

## Key Technologies for Flexible Construction of Receiving-End Power Grids with Large-scale HVDC Systems

The increasing proportion of electricity imported from outside regions and the high penetration of new energy sources have introduced major challenges to the stability of receiving power grids, mainly due to reduced system inertia and lower grid strength from large-scale HVDC feed-in and declining local synchronous generation. This report analyzes key technologies to address these issues. First, advanced stability analysis methods are discussed, including new frequency response assessments and system strength indicators such as voltage stiffness. Second, active support control strategies for external MMC-HVDC transmission and offshore wind HVDC integration are presented to enhance grid security and stability, covering large-scale MMC-HVDC active frequency and voltage support. Third, flexible construction methods for receiving power grids with substantial HVDC feed-in are explored, aiming to build stable and controllable AC/DC grid structures. These approaches lay the foundation for robust and adaptable power grids capable of supporting large-scale HVDC and renewable energy integration.