

Frontier developments in solar thermal power generation

What is the future of solar energy?

The Future of Solar Energy considers only the two widely recognized classes of technologies for converting solar energy into electricity -- photovoltaics (PV) and concentrated solar power (CSP), sometimes called solar thermal) -- in their current and plausible future forms.

How do solar thermal power plants work?

Solar thermal power plants are composed of three processes: collection and conversion of solar radiation into heat, conversion of heat to electricity, and thermal energy storage to mitigate the transient effects of solar radiation on the performance of the system.

Which thermodynamic cycle is used for solar thermal power generation?

Rankine, Brayton, and Stirling cycle are commonly used thermodynamic cycles for solar thermal power generation. The integration of thermal energy storage and hybridization of solar thermal energy systems with conventional power generation systems improves the performance and dispatchability of the solar thermal systems.

Is solar thermal power generation better than solar PV?

In the world of renewable power generation technologies, solar thermal power generation faces stiff competition from solar PV and wind energy systems. The latter two systems are not just more technologically mature, but also cheaper than the former.

What are solar thermal technologies for power generation?

This chapter also covers the recent developments in solar thermal technologies for power generation. In recent times, solar thermal technologies are integrated with conventional fossil-fuelled power plants as well as other renewable energy sources such as biomass, geothermal to improve its performance.

How to compare the different solar thermal power generation systems?

To compare the different solar thermal power generation systems, some key characteristics/parameters are important to analyze the performance of the power generation system. Some of those parameters are discussed as follows: Aperture is the plane of entrance for the solar radiation incident on the concentrator.

Thermoelectric materials convert waste heat into electricity, making sustainable power generation possible when a temperature gradient is applied. Solar radiation is one potential abundant and eco-friendly heat source for this application, ...

It explores the evolution of photovoltaic technologies, categorizing them into first-, second-, and third-generation photovoltaic cells, and discusses the applications of solar ...

A lot has changed in the past few decades. Today, solar power. is widely used for terrestrial applications and is rapidly increasing its share of the power generation mix as a result of the ...

Technical efficiency of thermal power units through a stochastic frontier Dyna, vol. 82, n°191, junio, 2015, pp. 63-68 ... solar and biogas capacity. In the alternative scenario, the expansion ...

Atiz et al. [8] proposed a solar integrated system to generate electricity and hydrogen using a solar pool source of 217 m² and an evacuated tube solar collector (ETSC) ...

Based on global distribution of solar energy and its feature, this paper discusses a review about solar energy's utilization techniques, mainly discusses the latest development of photo-thermal ...

Solar energy can be converted directly into electrical energy by photovoltaic cells. In addition, using thermal collectors, including parabolic trough collectors (PTCs), solar energy ...

Solar energy is abundantly present in most parts of the world where there are human activities. The vast abundance and inexhaustibility of solar energy, when coupled with low carbon ...