zenon
by COPA-DATA

INDUSTRY SOLUTIONS

zenon
Energy Edition

ADVANCE EFFICIENCY, CONNECTIVITY,
AND SECURITY IN ENERGY GENERATION,
TRANSMISSION, AND DISTRIBUTION.

COPA-DATA, your trusted partner in energy and infrastructure solutions.

For over 30 years, COPA-DATA has been providing customers with comprehensive solutions to meet their project goals in the energy and infrastructure industry. zenon Energy Edition provides an integrated software platform featuring HMI, SCADA, DMS, GIS, and more. Backed by a wide range of drivers and communication protocols built in-house, including IEC 60870-101/104, DNP3, and IEC 61850, zenon offers industry leading communication, visualization, and control, with a proven track record of engineering efficiencies, operational excellence, and cost effectiveness.

EXPERIENCE AND EXPERTISE

Operating in energy generation, transmission, and distribution requires a high degree of monitoring, control, analysis, and protection. zenon® Energy Edition and our in-house experts will help you master your projects with confidence, with proven expertise in areas such as:

▸ Local control for substations of any voltage level
▸ Control centers for medium voltage
▸ Renewable energy management
▸ Energy storage

GLOBAL PRESENCE – LOCAL SUPPORT

Over 30,000 projects worldwide trust zenon to install, operate, monitor, analyze, and optimize their processes, due to our network of local application engineers, technical consultants, industry experts, sales managers, and partners. As an independent software manufacturer, we listen only to the needs of our customers and deliver the best possible user experience.

QUALITY AND INNOVATION

All of our drivers and communication protocols are developed in-house and support all standard IEDs on the market. Our product development and quality management team ensure our solutions meet the highest standards in reliability and security. Every day we work hard to exceed customer expectations by catering to their feedback on product quality and innovation.

TRUSTED PARTNER IN THE ENERGY SECTOR

COPA-DATA is committed to providing industry leading automation software. We work closely with a global network of system integrators and technology partners via our official partner program, the COPA-DATA Partner Community. Through our global and local partner events, and daily interactions, we share industry intelligence with partners, receive their input, and provide resources to ensure the best knowledge and highest quality for our customers.

"The zenon Software Platform delivers important sector-specific advantages, such as the built-in device drivers for DNP3 and IEC 61850 MMS, sequence of events, and easy-to-configure circular redundancy. **"**

NIRAJ SHAH, SEL ENGINEERING SERVICES (USA)

One fully integrated platform. 30,000 worldwide installations.

FROM HMI/SCADA TO REPORTING

zenon offers comprehensive automation solutions to meet customer needs: from flexible and secure communication, visualization and control, to customized reporting. The integrated platform allows you to significantly reduce time and lower the cost of your projects.

HIGHLIGHTS

▸ Advanced supervisory control and data acquisition

▸ High-performance HMI visualization

▸ Real-time operational intelligence and control

▸ Customizable reports out of the box

▸ Sophisticated security features

▸ Various redundancy modes

▸ Built-in drivers for connectivity

▸ Gateway for IEC 60870 and DNP3

▸ SCL Editor for IEC 61850 documents

▸ Integrated IEC 61131-3 programming

▸ Built-in Historian

▸ Command sequencer

▸ Process recorder

▸ Load flow calculation and state estimator

ZENON ENERGY EDITION

zenon is a software platform developed by COPA-DATA for the automation and control of power generation, transmission, and distribution. Applications include and are not limited to substation automation, distribution management, energy storage, renewable energy management, and public transport.
Our drivers developed in-house support all major industry standard protocols, such as IEC 61850, IEC 61400-25, IEC 60870, and DNP3. Integrated with our IEC 61131-3-based logic engine, zenon can help you achieve seamless interoperability from the field to the network.

The smart solution for a broad range of applications.

With over 30,000 global installations, zenon delivers the leading solution and outstanding support for power and energy automation.

> " *zenon can be integrated very easily into existing infrastructure with existing functions such as the simple switching of pumping stations by means of the IEC 60870 telecontrol driver and dual commands.* "
>
> **MARTIN ABLEITNER, METIOR (AUSTRIA)**

SUBSTATION AUTOMATION

zenon's SCADA solution can serve as a control system in the substation, a process visualization platform in the control room, or a gateway to higher-level systems. Use zenon Energy Edition for reliable and secure operation of substations – locally or remotely. Benefit from quick project configuration, simple operation, and seamless interoperability.

RENEWABLE ENERGY

zenon offers an integrated environment for the management of equipment, distributed energy generation from renewables, and electrical distribution in a substation environment. Whether it is a wind park, solar power equipment, or a small hydro-electric power plant, zenon provides full visibility into the operation with reports detailing events, alarms, and values, as well as sophisticated event data handling to reduce maintenance costs and ensure maximum security.

HYDROPOWER PLANT

zenon visualizes, controls, and optimizes hydropower plants while offering comprehensive reporting. It communicates with components of the energy generation and distribution while providing connections to process automation components, all in one application. Our extensive driver library allows you to connect all subsections of a hydropower plant without a gateway.

DISTRIBUTION MANAGEMENT SYSTEM

Monitor and optimize your electrical grids with zenon's DMS package. From configuring a project, through visualization, to reporting and archiving, zenon offers a wide range of features that make operations secure and efficient. The Worldview feature displays your complete grid and allows you to zoom in and out on components of the grid at any level of details to make an informed decision.

ENERGY STORAGE

zenon connects energy storage systems to the grid. The software platform visualizes live data and serves as a reporting tool to evaluate archived measurement data. It includes all major features such as command processing in accordance with IEC 61850. You can manage energy storage and substations within one SCADA application without the need for a second system.

PUBLIC TRANSPORT

zenon provides a comprehensive solution for the automation of substations on railroads as well as the control of tunnel-infrastructure systems. It also offers SCADA functionalities for public transportation control rooms and supports energy management. With process automation and the alert escalation chains, operating personnel can respond promptly to incidents or failures.

# Why do our customers choose zenon?

Save time on designing projects, streamline operations and control, and reduce total cost of ownership.

Creating your custom projects can be a quick and straightforward process. The zenon Editor (engineering environment) provides an intuitive, graphical interface with easy-to-locate tools, allowing engineers to rapidly configure projects using templated applications and out-of-the-box functionalities, such as Global Projects, Symbol Libraries, and the Network Topology.

The zenon Runtime delivers real-time control and monitoring, which empowers operators to work efficiently through their tasks. zenon is highly scalable. If you start small, everything can be accomplished with one Runtime. As your project grows and expands, zenon can grow with it.

Over 30,000 zenon installations in the Energy Industry are helping our customers significantly reduce time and cost on routine tasks and maintenance, and benefit from a highly efficient, reliable, and secure system as well as exceptional technical support from COPA-DATA.
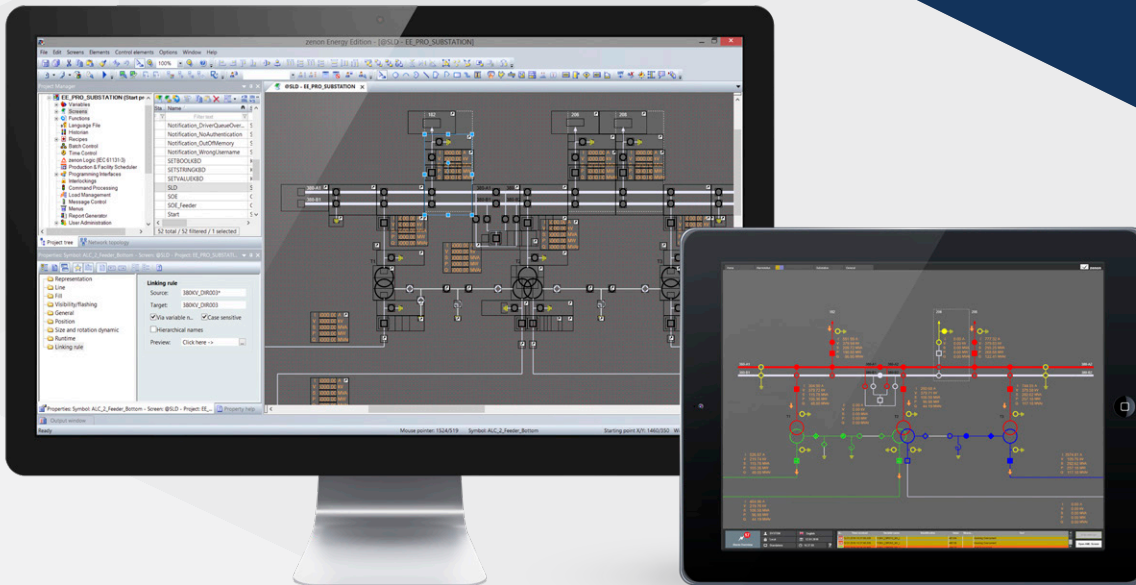
IMPROVED EFFICIENCY

Compared to other systems, zenon natively integrates all industry-specific functionalities, such as drivers, wizards, and GIS screens. Our extensive library of graphical objects and templated applications let engineers to create custom projects in a simple and efficient manner. Easy to deploy and scale, zenon automates routine commands and actions, helping operators improve productivity in the control room and avoid errors. Our award-winning HMI system increases situational awareness, allowing quick troubleshoot when problems arise.

READY-TO-USE FUNCTIONALITIES:

- Redundancy
- Alarm Management
- Command processing
- Process gateway
- Automatic line coloring (topology processor)
- Breaker tripping detection
- Switch locking (lockout-tagout)
- Topology check
- Worldview
- Simulation
- Multi-touch
- Impedance-based fault locating
- GIS integration
- Load flow calculator
- State estimator

The standardized user interface and control concept guarantee time and cost savings. The expense of training employees is very low. In medium-sized and large plants, the employees can supervise and monitor the whole plant from any location in the plant.

OTTO STAIB, BODENSEE-WASSERVERSORGUNG (GERMANY)

Maximize your profits

INCREASED RETURN ON INVESTMENT (ROI)

zenon makes the engineering and operation of your projects fast and simple and can easily integrate with heterogeneous infrastructures. Utilities can benefit from dramatic cost savings and increased ROI due to zenon's key features, such as:

▸ Flexible architecture allowing remote control

▸ User-friendly SCADA engineering environment

▸ Graphical and customizable HMI

▸ Multi-user project access and synchronization

▸ Product openness and extendibility (with an API for C#)

REDUCED TOTAL COST OF OWNERSHIP (TCO)

The lifespan and maintenance costs of an operating system are crucial factors of the total cost of ownership. By automating routine tasks and eliminating errors, zenon saves your maintenance time and improves operational efficiency. In addition, zenon provides a low total cost of ownership through a number of features, such as:

▸ Openness and connectivity

▸ Development independence

▸ Automated maintenance

▸ Modularity

▸ Backward compatibility

Security is key

ZENON IS SETTING INDUSTRY STANDARDS IN SECURITY.

At COPA-DATA we understand a secure SCADA system requires continuous improvement and innovation. Our philosophy of security first has allowed us to deliver the most robust SCADA system on the market.

Based on user roles, zenon defines access rights and ensures critical operations are carried out by authorized users only.

Combined with sophisticated security settings, zenon fully protects your projects from data loss or unauthorized access. Additionally, zenon is a compiled system, meaning only a few binary files are residing on the panel or with the Runtime. You do not need a Runtime database. Therefore, it is almost impossible to tamper with any of the zenon files.

SECURITY FEATURES

- IEC 61850 authentication
- DNP 3 secure authentication v2 and v5
- TLS for IEC 60870 104 and DNP3
- Encrypted network communication
- Data encryption with password and hash encryption
- Certified for Windows 10 – supporting all Windows security features
- Active Directory for user administration
- No data stored in plain text
- Signed files
- Password protected SQL database access
- Each action can be locked/attributed to user rights
- History of changes
- Chronological Event List (CEL) logging security incidents
- Webserver offers HTTP Tunneling
- Webserver available solely for monitoring without operational functions
- Authorization via Equipment Model

To ensure cybersecurity, zenon meets the IEC 62351 standard. In compliance with S1 of PICS for ISO 9506 profile, the IEC 61850 client driver supports ACSE Authentication (8650-1 authentication). Our experts are constantly working on compliance with additional profiles and standards.
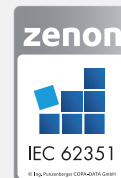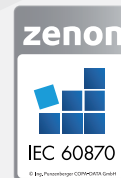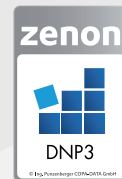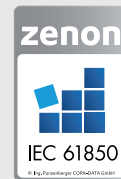
Connectivity & Independence

zenon ensures secure and open communication, using a wide range of energy-specific protocols from GOOSE to IEC 60870.

With native drivers that support all common communication protocols, zenon Energy Edition secures connectivity between IEDs or with remote systems. Each connection is developed by our in-house experts, ensuring that zenon has the best backward compatibility in the industry. Should a special protocol be missing, we can quickly provide you with a replacement driver that is of top quality and performance. Our engineers continuously add drivers to the system.

ENERGY DRIVERS AND PROTOCOLS:

▸ IEC 61850 Client/Server and GOOSE

▸ IEC 61400-25

▸ IEC 60870-5-101/103/104

▸ DNP3

▸ IEC 62056-21

▸ OPC UA

▸ Modbus

▸ IEEE C37.118 (Synchrophasor)

▸ IEC 61850-90-5

▸ Slave/Server Side with the zenon Process Gateway for ICCP/TASE.2/ IEC 60870-6, IEC 60870-5-101/104, DNP3, OPC UA, Modbus

zenon IEC 61850

zenon DNP3

zenon IEC 60870

zenon ICCP / TASE.2 IEC 60870-6

zenon IEC 62351

zenon IEC 62439-3 PRP READY

> *zenon is perfectly scalable and could therefore be adapted to the growing requirements. It is primarily the simple reuse of screens and symbols, as well as the support for many energy protocols, that simplified project configuration for us.*
>
> CLAUDE NIDEGGER, COSTRONIC SA (SWITZERLAND)

Highly reliable network technology

REDUNDANCY

zenon offers unparalleled redundancy features that enable you to significantly improve network reliability and have constant access to projects without interruptions, downtime, or data loss. Depending on your project requirements, you can choose from various types of redundancy modes for the servers:
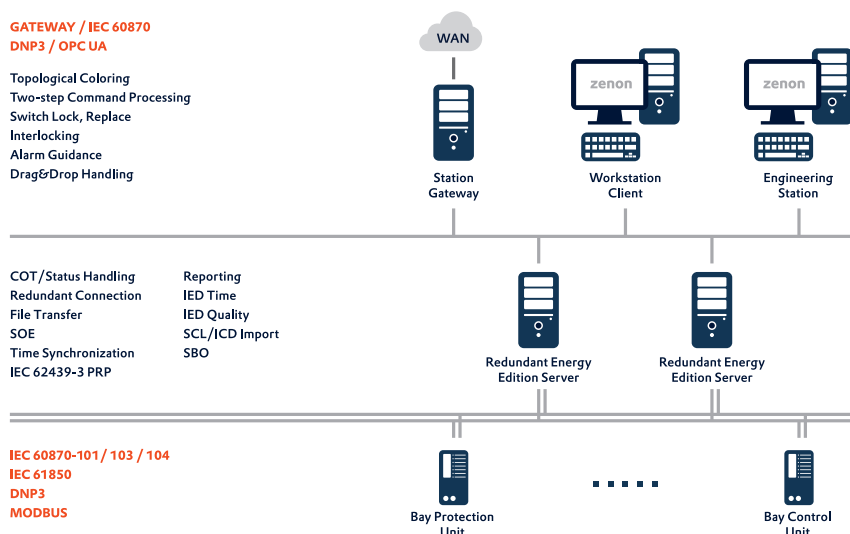
▸ **Dominant mode:** This mode establishes traditional primary standby roles for defined machines.

▸ **Non-dominant mode:** This mode provides full redundancy without traditional primary and standby definitions. Either machine is capable of handling either role.

▸ **Rated mode:** Intelligent switchovers. Based on connection status and other calculated data, the servers decide which machine is the primary server.

PROJECT UPDATES WITHOUT DOWNTIME

Project updates can be implemented while the system is running. The system will stay online, available, and fully functional throughout the updates.

FLEXIBLE COMMUNICATION

zenon provides you with the flexibility in upstream and downstream communication. With zenon, you can read and write data to all types of IEDs; access the integrated gateway and the web server; and use client workstations for operation as well as simulation and testing of command sequences.

GATEWAY / IEC 60870
DNP3 / OPC UA

Topological Coloring
Two-step Command Processing
Switch Lock, Replace
Interlocking
Alarm Guidance
Drag&Drop Handling

WAN

Station Gateway

Workstation Client

Engineering Station

COT/Status Handling
Redundant Connection
File Transfer
SOE
Time Synchronization
IEC 62439-3 PRP

Reporting
IED Time
IED Quality
SCL/ICD Import
SBO

Redundant Energy Edition Server

Redundant Energy Edition Server

IEC 60870-101 / 103 / 104
IEC 61850
DNP3
MODBUS

Bay Protection Unit

Bay Control Unit

Tech Features

COMMAND PROCESSING

▸ Error-free command processing (integrating "select before operate" for DNP3, IEC 61850, and IEC 60870)

▸ Breaker tripping detection

▸ Interlocking at SCADA level

▸ Switch locking (lockout-tagout)

TOPOLOGY CHECK

The integrated module secures command processing; allowing two step and two hand commands, including the consideration of protocol-specific features such as select and execute (IEC 60870) or select before operate (IEC 61850). To prevent operations from creating any hazardous conditions to the plant personnel or equipment, zenon allows the definition of interlockings for each command. The interlocking-logic can be calculated by the use of switch status or by consideration of the topological status of the grid. The Command Processing offers additional functionalities like breaker tripping detection, switch locking, and tag management.

COMMAND SEQUENCER

Repetitive switching tasks can be executed automatically with Command Sequencer to increase operating security. User can easily edit, test, and implement command sequences without the need of programming. Complex sequences with parallel executions or conditional actions can be configured by just click and drag in the graphical editor.

NETWORK TOPOLOGY

You can instantly check the power status of the lines using automatic line coloring. Define colors for powered, unpowered and grounded lines at each voltage level and see even the transformer feedback. To enhance security, zenon displays undefined or faulty switches in different colors. The easy visualization increases your awareness of critical operations and enables rapid detection of errors. The calculated topological model can also be used for the interlocking of commands. The topology can be developed in the zenon Editor (engineering environment) by just creating the single line diagram.

SIMULATION

zenon can display all variables and simulate their values on the screen, even before they are actually connected to the process. So the test operation can start on its own without needing all equipment parts to be set up in the automation and control components. Results in the simulation mode can be displayed using automatic line coloring to enhance visibility into the test operation. Additionally, using IEC 61131-3 logic programming, an engineer can design a training simulator with a workstation by defining the process behavior.

When testing the command sequences in the simulation mode, you can simply set up the switching commands in the single line diagram and record the sequence. The sequence can easily be switched to active use at any time.

ALARM MANAGEMENT

Sophisticated alarm management is crucial to operational safety. In zenon Energy Edition, alarm management is a built-in feature that can be quickly configured and activated without needing to write a single line of code. It is also fully integrated into zenon's redundancy functionalities.

The Alarm Message List (AML) visualizes and filters alarms as well as their statuses (e.g. active, active/acknowledged, and inactive/unacknowledged). It also identifies and displays alarm areas, providing on-site employees with the most informed view of the problem, from an aggregated view to a detailed diagnosis.

STATUS FLAGS

A zenon Energy Edition tag allows up to 64 status flags in addition to its value and time stamp. The status flags include:

▸ Protocol specific information (e.g. Not Topical, Invalid, Substituted, Cause of Transmission, Blocked)

▸ Product-specific information (e.g. breaker trip, network select)

▸ User-specific information (set by programming interface)
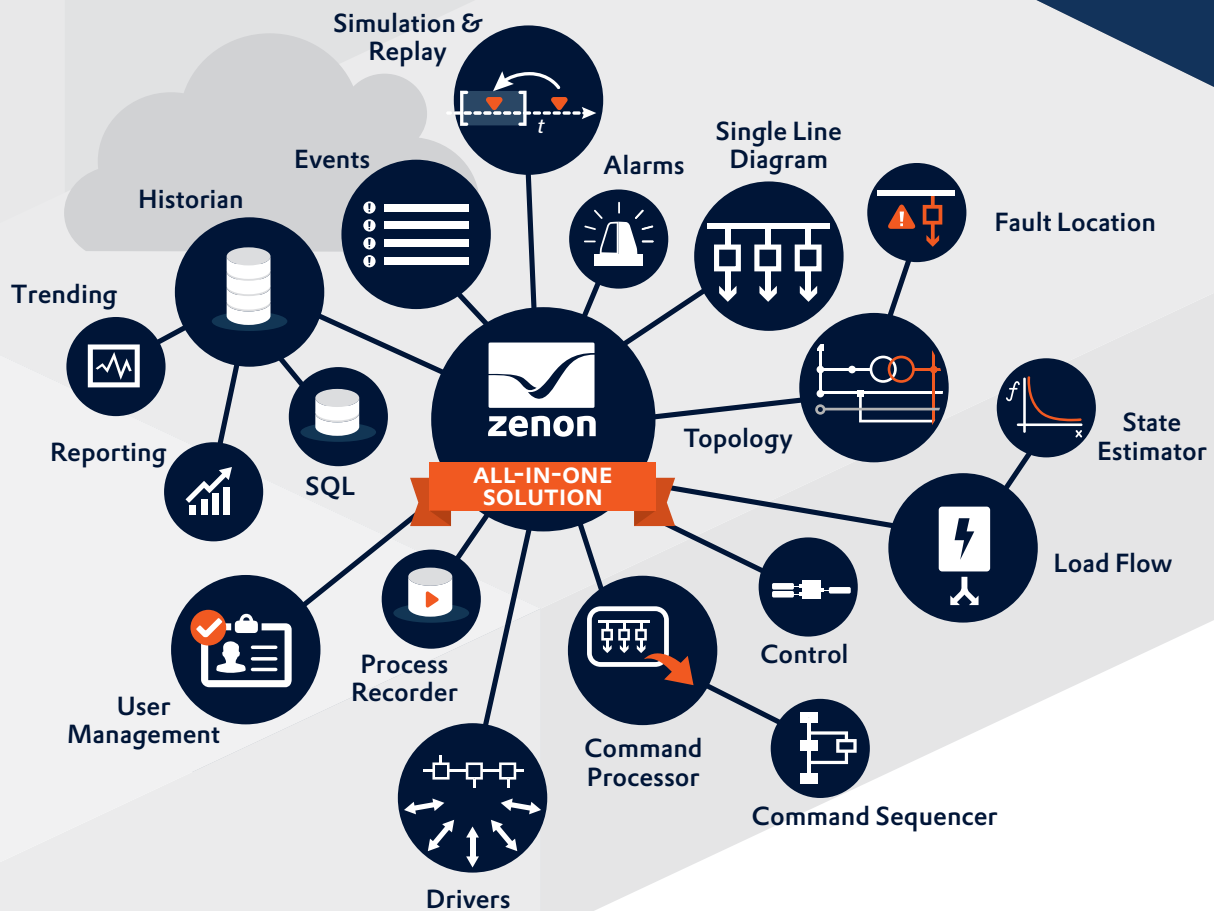
CLIENT/SERVER AND REDUNDANCY

zenon client/server network technology provides a platform-independent solution that enables you to improve network reliability and have constant access to projects without interruptions, downtime, or data loss. zenon's unmatched redundancy features allow engineers to easily set up and customize the redundant network. zenon offers three redundancy modes, depending on the project needs.

NETWORK SETUP AND TESTING

Setting up a network in zenon takes just minutes with a few clicks. Project updates can be implemented while the system is running, so the system is accessible online at any given time.

During the SAT (Site Acceptance Test), zenon makes communication tests easier on the system integrator in various ways. Via a SNMP driver and a system driver, zenon helps to build a screen that displays the entire network infrastructure and its status. There is also a Variable Diagnosis

Screen that can be built into zenon. This allows any of the variables as well as their statuses and value to be clearly displayed.

SSD/SCD WIZARD

zenon offers native wizards to speed up communication configurations, such as IEC 61850. The wizards dramatically save engineering time through easy configuration of Attributes, Datasets and Reports, as well as automatic single line diagrams by using SSD files.

Tech Features

WEB SERVER

With zenon's Web Server, you can work on your projects on a web browser without additional engineering requirements. All screens, users, password administration, information, etc., are available online, with the same look and feel and functionality. Any project changes made on the Web Server are instantly executed in the Runtime and pushed to all users, so that your whole team can work on the project from anywhere and stay on the same page. For security purposes, the zenon Web Server is also available as a standard version, only for monitoring - no operation is possible.

INTEGRATED HISTORIAN

The zenon Historian records process data on a lasting basis. You can save an unlimited number of archives and variables. Different types of storage mechanisms are available, such as on change, cyclic, and on event. The intelligent software architecture allows you to easily store data within a short time, including up to several thousand changes per second.

Each set of data that is archived has the time stamp in milliseconds, the variable value, and the variable status through real-time data acquisition. The data can be sorted at any time and exported into any other format for analysis.

MONITOR ADMINISTRATION

You can easily configure projects for single or multiple monitors. Project screens can be allocated to match multiple monitors. zenon multi-monitor projects can also be displayed on a single monitor system without additional engineering input.

WORLDVIEW

The Worldview functionality can display your complete grid, including all energy generators, switching equipment, and lines in a graphical form. From there, you can zoom in and out on components of the grid at any level of details and gain the insights you need to make an informed decision.

MULTI-TOUCH

zenon offers the world's first HMI/SCADA applications that enable Multi-Touch project screens. This ranges from two-hand operation to advanced interface options, such as zooming, panning, and scrolling with two fingers, as well as additional gestures to trigger actions.

OBJECT-ORIENTED ENGINEERING

zenon is structured in a completely object-orientated manner. You can create a robust library of common symbols and reuse them across projects. Integrate components, processes, and functions easily with the click of a button.

The reusability of graphical objects, screens, or entire projects enables rapid generation of follow-up projects. Furthermore, screens can be saved as templates in the Editor (engineering environment). To automate the project creation process, you can use Wizards that automatically generate projects or portions of one.

MULTI-PROJECT MANAGEMENT

In the zenon Runtime you can run multiple projects simultaneously. Users can segment a large project into various smaller projects and benefit from efficient project maintenance, precise load distribution, and sophisticated network features such as circular redundancy.

USER ADMINISTRATION

User administration is an important feature zenon provides to protect against cybersecurity threats. zenon's role-based user administration lets you define the level of access in zenon Editor and Runtime for any user in the Active Directory. Changes to the Runtime can be synchronized with the Editor remotely in real time. There are 128 different access levels available. You can add as many users as desired. Only an administrator can create new users, unblock users, or deactivate users.

DRIVERS AND PROTOCOLS

zenon has over 300 communication protocols and supports all standard IEDs on the market. zenon also has industry-specific protocols such as the IEC suite, DNP, FTP, and many proprietary drivers. It also communicates via Profibus DP, Modbus, Profibus FMS, and more. Our engineers continuously add drivers to the system. Each connection is developed by our in-house experts, ensuring that zenon has the best backward compatibility in the industry. Should a special protocol be missing, we can quickly provide you with a replacement driver that is of top quality and performance.

EVENT LIST

The Chronological Event List (CEL) keeps automatic and timely account of the operation. It displays all system and predefined messages and can filter information for analysis and reports. The list is stored in the system in a binary format so that the data cannot be tampered. The operator can comment on the list entries for efficient traceability.

DISTRIBUTED ENGINEERING

To accelerate project development, zenon allows multiple engineers to check out portions of a project and simultaneously work on specific areas, where only they can make changes. These changes are then synchronized across all engineering machines. zenon also enables logging of changes in a project along with simplified version control.

PROCESS RECORDER

zenon continuously records the entire operational process. When a problem arises, the Process Recorder allows you to play back the recorded data and analyze the errors that occurred at any point in the past. Its combination with the Alarm Message List (AML) and Chronological Event List (CEL) greatly increases users' visibility and slashes response time to errors. The Process Recorder also can be used for training and simulation purposes.

LOAD FLOW CALCULATION AND STATE ESTIMATOR

Smaller grids can use the load flow calculator to analyze the distribution of the electrical power in the grid. With the pre-switching calculation, the operator can acquire information about possible over loads after execution. This can avoid trips of transformers or power lines. In addition, an N-1 calculation continuously checks whether assets are running safely. If there is not enough measured data available for the load flow calculator, a state 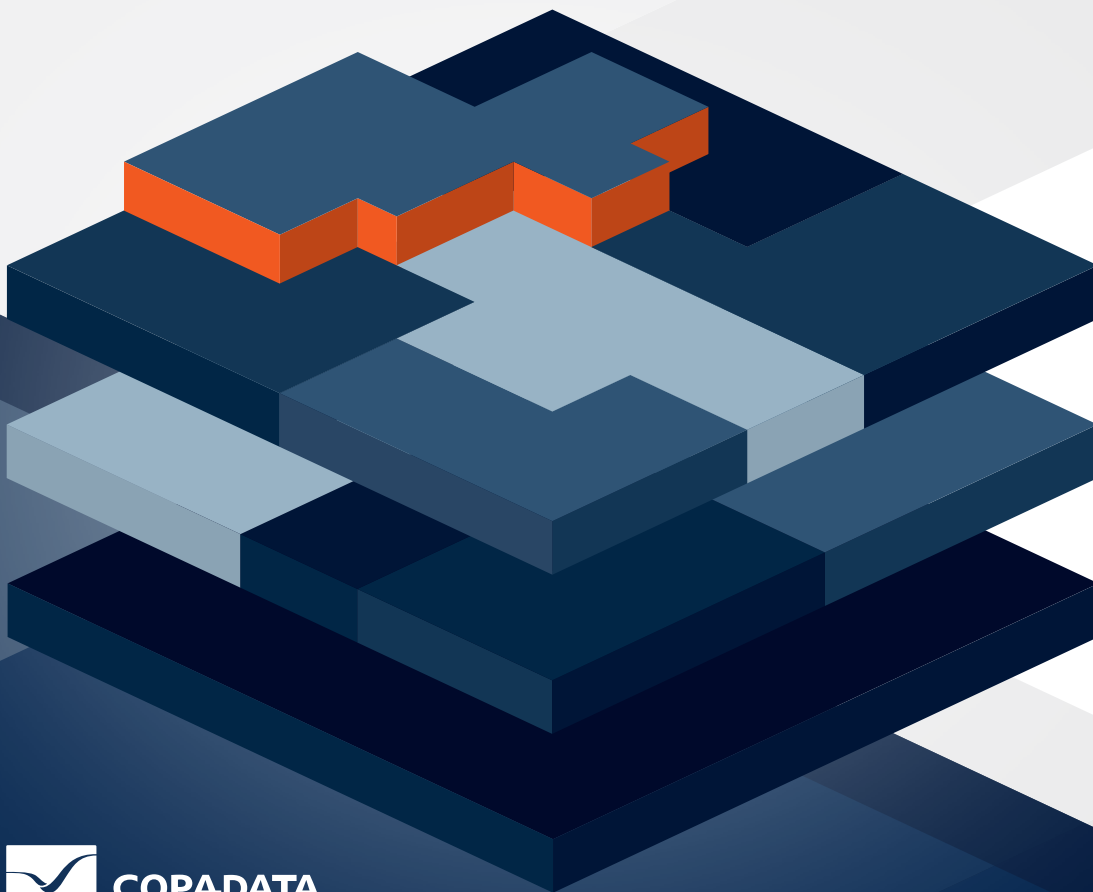estimator can be used to estimate the missing information.