

Net Load Forecast Error Compensation for Peak Shaving in a Grid-Connected PV Storage System

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In modern power systems, it is important to compensate net load forecast errors which are caused due to variability and uncertainty of load and renewable energy source powers for improving the stability and reliability. Super capacitor (SC) is a well suited component for compensating forecast error due to its power and energy density characteristics. In this article, a novel method is proposed for net load forecast error compensation through SC application. The proposed method is simple and general which can be used at industry scale while implementing the energy management applications. In order to test the performance of the proposed method, a grid-connected photovoltaic storage system is considered. The forecast error in load/PV powers is compensated while limiting both grid demand and feed-in powers to their optimal limits. Battery energy storage system charge/discharge schedules are controlled by a rule-based peak shaving method to minimize the day-ahead average peak demand of the system. For controlling SC charge/discharge schedules, the proposed net load forecast error compensation method is used. It is observed that the peak demand and feed-in powers are reduced significantly with the proposed method as compared with the case when there is no net load forecast error compensation.