# Multiobjective Intelligent Energy Management for a Microgrid

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## Abstract:

In this paper, a generalized formulation for intelligent energy management of amicrogrid is proposed using artificial intelligence techniques jointly with linear-programming-based multiobjective optimization. The proposed multiobjective intelligent energy management aims to minimize the operation cost and the environmental impact of a microgrid, taking into account its preoperational variables as future availability of renewable energies and load demand (LD). An artificial neural network ensemble is developed to predict 24-h-ahead photovoltaic generation and 1-h-ahead wind power generation and LD. The proposed machine learning is characterized by enhanced learning model and generalization capability. The efficiency of the microgrid operation strongly depends on the battery scheduling process, which cannot be achieved through conventional optimization formulation. In this paper, a fuzzy logic expert system is used for battery scheduling. The proposed approach can handle uncertainties regarding to the fuzzy environment of the overall microgrid operation and the uncertainty related to the forecasted parameters. The results show considerable minimization on operation cost and emission level compared to literature microgrid energy management approaches based on opportunity charging and Heuristic Flowchart (HF) battery management.

## Keywords:

Index Terms—Fuzzy logic (FL), microgrid, multiobjective intelligent energy management (MIEM), neural network ensemble (NNE), short-term forecasting.

## Published In:

IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, APRIL 2013 , VOL. 60, NO. 4 ,