Abstract

The conventional power system has been undergoing significant changes. The growth in renewable sources is necessitated by several factors, such as environmental issues, market deregulation, incentive policies, and growth in the global demand for electricity. In a grid connected microgrid, the active power loss is borne by the system operator. Therefore, the active power loss is a major chunk of operating costs. This work proposes to minimize such losses through renewable distributed generation (DG) and reconfiguration. The minimization of total system energy loss in a year is chosen as the objective to account for the seasonal load and renewable generation variation. The optimal location and size of the DG unit are found, and a reconfiguration method is developed for power loss minimization. The proposed methodology is applied to a 33-node and 118-node test distribution system with different scenarios. Results show a substantial reduction in energy loss. A cost-benefit analysis is also carried out.

The operating cost in an islanded microgrid is the sum of fuel cost of all the fuel consuming DG units. Energy storage system (ESS) can save fuel by taking the load off from inefficient generators which are dispatched during peak load. This work presents a method for optimal siting and sizing of a battery-based energy storage system (BESS) in a droop controlled islanded microgrid (DCIMG). The optimal siting and sizing problem is successfully integrated into the economic load dispatch (ELD) problem and solved for various cases. The ELD problem considers operational constraints, such as congestion and voltage limits. A new index called Locational Economic Driving Force (LEDF) is proposed to select the location for BESS installation. A new heuristic method is proposed for optimal charging of battery units. The proposed method is compared with the Dynamic Programming (DP) method. The proposed method is applied to a 33 node system for various cases.