Decentralized energy supply with zenon from COPA-DATA

Potsdam Chamber of Crafts: Trailblazer of the energy revolution

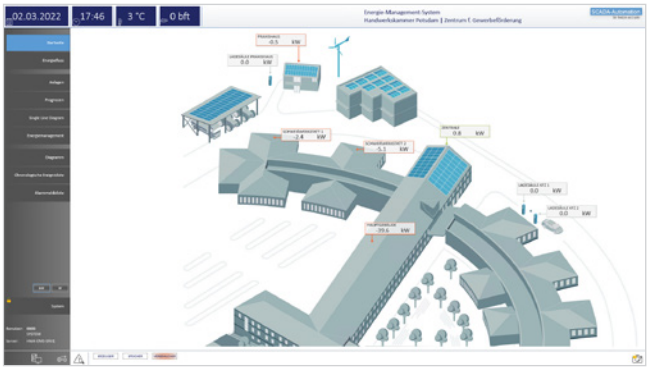
The energy revolution urgently needs specialists qualified in installing and maintaining sustainable, decentralized energy systems. Potsdam Chamber of Crafts is looking to facilitate training in this field at its new Competence Center for Energy Storage and Energy System Management. The centerpiece of the project is the zenon-based Microgrid Energy Management System (EMS) from SCADA-Automation.

Energy security and the need for a comprehensive supply of energy from renewable sources have long since established themselves on the agendas of businesses, policymakers, and even private individuals. Global political and economic tensions have lent the topic additional momentum. Technologies and concepts for decentralized energy supplies involving renewables have been around for a long time, and work on how to put them into practice is gathering pace. An important aspect to enable these futuristic concepts to become a reality is the education and training of qualified specialists. Who is going to build, install, maintain, network, and operate all the plants that are so urgently needed to make the energy revolution a success?

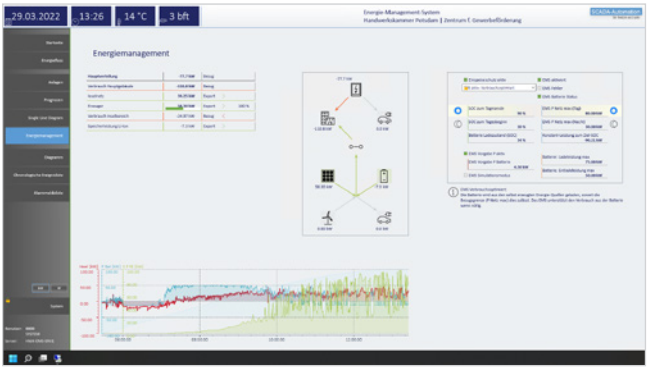
SHAPING THE FUTURE

Potsdam Chamber of Crafts (HWK) recognized this demand and, in 2013, launched a project at the Education and Innovation Craft Campus in Groß Kreutz. At the time, it was the only one of its kind in Germany. Building on this, the Competence Center for Energy Storage and Energy System Management opened in April 2022. Its primary aim is to offer practice-oriented qualifications to tradespeople, covering all the topics involved in implementing sustainable, decentralized energy systems and installing them in industry, trade, and residential applications.

With this in mind, the campus has been split into two halves in terms of energy supply – with one half disconnected



The Microgrid EMS shows users at a glance all the consumers in the island along with their current consumption values.



In the "Energiemanagement" area, the EMS clearly summarizes all the relevant energy values.

from the public electricity supply so that it can be operated independently as an island grid. "We have installed eleven photovoltaic plants totaling 144 kWp, a wind turbine, several charging stations, and various home storage systems on the campus. To put the plants into operation, we needed a large 640 kWh battery storage system and an intelligent energy management system," explains Christian Leest, Technical Manager of the Education and Innovation Craft Campus (BIH) at Potsdam Chamber of Crafts.

Initiating a Europe-wide tendering process, HWK Potsdam went on the hunt for a specialist supplier that could supply, develop, and install both core components.

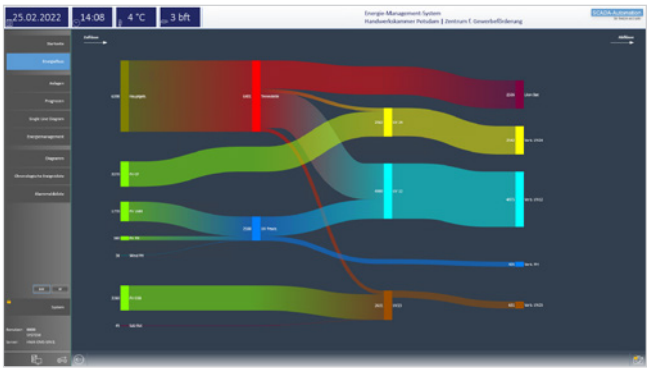
In WEMAG, a utility company based in the northeast of Germany, and its partner SCADA-Automation, HWK found the ideal partners, as they offered comprehensive experience and expertise in the control of large-scale storage systems and the ideal software to develop an innovative control system – zenon from COPA-DATA.

SCADA-Automation is a system integrator for control system and automation solutions in industrial plants for power generation and production as well as for energy management in companies. Based in Brandenburg and Berlin, the young company uses zenon industrial automation software in almost all of its projects requiring visualization, logging, and operation.

ZENON – THE "AUSTRIAN ARMY KNIFE"

In addition to the zenon-based control of the WEMAG large-scale battery storage system, the Microgrid EMS energy management system from SCADA-Automation has a particularly important role to play in facilitating Potsdam Chamber of Crafts' forward-looking training program. It links all producers and consumers in a virtual power plant, ensures an end-to-end energy supply for the campus, and clearly visualizes all energy flows.

One of the biggest challenges when developing the EMS was the wide variety of existing plants on campus and their different manufacturers, systems, clouds, and protocols. All the components needed to be brought together into one control system. This is no easy task but happens to be one of zenon's specialist strengths. "The flexibility offered by zenon was a decisive criterion in the success of the project," says Jens Ramlow, Managing Director and Control Systems Architect at SCADA-Automation. Martin Spiegel, Managing Director and Control Systems Engineer at SCADA-Automation adds, "It enables the different plants to be linked in one Microgrid EMS using the VHP-ready standard and the IEC 60870-5-104, IEC 61850, and Modbus protocols as well as allowing custom-programmed expansions to be integrated. zenon is effectively the Austrian version of the Swiss army knife – versatile, adaptable, and highly flexible."



The Sankey diagram in the Microgrid EMS clearly visualizes all energy flows from producers to consumers.

COMPLEX PROCESSES SHOWN IN CLEAR VISUALIZATION

In the Microgrid EMS from SCADA-Automation, all energy flows are documented seamlessly. What's more, factors such as temperature, rainfall, wind, and sunlight are taken into account. This is essential when it comes to ensuring effective control of the energy flows – and meeting the training requirements of the operators. It is another area where the particular qualities of zenon once again come to the fore, as the various graphical options facilitate a whole new dimension of visualization. In the Sankey diagram, course participants can carefully track the amounts and flows of energy at the different generation and consumption points in real time and using easy-to-interpret energy bars. Bars shown in different colors and sizes make it easy to identify the various plants and the amount of power that is flowing.

"Our aim was to represent the energy flows in such a way that the EMS would offer an impressive user experience and enable even beginners to understand relevant factors at a glance. This is something that is important for the broad target group at the Chamber of Crafts," emphasizes Jens Ramlow. A key criterion in the success of the implementation was the extensive template library, which the team at SCADA-Automation has built up in recent years as part of numerous projects with zenon and which is being added to all the time. "When we are developing our templates, we are often able to draw on existing templates in zenon and configure them as we wish to meet our requirements. This too is an advantage of our continuing cooperation with COPA-DATA," says Martin Spiegel.

ACTIVE ENERGY MANAGEMENT AND LEARNING TOOL

Another unique selling point of the Microgrid EMS is that the system actually acts as a control system. It automatically engages with the grid and regulates energy flows within defined values. For example, it switches producers on or off, ensures that supply thresholds from the public grid are adhered to, and safeguards the level in the battery storage system. In doing so, the system incorporates historical and forecast values and takes proactive action.

"In terms of control, too, we knew that we could rely on zenon. It's not just a matter of working with big data, but also of using the data collected in a practical way to optimize consumption efficiently," explains Martin Spiegel. Most notably, the students benefit from training with a live system. The tutors have lots of opportunities to change properties manually in order to assess and demonstrate the effects in the Microgrid, at the energy storage systems, and at the grid connection points. This is a USP that also impresses the operators.

> *With our Competence Center, we are making a sustainable contribution to the success of the energy revolution: we are training the energy managers of tomorrow. Without the zenon-based Microgrid EMS as the central control system, none of this would be possible.*

CHRISTIAN LEEST, TECHNICAL MANAGER, EDUCATION AND INNOVATION CRAFT CAMPUS, POTSDAM CHAMBER OF CRAFTS

"When you start a project of this scale, you can never quite gauge where the journey will take you. Today, we can say that we are more than satisfied with the Microgrid EMS and the wide range of options that it – along with our plants and the new storage system – offers for our center and our portfolio of courses," says Christian Leest from the BIH. "We can't wait to get started with our courses and to play our part in showing that the energy revolution can be a success."

SECURITY OF SUPPLY WITH VISION

Potsdam Chamber of Crafts is ideally equipped to meet the challenges of the future. The Microgrid EMS can be further developed at any time, be it through the addition of further plants or future energy systems. This is also a clear part of the operators' plan to offer forward-looking training in the field of energy management on a long-term basis. The team from SCADA-Automation is also looking to the future with optimism: large companies are already thinking about how they can secure their own energy supply and use decentralized island grids to become self-sufficient. Without intelligent energy management systems combined with high-performance large-scale storage systems like those offered by Jens Ramlow, Martin Spiegel, and their team, none of this will be possible.

HIGHLIGHTS:

- Energy management specialists to be trained on a live system
- Decentralized energy supply from renewable sources in an island grid thanks to intelligent EMS combined with a 640 kWh storage system
- Intuitive visualization and automated control of complex energy flows
- Flexible, manufacturer-independent linking of different energy producers and consumers