

The Roles of FACTS and HVDC Systems in the Smart Grid

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Flexible AC Transmission Systems (FACTS) devices and High Voltage Direct Current (HVDC) systems improve controllability, flexibility, security, and sustainability of the Smart Grid. Advanced FACTS and HVDC technology are promising power electronics-based solutions to eliminate the transmission constraints by enhancing transmission and distribution capability and efficiency and also voltage/power flow management of the grid. FACTS and HVDC also play an important role in widespread distributed energy resource interconnections and long-distance bulk power transmission.

This presentation will focus on the features, roles, and impacts of FACTS devices and HVDC systems in the operation and management of the Smart Grid. In particular, it will be highlighted how:

- FACTS and HVDC will be helpful to provide fast dynamic voltage, power flow and stability control of the power grid while enhancing efficient utilization of transmission assets.
- HVDC transmission systems in combination with the FACTS devices and/or Distributed FACTS devices can be deployed, in the transmission/distribution levels to achieve voltage regulation, improve system stability, increase the transmission capacity, control power flow, and assist in preventing cascading disturbances.
- FACTS and HVDC transmission systems can be meshed and integrated within the existing AC power system for grid interconnection and point to point long distance transmission in a hybrid configuration.
- The integration of the wide area measurement systems with FACTS and HVDC control will fully employ control capabilities of both technologies to achieve fast stability control of the system, and to prevent the system against blackouts.
- The technology development/recent advances in power electronics enable efficient deployment of FACTS and HVDC systems.