

Article Overview

Chilean hybrid energy systems combine renewable generation with battery storage to provide dispatchable power, often integrating solar PV, CSP, and BESS for stable 380V distribution.

Overview of Hybrid Systems in Chile

Chile has rapidly advanced in hybrid renewable energy systems, combining solar photovoltaic (PV), concentrated solar power (CSP), and battery energy storage systems (BESS) to enhance grid stability and dispatchability. These systems are designed to store excess energy during peak generation and deliver it during periods of high demand or low solar availability, supporting a more flexible and reliable 380V distribution network .

Key Components

o Generation Units

o Solar PV: Projects like the Victor Jara plant feature 231 MWp solar PV arrays.

o CSP: Some industrial hybrid systems integrate CSP with molten salt thermal storage to provide base-load electricity, achieving high capacity factors (~70%), .

o Battery Energy Storage Systems (BESS)

o BESS capacities in Chilean hybrid plants range from 1.2 GWh to 1.3 GWh, capable of delivering up to 200 MW continuously for 6.5 hours after sunset .

o These systems enable nighttime dispatch and firm solar power, critical for industrial and grid applications.

o Hybrid Integration

o Hybrid plants, known as Renewable Plants with Storage Capacity (CRCA), combine generation and storage at a single connection point. The generation component converts primary energy to electricity, while the storage component transforms and reinjects energy to the grid, enhancing system adequacy and reliability .

Regulatory and Market Context

o Law 21.505/2022 and Supreme Decree No. 70/2023 recognize storage and hybrid systems in the capacity market, allowing capacity payments for both stand-alone storage and hybrid plants .

o Chile's regulatory framework supports dispatchable renewable energy, incentivizing storage deployment to reduce curtailment and improve grid flexibility .

Operational Examples

o Victor Jara Hybrid Plant: 231 MWp solar PV + 200 MW / 1.3 GWh BESS, providing 6.5 hours of

continuous power post-sunset, operating under a 15-year night-only PPA .

- o Industrial CSP-PV Hybrid near La Serena: 150 MW base-load supply with molten salt storage, achieving a levelized cost of energy (LCOE) of \$84.39/MWh and high dispatch efficiency .

Technical Considerations for 380V Systems

- o Hybrid systems at 380V typically use medium-voltage inverters to integrate PV and storage outputs.

- o BESS units are synchronized with the grid to provide voltage support, frequency regulation, and peak shaving, ensuring stable operation for industrial or municipal loads.

- o The combination of PV, CSP, and BESS allows continuous power delivery, even during low solar irradiance, making these systems suitable for industrial mining operations and urban microgrids.

Conclusion

Chilean hybrid energy systems at 380V leverage solar PV, CSP, and advanced BESS to provide reliable, dispatchable renewable energy. Supported by progressive regulations and capacity payment mechanisms, these systems enhance grid stability, reduce curtailment, and enable industrial-scale renewable integration, exemplified by projects like Victor Jara and La Serena hybrid plants .

Electricity generation in Chile by source in terawatt hours As of August 2020 Chile had diverse sources of

In the period from May 2025 to April 2026, Chile's electricity consumption primarily leaned towards low

The technological development of Chile has lead to a major energy demand. This paper presents a description of the current reality

For this, the transformation of the Chilean electricity system between the years 2018-2050 is studied, using a tailored

The primary objective of the analysis presented in this section was to preliminarily assess the risk of compromising reliable and

AES has seen a hybrid wind, solar and battery energy storage system (BESS) project in Chile receive an

Abstract The aim of this research is to analyse the impact of renewable energy (RE) technologies and sector coupling

This plant, which is expected to reach 200 MW of solar power and 704 MWh of storage, is set to become a European

Chile's electrical energy sector is divided into three components: generation, transmission, and distribution. Each is operated entirely

Next, both the process of the Chilean energy system prior to the start of the energy transition, as well as public policies

THE Chilean electricity sector is fully developed by private sector companies, carrying out the activities of generation, transmission

This second stage of the country's electricity development requires strengthening the networks and enhancing system flexibility to

The evaluation of the potential of on-site 1 MWh steady electricity generation from a hybrid renewable energy system

Solar power in Chile is an increasingly important source of energy. Total installed photovoltaic (PV) capacity in Chile reached 11.05

The analysis relies on an optimization model to size hybrid renewable energy systems and 10 years of weather data

ContourGlobal has commissioned the battery energy storage system (BESS) at the Víctor Jara hybrid power plant in

Web: <https://www.supremeacademicresearch.co.za>

