

Trouble-free power distribution for the Persian Gulf

54° east, 24° north



Facts about the project: The Siemens solution enables ADWEA to deliver reliable power at all times – even at peak load times when air conditioners are in heavy use. Abu Dhabi started preparing itself for the post-oil era early. New industries with a bright future have been established, and as a result, power production and consumption have more than doubled in the last ten years. To ensure a reliable, problem-free power supply for many years to come, Siemens was awarded the delivery of a turnkey distribution management system (DMS) as part of an ambitious investment program.

Abu Dhabi Water & Electricity Authority (ADWEA), Abu Dhabi, UAE

Answers for energy.

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Abu Dhabi Water & Electricity Authority (ADWEA), Abu Dhabi, UAE



The challenge:

ADWEA and Siemens assume the responsibility for a stable energy transmission of the metropolis Abu Dhabi and Al Ain. In both cities, future-proof, upgradable, modern medium-voltage control centers were built employing the newest distribution applications, telemetry and telecommunications technologies.

The two-stage project included installation of the newest distribution management system with advanced functionality and technology. Stage one entailed the automation of more than 600 mediumvoltage substations, while stage two, currently underway, will automate 214 additional substations.

Our solution:

A customized distribution management system to control all relevant data and information was developed to handle the special requirements of this project. Data can be retrieved remotely from the entire network via RTU (remote terminal units) and SCMS (substation control and monitoring systems). Top-of-the-line GPRS-based communications systems, fiber-optic lines, and distribution line carriers make this possible. The high level of integrated service required calls for an innovative, highly complex solution that only Siemens PTD can provide. The distribution management system allows a fast and flexible reaction to any changes in the grid. The goal is to prevent grid problems and guarantee energy transmission at all times – both at night, when temperatures fall to a brisk 10° C, and during the day, when temperatures climb to 45° C and air conditioners are running full blast.

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Swiss precision extends to the power supply system

6° east, 46° north



Facts about the project: This solution allows EOS to be proactive in avoiding outages and reducing costs. EOS is already the second Swiss power utility to invest in improved network quality. For its high-voltage network, Siemens implemented a solution using SIMEAS SAFIR. The solution integrates numerical and digital equipment from different manufacturers, thereby ensuring problemfree communication and proactive detection of faults.

Energie Ouest Suisse (EOS), Geneva, Switzerland

Answers for energy.



Energie Ouest Suisse (EOS), Geneva, Switzerland



The challenge:

Energie Ouest Suisse (EOS) operates a 125- to 380-kV high-voltage system in French-speaking Switzerland. Here, in the region bordered by the Alps, the Jura mountains and Lake Geneva, it has the vital job of providing a reliable power supply to customers including the legendary Swiss precision engineering and watch making industries.

A SIMEAS SAFIR network quality system has already been operating smoothly at another Swiss power utility, Zurich-based ewz, for six years. EOS is now the second utility to choose Siemens as a partner.

Our solution:

SIMEAS SAFIR provides a more effective method of monitoring network quality, preventing faults and minimizing blackouts. SIMEAS R has already been installed in the St. Triphon control center in an initial project phase. The solution also integrates SAT SCS (Substation Control System) numerical protection devices in the Crans station. Equipment from non-Siemens suppliers is integrated in Verbois and Chamoson, too.

EOS is now perfectly equipped to carry out systematic condition monitoring – the constant monitoring and documentation of network states. This also provides the basis for planning the necessary preventive maintenance work. The solution represents an investment in better network quality, and a proactive step against system downtime and costs due to faults.

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Leading the way in standardization

8° east, 47° north



Facts about the project: The impact of standardized communication from end to end is reflected in the statistics. The complete switchgear installation was ready for connecting up to the power system after only four weeks' project planning and parameterization time. We implemented the first switchgear automation system based on the IEC 61850 communications standard for Aare-Tessin Ltd. for Electricity (Atel), an energy supply company headquartered in Olten, Switzerland, with operations throughout Europe. The system is installed at its Winznauschachen substation. Thanks to the new standard, all connected devices can intercommunicate perfectly, ensuring increased network reliability, greater ease of maintenance and more future compatibility.

Aare-Tessin Ltd. for Electricity (Atel), Olten, Switzerland

Answers for energy.

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Aare-Tessin Ltd. for Electricity (Atel), Olten, Switzerland

The challenge:

Switzerland is a country with four official languages. Due to historical growth, at least as many different communications protocols and "languages" are used in the electricity network infrastructure. That used to be true of Atel's 16-kV substation in Winznauschachen as well. Siemens was therefore not only awarded the order to modernize the 40 year old switchgear assembly, but also to upgrade communications in the switching center to the latest standard.

Our solution:

Installation of a new metal-encapsulated and compartmented medium-voltage switchgear with the standard control system SICAM PAS and SIPROTEC protection devices, with communications compatibility in accordance with the new standard IEC 61850. This ensures a uniform communication standard between station and field level.

The result is fast, low-cost commissioning instead of complex coordination processes, rapid diagnosis and simple maintenance, thanks to standardized protocols, as well as smooth expansions in the future to help safeguard the customer's investment. The requirement for both remote and direct local control and super-vision is also fulfilled.

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Tailor-made power supply

8° east, 49° north



Facts about the project: A world record was set at the end of 2004 on the new reel cutter in Maxau. With a production speed of 3,000 m/min, or about 110 mph, we have good reason to be proud of this accomplishment. The Karlsruhe-Maxau, Germany, location of Finnish paper group Stora Enso obtains its electricity supply for administration and production from a public utility and a national power supplier. We connected a section of the power supply system to the Spectrum PowerCC system control center using SICAM eRTU telecontrol technology, including SIPROTEC protection devices. This plays an important role in ensuring a constant electricity supply for power-intensive production.

Stora Enso Maxau GmbH, Maxau, Germany

Answers for energy.

SIEMENS

Stora Enso Maxau GmbH, Maxau, Germany



One of the main selling points for Stora Enso was the way different Siemens business units worked together like clockwork. The Industrial Solutions and Services Group contributed its industry expertise as well as its turnkey capability and also acted as sales channel. Power Transmission and Distribution was responsible for the entire power automation – control center, secondary systems and protection systems as well as transformers.

Finally, Siemens Industrie Montage Services GmbH & Co. KG undertook the communications and information network including cabling. All in all, a host of specialists working for the common goal of providing the best possible solution for Stora Enso.

The challenge:

Stora Enso Maxau GmbH has been producing high-grade printing and special papers for nearly 125 years. During this time it has not only accumulated a wealth of experience but also a host of individualized power supply solutions. Central monitoring and control in a system control center was therefore one of the priorities.

Our solution:

Installation of a complete communication and information network. And in addition to that, the gradual expansion of the existing power supply system while it remained in operation, including SIPROTEC protection technology, which was connected to the Spectrum PowerCC control center with three workstations using SICAM eRTU telecontrol technology. As a full-service supplier, we coordinated all necessary steps throughout the entire implementation process, allowing the project to be successfully concluded with no negative impact on operation and "on time and budget". The result today is that the Maxau location is not only on the safe side in terms of power supply, but also when it comes to efficient use of resources.

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A redundant safety net for the power system

12° east, 42° north



Facts about the project: SICAM PAS is used here to create a standard platform to integrate the existing SICAS 1 systems. Siemens is currently working on the installation of a new station infrastructure with SICAM PAS on the Italian peninsula. The project has been in progress since 2006.

Trasmissione Elettricità Rete Nazionale (TERNA), Rome, Italy

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Answers for energy.

Trasmissione Elettricità Rete Nazionale (TERNA), Rome, Italy

The challenge:

TERNA wanted a standard platform that could be managed efficiently while allowing existing SICAS 1 systems to be merged with the new SICAS standard within the same system. This is why TERNA decided to go with SICAM PAS.

Our solution:

With the SICAM PAS energy automation system, TERNA and Siemens are employing an option that will remain viable into the future - an option that provides maximum investment security.

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New pearls for the power supply on the Gulf

48° east, 29° north



Facts about the project: The current NCC upgrading project was complete after just 30 months. Kuwait's energy infrastructure must keep pace with the increasing requirements. Consumption is high, and population and demand for energy continue to grow. With Siemens, the Ministry of Energy of the small Gulf state has found the right partner for modernizing its national grid. The new control technology based on SINAUT Spectrum keeps all options open for the future.

Ministry of Energy, Kuwait

Answers for energy.



siemens-russia.com

Ministry of Energy, Kuwait

The challenge:

Kuwait has undergone an impressive metamorphosis - from a country of pearl divers and spice traders to one of the world's booming regions. Economic strength and prosperity are reflected in power consumption that ranks among the highest in the world. In 2003, per capita consumption stood at 13,000 kWh. Plus there is strong population growth of around 8%. The Ministry of Energy is therefore planning new power plants and seawater desalination plants.

Siemens was originally commissioned with the modernization of the Kuwaiti power infrastructure in 1990. This project was initially interrupted because of the Gulf War but was then successfully completed. It is now being continued with the NCC upgrading project.

Our solution:

Within a period of just 30 months, Siemens created the basis for a futureproof power supply in Kuwait with the new SINAUT Spectrum control technology. Nearly 170 of the 240 substations for which the system is designed have been implemented to date. Except for seawater desalination, the SINAUT Spectrum is used here to its full potential.

A control system with such comprehensive functionalities needs efficient peripheral equipment. For this reason, the project also included adapting automation equipment and communication channels to the latest state of the art. This encompassed the modernization of the PLC, microwave and optical fiber transmission and the telephone systems, as well as the standardization of signal transmission at all 300/132/33/11-kV substations.

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Everything at a glance – in the entire network

9° east, 51° north



Facts about the project: In the supply network stretching more than 2,000 kilometers, telecontrol engineering operates about 63,000 data points. Telecontrol engineering with communication capabilities plays an important role. Safety and efficiency are critical not only in electricity supply networks, but also in supply networks for gas. That's why telecontrol engineering from Siemens is trusted to deliver data from the WINGAS network stretching more than 2,000 kilometers to the control center. Remote parameter setting and diagnosis ensure effective operation management, and the telecontrol engineering can be flexibly adapted if the network grows in the future.

WINGAS, Kassel, Germany

Answers for energy.



WINGAS, Kassel, Germany



The challenge:

WINGAS GmbH, a joint venture between Germany's Wintershall and Russia's OAO Gazprom, provides principally Russian gas to municipal utilities, large industrial companies, and regional utilities via its supply network. WINGAS also supplies other European countries with gas in addition to its consumers throughout Germany. A crucial aspect for an extensive network is reliable monitoring and management from a central point.

Our solution:

Remote engineering from Siemens provides the WINGAS control system with all the necessary data. A high level of availability of the telecontrol network is needed to ensure efficient dispatching, which is why redundant telecontrol interface modules were installed in Kassel, where the control system is located. These modules communicate with the remote telecontrol interface modules throughout Germany via the WINGAS WAN network. If this communication route should fail, the telecontrol components automatically switch to a bypass route. Selected data from the compressor stations are output redundantly via OPC and distributed to the control system using IEC 60870-5-104.

The solution also includes an integrated access control system. Furthermore, from Kassel operators can set parameters and run diagnosis for all stations, which provides a solid basis for effective operation management. Naturally, the telecontrol network is designed so that it can be conveniently expanded at any time, allowing it to grow along with the WINGAS gas network.

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Massive improvement in network transparency

2° west, 44° north



Facts about the project: For an unprecedented level of network transparency. With over 100 years experience in Spain and around seven million customers in South and Central America, Iberdrola is still one of the largest private power supply companies in the world. In 2000, when it needed to develop and implement an end-to-end energy distribution management system for the group's entire Spanish network, it opted for Siemens. The advanced functions of the EMS/DMS solution of our SINAUT Spectrum power system control center and our implementation expertise were the deciding factors.

Iberdrola S.A., Bilbao, Spain

Answers for energy.



Iberdrola S.A., Bilbao, Spain

The power supply area covered by Iberdrola, encompassing over 50% of the total area of Spain, is coordinated from six system control centers. Successful operation depends on innovative communication within a real redundant LAN without a ring structure. 1,500 data points communicate correctly and consistently with one another at all times, which generates extremely high reliability statistics. All in all, the advanced functionality is reflected in Iberdrola's growing market share.

Thanks to the installation of SINAUT Spectrum quality of service, such as the average weighted duration of power cuts, has improved by about 50%.



The challenge:

The number two on the Iberian peninsula supplies some nine million Spanish customers with electricity, a large part of which (about 50% of installed capacity) comes from renewable energy sources such as water or wind power.

The group has six power system control centers for guaranteeing a very reliable, high-quality supply. These not only needed updating technically to the latest state of the art, but also equipping to allow the company to react quickly and proactively to fluctuations in supply and demand.

Our solution:

The pilot project was the Bilbao power system control center. At the beginning of 2001, the existing hardware and software was analyzed. In place of the existing island solutions, the newly developed systems – first and foremost our end-to-end EMS/DMS solution using SINAUT Spectrum – were installed and tested.

Since then, our specialists have also converted all the other power system control centers to the new system in stages, with no negative impact on routine operation. At the same time, the existing communications infrastructure was modernized with an innovative, highly available LAN/WAN architecture and intelligent switching technology. In addition, an export interface was implemented for network planning. This means a big saving in time and costs since all business fields can now access a consistent database. Today Iberdrola can gear its electricity generation and distribution considerably more efficiently to demand. At the same time, it can guarantee maximum supply security as the basis for greater costefficiency and competitiveness.

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Fertilizer for the future

37° west, 11° south



Facts about the project: Siemens not only supported PB-FAFEN with energy automation solutions for its three power plants, it modernized the energy distribution system in the plants themselves. For the agriculture market, urea is like synthetic gold. The Brazilian manufacturer PB-FAFEN (Fábrica de Fertilizantes Nitrogenados) – already one of today's fertilizer market leaders – is eager to grow. A modern, reliable power supply for its production facilities is a key prerequisite. That's where station control technology from Siemens comes in.

PB-FAFEN/Petrobras, Bahia/Sergipe, Brazil

Answers for energy.



siemens-russia.com

PB-FAFEN/Petrobras, Bahia/Sergipe, Brazil

The entire energy automation system, including all communication systems, was comprehensively simulated and tested before start-up. The system passed with flying colors: even when the entire network is loaded to 100% capacity, messages still arrive with a maximum delay of three seconds. The company now has the best possible basis for optimum control of the network, even in time-critical situations. Information from the IEDs in the industrial plants is also accessible in the central engineering control room located in Rio de Janeiro.



The challenge:

The Brazilian state oil company Petrobras has diversified heavily over the past few years. One of its subsidiaries is fertilizer manufacturer PB-FAFEN, which produces 64% of total Brazilian urea. That makes it the market leader for this extremely important synthetic nitrogenous fertilizer.

In order to ensure that production can expand reliably, economically and in an environmentally safe way, PB-FAFEN operates its own power generation stations. They provide energy to the industrial plants of Aracaju, Camaçari, and Aratu in the north of Brazil. Both for power generation and industrial production, PB-FAFEN depends on a wide variety of Siemens products and solutions. This spans the range from gas turbines and generators to full automation of energy distribution and protection, including field devices, SIPROTEC 4 numerical devices and switches, and SICAM PAS station control technology.

Our solution:

The project was developed in three phases. First, all field devices and control systems were assembled into 44 cubicles. In the second phase the assembled cubicles were integrated into the three power plants, electromechanical devices were installed, and the control center was modernized with SICAM PAS control technology. In phase three, the industrial plants were retrofitted.

Right from the start, PB-FAFEN's top priority was to ensure the system's viability in practice. After the factory acceptance test at the Laranjeiras industrial plant, PB-FAFEN – together with Siemens – simulated and optimized the function of the entire system on site under realworld conditions. This included successful transmission of GOOSE messages (Generic Object-oriented Substation Event) between bay controllers, even under the worst possible network conditions. Later, a routine three-week shutdown at Laranjeiras was utilized to replace the existing electromechanical devices with numerical ones and equip the control center with SICAM PAS technology. In parallel, the industrial plant in Aratu was retrofitted; Camacari followed a short time later. At this site, the retrofit procedure was done while the plant was still in operation. The work required precise managerial and technical skills and knowledge - for example in order to prevent ammonia, which is necessary for urea production, from leaking into groundwater and minimizing any damage from such a leak.

The diagram shows one of the PB-FAFEN energy distribution systems.

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Jubilee in China's boomtown

121° east, 31° north



Facts about the project: For Siemens, it was the 100th IEC 61850-compliant plant – only a year after the pilot project was completed. The 100th IEC 61850 project marked a small milestone against a huge backdrop, as Siemens modernized a complete station control system in the 500/200/35 kV transformer substation of the East China Power Grid Company in Shanghai. The new communications standard, implemented here together with other innovations, is part of a pioneering solution based on SICAM PAS.

East China Power Grid Company, Shanghai, China

Answers for energy.



East China Power Grid Company, Shanghai, China



The challenge:

Shanghai is one of the most fascinating megacities in the world. A reliable power supply to industry, households and transportation systems is one of the most important prerequisites for the further development of this boomtown.

The Nanquiao transformer substation of the East China Power Grid Company plays an important role, covering 50% of the energy needs for this city of 12.8 million people. This substation is the receiving point for power transported to the southwestern edge of Shanghai via a high-voltage direct current transmission (HVDCT) route from the Three Gorges plant in the central Chinese city of Gezhouba, 1,000 kilometers (600 miles) away. To ensure that it continues to operate efficiently in the future, the substation required radical modernization. And the partner for the replacement of the complete station control system was Siemens Power Automation in Nanjing, a wholly owned subsidiary of Siemens Power Transmission and Distribution.

Our solution:

The reliability and efficiency of the power supply is considerably improved by the new, easily expandable SICAM PAS control system in conjunction with SIPROTEC 4 protection devices. Thanks to the IEC 61850 communications standard, the system is also ideally prepared for the future. For Siemens, it was already the 100th project based on this new standard, just one year after the pilot application in Switzerland. Another innovation is the deployment of bay controllers that work with integrated and exchangeable IEC 61850 optical fiber Ethernet switches with ring redundancy function, thereby providing the basis for simple cabling and high operational reliability. An additional switchgear interlocking level is implemented directly in the process with the aid of so-called GOOSE messages (Generic Object-oriented Substation Event). At the customer's request, an operator control and visualization system from a Chinese manufacturer was combined with the Siemens system more proof of the high interoperability of Siemens products.

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High-tech down to the last detail

7° east, 47° north



Facts about the project: The station control system is part of an overall revamping of the two substations, and as such an essential element for assuring a reliable supply in the future. When a power supplier commits itself to the idea of absolute reliability, the infrastructure has to be up-to-date right down to the very last corner of the network. This also applied to the Electrical Utilities of the Canton of Zurich, for which we equipped the two substations Wallisellen and Dübendorf with advanced station control technology from Siemens.

Electrical Utilities of the Canton of Zurich, Zurich, Switzerland

Answers for energy.



Electrical Utilities of the Canton of Zurich, Zurich, Switzerland



The challenge:

The Electrical Utilities of the Canton of Zurich (EKZ) supply 126 municipalities directly with electricity as far away as the remote Tösstal valley. Another 48 communal utilities purchase electricity for distribution to end customers. One of the basic principles of the company is to maintain a state-of-the-art infrastructure at all times so that it can guarantee a very high quality of supply. Against this background the EKZ decided to modernize the Wallisellen and Dübendorf substations with innovative station control technology from Siemens.

Our solution:

Our open, vendor-neutral total solution for secondary systems in switching stations and substations is used in Wallisellen and Dübendorf.

The coupling of the two substations via a station bus (IEC 60870-5-104) provides an efficient means of controlling and monitoring both substations. The communication channels are also open for Web solutions such as visualization, remote maintenance and linking to the office world. Valuable advantages have been gained with regard to training, service and stock keeping of spare parts by using identical bay controllers in the high-voltage and medium-voltage switchgear.

Just as innovative as the secondary system itself is the TOOLBOX II, which can be used for the entire engineering of the switching stations as well as for remote maintenance, diagnosis, changes and many other functions besides.

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Striking a balance in Saarbrücken

7° west, 49° north



Facts about the project: Work started on the new control center in 2002, and the plant was officially connected to the grid in early 2004. Evonik Power Saar GmbH expects a clearly positive return on investment as early as 2005. Since early 2004, the Evonik Power Saar GmbH utility in Saarbrücken, Germany, has used the most advanced power system management in the world, Spectrum PowerCC. This solution not only allows operators to control their own power plants safely and reliably. As a virtual power plant, the central station also coordinates the output of decentralized plants all over Germany. This enables Evonik Power Saar GmbH to quickly balance short-term load fluctuations and power plant outages, and to participate in the promising control power market.

Evonik Power Saar GmbH, Saarbrücken, Germany

Answers for energy.

SIEMENS

Evonik Power Saar GmbH, Saarbrücken, Germany



"The new Siemens control system Spectrum PowerCC enables us to seize effectively the opportunities of the deregulated market and to respond to our customers' requirements. This is one of the reasons why we want to continue our good cooperation with Siemens."

Franz-Josef Blug, Project manager, Evonik Power Saar GmbH



The challenge:

There are many changes taking place in Saarland. In the past, the Saarland utility Evonik Power Saar GmbH produced electricity for the power-hungry mining industry. Today, the company aims to play a strong role as a modern energy service provider in a liberalized market, which also includes participating in the control power market, where Evonik Power Saar GmbH views itself as one of the leading providers.

The need for a new network control system became evident in 2001. Rising costs for maintenance and spare parts, lack of opportunity to analyze the network online, isolated solutions for power generation scheduling, schedule management and energy trading were only a few of the reasons why it was time for fundamental innovation.

Our solution:

With Spectrum PowerCC, Evonik Power Saar GmbH is prepared for the future in every respect. From the central station in Saarbrücken, the company controls a complex energy network combining about 2,000 MW of its own electrical power and more than 100 MW of external power plant output. This power comes from various sources, including block-type thermal power plants and wind power plants.

For more efficient control of this network, the connected plants were integrated into a single "virtual power station". The data from the entire network is gathered here, and ensures a secure supply at cost-effective conditions at any time. This is cutting-edge energy data management. If more or less power is needed for a short time, Evonik Power Saar GmbH can also start up most of the external plants remotely, anywhere in Germany.

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Major hydroelectricity program

43° west, 9° south



Facts about the project: The comprehensive solution from Siemens included everything from planning to the start-up of all systems. Expertise and implementation came from a single source. Brazil is presently the 10th greatest energy consuming country in the world and the first in South America. Following years of political reform and privatizations, energy demands continue to grow as Brazil's economy develops. When a crippling power shortage rocked the nation in 2001 and led to widespread blackouts, the need for more efficient production and distribution was made strikingly obvious. The result was a nationwide plan to initiate a major hydroelectricity program, which includes a new plant near the city of Peixe.

Peixe Angical, Rio Tocantins, Brazil

Answers for energy.



Peixe Angical, Rio Tocantins, Brazil



The challenge:

Siemens was asked to supply the telecommunication needs of the Peixe Angical hydropower plant in Rio Tocantins, Brazil. This plant is scheduled to open in May of 2006 and will have a total installed power of three turbines with 450 MW. This is sufficient to supply the demands of a city with about four million inhabitants. A transmission line of 500 kV will connect the Peixe Angical plant and the 92 kilometers distant Gurupi substation in the north, thereby providing an important link to the north-south connection.

Our solution:

Siemens installed internal communication systems in the Peixe Angical plant and in the sub Peixe and Gurupi. The PLC equipment enables protection devices, data, fax and voice channels. Control center and the Peixe substation are connected through optic systems with dielectric cable. Optimizing administrative, supervision, control, invoice and maintenance operations, these installations were designed to meet the demands of modern-day communication.

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Turning twelve months into nine

37° east, 37° north



Facts about the project: The project was finished in only nine months, three months earlier than recorded in the contract. Twelve months was the contractually specified period for the installation of the new Spectrum PowerCC control center – but the project was successfully completed in nine. The satisfied customer was GAOSB, the municipal power, water and natural-gas utility in the Turkish city of Gaziantep. And the project has lots of potential to grow.

Gaziantep Organized Industrial Zone (GAOSB), Gaziantep, Turkey

Answers for energy.



Gaziantep Organized Industrial Zone (GAOSB), Gaziantep, Turkey



The challenge:

Gaziantep, in the southeastern corner of Turkey near the Syrian border, is not only home to the largest mosaics museum in the world with its 2,800-year-old Zeugma mosaics. The city has also experienced an impressive economic upturn over recent years. In the local industrial zone, more than 900 companies are established on an area of 24 hectares (60 acres), and they require more than 140 million kWh of electrical power per month.

For utility GAOSB, there is an obvious answer to this challenge, and that is state-of-the-art power automation. With Siemens as its partner, it planned a new operational control center that would initially be responsible for the power supply, while leaving scope for expansion to include water and gas supply functions in the future.

Our solution:

For this project we used Spectrum PowerCC, the innovative solution for municipal utilities, industry and small power generators. Spectrum PowerCC communicates with an integrated AMR system via OPC. This means that in the foreseeable future, GAOSB will be able to give every customer online access to their power consumption figures, updated every two hours, for highly transparent customer service.

In the recently completed phase of the project, the control center processes 6,100 signals for one of four regions. The aim is to link up the remaining regions with 100 substations and more than 22,000 signal points within three years. The fourth project with Spectrum PowerCC in Turkey thus remains on the agenda.

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Power for the next 40 years

6° east, 51° north



Facts about the project: The project consisted of delivering 110-kV, 25-kV and 6-kV substations with a total of 140 switchgear systems, including all the equipment for automation and protection of the substations. Since 2005 the former Rheinbraun company, part of RWE Power today, has operated the Garzweiler II lignite opencast mine. This operation has a total of seven bucket wheel excavators and 60 kilometers of conveyor belts that must work reliably until the end of extraction in 2045. A secure power supply for these widely distributed stations is absolutely essential for profitable operation.

RWE Power, Garzweiler, Germany

Answers for energy.



RWE Power, Garzweiler, Germany

The challenge:

When it comes to ensuring a highly secure power supply, standardization of the substations plays as large a role as optimization of system management. Since long distances must be bridged in opencast mining, the capability to remotely diagnose all components is critically important.

By using Ethernet-based communication, RWE Power first and foremost hopes to achieve faster access to all station data as a solid foundation for optimizing system management of the network.

Our solution:

Delivery, project planning, parameterization and commissioning of more than 140 SIPROTEC 4 protection and portable control devices, a SICAM PAS control system, a SICAM PAS CC visualization system and a fiber-optic connection for linking the central control technology level - each based on the latest communications standard IEC 61850.

Various transformer controllers were implemented for voltage regulation of the transformers, some stationed centrally and some decentrally. Everything is coordinated via modern, independent transformer monitoring.

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The power is always on for aluminum production

91° east, 53° north



Facts about the project: Delivery, commissioning, testing and linking up the transformer substation to the network all took place within just one year. With the modernized production facility, RUSAL is perfectly equipped to supply the global market with this widely used light metal. Extreme weather conditions down to as low as minus 50°C and extremely energy-intensive production are the external fundamentals for the power supply to the aluminum plant at Sayanogorsk in Siberia. That's no problem with Siemens: Our station control and protection systems ensure smoothly functioning processes and efficient communications in compliance with standard IEC 61850.

RUSAL, Sayanogorsk, Russia

Answers for energy.



RUSAL, Sayanogorsk, Russia

The challenge:

RUSAL, one of the largest aluminum holding companies in Russia, operates an aluminum plant with an annual production of about 480,000 metric tons near Sayanogorsk on the Yenisey river. In view of an anticipated increase in annual output of 5.5% over the next ten years, a comprehensive modernization of the plant was started.

A stable power supply that functions reliably and without system perturbations even at maximum load peaks - for example when starting up the furnaces - is an absolute must for energy-intensive aluminum production.

Our solution:

In March 2005 Siemens was awarded an order to equip the "Alyuminievaya 500 kV" switchgear with a redundant station control system SICAM PAS including 110 SIPROTEC protection devices, which are connected in conformance with IEC 61850. A redundant humanmachine interface (HMI) in a client-server architecture is also part of the delivery.

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Integral solutions for reliable supplies

18° east, 44° north



Facts about the project: The inclusion of many companies in the area made it possible to achieve a high degree of local added value, which represented an important contribution toward economic stabilization of the country. By order of the three largest utilities of Bosnia-Herzegovina and the ZEKC independent power system control center in Sarajevo, we're working on preparing station control and protection technology in the entire country for the planned deregulation of the energy market. The goal is to create a more secure supply, more competition and better general conditions for economic recovery of the country.

Zajednicki Elektroenergetski Koordinacioni Centar, Sarajevo, Bosnia Elektroprivreda Bosne i Hercegovine d.d., Sarajevo, Bosnia Elektroprivreda Hrvatske Zajednice Herceg Bosna d.d., Mostar, Bosnia Elektroprivreda Republike Srpske, Banja Luka, Bosnia

Answers for energy.



Zajednicki Elektroenergetski Koordinacioni Centar, Sarajevo, Bosnia Elektroprivreda Bosne i Hercegovine d.d., Sarajevo, Bosnia Elektroprivreda Hrvatske Zajednice Herceg Bosna d.d., Mostar, Bosnia Elektroprivreda Republike Srpske, Banja Luka, Bosnia

The challenge:

Our solution:

Bosnia-Herzegovina has been at peace for ten years, and today the local energy market is facing deregulation. But the country is in many ways still fragmented, and several utilities (Elektroprivredas) supply power to different, sometimes very intertwined parts of the country. These utilities have different standards regarding safety, communication and control technology.

The ZEKC independent power system control center was founded to make the supply as secure as possible. In the runup to deregulation, it was necessary to harmonize the overall station control and protection technology of the Elektroprivredas and ZEKC and thus to prepare them for a free energy market.

Our goal was modernization of the entire infrastructure for monitoring and controlling the electrical transmission system. This included the installation of a 2,200-km fiber-optic network (OPGW), which serves as the basis for integration, the equipping of the more than 100 transformer substations partly with modern SICAM RTU telecontrol equipment and mostly with SICAM SAS intelligent station control technology and with SIPROTEC units, and the modernization of the overall control technology to SINAUT Spectrum.

As the highest management level, ZEKC will have the rights of an "independent system operator" and thus monitor network stability and security of supply in the whole country. The ZEKC will be supported in this task by four regional control centers.

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Everything standard

67° west, 10° north



Facts about the project: With SINAUT Spectrum, CADAFE now has a forward-looking solution for four control centers. With a network that had grown bit by bit over the years and four control centers using different equipment and protocols, Venezuela's largest electric utility CADAFE faced a real problem. But the new solution with SINAUT Spectrum and SICAM 1703, based on open standards, makes all options possible – and offers pure and simple flexibility.

CADAFE, Caracas, Venezuela

Answers for energy.



CADAFE, Caracas, Venezuela

The challenge:

CADAFE operates one national and three regional load dispatch centers in Venezuela. In the past, each location was distinct and used its own nonstandardized network control technology. Over the years, this led to high costs for the upkeep of hardware and updating of databases.

Another challenge was the lack of compatibility between the protection devices and bay controllers in the substations. They were supplied by different manufacturers and consequently used different protocols. This had a number of drawbacks, including the inability to communicate with the existing RTUs. In short, this was a situation that called for a standardized solution.

Our solution:

With SINAUT Spectrum, CADAFE now has a technological basis designed to remain viable into the future. The system uses proven technologies for everything from the SCADA system to the network applications and the ICCP. And the innovative Multisite feature makes it possible to take over and operate a control center from any other. In the event of an alarm this means additional reliability due to redundancy, and reduced costs at times of low capacity utilization.

Existing RTUs have also been replaced by SICAM 1703, the most innovative technology on the market. Communication with the bay controllers is based on the current industry standard IEC 61850, which provides a standard platform for IEDs and protection devices. The RTUs communicate with the control center via the standard IEC 61850-5-101 and -104 protocols, which forms the basis for a new TCP/IP communications structure.

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Controlling the flow of power in the Golden State

122° west, 38° north



Facts about the project:

CAISO can realize daily savings of between US\$ 100,000 and one million through optimized utilization of the system. And thanks to its role as a nonprofit organization, it can pass these savings on to Californian electricity customers. The independent operator company CAISO controls and coordinates the power supply in the deregulated Californian electricity market. Leading IT solutions from Siemens ensure that the networks of the individual operators and their electricity supplies are optimally matched in order to utilize price advantages to the benefit of the consumer and to safeguard the supply.

CAISO, Folsom (California), USA

Answers for energy.



CAISO, Folsom (California), USA



"In the evaluation we rated the Siemens software as exceptional because it can accommodate an extremely large volume of model data, a large number of power plants and the various different outline conditions. At the same time it meets the very high standards of performance and reliability required."

The challenge:

Since 1998, the Californian electricity market, which has a total volume of about 250 TWh, has been completely restructured and is at the forefront of a global trend in this respect. The California Independent System Operator Corporation (CAISO) is an independent system operator that operates and coor-dinates the bulk of the state's power system with the aim of matching an adequately reliable supply with energy demand at all times.

The standards required of an independent transmission operator with a line length of approximately 40,000 kilometers, connected to 1,400 generators, are extremely high. The specified task was intended to provide a means of optimizing the secure provision of power, or in other words balancing out capacity between the operators, and avoiding system overloads.

Our solution:

The solution encompasses network planning in several forecast stages as well as longer-term market monitoring designed to avoid costly safety reserves as well as short-term bottlenecks.

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Modernization and expansion to plan

70° west, 33° south



Facts about the project: The solution realized here is part of an ambitious upgrade plan for the main lines in the national transmission grid. The Siemens Energy Sector has consolidated its strong position in South America, especially in the field of energy automation, with a number of modernization projects for power utility Transelec. Apart from its technology, Siemens' skills as a system integrator for 3rd party products were required here.

Transelec, Santiago, Chile

Answers for energy.



Transelec, Santiago, Chile

The challenge:

In 2004, the Chilean Ministry of Economics approved the ambitious plan of modernizing the country's power transmission systems to improve the efficiency of the power supply. The lion's share of the project is being handled by Transelec, which is far and away the largest national player in the power supply industry between the Andes and Tierra del Fuego.

Transelec focused on four main projects, namely the construction of a new substation in Cautín and the modernization and expansion of the existing Polpaico, Valdívia, and Charrúa substations.

Our solution:

At Transelec, different systems and solutions from Siemens work together like clockwork. For example, the SICAM SAS control system is used together with SIPROTEC protection devices in the Cautín station, which is designed to relieve the load on another substation in Temuco. The Charrúa substation, on the other hand, is equipped with SICAM PAS.

Charrúa is one of the most important switching stations in the entire Chilean power system, primarily because of its strategic position with optimum connections to power plants and other major transmission lines. Some of the technical equipment in use has reached an advanced age and needs replacing; other parts, especially digital protection devices from General Electric, will be integrated by Siemens in the overall solution. The new 525-kV plant in Polpaico will connect the Ancoa and Alto Jahuel substations. Put more precisely, the existing connection line between both substations in Polpaico will be divided into segments. The finished and completely digitized system will use SICAM PAS and SIPROTEC solutions.

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Lots of power for the customer

14° east, 48° north



Facts about the project: 500,000 multifunctional meters and over 100,000 load disconnectors are a solid foundation for providing new and customer-oriented services. Austrian energy company Energie AG is going on the offensive with a comprehensive overall system for automated acquisition of consumption data and management of distribution networks (AMIS). The goal is to create an open solution for new services and communication with the customer, and to help optimize consumption behavior through transparency, thereby increasing energy efficiency.

Energie AG Oberösterreich, Linz, Austria

Answers for energy.



Energie AG Oberösterreich, Linz, Austria



The challenge:

Energie AG, with energy, waste disposal and water as its core business, is the number one infrastructure company in the Austrian province of Upper Austria. By consistently selecting renewable forms of energy and innovative technologies, the company is showing that it intends to play an active role in shaping the future, with top priority on efficient use of energy and a highly reliable supply.

The current project was set up with the aim of optimizing processes and offering customers greater transparency and convenience. Energie AG also plans to open up new future-proof business fields with customer- and supplier-oriented services. Achieving these goals required an integrated total solution for automating consumption data acquisition and for efficient management of the distribution network.

Our solution:

Siemens installed the AMIS data acquisition and management system for Energie AG. The system records and compresses a wealth of consumption data, allowing the company to provide customers with an optimized power supply and more flexible tariff scales.

The AMIS infrastructure is completely geared to efficient engineering and simple communications. AMIS uses multifunctional meters, load disconnectors and data concentrators in the transformer substations to collect data and information from private households, special contract customers and the Energie AG distribution network infrastructure. This information is collected and processed by the transaction server in the control center and distributed to various different applications, such as energy data management or power quality monitoring. Communication between the terminal devices and the data concentrators in the transformer substations is based on narrow-band DLC communications technology in the low-voltage network. The link to the front end in the control center is provided via wireless or fiber-optic cables. By integrating them in the AMIS management system, wireless devices and IP components can be monitored and parameters set entirely by remote control. The automation data from the distribution network infrastructure is passed on directly to a supervisory control system (SCADA).

In short, AMIS allows Energie AG to optimize essential business processes while improving its image as a modern, customer-oriented energy service provider – for example by automating the metering processes, through tariffs tailored to customers' needs, and through improvement of consumption data by regular reading of the meter each month.

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Turnkey solution for a key project

77° east, 28° north



Facts about the project: With energy automation from Siemens, the Power Grid Corporation of India has the best possible foundation for successful operation of the first 765-kV power supply network in the country. The enormous industrialization process in the emerging nations, expansion of the infrastructure and growing prosperity mean an increasing demand for energy. To be able to easily meet these challenges, the Power Grid Corporation of India opted to implement the first extra-high-voltage (EHV) basic network in India – supported by Siemens as turnkey supplier.

Power Grid Corporation of India Ltd (POWERGRID), New Delhi, India

Answers for energy.

SIEMENS

Power Grid Corporation of India Ltd (POWERGRID), New Delhi, India



The challenge:

The Power Grid Corporation of India is not just India's central state power supplier, but at the same time a trendsetter for other players on the rapidly changing energy market. Supply reliability and high quality are not the only challenges facing POWERGRID. Its initial goal is to ensure nationwide coverage across the whole of India – the country is still far from having all areas of the country connected to a public power supply network. The government's target is to reach all locations with a complete supply network by 2012.

The first 765-kV EHV backbone in India installed in the Seoni region in the center of India is to be the foundation for these efforts. The first IEC 61850 standard-compliant automation systems have been installed for the transformer substations and 3rd party products have been integrated.

Our solution:

Siemens performed turnkey coordination and delivery of the entire system for this pioneering project for India, including the energy automation.

The SAS system is based on IEC 61850. Components critical for the success of the project were designed with built-in redundancy, with SICAM PAS and the HMI in client-server architecture. The communications infrastructure to the RCC (regional control center) and RSCC (regional service control center) is also of redundant construction. Various SIPROTEC protection devices round out the scope of the delivery. 3rd party field devices were also integrated in the solution. Despite its complexity, the project was successfully completed within the planned period of three years. Even before it was completed, several followup projects were agreed following the same concept. With this successful implementation of a 765-kV extra-highvoltage line, POWERGRID is once again setting new standards in its market.

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An integral solution for Carinthia

14° east, 46° north



Facts about the project: Reliable and flexible system management – with 14 redundant servers, 18 UI workstations, 5 MMI servers with 30 X terminals and two large display projections. With the SINAUT Spectrum 4.5.1 network control system, the Austrian distribution network operator KELAG Netz GmbH has successfully upgraded to a centralized, openended system for system and fault management. This marks the first successful implementation of an incremental data transfer from the GIS and automatic generation of a schematic plan.

KELAG Netz GmbH, Klagenfurt, Austria

Answers for energy.



KELAG Netz GmbH, Klagenfurt, Austria



The challenge:

KELAG Netz GmbH operates the bulk of the regional distribution network in the Austrian province of Carinthia. Like other network operators in this deregulated market, KELAG Netz GmbH faces the dual challenge of firstly preserving its competitiveness with reduced equipment and resources, and secondly guaranteeing a functioning power supply with a high standard of quality.

Under these circumstances, the network operator therefore opted to install centralized system management and centralized fault management for the high-voltage and medium-voltage supply networks. Since the hardware and software components previously used for its network control system had already been discontinued or were no longer available, it was a good opportunity to upgrade the system to the current version of SINAUT Spectrum 4.5.1 with up-to-date 3rd party products.

Our solution:

Siemens implemented a redundant network control system that meets all the requirements for today and the future. The SINAUT Spectrum 4.5.1 solution runs under Solaris 10 and Oracle 9i and communicates with 200 telecontrol stations using the IEC 60870-5-101 and -104 protocols.

System management and fault management were implemented centrally as required. In addition to the standard SCADA functions, a further highlight is that for the first time, technical data and geographical information are transferred incrementally from the GIS, thereby enabling a schematic plan for system management to be generated automatically. The system also offers a wealth of additional functionalities for reliable, costefficient and flexible system management, including outage management system and load flow calculations (EMS/DMS) as well as load forecasting.

The project was completed in the winter of 2007 virtually on schedule, not least because of perfect teamwork between the two partners. With this modernization measure, KELAG Netz GmbH has increased its productivity. Downtimes are minimized and the proportion of "energy not delivered" is reduced. And naturally, the end customer also profits from the higher supply reliability.

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Tight deadline for electricity

4° east, 52° north



Facts about the project: Successfully balancing a tight schedule, Siemens is delivering a number of modules for a modern energy automation system under a master contract comprising about ten subprojects. The Dutch public utility NUON supplies around 2.7 million Dutch households with electricity and gas. It expects to achieve greater network stability and lower downtime costs as a result of its investment in modern control and protection technology from Siemens.

NUON, Alkmaar, Netherlands

Answers for energy.



NUON, Alkmaar, Netherlands

The challenge:

NUON is one of the three largest power suppliers in the Netherlands. Headquartered in Amsterdam, the company has also been active in neighboring European countries for several years. With technology changing at a rapid pace, it attaches great importance to keeping its installed base up to date.

That's why NUON awarded the "RTU+" order (exclusive delivery of protection devices) for an entire series of control and protection technology projects involving both new installation and modernization. The project's goal is to achieve a significant reduction in downtimes and the associated costs. All subprojects had to be implemented within the very short time frame of four to six months, a challenge that required professional project management.

Our solution:

Under the terms of the "RTU+" order. Siemens carried out delivery and installation of the entire control system, and in addition to the originally agreed delivery package - also supplied the protection technology. SICAM 1703 RTU is deployed with a client that communicates with the load dispatching center via the standard protocol IEC 60870-5-101, while a SICAM 230 system provides the humanmachine interface. IEDs (Intelligent Electronic Devices) from third parties are also integrated in the solution via IEC 61850.

In all, there are about ten energy automation subprojects on the agenda. Implementation within the planned time frame largely depends on the trusting relationship that has been built up between the teams at all companies involved. The solution implemented here will help NUON consolidate its position as a dependable power provider. In the distribution network, a permanent reduction in downtimes and the resulting costs is expected.

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More people – more power – more possibilities

100° east, 1° south



Facts about the project: By installing a modern network control system, PT PLN (Persero) P3B Sumatera is taking a major step to ensure that it can provide a secure, reliable supply of electricity for Indonesia's growing population. The Indonesian electric utility and system operator PT PLN (Persero) P3B Sumatera is laying the foundation for a wellfunctioning nationwide power supply network with stateof-the-art technology. The installation of SINAUT Spectrum has created an excellent basis for the company's future expansion.

PT. PLN (Persero) P3B Sumatera, Padang, Sumatra/Indonesia

Answers for energy.



PT. PLN (Persero) P3B Sumatera, Padang, Sumatra/Indonesia



The challenge:

PT. PLN (Persero) P3B Sumatera is Sumatra's electric utility and power system operator. Because the country's population continues to grow rapidly, the quantity of the power supply matters every bit as much as the quality, if not more. Since the generating capacity in some parts of the country can hardly keep pace with the fast-growing population, one of the most important challenges is to prevent supply bottlenecks in the future.

The company is seeking to permanently stabilize power supply by installing an efficient and reliable network control system. Since the control system used by PT. PLN up until now is no longer available on the market and could not be expanded, the power provider opted for a completely new solution from Siemens.

Our solution:

Siemens not only installed an energy management system (SCADA) based on SINAUT Spectrum, and the communications equipment to go with it, but also coordinated all personnel planning for the subcontractors involved in the project.

The network control system used is the first of its kind in the region and represents the state of the art in this technology. It provides a means for the complete supervision and control of Sumatra's now secure and reliable power supply.

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Black gold and a reliable power supply

67° west, 11° north



Facts about the project: Well equipped for rapid expansion: New, state-of-the-art control systems and protection technology to be installed in seven PDVSA transformer substations. For Petróleos de Venezuela (PDVSA), the reliability of its oil production operations and maintaining highest quality standards are two major priorities. With the installation of future-proof control, protection and communications technology from Siemens, PDVSA laid an important cornerstone for reaching its growth targets.

Petróleos de Venezuela S.A. (PDVSA), Caracas, Venezuela

Answers for energy.

SIEMENS

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Petróleos de Venezuela S.A. (PDVSA), Caracas, Venezuela

The challenge:

As the fifth largest exporter in the world, PDVSA not only dominates the Venezuelan oil industry but is an important player on the global market. By 2012, just a few years from now, the rapidly expanding company - backed by a reliable and secure power supply – plans to produce roughly six million barrels of oil a day.

The ambitious "Planta Electrica" project in the region around Lake Maracaibo plays a key role in achieving this goal. The project includes installing new transmission and distribution lines as well as modernizing and expanding the existing infrastructure - and all on a tight schedule.

Our solution:

Within just one year, Siemens delivered and installed the control system and protection technology for seven transformer substations - an important cornerstone for ensuring PDVSA's continued growth and high availability in its production plants.

One highlight was preparation of the electrical and mechanical design for 100 operator panels in just 80 days. The scope of delivery also included software and hardware, as well as conducting simulations and tests on the substations connected with 230-kV and 115-kV high-voltage cables. At the same time, the IEC 61850 protocol was selected as the new standard as part of the modernization of the switching stations.

Thanks to true teamwork between PDVSA and the Siemens units from the U.S., Venezuela and Brazil, the project was completed on time - despite the occasional unexpected problem.

With this project, PDVSA has attained a new level of excellence in its electrical infrastructure, and now has a secure, reliable power supply as a solid basis for further growth.

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Live communications

13° east, 52° north



Facts about the project: The reliable, economical LiveLine installation process has already been used on two lines in Mecklenburg and in the Spreewald, with impressive results. Vattenfall Europe-Transmission faced the challenge of a new transformer substation requiring a higher data volume. To enable the fast and efficient communications needed, Siemens installed a 40-kilometer- (25-mile-) long fiber-optic link within a 380-kV high-voltage line. This project was marked by difficult installation conditions and extremely high safety precautions.

Vattenfall Europe-Transmission, Berlin, Germany

SIEMENS

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Answers for energy.

Vattenfall Europe-Transmission, Berlin, Germany

The challenge:

As one of the largest private power providers in Europe, Vattenfall Europe-Transmission invests continuously in improving the efficiency of its networks. In the example described here, an existing transformer substation was due for expansion, which resulted in the need for a higher communications volume. The current infrastructure would no longer have had sufficient capacity to handle this volume; a new fiber-optic cable to the substation was designed to remedy the situation.

Integration of the cable in a previously installed 380-kV high-voltage line imposed clear requirements. For operational reasons, the line could not be interrupted during installation. This was another reason why it was absolutely vital to follow the prescribed installation process exactly and observe the comprehensive safety regulations.

Our solution:

Siemens LiveLine installation technology made it possible to lay the 40 kilometer fiber-optic cable on the existing 380-kV high-voltage line as required.

Specially developed equipment and tools were used to comply precisely with the safety regulations and the installation process. Despite highly adverse weather conditions at times in the winter of 2007/2008, stage 1 of the project was completed punctually. Installation of an additional 120 kilometers of cable is currently planned as part of stage 2.

The teamwork between Vattenfall and Siemens was marked by a high degree of trust and close cooperation. This was an important factor in the successful completion of this challenging "live" project implemented without any disturbance at all on the line.

Thanks to the broadband link, the speed of completion of the project is mirrored in the high speed of communication from the transformer substation into the corporate communications network. The result is improved control of all processes.



"The reliability of our network must still be guaranteed during complex network modernization work. That's why it is often not possible to totally isolate circuits and lines. To be able to still implement the urgently needed message communication channels, Vattenfall Europe-Transmission opted to use Live-Line technology. LiveLine technology from Siemens offers a reliable, economical process for the installation of fiberoptic aerial cable connections using electricity circuits while in operation. This even covers the two usual aerial cable installation locations as replacement for the overhead ground wire at the top of the tower and as an additional aerial cable in the center of the tower structure. This was demonstrated in impressive fashion on two lines in Mecklenburg and in the Spreewald."

Dr. Uwe Ziebold,

Project manager Region Eastern Germany, Vattenfall Europe-Transmission GmbH

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Mammoth project in the land of the fjords

10° east, 60° north



Facts about the project: The substation control technology will be modernized, expanded and standardized for 14 to 16 new and modernized substations over an estimated five-year construction period.

Statnett is preparing for the challenges of the future by replacing a variety of different systems that have developed over the years with standardized substation control technology. Siemens' SICAM 1703 network control system plays a key role in the multiyear, tightly scheduled project.

Statnett SF, Oslo, Norway

Answers for energy.



Statnett SF, Oslo, Norway

The challenge:

Norway's electricity system regulator, Statnett SF, faced various challenges: Some of its existing control systems were aging and, as a result of using a variety of different systems and system versions, it had evolved a highly heterogeneous technology environment. Statnett was in need of building several new substations the coming years.

Statnett therefore began a modernization and expansion project for its entire power supply network, including upgrading the substation control systems and constructing brand new substations. One of the project's main challenges was keeping to a strict timetable. In order to connect new industrial enterprises to the supply network on time, for example, it was critical to stay on schedule.

Our solution:

Statnett contracted Siemens to deliver and install the entire control technology based on SICAM 1703. The system also comprises the SIPROTEC 4 protection system and an internal communications solution using the standard protocols IEC 61850 and IEC 60870-5-104.

To provide additional flexibility, the new system provides direct access from the control room to the bay controller BC 1703 via the automation component AK 1703.

While the first substations were being connected up locally to the supply system, Statnett and Siemens were defining standards for further deliveries. Standardization reduces the costs of training and spare parts, and using the same proven solutions in different substations significantly contributes to reliable operations.

The project, so far, has run smoothly, and the entire undertaking will be completed by the end of 2010/early 2011. However, in order to successfully coordinate with other activities in Statnett's transmission network, it's crucial to precisely adhere to the rest of the schedule.

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A pilot project for north Germany

8° east, 53° north



Facts about the project: AMIS pilot project in part of the supply area of swb. Energy provider swb wants to offer its customers even more and even better service using AMIS, a system for automated consumption data acquisition and management of distribution networks. At the same time, it is aiming to cut process run times and reduce follow-up processing time and expenditure for invoicing and clarifying bills. To gain information about the benefits of such new services, a pilot project has been installed in part of the supply area, with a view to subsequent coverage of the entire supply area.

swb, Bremen, Germany

Answers for energy.



swb, Bremen, Germany



The challenge:

In the north Germany region and the cities of Bremen and Bremerhaven, swb stands for much of what people take for granted each day – electricity, natural gas, drinking water and heat. With a total electricity supply network of nearly 7,000 kilometers, swb delivers more than five billion kilowatt hours of electricity to its customers annually. The efficient use of energy and maintaining the high standard of power supply play a crucial role for the company.

To optimize processes and at the same time provide customers with greater cost transparency and more flexible tariffs, the power provider opted for the installation of a pilot AMIS system (system for automated consumption data acquisition and the management of distribution networks). With this approach, swb hoped to generate information about costs, expenditure and the quality of its operation to provide a sound basis for deciding on a possible coverage of its entire network.

Our solution:

The pilot installation of AMIS gave swb the opportunity to test out innovative business processes on a manageable scale. This includes in particular offering customers and suppliers new services and improved communications. AMIS collects data and information from private households as well as from swb's distribution system infrastructure and transfers it to the control center.

The scope of the project included the installation of 1,000 multifunctional meters and 10 load disconnectors. Communication between the terminal devices and the data concentrators in the transformer substations is based on special narrowband DLC communication technology in the low-voltage network. The transaction server in the control center collects and processes all data before transferring it to the existing SAP system. The data concentrators are connected to the front end in the control center via GPRS. The comprehensive overall system enables swb to collect the consumption data from its electricity customers cyclically using automated processes. The system offers important advantages such as fast monthly billing with fewer adjustments of the bill, active tariff control and automatic remote blocking and unblocking. In other words, AMIS translates into fewer customer complaints and lower costs.

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Effective systems for more coal

72° west, 12° north



Facts about the project: As part of Spectrum Power CC, mobile transformer substations monitor and control the power supply for Cerrejón. In opencast mining, equipment is always "on the move." To ensure maximum availability with no interruptions, the power supply must be similarly flexible. The solution adopted for the largest opencast coal mine in the world is the Spectrum Power CC control system with mobile substations and RTUs. It helps ensure the most effective use of the equipment – both now and in the future.

Cerrejón, La Guajira, Colombia

Answers for energy.



Cerrejón, La Guajira, Columbia

The challenge:

The private coal producer Cerrejón, which operates worldwide, is continuously investing in the modernization of its plants and systems.

Triggered by strong economic growth especially in the emerging nations, the ongoing boom in raw materials means that mines must have a permanently high and dependable extraction capacity. And that requires a problem-free power supply. That's why Cerreión opted for a new control system: Spectrum PowerCC. Its specific aim was to ensure the continuous monitoring and control of the power supply throughout the extensive mining operation by means of "lean" mobile substations.

The aggressive environment encountered in coal mining posed an additional challenge for the project teams and the technology.

Our solution:

Siemens developed and installed a complete SCADA solution to meet the requirements of everyday mining operations. Within a year, several mobile transformer substations were constructed and equipped with 34 SICAM 1703 RTUs and wireless communications. A special requirement: because the transformer substations regularly change location, the communication systems and antennas had to be equally mobile. The installed control system Spectrum PowerCC communicates with the transformer substations via the IEC-60870-5-104 protocol.

Thanks to the outstanding cooperation between Cerrejón and Siemens, to date the project has been implemented successfully and according to plan. With successful completion and the optimization of the power supply that this will bring about, Cerrejón can use its existing plant and equipment (and its future investments) even more effectively.

At the present time there are already plans for a system expansion that will enable information to be exchanged between Spectrum PowerCC and other systems.

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Fit for the future

74° west, 4° north



Facts about the project: Implementation of this project marked the first Spectrum PowerCC redundant control system for the Meta region of Colombia. To create the basis for efficient power transmission and distribution, the EMSA utility in Colombia wanted to install a SCADA system with modern control, protection and communication technology. Thanks to a reliable, open-ended solution based largely on Siemens systems, the company can now compete on even terms with international rivals.

Electrificadora del Meta S.A. (EMSA), Meta/Bogotá, Colombia

Answers for energy.



Electrificadora del Meta S.A. (EMSA), Meta/Bogotá, Colombia

The challenge:

With annual growth rates in excess of 5 percent, Colombia is currently one of the most dynamic economies in South America. The country is making huge efforts to move forward, not least in the energy sector, and the modernization project being undertaken by Electrificadora del Meta S.A. (EMSA) in the capital Bogotá can be seen as part of these efforts. Until now the public supply company did not have a SCADA system, but only SICAM PAS CC for certain substations.

To be able to operate successfully on the market in the future as well, EMSA therefore urgently needed a complete upgrade of its control technology, including a modern, smoothly functioning standard communication system.

Our solution:

The newly installed SCADA system was equipped almost entirely with Siemens products for station automation in the form of the Spectrum PowerCC control system, SICAM PAS automation technology and the SIPROTEC protection system. To comply with the latest state of the art, a communications solution featuring the international standard protocol IEC 61850 was selected. The overall project also included incorporation of a local DMS solution in the system.

This extensive project was only possible with real teamwork and a high level of trust on both sides. The successful completion of the project in March 2008 meant that the supply area covered by EMSA now has its first redundant Spectrum PowerCC, which makes it possible to monitor and control all transformer substations from the control center. Fault diagnosis and treatment is also simplified by the use of the modern systems so that downtimes can be further reduced. Modernization of the system is to continue in the next stage, for which a second backup control center is planned.

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Growing stronger with a standard

2° east, 49° north



Facts about the project: The first project with the IEC 61850 standard at transmission level – for RTE and France. As a player on the French and European energy markets, RTE is vigorously working to remove any obstacles to its competitiveness. One key to achieving its goal is the application of an energy automation solution that complies on the one hand with the long-term strategy of RTE and on the other hand takes into account the existing customer philosophy.

Réseau de Transport d'Electricité (RTE), La Défense Cedex, France

Answers for energy.

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Réseau de Transport d'Electricité (RTE), La Défense Cedex, France



The challenge:

The French state-owned network operator RTE, a subsidiary of Electricité de France (EDF), is preparing for a further internationalization of its markets, where the technical requirements and the reliability will have a particularly important role to play. These developments were the impetus for deciding to thoroughly modernize the energy automation system and reduce life-cycle costs by installing a standard system environment.

The project, which will span several years, is made up of three components – qualification, system delivery and service. Successful qualification is a basic precondition for delivering each of the substations.

Our solution:

Siemens implemented the entire substation automation system, including protection technology and communication based on IEC 61850. The scope of the project also included cabinets, protective relays, control units, HMI and a remote access for maintenance and fast analysis of the fault records and the events. At the very least, more than 20 extra-high-voltage substations up to 400 kV will be equipped with the Siemens products SIPROTEC 4 and SICAM PAS as well as 3rd party voltage regulators.

One of the project's most significant accomplishments was the connection to the existing control center and to the existing infrastructure. The connection was carried out gradually according to the planned stages and more and more bays are being controlled via the new substation automation system. The new system offers a wide range of advantages that come with a modern, costefficient network infrastructure. These include effective monitoring and control as well as more flexibility for further requirements due to changes in the energy market.

Because of the close cooperation required during the course of the project, RTE and Siemens developed a working relationship founded on trust. The partnership has been further strengthened by intensive training and instruction. RTE is already planning further projects of this type to further bolster its international competitiveness.

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Fast track to the future

9° west, 38° north



Facts about the project: 50 transformer substations will be equipped with new IEC 61850 standard-compliant network control, protection and communications technology. Increasing electricity demand, continuous improvement of the quality of service, finite fossil resources and intensified efforts to protect the environment are among the many reasons why Portugal is developing its wind energy capacities. The electricity network infrastructure – with future-proof solutions from Siemens – plays a key role in these efforts.

Eólicas de Portugal / EDP RENOVÁVEIS, Lisbon, Portugal

Answers for energy.

SIEMENS

Eólicas de Portugal / EDP RENOVÁVEIS, Lisbon, Portugal

The challenge:

Portuguese energy supply system is heavily dependent on fossil fuel importation. Energy consumption is expected to grow during the next years leading to an increasing dependence on energy importation, higher energy bills and growth of the CO₂ emissions.

Given this scenario, the priorities and challenges of the Portuguese energy policy are at present mainly focused on the massive development of renewable endogenous sources to reduce external dependency and to comply with the country's international environmental commitments.

The Eólicas de Portugal consortium, under the lead management of ENERNOVA, an EDP Renováveis company, is now playing a key role in achieving, by 2010, the national target of a 15 percent share of wind power generation in the total electricity consumption.

Within the scope of this project fifty wind power plants with a installed capacity of 1,200 MW are currently being installed. An important component of this project is the development of modern substation architecture, using state-of-the-art technology infrastructure (based on the communications standard IEC 61850), which will contribute to a successful integration of wind power into the electricity grids.

Our solution:

With the contribution of Siemens, the Eólicas de Portugal wind power plants are being equipped with a brand new substation control system, including communications and protection equipment. The scope of delivery for this major project, which is due for completion by 2013, comprises approximately 50 VHV and HV substations, where the energy generated by approximately 600 wind energy converters will be evacuated into the national transmission and distribution network infrastructures.

The SICAM PAS substation control system, based on the international communications standard IEC 61850, is to be used in this project. SICAM PAS CC provides an ergonomically optimized humanmachine interface (HMI) for reliable and efficient operation, with an overview of all processes in the network at all times.

Real-time communications with the existing remote control and dispatching center will be done using an OPC interface (OPC XML DA). Other components from the SICAM system family, in this case SICAM 1703 ACP, will also be responsible for automation down to the field level. Coordinated integration of the protection system, based on SIPROTEC intelligent bay units, is also part of the project.

Even though the project still has a number of years to run, the quality of the cooperation to date has already led to follow-up orders. For Eólicas de Portugal, the implemented solution represents an important step in ensuring that wind generation will be injected in the distribution and transmission network infrastructures according to the highest standards of quality and reliability, and using an innovative substation control system based on the newest international standards.

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