Experimental analysis of flexibility change with different levels of power reduction by demand response activation on thermostatically controlled loads

This paper studies the flexibility available with thermostatically controlled loads (TCLs) to provide power system services by demand response (DR) activation. Although the DR activation on TCLs can provide power system ancillary services, it is important to know how long such services can be provided for when different levels of power reduction are imposed. The flexibility change with different levels of power reduction is tested experimentally with domestic fridges used by real customers with unknown user interaction. The investigation quantifies the flexibility of household fridges and the impact of DR activation in terms of deviation in the average temperature. The maximum possible power reduction with the cluster of refrigerators is 67% and the available flexibility with the cluster of refrigerators is 10%. The resulting deviation in the average temperature is 14%.