DolWin epsilon

The offshore converter station for DolWin5

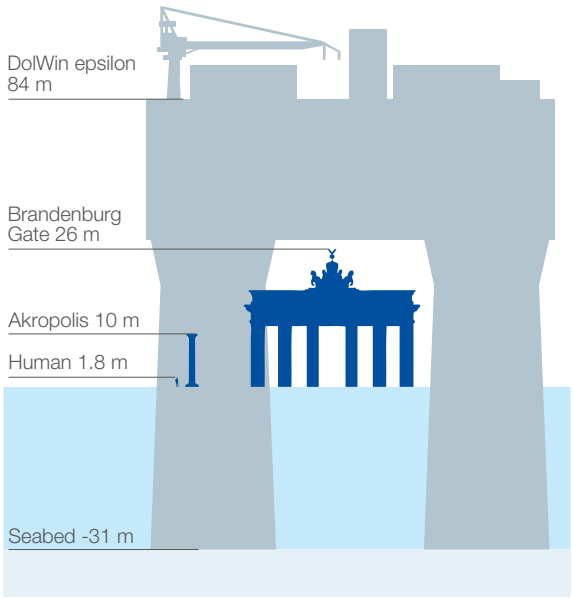
TenneT develops and operates offshore grid connections to transport electricity generated by offshore wind farms in the Dutch and German North Sea to the mainland. One of these projects is DolWin5, in which a new direct connection is being realised for the first time as a technical connection concept. Together with its industry partners Aibel and Seatrium, TenneT is implementing the DolWin epsilon platform, the centrepiece of DolWin5.

aibel Seatrium TenneT

About the platform

When completed, DolWin epsilon will be able to receive power from offshore wind farms and to convert high voltage alternating current (HVAC) to HVDC before sending it to the onshore converter station via subsea cables. The onshore converter station will then convert the HVDC back to HVAC and transmit it to the grid.

DolWin5 also opens a new chapter in offshore grid connection technology: for the first time, the so-called 66-kilovolt direct connection is being used. The wind farms transmit the electricity directly to TenneT's converter platform. Firstly, this eliminates the transformer stations that were previously necessary in each wind farm. On the other hand, 155-kilovolt three-phase cables are no longer required to connect TenneT's offshore platform to that of the wind farm.

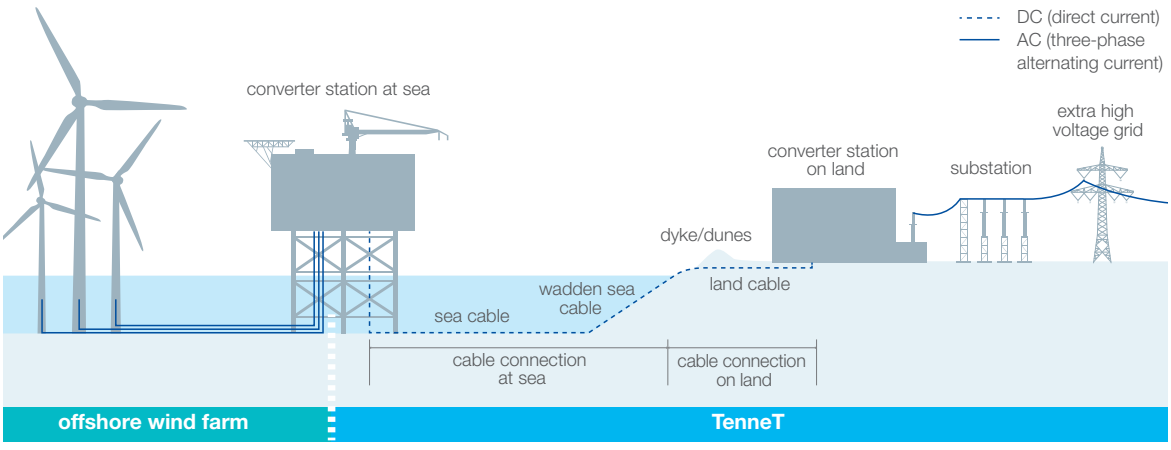


Design and features

The consortium consisting of Aibel and Seatrium (previously named Keppel FELS) developed a platform together with TenneT, which is now being transported from Singapore to Norway. In Haugesund (Norway), it will then undergo final technical fitting at Aibel before being towed out to the North Sea and installed in the summer of 2024.

The most important features:

- The transmission capacity is 900 megawatts. In terms of pure arithmetic, this can supply more than 1.1 million households with electricity.
- In addition to the converter plant, the platform will have accommodation for 50 people, a helipad, a crane and lifeboat.
- Monitoring and operational management of the mostly unmanned platform is carried out by TenneT's control room, while maintenance and servicing work takes place directly on the platform.
- Similar to the DolWin beta, the concept utilised in the new platform, DolWin epsilon, is the Aibel patented 'Gravity Base Structure' anchored to the seabed by gravity alone. It is developed from Aibel's long experience from semi-submersible floating platforms for the oil and gas sector.



Installation method

DolWin epsilon uses the concept of a self-installing, gravity-based structure. The platform is slowly lowered to the seabed by ballasting the four steel legs with water. The water is then completely replaced by gravel to permanently secure the platform.

Since no piles have to be driven into the seabed for anchoring, the installation will be quiet and thus gentle on marine animals. Moreover, when such a platform reaches the end of its service life, the ballast can be removed from the hull and the complete platform towed back to a harbour and dismantled there.

Indicative dimensions and weights

DolWin epsilon was designed for a water depth of about 31 metres.

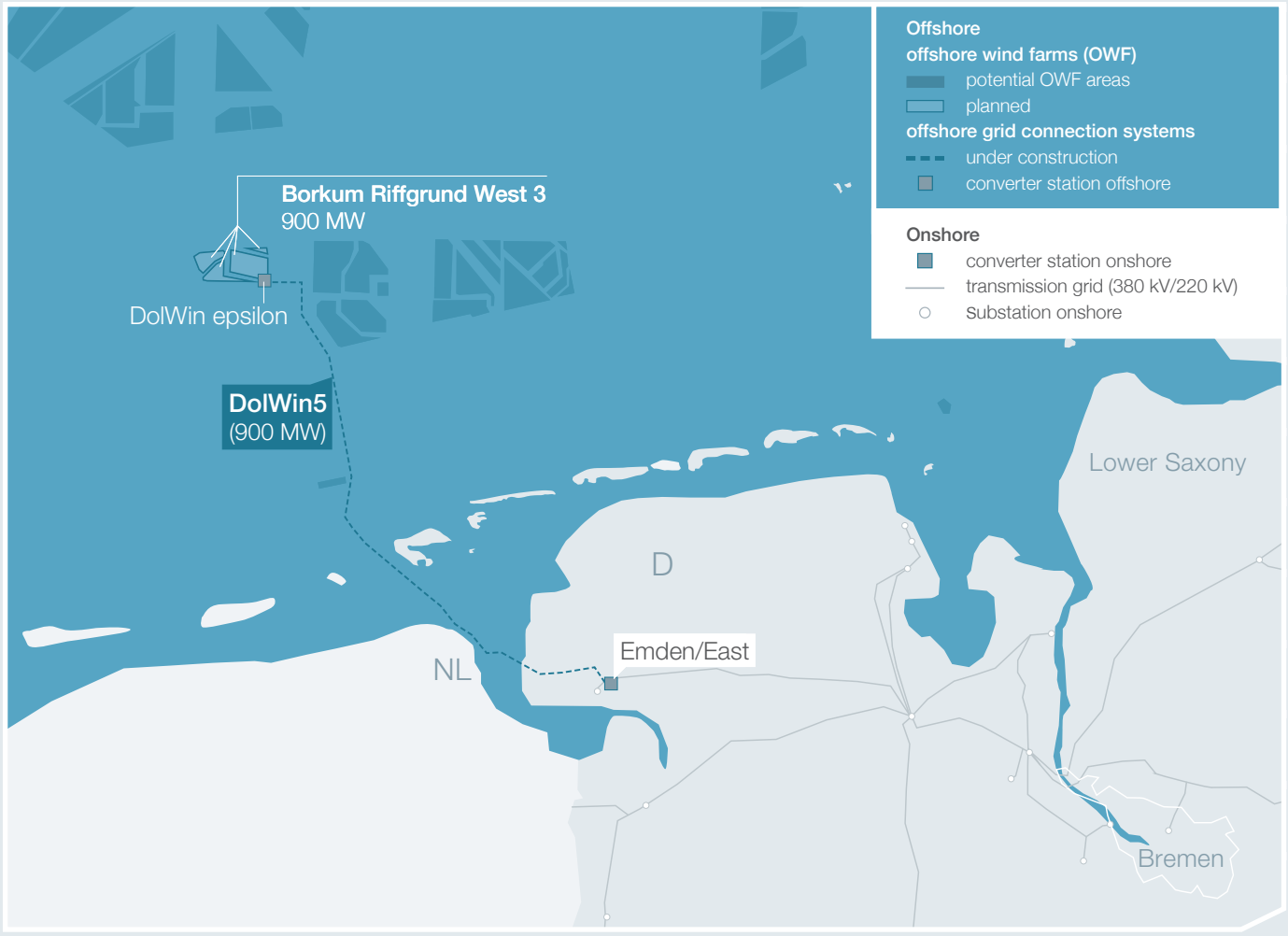
Topside

Height:	84 metres
Length:	82 metres
Width:	73 metres
Weight:	11,450 tons

Substructure

Gravity Based Structure with four legs

Weight:	12,100 tons



TenneT is a leading European grid operator committed to a secure and reliable electricity supply - 24 hours a day, 365 days a year. We are shaping the energy transition for a sustainable energy future. As the first cross-border transmission system operator, we plan, build and operate over 25,000 kilometres of high and extra-high voltage grid in the Netherlands and Germany and are one of the largest investors in national and international electricity grids, on land and at sea. Every day, our 8,300 employees give their best and ensure with responsibility, courage and networking that more than 43 million end consumers can rely on a stable power supply.
Lighting the way ahead together

Aibel builds and maintains platforms and other critical infrastructure for the energy industry. The company holds a leading position within the European offshore wind industries and electrification of offshore oil and gas installations and onshore processing plants. Aibel is one of the largest suppliers on the Norwegian continental shelf and a full-range supplier of innovative and sustainable solutions. More than 4,700 employees work at the company's offices in Norway, Thailand and Singapore. In addition, Aibel owns two modern yards in Haugesund, Norway, and in Laem Chabang, Thailand, with significant prefabrication and construction capacity.

Seatrium Limited (formerly Sembcorp Marine Ltd and renamed as Seatrium Limited following its merger with Keppel Offshore & Marine Limited) provides innovative engineering solutions to the global offshore, marine and energy industries. Headquartered in Singapore, the Group has 60 years of track record in the design and construction of rigs, floaters, offshore platforms and specialised vessels, as well as in the repair, upgrading and conversion of different ship types. The Group's key business segments of Oil & Gas Newbuilds and Conversions; Renewables and New Energies; Specialised Shipbuilding; and Repairs & Upgrades provide a diverse suite of products and services, with a growing focus on sustainable solutions to advance the global energy transition and maritime decarbonisation. As a premier global player offering offshore renewables, new energy, and cleaner offshore & marine solutions, Seatrium is committed to delivering high standards of safety, quality, and performance to its customers who include major energy companies, owners of floating production units, shipping companies and cruise and ferry operators. Seatrium operates shipyards and other facilities in Singapore, Brazil, China, Indonesia, Japan, the Philippines, Norway, the United Kingdom and the United States.

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