

The Effect of Information Transparency and Social Values on Smart Grid Balancing

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Abstract

In electricity markets, real-time balancing of demand and supply in smart grids is a major concern for electricity generators and distributors, as well as policy institutions. Supply and demand need to match quite precisely at every time point, and an unbalanced electric grid increases costs for all users. Given the nature of electricity as a public good, we posit that smart grid coordination shares *gamification* principles with repeated games, and is sensitive to individual differences in social value orientation – i.e., the extent to which someone is competitive vs. altruistic. We developed an online game to simulate balancing of a smart grid and test the effect of players' social orientation on their performance. We also test the hypothesis that information transparency would improve a player's balancing behavior. We find that the gamified system leads to a balanced electric grid, and higher information transparency leads to a more balanced grid. We also find that social values and information transparency provide benefits at an individual level, which can be detected using incremental modeling techniques. Insights from this research can be used by electric grid regulators to better balance their system and decrease prices for all grid users. Our gamification approach can be generalized to other public systems where personal characteristics, coupled with incentive schemes, can be used to improve system efficiencies.