SIEMENS

Newsletter

Power Transmission

Issue 10/02

HVDC/FACTS - Highlights

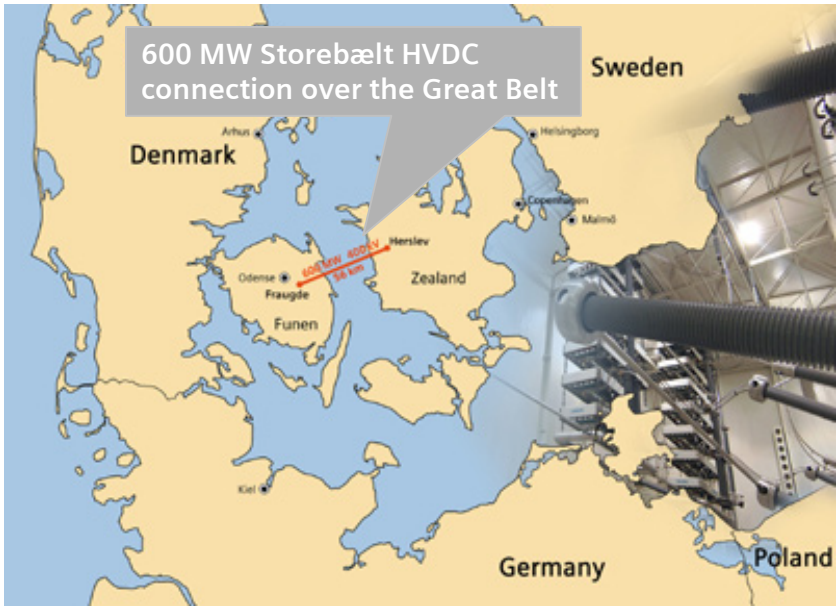
The 400 kV Storebælt HVDC Project

A prime example of good and efficient cooperation with the customer

In May 2007 Siemens Energy Power Transmission was awarded an order by Energinet.dk in Denmark for a High Voltage Direct Current (HVDC) Transmission Link between the islands of Funen and Zealand which are separated by the Great Belt (in Danish *Storebælt*). The 600MW HVDC link will allow access to reserves from other parts of the country, thereby increasing the security of electricity supply in Denmark and reducing operating costs for the Danish power supply.

The Danish power transmission system – A split grid

The Danish power transmission system consists of two different transmission systems which in the past had often been discussed to be connected. Western Denmark is synchronous with the Nordel system to which also Middle and Western Europe (including Germany) are connected. On the other hand, Denmark´s eastern islands are supplied by the UCTE system which the Scandinavian countries of Norway, Sweden and Finland belong to. After years of discussions and studies finally a feasibility study in the year 2005 had given the background for the decision to build the Storebælt HVDC interconnection.



Project Details

The new sea cable HVDC transmission link is the seventh system of this type of application in Denmark. The Storebælt HVDC is a 600 MW Line Commutated Converter (LCC) HVDC with a DC voltage of 400 kV. It will improve the scope for redressing imbalances in the power system between the two grids.
The customer Energinet.dk owns, operates and develops the gas transmission grid and the 400 kV electricity transmission grid of Denmark and is co-owner of the international connections between Denmark and the Nordic countries and Germany. One of the main tasks for Energinet.dk is to maintain the security of energy supply and the sustainability of the market for electricity and gas.

The contract between Siemens and Energinet.dk includes the supply of the monopolar HVDC converter technology, the design of the HVDC converter stations, the complete delivery of the components such as converter valves, converter transformers, AC filters, DC switchgear and smoothing reactors as well as the control and protection systems and the installation and commissioning of the converter stations. Energinet.dk will supply the AC stations, the valve halls and the service buildings. The cables with an approximate length of 56km between the two converter stations are covered in separate contracts.

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Teamwork

Energinet.dk is one of the most experienced customers in the area of HVDC technology since it has already six HVDC Power Transmission Systems in operation: two HVDC interconnections to Sweden and three to Norway in the Western system; one interconnection to Germany in the Eastern system.

From the beginning of the project, the whole working process happened in close collaboration of both, customer and contractor. Energinet.dk has a clear idea of requirements and expectations of the new HVDC system and delivers the ac switchyard including controls. Therefore a very important topic is the clarification of the interfaces. The management changed the common design process, to clarify the specified design and requirements before starting the engineering process. This led to an efficient and successful engineering process, reflecting the ideas and requests of the customer wherever possible.

Project Status

Fraugde converter station on Funen will be connected to an existing 400 kV substation. The installation is completed and the commissioning is ongoing.

The Herslev converter station on Zealand, which will be connected to an existing 400 kV overhead line, is in the installation phase. The building permission for Herslev site was postponed. This resulted in a later site access and postponed all works for this converter station.
Due to strict requirements regarding noise and visual impacts, the Herslev station has to be built 2 meters deeper than the surrounding level. In addition it has to be surrounded by heaps which will be vegetated in the future. Energinet.dk has had to handle massive earth moving to prepare the ground for erection and to implement a good drainage system.
Despite all these challenges the installation of both stations is on schedule. On the first station in Fraugde, the commissioning phase commenced beginning of September, Herslev, Zealand followed mid of November 2009. The trial period is scheduled from June to August followed by hand over to Energinet.dk mid of August 2010. The Project Management, Jutta Kunisch and Andreas Andersson, emphasize the good cooperation between Energinet.dk and Siemens to lead this project to success.

Fig.: Site View Fraudge, Funen

Summary

As part of Denmark's Storebaelt power transmission project, Siemens is constructing both converter stations for the high voltage direct current (HVDC) interconnector between the islands of Funen and Zealand. The 400kV connection with a power rating of 600 MW will link the Western with the Eastern Grid. This will increase the reliability of the Danish power supply by enabling the exchange of electrical energy with other parts of the country via the new power link. The Storebaelt HVDC interconnection is scheduled to commence commercial operation in summer 2010.