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Abstract In this paper, the information gap decision theory is proposed as a solution model for reliable planning in residential smart building by considering the nondeterministic prices of the market and solar thermal storage system. In this model, combined heat and power, energy storage system, boiler, smart home appliances, and solar thermal storage system have been considered. The information gap decision theory is independent from the model size. Therefore, apartment smart building's energy management systems (also known as small scale loads) are able to utilize information gap decision theory in order to make better-informed conclusions against nondeterministic behavior seen in prices. In the suggested approach, two main functions are exist as reliability and opportunities. Optimum scheduling of smart residential building risk prevention approach is modeled based on reliability function while opportunity function is used to model risk-taking approach of apartment smart building's optimum scheduling. In this work, two scenarios have been considered for evaluating the impact of the solar thermal storage system which are being assessed yielding some impactful outcomes, which will mark the suggested model's validity. In obtained results, the STSS is in our consideration, the overall operation cost of the example smart residential building is decreased by 22.23%.

Keywords Solar thermal storage system, smart homes, information gap decision theory.