



SMA Large Scale Stability Enhanced DC Coupled Hybrid Solution

Grid Stability. Higher Efficiency. Greater Project Value.



A Hybrid Solution Engineered for Enhanced Stability

As Australia's energy system evolves, utility-scale renewable projects face increasingly complex grid conditions and performance requirements. SMA's Stability Enhanced DC-Coupled Hybrid Solution is designed to help deliver enhanced stability, higher energy yield, reliable output and consistent system performance for utility-scale PV and storage hybrid projects.

By combining advanced DC-coupled architecture, grid-forming technology and coordinated plant-level management, the solution reduces conversion losses while maximising plant yield and supporting high round-trip efficiency. Its compact footprint and high-power density simplify plant layout and reduce infrastructure costs while maintaining stable output, even at high ambient temperatures.

Integrated intelligent digital controls provide real-time insights and enable proactive plant management, reducing operational complexity. Delivered as a turnkey solution, it is designed to support faster project execution and maximise system performance for utility-scale deployments.

With advanced grid-forming technology providing enhanced stability in weak and constrained grids, the solution helps optimise project returns, reduce costs and support reliable, long-term energy management and production across diverse utility-scale applications.

The advanced DC-DC controller is designed to expand the applications and capabilities of the power conversion system, supporting PV clipping recapture, energy shifting and a range of grid services, including inertia and fault current provision.

Its advanced grid-forming functionality supports evolving market requirements while enabling the stacking of multiple revenue streams to maximise overall asset value.

Every aspect of SMA's Stability Enhanced DC-Coupled Hybrid Solution has been designed and engineered to deliver high performance and operational confidence from day one.

Hybrid Performance for Real-World Grid Challenges

SMA's Stability Enhanced DC-Coupled Hybrid Solution reliably supports PV and storage performance in grids with high renewable penetration and variable operating conditions. By helping reduce curtailment losses, recapturing clipped energy and enabling energy shifting and reserve power, it supports higher energy yield and creates opportunities for multiple revenue streams.

Its grid-forming capability actively supports grid stability through voltage and frequency control, enabling operation in weak or dynamic grid environments and enhancing power system resilience as renewable penetration increases.

The adaptable hybrid architecture is designed to support long-term project viability, reduce operational risk and provide the flexibility required to perform across diverse markets and evolving grid conditions.



Enhanced Grid Stability with Grid-Forming Technology

Grid-forming technology enhances grid stability and reliability through advanced control, rapid voltage and frequency response, and robust performance under challenging grid conditions.

- **Grid forming stability:** Enables direct voltage and frequency control for stable operation in weak grids, low short-circuit ratio environments and dynamic network conditions.
- **Inertia and fast frequency response:** Provides synthetic inertia and fast frequency response, supporting disturbance ride-through and system stability.
- **System strength contribution:** Supports short-circuit current contribution, improving fault response and helping facilitate grid connections in constrained networks.
- **Proven and compliant:** Designed to meet applicable Australian grid requirements, supported by SMA's proven expertise and track record in grid-forming projects.

Optimised Energy Performance

SMA's advanced power conversion technology supports higher energy yield and reliable plant performance, even under challenging operating conditions.

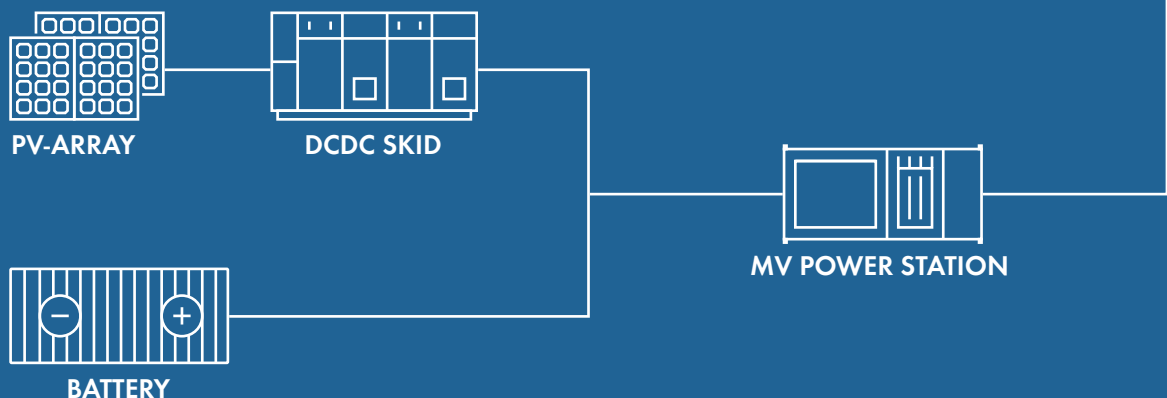
- **SiC MOSFET technology:** Increases efficiency and reduces energy losses, supporting improved lifetime performance.
- **High energy output:** Delivers DC-side efficiency of up to 99.5% and AC-side efficiency of up to 99.45%, supporting higher energy yield.
- **Consistent performance:** Maintains full output power at ambient temperatures of up to 35°C

OPTIMISED DC-COUPLED DESIGN FOR MAXIMUM ENERGY YIELD

SMA's DC-coupled architecture supports system configurations of up to 7 MW at 1,100 V DC, enabling flexible PV design and simplified system integration.

Combining the SiC-based DC-DC Converter with Sunny Central Storage technology, the solution delivers DC-side efficiency of up to 99.5% and AC-side efficiency of up to 99.45%.

The integrated architecture helps minimise conversion losses, maximise usable energy and support improved system performance and cost efficiency.





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