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Energy storage orc power generation system

Overview

In this study, the optimal design and operation of an Organic Rankine Cycle (ORC) system driven by solar energy is investigated. A two-tank sensible thermal energy storage system is configured to overcom.

Is a solar energy driven ORC system optimal?

This study investigates the optimal design and operation of a solar energy driven ORC system with a parabolic trough collector and a two-tank sensible thermal energy storage system. The energy storage system and the ORC system have been optimized simultaneously to achieve the best performance of the total system.

Does a solar driven ORC system have a stable output?

Recently, Eterafi et al. also investigated the solar driven ORC system with stable output. Domestic hot water production is considered alone with the ORC system for power generation. The prominent role of thermal energy storage system is also examined. The solar collector is parabolic dish concentrator (PDC) instead of PTC used in our study.

What is a solar ORC system?

The ORC system driven by solar energy generates round-the-clock stable power output. The integrated ORC system is optimized based on a simulation-based optimization framework. Optimal design and control strategy are identified.

How to maximize system efficiency of solar energy driven ORC power plant?

The system efficiency of the solar energy driven ORC system is maximized with the proposed optimal operation strategy. With the simulation-based optimization framework, the system efficiency of the recuperative ORC power plant with toluene as the working fluid is increased from 17.9% to 24.8% compared with a previous study in the literature.

How is a solar energy driven ORC power plant modeled?

An integrated model is developed in Matlab and Aspen HYSYS, which is a widely used process simulator, to obtain the optimal process design and control strategy of the solar energy driven ORC power plant. The thermal energy storage sub-system and the PTC sub-system are modeled in Matlab, while the ORC sub-system is simulated in Aspen HYSYS.

What is the optimal design and operation of an organic Rankine cycle (ORC)?

The integrated ORC system is optimized based on a simulation-based optimization framework. Optimal design and control strategy are identified. In this study, the optimal design and operation of an Organic Rankine Cycle (ORC) system driven by solar energy is investigated.

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Frontiers , Applications of Thermal Energy Storage in Solar ...

Oct 13, 2021 · Organic Rankine Cycles (ORCs) are promising approaches for generating power from medium or low temperature heat sources. In this regard, ORCs can be used to indirectly ...

Green Energy Storage with ORC System for Thermal Power ...

Jul 14, 2025 · With the continuous advancement of energy structure transformation and green and low-carbon goals, more and more thermal power plants have begun to deploy ORC (Organic ...

A combined CPV/T and ORC solar power generation system ...

Aug 15, 2017 · This work investigates the behavior of a solar power generation system that consists of a concentrated photovoltaic/thermal (CPV/T) system that

utilizes an Organic ...

ORC Power Plant

Apr 15, 2025 · ORC Power Plant: Organic Rankine Cycle is a thermodynamic cycle that is similar to the traditional Rankine cycle (used in steam turbines), but it uses an organic fluid (such as ...

Optimal heat storage temperature and performance of ORC ...

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3 days ago · Therefore, a joint optimization model of economic, environmental and exergy for IES combining waste heat driven organic Rankine cycle (ORC) power generation and multi-energy ...

A small-scale solar organic Rankine cycle combined heat and power

Dec 25, 2017 · In this paper, we examine integrated thermal energy storage (TES) solutions for a domestic-scale solar combined heat and power (S-CHP) system based on an organic Rankine ...

Pumped thermal energy storage with heat pump-ORC-systems...

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air ...

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Solar Organic Rankine Cycle (ORC) Systems: A ...

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Optimal configuration of a solar-powered Organic Rankine Cycle power

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An intensive review of ORC-based pumped thermal energy storage

This paper provides an intensive review of a typical Carnot battery (CB): Rankine cycle-based pumped thermal energy/electricity storage (PTES), focusing on their development, integration ...

The Thermo-Economic Potential of ORC-Based

Apr 28, 2022 · Comparison of the SIC in today (top) and in 2030 (bottom) for the optimal ORC-based PTES systems using three cost correlations for the compressor purchased-equipment ...

(PDF) A review of solar-driven organic Rankine ...

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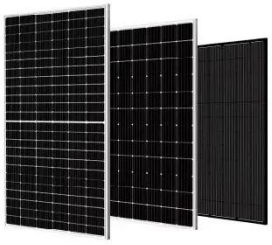

Frontiers , Applications of Thermal Energy ...

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The organic Rankine cycle: A promising technology for ...

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Performance Evaluation of a Combined Heat and ...

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Quantification of realistic performance expectations from trigeneration

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Driving Higher Energy Efficiency in Power Plants

with ORC ...

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Thermal performance study of a solar-coupled phase ...

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Performance analysis of a novel small-scale

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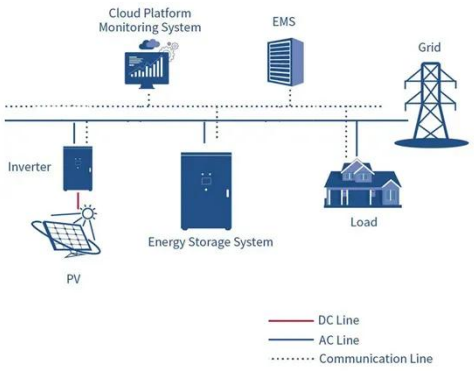

Optimal configuration of a solar-powered Organic Rankine Cycle power

Jan 1, 2025 · An ORC power plant equipped with an TCES system utilizes solar energy for electricity generation and incorporates an energy storage system for efficient energy utilization. ...

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