

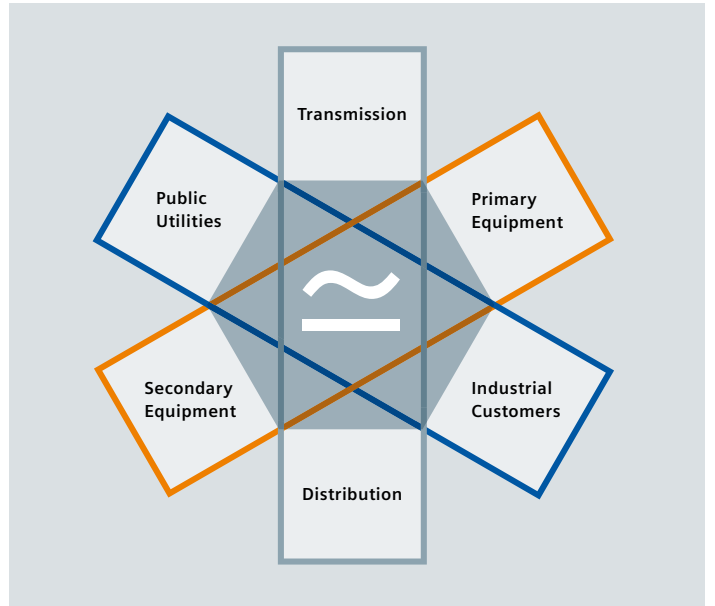


Reliable networks today and tomorrow

Network consulting

Answers for energy.

SIEMENS



Siemens competence for all aspects of network planning

Reliable networks form the backbone of success

A steady flow of energy is indispensable for today's business and private life. However, target network reliabilities exceeding 99.9% cannot be taken for granted, especially not in increasingly complex, developing systems. A number of different factors are currently influencing our electricity supply systems, such as new regulations, the need to integrate small-sized distributed generation or large-scale wind farms, the increasing asset service age and the availability of new concepts and technologies.

Requirements for successful electricity supply systems:

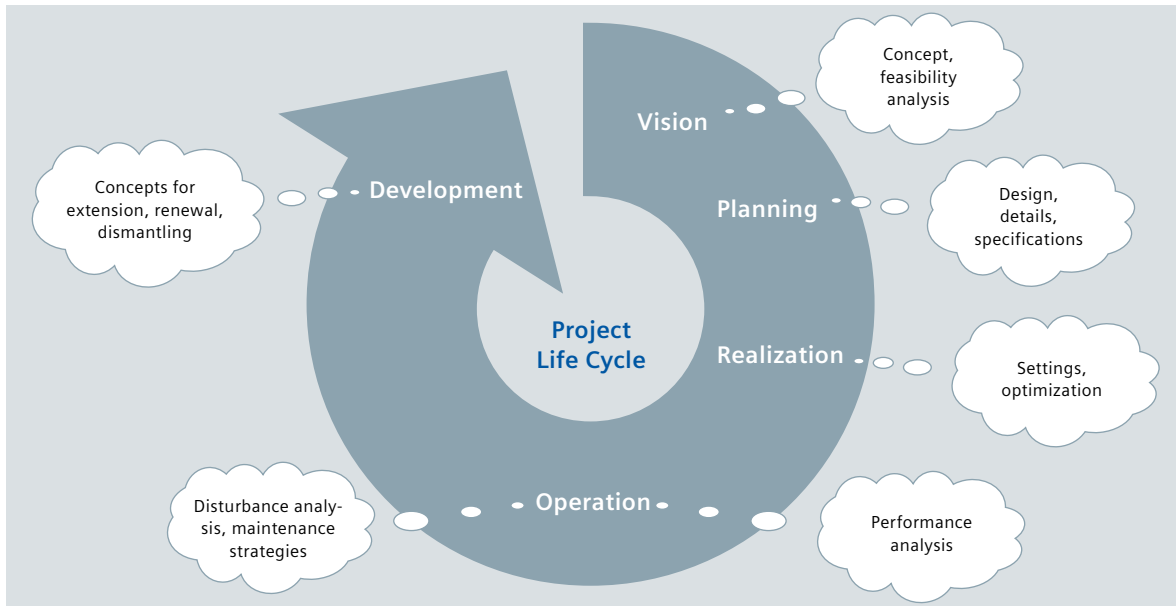
- **Power quality:** Constant frequency, voltage level and other quality parameters, even in disturbed operation
- **Economical performance:** Maintaining budgets, and other economical performance criteria
- **Safety:** Minimizing the risk of harm and damage to people and equipment
- **Security:** System stability after disturbances (e. g. load/generation shifts or electrical failures)
- **Adequacy:** Supplying all customers sufficiently in normal operation
- **Ecological performance:** Minimum environmental impact from power stations and network equipment (e. g. lines).

A full scope of network planning

Siemens Power Technologies International (Siemens PTI), the provider of network consulting, software solutions and T&D training within Siemens Energy, is able to perform network studies from low-voltage distribution networks to extra high-voltage transmission, including the integration of DC equipment. Our familiarity with the requirements of distribution and transmission levels for public utilities, industrial or commercial customers in any area of business is further enhanced by our comprehensive expertise in both primary and secondary equipment.

Reliability requires a comprehensive view

For network planning to be successful you have to consider the system as a whole. The electricity supply system is an overall solution that integrates all components to meet your individual requirements regarding load demand and power quality – from switchgear, transformers, overhead lines and cables to secondary equipment for protection, control and communication. Therefore, network planning defines each component's functional specifications and ensures the safe and secure operation of the entire system.



Concepts and consultancy for any phase of the project life cycle

Your partner throughout the entire project life cycle

With network consulting we can support the strategic development of your system. Based on detailed calculations, measurements and system modeling, we provide well-founded consultancy and reasoned concepts that will help ensure an optimized system operation with regard to both economical and technical criteria, throughout the life cycle of your system. Eventually, every phase of a project life cycle implies various system analysis and planning tasks.

Vision

On the basis of your project targets we define the requirements and develop potential concepts that meet all technical and economical criteria. Since electrical networks must also be generally designed for a life-time of several decades, long-term scenarios are considered. A feasibility analysis will provide you with reliable criteria for your decision.

Planning

Following the analysis of possible concepts, a network design is specified in detail. All equipment is coordinated to ensure safe and reliable system operation. Close cooperation with our customers and the suppliers is a key factor in a successful planning process.

Realization

The optimum settings for protection and control devices are determined on the basis of the actual installed equipment. These optimum settings can be verified by means of digital real-time simulation. If requested, we can support the commissioning of your network with detailed system analyses.

Operation

During operation a detailed system performance analysis can be carried out. Our goal is to help you achieve the highest efficiency of your network in normal operation. In case of disturbances the equipment and processes involved will be subject to in-depth investigation, and our experts will define suitable corrective measures. Our maintenance planning support can increase efficiency and help keep downtimes to an absolute minimum.

Development

When planning your network we ensure that the design allows for a quick and easy modification, if required. Should expansions, renewals or dismantling become necessary, we will be glad to offer our assistance in those projects.



Developing solutions in close cooperation with you

A reliable partner, for your benefit

We specialize in the planning and efficient operation of electrical supply networks. We hold the resources to support you in any network related topic – worldwide. With more than 120 dedicated consulting engineers in 15 international locations, we are always close to you and know the local energy markets. This allows us to develop tailored solutions and work in close cooperation with you.

Acknowledged worldwide

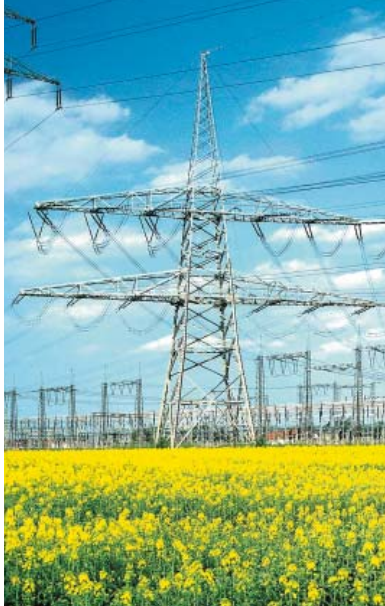
Our experts have extensive international experience and a solid reputation. By contributing actively to national and international committees, such as VDE, CIGRE, CIRED, IEEE, IEC, IFAC and others, we have a significant influence on future technical developments and standards. Most of the latest technical developments are already included in the Siemens products.

Dedicated software for your network

We have used our significant competence and experience in network consulting to develop the Power System Simulator PSS® Product Suite. To assist your engineers in their critical input, our power system simulation and analysis tools are cutting-edge products encompassing technical performance and user-friendliness. Using comprehensive interfaces, they interact with each other and also can be integrated with other IT systems.

Your benefits at a glance

- Well-proven concepts due to long-term and international experience
- Independent and objective analysis of your system
- Familiarity with local requirements and standards
- Transfer of knowledge and know-how through close cooperation during the entire project
- Improvement of system availability and minimization of outages through:
 - Enhancement of the network structure
 - Optimization of the protection system
 - Analysis of power quality-related problems and development of mitigation measures
 - Early identification of weak points
 - Compliance with all technical and regulatory standards and relevant safety regulations
- Optimized network performance by thorough consideration of the system as a whole
- Improved economic efficiency by assessment of cost/benefit ratio and prioritization of measures
- Reliable and detailed system analysis results by use of cutting-edge software solutions in the Siemens PSS® Product Suite
- Ecological and economical solutions, e. g. integration of decentralized generation and renewable energy sources
- A reliable partner for future extensions or modifications of your system.



Solutions for power and industry sectors

Network consulting with Siemens

Understanding the needs and requirements of our customers is one of our special strengths. We are able to offer tailor-made solutions for power companies and industrial customers alike, covering different tasks in network consulting, as required.

Comprehensive network planning

Structuring and configuring your network calls for an understanding of all technical and economical requirements. Our objective is to facilitate reliable network performance at any voltage level – including all relevant issues, such as protection coordination, power quality or control strategies.

Thorough disturbance analysis

Our technical expertise also covers the analysis of disturbances in customer processes originating from the electricity supply system. This is achieved by on-site measurements and expert investigations as well as a detailed analysis of operational data and fault records. With the identification and explanation of failure processes, we can propose appropriate mitigation measures.

Power markets and regulation impact

Today, network operators in deregulated markets require optimized strategies. Based on an analysis of your market / regulatory structure, we develop optimum strategies, such as network access, the integration of power plants, a due diligence analysis of your electricity networks, an analysis and review of your tariff structures or your capital and operational expenditure.

Addressing the complete scope of projects

Every network consulting project has to be geared towards the individual requirements of the network under consideration. These requirements are largely defined by the particular power supply task, the condition of the network and the economic environment, including power market regulation. The following are typical subjects that might be addressed in a network consulting project:

- Strategic planning of transmission, distribution and industry networks
- Selection of components based on economic criteria
- Asset management support
- Network security and power quality (e. g. harmonics)
- Grounding and interference
- Dynamic performance of transmission and industry networks
- Dynamics and control of generating units
- Lightning and overvoltage protection, insulation coordination
- Switching transients
- Protection design and coordination
- Real-time system simulation
- Integration of wind power
- Renewable generation, energy management
- Tariffing and regulatory requirements
- Energy market business solutions.

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Siemens AG
Energy Sector
Freyeslebenstrasse 1
91058 Erlangen, Germany

Siemens AG
Energy Sector
Power Distribution Division
Transmission and Distribution Services
Humboldtstrasse 59
90459 Nuremberg, Germany
www.siemens.com/energy/services

Siemens AG
Energy Sector
Power Distribution Division
Transmission and Distribution Services
Power Technologies International
Freyeslebenstrasse 1
91058 Erlangen, Germany

Siemens Energy, Inc.
Siemens Power Technologies International
400 State Street
P.O. Box 1058
Schenectady, NY 12301-1058, USA
Phone: +1 (800) 347-6659

For more information, please contact
our Customer Support Center.
Phone: +49 180/524 70 00
Fax: +49 180/524 24 71
(Charges depending on provider)
E-mail: support.energy@siemens.com

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The required technical options should therefore
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