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Thermodynamic evaluation of a distributed energy system integrating a solar thermochemical process with a double-axis tracking parabolic trough collector

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Abstract

A new distributed energy system integrating a solar thermochemical process with a double-axis tracking parabolic trough collector is proposed to address the challenges on large seasonal variations of solar-to-fuel efficiency and insufficient utilization of solar energy in existing distributed energy systems. Low-energy level discontinuous solar energy is upgraded into the chemical energy of syngas via the solar thermochemical process, which is easy to be stored. The double-axis tracking parabolic trough collector is deployed to the solar thermochemical process to eliminate the cosine loss completely to increase the annual thermodynamic efficiency. With the consideration of the variation of solar energy, the coupling between user's loads and energy outputs in the proposed system is investigated, and the favorable

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