



Advanced power plant control with GEMS PPC



Market intelligence and revenue optimisation

Most PPCs focus on P-Q signal following. GEMS PPC integrates full system intelligence: market participation, dispatch, compliance, forecasting, automated bidding, revenue stacking, & portfolio optimisation. It actively aligns dispatch with market bids, fast frequency market opportunities, and compliance limits, unlocking revenue streams traditional PPCs simply don't access.

Supported by: Built in EMS, automated bidding (GEMS Bidcast), portfolio optimisation, and market participation capabilities.



Ultra fast, deterministic control for high-value services

Traditional PPCs operate in the hundreds of milliseconds range. GEMS PPC delivers sub10ms local loops and ~100ms plant coordination, enabling reliable participation in fast response markets like FCAS and FFR, reducing penalties and curtailment risk while maximising asset utilisation. Traditional PPCs depend on inverter-level fast frequency response, risking gaps when inverters are offline.

Supported by: Very low latency (<10ms local, ~100ms coordination) optimised for FCAS/FFR.



Multi asset, multi vendor flexibility

Where typical PPCs are optimised for one OEM, GEMS PPC is hardware agnostic. It supports batteries, PV, thermal, wind, STATCOM, and mixed fleets – ideal for hybrid plants, expansions, or retrofits. Operators also gain deeper visibility (down to per-cell when available).

Supported by: Designed for multi-vendor hybrid sites and retrofits; extensive driver library.



Native grid forming support & system resilience

GEMS PPC embeds deep grid-forming (GFM) capabilities, enabling stable operation in weak grids, microgrids, and islanded environments. Features such as synthetic inertia, advanced P-Q envelope management, and voltage optimisation ensure stability where other PPCs are purely compliance-driven.

Supported by: Deep integration of GFM modes, weak grid support, P-Q optimisation.



Intelligent internal management for continuous, reliable compliance

Unlike other PPCs that rely on external EMS logic to manage SoC, thermal limits, or headroom, GEMS PPC handles these constraints natively. It automatically manages SoC, thermal limits, and headroom reservation to ensure compliance while maximising capacity and revenue.

Supported by: Native SoC/thermal-aware dispatch and predictive constraints.



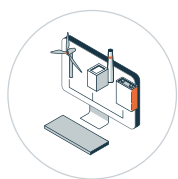
Enterprise grade security, scalability & transparency

GEMS PPC is designed as critical infrastructure; it's not a bolt on controller. It includes hardened cybersecurity measures, IEC 62443-aligned processes, SOC 2 Type 1 compliance for GEMS Cloud Connect, anomaly detection, and the ability to scale from a single plant to a full fleet. The cloud portfolio layer delivers portfolio visibility.

Supported by: Cloud-based portfolio optimisation (GEMS Cloud Connect), security hardening, and fleet-level tools.

Technical Benefits

	Standard PPCs	GEMS PPC	GEMS Benefits
Positioning	Plant-level PPC focused on deterministic P/Q set pointing, ramping, and grid-code compliance	Ultra-fast local control + plant PPC + fleet/cloud optimisation	Moves beyond P-Q following into optimisation and portfolio intelligence
Control topology	Centralised hierarchical control; ms-s loop via SCADA/fieldbus to inverters	Layered distributed control; 10ms local loops on BESS = ~100ms plant orchestration	Advantage for fast response requirements and tighter timing windows
Latency	Active: 0.2-0.8 s; reactive: <=0.5 s (plant-level). No event-driven response to an AGC signal	Very low latency; local BESS loops <10ms; plant coordination ~100ms; ideal for frequency response services; immediate event-triggered response	Better suited for fast services and strict recovery windows
Grid-following / grid-forming coordination	Supports both; often relies on inverter firmware for GFM behaviour	Native coordination of GFM/GFL in mixed fleets including synthetic inertia	Stronger fit for weak grids, microgrids, islanding/black start use cases
Voltage & VAR control	Volt/VAR, power factor, and constant Q control with limiters/deadbands	Same + constraint-aware multi-asset VAR sharing (PV< BESS, STATCOM)	Helps stay inside constraints (e.g., at low voltage) using coordinated asset
Reactive capability / P-Q circle management	Ensures compliance with static/dynamic reactive envelopes	Dynamically optimises inside the P-Q circle, esp. at low voltage	Reduces over-current/ compliance breach risk under stressed conditions
Frequency services	Plant droop/ OF curtailment; UF support needs BESS/headroom	FFR-ready; droop+ AGC with SoC-aware headroom reservation	Supports ancillary services while protecting operational headroom
Ramp-rate & setpoint tracking	Deterministic ramping; plant-wide active power coordination	Deterministic ramping + predictive constraints from forecasting	Helps prevent compliance breaches even under SoC/thermal stress
SoC / thermal constraints	Requires external EMS/logic for SoC & thermal headroom	Native SoC/thermal-aware dispatch integrated	Maintains performance under stress without bolt-on logic
EMS / market functions	External EMS needed for bidding/optimisation	Built-in EMS: forecasting, auto-bidding/revenue stacking, portfolio optimisation	GEMS has grid- compliance + market intelligence in one stack
Dispatch alignment	Follows dispatch within compliance limits	Optimises dispatch within compliance and asset operating limits	Reducing curtailment/penalty risk by respecting limits
Asset/vendor integration	Often optimised for a specific OEM; 3rd-party via standard protocols/custom drivers	Hardware-agnostic driver library (PV, BESS, thermal, wind, meters, STATCOM, synchronizing breakers)	Uniquely fit for multi-vendor sites + retrofits
Scalability	Single plant; multi-plant via additional multi-plant controller	Single site → fleet orchestration across many sites	Portfolio-level optimisation



Open the door to seamless site & portfolio management with **GEMS**

Talk to our team