

Kraftnät Åland, Finland

Kraftnät Åland AB owns, operates, maintains and develops the Åland transmission grid (110 and 45 kV) supplying electricity for the region of Åland. The company is also responsible for connection of this regional grid to other grids and making power available both during normal and exceptional conditions.

BACKGROUND

Åland is an archipelago of 6,500 islands lying at the entrance to the Gulf of Bothnia in the Baltic Sea. It is a self-governing region of Finland although, geographically the area is located closer to Sweden. For that reason, Åland has relied on its main power supply coming through a submarine 110 kV AC power connection to the Swedish grid rated at 80 – 100 MW.

There is another, minor power connection, fed from the Finnish mainland through a 45 kV transmission line both on land and by underwater cables. This connection, however, is limited to less than 10 MW and cannot be synchronised to the one from Sweden. It is used primarily to supply power to the islands situated between Åland and the Finnish mainland.

A total of 296,4 GWh was brought into the network during 2012, of which 71.7 per cent

came through the link from Sweden. 20.7 per cent was locally produced by wind power. Further 6.6 percent came from Finland via the 45 kV connection and the remaining 0.7 per cent was generated through a bio-fuel burning heat and power plant used during winter that also supplies district heating to the capital Mariehamn.

CLIENT CHALLENGE

The power supply of Åland has been vulnerable to different forces. Although the area largely relies on wind energy, it's not enough to meet the full energy requirements during winter.

The bulk power through the AC connection to Sweden is also an issue and Åland officials were worried about the real possibility of having the AC line cut by passing ships. In cases when power is cut from the Swedish supply, backup power is provided by three gas turbines and three diesel generators.

However, it can take up to two hours to get the backup supply running. Only one of the gas turbines is modern, installed in 2004. The other two gas turbines and the diesel generators are all old and are scheduled to be decommissioned.

Åland needs a much more dependable back-up power supply. With that in mind, Kraftnät Åland signed a contract for the largest single infrastructure investment in the history of the region. And they asked Pöyry to help. The two companies have a long partnership stretching back over two decades.

The overall scope of the project is ambitious: Create a high-voltage direct current (HVDC) transmission system capable of transmitting 100 MW (megawatts) of electricity with minimum losses across a distance of 158 kilometres, connecting Åland to Finland.

SUCCESS FACTORS

“Pöyry worked tirelessly alongside our own people on this project. Their depth of expertise in areas like HVDC, sub-stations, and transmission lines complemented our own areas of knowledge and made working together a seamless experience”

CEO Jan Kahlroth, Kraftnät Åland





SOLUTIONS

Pöyry was involved from the beginning, working closely with Kraftnät Åland to prepare the detailed tender documents for the HVDC work. In addition, Pöyry also monitored an in-depth seabed survey, ensuring the path was clear for the 158 kilometre-long submarine cable.

A new 110 kV transmission line to connect the converter station in Åland to the existing substation was designed by Pöyry. This included an un-stayed steel tower with a small footprint (to minimise impact on the surrounding agricultural land), also partially supporting an existing 45 kV line following the same route.

The project included an extension of two substations and the construction of a brand new one to eventually connect to a wind farm.

Pöyry also handled the documentation for the substations.

BENEFITS

The HVDC transmission system will be capable of transmitting 100 MW (mega-watts), including an additional 30 MW reactive power, allowing a total of 130 MVA of electricity—enough to guarantee the supply of Åland for at least the coming 30 years. The project is expected to be completed on time in the beginning of 2016.

The new system will provide Åland with much more flexibility. For example, today, ferries travelling between Sweden and Åland need to run their engines in order to generate power. When the new system is in place, Åland will be able to power the ships directly, reducing emissions from the vessels.

KEY FACTS

Project management, design, engineering, procurement services and acceptance testing for a 100 MW (130 MVA) HVDC link of the VSC type, from Åland to mainland Finland.

- Rated capacity of link 100 MW, with an additional 30 MVar available at peak load
- Distance between converters, length of submarine cable, approximately 158 km
- Addition of a third terminal shall be possible
- 110 kV transmission line, with un-stayed single poles of steel, for connection of the converter station in Åland

Pöyry has been involved in the ambitious HVDC project since 2009.

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