

A variety of multi-agent systems methods has been proposed for forming cooperatives of interconnected agents representing electricity producers or consumers in the Smart Grid. One major problem that arises in this domain is assessing participating agents' uncertainty, and correctly predicting their future behaviour regarding power consumption shifting actions. In this paper we adopt various machine learning techniques and use these to effectively monitor the trustworthiness of agent statements regarding their final shifting actions. In particular, we evaluate the performance of four approaches, one based on a Histogram Filter, and three on regression approaches, that is, Gaussian Process, k -Nearest Neighbours, and Kernel Regression. We incorporate these to aggregate individual forecasts within a directly applicable scheme for providing cooperative electricity demand shifting services. Experiments were conducted on real-world datasets from thousands of users located in Kissamos, a municipality of Crete. Our results confirm that the adoption of machine learning techniques provides tangible benefits regarding enhanced cooperative performance, and increased financial gains for the participants.