Seyed Mojtaba Poorseyed and Alireza Askarzadeh, 2023, Risk-averse optimal operation of an on-grid photovoltaic/battery/diesel generator hybrid energy system using information gap decision theory, *IET Renewable Power Generation,* July 2023; pp.1–14, DOI: 10.1049/rpg2.12801.

Abstract This paper focuses on risk-averse-based optimal operation of a grid-connected hybrid energy system (HES) composed of photovoltaic (PV), diesel generator, and battery storage system (BSS). For this goal, information gap decision theory (IGDT) is used to model load demand uncertainty. The aim of the optimal operation is to minimize cost of PV/diesel/BSS by optimal determination of the power purchased from the electricity grid. Since in the risk-averse strategy, load demand has an undesirable impact on the objective function, the decision maker attempts to maximize the uncertainty radius in a way that any deviation of the uncertain parameter leads to an objective function value which is not worse than the critical value. Over the case studies (considering different radiations), simulation results indicate that in the risk-neutral strategy, at high, medium, and low radiations, the operation cost is 28.88, 36.10, and 42.63$, respectively. In the risk-averse strategy, when the radiation is high, by increase of the deviation factor from 0.1 to 0.25, the optimal uncertainty radius increases from 6.98% to 15.72% (increase of around 125%) and the operation cost increases from 31.768 to 36.101$. When the radiation is low, by increase of the deviation factor from 0.1 to 0.25, the uncertainty radius increases from 8.64% to 16.9%(increase of around 96%) and the operation cost increases from 46.895 to 53.291$.

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