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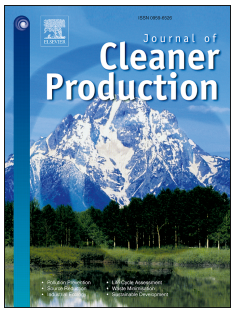

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F. Hamzeh Aghdam, S. Ghaemi, N. Taghizadegan Kalantari

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Evaluation of Loss Minimization on the Energy Management of Multi-Microgrid based Smart Distribution Network in the Presence of Emission Constraints and Clean Productions

F. Hamzeh Aghdam[a], S. Ghaemi[a], N. Taghizadegan Kalantari[a,*]

[a]*Department of Electrical and Computer Engineering, Azarbaijan Shahid Madani University, Tabriz, Iran*

Abstract

This paper presents a stochastic multi-layer energy management for a multi-microgrid (MMG) based smart distribution network (SDN). Also, all network constraints have been regarded to evaluate the effect of the active power loss on the energy management of the entities. Besides, demand response (DR) programs have been considered in the optimization process, which is one of the features of the SDN and could be used to manage the consumed power of each individual entity. Furthermore, in order to contemplate environmental issues, emission constraints for dispatchable generators have been taken into account. In this procedure, first, each microgrid (MG) performs an energy management to determine the schedule of its units and the shortage/surplus power. Then using the received data, the SDN operator (SDNO) prepares a priority list (PL) of units capable of injecting power to the SDN based on their average cost and capacity. The preparation of the PL entices the investors for using renewable based generators. Afterwards, it executes a global energy management. In the proposed approach, scenario based stochastic optimization has been utilized to model the uncertainties of the renewable energy resources. Finally, simulations using the modified IEEE 33-bus test feeder are done to demonstrate that how the proposed method encourages each MG for deploying clean productions as their main generation units. Moreover, the executed results illustrate the changes in the schedules of the MGs in the case of considering active power loss.

Keywords: Energy management, MMG based smart distribution network, Network losses, Emission constraints, Priority list, clean production

Nomenclature

Indices

i, j	Indices for bus.
t	Index for time.

*Corresponding author: EE Department, Azarbaijan Shahid Madani University, Tabriz, Iran

Email addresses: F.hamzehaghdam@azaruniv.ac.ir (F. Hamzeh Aghdam), s.ghaemi@azaruniv.ac.ir (S. Ghaemi), taghizadegan@azaruniv.edu (N. Taghizadegan Kalantari)

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