

Base Data for “Distribution System Planning Considering Peak Shaving of Energy Station”

Shuaijia He, Hongjun Gao, *Member, IEEE*, Junyong Liu, *Member, IEEE*, Xi Zhang, and Zhe Chen, *Fellow, IEEE*

Abstract—This material presents some base data of modified IEEE 33-node and practical 99-node distribution systems in the paper “Distribution System Planning Considering Peak Shaving of Energy Station”.

The proposed planning model is tested on a modified IEEE 33-node and a practical 99-node distribution system with an ES in this paper. The unit investment cost of the substation is 50000\$/MW [1]. Parameters of candidate lines are shown in Table I. Parameters of EC can be found in [2], [3]. Normalized electric and cooling loads after clustering historical data are shown as Fig. 1. Some parameters are obtained from [4], such as the transmission prices. The selling price of cooling energy is 92 \$/MWh [5]. Other needed parameters are listed in Table II.

TABLE I PARAMETERS OF CANDIDATE LINE TYPES

Types	Resistance (Ω/km)	Reactance (Ω/km)	Current limit	Power limit	Cost (\$/km)	Lifetime (year)
-------	--------------------------------------	-------------------------------------	------------------	----------------	-----------------	--------------------

			(A)	(MW)		
1	0.85	0.4	170	2.15	6638	15
2	0.45	0.4	275	3.48	8427	15
3	0.27	0.4	380	4.81	10930	15
4	0.21	0.4	445	5.63	12000	15
5	0.17	0.4	515	6.52	13500	15
6	0.13	0.4	610	7.72	15200	15
7	0.11	0.4	770	9.75	16200	15
8	0.08	0.4	800	10.13	17200	15
9	0.05	0.4	1990	25.2	24638	15

TABLE II PARAMETERS INVOLVED IN THE MODEL

Parameters	Value
The investment cost of CST (\$/kW)	71.4
The lifetime of substation	20
The lifetime of feeder	15
The lifetime of EC	14
The lifetime of CST	10

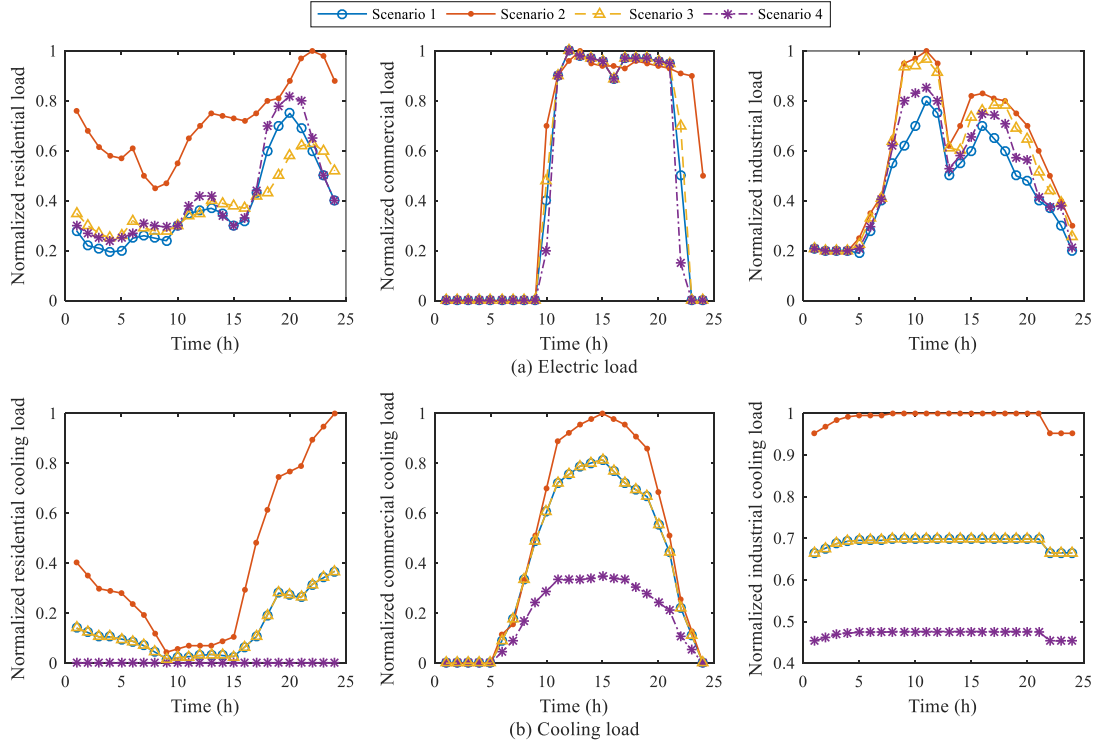


Fig. 1 Electric and cooling loads

REFERENCES

- [1] H. Haghighat and B. Zeng, “Stochastic and Chance-Constrained Conic Distribution System Expansion Planning Using Bilinear Benders Decomposition,” *IEEE Trans. Power Syst.*, vol. 33, no. 3, pp. 2696–2705, May 2018.
- [2] “50HP Air-cooled Chillers.” <https://detail.1688.com/offer/561890523586.html> (accessed Aug. 13, 2020).
- [3] “40P Water-cooled Screw Chillers.” <https://detail.1688.com/offer/546029837084.html> (accessed Aug. 13, 2020).
- [4] S. He, H. Gao, J. Liu, Y. Liu, J. Wang, and Y. Xiang, “Distributionally Robust Optimal DG Allocation Model Considering Flexible Adjustment of Demand Response,” *Proceedings of the CSEE*, vol. 39, no. 08, pp. 2253–2264+8, 2019.
- [5] Y. Teng, L. Wu, O. Leng, Z. Chen, and W. Ge, “Multi-energy microgrid optimization operation model considering waste disposal and multi-source coordinated energy storage,” *Trans. China Electro. Society*, vol. 35, pp. 4120–4130, 2020.