

Efficient Operation of Distributed Generations and Suppression of CO² Gas Emission using Microgrid Control System

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Abstract

A concept of Microgrid was proposed and is being developed in many laboratories and organizations. Microgrid is a small grid in which distributed generations and electric loads are placed together and controlled efficiently in an integrated manner. It contributes to utility grid's load leveling by controlling power flow between utility grid and Microgrid according to a predetermined power flow pattern. Also, it will be able to contribute to an efficient operation of distributed generations and suppression of CO² gas emission by operation planning considering grid economics and energy efficiency. In addition, Microgrid is useful for the area with no power system or weak power system. It can be operated in an islanded manner with appropriate control scheme.

In this paper, a Microgrid control system is proposed. In this control system, operation planning is realized based on generation and load forecasting by using neural network and fuzzy systems. It includes multi-objective evaluation of generation cost and CO² gas emission with some constraints. Unit commitment of generations includes start/stop of power generations and storages. Load following function is accomplished by an adaptive control system based on conventional PI control scheme. To include, in a flexible manner, new generations or loads into the Microgrid, multi-agent system can be applied.