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First building blocks of Belgian energy island successfully placed in the North Sea

VLISSINGEN (NL) – NORTH SEA (BE) | Construction has begun in the Belgian North Sea on the Princess Elisabeth Island, an artificial energy island located 45 km off the coast. After a successful sea transport operation, the first two of a total of 23 caissons have been submerged at their final location. Caissons are concrete building blocks that form the outline of the future island. In a later phase, the interior will be filled with sand to build high-voltage infrastructure that will connect new offshore wind farms. The work is being carried out on behalf of grid operator Elia Transmission Belgium (Elia) by TM Edison, a consortium of Belgian marine construction companies DEME and Jan De Nul. In the coming decades, the energy island will become an essential part of Belgium's electricity supply.

Complex maritime operation

The transport and installation of the caissons at sea is a technically complex operation that began on Easter Monday, 21 April 2025. Each caisson weighs approximately 22,000 tons and measures 58 meters in length, 28 meters in width, and between 23 and 32 meters in height, depending on the presence of a storm wall. For the transport from the port of Vlissingen—where they are built—four powerful tugboats are used to tow each caisson via the Western Scheldt and the North Sea to the island site; covering a distance of approximately 53 nautical miles or 98 kilometres. The complete installation cycle—from departure from the port to placement and fixation at the final destination—takes about 24 hours.



Figure 1: Sea transport route

Once at its destination, the caisson is connected to pre-installed anchors and positioned above the foundation zone (see Figure 2). Advanced surveying techniques, continuous monitoring, and precise tidal measurements ensure that the concrete structure is lowered with great precision. The caisson is then filled with water, allowing it to descend to the seabed in a controlled and stable manner.



This is followed by the next construction phase: placing rock armour around the submerged caisson to protect it against potential summer storms, filling the caisson with sand, and preparing for the installation of the next caisson. Finally, the opening between the caissons is sealed to prevent sand from escaping later when the interior surface is filled.



Figure 2: Positioning of the first caisson via eight anchor points for stable lowering

Close monitoring of risks and weather conditions

The operation involves about ten vessels, including four tugboats, a multicat vessel, and dredging, transport, and installation ships. In total, around 150 people are participating. The operation requires extremely precise planning and is carried out in close collaboration with the Rescue and Coordination Centre (MRCC) in Ostend, the Joint Nautical Authority and North Sea Port. Emergency procedures, maritime evacuation plans, and strict communication protocols have been developed according to the highest safety standards. All involved have been trained accordingly.

The transport and placement of the caissons at sea are also highly dependent on tidal movements and weather conditions. The operation only proceeds if waves do not exceed 1.5 metres and wind speeds remain below 5 Beaufort. Two independent weather forecasting services and multiple buoy measurements provide real-time monitoring.

Technological achievement

The successful placement of the first caissons marks an important milestone in the construction of the Belgian energy island. It also demonstrates the expertise of Belgian companies in complex marine engineering works. In the coming months, the east side of the island will first be completed, after which work will begin on the south side. The speed of progress depends entirely on weather conditions.



Belgium's electricity hub at sea

The Princess Elisabeth Island will be a crucial link in connecting future offshore wind farms in the Belgian North Sea. It is both technologically and economically the most efficient way to significantly expand Belgium's offshore electricity production and reduce dependency on fossil fuels. The project is therefore of major strategic importance and will be a key factor in Belgium's electricity supply over the coming decades. In the longer term, the project also offers opportunities to integrate Belgium into a unified European electricity grid at sea. The Princess Elisabeth Island is one of the flagship projects of the Federal Development Plan for the Belgian high-voltage network, which was approved by the federal government in 2023.

The construction of the island and the implementation of the already signed <u>alternating current</u> (HVAC) contracts are continuing without interruption. Two of the three future offshore wind farms -or 60% of the new Princess Elisabeth Wind Zone – will thus be completed.

Due to the price increase for high-voltage <u>direct current</u> (HVDC) infrastructure, the decision on the final contracts for the Princess Elisabeth Island has been delayed. Elia is indeed carrying out the project within a legal framework but remains attentive to growing concerns over the rising costs of HVDC technology. This delay is not without consequences but provides extra time to evaluate the current design against alternative concepts in a changing market context.

Elia and the relevant federal authorities have been discussing this matter for some time, with the aim of supporting a well-founded political decision when it is made.



A first video impression of the placement of the initial caissons at sea can be viewed via this link: <u>https://youtu.be/0FRpcwhHtts</u>



About Elia Group

One of Europe's top five TSOs

Elia Group is a key player in electricity transmission. We ensure that production and consumption are balanced around the clock, supplying 30 million end users with electricity. Through our subsidiaries in Belgium (Elia) and the north and east of Germany (50Hertz), we operate 19,460.5 km of high-voltage connections, meaning that we are one of Europe's top 5 transmission system operators. With a reliability level of 99.99%, we provide society with a robust power grid, which is important for socioeconomic prosperity. We also aspire to be a catalyst for a successful energy transition, helping to establish a reliable, sustainable and affordable energy system.

We are making the energy transition

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By expanding international high-voltage connections and incorporating ever-increasing amounts of renewable energy into our grid, we are promoting both the integration of the European energy market and the decarbonisation of society. We also continuously optimise our operational systems and develop new market products so that new technologies and market parties can access our grid, thus further facilitating the energy transition.

In the interest of society

As a key player in the energy system, Elia Group is committed to working in the interest of society. We are responding to the rapid increase in renewable energy by constantly adapting our transmission grid. We also ensure that investments are made on time and within budget, with a maximum focus on safety. In carrying out our projects, we manage stakeholders proactively by establishing two-way communication channels between all relevant parties very early on in the development process. We also offer our expertise to different players across the sector in order to build the energy system of the future.

International focus

In addition to its activities as a transmission system operator, Elia Group provides consulting services to international customers through its subsidiary Elia Grid International. In recent years, the Group has launched new non-regulated activities such as re.alto - the first European marketplace for the exchange of energy data via standardised energy APIs - and WindGrid, a subsidiary which will continue to expand the Group's overseas activities, contributing to the development of offshore electricity grids in Europe and beyond.

The legal entity Elia Group is a listed company whose core shareholder is the municipal holding company Publi-T.

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