

Asuncion residential energy storage

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Location of the Jono Zero Carbon Advanced Urban Area. (Generated by Arc GIS10.8,).

Monthly energy consumption of the target residence.

Monthly PV power generation of the target residence.

Structure of residential energy system with energy storage equipment.

This study involved two main research models, namely, the double-layer optimization model and the comprehensive comparison model. The double-layer optimization model is used to achieve dual optimization of the energy storage device configuration and system energy management. The comprehensive comparison model is used to comprehensively compare and evaluate ESSs in different scenarios. At the same time, it is necessary to meet certain constraints when using ESS energy consumption simulation models. The research method and model compositions are shown in Fig. 5.

Structure of the research method and model compositions.

In this study, we present an optimization model for a home energy system with an energy container that takes into account the total operating costs of the system. This model considers system costs holistically, improving system financial performance while ensuring safe system operation and optimizing the energy storage and management systems.

The framework of the double-layer optimization model.

The expression is as follows:

The optimization expression is as follows:

A decay constant is introduced into the APSO algorithm, which leads to individual decay and global optimization. The decay constants of all particles are identical, but their refresh rate are different. With the increase in X, the optimum value will be renewed increasingly more frequently, and then, the optimum will be achieved.



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