Case Data

1. Parameters for BES and HES

For modified IEEE 6-bus system and IEEE 30-bus system:

Table A1. Parameters for BES and HES

Terms	$E_{\text{BES},i}^{\min} / E_{\text{BES},i}^{\max}$	$\eta_{\text{BES},i}^{\text{c}} / \eta_{\text{BES},i}^{\text{d}}$	$E_{\text{BES},i}^{initial}$
Values	10 MWh/ 90 MWh	0.95/0.95	50 MWh
Terms	$P_{\text{HES},i}^{\text{c,max}} / P_{\text{HES},i}^{\text{d,max}}$	$\eta_{\text{HES},i}^{\text{d}}$	$\alpha_{\text{HES},o}^{\text{c}}$
Values	100 WW/ 100 MW	11.4 (kg/MW)	{0.1805, 0.6080, 1.0735} (MW/kg)
Terms	$V_{\text{HES},i}$	$\rho_{\text{HES},i}^{\min} / \rho_{\text{HES},i}^{\max}$	$\Delta\rho_{\text{HES},i}^{\max}$
Values	100 m3	103.5/38.8 (Pa)	38.8 (Pa)

2. Ambient temperature

For the modified IEEE 6-bus system and IEEE 30-bus system, temperature data are from historical Chongqing weather data in Chongqing in August 2022: https://www.timeanddate.com/weather/china/chongqing/historic?month=8&year=2022. The temperature in six days is shown in Figure A1.
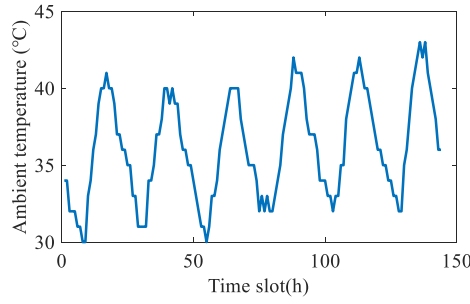

Figure A1. The temperature in 6 operating days

3. Wind and PV generation in the modified IEEE 30-bus system

For the modified IEEE 30-bus system, a 100 MW wind farm and a 100 MW PV are connected to bus 19 and bus 26, respectively. Wind power output, PV power output, and load demand under unit capacity are presented in Figure A2. A 40MW/80MWh BES and an underground HES are connected to bus 19, and bus 26, respectively. Parameters of BES and HES are presented in Table A1.
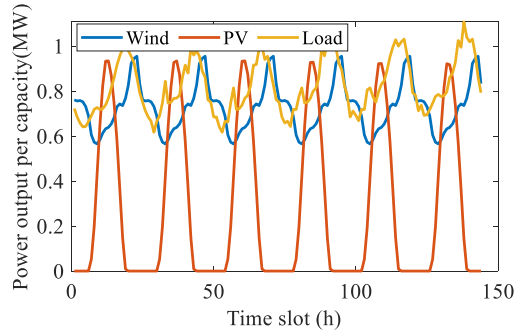

Figure A2. Renewable power output and load demand.