Solar energy complementary combined cycle system

The complementary of biomass and solar energy in combined cooling, heating and power (CCHP) system provides an efficient solution to address the energy crisis and environmental pollutants. This work aims to propose a multi-objective optimization model based on the life cycle assessment (LCA) method for the optimal design of hybrid solar and biomass ...

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Integrated Solar Combined Cycle Power Plants (ISCCs), composed of a Concentrated Solar Power (CSP) plant and a natural gas-fired Combined Cycle (NGCC) power plant, have been recently introduced in the power generation sector as a technology with the potential to simultaneously reduce fossil fuel usage and the integration costs of solar power.

In the ISCC system 2, the cold and hot oil tanks allow the solar field and combined-cycle system to operate independently via an appropriate operation strategy with the heat storage system, which makes the solar energy integrated into the bottom cycle and the solar energy power generation constant. Consequently, the influence of the changes in DNI on the ...

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An integrative renewable energy supply system is designed and proposed, which effectively provides cold, heat, and electricity by incorporating wind, solar, hydrogen, and geothermal energy. The principles of the proposed R-CCHP system are outlined, highlighting the energy sources and interactions among the equipment and subsystems as shown in ...

In the current study, four different combinations of the sCO 2 cycles and ORC, including basic recuperated, pre-compression, recompression with main compressor intercooling, and partial cooling, were taken into consideration, and their performances with regard to CSP application were compared.

The solar thermal efficiency and power output of the traditional integrated solar combined cycle system (ISCC) are limited by the integrated solar mirror field area and Rankine cycle efficiency. This paper presents a new system, on the basis of the combined cycle system with the three pressure HRSG with reheat, the solar energy is integrated ...

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The multi-energy complementary power systems based on solar energy were mainly divided into solar-fossil energy hybrid systems (including solar and coal-fired hybrid systems, solar and oil-fired hybrid systems and solar and gas-fired hybrid systems), solar-renewable energy hybrid systems (including solar and biomass hybrid systems, solar and ...

From the above analysis, although solar energy is formed the multi-energy complementary system with coal-fired power plant, gas turbine or biomass, the combustion of fossil fuels, biomass and other fuels still produces certain amount of greenhouse gases. The research actuality on the combination of sCO 2 cycle with SPT or GT is summarized in Fig. 1. ...

For example, the novel solar-based CCHP system [26], a small-scale novel cogeneration system integrated with a gas turbine cycle and the Kalina cycle [27], a novel parallel double-effect absorption power cycle using lithium bromide-water solution [28], and a CCHP system based on the hybridization of solar energy and gas turbine cycle [29] have been ...

Thermal Energy Storage (TES) systems when integrated into the solar cycle can address such issues related to energy efficiency, process flexibility, reducing intermittency during non-solar hours. This review work focuses and discusses the developments in various components of the ISCC system including its major cycles and related parameters ...

The integration of solar thermal energy with fossil fuel-driven energy systems, such as coal-fired power generation system [20], gas turbine [21], gas-steam combined cycle system [22], coal-fired CHP system [23], and micro-CHP [24], have been investigated by many researchers. The integration mode, performance analysis and evaluation method of these ...

A renewable energy multi-generation system based on proton exchange membrane fuel cell (PEMFC) and solar energy is proposed. The hybrid system is mainly composed of PEMFC, solar dish collector (SDC), solid oxide electrolyzer cell (SOEC) and dual Rankine cycle (DRC), which can provide electricity, heat, hydrogen and hot water.

The source-side energy cycle of the system begins with the PV/T component. The fluid in the PV/T collector absorbs solar energy and then stores it in the hot water storage tank. This stored thermal energy is utilized as a heat source for the water-water heat pump unit. In addition to solar energy, the fluid also absorbs geothermal energy from ...

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