ACCELERATING THE ENERGY TRANSITION WITH RESILIENT IOT SOLUTIONS

Digital solutions for real challenges

Start

SIEMENS

Overview

Our mentioned portfolio is part of the curated modular Siemens Xcelerator portfolio. Siemens Xcelerator is an open digital business platform that enables customers to accelerate their digital transformation easier, faster and at scale.

What's at stake?

A good deal of future security!

Energy distribution, automation systems and networks are the fields where a good deal of future security is being shaped. Transmission system operators (TSO) and distribution system operators (DSO) are managing this on the grid side, while Industry & Infrastructure customers (I&I) operate distribution systems and assets for their own facilities.

Most important for all parties involved: Optimal transparency of all energy distribution procedures and processes in order to keep uptime and resilience as high as possible. The advent of digitalization also requires a precisely coordinated cybersecurity concept across all levels. Due to its modular character, our IoT and cybersecurity suite offers all possibilities to find the perfect answer for your individual challenge in terms of reliability, availability, sustainability, costs and cybersecurity.

Transmission system operators

TSOs are responsible for transporting electricity at high-voltage level over long distances. In their switching stations and substations, they provide the medium voltage for the DSOs, but also take care of the integration of large renewable energy sources such as offshore wind parks, for example.

TSO

Distribution system operators

These are usually energy suppliers who operate their own medium- and low-voltage grids. They ensure that these two network levels are reliably supplied with power and that the network components used, such as transformers and switchgear, perform their tasks flawlessly.

DSO

Industry & Infrastructure customers

Their task is defined by the fact that they have to operate their own energy distribution systems at medium- and low-voltage level and supply them with energy, for example to keep high risk systems running. They therefore need security of supply on the grid side just as much as they need their own systems to function at lowest cost.

I&I

EV charging operators

These operators aim to improve the uptime of EV charging infrastructure, including chargers, grid connection infrastructure, and software to manage and monitor charging processes. They want to increase their revenue by improving the EV Driver customer experience, all while maintaining a lean operations team.

EV

Siemens Xcelerator IoT Suite for Electrification & Automation

Electrification X combines the real and digital worlds in the Xcelerator IoT Software as a Service (SaaS) offering, designed to master the challenges of energy transition.

It helps transmission system operators (TSOs), distribution system operators (DSOs), renewable energy operators, industries and infrastructure customers to manage their energy networks, increase uptime and improve reliability, asset utilization, cybersecurity, and energy efficiency to reach sustainability goals.

Electrification X has an integrated user experience, meaning that all data of one station is available to the user in one place with a harmonized data structure and user experience. For example, there is one login to the system, a general map view of all connected stations, a list of all alarms and events, and a common asset topology with all connected assets.

Electrification X has six feature sets that have dedicated use cases and value propositions:

- Load Management
- Network Fault Management
- Asset Management
- Sustainability/Energy Management
- Distribution Grid Monitoring
- OT Companion

Electrification X – your benefits

- **Reduce energy cost and CO_2 emissions**
- **Optimize OPEX by reducing operation and maintenance costs**
- **Increase uptime and resilience, extend the lifetime of assets**
- **Maintain the stability of the distribution grid despite the growing share of decentralized generation and EV charging**
- **Reliably protect your systems against cyber threats**
- **Get continuous information of new patches to ensure cybersecurity of OT assets in your substations**

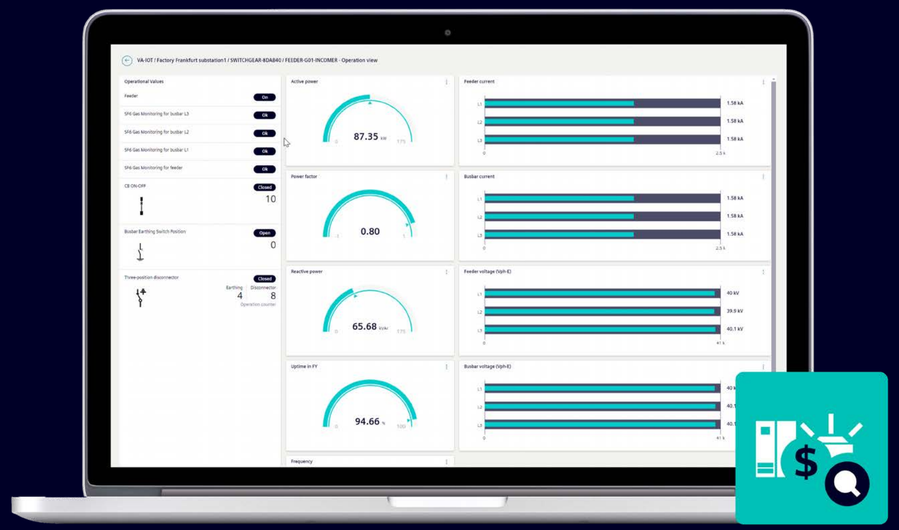
Electrification X is your solution for

TSO DSO I&I EV

Learn more about Electrification X on the website

Digital caretaker for your electrical grids

Electrification X – Asset Management provides different views for visualizing and monitoring electrical assets in a substation or substations across multiple locations from anywhere in the world at any time.



Asset transparency and operations
With the asset summary you get an overview of the key performance indicators of your assets. This allows you continuous monitoring, identification of optimization potential, and improves availability.

Condition monitoring
Continuous monitoring of temperature, partial discharge and circuit breaker with real-time health status updates for connected equipment. It provides instant alarms and early warnings to help manage risks by identifying potential breakdowns and failures before they occur. This proactive approach ensures better risk management and significantly increases asset lifetime.

Predictive maintenance
Our predictive maintenance feature ensures better maintenance planning, improved asset reliability, and reduced unscheduled downtime through remote access to the real-time data.

Electrification X – Asset Management – your benefits

- Prevent unplanned shutdowns
- Increase uptime, availability and resilience of the substation
- Optimize OPEX by reducing operating and maintenance costs, and optimizing maintenance cycles
- Improve risk management capabilities
- Identify potential optimizations to improve asset utilization and reduce capital expenditures

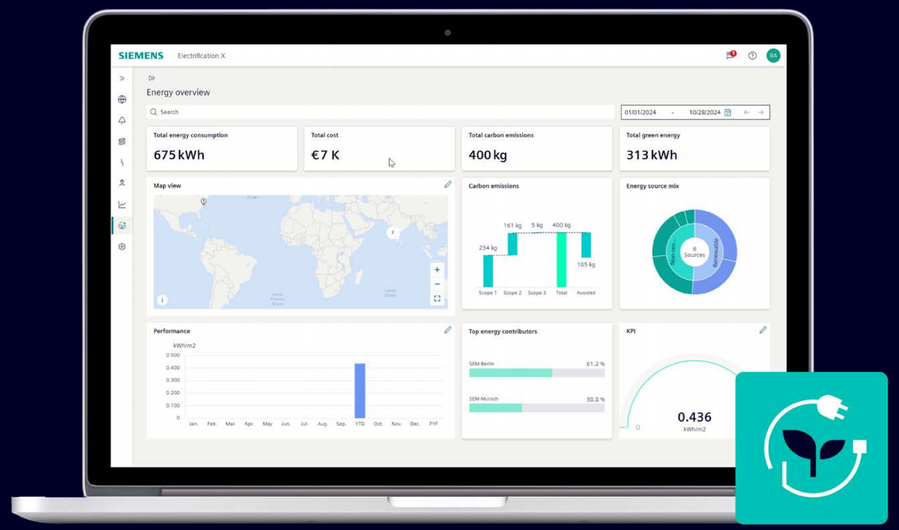
Electrification X –
Asset Management is your solution for

TSO DSO I&I

Learn more about Electrification X – Asset Management on the website

First steps towards efficient processes and sustainability goals

Electrification X – Sustainability/Energy Management is designed to overcome industrial challenges and improve energy efficiency, optimize costs and energy mix, and reduce carbon emissions.



Improve energy efficiency – proactive approach

From a global energy performance overview to device level data transparency, Electrification X – Sustainability/Energy Management can monitor, track, improve and report all key performance indicators.

The module delivers a comprehensive summary of your facility w.r.t energy, cost and emissions. This helps to identify potential hotspots for improvements. At the same time, you can accelerate your decarbonization journey with energy target setting and project tracker. The energy performance KPIs further support energy strategy, operation, maintenance and decarbonization roadmap.

Electrification X – Sustainability/Energy Management – your benefits

- 24/7 enhanced data transparency & reporting for all global locations (individual as well)
- Monitoring, tracking & reporting of energy, cost and emission KPIs
- Saving potential and anomalies identification
- Accelerated approach to manage tariff & peak
- Optimum use of renewable energy
- Standardization with project tracking and energy targets
- Optimized energy investment strategy & roadmap

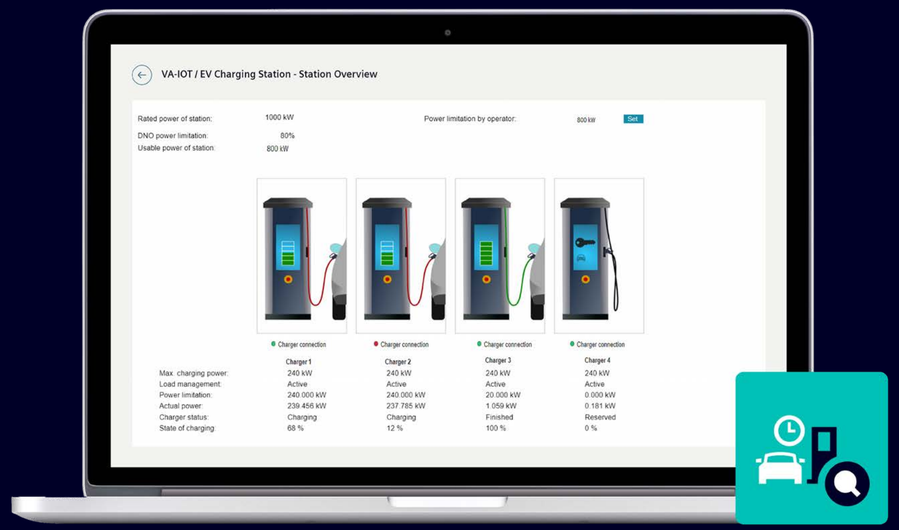
Electrification X – Sustainability/ Energy Management is your solution for

TSO DSO I&I

Learn more about Electrification X – Sustainability/Energy Management on the website

Higher charging uptime and lower operational costs

Electrification X – Load Management offers you transparency of EV-charging infrastructure health, remote control of feeders/ chargers and load management including the ability to follow power limitations set by the Distribution System Operator (DSO), avoiding costly demand charges.



Station Monitoring

Monitor all components of your EV Charging station from expensive transformers, medium-voltage and low-voltage switchgear to all equipment like chargers and circuit breakers. Get transparency about the system health and correlate analyses with load profile and temperature/humidity measurements.

Set Operational Load Limits

The larger your charging station network grows, the more challenging it is to offer reliable and efficient charging service. The ability to remotely adjust load limits provides you the flexibility to optimize operational costs with varying demands at different sites. The feature set also allows the DSO to change power limitations with a setpoint, and the system automatically adjusts the load accordingly to meet charging power demands of the EV.

Remote Control of EV-Charging Stations

Increase uptime of EV Charging stations with the ability to remotely reset LV circuit breakers and chargers. This eliminates the need for on-site visits to rectify charger errors or safely energize unmanned stations, resulting in significant savings in troubleshooting time and effort.

Electrification X – Load Management – your benefits

- Reduced peak demand charges on your electricity bills with load management
- Increased uptime via remote access in case of failures
- Reduced OPEX by avoiding unnecessary trips to EV-charging stations
- Reduced OPEX by managing the load and preventing overloads
- Fast identification of the fault location
- Reduced outage duration leads to reduced service costs
- Support for problem root cause analysis
- Optimized planning of maintenance activities

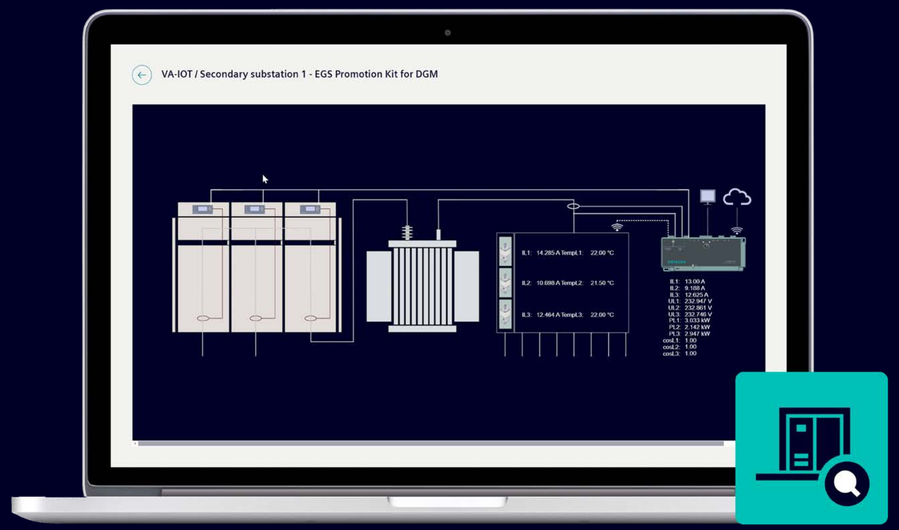
Electrification X – Load Management is your solution for

EV

Learn more about Electrification X – Load Management on the website

Bringing transparency in distribution grid stations and street cabinets

Electrification X – Distribution Grid Monitoring offers precise monitoring of all distribution grid stations and street cabinets of medium voltage (MV) and low voltage (LV) grid. Comprehensive load monitoring in the low voltage distribution grid provides insights into the power grid's utilization, the load of critical grid components and, in particular, identifies bottlenecks in the power supply.



Operational Transparency
Real-time monitoring of critical electrical parameters from the RMU and distribution transformer, including current, voltage, frequency, power factor, active power, and reactive power. This enables informed decision-making based on operational KPIs.

Load Monitoring
Bundling with SICAM EGS and using smart fuses like 3NA COM allows to monitor load current and temperature, enabling and benchmarking feeder load profiles/ heatmap. It also helps to easily determine the duration of the load limit violation and provides a comprehensive utilization analysis.

Electrification X – Distribution Grid Monitoring – your benefits

- Avoid power constraints and proactively detect overload conditions in grid components long before they reach failure points
- Utilize digitalization and effective data management as a foundation for strategy to redispatch or upgrade the grid where necessary
- Provides valuable insights into the load pattern over time, allowing operators to better understand how power is being consumed and distributed throughout the system

Electrification X –
Distribution Grid Monitoring is your solution for

DSO

Learn more about Electrification X – Distribution Grid Monitoring on the website

For fast and efficient fault localization and handling

The Electrification X – Network Fault Management (NFM) feature set provides comprehensive transparency into electrical faults in transmission and distribution networks and enables users with an efficient and manageable approach to electrical fault management. This feature set enhances visibility of overhead and underground electrical networks, facilitating prompt and efficient fault management.

Improved Grid Monitoring
Monitors the operational status of your protection device fleet and overhead line distribution grid, increasing data transparency of grid operation.

Fault Data Retrieval and Analysis
Efficiently retrieves fault records (e.g. COMTRADE, COMFEDE, PQDIF) from protection relays and power quality meters in substations leveraging Substation Fault Management, while Overhead Line Fault Management enables monitoring and analysis through sensor-based devices for overhead line grids. This ensures rapid fault detection and equips maintenance teams with actionable insights.

Comprehensive Fault Monitoring and Management
Provides real-time insights into grid health, optimize fault detection, and support predictive maintenance, ensuring improved operational efficiency and reliability across the entire network.

Electrification X – Network Fault Management – your benefits

1. Overhead Line Fault Management

- **Efficient Fault Detection:** Quickly identifies and locates faults in overhead line grids, enabling faster response times and minimizing downtime.
- **Data Transparency:** Increases visibility into the performance of overhead lines, offering valuable insights that improve operational planning.
- **Predictive Maintenance:** Helps predict potential faults and optimize maintenance schedules, reducing unplanned outages and improving operational efficiency.
- **Optimized Resource Allocation:** Enables smarter deployment of maintenance teams by providing precise faulty section information, reducing the need for time-consuming inspections.

2. Substation Fault Management

- **Ensuring transparency in the operation of protection relays and power quality devices to maintain system integrity**
- **Implementing a comprehensive monitoring system that operates round-the-clock, providing immediate notifications to customers regarding any alarms or trips due to protection events**
- **Facilitating access to fault records, files and protection settings with visualizations, enhancing the ease of fault management and analyzing processes**
- **Providing improved access to continuous recording and trend analysis, making it more convenient and accessible**

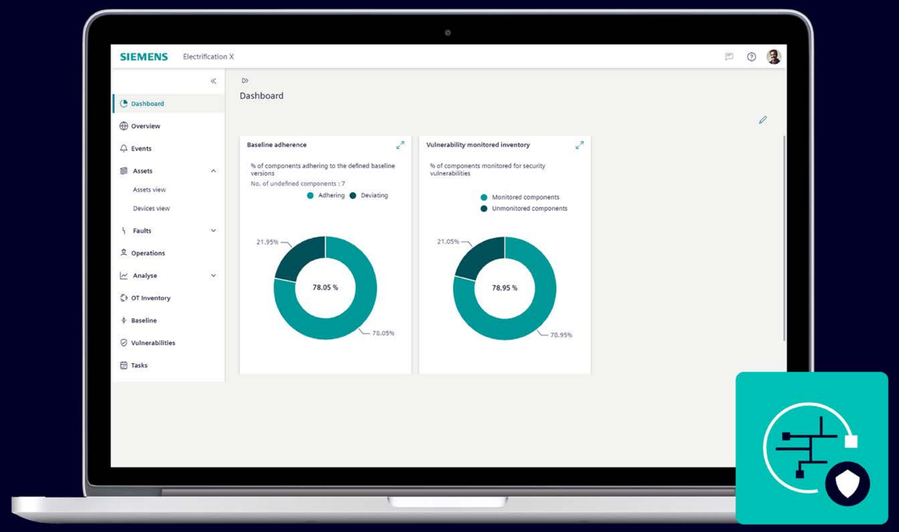
Electrification X –
Network Fault Management is your solution for

TSO DSO I&I

Learn more about Electrification X – Network Fault Management on the website

Master the OT inventory of your power systems, mitigate cyber risks effortlessly

The accelerating convergence of IT and OT systems is transforming the energy sector. Grid operators, including Transmission System Operators (TSOs) and Distribution System Operators (DSOs), face increasing complexity in managing their infrastructure. While smarter, connected devices and industrial IoT bring opportunities for automation and efficiency, they also present significant cybersecurity challenges.



Electrification X – OT Companion is your partner in the management and protection of Operational Technology (OT) assets. That makes it easier to navigate challenges like outdated inventory information, long patch cycles, regulatory pressure and increasing cyber threats.

OT Asset Transparency
Combined with SICAM GridEdge, Electrification X – OT Companion automates asset discovery and provides a complete inventory of multi-vendor, multi-generational devices. From the level of substations down to subcomponents such as firmware and modules. An entity model for deep insights helps users to gain a hierarchical and detailed view of their OT systems. With Baseline Management operators can define, monitor, and ensure adherence to approved software and firmware versions.

Optimized Vulnerability Monitoring and Structured Patch Management
Integrated with a comprehensive database for over 300,000 IT and OT products software vulnerabilities (CVEs) are mapped directly to the operator's asset inventory. Continuous risk awareness is achieved when operators receive real-time notifications of newly identified risks, end-of-life advisories and mitigation recommendations. Process quality is assured with built-in workflows and audit-ready documentation so that countermeasures can be defined, planned and acknowledged collaboratively.

Enabling Cybersecurity Resilience
Electrification X – OT Companion is more than just a tool – it's a digital assistant for grid operators. By addressing the pressing cybersecurity and operational challenges faced by network operators, OT Companion ensures that energy networks remain secure, resilient, and future-ready.

Electrification X – OT Companion – your benefits

- **Gain Operational Visibility:** Achieve full transparency across OT assets and their configurations, enabling better decision-making and situational awareness.
- **Proactively Manage Cyber Risks:** Leverage continuous vulnerability monitoring and structured patch workflows to address risks efficiently.
- **Ensure Compliance with Industry Standards:** Align with best practices from ISO 27019 and IEC 62443 to meet regulatory requirements, including NIS2 and NERC CIP.
- **Streamline Operations:** Automate information gathering and reduce manual tasks, allowing teams to focus on value-added activities.

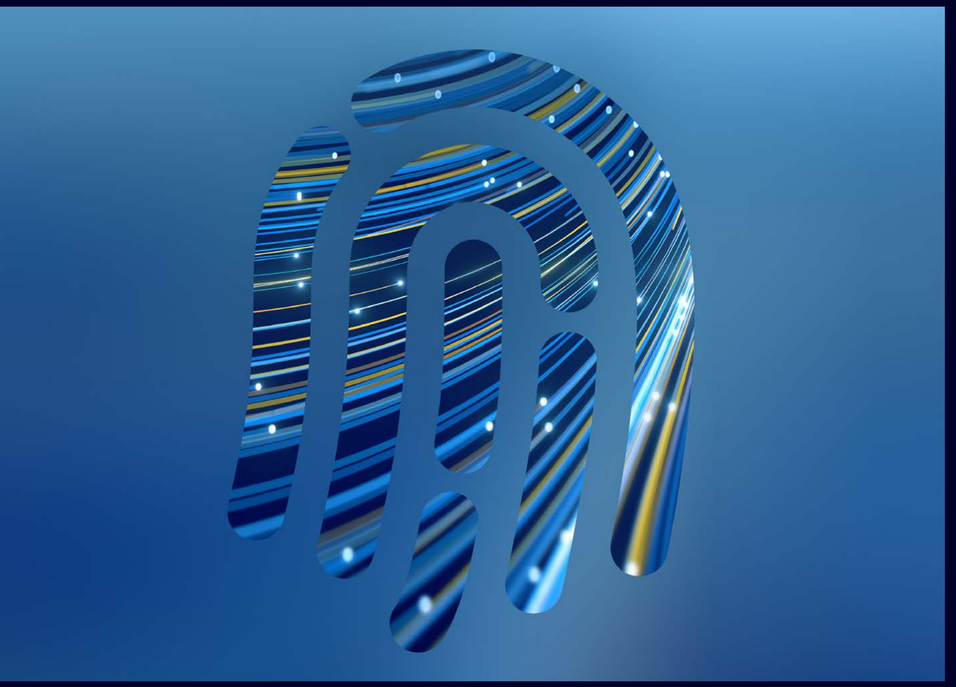
Electrification X –
OT Companion is your solution for

TSO DSO I&I EV

Learn more about Electrification X – OT Companion on the website

OT cybersecurity incident detection and response for energy automation systems

Security Information & Event Management (SIEM) system is a solution that enables the monitoring, detection and alerting of security events or incidents within an OT environment. It provides a comprehensive and centralized overview of the security situation of an OT infrastructure. SIEM systems collect, aggregate and evaluate log data generated throughout a whole organization's OT infrastructure.



On the cybersecure side
"Attack detection systems" are a requirement of the new IT security laws that have been implemented in many countries.

Improved interaction of security systems and functions
A SIEM system collects all security-relevant notifications from all components of the system, detects abnormal activities, and sends an alarm notification to the operator.

Tailored for monitoring energy automation & SCADA systems
All collected logs are evaluated in the SIEM via rulesets that are curated for energy automation and SCADA systems in order to reduce noise in the logs, correlate them and detect abnormal behavior of/in the systems.

Towards better cyber incident response
Timely detection is a prerequisite for response and reporting. In SIEM, any suspicious activity is checked against more than 200 alarm rules.

SIEM – your benefits

- **Comprehensive detection of cybersecurity threats from a trusted partner**
- **Reduced downtime in the face of cyber threats**
- **Improved operational security for energy automation systems**
- **Swift and secure incident response and recovery**

SIEM
is your solution for

TSO DSO I&I EV

Learn more about SIEM on the website

Digital intelligence for your electrical distribution systems

SIMARIS control is an on-premise monitoring and diagnostics station for electrical power distribution assets, including medium-voltage switchgear, low-voltage switchboards, generator breaker systems (GBS), transformers, and substation peripheral devices. Its modular architecture allows SIMARIS control to offer solutions tailored to current market needs, ranging from asset monitoring, simple threshold-based temperature monitoring, condition-based health status monitoring, energy monitoring, digital documentation, and remote visualization.

All-in-one system
SIMARIS control supports a wide range of industry protocols to integrate the field devices into your electrical power distribution system to turn many individual devices into one integrated system. With the local touchscreen display, you will have all-in-one monitoring and diagnostic station for complete substation or E-House.

Local data storage
The operational or statistical data will not leave the customer premises as the data collected from all the field devices and sensors will be stored and processed on-site giving you peace of mind in terms of data security. However, as per the project specific requirement, the relevant data can be transferred to higher-level automation systems.

Condition monitoring
Continuous monitoring of temperature, humidity, partial discharge and circuit breaker with real-time health status updates for connected equipment. It provides instant alarms and early warnings to help manage risks by identifying potential breakdowns and failures before they occur. This proactive approach ensures better risk management and efficient maintenance planning.

SIMARIS control – your benefits

- Local data processing and storage
- Eliminate the need for manual inspection visits
- Prevent unplanned shutdowns
- Increase uptime, availability, and resilience of the substation
- Optimize OPEX by reducing operating and maintenance costs, and optimizing maintenance cycles
- Improve risk management capabilities

SIMARIS control
is your solution for

I&I TSO DSO

Learn more about SIMARIS control on the website

Virtual testing of SIPROTEC 5 protection devices

Save time and increase system quality with SIPROTEC DigitalTwin, the real time digital replica of a physical SIPROTEC 5 device including algorithms, functionality, and communication interfaces. It offers a comprehensive test of your energy automation system within minutes, without hardware, and supports all SIPROTEC 5 firmware versions. The cloud-based SIPROTEC DigitalTwin is available anywhere, anytime, 24/7.

Shortest commissioning times
SIPROTEC DigitalTwin fast feedback loops help you continuously deliver precisely fitting solutions. You no longer have to wait for the fixed time window of the physical FAT. Nonconformance costs are even better managed, increasing SAT confidence and reducing the time required for on-site commissioning.

Efficient testing of SIPROTEC 5 devices
Virtual remote testing across different locations saves you not only travel costs and time but also logistics for setting up the system. Perform comprehensive tests of the SIPROTEC 5 devices in your energy automation system with high efficiency, performance, security, and availability – without any hardware.

Fewer and shorter outages
Better pre-testing of the entire functionality of the SIPROTEC 5 devices results in higher availability of the energy automation system, with fewer and shorter outages, and lower operating costs. Efficient and scalable training of operation teams further reduces the risk of human errors.

SIPROTEC DigitalTwin – your benefits

- Fast and realistic fault analysis
- Faster system energization
- Virtual testing for fast commissioning
- OPEX reduction, shorter outages and higher availability
- Simulation and validation of product properties
- Efficient, scalable trainings on the job

SIPROTEC DigitalTwin
is your solution for

TSO DSO I&I

Learn more about SIPROTEC DigitalTwin on the website

Smart Infrastructure combines the real and digital worlds across energy systems, buildings and industries, enhancing the way people live and work and significantly improving efficiency and sustainability.

We work together with customers and partners to create an ecosystem that both intuitively responds to the needs of people and helps customers achieve their business goals.

It helps our customers to thrive, communities to progress, and supports sustainable development to protect our planet for the next generation.

Creating environments that care.

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