

Mega battery under control: zenon optimizes energy management

Elemental Strategic Metals builds a new energy storage facility

[Elemental Strategic Metals Sp. z o.o.](#) is a company specializing in the recovery of strategic industrial and precious metals. With a state-of-the-art facility, the company combines innovative processing and refining technologies to recover metals from lithium-ion batteries as well as from automotive and industrial catalytic converters. It focuses on recovering valuable raw materials, such as lithium, cobalt, nickel, manganese, platinum, palladium, and rhodium, thereby supporting the development of sustainable industry.

Elemental Strategic Metals implemented the zenon software platform to control a new local mega battery storage facility. This has optimized energy storage, grid stability, and the integration of renewable energy sources, while also yielding significant cost savings.



As a leader in the recycling of valuable raw materials, Elemental Strategic Metals exemplifies a responsible approach to environmental protection, emphasizing energy efficiency and waste minimization. A sustainable modern production system is necessary in the transition to an economy based on renewable energy sources. By integrating solar energy with energy storage systems, industrial facilities can generate their own power, use it to fuel production, and store excess energy for later use. This model not only helps reduce energy costs and risk, it also minimizes the environmental impact of manufacturing

operations. At Elemental Strategic Metals, the ability to store excess energy supports the transition toward more environmentally friendly and stable energy systems, while reducing CO2 emissions.

MEGA BATTERY: A MODERN ENERGY STORAGE SYSTEM IN POLAND

One of the most modern battery energy storage facilities in Poland – and Europe – has been built in Zawiercie at the Elemental Strategic Metals premises. Thanks to the Li-ion



The container-based structure of the 14 MWh Battery Energy Storage System: located on the grounds of the Elemental factory in Zawiercie, it has a capacity of 7 MW.

technology used, the energy storage facility has an impressive capacity of 14 MWh and a power output of 7 MW. The system consists of seven containers equipped with lithium iron phosphate (LFP) lithium-ion batteries. These provide efficient energy storage and improve the plant's energy stability. The newly constructed energy storage facility will improve the factory's energy efficiency and generate significant savings, which Elemental Strategic Metals expects to amount to between 2 and 5 million PLN annually.

OVERCOMING SYSTEM INTEGRATION CHALLENGES

One of the main challenges in implementing the energy storage system at Elemental Strategic Metals was adapting the energy management system to the plant's existing infrastructure. A key element of this process was the development and implementation of an advanced Energy Management System (EMS). The EMS was designed and integrated by Elsta, a system integrator specializing in the fields of electrical engineering, automation, and power engineering. Since 2018, Elsta implements systems based on COPA-DATA's zenon software platform. It is an experienced partner in the implementation of modern solutions that support the digitization and optimization of industrial processes. The system at Elemental Strategic Metals was implemented in collaboration with Vast Energy and Integrale IT, using zenon.

The EMS covers the plant's entire electrical infrastructure. It is responsible for the comprehensive control and monitoring of a 12 MWp photovoltaic plant, covering an area of 9.6



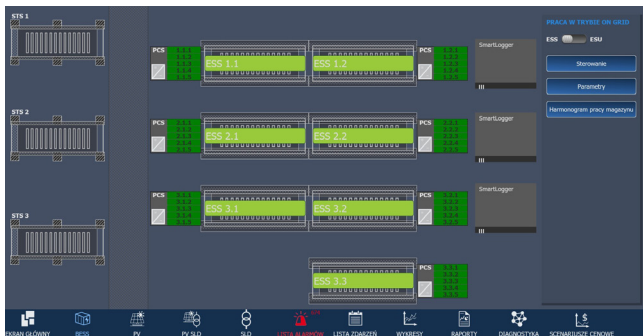
A screenshot of the EMS operator desktop shows the operational status of the storage facility and the PV farm.

hectares and equipped with 32 inverters and two transformer stations. In addition, the system manages a 7 MW battery energy storage system with a capacity of 14 MWh, consisting of seven containers, 35 inverters, three transformer stations, and low- and medium-voltage switchgear. All infrastructure components have been integrated in a way that enables the effective management of electricity flow between the photovoltaic system, the energy storage facility, and demand from the plant, while maintaining a "zero export" requirement. This means that the energy generated onsite is used entirely locally, without selling any surplus to the power grid.

THE ROLE OF ZENON IN ENERGY STORAGE OPTIMIZATION

The zenon-based EMS plays a key role in optimizing the energy efficiency of the plant. zenon enables the automatic management of functions such as peak shaving, load shifting (shifting load from periods of high energy demand to off-peak periods), and time shifting. These native features enable significant improvements in energy efficiency and a reduction in operating costs. One of the system's standout features is its advanced reactive power compensation, which has been reduced to nearly zero. As a result, the plant has achieved greater energy stability and its dependence on external energy suppliers has been significantly reduced.

zenon can operate in fully automatic mode, which minimizes the need for ongoing supervision. However, it can also be controlled manually from the operator console. This flexibility



The EMS system screen displays a single-line diagram of the switchgear with active transformer and line fields of the PV system and energy storage facility.



Chart showing the operation of the PV system and BESS provides a comparison of the active power of the sources and the state of charge of the batteries on a daily basis.

enables efficient energy management with minimal involvement from maintenance staff.

The high flexibility zenon offers enabled the easy integration of devices of various types and manufacturers throughout the production facility. zenon supports over 300 native, built-in communication protocols. This includes: IEC 60870-5-101/-104, IEC 60870-5-103, IEC 62056-21, DNP3, S7TIA, S7TCP32, Modbus TCP/IP, RTU. As a result, future manufacturer-agnostic expansion capabilities for the system have been ensured.

In addition, the use of redundant Ethernet rings and fiber-optic infrastructure ensures the continuity and reliability of data transmission. The company's team also emphasizes its satisfaction with the collaboration with COPA-DATA, particularly the high level of technical support, which has enabled the optimization of trend charts on zenon Extended Trend screens. Thanks to the modifications made, the system operates intuitively, enabling real-time and historical analysis of the entire system's performance.

ECONOMIC AND ENVIRONMENTAL BENEFITS

The battery energy storage system (BESS) installed at Elemental Strategic Metals delivers tangible economic benefits in the form of savings amounting to several million PLN annually. It also supports the company's sustainable development. Integrating energy storage with renewable energy sources, such as the photovoltaic system, allows for the efficient use of locally generated energy and minimizes the environmental impact. The energy storage facility can also be used to stabilize

grid parameters, which improves power supply reliability and supports carbon neutrality goals. The benefits of the implementation are evident in both operational and financial terms.

Wojciech Sorek, Industrial Automation Specialist at Elemental Strategic Metals, explains, "The implementation of a zenon-based SCADA system at the facility has given us full control and transparent monitoring of the energy storage facility, the solar farm, and the medium-voltage switchgear. Thanks to the system's advanced features, we have a real impact on the operating parameters of the energy infrastructure and the ability to optimize operating schedules based on day-ahead energy prices. This translates into cost efficiency and increased process reliability."

In the future, similar solutions could serve as the foundation for building more sustainable and resilient industrial systems in the energy sector.

PLANS FOR THE FUTURE

Elemental Strategic Metals is already planning the next phases of its energy infrastructure development. Plans include the expansion of the existing energy storage facility, as well as the construction of a wind farm to further increase the share of renewable energy sources in the energy mix of the plant. Plans to connect the warehouse to the national power grid and to build a new facility – a copper smelter – will significantly expand the company's operations and production capacity.

Employees at Elemental Strategic Metals have completed zenon training to enable them to make even better use of the system's capabilities and tailor it to the plant's specific needs.

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ELEMENTAL STRATEGIC METALS**

The company is continually expanding the system’s functionality – with a particular focus on enhancing reporting capabilities. This includes the planned implementation of the zenon Report Engine, which will enable the integration of various data sources into a single, easy-to-read report, as well as on further increasing the flexibility of energy management. The modular and scalable architecture of the zenon software platform aligns perfectly with Elemental Strategic Metals’ strategy – enabling both horizontal and vertical expansion of the system, in line with the company’s growing operational and production needs.

HIGHLIGHTS:

zenon-based EMS optimizes the flow of energy between the facility, the photovoltaic system, and the energy storage system:

- ▶ Integration with the plant’s power system
- ▶ Control and monitoring of 14 MWh energy storage system with a capacity of 7 MW
- ▶ Control and monitoring of 12 MWp solar farm
- ▶ System flexibility and scalability
- ▶ Communication via zenon’s built-in native communication drivers, including IEC 60870-5-101/-104, IEC 60870-5-103, S7TIA, S7TCP32, Modbus TCP/IP, and RTU
- ▶ Capability to operate in both off-grid and on-grid modes
- ▶ Implementation of peak shaving, load shifting, and time shifting functions
- ▶ Peak power reduction feature
- ▶ Estimated savings: 2 to 5 million PLN per year