Peak-valley electric heating energy storage device

Can thermal energy storage reduce peak-valley difference of energy consumption?
Introduction Thermal energy storage techniques have become a promising way to minimize the peak-valley difference of energy consumption. Latent thermal energy storage (LTES) is a major aspect of thermal energy storage due to its high thermal storage density, and it can maintain a constant temperature in the process of heat release .

Does the optimized device improve the heat storage performance?
Compared with the original device,the heat energy charged of the optimized device increases by 5.7% and the filling amount of PCM decreases by 7.4%,indicating that the heat storage performance of the optimized device has been improved.

How can a phase change heat storage device be evaluated?
For a phase change heat storage device,the melting-solidification processing can be evaluated by the melt fraction v quantity. The larger the value of melt fraction v at the end of the simulated heat charging process,the more PCM has melted and the more heat energy is stored,revealing a better heat transfer effect. 3.1.2.

What is latent thermal energy storage (LTEs)?
Latent thermal energy storage (LTES) is a major aspect of thermal energy storagedue to its high thermal storage density,and it can maintain a constant temperature in the process of heat release . Therefore,phase change materials have received an increasing level of attention and have been widely applied to various heating systems.

What is a phase change heat storage device (PCM)?
In the studies of Li et al. , , PCM was filled in cylindrical tubes and all tubes were immersed in HTF of the storage tank. The structure forms of phase change heat storage devices can be broadly divided into two categories: shell and tube structure as well as encapsulated PCM structure, but the former is more common.

Which module has a larger heat energy discharged-charged ratio?
As can be seen in Fig. 7,whether focusing on the comparison of a single day or the comparison of the mean value,module 2has a larger heat energy discharged-charged ratio. This result was also affected by the connection mode between modules.

Li et al. (2018) considered how a heat storage device, like an electric boiler, could be used to increase the role of wind power; a case study verified the effectiveness of the proposed model. An energy-storage device is also added to the heat supply system studied by Quan et al. (2014) as one part of peak dispatching system. Their proposed ...

While the proportion of electric energy conversion devices has diminished, the energy supply of

corresponding cold and heat conversion devices such as HRSG, AC, and GSHP has grown. It is noticed that the involvement of energy storage equipments is more frequent in the park"s peak and valley periods of energy consumption.

The utility model relates to a complex hot water tank of solar heating and peak-valley electric storage energy heating, and consists of a heat type water tank, a connecting tube, an on-off control valve, an electronic heating apparatus as well as a final temperature hot water tank, wherein, the final temperature hot water tank is connected with the heat type water tank ...

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In this study, by adding a high temperature heat storage device in the cold (hot) section of the reheating pipeline and taking the 300MW extraction steam turbine as the research object, it is ...

According to the new high-temperature solid heat storage system designed in this study, it can be seen from the following Figure 2 that the minimum load of the unit is effectively reduced under the condition of the ...

As a large number of wind turbines connected to the grid, the difficulty of peak regulation of the power system is becoming more and more difficult. Therefore, a large number of peak-shaving ...

Store electricity during the "valley" period of electricity and discharge it during the "peak" period of electricity. In this way, the power peak load can be cut and the valley can be filled, and the user-side demand ...

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Aiming at problems such as high operating costs, the low utilization efficiency of renewable energy, and the increase in the peak-valley difference in user load caused by disordered charging of electric vehicles (EVs), the operation mode of "setting electricity by heat" or "setting heat by electricity" is adopted in the integrated energy system of intelligent residential ...

Users in industrial park can regulate their electric load autonomously. The system can smooth PV generation, and level peak-valley electric quantity. The system is benefit for energy storage, peak-shaving, valley-filling, and stabilizing intermittent RES generation. It is an important technology support for smart grid.

The traditional regulation method is difficult to meet future peak-shaving needs [5].Virtual power plant (VPP) can aggregate distributed resources such as wind turbines, photovoltaic (PV) generators, controllable loads,

and energy storage devices into an adjustable and easily controlled "equivalent power plant" through various advanced information and ...

In this paper, on the basis of analysing the feasible domain in which the configuration of heat storage can expand the work of CHP plants, we will set up a heat supply ...

For electric heat storage heating systems, incorporating phase change heat storage devices can make full use of peak-valley pricing policy. Cost savings and peak load shaving ...

The electric heating device with thermal storage can store inexpensive thermal energy at night and release the heat for space heating during the daytime. Such electric heating devices with thermal storage can store the energy of the power grid during the low-load period at night, reducing the peak load during the daytime and the load ...

Furthermore, energy efficiency can be enhanced by 151.6 % compared to traditional TES device and operational cost can be decreased to 15.1 % of conventional electric heating system. The proposed energy-efficient HP-PCM system exhibits great potential for scalable and cost-effective space heating with energy storage.

Therefore, it is necessary to realize the balance of thermal energy supply and demand through heat storage of heat storage device and shiftable heating load. The gas system is shown in Fig. 10 (c). In order to meet the power load demand, the natural gas consumption of gas turbine increases.

The heating system consists of a heat source (CHP plants, electric heating and heat storage tank), heating network and radiators. In actual district heating, the secondary pipe network is smaller in size and has a shorter distance from the heat exchange station compared to the primary pipe network.

Electric energy storage trading refers to the charge and discharge services provided by energy storage devices according to the needs of power system operation. The energy storage device accumulates electricity during the renewable energy abundant period and discharges during the load peak period.

In addition, the application scenarios of energy storage devices have a greater impact on their configuration results, which can effectively solve the problems of supply and demand balance, peak shaving and valley filling, smoothing and absorbing and electric energy substitution. ... Due to the low price of heat/cold storage equipment and the ...

Rong et al. [35] provided an auxiliary heat source by installing electric heating and heat storage devices to consume wind power during peak shaving; ... as the energy input and converts electricity into heat through electric heaters to meet the energy demand while achieving peak and valley reduction of electricity. To match the peak and valley ...

Peak-valley electric heating energy storage device

A peak-valley energy-saving electricity storage and charging device for a new energy vehicle, wherein a portable mobile box (1) thereof comprises a box body (11), movable ...

The use of inefficient energy sources has created a major economic challenge due to increased carbon taxes resulting from emissions. To address this challenge, multiple strategies must be implemented, such as integrating technologies related to energy supply, storage, and combined cooling, heating, and power (CCHP) system [1] tegrated energy systems ...

Thermal energy storage technology is an effective method to improve the efficiency of energy utilization and alleviate the incoordination between energy supply and demand in time, space and intensity [5].Thermal energy can be stored in the form of sensible heat storage [6], [7], latent heat storage [8] and chemical reaction storage [9], [10].Phase change energy storage ...

In recent years, many scholars have carried out extensive research on user side energy storage configuration and operation strategy. In [6] and [7], the value of energy storage system is analyzed in three aspects: low storage and high generation arbitrage, reducing transmission congestion and delaying power grid capacity expansion [8], the economic ...

Bear in mind that you"ll probably have more than one storage heater to power. Using your storage heater"s boost function adds to heating costs because it uses pricier daytime electricity, rather than stored heat. * Based on ...

The global building heating demand grows rapidly with the promotion of people"s living level during past decades. It is reported that the contribution of residential coal burning has exceeded the combination of transportation and power generation on the production of PM2.5 in northern China [1] paring with fossil fuels, industrial waste-heat, renewable energy and ...

Due to the severe energy depletion and worldwide environment pollution, improving energy efficiency and making use of renewable energy has become hotspots in energy researches [1].The effective use of distributed renewable energy is defined as "local collection, local storage, local use" [2], [3].Regional integrated energy system is a feasible way of efficient ...

In above studies, the terminal load is regarded as a constant. In fact, the cooling/heating/power loads in IES have flexible characteristics and good adjustability [15], and they can participate in demand response (DR) to reduce the peak-valley difference and the total cost of the system [16] is worth noting that the traditional DR is only focused on electric ...

The exhaustion of fossil fuels and the aggravation of environmental pollution make the integrated energy system (IES) with clean and sustainable energy sources more applicable [1].Vigorously developing an

integrated energy system is an important measure to realize energy transformation and energy structure adjustment [2].The IES, meeting the electricity, ...

Pumped Thermal Electricity Storage or Pumped Heat Energy Storage is the last in-developing storage technology suitable for large-scale ES applications. PTES is based on a high temperature heat pump cycle, which transforms the off-peak electricity into thermal energy and stores it inside two man-made thermally isolated vessels: one hot and one ...

The embodiment of the invention provides an energy valley-peak energy storage and conversion device which comprises a shell, wherein a plurality of layers of heat exchange tube sets...

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