EnOS™ **SCADA & PPC**

Real-time asset monitoring and grid-compliant control for renewable energy

2025

univers

We understand your energy challenges

Managing a diverse portfolio of renewable energy assets has never been more complex. From navigating shifting regulations to optimising performance across disconnected systems, organisations face mounting pressure to enhance efficiency and resilience while keeping costs under control.

Many organisations struggle with:

Disconnected systems
Solar, wind, and storage assets operate on separate platforms, making real-time coordination impossible.

Rising operational & maintenance costs
Without predictive insights, maintenance remains reactive, leading to downtime and higher expenses.

Regulatory uncertainty
Grid compliance rules vary by market and shift frequently, creating ongoing operational challenges.

Growing cyber risks
As energy infrastructure turns digital, security vulnerabilities increase, demanding stronger protections.

EnOS™ SCADA & PPC is built to drive change

Unlocking grid-optimised asset performance

Multi-site, multi-technology control from a single platform

Designed for operators managing a combination of solar, wind, battery storage and hybrid plants across multiple locations. Unlike traditional SCADA, which is site-specific, EnOS™ SCADA & PPC provides:

- → Centralised monitoring and control of geographically dispersed assets.
- → AI-driven predictive maintenance to reduce downtime.
- → Seamless integration with existing SCADA systems — no rip-and-replace required.

Intelligent grid compliance & real-time market adaptability

Grid compliance is an ongoing challenge. EnOS™ SCADA & PPC simplifies this process with:

- → Active power and frequency control to ensure grid stability.
- → Dynamic reactive power management to prevent penalties and optimise grid interactions.
- → Automated grid code updates to maintain compliance with regional regulations.

Cybersecure, resilient and future-ready

Unlike legacy SCADA systems, EnOS™ SCADA & PPC is designed for a highly secure and interconnected energy landscape:

- → End-to-end cybersecurity with encrypted data transmission and VPN-secured communications.
- → Redundant, failover-ready infrastructure for continuous operation.
- → Hybrid cloud and edge deployment for real-time performance and scalable analytics.

EnOS™ SCADA & PPC are built to drive change

- **EnOS™ SCADA: Built for actionable monitoring**

End-to-end asset visibility across sites, substations, weather sensors and hybrid systems.

Vendor-agnostic architecture for fast, cost-efficient scaling.

Real-time fault detection and secure automation to maintain uptime.

Customisable, intuitive dashboards for operators and executives.

- **EnOS™ PPC: Built for compliance, control & performance**

Works across diverse inverter, BESS and sensor brands with built-in protocols and integration templates.

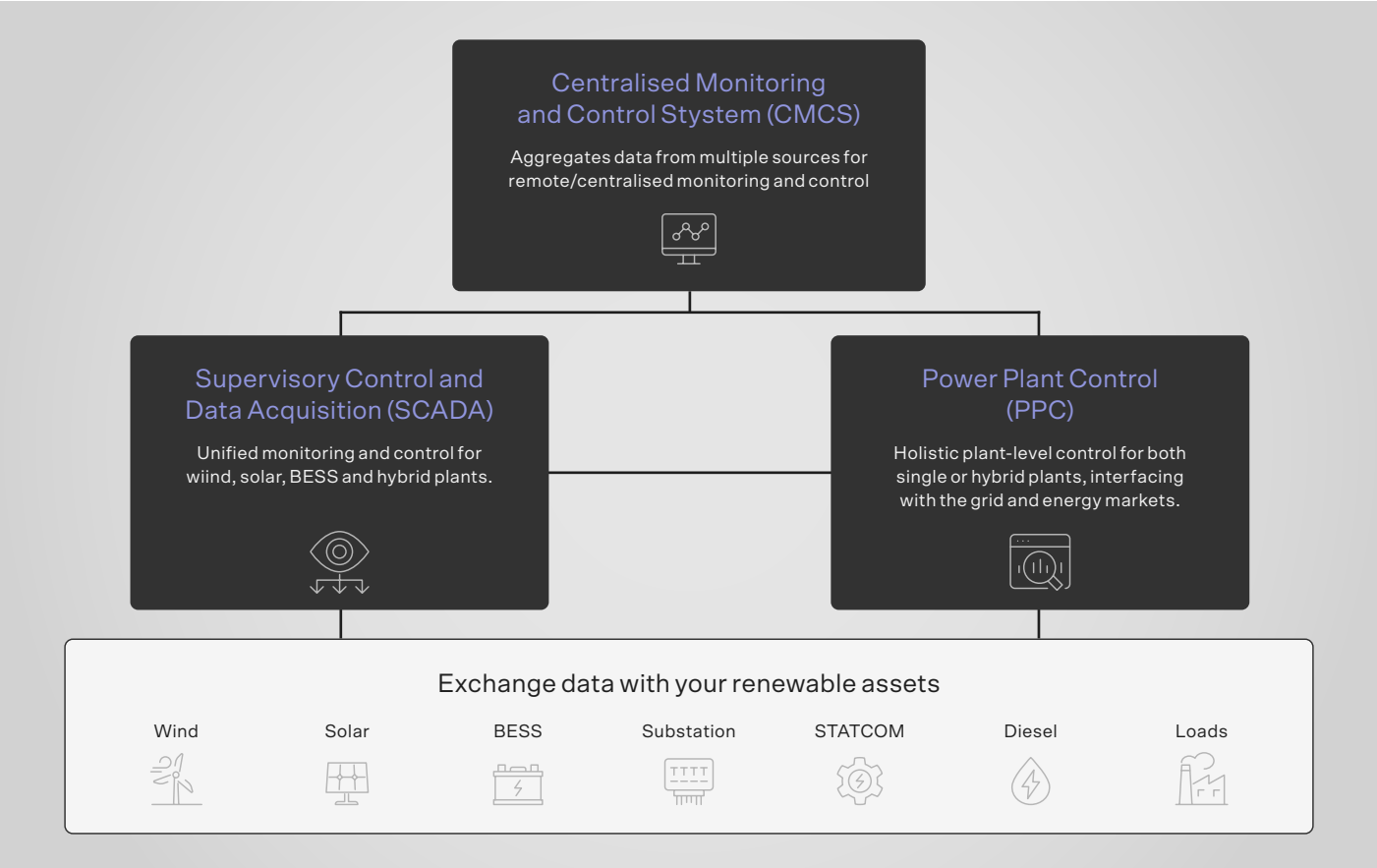
Track energy production, equipment health, and grid interactions with millisecond-level precision.

Stay ahead of evolving grid requirements with automatic compliance updates.

AI-powered flexibility to monetise grid services and ancillary markets.

How they work together

EnOS™ SCADA and EnOS™ PPC integrate seamlessly to deliver full lifecycle support for renewable energy sites. SCADA ensures deep real-time asset monitoring and operational automation, while PPC delivers intelligent grid interaction, performance optimisation, and revenue unlocking — all with open architecture for maximum flexibility.



Capabilities at a glance

- **EnOS™ SCADA**

EnOS™ SCADA provides a turn-key solution of building plant monitoring system, from field device data acquisition to remote centralized monitoring, based on a unified architecture.

The system can easily scale up to handle massive capacities, supporting over 10 million measurement points and 10 GW of power generation assets.

It provides very comprehensive SCADA capabilities for a wide range of power generation assets, including solar PV, energy storage, wind turbine, substations, hydroelectric, solar thermal, and gas turbine units. The system can be easily expanded at a low cost to accommodate new types of power devices as needed.

Real-Time Monitoring and Situational Awareness

Provide comprehensive, real-time visibility into renewable power plant operations. It aggregates data from diverse sources—solar panels, wind turbines, battery storage systems (BESS), and substations—into a unified interface. Operators gain insights into power output, equipment status, environmental conditions, and alarms, enabling rapid response to anomalies.

Modular and Scalable Architecture

The platform's modular design allows customization for projects of any scale—from megawatt to gigawatt installations. Pre-built templates for common use cases (e.g. device model mapping, domain configuration) enable rapid deployment, while custom KPIs, reports, and interfaces adapt to specific operational needs.

Remote Control and Autonomous Operation

Operators can adjust asset parameters (e.g., solar panel orientation, inverter settings) remotely via an intuitive user portal. The system also supports autonomous control, such as automated SOC balancing in BESS or closed-loop adjustments for grid stability, minimizing manual intervention.

Configurable Dashboards and Reporting

Offer customizable dashboards and rule-based performance classifications, simplifying regulatory compliance (e.g., GADS reporting for wind and solar). Users can generate detailed reports on availability, downtime, and energy yield, aiding strategic decision-making.

Cybersecurity and Reliability

Industry-standard SCADA security practices—such as IEC 62443-4-2, network security level, redundancy, identification and authentication, RBAC, system hardening, data encrption and backup—are implied to ensure secure, continuous operations.

- **EnOS™ PPC**

EnOS™ PPC is designed to address challenges in renewable power plant operation, combining advanced automation with grid-friendly strategies to enhance performance, compliance, and profitability.

Interface with grid

Ensure seamless integration with the grid by adhering to stringent grid codes and regulatory standards. Facilitate real-time data exchange, enabling compliance with voltage, frequency, and power factor requirements. This capability enhances grid stability and supports bidirectional communication for efficient power dispatch and fault management.

Open loop control

Allow operators to execute pre-programmed setpoints or schedules without real-time feedback. Ideal for scenarios with predictable conditions, such as scheduled power output based on weather forecasts or market commitments. Offer flexibility for manual overrides and strategic planning, ensuring baseline operational efficiency.

Closed loop control

Utilize continuous feedback from grid and power measurements, dynamically adjust generation assets (e.g., wind turbines, solar inverters) to maintain optimal performance. By responding to real-time fluctuations in demand or environmental factors, enhance grid reliability, minimizes curtailment, and maximizes energy yield.

Frequency response

Rapidly modulates power output to counteract grid frequency deviations, critical in balancing supply and demand. By automatically increasing or decreasing generation within milliseconds, stabilize grid frequency during disturbances, ensuring compliance with ancillary service requirements and enhancing system resilience.

Voltage control

Regulate voltage by managing reactive power flow through inverters, capacitors, or reactors. It proactively adjusts to grid conditions, preventing overvoltage or undervoltage scenarios. Improves power quality, reduces equipment stress, and ensures compliance with grid operator specifications.

STATCOM control

Integrates with Static Synchronous Compensators (STATCOMs) to provide dynamic reactive power support. By stabilizing voltage fluctuations and mitigating harmonics, enhance grid reliability during sudden load changes or renewable intermittency.

Hybrid control

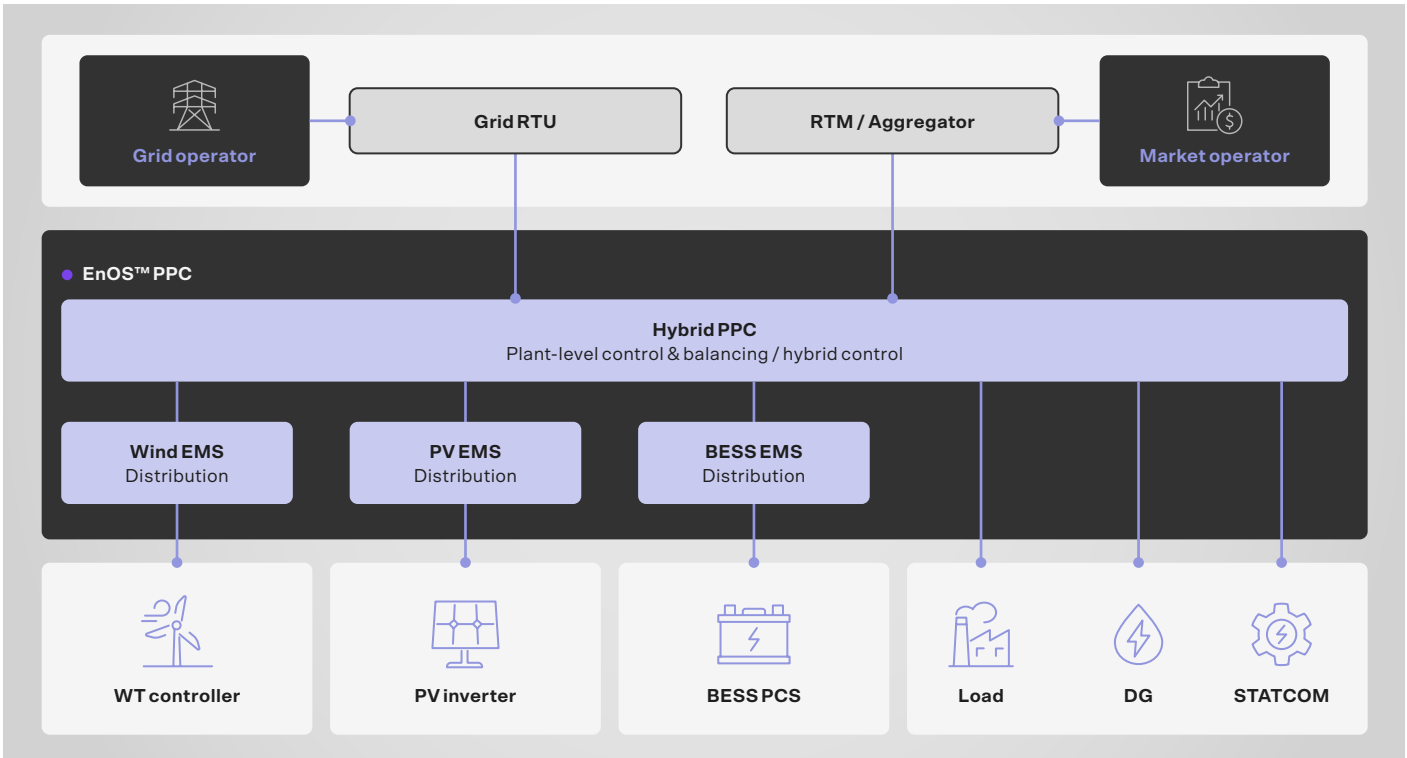
Orchestrate hybrid systems (e.g., solar PV, wind, battery storage) to optimize energy generation, storage, and grid injection. Intelligently balance diverse resources, prioritizing cost-efficiency and reliability. Enable smooth transitions between energy sources, ensuring uninterrupted supply and maximizing ROI for hybrid projects.

How EnOS™ SCADA works

EnOS™ SCADA collects and normalises data from on-site equipment such as wind turbines, inverters, weather stations, BESS and substations. Data is processed at the edge for immediate control actions and streamed to the platform for long-term analysis. Through the central HMI, operators can visualise system status, generate reports and dispatch commands.

How EnOS™ PPC works

EnOS™ PPC connects to all on-site equipment — including inverters, meters, weather stations, storage controllers and substations — using standard protocols. The intelligent control engine interprets real-time conditions, enforcing grid commands while optimising internal dispatch across PV, storage and other devices.



How EnOS™ SCADA & PPC differentiate themselves

EnOS™ SCADA

Open architecture for multi-vendor environments

Unlike traditional SCADA solutions that require proprietary hardware, EnOS™ SCADA integrates with any vendor, allowing asset owners to preserve existing infrastructure while scaling operations.

Boost operational efficiency

Reduce manual interventions by 40% with centralised, automated control.

Scale with ease

Adapt to growing portfolios — from several MW single plants to multi-GW hybrid plants.

Technical Specifications:

- Supported Assets: Solar, Wind (Onshore/Offshore), BESS, Hybrid Systems.
- Communication Protocols: IEC 104, IEC 61850, Modbus, DNP3, OPC UA, MQTT, REST API.
- Data Resolution: Second-level sampling for critical data.
- Redundancy: High-availability architecture with failover support.
- Cybersecurity: ISO 27001, NIST, and IEC 62443 compliance.

EnOS™ PPC

Grid compliant

- 2000+ installations in 25+ countries.
- Meets connection codes and automates grid services like voltage control, frequency response and active/reactive power dispatch.

Hybrid plant optimisation

- Mitigate fluctuations in power output.
- Synchronises PV, wind, BESS and controllable loads to maximise availability and performance.

High accurancy and performance

High control accuracy and response times to meet the strictest requirements of latest grid codes in different countries.

Technical Specifications:

- Compatible Sources: Solar, Wind (Onshore/Offshore), BESS, Hybrid Systems.
- Protocols Supported: IEC 104, IEC 61850, DNP3, Modbus, OPC-UA.
- Cybersecurity: IEC 27001/27701/62443 certified, end-to-end encryption, role-based access.
- Latency: Less than 500 milliseconds response for grid-critical commands.

Proven solutions that drive real results

Energy & Utilities

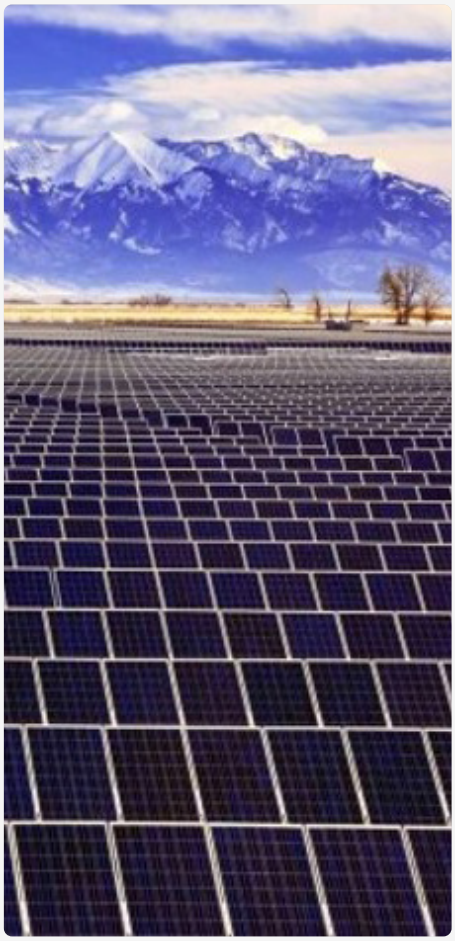
Utility-scale solar PV plant in Chile

The Conejo Solar PV Park in Antofagasta, Chile, is a landmark renewable energy project with a capacity of 122 MW, producing clean energy equivalent to the annual consumption of 200,000 households. It employs EnOS™ SCADA and PPC systems for intelligent monitoring and control, including substation monitoring, solar plant power management, and a solar tracking system.

Capacity:

122MW

PV



Energy & Utilities

Utility-scale BESS station in Singapore

ASEAN's largest BESS, featuring 200MW / 200MWh energy storage systems from two BESS OEMs, enhances grid resilience by enabling energy trading and providing critical grid services such as contingence reserve and frequency regulation, adding substantial economic value.

Capacity:

200MW / 200MWh

BESS

• Energy & Utilities

Large-scale grid service BESS in UK

This energy storage project was designed for participation in the UK's ancillary services, capacity and wholesale electricity markets. SCADA & PPC provided monitoring and control of the storage assets and have successfully completed the G99 testing required by the UK National Grid ESO.

Capacity:

83MW / 166MWh

BESS

• Energy & Utilities

Cambodia's first utility-scale PV + BESS hybrid project

With Cambodia's grid requiring stable, dispatchable power, the project combines 90 MW solar PV and 18 MW/18 MWh BESS to ensure continuous energy supply during peak demand and low solar irradiation periods. Univers' SCADA and PPC systems harmonise PV and storage operations, with PV Smoothing emerging as a standout feature.

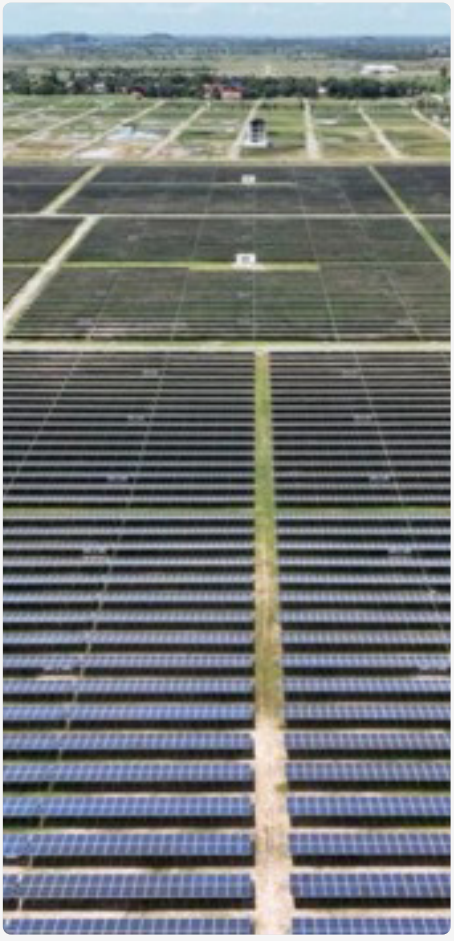
Capacity:

90MW

PV

18MW / 18MWh

BESS



Energy & Utilities

Indonesia's groundbreaking solar + BESS project

Univers has deployed its cutting-edge Power Plant Controller and SCADA systems to optimize a pioneering solar-plus-BESS project in Nusantara, Indonesia's future capital. Univers' hybrid PPC ensures grid stability by managing solar fluctuations, SOC balancing, frequency response, and voltage regulation—meeting the stringent requirements of Indonesia's national grid operator, PLN.

Capacity:

50MW
PV

14MW / 14MWh
BESS

EnOS™ **SCADA & PPC**

Across
25+
Countries

Manage
> 200GW
Wind, PV, BESS assets from 2000+ plants

Integrate
50+
OEM Brands

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EnOS™ SCADA & PPC help you command your renewable energy future — achieving real-time operational mastery, grid compliance, and financial performance in one unified ecosystem.

Univers is the global leader in **AI and IoT for Energy**. Our EnOS™ platform empowers enterprises across industries to solve complex energy challenges with intelligent, data-driven insights.

With over 365 million devices connected, more than 845GW of renewables managed, and a global network of 1,200+ customers, we are the only global technology partner offering a truly comprehensive, end-to-end energy management solution, supporting enterprises at every stage of their energy transition journey.

Get started today

univers.com

linkedin.com/company/univers-intl/

marketing@univers.com

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