

A Review and Future Scope on Demand Side Energy Management in the Presence of ESS and PEV

Dr. Deepak P. Kadam¹, Mr. Abhilash A. Netake²

¹Associate Professor, ²Assistant Professor

Department of Electrical Engineering

MET's Institute of Engineering, Bhujbal Knowledge City, Adgaon, Nashik.

Abstract:

The advancement of the smart grids (SGs) is enabling consumers to schedule home appliances to respond to demand response programs (DRs) offered by distribution system operators (DSOs). This way, not only will customers save money on their energy bills and be more comfortable, but the utility company will also be able to regulate peak-hour demand and reduce carbon emissions (CE). Designing an optimization scheme to reduce the electricity bill cost, peak-to-average ratio (PAR), CO₂ emission, wait time, and enhance the user comfort in terms of delay, luminance, and thermal comfort is not only the aim of this work but also the need of demand-side management. The smart home energy management system (HEMS) is critical for a prosumer to intelligently and conveniently manage the use of their domestic appliances, renewable energies (RES) generation, energy storage system (ESS), and electric vehicle (EV). In this study, a novel framework will be proposed for efficient energy management of residential home considered into a cluster to reduce the electricity bill, alleviate peak-to-average ratio (PAR), and acquire the desired trade-off between the electricity bill and user-discomfort in the smart grid, in the presence of ESS and PEV in low voltage distribution network.

Keywords: DSM, HEMS, PAR, Plug in EV, Energy Storage System

Introduction

Nowadays, there is an increasing electricity demand and an increasing cost of the raw materials. One essential challenge within the energy sector is how to consistently improve energy efficiency. DSM has been identified as one of the main strategies to be supported in order to increase the reliability and secure operation of electricity [14,15]. This strategy generally aims to overcome problems such as high energy costs, environmental issues, network reliability issues, and reduced energy supplies.

DSM strategies that focus on changing consumer demand for electricity include new financial incentives and education supporting changes in human behaviour. DSM strategies also focus on the integration of RES to produce clean energy whilst achieving environmental goals. These DSM approaches are most effective in the long term. There are also many other ways of