The 15th International Workshop on Electric Power Control Centers
Reykjavik, Iceland, May 12-15, 2019

Effective Inertia Metering, Forecasting and Grid-Sensitive Control for Renewable Integration

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Achieving a high penetration of renewable generation in an electricity system tends to result in low inertia and consequently challenges in maintaining a stable frequency. In the past, the inertia of large synchronous generators limited the rate of change of frequency after a large loss of generation or load, and response within about 10s would avoid customer interruptions, and could be achieved with conventional plant governors. However, frequency can change much faster in a power system where either the whole system or certain regions have low inertia, leading to increasing risks of load shedding, distributed generation tripping (due to large ROCOF) or system islanding between areas.

A new approach using synchrophasor measurements in real-time to measure the effective inertia of the grid and its distribution between areas of the network is vital for managing the limitations of the grid and the services required to rebalance the system in the event of load or generation loss. The effective inertia metering accounts for both physical rotating inertia and the various positive or negative contributions of other devices to stabilize frequency. This leads to practical information on the services required, such as the volume, response time and location of fast frequency response, along with potential need for constraints. In addition to the real-time measurement of inertia, a mitigation strategy also requires forecasting inertia and the ability to apply control that rapidly stabilizes the grid after a disturbance. New measurement and control capabilities are presented with examples from real system experience that provide an end-to-end metering, forecasting and control solution for managing low inertia systems.

Please send the Abstract to **dsobajic@gridengineering.com** by April 12