Shared energy storage game

What is shared energy storage Nash game model?

The user-side shared energy storage Nash game model based on Nash equilibrium theoryaims at the optimal benefit of each participant and considers the constraints such as supply and demand equilibrium,so as to achieve the overall optimal and obtain the best strategy choice.

What is shared Energy Storage (SES)?

Shared energy storage (SES) enables users to withdraw electrical energy from shared batteries. This paper proposes a P2P energy trading model combined with SES and studies a cooperative surplus distribution mechanism based on the asymmetric Nash bargaining (ANB) theory.

Is shared storage planning a game-theoretic approach?

Furthermore,a Stackelberg game-theoretic approach embedded in the shared storage planning model has been proposed,considering storage sharing among energy prosumers at the design phase,with the storage investor as the leader and energy prosumers as followers .

How can shared storage improve energy systems?

By integrating shared storage into these projects, system operators can better manage their energy resources, improve grid stability, and support the transition to renewable energy sources. This model fosters participants cooperation and investment, leading to more sustainable and resilient energy systems. 6. Conclusions

What is shared energy storage?

In the energy sector,the sharing economy extends to the form of shared energy storage,which separates the ownership and uses rights of energy storage4. Currently,there are many studies on shared energy storage by domestic and international scholars.

What is user-side shared energy storage?

User-side shared energy storage is composed of interconnection and mutual benefit of adjacent energy storage devices in the same area,so the power loss in the power interaction process can be ignored 17.

When the shared energy storage station"s energy storage battery is being charged, the state of charge (SOC) at time interval t is related to the SOC at time interval t-1, the charging and discharging amount of the energy storage battery within the [t-1, t] time interval, and the hourly energy decay.

2.2. Application scenarios. Shared energy storage is generally applied in the supply, network, and demand sides of power systems. The shared energy storage at the supply side is mainly utilized for renewable energy consumption (Zhang et al., 2021).The proportion of renewable energy is greatly increasing due to the continuous promotion of "carbon peaking ...

Given this context, the sharing economy theory is integrated with the energy storage industry. At present, there have been some research results on shared energy storage (SES), but the main research scenario is sharing between prosumers in communities [7,8], and few studies have discussed energy storage sharing between power stations.

Xue Kong used a multi-objective approach to optimize the capacity of the shared energy storage system to ensure the economy of shared energy storage and the independence of the energy community, proposing a two-layer framework that optimized the scheduling of the energy community and the capacity of the shared energy storage system [16 ...

With the ongoing development of new power systems, the integration of new energy sources is facing increasingly daunting challenges. The collaborative operation of shared energy storage systems with distribution networks and microgrids can effectively leverage the complementary nature of various energy sources and loads, enhancing energy absorption ...

To face these challenges, shared energy storage (SES) systems are being examined, which involves sharing idle energy resources with others for gain [14].As SES systems involve collaborative investments [15] in the energy storage facility operations by multiple renewable energy operators [16], there has been significant global research interest and ...

Shared energy storage (SES) model as an emerging business model having significant contributions to enhancing energy storage (ES) utilization efficiency, renewable energy consumption and improving the stability of power grid operation. Among them, the distributed SES model usually involves different stakeholders including the energy storage providers (ESPs), ...

Shared energy storage operator game model. In the lower-layer model, shared energy storage operators aim to maximize annual revenue, including electricity trading profit and thermal trading profit, which can be expressed as follows: (23) max Profi t st SES = ...

Sizing and configuring community-shared energy storage according to the actual demand of community users is important for the development of user-side energy storage. To solve this problem, this paper first proposes a community energy storage cooperative sharing mode containing multiple transaction types and then establishes a sizing and configuration ...

The sharing of energy storage in the alliance formed by different types of WPGs provides a new solution to the problem, but alliance cooperation and alliance selection are crucial issues that warrant diligent attention by WPGs from the perspective of the cooperative game. Given this background, a shared energy storage (SES)-assisted and ...

The user-side shared energy storage Nash game model based on Nash equilibrium theory aims at the optimal benefit of each participant and considers the constraints such as supply and demand equilibrium, so as to

achieve the overall optimal and obtain the best strategy choice. ... User-side shared energy storage is composed of interconnection and ...

In recent literature, many studies have been engaged in the operation mode for SES to enhance the cost-effectiveness of energy storage. Kharaji et al. propose a two-echelon multi-period multi-product solar cell supply chain (SCSC) with three scenarios base on non-cooperative game in Ref. [18].Yajin et al. present a decentralized energy storage and sharing ...

They proposed a shared energy storage mechanism on the power generation side and developed a cooperative game-based planning model for shared energy storage. The game involves the participation of individual renewable energy power stations, who make decisions regarding their involvement in the sharing process by evaluating the benefits they ...

Aiming at the problems of a single trading mode of shared energy storage and complex cooperative relationship among multiple participants, this paper proposes a cooperative game-based trading model for shared energy storage considering multi-participant benefit incentives. Firstly, a trading model is proposed to tripartite cooperation among power supply, power grid, ...

Secondly, a distributed shared energy storage operation mechanism based on cooperative game theory is designed, and users with different source-load characteristics can share capacity, power mutual interact and benefit allocation based on cooperative game theory. Finally, a distributed algorithm suitable for energy storage sharing operation ...

To further promote the efficient use of energy storage and the local consumption of renewable energy in a multi-integrated energy system (MIES), a MIES model is developed based on the operational characteristics and profitability mechanism of a shared energy storage station (SESS), considering concentrating solar power (CSP), integrated demand response, ...

Shared energy storage is a manifestation of the sharing economy in the storage industry, and allows storage facilities to provide idle resources to other users in need and earn profits. ... In this paper, the key player in the Stackelberg game is the shared storage investor, who decides the rental price for the virtual storage capacity and ...

Therefore, the cooperative game under the shared energy storage mode on the energy side satisfies (1) The investment cost of the shared energy storage power station is lower than the sum of the costs of the renewable energy station with the separate configuration of the energy storage system. (2) After cooperation, the sum of the shared cost of ...

Shared energy storage (SES) is of great significance for building a new type of power system. The integration of SES with renewable energy communities (RECs) to establish the "REC + SES" model represents a novel approach to enhancing the operational efficacy of SES while simultaneously addressing the challenges of

electricity consumption in RECs.

Community shared energy storage (CSES) is a solution to alleviate the uncertainty of renewable resources by aggregating excess energy during appropriate periods and discharging it when renewable generation is low. ... [9,10,11], the game theory is used to specify the optimal energy trading between shared energy storage and local integrated ...

Therefore, A cooperative game-based strategy for optimal allocation of shared energy storage in commercial areas, and simulates the shared energy storage business park, and the results verify that the proposed model can effectively improve the total income of the Business park, and the income scheme based on the Shapley value method is ...

Energy storage sharing can effectively improve the utilization rate of energy storage equipment and reduce energy storage cost.However, current research on shared energy storage focuses on small and medium-sized users while neglects the impact of transmission costs and network losses.Thus, this paper proposes a new business model for generation ...

The shared energy storage of the new energy power system should be able to meet the regulating demand in multiple scenarios. However, the demand in multiple scenarios is coupled, which makes the existing operation strategies difficult to apply. It restricts the large-scale development of shared energy storage. So, this paper proposes the cooperative operation mode of multi ...

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Shared energy storage offers investors in energy storage not only financial advantages [10], but it also helps new energy become more popular [11]. A shared energy storage optimization configuration model for a multi-regional integrated energy system, for instance, is built by the literature [5]. When compared to a single microgrid operating ...

To tackle these challenges, a proposed solution is the implementation of shared energy storage (SES) services, which have shown promise both technically and economically [4] incorporating the concept of the sharing economy into energy storage systems, SES has emerged as a new business model [5].Typically, large-scale SES stations with capacities of ...

A stackelberg game-based transactive energy market was constructed where the distribution network can be as the upper level leader and multiple ... which can decrease the impact of microgrids on distribution network. Comparing Case 1 and Case 3, the shared energy storage charges 2208 kW during the valley period and discharges 2210 kW during the ...

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