Islanding Control Architecture in future smart grid with both demand and wind turbine control - DTU Orbit (16/12/2018)

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In recent years, a large number of Distributed Generation units (DG units) such as Wind Turbines (WTs) and Combined Heat and Power plants (CHPs) have been penetrating the distribution systems. Meanwhile, an intentional island operation of distribution systems is proposed as a potential measure against power supply outages by continuously running DG units during system emergencies. However, there are some challenging security issues for an island operation, such as the power imbalance during the islanding transition and the coordination of feeder protection systems. To tackle the former issue, which is the focus of this paper, available resources including both DG units and demand should be fully utilized as reserves. The control and coordination among different resources requires an integral architecture to serve the purpose.

This paper develops the Islanding Control Architecture (ICA) for future smart grid, based on the Islanding Security Region (ISR) concept. With the ISR, system operators can assess beforehand if an island operation can be successful for a given distribution system at its current operating state. In case of unfavorable assessment, control measures will be suggested to coordinate different resources, aiming at pulling the system back into the ISR to ensure a successful island operation on time.

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