

Micro-grid Concept for Coordinated Control of Renewable Energy Power Plants and a Way to Integrate with Main Grid

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Abstract

Many research papers discussed the increasing fossil fuel cost. As the cost is increasing in the present scenario it is necessary to incorporate Renewable Energy (RE) technologies to take primary role in generating electricity. As a result of increasing the RE – based power generation and reducing the fossil fuel technologies to generate electric power has created real challenges in power system operations. It is the high time for the researchers to do detailed analysis to find possible ways to tackle the challenges in power system operations.

In the past, power system preferred to have large inertia to keep up its operations especially during transient periods of a disturbance. The modernized systems with latest technologies and their speedy responses, could create inertia by properly coordinating the control of many, small, generating plants. Further the accurate prediction algorithms release the stress by giving advance information about the system. As it is a new direction of modernized control, it always starts with small system and then integrates with large system through a supervisory control loop. This is opening a new direction with the RE technologies to be incorporated through microgrid systems.

The research on microgrid system was initiated about two decades ago. It has been developed in parallel with the possible development of RE technologies. This has been expensive when compared with the conventional power system. However, the recent hike in fossil fuel cost is pushing the RE sector to consider the micro-grid operational concept. Accordingly, this paper presents, the coordinated control of few RE power plants, using a microgrid concept while integrating the microgrid with the main grid through supervisory control concept.

The microgrid concept is much easier for minimizing the line losses and providing good quality and reliable power, if it is properly managed. Further it will be more efficient. If required,

interconnection can be made through tie-line connection with supervisory control concept to transfer the power. The proposed concept is simulated using the EMTDC/PSCAD and it shows excellent result. Furthermore, it will be more attractive in this era over expensive fossil fuel system.