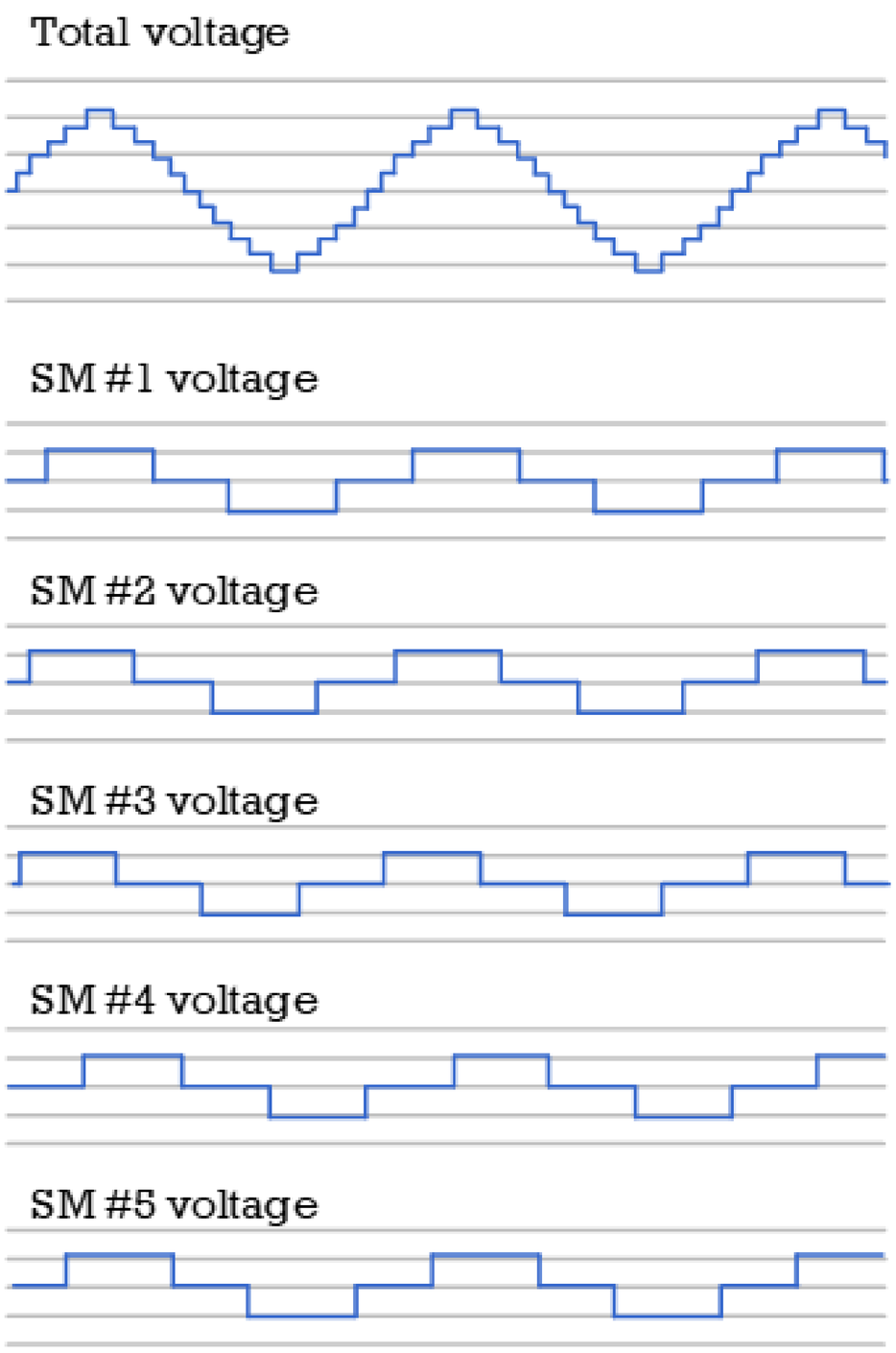
SVC-Diamond®

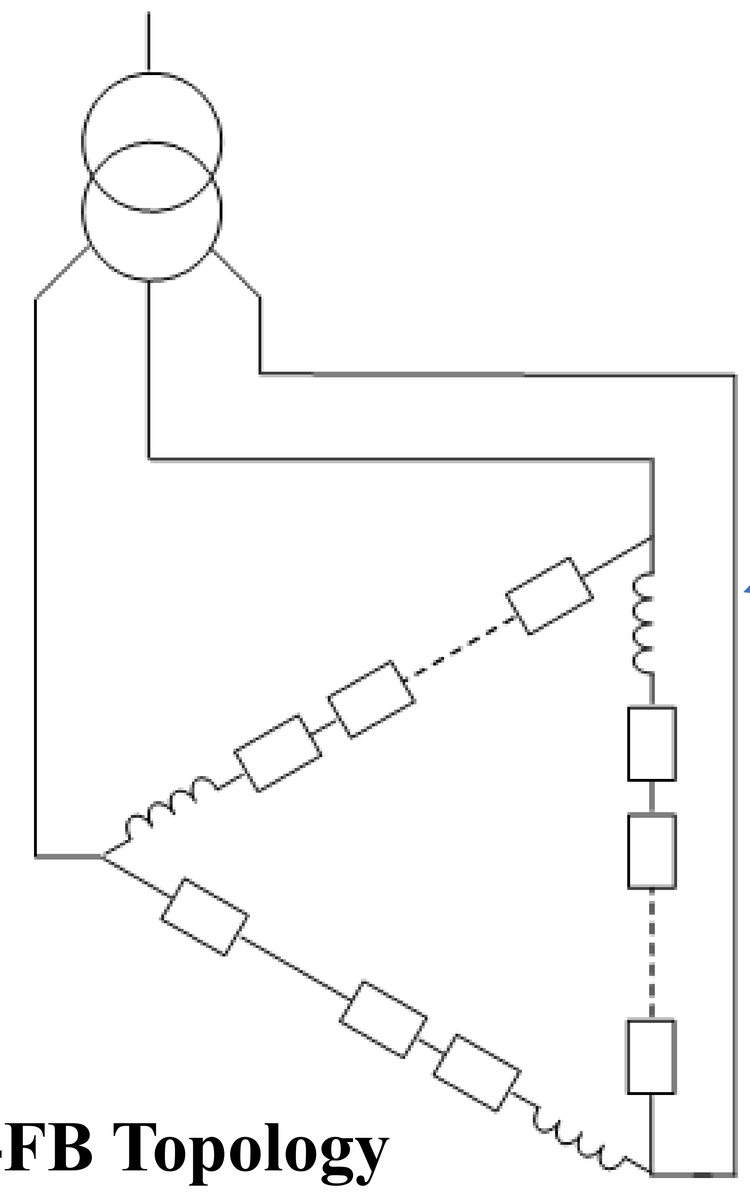
Modular Multi-level Converter Technology

Mitsubishi Electric's SVC-Diamond STATCOM system uses a Modular Multi-level (MMC) topology, with world-leading control features.

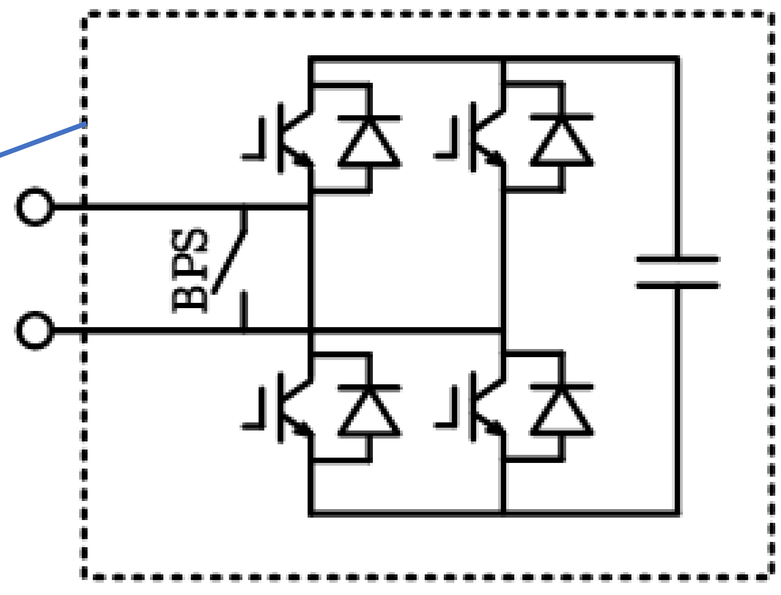
- Each phase consists of full-bridge sub-modules connected in series, offering a scalable solution for a wide range of power needs
- The output voltage of each sub-module is phase-shifted, resulting in a sinusoidal-shaped waveforms with low harmonic component.



Output voltage waveforms of sub-module



MMC-FB Topology



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Supply Chain

Integrated, robust solutions

Controller

Cooling pump

Valve tower

Mitsubishi Electric's supply chain covers all core components

Heat exchanger

Sub-module

Bypass switch

IGBT

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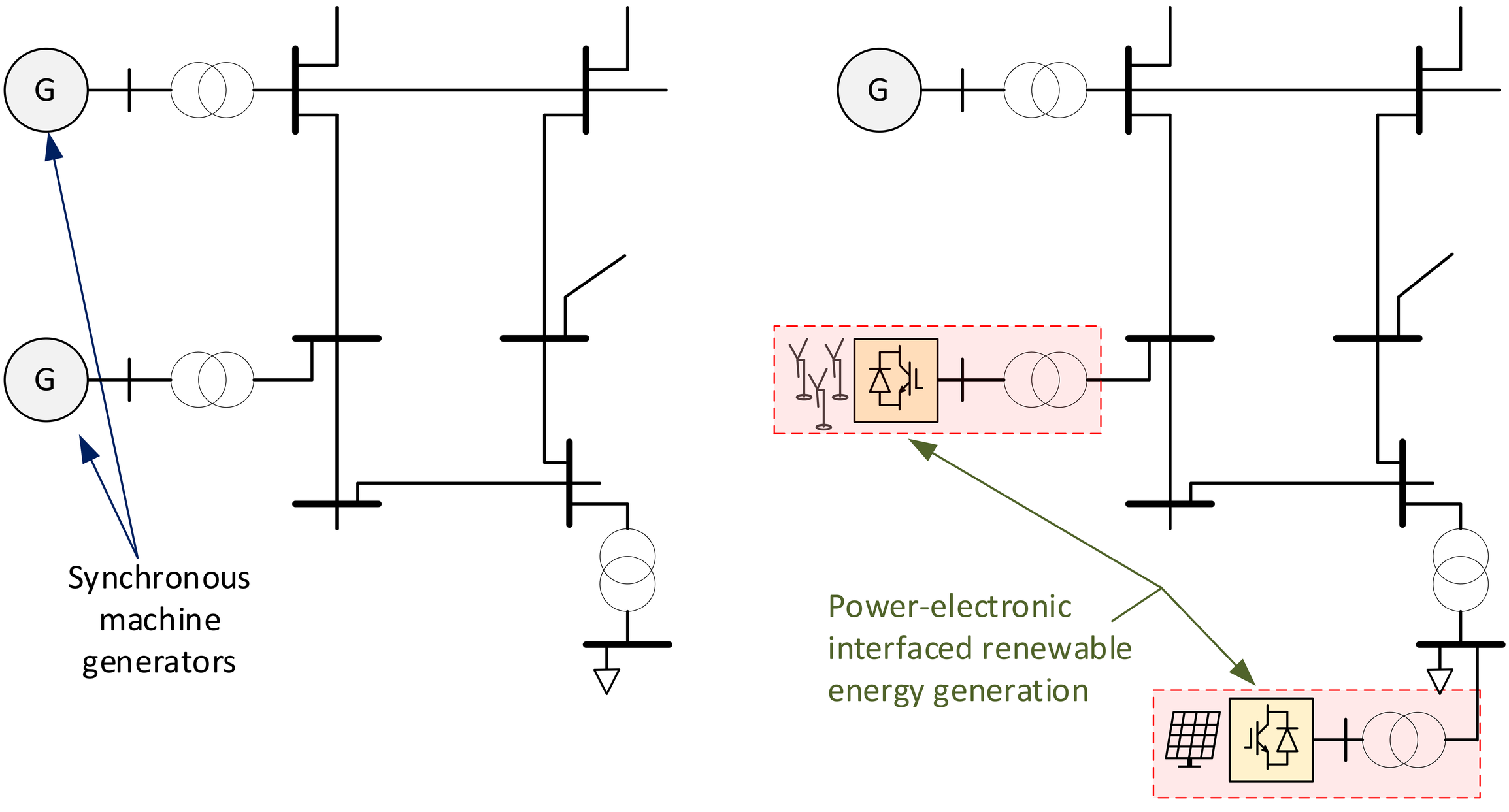
Future Grid

System Stabilization Solutions for a Renewable Transmission System



(a) Traditional Power Transmission System (b) Future Power Transmission System

The introduction of wide-spread renewable energy sources is leading the new demands for system stabilisation equipment. As inverter based resources become dominant, and the quantity of synchronous machines reduce, system stabilisation equipment must perform a wider range of roles.

Phase 0
Standard STATCOM

Phase 1
GFM Control

Phase 2
GFM + ESS

GFM: Grid Forming Control
ESS: Energy Storage System

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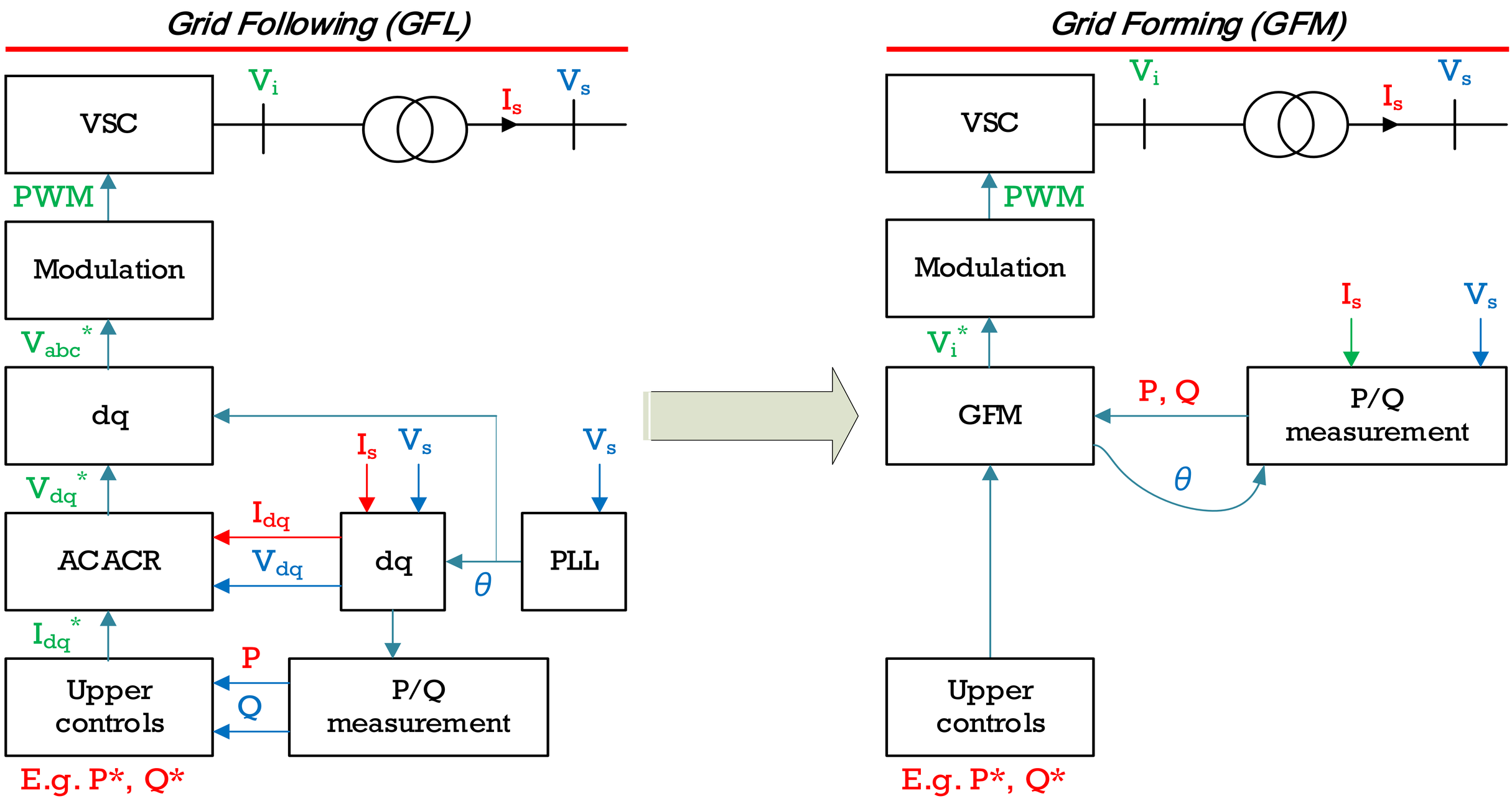
Grid Forming Control (1)

Next Generation Control Functionality

Grid Forming Control (GFM) paves the way increased inverter-based resources to be deployed, allowing a 100% renewable energy generation system in the future.



Mitsubishi Electric has developed a proprietary control system to allow the converter to operate in a wide variety of conditions, such as very low short-circuit environments.

GFM control, combined with flexible energy storage, can provide significant synthetic inertia to the system, improving stability and enabling legacy grid-following inverter-based systems to operate into the future.

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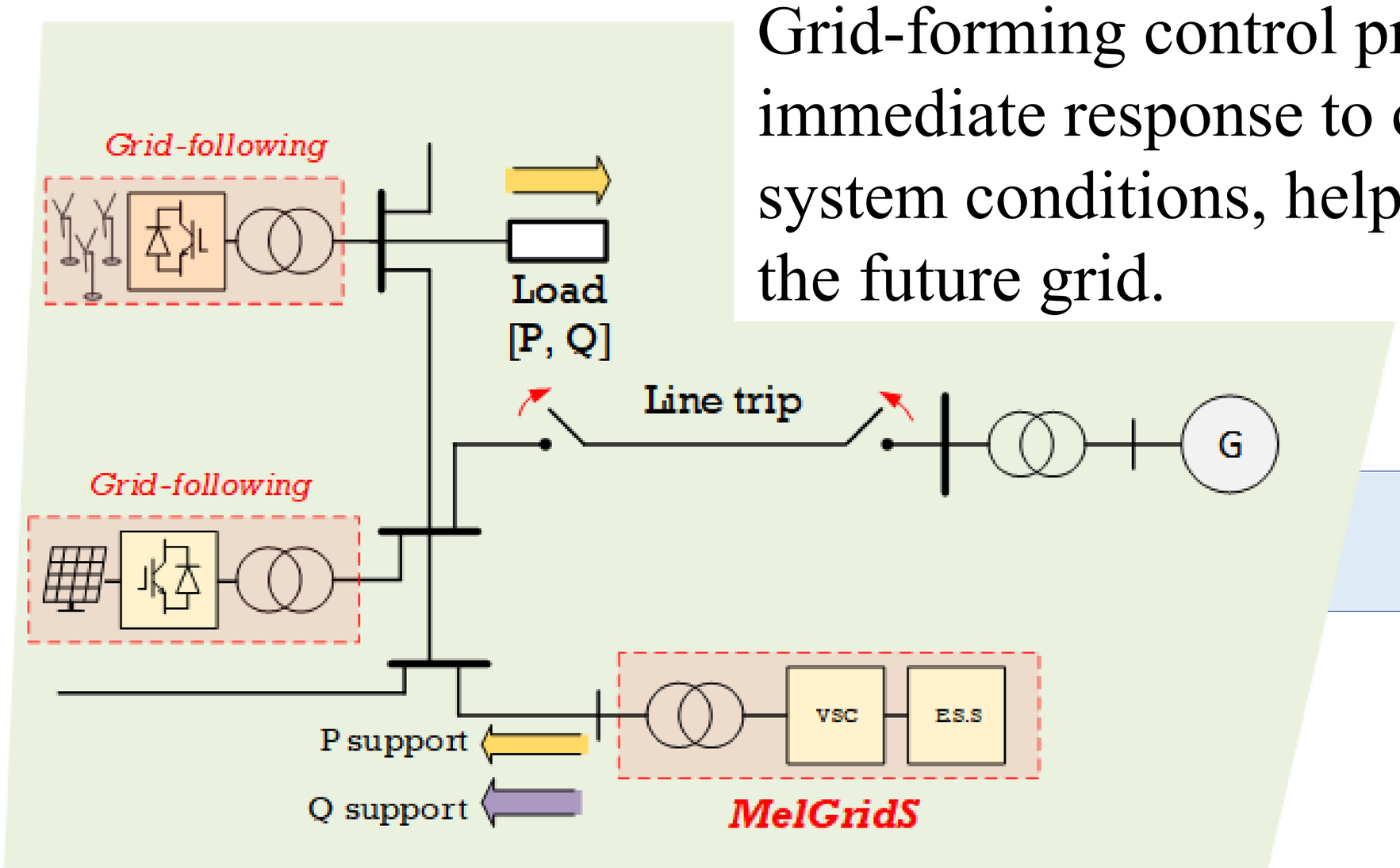
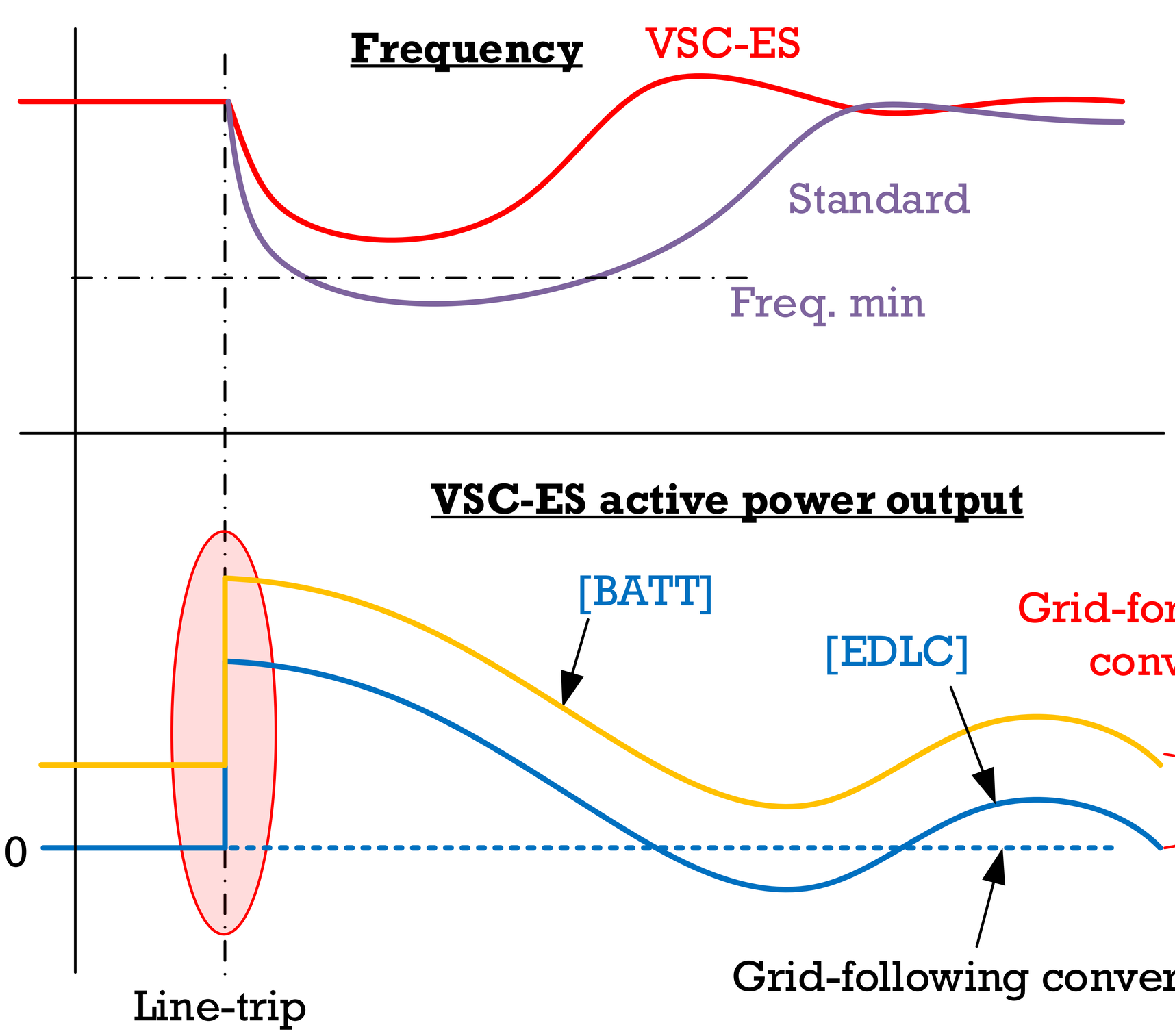
Grid Forming Control (2)

Improved system stability



Grid-forming control provides immediate response to changes in system conditions, helping to stabilise the future grid.



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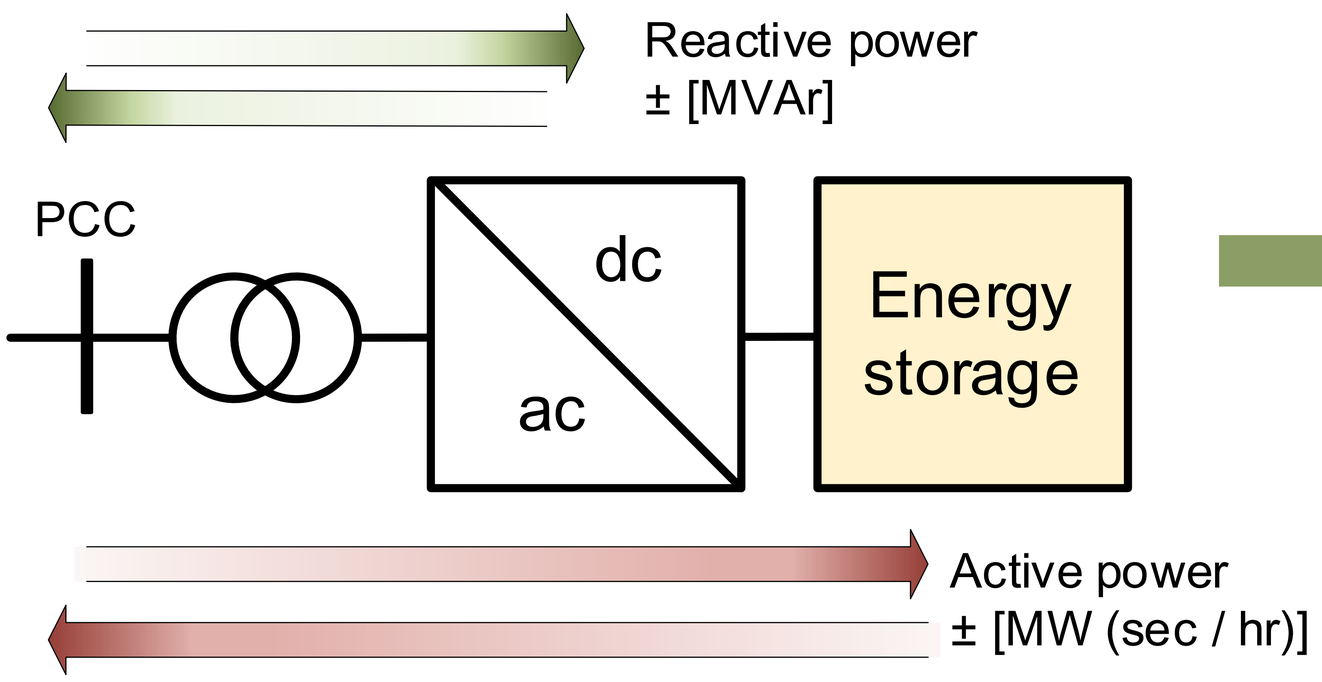
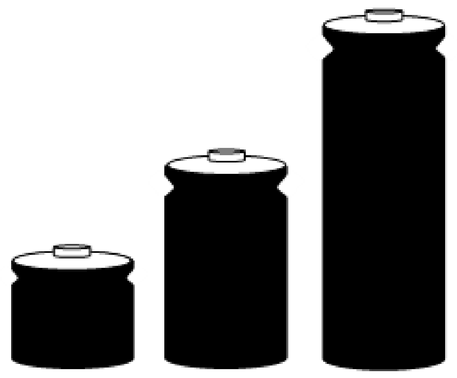
MelGridS

Mitsubishi Electric Grid Stabiliser

A versatile platform for future transmission systems

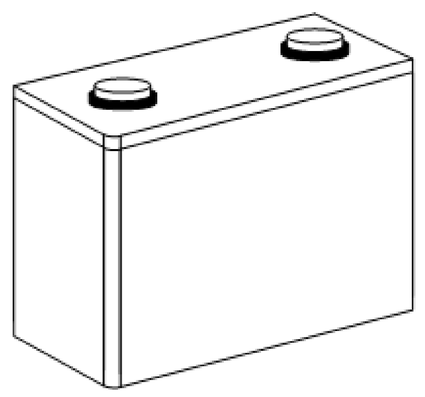
- Dynamic reactive power (STATCOM functionality)
- Grid-forming control (synthetic inertia contribution
- Frequency stabilisation
- Energy balance
- A flexible, Scalable Platform





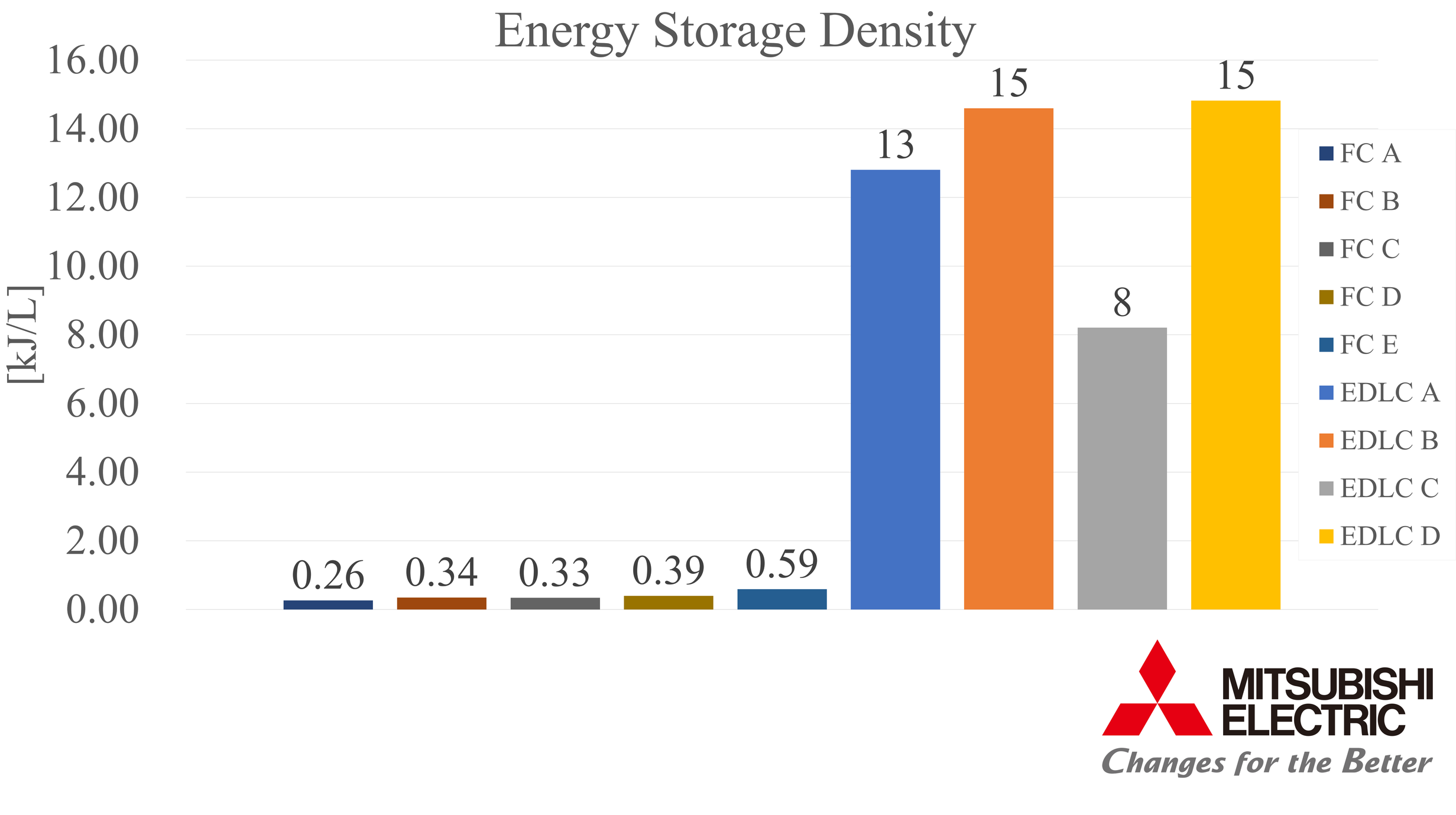
Super-capacitor

Short-term energy



Lithium-Ion Battery

Medium-term energy



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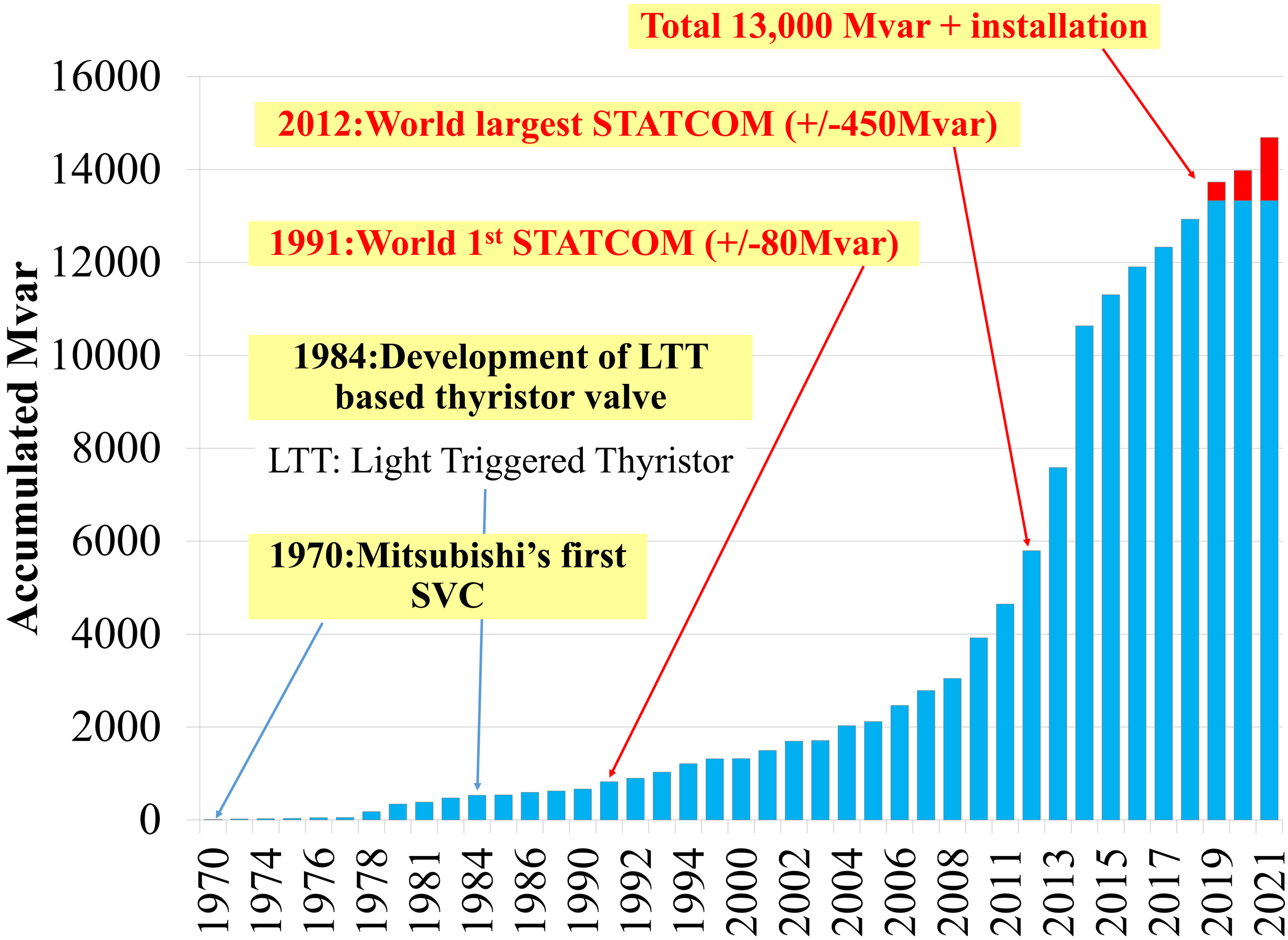
STATCOM Track Record

A proven track-record and world firsts

Around 50 years experience — **World's Pioneer**



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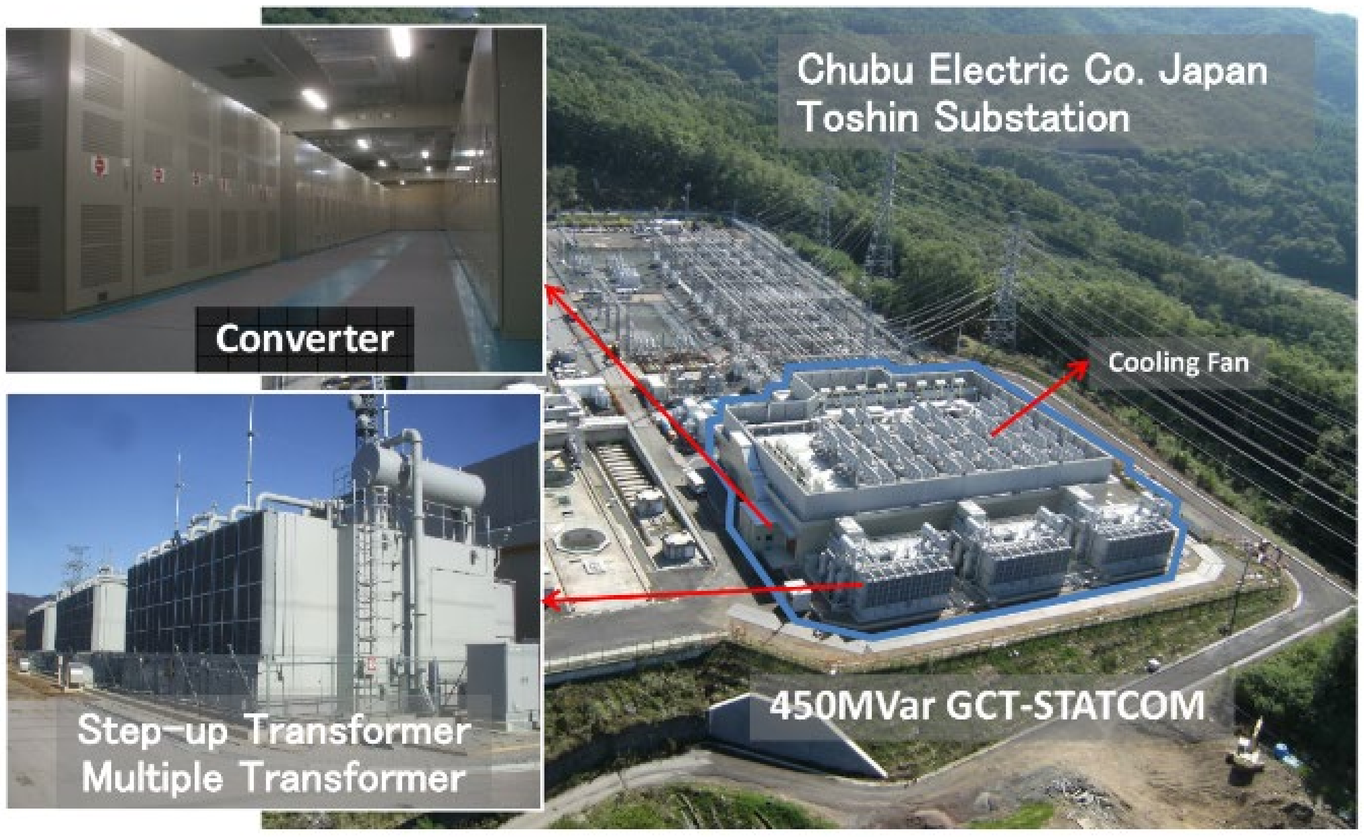
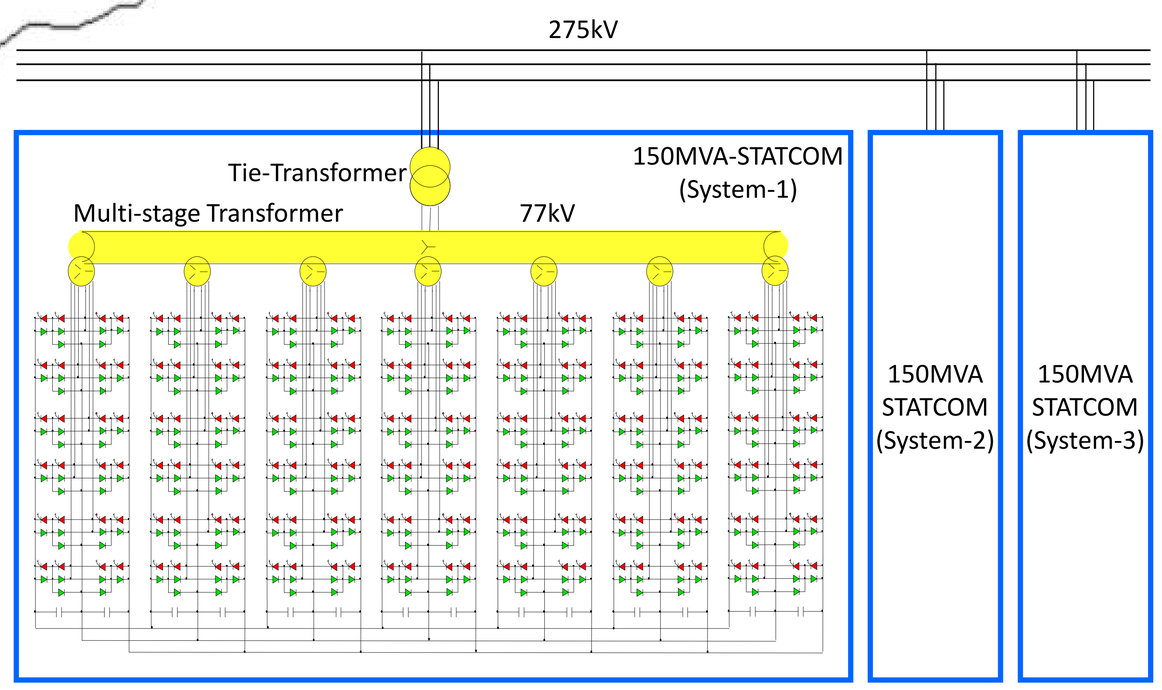
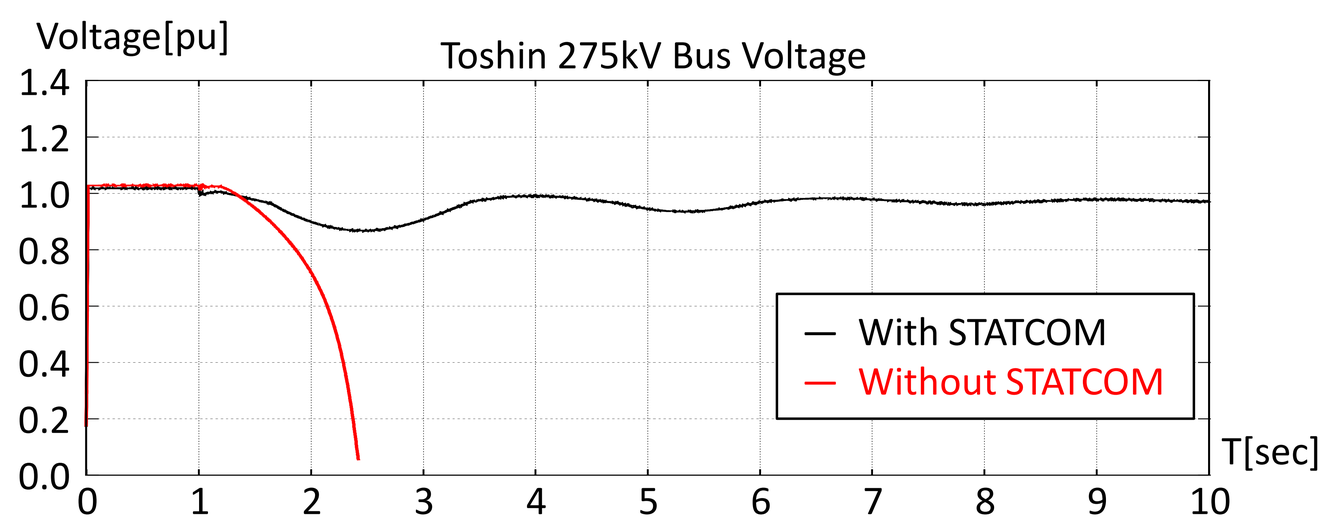
Toshin STATCOM (450 MVA)

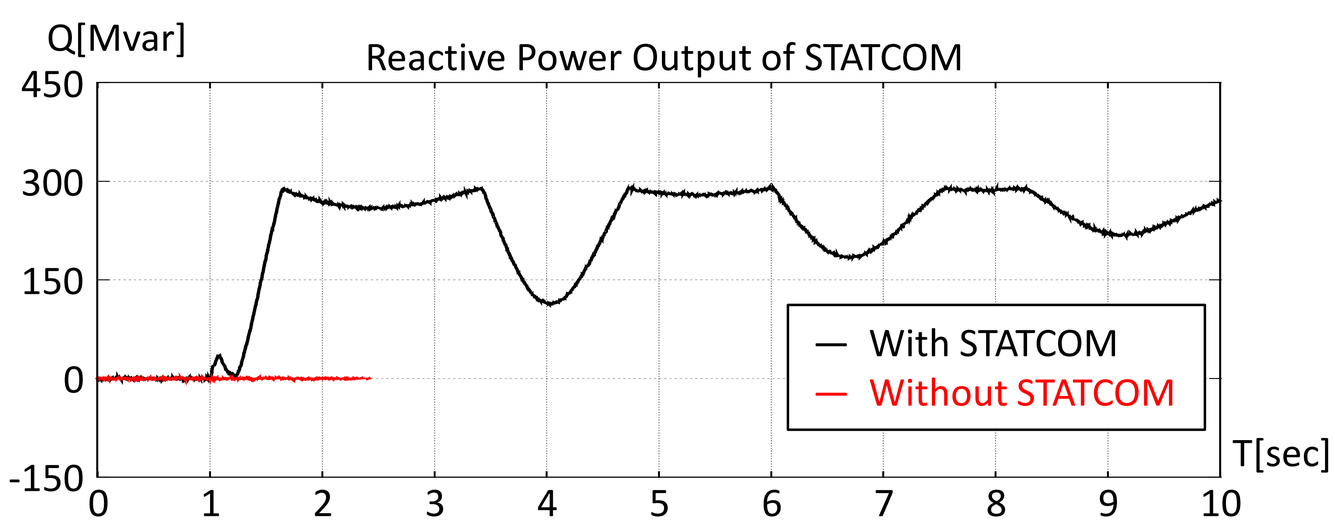
Toshin STATCOM, at the time of installation in 2012, was the world's largest.



±450MVar, 2012 Toshin STATCOM







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