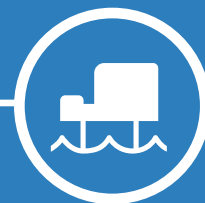


DolWin kappa

The offshore converter station for DolWin6



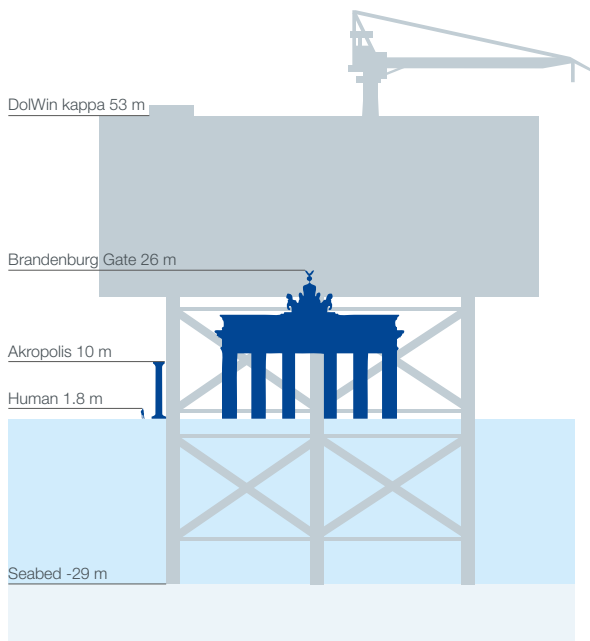
TenneT develops and operates an offshore grid that transports electricity generated by offshore wind farms off the Dutch and German North Sea wind areas to the mainland. At present (status April 2022), TenneT's offshore grid offers a transmission capacity of 8,532 megawatts (MW) – providing green wind energy for roughly 10.6 million households. With its strong and reliable partners, TenneT is driving the energy transition and securing the supply of green energy – for today and tomorrow. Together with its industry partners Siemens Energy and Dragados Offshore, TenneT is implementing the DolWin kappa platform, the centrepiece of DolWin6.



About the platform

Since expanding the offshore grid is crucial for ensuring the security of supply, more systems need to be built. DoWin6 is one of these connections. Its offshore centrepiece will be DoWin kappa, a high-voltage direct current converter platform at sea, built in Cádiz, Spain.

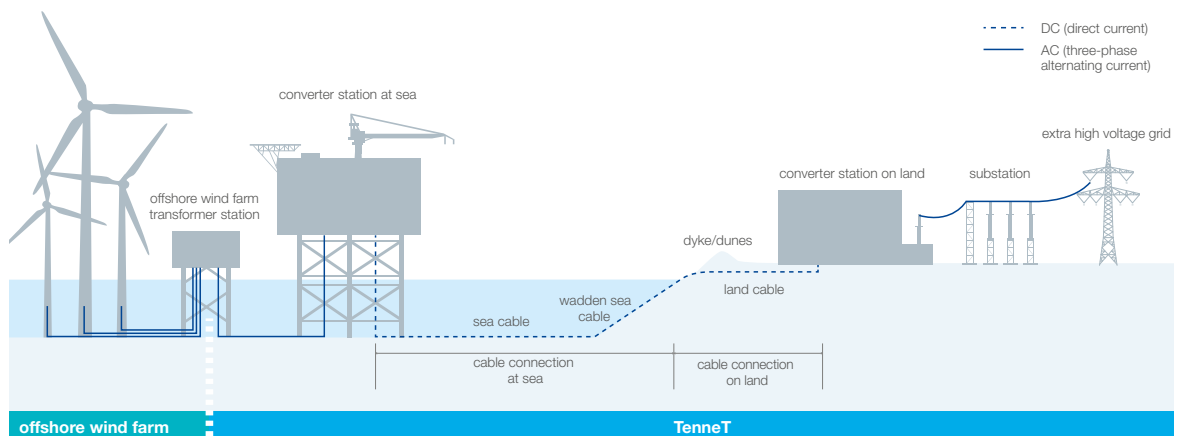
The offshore converter station will transform power generated by offshore wind turbines – from 155 kilovolts (kV) high-voltage alternating current (HVAC) to 320 kV high-voltage direct current (HVDC) – before it is transported via a subsea cable to an onshore converter station. The platform will be bridge-linked to the existing DoWin beta platform to strengthen logistic synergies between both platforms.



Design

Siemens Energy and Dragados Offshore developed a platform together with TenneT that now has been built and delivered by Dragados Offshore. It features the following standards and characteristics:

- Highest safety standards – shown by a zero-harm policy.
- A basic transmission capacity of 900 MW.
- An efficient, sustainable and well-considered design, e.g. no additional accommodations and no helicopter landing pads, as synergies are being used with DoWin beta.
- Monitoring and operational management are being conducted from TenneT's Grid Operations Centre. During maintenance projects, these activities take place on the platform.
- A direct 10 kV cable connection between the two platforms DoWin beta and DoWin kappa makes having permanent diesel generators on the DoWin kappa platform superfluous.
- Siemens Energy is supplying all of the technology needed for efficient HVDC transmission and will use a compact DC switchgear for the first time with the DoWin kappa platform. The new gas-insulated switchgear for 320 kV requires up to 95 percent less space compared to previous air-insulated solutions. By using this switchgear on an offshore platform, the size of the platform itself can be reduced by up to 10 percent.





Construction method

The topside (superstructure) and the jacket (substructure) are built separately on land and will be installed on site offshore. Piles will solidly anchor the jacket in the seabed.

Structure

The platform consists of three components from top to bottom:

- The topside is 31.6 metres high and contains the technical components including transformers, converters, safeguards and the switchgear.
- The jacket (steel supporting structure) reaches to 21.45 metres above sea level (the maximum wave height plus a safety margin).
- Piles up to 80 metres long will be driven into the seabed.

Indicative dimensions and weights

DolWin kappa was designed for a water depth of about 29 metres.

Topside (superstructure)

Consists of three interior levels (main, utility, control decks) and an outer deck (roof deck).

| | |
|---------|------------------------------|
| Height: | 31.6 metres |
| Length: | 77.5 metres |
| Width: | 36.5 metres |
| Weight: | 11,297 tonnes gross, in situ |

Jacket (substructure)

Including cable deck and J-tubes.

| | |
|---------|-----------------------------|
| Height: | 43.7 metres |
| Length: | 54.3 metres |
| Width: | 32.3 metres |
| Weight: | 5,250 tonnes gross, in situ |

Piles

| | |
|---------------------|-----------------|
| Number: | 10 |
| Length: | max. 80 metres |
| Pile driving depth: | 55 to 68 metres |
| Weight: | 380 tonnes each |



TenneT is a leading European grid operator. We are committed to providing a secure and reliable supply of electricity 24 hours a day, 365 days a year, while helping to drive the energy transition in our pursuit of a brighter energy future – more sustainable, reliable and affordable than ever before. In our role as the first cross-border Transmission System Operator (TSO) we design, build, maintain and operate 24,500 kilometres of high-voltage electricity grid in the Netherlands and large parts of Germany, and facilitate the European energy market through our 16 interconnectors to neighbouring countries. We are one of the largest investors in national and international onshore and offshore electricity grids, with a turnover of EUR 6.4 billion and a total asset value of EUR 32 billion. Every day our 6,600 employees take ownership, show courage and make and maintain connections to ensure that the supply of and demand for electricity is balanced for over 42 million people.

Lighting the way ahead together

Siemens Energy is one of the world's leading energy technology companies. The company works with its customers and partners on energy systems for the future, thus supporting the transition to a more sustainable world. With its portfolio of products, solutions and services, Siemens Energy covers almost the entire energy value chain – from power generation and transmission to storage. The portfolio includes conventional and renewable energy technology, such as gas and steam turbines, hybrid power plants operated with hydrogen, and power generators and transformers. More than 50 percent of the portfolio has already been decarbonized. A majority stake in the listed company Siemens Gamesa Renewable Energy (SGRE) makes Siemens Energy a global market leader for renewable energies. An estimated one-sixth of the electricity generated worldwide is based on technologies from Siemens Energy. Siemens Energy employs around 91,000 people worldwide in more than 90 countries and generated revenue of EUR 28.5 billion in fiscal year 2021.

Dragados Offshore S.A. was founded in 1972 and is a leading engineering, procurement, construction, installation, and commissioning (EPCIC) contractor to the oil, gas, and offshore renewable energy industries, successfully delivering projects worldwide from its yards operated in Spain and Mexico. Its five decades of experience in both offshore platform projects and modular onshore installations give Dragados Offshore a solid track record, ensuring clients that their most complex and challenging projects will be successfully planned, executed, and delivered. Dragados Offshore is a solutions-based company, with an agile and efficient corporate structure that allows flexibility to tailor project execution to the specific needs of each client while ensuring safety, quality and on-time delivery. Since January 2022, Dragados Offshore is part of Cobra IS, the new business division of the VINCI group.

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