

Supplementary Material File S2. Prediction of electricity consumption in the whole society

The initial screening results of Lasso regression show that the overall electricity consumption in society is an important factor affecting carbon emissions, and the development of electricity consumption in society will enter a saturation stage in the future[1]. The logistic model has saturation characteristics and is suitable for medium - and long-term prediction of electricity consumption in the entire society[2]. The logistic model is shown in equation (S1):

$$C = \frac{k}{1+ae^{-bt}} \quad (S1)$$

In the formula, t is the time independent variable; a, b is the parameter to be identified, which is obtained by substituting historical year data; k is the total electricity consumption of the whole society in 2060.

According to Kaya's identity, the total social electricity consumption C can be decomposed into equation (S2):

$$C = \frac{1}{k} \frac{\eta_1 \eta_2}{\eta_3} E \quad (S2)$$

In the formula, k is the conversion coefficient between electricity and standard coal, normally it is 1.229×10^{-4} tce/kWh[3]; E is the total energy consumption; η_1 is the conversion efficiency of total energy on the production end; η_2 is the overall level of electrification; η_3 is the total power conversion efficiency calculated for the production end.

In the three scenarios, the values of η_1 , η_2 , η_3 are based on Qin, et al. [4] results, and the prediction of total energy consumption is detailed in the appendix A, which will not be repeated here. The total social electricity consumption in 2060 under three scenarios is shown in Table S3.

Table S3 Prediction of Total Social Electricity Consumption in 2060 under Three Scenarios

Scenarios	Total energy consumption	η_1	η_2	η_3	Total electricity consumption (10^4 kwh)
Benchmark scenario	117960275.7	0.8	0.67		124490126.8
Low-carbon scenario	102663256.4	0.87	0.79	0.95	93445068.26
Demonstration scenario	74456975.11	0.94	0.9		70390341.67

According to equation (S2), the estimated total social electricity consumption of Suzhou City in 2060 can be calculated for each scenario based on the total energy consumption under each scenario. Therefore, the electricity consumption of the whole society under three scenarios is shown in Figure S1.

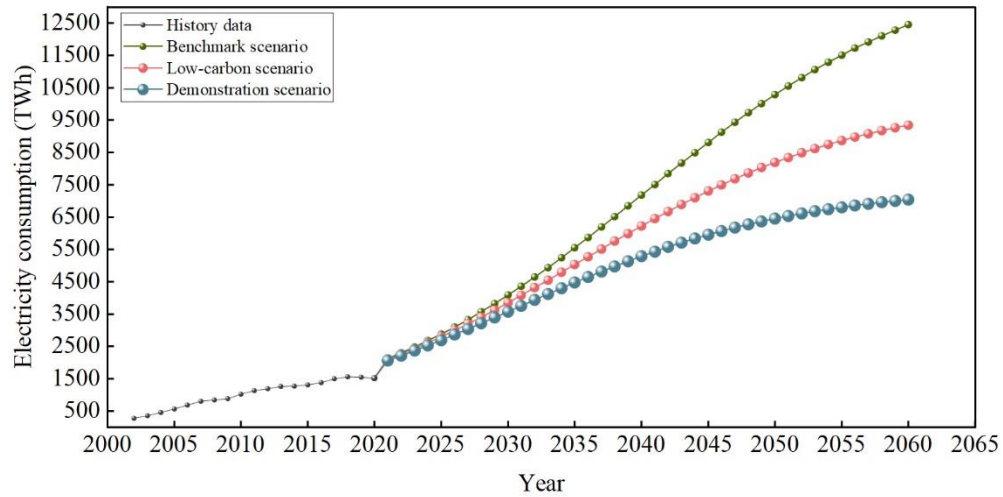


Figure S1 Electricity consumption in the whole society under three scenarios

Reference

1. Li, H.; Mao, X.; Zhu, L.; Yao, Y.; Tan, J. Saturation Load Forecasting Based on Long Short-Time Memory Network. In *2018 2nd IEEE Conference on Energy Internet and Energy System Integration (EI2)*, 20-22 Oct. 2018, 2018; pp 1-6. DOI: <https://doi.org/10.1109/EI2.2018.8582222>.
2. Zhai, X.; Tian, S.; An, Q.; Chen, W.; Li, J. Automatic Coordinated Control Technology of Incremental Distribution Network Based on Saturated Load Forecasting. *Techniques of Automation & Applications* **41** (3).
3. Tian, S.; Zhou, Q.; Cheng, H.; Liu, L.; Lu, L.; Jiang, S. Application of pigeon-inspired optimization algorithm based SVM in total power demand forecasting. *Electric Power Automation Equipment* **2020**, *40* (5), 173-181. DOI: <https://doi.org/10.16081/j.epae.202004016>.
4. Qin, H.; Luo, C.; Bao, Z.; Huang, L.; Li, K.; Chen, L. Medium-long term electricity consumption prediction considering future scenario constraints. *Power Demand Side Management* **2022**, *24* (4), 59-66. DOI: <https://doi.org/10.3969/j.issn.1009-1831.2022.04.010>.