M. Majidi, B. Mohammadi-Ivatloo, A. Soroudi, 2019, Application of information gap decision theory in practical energy problems: A comprehensive review, *Applied Energy,* 249: 157–165.

Highlights

- The cons and pros of different decision making methods.
- The uncertain parameters affecting the performance of energy systems.
- Robust decision making tools for energy systems in uncertain environment.
- Renewable energy modeling and uncertainty management.

Abstract The uncertainty quantification and risk modeling are hot topics in operation and planning of energy systems. The system operators and planners are decision makers that need to handle the uncertainty of input data of their models. As an example, energy consumption has always been a critical problem for operators since the forecasted values, and the actual consumption is never expected to be the same. The penetration of renewable energy resources is continuously increasing in recent and upcoming years. These technologies are not dispatch-able and are highly dependent on natural resources. This would make real-time energy balancing more complicated. Another source of uncertainty is related to energy market prices which are determined by the market participants' behaviors. To consider these issues, uncertainty modeling should be performed. Various approaches have been previously utilized to model the uncertainty of these parameters such as probabilistic approaches, possibilistic approaches, hybrid possibilistic-probabilistic approach, information gap decision theory, robust and interval optimization techniques. This paper reviews the research works that used information gap decision theory for uncertainty modeling in energy and power systems.

Keywords Uncertainty, Uncertain parameters, Information gap decision theory, Robustness function, Opportunity function, Energy