

Connecting wind farms by HVDC Light®

HVDC Light® is a state-of-the-art power system designed to transmit power underground and underwater. It offers numerous environmental benefits, such as “invisible” power lines, neutral electromagnetic fields, oil-free cables and compact converter stations. These benefits make it possible to connect wind farms far away from the AC network without distance limitations or constraints on the AC grid.

Your needs – Our response

The demand for large wind farms far away from shore creates the need for higher power and longer transmission connections than before. Often the connection points will be in a weak part of the grid and power quality and voltage stability criteria need to be fulfilled.

Environmental restrictions on overhead power lines in coastal areas are common, thus making the option of undersea and underground cables attractive.

Underground HVDC Light® transmission is not only economically feasible, but meet these special needs.

Customer Value

In 1999 ABB installed the Gotland HVDC Light® underground transmission system that connected the wind farm in the south of Gotland with a remote load centre. The project has demonstrated the following values:

- Reliable grid connection
 - Facilitates grid connections in remote areas without need for grid reinforcements
 - “Ride-through-capability” in case of grid faults
 - AC grid enhancements
- Can connect any type of windmill technology
- Easier permit procedure
 - Underground invisible cable system
 - Environmental friendly oil-free cables
 - Short installation and implementation time
 - Environmentally adapted converter stations
- Low project risk by
 - Easy permitting
 - Short construction and commissioning time
 - Minimizing time from decision to commercial operation
- Flexible, modular systems
 - Can easily be built or expanded to multi terminal system
 - Modular systems can be staged and installed to meet capacity demand
 - Comprehensive factory testing and fast installation
 - Short installation and implementation time
- Compact, environmentally adapted converter station design
 - Reduction of station foot-print
 - Lower costs for land and civil works



Middlegrund wind farm, Denmark

- Health Safety and Environment (HSE) impact
 - Twin cable installation neutralizes magnetic fields
 - Enclosed equipment gives efficient noise suppression
- Low operation and maintenance costs

Scope of supply

- Feasibility studies to facilitate customer’s business development process, including optimization of the entire project/system
- System analysis and network studies
- Engineering and project management
- State of the art HVDC Light® technology including turnkey supply of
 - Converter stations with compact, light-weight offshore module design
 - Light-weight, oil-free cables
- Quality assurance ensures the customer systems, operations, and maintenance staff receives proper training and documentation for a smooth transfer at Take Over
- Maintenance Support with short response thanks to remote diagnostics from supplier home base

ABB – pioneers of HVDC

ABB pioneered HVDC technology 50 years ago when the company built the world’s first commercial high-voltage direct current transmission link in Sweden. Building on this world first, ABB has maintained its undisputed world leadership in HVDC transmission technology. We have supported our customers with more than 55 HVDC projects around the world providing more than 45, 000 MW of transmission capacity. And since 1999, with its new HVDC Light® technology, ABB is once again building a technological lead with solutions to customers’ transmission challenges around the world.

Continuing to meet these needs will maintain ABB’s leadership position.

For reference projects, please see the reverse side. More information can be found on www.abb.com/hvdc

Reference list - HVDC Light®

PROJECT	In service	Power MW	DC voltage kV	Station location and AC grid	Transmission distance	Application	Customer
HÄLLSJÖN Sweden	1997	3	±10	Hällsjön, 10 kV Grängesberg, 10 kV	10 km (overhead)	Pilot system	VB Elnät, Sweden
GOTLAND Sweden	1999	50	±80	Näs, 77 kV Bäcks, 77 kV	70 km	Wind, Undergrounding	GEAB, Sweden
DIRECTLINK Australia	2000	3 x 60	±80	Terranora, 110 kV Mullumbimby, 132 kV	65 km	Undergrounding	TransEnergy, USA North Power, Australia
TJÆREBERG Denmark	2000	7,2	±9	Enge, 10,5 kV Tjaereborg, 10,5 kV	4,4 km	Wind, Undergrounding	Eltra, Denmark
EAGLE PASS USA	2000	36	±15.9	Eagle Pass, 138 kV (both sides)	NA (back-to-back)	Grid reliability	AEP, USA
CROSS SOUND USA	2002	330	±150	New Haven, 345 kV Shoreham, 138 kV	40 km	Grid reliability	TransEnergie US, USA
MURRAYLINK Australia	2002	220	±150	Berri, 132 kV Red Cliffs, 220 kV	180 km	Undergrounding	TransEnergie US, USA
TROLL A Norway	2005	2 x 41	±60	Troll A, 56 kV Kollsnes, 132 kV	67 km	Offshore	Statoil, Norway
ESTLINK Estonia - Finland	2006	350	±150	Espoo, 400 kV Harku, 330 kV	105 km	Grid reliability, Undergrounding	Nordic Energy Link AS, Estonia
VALHALL Norway	2010	78	150	Lista, 300 kV Valhall, 11 kV	292 km	Offshore	BP, Norway
NORD E.ON 1 Germany	2009	400	±150	Diele, 380 kV Borkum 2, 170 kV	203 km	Offshore wind	E.ON Netz Germany
Caprivi Link Namibia	2009	300	350	Zambezi, 330 kV Gerus, 400 kV	970 km (overhead)	Grid reliability	NamPower Namibia

More information regarding each specific project can be found on

www.abb.com/hvdc



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