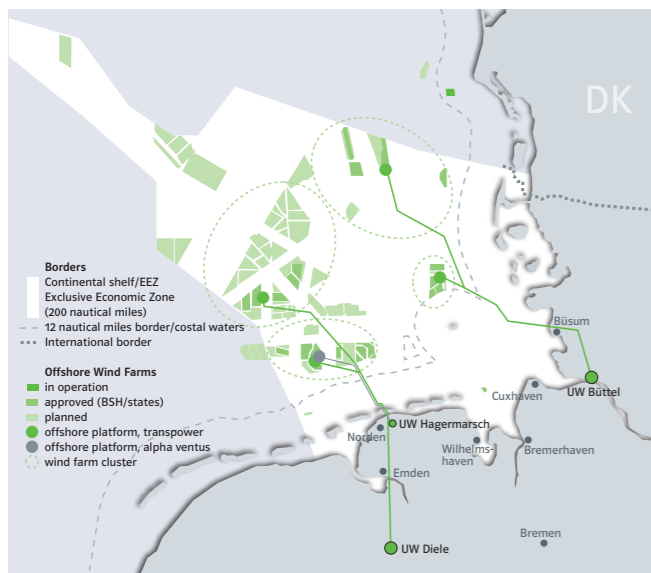
Energy
from sea to land

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Wind farms Connection

Direct current connection



Germany's first offshore wind park connected

In spring of 2009, transpower completed the first connection of an offshore wind farm. "alpha ventus" was linked to the onshore grid by a single 110 kV three-phase alternating current (AC) connection. The wind farm is located 45 kilometres north of Borkum. The cable from the wind farm at sea to the point of delivery in the transformer station Hagermarsch is about 70 kilometres. It runs across the island of Norderney and the Lower Saxony Wadden Sea National Park and links up with the E.ON Netz's 110-kV-grid. Already in 2007, transpower undertook underground horizontal drilling on four occasions to protect the Lower Saxony Wadden Sea National Park under the dunes and levees of Norderney and near Hilgenriedersiel for the connection of alpha ventus. In spring of 2008, a 1.5 kilometres long hollow ducting construction was completed across Norderney to house the cable connection for alpha ventus. During the summer of 2008, the land cables were laid first, followed later by laying the undersea cable using special vessels. At the same time, transpower constructed the new transformer station Hagermarsch.

Connection of additional wind parks by "Outlets" at sea

Given the distances in the North Sea and the necessary transmission performance, direct current transmission systems are the preferred solution to connect the planned, remote wind farms to the grid in a way that is as environmentally friendly and efficient as possible. transpower provides a transformer station on an offshore platform. The wind farms are connected here, just like hooking up to a power outlet. From there, the electricity generated by the wind energy plant is converted into direct current and transported through the sea and across land by a so-called high-voltage direct current line (HVDC) to the next on-shore point of delivery in a transformer station. From there, the direct current is reconverted into alternating current and then fed into the grid.

The world's longest direct current connection from a wind farm at sea to land

transpower currently realizes the world's longest direct current connection between an offshore wind farm and the extra-high voltage grid with a length of 200 kilometres in the project BorWin1. The wind farm 125 kilometres off the shore will get a high-performance grid connection, enabling them to feed large quantities of wind energy into the grid. This cable connection from the platform to the transformer station Diele includes about 75 kilometres of land cable and 125 kilometres of sea cable. Here again the hollow ducting construction is used for laying cables on the island of Norderney. Aside from the cables for alpha ventus, these buried empty pipes house the direct current cables for BorWin1. In the future, cables for the connection of additional wind farms will be fed through these

ducts. With the exception of the required horizontal drilling, there will be no further construction work needed on Norderney.

Cable laying on land and at sea

The land transmission route from Hilgenriedersiel to Diele is about 75 kilometres long. In May 2008, transpower began work for the northern part of the landline connection from Hilgenriedersiel to the transformer station Diele. During the summer of 2008, additional horizontal drilling for the pull through of the first direct current cable system occurred on the island of Norderney and in Hilgenriedersiel. In the fall of 2008, one passed under the river Ems by a 1,330 m long horizontal drilling. During spring of the same year, the southern part of the landline connection followed. In summer of 2009, transpower lays some 125 kilometres of undersea cable. The transformer station Diele was developed and reconstructed at the same time. There, the direct current is retransformed to alternating current and fed into the 380-kV-grid.