

Hamid Asadi Bagal, Yashar Nouri Soltanabad, Milad Dadjuo, Karzan Wakil, Noradin Ghadimi, 2018, Risk-assessment of photovoltaic-wind-battery-grid based large industrial consumer using information gap decision theory, *Solar Energy*, vol. 169, pp.343–352.

Abstract In this paper, the energy procurement problem for a large electricity consumer is solved under various resources. In this problem, the uncertainty of pool market price is a big challenge to achieve optimal result. In this paper, the information gap decision theory has been proposed to handle the pool market price uncertainty. The results of information gap decision theory are presented in three different strategies for the large consumer. These three strategies include risk-averse, risk-neutral and risk-taker strategies which examine the large consumer risk at various prices in pool market. In addition, the results in all strategies point out the importance of demand response program in reducing the large consumers costs. In the risk-neutral strategy, the large consumer cost with and without demand response program is \$36,945 and \$40,253 respectively. Therefore, the positive impact of demand response program has reduced large consumer cost about 8.2%. Large consumer resistance is 72.5% higher than the without use of demand response program mode in the risk-averse strategy. Finally, large consumer cost is 8% less than the without use of demand response program mode in the risk-taker strategy.

Highlights

1. Performance of solar photovoltaic-wind-battery based large consumer is studied.
2. Information gap decision theory is proposed to assess risk management.
3. Risk-neutral strategy obtained with deterministic approach without uncertainty modeling.
4. Risk-averse and risk-taker strategies are compared with risk-neutral strategy.
5. Effective load management is proposed to reduce procurement cost of large consumer.

Keywords Solar photovoltaic and wind-turbine; Energy storage system; Demand response program; Information gap decision theory