



GE VERNOVA

JEJU ISLAND LINK II

HVDC Solution to Support Increasing Tourism on Jeju Island

GE Vernova commissions the first 400 MW HVDC project in South Korea, linking the mainland and Jeju Island.

Case Study



Grid Solutions



105 km submarine HVDC line from North-Korean mainland to Jeju Island

PROJECT OVERVIEW

Country:	South Korea
Project:	Jeju 2
Customer:	Korea Electric Power Corporation (KEPCO)
Technology:	High Voltage Direct Current (HVDC), Line Commutated Converter (LCC)
Scope:	2 bipole line-commutated converter stations, including converter transformers, thyristor valves, AC and DC equipment (harmonic filters, reactors, switchgear, etc.) control and protection, installation supervision and commissioning
Rating:	400 MW, ± 250 kV
Commercial operation:	2014

CUSTOMER CHALLENGES

Looking for Energy Independency

With 51.3 million people¹, South Korea has experienced nearly a 35% growth² in energy demand in the last decade alone. South Korea is an energy-intensive nation, standing at eleventh worldwide in terms of total energy consumption (IEA). The country faces the ambitious challenge of providing efficient energy to its densely populated areas.

South Korea imports a remarkable 82% of the total energy it consumes. Since 2006, the Korean government has developed many new energy policies to become more energy independent, to meet growing demand and increase energy efficiency.

Jeju Island, located 100 km south of the peninsula mainland, is commonly known as the country's honeymoon and holiday destination.

- 1 - World Bank
- 2 - Index Mundi

Transmitting Power from Mainland to South Korea's Largest Island, Jeju

At 73 km wide and 41 km long, Jeju is South Korea's largest island and also the center of Smart Grid investments and energy efficiency projects.

Previously operating on an independent electric network, the island had experienced frequent blackouts and unstable power supply due to the network's lack of efficiency and low power capacity.



AC filter yard

GE VERNOVA SOLUTION

In 1997, GE Vernova successfully delivered the first 300 MW High Voltage Direct Current (HVDC) link between the mainland, at Haenam, and Jeju island. On average, 150 MW of power was transmitted from the mainland to Jeju, corresponding to approximately 60% of the total demand on Jeju Island.

Booming tourism on Jeju Island, however, has further increased energy demand, and the Korean government decided to install another submarine line. GE Vernova was selected once more for this second HVDC Jindo-Jeju project.

This HVDC project, with a power capacity of 400 MW in South Korea, was designed for bi-directional power flow between mainland and Jeju Island. This ensures that the island can be fed with power from the mainland, and any potential surplus of the increasing renewable power on Jeju Island can also be transmitted to the mainland.

The implemented solution takes the electrical power from an alternating current (AC) system, and converts it into DC using thyristor-based converters. The direct current is then transmitted through the submarine cables to the remote HVDC station where it is turned back to AC by another converter station.



Thyristor valves stack inside the converter hall

KEY BENEFITS

- Efficient transmission of electricity over long distances
- Fast, accurate, fully-controllable and measurable power flow
- Interconnecting different power systems makes their existing generating reserves available to both systems, increasing efficiency and eliminating need to build a new plant

TURNKEY PROJECT STEPS

- Engineering and design: detailed studies and design of all necessary equipment, systems and civil works
- Site preparation: civil works and construction required to accommodate equipment installation
- Installation occurs as soon as equipment arrives on site
- Commissioning: after equipment verification, control software is installed and the entire system is tested before handing over the site to the client for commercial operation

1. W. Park, Y. H. Park and S. I. Moon, "Instantaneous Wind Power Penetration in Jeju Island", IEEE PES General Meeting 2008, Pittsburgh, July 20-23, 2008
2. In 2012, the Jeju Special Self-Governing "Province founded the Jeju Energy Corporation to "regulate the public use of Jeju's wind power sources." The aim is to achieve, by 2020, 1 GW offshore wind power, 300 MW of inland wind power, and 30 MW of solar power to make up for 68 percent of Jeju's total electricity demand.

Source:
Jeju Special Self-Governing Province

For more information, visit
gevernova.com/grid-solutions

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