ABSTRACT

Load or demand side management (DSM) has been considered as an effective tool for power system operation and management. This paper presents a load management scheme using integrated economic, emission and environmental electric power dispatch algorithms for generation cost and emission reduction. The algorithms have been implemented using Matlab optimization toolbox and tested on a 5-bus, 3-generator system. The simulation results are presented, compared and discussed for different scenarios with different levels of load management. The results show that load management can help reduce generation costs and emissions.

OBJECTIVES

Various techniques have been proposed to reduce the negative environmental impacts of increasing electricity generation. Emission sensitive power dispatch is an important method for reducing emissions due to electric power generation. Load management also shows great potential in reducing emissions due to electric power generation. Though DSM methods can reduce the total electric energy consumption through efficiency improvements, it is assumed that the load management will not change the total electricity consumption in a given period of time (e.g., a day). The optimization problems of load management integrated economic dispatch, emission dispatch, and economic/ emissions dispatch (EED) will be addressed respectively.

RESULTS (CONTINUED)

Conclusions

Load management integrated economic, emission, and economic/environmental dispatch algorithms were formulated in this paper. The algorithms were implemented using Matlab optimization toolbox and tested on a 5-bus, 3-generator system. The simulation results show that the load management can further reduce system generation costs and emissions. For all the three cases of economic, emission, and economic/environmental dispatch, the results show that the effect of load management reaches capacity when the level of load management is 25%.

In the future this work will be extended to include the optimal water pumping schemes responsible for the energy demand. Accordingly, one of our initial tasks is to integrate the hydraulic models of water delivery system into the EED of electric power. The pumping load of DWSD will be investigated as an example to further explore and verify the proposed MLIEED algorithms for emission and cost reduction due to electric power generation.

REFERENCES


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