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Scheduling of the Battery for Peak Shaving Using Model Predictive Control (MPC)

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Abstract
In this age of technology, the higher demand of renewable energy has become the main factor that contributes to the increasing power consumption. The electrical power generated needs to match with the load demand or the power consumption of the consumers, or else it will lead to the mismatch of supply and demand problem. However, the spike in the load demand will impact the electricity cost of the consumers. Therefore, the purpose of this research is to find an optimal solution to shave the peak load to reduce the electricity bills of the consumers. There are a lot of controllers that can be used to control the scheduling of the battery, and this research will focus on battery scheduling by using Model Predictive Controller (MPC). The MPC technique is able to control the battery energy storage system (BESS) to discharge during the peak hours and also charge during the off-peak hours. However, the MPC has a complex and high optimization algorithm due to its dynamic model, but MPC technique ensures that it is environment-friendly compared to the traditional method of peak-shaving. This research proposed the battery logic control to schedule the charge-discharge of the battery and for the MPC to optimize and get the best output for the peak shaving. The MPC design will be done by using MATLAB as the main software as it is very ideal to simulate the peak shaving by using MPC optimization © 2023 IEEE.

Author Keywords
battery energy storage system; model predictive control (MPC); peak load shaving

Index Keywords
Battery storage, Controllers, Costs, Economics, Electric loads, Electric power utilization, MATLAB, Predictive control systems, Secondary batteries; Battery energy storage systems, Control techniques, High demand, Load demand, Model predictive control, Model-predictive control, Peak load, Peak load shaving, Peak-shaving, Renewable energies; Model predictive control

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