JOURNAL OF SOUTHERN COMMUNICATION ENGINEERING
ISLAMIC AZAD UNIVERSITY BUSHEHR BRANCH

E-ISSN: 2980-9231
https://jce.bushehr.iau.ir

https://doi.org/10.30495/jce.2023.1996352.1280

Vol. 13/ No. 52/Summer 2024

Research Article

# Demand Side Management Based on Model Predictive Control in Microgrid in Grid Connected Mode

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**Received:** 21 August 2022
**Revised:** 15 January 2023
**Accepted:** 21 February 2023

**Abstract**

In this article, the control method of the economic predictive model for the use of the efficiency tariff of the photovoltaic backup system, diesel generator and microgrid, connected to the grid using the closed loop control system, the optimal open loop control, and also through the control and strengthening of the primary open loop has been The main goal of this study is to minimize the power grid energy and fuel costs by evaluating the limits related to the level of fuel level in diesel fuel tanks. In addition to complying with the restrictions among the controllable variables, this control method also meets the load requirements. In order to obtain the benefits of feedback and predict the optimal power timing as a back-up energy system control problem, as well as the diesel generator connected to the microgrid, it is modeled based on the linear programming structure. Specifically, analysis is divided into two groups. The first case in the alternative model is when: outage occurs between 7 AM and 6 PM and the other in the grid energy state occurs when the grid is available for more than 24 hours. Energy performance shows, cost savings and income, in the control of daily economic forecasting model has improved. As long as, daily energy saving is up to 52%, while diesel energy is up to 85%. Optimum operation control can be well associated with uncertainty and disturbance in the result.

**Keywords**: Demand side management, Microgrid, Renewable energy resources, Model predictive control.

**Highlights**

- Using a photovoltaic backup system and a diesel generator connected to the microgrid.
- Assessment of limits to fuel level in diesel tanks.
- Predictive model control algorithm to determine optimal values of future control inputs in a closed loop system.
- Gray Wolf Optimization Algorithm by Investigating Smart Grid Complexity with Uncertainties Related to PHEV Charging Behavior.

**Citation:** M. Bonyani, MM. Ghanbarian, and M. Simab, "Demand Side Management Based on Model Predictive Control in Microgrid in Grid Connected Mode," Journal of Southern Communication Engineering, vol. 13, no. 52, pp. 81–103, 2024, doi:10.30495/jce.2023.1996352.1280, (in Persian).