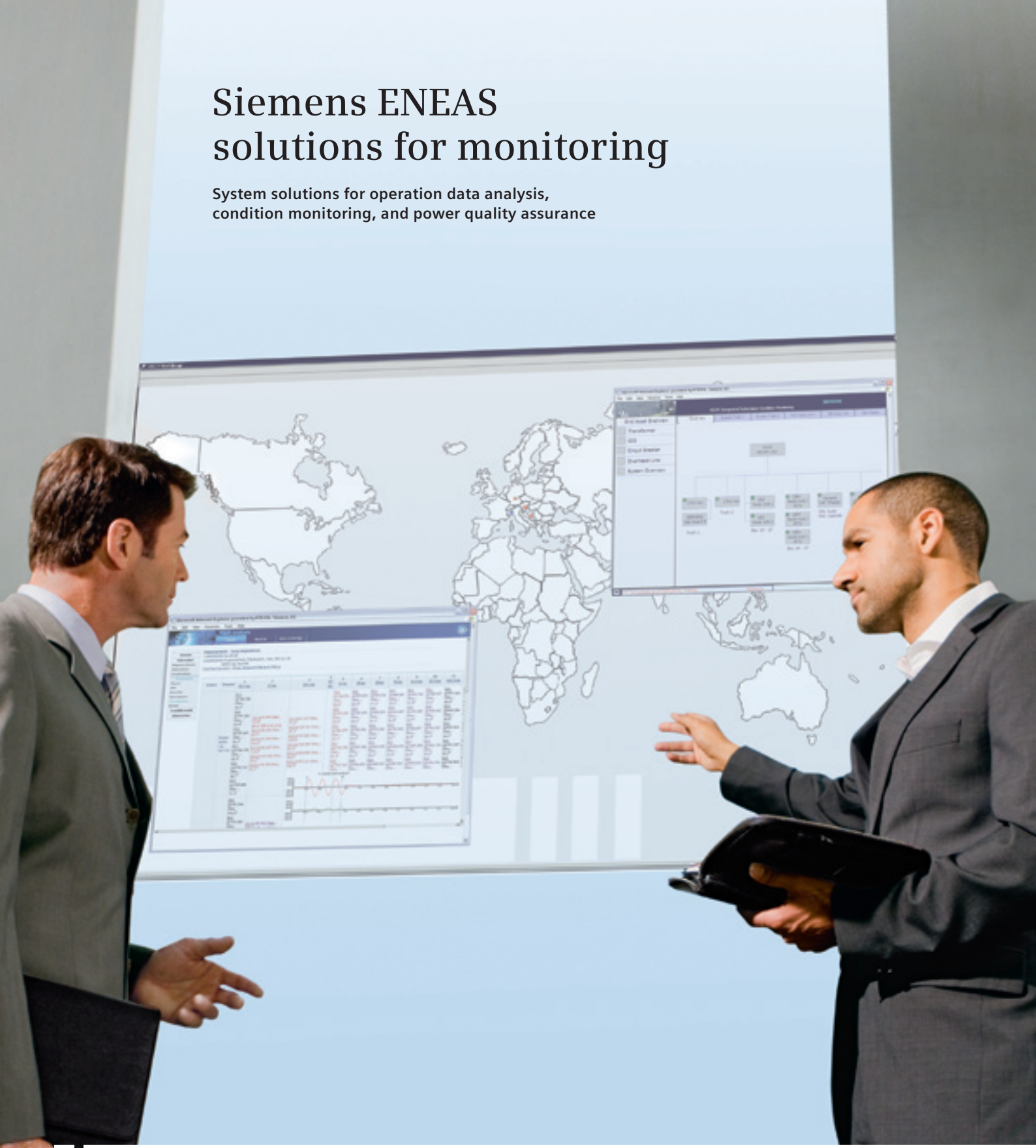
Siemens ENEAS solutions for monitoring

System solutions for operation data analysis, condition monitoring, and power quality assurance



Answers for energy.

SIEMENS

An integrated approach towards the entire spectrum of energy automation

Always one step ahead with ENEAS solutions from Siemens

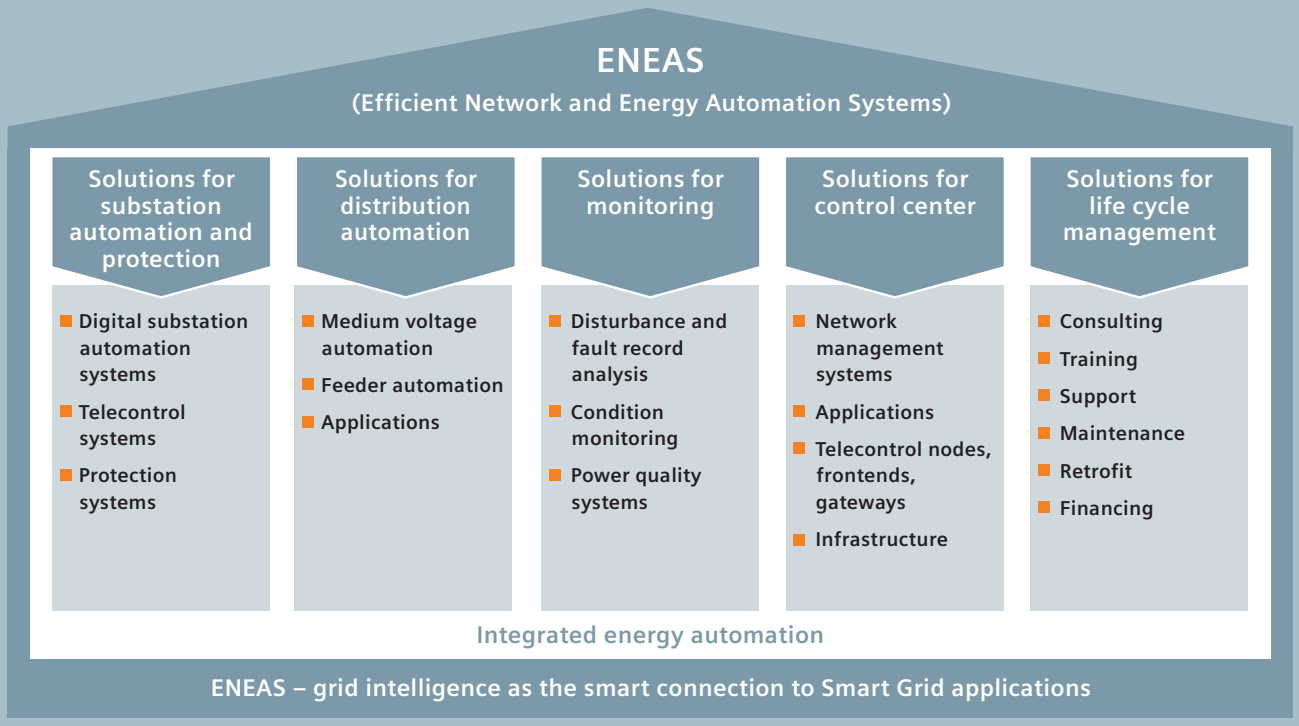
Comprehensive and efficient overall solutions for all areas of network automation based on time-tested Siemens products – this is the idea behind Siemens ENEAS (Efficient Network and Energy Automation Systems). For out-of-the-box system solutions as well as for highly customized turnkey concepts, ENEAS solutions excel by

- efficiency thanks to low costs throughout the entire life cycle
- sustainability through extensive performance reserves and open interfaces
- an ideal technical basis for the intelligent grids of the future
- the high level of safety only a demonstrably dependable business partner can guarantee

The basis for success

Siemens ENEAS solutions for monitoring provide the basis for all grid management and planning activities: the logging, processing, and visualization of relevant data from transmission and distribution networks. Such data allow for the substantial optimization of capacity utilization, availability, and power quality.

Power quality is an increasingly important issue. Regulation bodies tend to impose an increasing number of power quality specifications on network operators, and new business models are often based on accurate contractual agreements on power quality. ENEAS solutions for monitoring provide suitable answers: fast, precise, and easily accessible fault analysis and fault location, as well as the ongoing monitoring of all operational parameters, enable the continuous optimization of all network assets.



Siemens ENEAS solutions manage all aspects of energy automation with efficient project planning, reliable safety functions, unlimited communication, and compatibility with international standards. They create a solid foundation for intelligent transmission and distribution networks.

The key to reliable network operation: recognizing faults before they become failures

The world of today is highly dependent on a safe and secure supply with electrical power. Over 60,000 high-voltage and more than 900,000 medium-voltage substations, along with 550,000 transformers, 400,000 circuit breakers, and millions of miles of overhead lines and cables are in operation around the globe to bring electricity to the consumers.

However, most of these assets are still controlled by hand or only partially automated. At the same time, there are new challenges to be met by utilities and network operators. The rise of distributed generation and the growing share of renewable energy sources in the world's energy balance, aging equipment, and dramatically changing load situations are just a few of them. This is why asset monitoring and precise analyses become more and more important. Along with targeted automation they are considered an essential prerequisite to responsible grid management.

Siemens ENEAS solutions for monitoring fulfill the technical requirements necessary to keep a close eye on an entire grid and all its elements. The advantages are convincing: blackouts and power quality fluctuations can be effectively prevented, precise fault localization and analysis can be performed within a short time, and reports that comply with all relevant regulations are generated automatically. Moreover, Siemens ENEAS solutions for monitoring pave the way for condition-oriented maintenance, which further helps keep life cycle costs low.

How can I get a grip on network disturbances?

Disturbance and fault record analysis

The key to securing an advantage in a highly competitive market

Network quality is one of the most important competitive factors in today's liberalized and increasingly demanding energy markets. Unstable power quality and, in the worst case, blackouts result in considerable contractual penalties.

The best approach towards consistently preventing such difficulties is accuracy and quick response to power network events. Continuous monitoring and documentation enable such quick action. However, improving system diagnostic capabilities can also result in a data avalanche. Modern monitoring, protection, and recording systems produce data that need to be understood, processed, and analyzed quickly. And often diverse data for power quality and equipment monitoring reports need to be processed. Moreover, network events are often complex and time-critical. So qualified staff are required to resolve the issues.

Designed as an integrated network quality system and integrating third-party devices as well as heterogeneous generations of technology, Siemens ENEAS solutions for monitoring help to get a grip on these problems. The network diagnostic system is compatible with any given infrastructure and provides fast and highly accurate diagnoses of network events. It automatically provides clear, unambiguous facts. It makes possible consistent, standardized, and fully automated network monitoring and fault analysis. Moreover, it enables network operators to seamlessly document fault states and the quality of the supplied electrical energy based on relevant grid code standards.

A network diagnostic based on the Siemens ENEAS philosophy system is, therefore, a long-term investment which helps save value, archive acceptance, and enhances a good reputation in the market.

Consistent network monitoring and fault reporting with a single system

Your benefits

- Inclusion of all available data sources, also third-party fault recorders, numerical protection devices, and power quality devices, for instance
- Coherent grouping of all records relating to a specific network event
- Classification of the grouped events according to their severity
- Accurate distance to fault location and fault analysis
- Fast distribution and availability of the results through e-mail, text message, and Web interface
- Consistent archiving of all relevant data

Best practice: Energinet.dk, Denmark

The customized ENEAS solution for Energinet.dk, a network operator in Denmark, was the implementation of a single central Siemens SIMEAS SAFIR network diagnostic system for the collection of all records from the 23 substations within the company's network. The main aim was to provide a standardized, Web-accessible archive of all fault records as well as a standard reporting archive for easy analyses. The system integrates data from fault recorders as well as from protection relays.

At a speed of 0.7 megasamples per minute, which equals approximately 25 protection records per minute, the system sorts, documents, and reports all faults signaled by the various data sources used to monitor the transmission network. For Energinet.dk, the SIMEAS SAFIR system supports Qualitrol BEN 6000 with BEN 32, Hathaway IDM with ReplayPlus, and SICAM DISTO with protection relays.

The reporting is performed through the company's intranet, which provides high-speed data transfer. Within minutes after the first fault reports are generated, the system produces a report which the maintenance staff can use to take necessary action. This information is available to all required personnel, who just need to open the SIMEAS SAFIR Web pages to analyze the fault online. The records are stored for at least one year in a local database, and original as well as enhanced fault records can be viewed on the system's Web pages. They can be zoomed, and the data can be analyzed using a timeline. The records can also be exported in PDF format or as zipped Comtrade files.

A sophisticated ENEAS solution based on a Siemens SIMEAS SAFIR system provides Energinet.dk with a standardized archive of all fault records and standard fault reporting in a single system. Within the customer's Intranet, all data are accessible through an easy-to-operate Web interface.

How can I increase the performance of my assets in a sustainable manner?

Condition monitoring

Knowledge that translates into performance and profitability

Expenditure cuts, the loss of expert knowledge due to retirements or staff downsizing, and the need for the operation of aging equipment at higher levels are only some of the challenges utilities and network operators have to face today. Yet, they are expected to maintain and even increase their levels of performance.

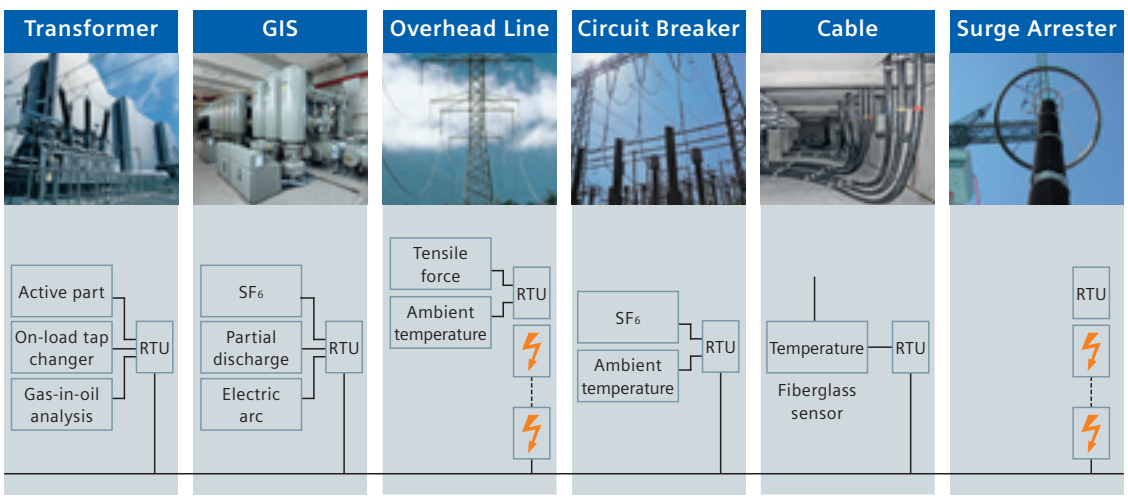
Intelligent grid technologies that help establish Smart Grids can provide suitable answers. Condition monitoring is one of these technologies, suitable whenever it comes to optimizing the performance of technical equipment. As an important element of both asset management and operation support, it provides network operators with recommendations based on diagnostics and the analysis of measured values.

While condition monitoring has, fortunately, become increasingly more advanced over the years, the development took place for each type of asset on its own, resulting in a cluttered condition monitoring landscape that offers virtually no synergy options.

Siemens has developed Integrated Substation Condition Monitoring (ISCM), a modular platform that is capable of bundling different types of power transmission and distribution monitoring systems. Various elements of this platform are used for the ENEAS solutions for monitoring. They make it possible to use time-tested standard modules in a highly efficient manner and are open to customer specific solutions for optimal integration.

ISCM surveys all relevant substation components and includes condition monitoring systems for transformers and their various components, for partial discharge and gas density in gas-insulated switchgear, for circuit breakers, overhead line capacity, cables, and optionally also for isolators and surge

arresters. ISCM can be implemented in any existing substation. Possible configurations comprise everything from simple asset-embedded value monitors all the way to a fully integrated condition monitoring solution. Such a solution provides complete asset-related condition information in a common format and practicable recommendations to the operator and the asset manager.



ISCM surveys all relevant elements of a grid and can be implemented in any given infrastructure.

The real innovation behind ISCM, however, is the evaluation of the logged data with centrally administrated knowledge modules on substation or, preferably, control center level. This paves the way for accurate condition information and enables the operators and asset managers to enhance the operating performance of the assets and at the same time reduce costs.

Siemens ISCM can be precisely customized and seamlessly integrated into any given substation communication and visualization infrastructure. Rendering all condition information in a consistent format, the system is a major contribution to the optimal utilization of all resources within a network.

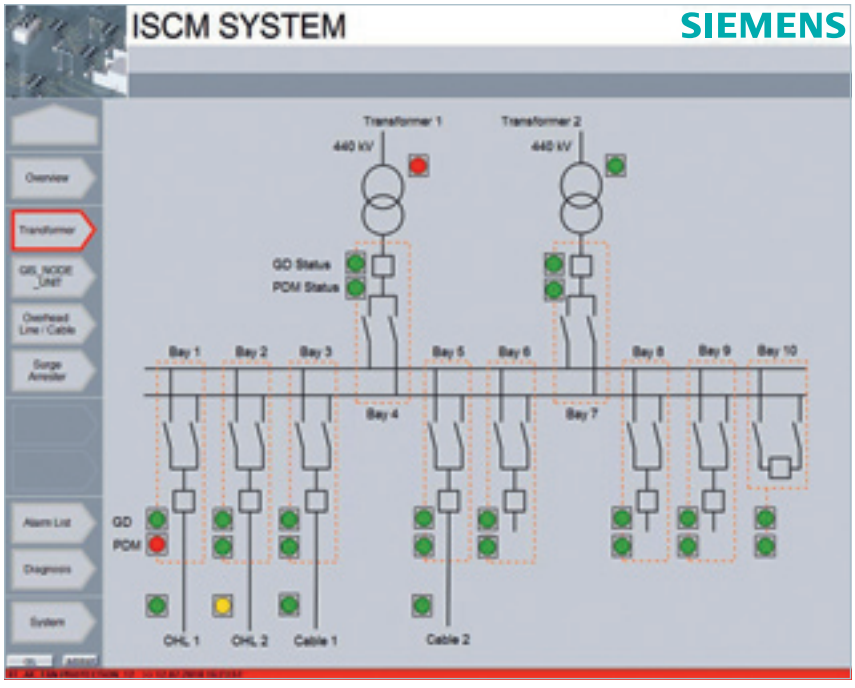
Unlike stand-alone condition monitoring systems for each asset, ISCM is an overall analysis system for all major assets of a substation, making possible the prediction of the future health state of entire networks.

Thanks to the common IT platform of all modules, the relevant data is collected, analyzed, and presented in a suitable manner through the SCADA system. Siemens' user interface provides clear, well-structured displays, the visualization of values, either numeric or in the form of bar graphs, curves, and charts, logging of reports, convenient query functions on reports, and even the visualization of external information.

Maximized investment utilization with targeted solutions

Your benefits

- Reduced life cycle cost thanks to optimized maintenance
- Extended component life through consistent prevention of overstressing
- Optimized performance through loading above "book" rating
- Avoidance of downtimes and the need for emergency maintenance
- Possibility for consistent preventive maintenance
- Reduction of material costs and incidental expenses



Exemplary user display and knowledge modules

How can I make power anomalies a thing of the past?

Power quality systems

The need for clean power

Reliability is only one side of the equation in electrical power supply. The other, and the one that is gaining in importance at the moment, is quality. Assuring the quality of delivered power at the point of use is no easy task. Even worse, there is no way that electricity which does not fulfill certain quality criteria can be withdrawn from the supply chain or rejected by the customer.

But while more and more everyday operations have quite critical power supply requirements, the number of factors that can create power quality problems is also rising. Today's widespread use of power electronics is just one example.

Customers are increasingly aware of power anomalies such as harmonic distortion, under and overvoltage, dips, surges, and transients. Many operations are very sensitive to even very short interruptions and anomalies, as these can cause outages, production losses, and high follow-up costs. Examples are continuous process operations, where short interruptions can disrupt the synchronization of the machinery and result in large volumes of semi-processed product and multistage batch operations, where an interruption during one process can destroy the value of previous operations.

This is why power quality is an issue for both network operators and power producers as well as for customers such as industrial plants, and power quality is an integral part of many power supply contracts nowadays.

Consistent power quality management with a comprehensive system

Your benefits

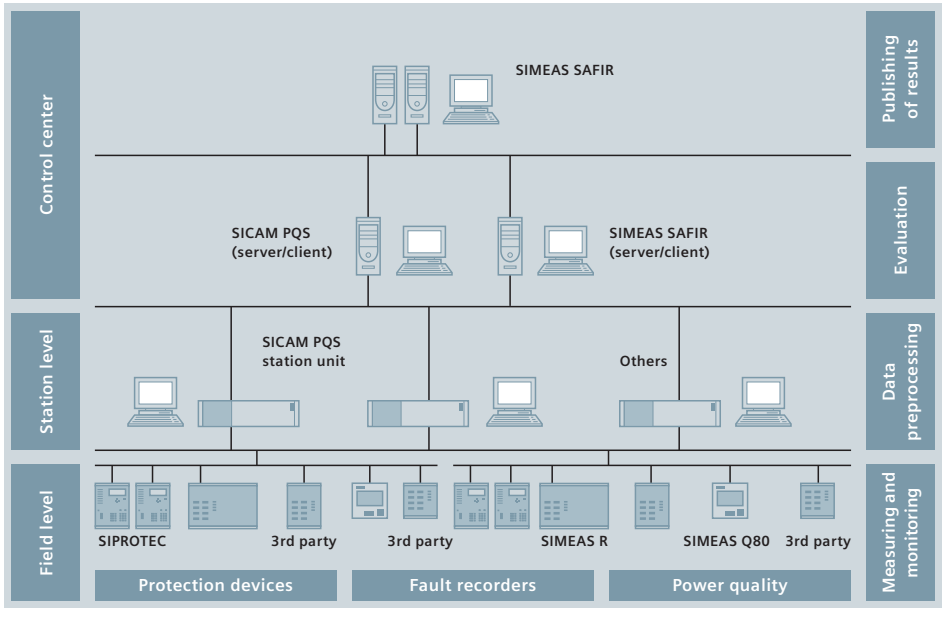
- Comprehensive solution for all power quality and reliability issues
- Generation of fully compliant reports
- Automatic notifications via email, text message, fax, and printer in the case of a fault

All it takes to be on the safe side

ENEAS solutions for power quality comprise a range of quality measurement and analysis systems that enable the network operator to manage and control all quality and reliability issues within a network. Tried and proven Siemens SICAM, SIMEAS, and SENTRON products are the basis for continuous data collection. At multiple points within the network, data are collected for all relevant parameters such as voltage, current, power, frequency, system load, reactive power, power flow direction, harmonics, flicker, dips and swells, and interruptions. Reports are generated according to EN 50160.

In case of a fault, automated notifications via email, text message, fax, and printer ensure fast reactions. Moreover, automatic reporting ensures full compliance with all contractual and regulatory obligations.

The levels of power quality solutions



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