

Centralized RES management using zenon

PVE GROUP invests in smart energy management

For over 30 years, [SPIE Energotest Sp. z o.o.](#) has specialized in the design and implementation of advanced automatic control systems and IT solutions for the energy, industrial, and infrastructure sectors. Using the zenon software platform, SPIE Energotest developed a scalable and secure system designed to manage renewable energy source (RES) facilities: the ECONTROLoze management system. The solution is implemented at one of the leading photovoltaic farm contractors in Poland, [PVE Construction Sp. z o.o.](#) It uses the ECONTROLoze system to comprehensively manage its energy resources, monitor installations, and improve performance.



In light of the dynamic growth of RES, increasing numbers of operators and owners of RES installations are grappling with the challenges of managing distributed energy infrastructure. For RES operators, output variability depends on weather conditions. This and the growing need for flexibility, grid integration, and remote control capabilities drive the need for modern technical solutions. ECONTROLoze answers these needs. The integrated tool supervises the operation of photovoltaic farms, wind turbines, energy storage facilities,

biogas plants, heat pumps, cogeneration systems, energy clusters, and other components of electrical infrastructure.

ANSWERING THE DEMANDS OF THE ENERGY MARKET

The team at SPIE Energotest has drawn on years of experience to develop its ECONTROLoze system based on the zenon software platform. It integrates all types of RES facilities in a single, unified environment. The system supports the

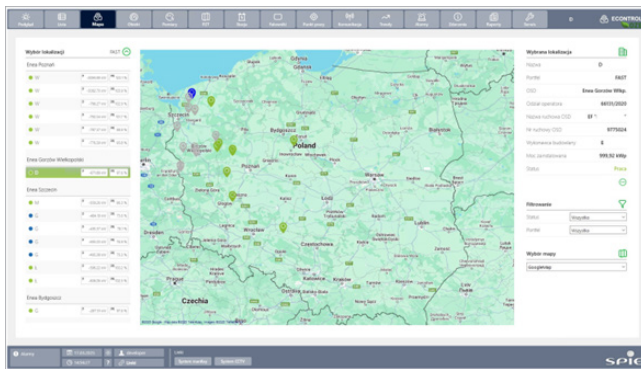


Fig. 1. Topological layout of RES facilities



Fig. 2. Main screen of a PV farm

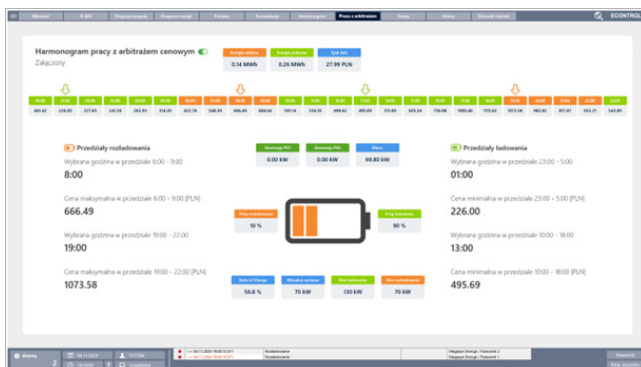


Fig. 3. Energy storage management: price arbitrage

Fig. 4. Site development plan for the individual farms:
GIS view on an interactive map

topological distribution of the facilities, generation prediction, installation management, off-grid balancing, management of energy storage facilities, advanced reporting, performance analyses, and a maintenance module with notifications and tickets. Leszek Bussler, Electrical Project Manager, PVE Construction, emphasizes: “The system implemented using the zenon software platform provides centralized and scalable supervision of our RES facilities, enabling monitoring, control, and regulation according to NC-RfG requirements. Used for individual generating units across our entire asset portfolio, it supports output planning, KPI monitoring, and efficient operations management.” The system monitors, controls, and manages RES installations and supervises connection with substations and switchgear. At PVE Construction, ECONTROLoze is currently used to manage several dozen distributed facilities with an overall capacity of 163 MW. Data from the equipment is archived and the system follows the implemented control, regulation, and interlock algorithms to ensure secure and cohesive operation of the facilities. The system is now being extended with additional facilities successively added, as well as new modules and features in line with the requirements of PVE Construction.

ENERGY PRICES UNDER CONTROL

The ECONTROLoze system offers advanced functions that help fully optimize the operation of distributed energy sources. The system supports the ongoing monitoring of technical parameters, immediate response to signals from grid operators, and dynamic adjustment of output to changing weather conditions. By enabling operation in response to real-time current market information and weather data, it makes the management of distributed energy sources more predictable, secure, and profitable.

For example, using weather stations and connections with weather forecast servers, the system can predict generating capacities of the individual installations within horizons of 24, 48, and 72 hours. It then compares the forecasts to actual energy generation by source. The automatic adaptation of operating parameters, such as active and reactive power, helps maximize revenue during periods of high energy prices and reduce output when prices turn negative.

The system supports integration with energy storage facilities to enable automatic charging when the prices are low and discharging when they are at their peak. The support of individual or group mode, scheduling of operations, and

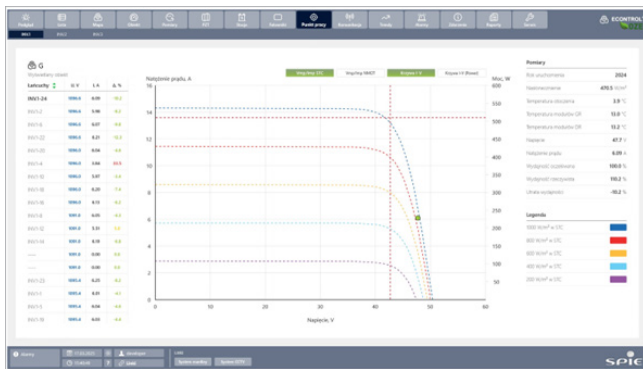


Fig. 5. Operating point monitoring for PV panels

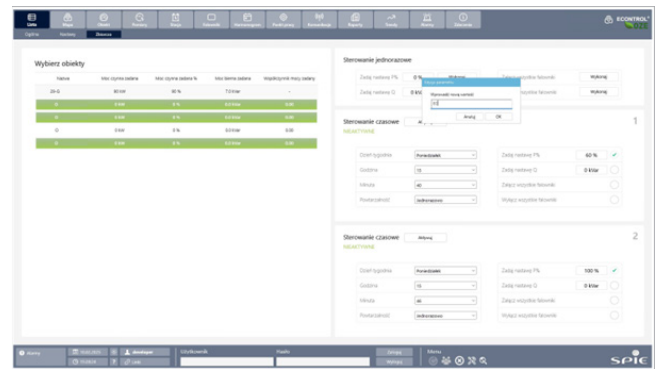


Fig. 6. Joint control of RES facilities

automatic response to signals from the balancing market significantly improve operational flexibility and enable fast reactions to energy shortages or surpluses in the grid.

As a result, operators can efficiently manage an entire fleet of installations, minimize the financial risks caused by energy price fluctuations, and improve the operating profitability of the photovoltaic farms, wind turbines, and energy storage facilities.

A SYSTEM IMMUNE TO CYBERATTACKS

By automating control and monitoring processes, the ECONTROLze system significantly reduces the need for operator intervention, minimizing the risk of operating errors. Remote setpoint adjustment and integration with local systems support the ongoing monitoring and optimization of the facilities, reducing operating costs and improving the reliability of the installations. ECONTROLze is aligned with the requirements of IEC 62443-4-1 for cybersecurity and the ongoing secure and compliant development of the system. The system protects against unauthorized access, ensuring stable communication and resistance to modern cyber threats, helping to guarantee business continuity and the stability of the energy supply. For example, encryption between the client and the application server uses TLS1.3 or later. This protocol improves privacy by encrypting the Server Name Indication (SNI) extension.

FULL CONTROL OF THE SYSTEM

Combining all functions in a single, intuitive environment forms the foundation of the modern management of distributed energy sources. ECONTROLze provides PVE Construction with a clear and intuitive visualization of the parameters of all energy sources in real time, enabling immediate access to information about the current power output of each source, its operating status, measurement parameters, and notifications of faults and irregularities. It can be used to control entire facilities or individual installation components, such as inverters, transformer stations, or photovoltaic trackers. It does this both manually and automatically according to predefined schedules.

Thanks to group setpoint adjustment, the operator can easily manage many facilities at the same time, quickly responding to signals from the power grid operator and dynamically adapting the operation of the installation to changing market conditions. Centralized control, full process automation, precise output prediction, and quick response to alarms enable the financial optimization of the operations, helping to drive efficiency and reduce costs. The system ensures data security, a stable energy supply, and flexible expandability, as well as adaptation to the future requirements of the client. This makes it a comprehensive and scalable tool for managing PVE Construction's portfolio of renewable energy sources.

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LESZEK BUSSLER, ELECTRICAL PROJECT MANAGER, PVE CONSTRUCTION.



UNIQUE SOLUTION

The implementation of the ECONTROLze solution at PVE Construction is a unique achievement in the local market. Thanks to its innovative features, scalability, strengthened security, and the stability it brings to the energy supply, the solution opens up new possibilities for the management of distributed renewable energy sources and the optimization of operating processes. It enables fully automatic photovoltaic farm management, output prediction, and quick response to changing market conditions. In this way, PVE Construction can improve its operating efficiency, minimize risks, and implement a sustainability strategy.



HIGHLIGHTS:

- ▶ Central management of distributed RES facilities and energy storage
- ▶ Visualization of parameters and alarms in real time
- ▶ Automatic and joint control of reactive and active power
- ▶ Output prediction based on weather stations and forecast servers
- ▶ Optimized installation performance according to changing energy prices
- ▶ Connection with the national power grid and the Polish Power Exchange (TGE)
- ▶ Price arbitrage
- ▶ Full security in line with IEC 62443