Solar pv and bess sizing

Solar pv and bess sizing

This paper proposes an optimization method for sizing and scheduling BESS and smart inverter (SI) of photovoltaic (PV) system. Scheduling optimization of related facilities is taken into account to ensure PV system owner"s investment returns and assist distribution system operator (DSO) to adjust the voltages.

The aim of the optimization formulation (PVBTOptimization) is to find the optimal sizes of PV only with or without BESS, BESS only in presence of PV, and PV with BESS sequentially. The optimization objective is to maximize the profitability through maximizing the net present value.

sizing) a Battery Energy Storage System (BESS) connected to a grid-connected PV system. It provides information on the sizing of a BESS and PV array for the following system functions: o BESS as backup o Offsetting peak loads o Zero export The battery in the BESS is charged either from the PV system or the grid and discharged to the

In this article, the Maximum Demand Reduction (MDRed) model is shown as an effective tool for the optimization of the MD threshold and solar PV-BESS sizing. The MD and net consumption reduction due to solar PV-BESS is shown in Figure 1.

This paper addresses this gap by proposing a four-step methodology that optimizes BESS sizing for PV plants, accounting for both cycling and calendar aging effects on system performance and the economic implications of battery replacements.

The optimal threshold for the maximum demand will allow commercial and industrial users to prudently invest on techno-economically sized solar PV and battery energy storage system (BESS). The determination of the optimal threshold and techno-economically sized solar PV-BESS can be complicated due to the varying load pattern and the intermittent behaviour of solar PV power output. Moreover, batteries are relatively expensive.

In this article, the Maximum Demand Reduction (MDRed) model is shown as an effective tool for the optimization of the MD threshold and solar PV-BESS sizing. The MD and net consumption reduction due to solar PV-BESS is shown in Figure 1. The optimized MDRed model is based on the mathematical formulation of the MD charges, energy consumed and the cost of solar PV modules, inverter, and batteries. Subsequently, the financial model focuses on the overall cost of solar PV-BESS in comparison to the energy/demand savings for fastest Return-On-Investment (ROI).

For comparison purpose, the optimized results and ROI for solar PV-BESS was compared with different scenarios where only solar PV or BESS were used. Results indicated that the solar PV-BESS resulted in higher ROI compared to the other two scenarios. In summary, the determination of the optimized threshold

and techno-economic sizing for solar PV-BESS can help commercial and industrial loads to reduce their monthly electricity bill.

For a downloadable copy of the March 2021 eNewsletter which includes this article, please visit the IEEE Smart Grid Resource Center.

To view archived articles, and issues, which deliver rich insight into the forces shaping the future of the smart grid. Older Bulletins (formerly eNewsletter) can be foundhere.To download fullissues, visit the publications section of theIEEE Smart Grid Resource Center.