

Micro-grid energy management with regard to uncertainty

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Nowadays, due to technical and economic reasons, the distributed generation (DG) units are widely connected to the low and medium voltage network and created a new structure called micro-grid. Renewable energies (especially wind and solar) based DGs are one of the most important generations units among DG units. Because of stochastic behavior of these resources, the optimum and safe management and operation of micro-grids has become one of the research priorities for researchers. So, in this study, the optimal operation of a typical micro grid is investigated considering variety of purposes, such as maximum use of renewable energy sources with the lowest operation cost with respect to the limitations for the load supply and the distributed generation resources. This micro-grid consists of the small thermal units, battery, wind turbines and photovoltaic panels, and fuel cost, start-up cost, spinning reserve cost, power purchasing cost the upstream grid and the sales revenue of the power to the upstream grid in the objective function are simultaneously estimated. Due to load and renewable generation forecasting errors uncertainties were considered in this study by apportioning supplementary amounts of spinning reserve. In order to evaluate the effects of uncertainties and spinning reserve on the total operation costs, micro-grids operation were analyzed considering four different cases. By comparing the results obtained of the micro-grids operation in studied cases is determine the importance of the uncertainties impact and renewable sources on micro-grid's costs. The optimization will be made by using the GAMS software and mixed integer planning method (MINLP).

Keywords : Micro-grid, Optimum operation, Renewable energy sources, Uncertainty of demand, Uncertainty of renewable energy sources generation.

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