

Feasibility study on the integration of residential PV-battery systems in system peak load shaving: a case study in Iran

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Abstract

In this paper, the impact of residential photovoltaic (PV) battery systems in a real test system with the goal of system peak load shaving is investigated. In order to encourage residential investors, a Levelized feed-in tariff (LFiT) scheme is introduced. Accordingly, two proposed cases and relevant suggestions are presented to reach a better performance. The profitability of the project is appraised via several economic criteria such as net present value (NPV), payback period years (PBY), internal rate of return (IRR), benefit to cost ratio (BCR), net cash flow (NCF), and Levelized cost of energy (LCOE). Moreover, different levels of peak shaving subject to customers' participation and the size of the PV-battery system are also obtained. An actual test system regarding one-year recorded data is employed to elevate the precise of results. Furthermore, results are economically compared with the current situation in the test system to assess the effectiveness of the suggested system. Obtained results determine the best size of PV and battery to attain the preferable profitability. Meanwhile, the LFiT with respect to the economic criteria is specified as well. Finally, a sensitivity analysis on systems' parameters is performed to identify the impact of these parameters on economic indices.

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