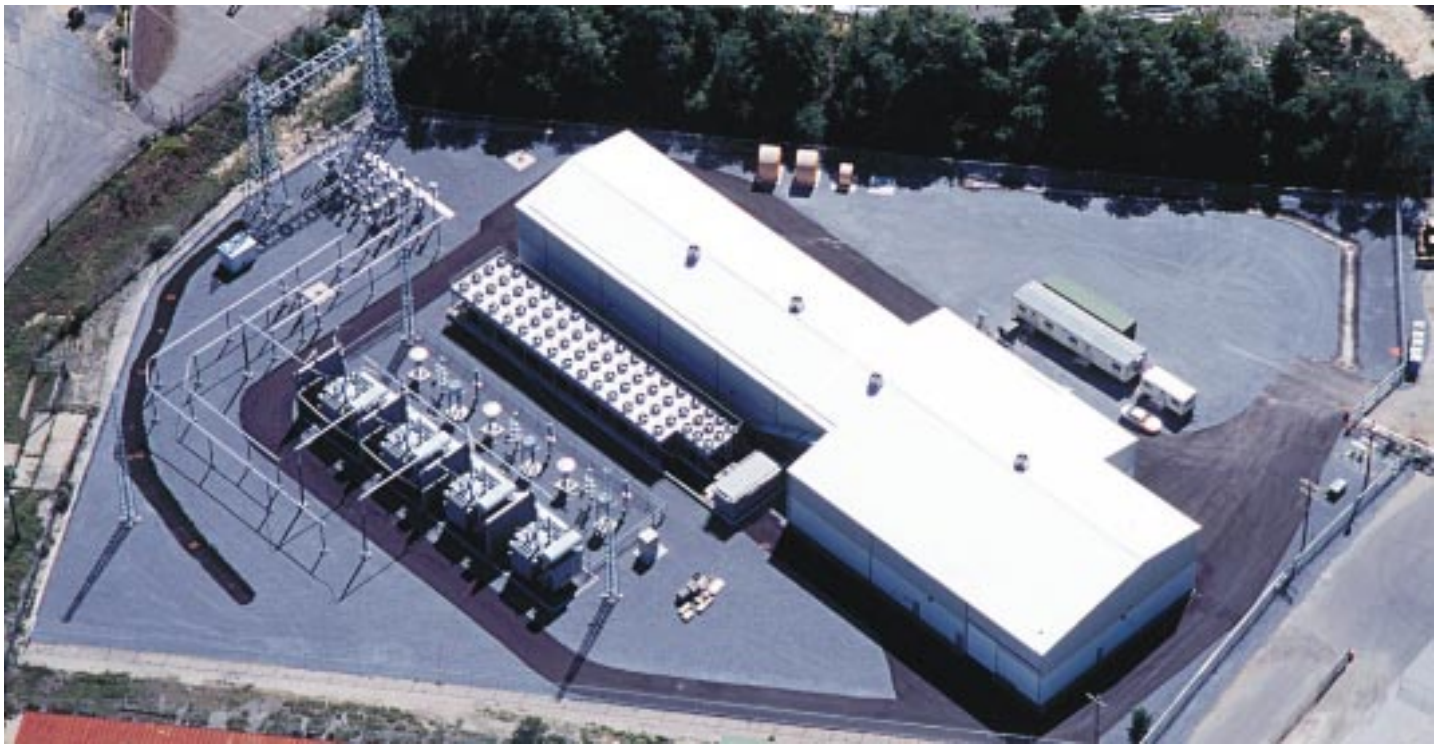
Cross Sound Cable Interconnector

Connecticut and Long Island, USA



Background

The Cross Sound Cable

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Since the beginning of the 1970s there have been plans to build an HVDC cable across the Long Island Sound to link the New England grid to that of Long Island. The Long Island grid has only been connected to the US main grid through New York City and through a small interconnection in southwest Connecticut. Concerns about the potential environmental impact of such an interconnector, especially on the delicate aquatic ecosystem, have prevented previous schemes from gaining the required statutory approvals. With the environmentally friendly HVDC Light™ technology from ABB an independent transmission provider, TransÉnergie U.S. Ltd, finally implemented the plans.

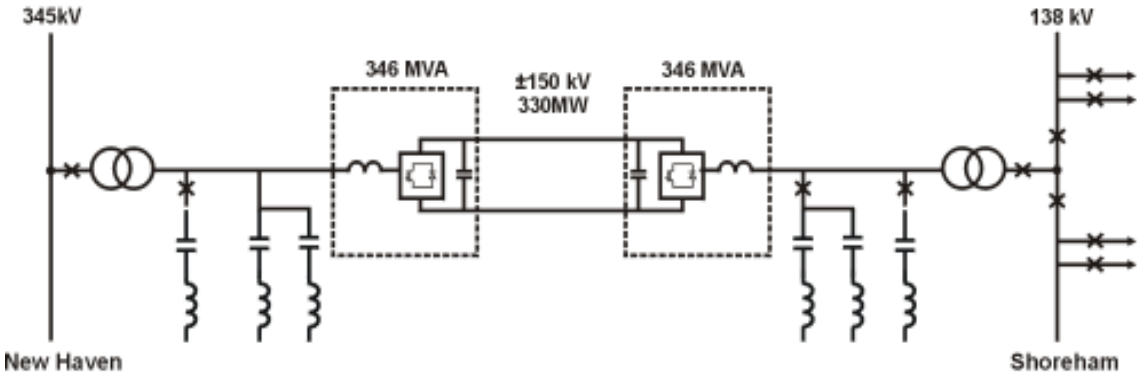
The Cross Sound Cable Interconnector is a 330 MW, 24-mile (40 km) long high-voltage direct current (HVDC), buried submarine cable system that connect the electric transmission grids of New England and Long Island, New York. The Cross Sound Cable Interconnector provides additional power transfer capability between New Haven, Connecticut and Shoreham, Long Island, in either direction. The Cross Sound link is expected to improve the reliability of power supply in the Connecticut and New England power grids and allow increased sharing of power plant capacity, thereby reducing the amount of power plant capacity each must have for a particular winter or summer. The connection is also designed to promote competition in the New York and New England electricity markets by enabling electricity to be traded among power generators and customers in both regions.

The Project

The Cross Sound Cable Project is a new strategic initiative designed to link the Long Island and New England power grids with an environmentally sensitive, state-of-the art, submarine cable system, HVDC Light™, that will create new and competitive sources of electricity for both regions. The project developer is TransÉnergie U.S. Ltd., with corporate headquarters in Westborough, Massachusetts and is a wholly owned U.S. subsidiary of Montreal-based Hydro Quebec.

The Cross Sound Cable HVDC Light project is a merchant-based, Independent Transmission Project (ITP) which appropriately allocates risks and rewards in an open market competitive environment. This project is privately developed, without electric customer funding, thereby placing the financial burden on the developer of the Cross Sound Cable.

No new right-of-way was needed. Cable landfalls and other facilities are located on existing waterfront utility property. Upland construction was minimal, impacts to marine and coastal resources were short term and localized, and the plastic-insulated cables contain no insulating fluid to leak if broken. The direct current technology used in transmitting the power on the cables does not emit electro magnetic fields (EMF) commonly associated with AC cables and overhead lines. Once installed, the narrow cable corridor returned to the natural seabed profile and poses no impediment to sea-life.



The Cross Sound HVDC Light transmission schematic

Main system components

Grid connections

The Cross Sound Cable system interconnects in Connecticut with the New England 345 kV electric transmission system at New Haven, adjacent to the United Illuminating Company's existing East Shore Substation, and in New York with the Long Island 138 kV electric transmission system adjacent to the decommissioned Long Island Power Administration's (LIPA) Shoreham Nuclear Power Station.

Each land-based facility comprises a bi-directional HVDC Light™ converter with the ability to transfer 330 megawatts (MW). Short land cables interconnect the respective facility to the cable landfalls at New Haven Harbor and Shoreham, Long Island.

Main data	
Rated power	330 MW
DC voltage	± 150 kV
DC current	1200 A
AC system voltage (60Hz)	
New Haven	345 kV
Shoreham	138 kV
AC filters	
Harmonic tuning orders	21st, 25th and 41st
IGBT valves	
Valve type	Three level
Cooling system	Water and glycol
Transformers	
Rated power	360 MVA
Voltage ratios	
New Haven	345/191.5 kV
Shoreham	138/191.5 kV
HVDC Light cables	
Length	2 x 40 km
Cross section	1300 mm^2, Cu
Outer diameter	98 mm
Weight	30 kg/m
Fiber optic cable	
Length	40 km
Number of fibers	192

The HVDC Light™ converter stations

The HVDC Light™ converter stations contain voltage source converters (VSC) employing state-of-the-art turn-on/turn-off insulated-gate bipolar transistor (IGBT) power semiconductors.

This technology does not rely on the AC network's ability to maintain a stable voltage and frequency. Instead, through its rapid and precise control of both the active and reactive power, the HVDC Light™ can, irrespective of the active power flow, stabilize the voltage in each of the connected AC networks. An ability that increases during AC network voltage reductions.

HVDC Light™ stations are compact, need little space and can easily blend into the local surroundings. Much of the equipment is installed in enclosures at the factory, which minimizes construction and testing time.

The stations are designed to be unmanned and virtually maintenance free with operation either carried out remotely or even partly automated.

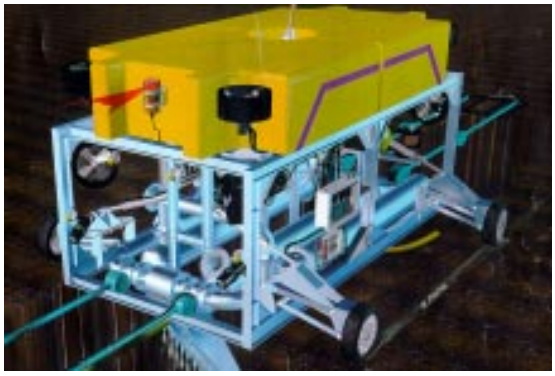
The Cable

The HVDC Light power cable is a polymer insulated, extruded cable, specifically adapted for direct current. It contains no insulating or cooling fluids and its strength and flexibility makes it well suited for severe installation conditions both as an underground land cable and as a submarine cable.

The two HVDC Light™ power cables and the fiber optic cable crossing under New Haven Harbor and the Long Island Sound were laid bundled together to minimize the impact on the sea bottom. The cables were buried up to six feet into the sea floor to give protection against fishing gear and ships anchors. The jet-plow uses jets of water to fluidize bottom sediments, creating a narrow trench within which the cable system can be laid. The cables settle via gravity into the trenches then the fluidized sediments quickly settle around the cable after the plow has passed. The seabed bottom returns naturally to pre-construction contours.

The Cross Sound HVDC Light cable, triple-extruded polymer insulation system.

The cable was precisely laid on the seabed in the first crossing of the Sea Spider, a ship specially designed for submarine cable installation.



The Smartjet plow fluidized the seabed with pressurized water placing the cable six feet under the seabed.

After the huge blackout in August 2003, a federal order allowed the first use of the Cross Sound Cable Interconnector. The cable interconnection was a great part of the success of getting Long Island out of the dark, and restore power to hundreds of thousands of customers across Long Island.

LIPA Chairman Richard Kessel heralded Cross Sound Cable as a "national symbol of how we need to enhance our infrastructure".

ABB Power Technologies
Power Systems
SE-771 80 Ludvika, Sweden
Tel: +46 240 78 20 00
Fax: +46 240 61 11 59
www.abb.com/

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