Steam extraction energy storage in thermal power plants

Can thermal energy storage be integrated into coal-fired steam power plants?
In the FLEXI- TES joint project,the flexibilization of coal-fired steam power plants by integrating thermal energy storage (TES) into the power plant process is being investigated. In the concept phase at the beginning of the research project,various storage integration concepts were developed and evaluated.

What are some examples of heat extraction in power plants?
The literature also contains examples of direct and indirect heat extraction in the feedwater section as well as high-pressure and low-pressure storage tanks in the steam section of power plants. One example is a concept presented by Jentsch et al. of a displacement storage arranged parallel to the high-pressure preheating section.

Should thermal energy storage be integrated into power plants?
For conventional power plants, the integration of thermal energy storage (TES) into the power plant process opens up a promising option for meeting future technical requirements in terms of flexibility while at the same time improving economic efficiency.

What is a single steam source heating storage strategy?
In the single steam source heating storage strategy, a portion of the live steam enters the preheater and heat exchanger, facilitating sensible heat exchange with cold molten salt. This process converts the cold molten salt into hot molten salt, which exhibits improved liquidity following heat exchange.

What is a multi-steam source energy storage mode?
The multi-steam source energy storage mode is proposed based on the heat transfer characteristics of molten salt. Compared to the single steam source storage mode,the multi-steam source configuration demonstrates higher heat storage and thermal efficiency while maintaining the same peak shaving capacity during the storage phase.

How does a single steam source heat storage-release system work?
Figure 2 presents a schematic diagram of the single steam source heat storage-release system. In the single steam source heating storage strategy, a portion of the live steam enters the preheater and heat exchanger, facilitating sensible heat exchange with cold molten salt.

In the FLEXI- TES joint project, the flexibilization of coal-fired steam power plants by integrating thermal energy storage (TES) into the power plant process is being investigated.

The development of large-scale, low-cost, and high-efficiency energy storage technology is imperative for the establishment of a novel power system based on renewable ...

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Regulating the thermal system configuration can improve the ramp-up rate of the coal-fired power plants during peak shaving transient processes, while it may bring penalties in ...

The energy storage invocation of different subsystems in the power plant is a cost-effective method, and it can achieve flexibility enhancement of the thermal power plant ...

In order to provide more grid space for the renewable energy power, the traditional coal-fired power unit should be operated flexibility, especially achieved the deep ...

Abstract Flexibility enhancement of coal-fired power plants is extremely urgent to accommodate high-penetrated renewable energy and maintain the stability of power grid. ...

The average power ramp rate, power capacity and energy capacity increase with the increment in the number of throttled valves and/or the degree of feedwater bypass. This ...

A new coordinated control strategy assisted by high-pressure extraction steam throttling was proposed to address the issue of reheat steam overtemperature and further ...

In this study, molten salt thermal storage systems utilizing live and reheat steam as heat sources were proposed, and the steam ejectors were integrated to recover the residual ...

Flexible operation of thermal power plants will become increasingly relevant in the coming years. This work evaluates the effect of integrating a steam accumulator into a 598 MW ...

This study considers options for upgrading a 1610-MWel nuclear power plant with the addition of a thermal energy storage system and secondary power generators.

The flexibility transformation of coal-fired units in thermal power plants can be achieved through main steam extraction and reheated steam extraction.

The growing use of renewable energy requires greater flexibility than existing thermal power units. A steam-extraction system was developed to adjust ...

The low-carbon energy system has introduced the urgent demand for the ability of peak-shaving for coal fired power plants (CFPPs). A novel and efficient integration concept of the high ...

To investigate the flexibility and economic characteristics of a molten salt-combined heat and power (CHP) integrated system under different heat sources, this paper ...

Solar Aided Power Generation (SAPG) plant is a type of solar thermal hybrid system. In such a system, the

coupling of solar field and regenerative Rankine cycle plant is ...

This study investigated the operational flexibility of coal-fired power plants retrofitted with steam extraction and thermal energy storage. First, a linear operation model is ...

The load cycling range enlargement of thermal power plants is essential to ensure the power grid stability, which can facilitate the penetration of large-scale renewable ...

A novel coordinated control strategy, informed by the characteristics of distributed energy storage and power ramping stages of thermal power plants, is proposed.

The results show that the ejector extracting the steam from the reheater shows better peak-shaving capacity and higher energy efficiency than the schemes extracting steam ...

At present, there are several ways to improve the flexible operation of coal-fired units: (1) enhancing the control technology of power plants; (2) retrofitting the power generation ...

Abstract. At present, the calculation method of steam extraction efficiency of power plant turbine have five methods: heat balance method, equivalent enthalpy drop method, cyclicfunctional ...

Abstract Improving the peaking capacity of coal-fired units is imperative to ensure the stability of the power grid, thus facilitating the grid integration and popularization of large ...

Based on the energy storage characteristics of the coal-fired power unit, a load regulation method based on the multi-scale energy storage utilization is proposed. The method ...

A novel and efficient integration concept of the high temperature molten salt thermal energy storage (TES) system with CFPP in the boiler side is proposed in this paper.

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