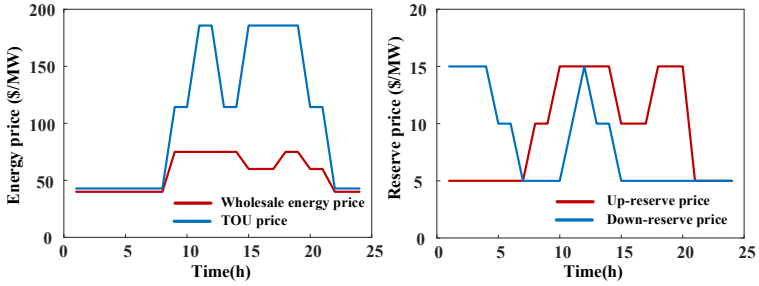
Appendix for the paper: Asynchronous distributed scheduling of active distribution network and thermostatically controlled loads with MPC-based aggregation

Case A. IEEE 33-Bus System Test

The forecasting wholesale energy, time of use (TOU) and reserve prices derived from the electricity market of China Southern Power Grid Co., Ltd., in Guangdong Province are shown in Fig. A1.



(a) energy prices (b) reserve prices.

Fig. A1. Profiles of forecasting prices

The optimal scheduling results of TCL aggregators are shown in Fig. A2.

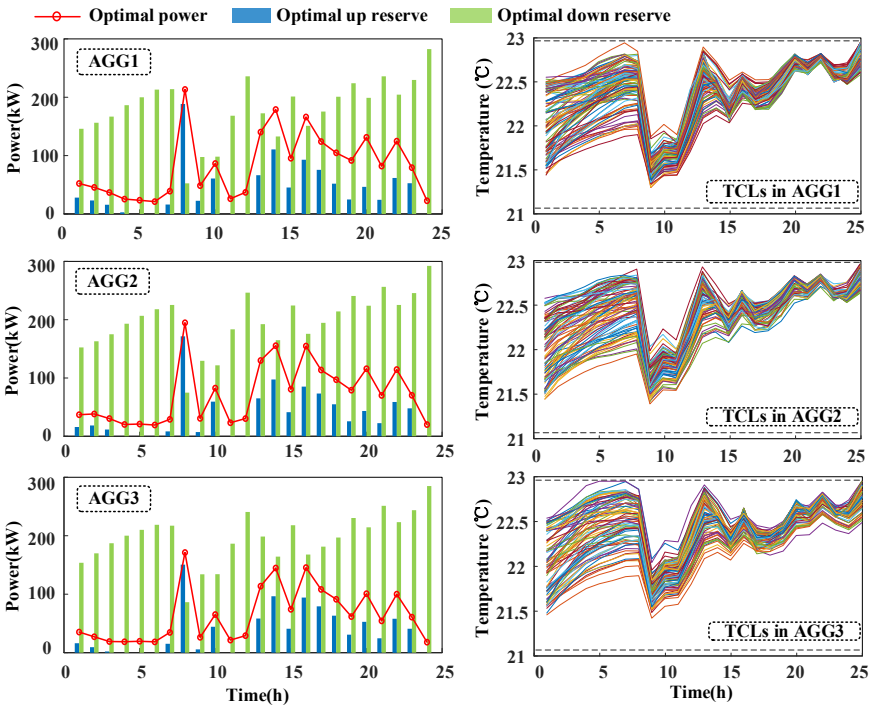


Fig. A2. The optimized scheduling results and indoor temperature of TCLs.

The cost iteration process of DSO and TCL aggregators are shown in Fig. A3.

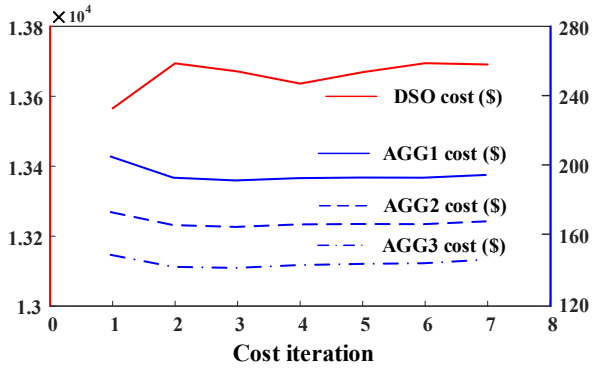


Fig. A3. The optimized scheduling results and indoor temperature of TCLs.

Case B. IEEE 123-Bus System Test

The DSO scheduling results of different methods in IEEE-123 bus system are summarized in Table III.

TABLE III

PERFORMANCE UNDER DIFFERENT METHODS IN IEEE 123 BUS SYSTEM

	DSO cost	EPR	PRP	Violation rate	Solving time
M1	$15,622	-	-	95.6%	2.01s
M2	$17,140	9.7%	5.2%	70.5%	2.12s
M3	$28,890	84.9%	35.1%	0.8%	2.05s
M4	$20,319	30.1%	22.1%	3.8%	1240.3s
M5	$29,139	86.5%	40.9%	0.4%	3.10s
M6	$20,217	29.4%	20.8%	3.9%	5.20s
M7	$20,021	28.2%	16.2%	4.1%	2.28s
M8	$19,968	27.8%	14.3%	4.2%	5.88s