NATO-L: Technical Feasibility and Initial Engineering Framework

The North Atlantic Transmission One-Link (NATO-L) is a large-scale energy infrastructure initiative designed to connect North America and Western Europe through one or more bundles of high voltage direct current (HVDC) subsea cable. The project aims to establish a dedicated corridor for carbon-free electricity transmission between allied nations, leveraging complementary renewable energy profiles on each side of the Atlantic, hydropower and wind resources in north-eastern America, and diversified generation assets across Europe. Beyond its clean energy objectives, NATO-L is positioned as a strategic response to growing energy security concerns among Western democracies, offering supply diversification and resilience at a time when energy resources are increasingly subject to geopolitical risk.

Jan De Nul – "World Builders shaping water, land and energy" – is a global leader in the construction of marine and offshore infrastructure. Jan De Nul's in-house team undertook a scoping assessment across nine topic areas: early-stage seabed and geophysical surveys; route optimisation and corridor selection; seabed terrain and geological risk management; seismic risk assessment and mitigation; environmental and oceanographic risk; cable protection and burial strategies; sectional cable laying and jointing strategy; repair and recovery capability in deep and remote waters; and installation vessels and payload capacity.

The assessment is structured around the four principal risks that underpin every major subsea cable project: Design, Depth, Distance and Damage.

NATO-L targets an offshore construction start in 2035, a financial investment decision in the early 2030s, and full operational ramp-up by 2040. Routing work was based on a 525 kV HVDC cable system, the highest voltage class currently in commercial service, with a 4,000 m water depth limit as the key subsea cable engineering constraint. NATO-L is separately pursuing an 800 kV solution in active discussion with the major cable OEMs.

Preliminary Route Assessment

Four cable routes were evaluated, each staying within the 4,000 m engineering depth ceiling that governs HVDC cable installation in the early 2030s.

Recommended route: Sept-Îles (Québec) – Princess Elisabeth Island (Belgium).

- ~40% of the route lies above 200 m water depth (burial and protection required); ~60% lies between 200 m and 4,000 m (cable laid on the seabed without burial).
- The route exits Québec via the mouth of the St. Lawrence River, heads east across the Atlantic Ocean, transits around the British Isles and connects into the Princess Elisabeth Island.
- Jan De Nul is currently constructing Princess Elisabeth Island, a key enabler for the development of future offshore grids in the North Sea, serving as an offshore energy hub that integrates large-scale wind generation and facilitates future international interconnections.
- The follow-up desktop study should formally evaluate the updated landing-point matrix: Sept-Îles (Québec), Halifax (Nova Scotia) and St. John's (Newfoundland and Labrador) on the Canadian side; Belgium, Denmark and Scotland on the European side.

Figure 1: Bathymetry profiles for all four proposed routes.

Delivery Feasibility & Fleet Capability

With its diverse and extensive fleet, Jan De Nul is uniquely positioned to successfully deliver unprecedented projects such as the proposed NATO-L interconnection. Each individual delivery step required for the recommended route is within current or near-term industry capability. Vessel capability is not a constraint, but some further subsea cable assurance will be required to meet the needs of this project.

Figure 2: Jan De Nul's newest subsea cable-lay sister vessels (left) and supporting fleet line-up (right).

Vessels

- Fleeming Jenkin and William Thomson, the world largest subsea cable-laying vessels, are designed to install subsea HVDC power cables to depths of 4,000 m. The vessels will be delivered in the fourth quarter of 2026 and the first quarter of 2027, respectively, and will thus be operational well before the 2035 offshore construction start. Each sister vessel has a cable carrying capacity of 28,000 tonnes.
- In addition to cable-lay vessels, Jan De Nul owns and operates a diverse and extensive fleet of supporting vessels, such as trenching support vessels for the deployment and recovery of burial tools, subsea rock installation vessels and multi-purpose vessels, required to support complex offshore construction works.

Technical Cable Gap

- No HVDC submarine cable has yet been certified for the static and dynamic tensile loads encountered at 4,000 m water depth.
- Increasing the operating voltage level from currently commercially available 525 kV up to 800 kV will require a customer-driven engagement programme with the major cable OEMs in Europe and Asia to advance type-testing and certification on a schedule consistent with the 2035 construction start.

Fault Detection & Repair

- Today’s fault detection technologies are inadequate to mitigate the risk of cable faults for ultra-long deepwater HVDC cable systems. We have identified mitigation pathways which require more work in the years ahead.
- Repair fleet: Jan De Nul offers a unique spread of capable repair vessels including Fleeming Jenkin, William Thomson and Connector which are equipped with work-class ROVs rated up to 4,000 m.

A more comprehensive version of this document can be obtained after signing a NDA.