Parinaz Aliasghari, Behnam Mohammadi-Ivatloo, Mehdi Abapour, 2020, Risk-based scheduling strategy for electric vehicle aggregator using hybrid Stochastic/IGDT approach, *Journal of Cleaner Production,* vol. 248, 1 March 2020, article 119270.

Highlights

- Optimal scheduling problem of electric vehicle is modeled with risk-based.
- Operation of electric vehicles in both V2G and G2V mode.
- Uncertainty of electricity prices in the day-ahead market through the IGDT scheduling.
- Robust scheduling of electric vehicle aggregator in the day-ahead market.
- Opportunistic scheduling of electric vehicle aggregator in the day-ahead market.

Abstract Electric vehicle aggregator is an agent for facilitating the interaction between grid and electric vehicle owners, which could bring advantages for all of them. Not only could the aggregator participate in the day-ahead market as a representative of electric vehicle owners, but the aggregator could also manage the integrated load of electric vehicles via arranging charging and discharging times in responding to price signals. The current paper presents a novel hybrid stochastic/information gap decision theory optimization technique for decision making of electric vehicle aggregator in uncertain environment. It evaluates the opportunity/robustness of optimal scheduling of electric vehicle aggregators facing with uncertainties. The uncertainties of arrival time, departure time and the initial state of charge of each vehicle are modeled via scenarios, while market price uncertainty in the day-ahead market is formulated with a bi-level information gap decision theory based approach focusing on the gap between forecasted and real values. The objective function is to maximize the expected profit of the aggregator regarding the two contradictory attitudes toward the risk management under the uncertainty of market price, i.e., risk-averse and risk-seeker strategies of information gap decision theory approach. In order to verify the effectiveness of the proposed approach, a case study has been investigated. The results confirm that a risker decision leads to a higher profit. By contrast, the aggregator can implement robustness function to make a more conservative decision to guaranty his predetermined profit in the face with the uncertainties.

Keywords Stochastic optimization, Information gap decision theory (IGDT), Electric vehicle aggregator, Uncertainties.

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