Optimal short-term operation schedule of a microgrid considering renewable energy sources

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Abstract:

Short-Term Scheduling of a standalone microgrid in the presence of renewable energy sources which is used to determine optimal daily operation is presented. The Necessity of this work is to use green and low-cost distributed energy resources that leads to lower costs and less pollution to the environment. Here, the commitment decisions are determined by minimizing the Lagrangian Function of the optimal power and then a duality-based analysis isapplied to derive closed-form solutions. Finally, an efficient subgradientbased method is introduced to numerically compute the optimal solutions. The under study microgrid consists of five DG units, including solar photovoltaic, wind turbines, micro turbines and fuel cells. In islanded mode, the unit commitment problem is solved with respect of load demand and electrical power generated by WT and PV in different hours, so as to meet the load demand and related system operating constraints, several senarios are studied. The intermittency nature of the renewable energy sources, as well as microgrid's capacity to operate either in parallel with, or autonomously of, the traditional power grid, pose new challenges to this classic optimization task. Using of an Energy Storage System with guidelines in deciding of its size is proposed to compensate the intermittent of the renewable energy sources.

Keywords: Unit commitment,Micro-turbine,Fuel cell,cost function, emmition function