Energy storage configuration of new energy industrial park

Overview

This study proposes a gravity energy storage system and its capacity configuration scheme, which utilizes idle steel blocks from industry overcapacity as the energy storage medium to enhance renewable energy integration and lower corporate electricity costs.What is industrial park multi-energy complementary system with hydrogen storage?

Industrial park multi-energy complementary system with hydrogen storage is built. DBSCAN algorithm is introduced to extract typical scenarios based on cluster analysis. Comprehensive benefits are taken into account in configuration optimization. An ε-constraint is applied to solve the mixed integer fraction optimization problem.

Why do industrial parks need a hydrogen energy storage system?

Excellent performance in energy storage of hydrogen energy can help mitigate the challenges posed by large-scale renewable energy penetration to the power system. With the coordination of electric power and hydrogen networks, industrial parks can make full use of clean energy sources such as wind and solar energy.

What is energy interaction in Industrial Park MECS?

The industrial park MECS usually consists of a power generation subsystem and an energy storage subsystem. These two subsystems cooperate with each other, realizing efficient energy supply. The relationship of energy interaction in the MECS is presented as shown in Fig. 1.

What is the optimal cluster quantity for reducing Industrial Park MECS?

The optimal cluster quantity for reducing scenarios of industrial park MECS is equal to 3. Therefore, power demand, WT and PV output in three typical scenarios are determined by clustering, as shown in Fig. 7, for following system configuration optimization. Fig. 6. CHI scores under different cluster quantity. Fig. 7.

How to analyze energy complementarity of Industrial Park MECS?

Optimization values under different optimization preferences. Optimal allocation under neutral preference, w 1 = 0.5, w 2 = 0.5, is taken as an example to analyze energy complementarity of the industrial park MECS. Electricity power balance of the industrial park MECS under typical scenarios is shown in Fig. 9.

How is Industrial Park MECS optimized?

Typical scenarios of power demand, WT and PV output. Then, industrial park MECS is optimized with taking all economic, environmental and social benefits into account. Relevant economic and technical parameters involved in the process are shown in Appendix B.

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