Future use with phase-shifting transformers (PSTs)

In a next step, further PMUs shall be placed in the Ternitz, Ernsthofen and Tauern substations with the aim of optimizing the use of three PSTs being installed in 2006. Their effectiveness shall be verified and their operation in a group coordinated with the aim to safely make full use of the available transmission capacity.

Conclusion

The comprehensive system information contained in the WAMS measurements is used for enhanced monitoring as well as for alarming purposes. The mentioned applications therefore serve as decision support both in case of normal operating conditions and in emergency situations.

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The Customer

Austrian Power Grid AG (APG) is a subsidiary of VERBUND, the largest producer and distributor of electrical energy in the country’s deregulated market. Headquartered in Vienna, the TSO plans, operates and maintains the super-regional high voltage and extra-high voltage grids with ties to all neighbouring countries. APG ensures the safe, economical and environmentally friendly transport of approx. 33,110 GWh to its customers per annum. Most of this electric power is produced by the VERBUND subsidiaries AHP and ATP with around 22,700 and 5,500 GWh being generated in 88 hydroelectric and 17 thermal power plants, respectively. APG operates some 46 substations and switching stations which are connected via 110 kV, 220 kV and 380 kV lines totalling 6,500 km in system length.

The Challenge

A production surplus of 1900 MW in North-Eastern Austria and a 1400 MW deficit in the South of the country bring about heavy power transfers via the three 220 kV north-south line connections with a total capacity of 1200 MW. Increasing congestion restricts electricity flows and reduces security of supply. The addition in 2006 of 1000 MW wind generation in the northeast and shutdown of coal-fired stations in the south will further aggravate the situation. Alleviation through required line upgrades to 380 kV and completion of the high-performance 380 kV line ring is imminent. Meanwhile, bottleneck management with emergency measures at power and distribution stations helps to scantily maintain network operation at exploding costs. These lead to rises in network cost and electricity prices, while the supply certainty drops. Network operators require support with maximizing transmission as well as detecting and counteracting evolving disturbance and overload situations.

ABB’s solution

The solution chosen for the enhanced monitoring of the operational condition of the 220 kV double line between the Vienna South-East and Ternitz substations comprises of a PSG 850 Wide Area Monitoring System with GPS-synchronized phasor measurement units (PMUs). The on-line monitoring of phase angle differences and average line temperatures improves observability of the massively overload-prone lines and alerts operators to dangerous situations. Cognizance of the dynamic condition of the corridor allows operators to react swiftly and adequately to sudden interruptions or bottleneck situations.
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