Impact of thermostatically controlled loads' demand response activation on aggregated power: A field experiment - DTU Orbit (08/11/2017)

Impact of thermostatically controlled loads' demand response activation on aggregated power: A field experiment

This paper describes the impacts of different types of DR (demand response) activation on TCLs' (thermostatically controlled loads) aggregated power. The different parties: power system operators, DR service providers (or aggregators) and consumers, have different objectives in relation to DR activation. The outcome of this experimental study quantifies the actual flexibility of household TCLs and the consequence for the different parties with respect to power behaviour. Each DR activation method adopts different scenarios to meet the power reduction, and has different impacts on the parameters. The experiments are conducted with real domestic refrigerators representing TCL. Activating refrigerators for DR with a delay reduces the ISE (integral square error) in power limitation by 28.46%, overshoot by 7.69%. The delay in refrigerator activation causes reduction in power ramp down rate by 39.90%, ramp up rate by 21.30% and the instantaneous average temperature increases by 0.13% in comparison with the scenario without activation delay.

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