

Can a parabolic trough solar thermal power plant be improved?

**Abstract** As a promising application of solar energy, parabolic trough solar thermal power generation technology is one of the most important methods of solar thermal utilization. This paper takes the SEGS VI parabolic trough plant as the research object and proposes an improved 300MW parabolic trough solar thermal power plant.

Does trough solar thermal power generation improve plant efficiency?

However, statistics have consistently shown that with the development of trough solar thermal power generation technology, the installed capacity of trough solar thermal power generation has been significantly improved, but the overall plant efficiency is still at a low level.

What are parabolic trough solar collectors?

Parabolic trough solar collectors are a type of solar thermal collector that can be used to generate electricity. This paper discusses the potential advantages and challenges of using parabolic trough solar collectors. One of the main advantages of parabolic trough solar collectors is their scalability.

How trough solar thermal power plant structure is based on SEGS VI plant?

Second, based on SEGS VI Plant, an improved trough solar thermal power generation plant structure that uses a sub-region heating scheme is proposed. Third, the subsystems of the 300MW power plant are analyzed and an optimization model for the overall plant efficiency is proposed.

Which concentrating solar trough is the cheapest?

Among the concentrating solar collectors, the parabolic trough is the most developed, cheapest, and widely used for large-scale applications in harnessing solar energy. However, it is not yet cheaper than conventional fossil fuels, and improvements and developments in the PTC are a must.

Does sectional heating improve the efficiency of a solar trough solar power system?

**Highlights** The improved 300MW parabolic trough solar thermal power system based on sectional heating was proposed. The optimization model for the plant efficiency was established. The performance parameters of the SEGS VI and the improved system were compared. The plant efficiency of the improved system was increased.

Parabolic-trough solar collectors are widely used in solar thermal power-generation stations because the structure is simple and inexpensive. However, many factors ... Heilongjiang Key Laboratory of New Energy Storage Materials and Processes, School of Energy Science and Engineering, Harbin Institute of Technology ... Parabolic-trough solar ...

The PTC with tube receiver is one of the mature solar technologies for thermal power generation. During application, the parabolic trough collectors concentrate the incoming sunrays on the bottom periphery of the tube receiver, while the top periphery is subjected to solar irradiation with low energy density.

At the early stages of STPP deployment, the research was focused on improving the solar field performance (Montes et al., 2009) spite of keeping a conservative power block configuration, some optimization studies were carried out, for example, the optimal number of extractions or the influence of different cooling options in the condenser (Blanco ...

collecting solar energy for thermal power generation. Ministry of New & Renewable Energy (MNRE) built and tested an 11.1 m<sup>2</sup> parabolic trough concentrator (PTC). A system that generates steam indirectly by using concentrating solar power (CSP) is examined. The study examined absorbers' thermal properties, thermal efficiency of combined thermal

The DISS (DIrect Solar Steam) project is a complete R+TD program aimed at developing a new generation of solar thermal power plants with direct steam generation (DSG) in the absorber tubes of ...

ed, parabolic trough solar thermal electric power plant technology represents one of the major renewable energy success stories of the last two decades. Parabolic troughs are one of the ...

China's largest trough solar thermal power plant, located in the Inner Mongolia Autonomous Region, generated 330 million kilowatt-hours of electricity in the 12-month period ending on March 31 this year.

Parabolic trough solar thermal power system (PTSTPS) is a kind of renewable energy technology, which can not only bear a large proportion of the basic power load, but also bear the flexible peak regulation of the grid. Its generation prediction is an important basis for the design, investment, and operation of power station. Based on the hourly meteorological ...

Parabolic trough solar thermal power plants are at present the cheapest option for utility scale solar electricity production. At present several projects are under development in Spain, in the USA, Egypt, Morocco, Mexico, Algeria and Iran. The levelised cost of electricity (LCE) for solar thermal power plants is in the range of 13-21 EURCts/kWh. Accordingly, subsidies are necessary ...

The Mechanics of Parabolic Trough Collector Systems. The parabolic trough solar collector is a key solar energy technology has more than 500 megawatts (MW) of installed capacity worldwide. These technologies are low-cost and help in efficient energy generation. Currently, electricity from these systems is about twice as expensive as from ...

This study investigates the frequency control of an isolated hybrid power system (HPS) in the presence of parabolic-trough solar thermal power system (STPS), wind generator, diesel engine generator and battery

energy ...

There is still considerable potential for the exploitation of solar energy. As the most mature and low-cost large-scale solar thermal power generation technology [2], parabolic trough solar thermal power generation technology is gradually being commercialized [3], while the overall plant efficiency is still fluctuating in the range of 11%-18% ...

An overview of the major types of solar thermal power plants or solar thermal electric technologies including concentrating parabolic trough, parabolic dish, fresnel lens systems, and locations and types of the largest solar thermal power plants. ... from 1984 to 2015, and the second, SEGS II, operated from 1985 to 2015. SEGS III-VII each had ...

The thermal stress-induced deformation issue of receiver is crucial to the performance and reliability of a parabolic-trough (PT) concentrating solar power (CSP) system with the promising direct steam generation (DSG) technology. The objective of the present study is to propose a new-type receiver with axially-hollow spiral deflector and optimize the ...

Fig. 5 shows the schematic layout of the CSP system using a parabolic trough. The power block, thermal energy storage, and solar field are the three primary parts of CSP systems. ... Since 2009, the solar thermal power plant Andasol 1 has run the earliest commercial system with indirect TES. However, compared to tanks used in two-tank thermal ...

Parabolic trough solar technology is the most proven and lowest cost large-scale solar power technology available today, primarily because of the nine large commercial-scale solar power plants that are operating in the California Mojave Desert. These plants, developed by Luz International Limited and referred to as Solar Electric Generating Systems (SEGS), range ...

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