Sandeep Chawda, Parul Mathuria & Rohit Bhakar, 2023, Load serving entity's profit maximization framework for correlated demand and pool price uncertainties, *Technology and Economics of Smart Grids and Sustainable Energy,* volume 8, Article number: 2 (2023).

Abstract Load serving entity (LSE) maximizes profit by maximizing the difference between revenue earned from supplying its consumer demand and procurement cost incurred in the wholesale electricity markets. Procuring energy for varying consumer demand at varying pool prices is a challenge for LSE, as their concurrent variations significantly affect its expected profit. Hence, modeling uncertainties of consumer demand and pool prices for LSE's profit maximization can offer significant opportunities. The paper capitalizes on this opportunity, by developing a novel framework to consider the uncertainties and correlation between LSE's consumer demand and wholesale market prices. The two uncertainties and their correlation are explicitly modeled in a single framework using the information gap decision theory (IGDT) based ellipsoid bound uncertainty model, for an LSE holding a large share of market demand. The proposed framework maximizes profit and addresses the risk-averse and risk-seeking behavior of LSE through robustness and opportuneness functions. Simultaneous consideration of demand and pool price uncertainties increases tolerance of decisions to handle these uncertainties while improving profit targets.

Keywords Consumers, Demand uncertainty, Decision-making, Information gap decision theory, Load serving entity, Pool price uncertainty, Procurement, Profit.

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