

Totally Integrated Power

SIESTORAGE supporting renewable generation integration



The challenge: Better utilizing and managing renewable energy

Intermittent renewable energy sources form a challenge for both power generators and grid operators. While power generators ideally seek to sell power at peak demand times when prices are higher, grid operators need to support grid stability at all times. Relying on conventional generation to counteract variability by ramping up and down to support load is a costly solution. It results in premature ageing of CAPEX-intensive equipment designed to run constantly and close to its operational design characteristics. Furthermore, grid operators impose strict connection rules related to ramp rates and forecasting, scheduling and dispatching. In this scenario, SIESTORAGE provides a solution to optimize renewable energy utilization while saving costs and improving grid stability.

The solution: SIESTORAGE energy storage system

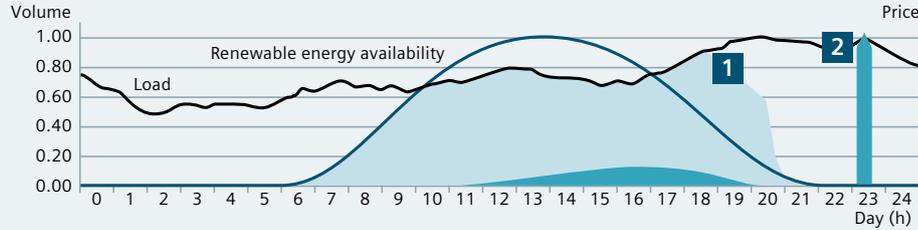
SIESTORAGE offers a reliable alternative power supply solution, being more economic and resource-efficient at the

same time. The system comprises very fast Li-ion battery technology as well as cutting-edge power electronics and automation to provide fast and accurate response services. SIESTORAGE can be seamlessly integrated into SCADA energy management and distribution management systems as well as into building or plant automation systems, allowing monitoring and programmable control that complies with operational or grid rules.

SIESTORAGE benefits from having a flexible modular design for sizing and scaling (from kW/kWh to MW/MWh sizes), and its redundant system architecture ensures a continuous and reliable power supply.

SIESTORAGE is supported by a comprehensive end-to-end expertise, including grid analysis, business case development, project planning, manufacturing, system integration, commissioning, and services. It can be installed in E-Houses, existing buildings, or even standard shipping-style containers.

Energy Arbitrage/Time Shifting



Legend:

- 1 Time shifting: to make excess renewable energy available to match load requirements
- 2 Energy arbitrage: to sell excess when market prices are higher

Example of how SIESTORAGE can be utilized to better match demand requirements

Facility Production Chart



Legend:

- A Ramping-up phase
- B Stationary phase
- C Ramping-down phase
- t1 End of ramping-up phase
- t2 Beginning of ramping down phase

Example of how SIESTORAGE compensates renewable energy variability to ensure compliance with grid code ramping rules

Applications and customer benefits

SIESTORAGE enables multiple applications for renewable generation while offering considerable economic benefits over its operational lifetime.

Arbitrage or time shifting

Mismatches between the availability of renewable energy resources and actual demand are a well-known fact, and when supply exceeds demand, market prices often reflect this mismatch through negative prices. By storing power generated by renewable energy resources and injecting it into the grid when demand is high, SIESTORAGE provides a means for generators to realize revenues faster, as well as providing energy to the grid when it is most needed.

Ramping control and renewable energy smoothing

SIESTORAGE can help to ensure that renewable energy generators comply with grid codes and ramping requirements. These grid codes specify the rate of change over time, and non-compliance can lead to delays in connection or penalties for deviations. By storing energy during generation peaks and injecting it to compensate dips, the storage system ensures compliance with these grid codes.

Capacity firming

Recognizing the challenge for grid operators to manage variable renewable energy and its impact on the cost to the consumer for grid balancing services, many regulators have started to impose rules for forecasting, scheduling and dispatching on larger renewable energy generators. These rules impose penalties for deviations between schedule and actual dispatch. By storing variable generation and controlling the amount injected into the grid, SIESTORAGE provides a solution to ensure that schedules are adhered to and deviations are minimized.

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Article No.: EMMS-B10003-00-7600 | Printed in Germany |
TH 260-150156 DB 0715 | © 07.2015 Siemens AG