



## A-Core Container

# Silicon Energy Wind and Solar Complementary Power Generation System



## Overview

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Can a multi-energy complementary power generation system integrate wind and solar energy?

Simulation results validated using real-world data from the southwest region of China. Future research will focus on stochastic modeling and incorporating energy storage systems. This paper proposes constructing a multi-energy complementary power generation system integrating hydropower, wind, and solar energy.

What is a multi-energy complementary power generation system?

The multi-energy complementary power generation system, incorporating wind, solar, thermal, and storage energy sources, plays a crucial role in facilitating the coexistence and mutual reinforcement of conventional thermal power and renewable energy.

How to integrate wind and solar power?

When considering the integration of wind and solar power, increasing the installed capacity of renewable energy while maintaining a certain wind-solar ratio can effectively match the power generation with the user load within a specific range. In engineering design, it is essential to address the issue of ensuring supply from 16:00 to 22:00.

Is a multi-energy complementary wind-solar-hydropower system optimal?

This study constructed a multi-energy complementary wind-solar-hydropower system model to optimize the capacity configuration of wind, solar, and hydropower, and analyzed the system's performance under different wind-solar ratios. The results show that when the wind-solar ratio is 1.25:1, the overall system performance is optimal.

What are the complementary characteristics of wind and solar energy?

The complementary characteristics of wind and solar energy can be fully

utilized, which better aligns with fluctuations in user loads, promoting the integration of wind and solar resources and ensuring the safe and stable operation of the system.

## 1. Introduction

### What is a wind-solar hybrid system?

egrates wind and solar energy, wind-solar hybrid systems have proven their important role and value in the global sustainable energy transition. By effectively integrating these two complementary forms of energy, wind-solar hybrid systems not only provide a more stable and reliabl

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