

## **Research and Application for Advanced VSC-HVDC Technology in China**

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### **Abstract**

As you know, Global Energy Interconnection is an increasingly ambitious plan for continuing renewable energy development around the world to ensure stable, long-term energy supplies. It consisted of UHV backbone networks, the North Pole and the equator large energy bases and national ubiquitous smart grids. VSC-HVDC improved the flexibility and stability of clean energy generation integration, and DC Grid which consisted of VSC-HVDC, can converge and transfer efficiently of clean energy in a large scale region. So VSC-HVDC will promote large-scale renewable energy integration.

VSC-HVDC is a novel transmission technology employing IGBT as the switching element for power conversion. It strikes advantages in clean energy integration, propelling DC Grid, and connection of weak systems, etc. The DC grid consisted by VSC-HVDC is efficient facility flexible and reliable to integration on regional renewable energy. But its study on technology and equipment should be accelerated which including control and protection, DC breaker, DC/DC converter and so on. China commissioned his first VSC-HVDC project, Nanhui  $\pm 30\text{kV}/20\text{MW}$  project, in 2011 and it links Nanhui wind farm to the Shanghai main grid. Xiamen island power supply project rated at  $\pm 320\text{kV}/1000\text{MW}$  with bipolar topology, it commissioned on the end of December, 2014. Breakthroughs required in fundamental and key technologies of multi-terminal VSC-HVDC and DC grid. And now a pilot project is planning to increase Zhoushan MTDC reliability and availability by using DCCB scheduled in 2016. Up to date SGCC is constructing a pilot DC grid project in Zhangbei of North China, it's the largest converter station rated at  $\pm 500\text{kV}/3000\text{MW}$  and scheduled commission on the end of 2018.

GEI is the solution to the human development and energy demand. VSC-HVDC technology providing more effective support for the regional power grid construction, and China is accelerating exploration and practice on this field. The experience gained from the all HVDC power transmission projects will provide valuable reference to develop and utilize this technology worldwide.