



SIEMENS

Ingenuity for life



Partnering for
reliable distribution

Our solution for municipalities
and distribution system operators

[siemens.com/municipalities](https://www.siemens.com/municipalities)



Whether new market players or changing regulations: municipalities and DSOs have to adapt to fit a changing market – without losing sight of their customers. With Siemens as your partner, you can rely on cutting-edge technology to reliably and efficiently deliver electricity, water, district heating/cooling, transportation, and more.

Municipalities and grid operators – reliable, sustainable supply for your customers

To provide an efficient, environmentally friendly infrastructure in a modern society, municipalities and DSOs* have to juggle many challenges – providing reliable and economic power supply, renewable integration, balancing the grid, increasing energy demand, distributed generation, technical and non-technical losses as well as managing big data from the grid.

1. Power distribution

Planning, building, expanding, and maintaining an intelligent distribution network's infrastructure are the main tasks of distribution grid operators. With an increase in decentralized generation, municipalities and DSOs have to face growing challenges in terms of grid transparency, power quality, and stability. Intelligent substations, including products like smart switchgear, regulated transformers, and distribution automation, enable new applications to increase grid reliability. IT solutions help to balance supply and demand and can also create new business models, even for smaller municipalities.

2. Power transmission

In some countries, municipalities and DSOs are in charge of managing a complex network, from low- and medium-voltage all the way up to high-voltage power transmission. The trend of distributed energy that needs to be transported to consumers over long distances and the interconnection of grid infrastructures must be addressed. Our product range spans the entire field of high-voltage equipment, complete grid access solutions, and trendsetting DC transmission systems.

3. Power generation

Municipalities today are already considering investing in their own power generation systems for a variety of reasons, such as changes in regulations or the desire for more energy independence. Siemens is a leading player that can deliver the entire range of generation systems, from fossil to CHP (combined heat power), waste-to-power, and renewables, including grid integration.

4. Renewables

Electricity from renewables such as wind, sun, and biomass stands for sustainable power generation without CO₂ emissions. Siemens not only manages the infeed of electricity into existing grids, it also offers solutions like microgrids and energy storage systems to ensure reliability and stability.

5. Grid consulting and services

In today's complex and changing power systems environment, sound advice from power system experts is essential. Siemens delivers power system studies, field measurements, disturbance investigations and software tools for power system simulation and analysis. Our grid services keep grids at the cutting edge. Customers are accompanied throughout the lifetime of their assets from operation and maintenance to repair and retrofit up to the final disposal.

6. Microgrids

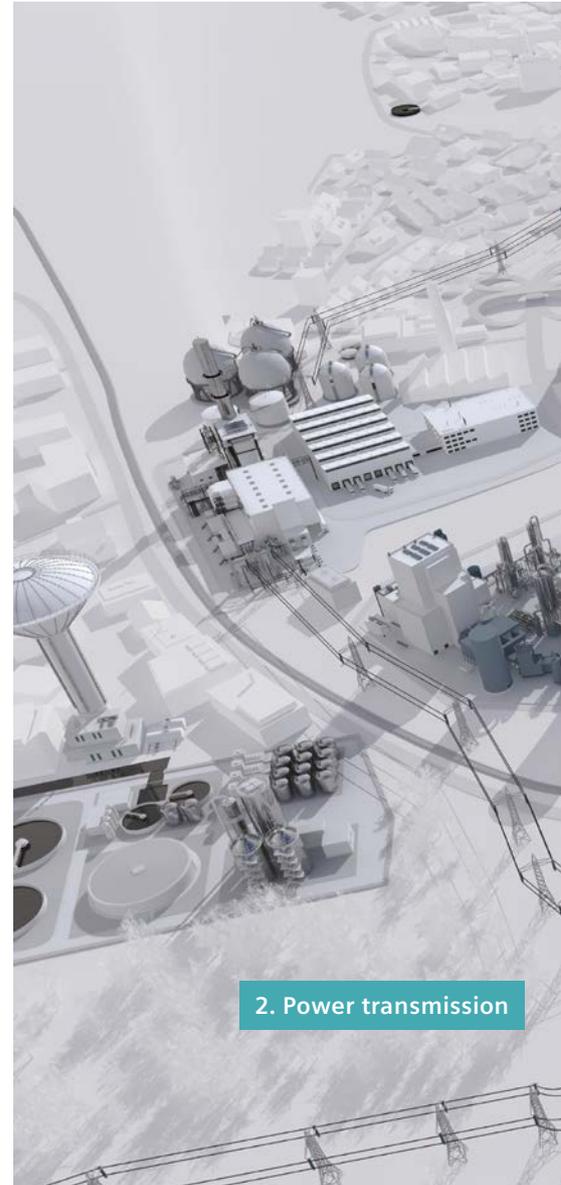
Microgrids are a fundamental component for developing grid resilience in areas of critical infrastructure. Multiple renewable and alternative-fuel generation sources (wind, solar, biogas) as well as fossil fuels will enable the microgrid to provide emergency back-up as well as base load generation. Siemens provides a complete microgrid solution to design, execute, finance, and support your long-term strategy.

7. Smart metering

For various reasons, such as transparency and stability, advanced metering infrastructure is deployed across distribution grids. As a result, the amount of grid- and customer-related data increases dramatically. The challenge is to convert this massive amount of data into actionable information. Siemens provides comprehensive metering and energy information management systems, including meter data management hardware and software, integration services, and consulting.

8. IT/OT integration

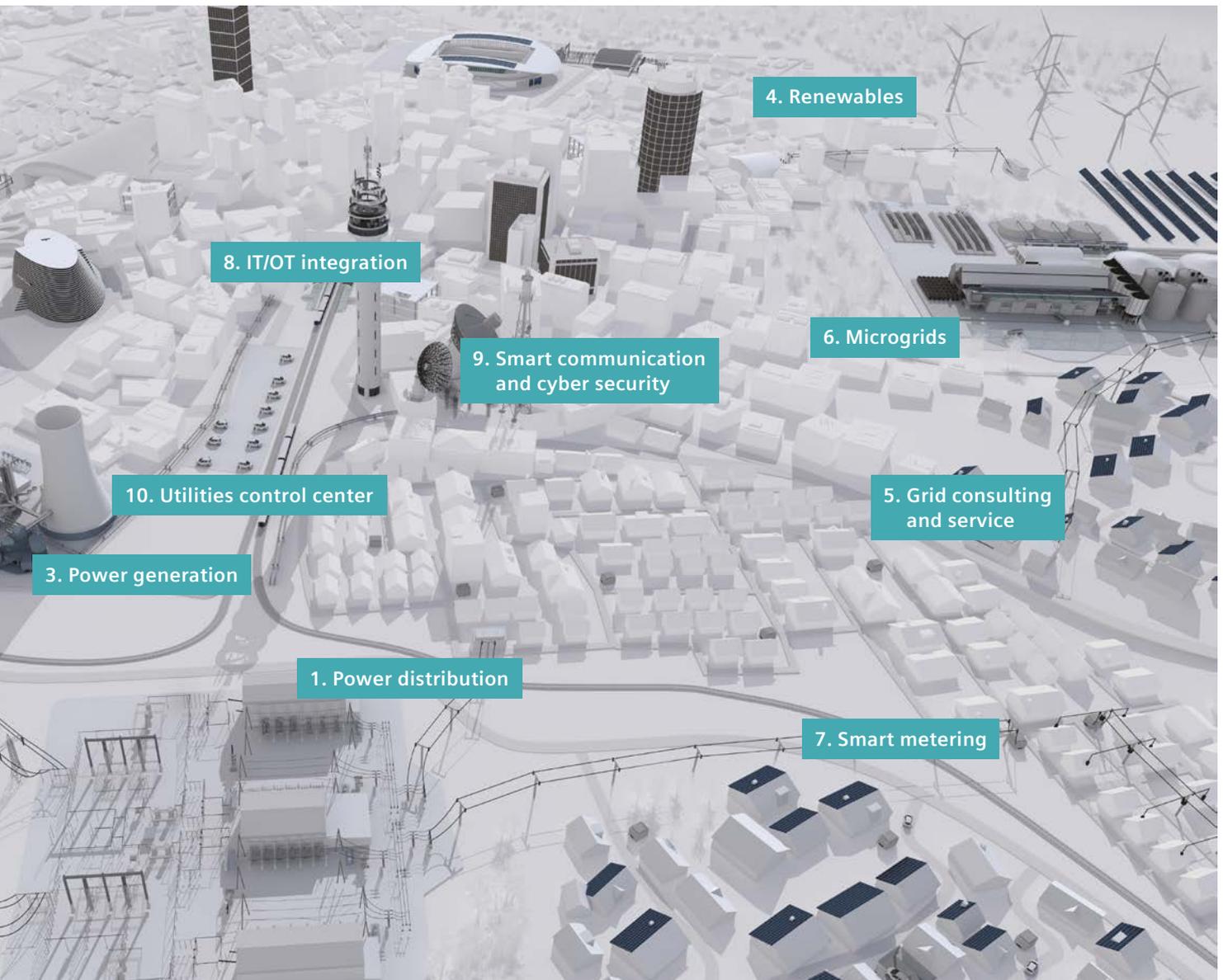
The evolution toward a smarter grid has led to multidirectional flows of energy and digital information. To help utility companies realize the benefits of a more digital grid, Siemens and Accenture have joined forces to create OMNETRIC Group. The company develops and integrates software solutions for energy providers, based on Siemens product suite, helping them use industry-leading data intelligence to improve their grid and business performance.



2. Power transmission

9. Smart communication and cyber security

The communication infrastructure is usually heterogeneous and depends on the local topology. To meet these requirements, Siemens offers a full range of communication technologies including rugged switches and routers. Due to ever-increasing cyber threats, Siemens provides end-to-end grid security, from product to operation, based on secure substation architecture, secure communication, software signing, software patch management, secure remote access solutions, centralized security management, and CERT and security incident handling.



10. Utilities control center

In their efforts to provide an even more efficient and economical supply of power, gas, water, and district heating, municipal utilities are interested in creating central and standardized control centers, where the entire supply and distribution system can be managed and operated in the same way, reducing construction and operating costs. Siemens offers a wide range of features: advanced network control, including alarm management; demand-side management with load management and load and consumption forecast; fault and outage management, isolation, and service restoration; management of storage resources, and more.

Full lifecycle support



Siemens is positioned to support municipalities and DSOs across the entire project lifecycle, from consulting and planning through installation and operation to service and maintenance.

Our unmatched domain know-how and technological expertise – as well as our end-to-end portfolio comprising state-of-the-art products, systems, solutions, and services for distribution networks and municipal infrastructure – will support you in managing both existing requirements and future challenges.

Major challenges

Growing demand

Global demand for electricity continues to grow due to urbanization and the increase in standards of living and electricity use in developing countries. These factors put a strain on existing grids that need to be refurbished and expanded. As worldwide growth in energy demand continues, stability of supply and security remain important.

Reduction of losses

Reducing the amount of missed revenue due to technical and non-technical losses is important as ever. Non-technical losses occur when customers miss payments or from energy theft. Technical losses, due to weak and aging infrastructure, are an additional cost that could be reduced by better maintaining and replacing grid components at correct time intervals. Both technical and non-technical losses are avoidable costs to society and grid operators.

Distributed generation

Decentralized energy systems have become an integral part of many power grids. In many countries, "prosumers" can create their own electricity and market it through the grid, causing capacity and stability constraints. Continued growth in distribution and small-scale applications focusing on power electronics, automation, and IT add to the challenge.

Digitalization

The digitalization of the grid and its operators is a growing challenge, as it is often not clear where to begin or how to complete such a transformation. Modern grids contain many sensors that record vast quantities of data that in turn are gathered by the utility to gain business insight. Reaching the level of having state-of-the-art analysis methods, which are required to ensure this data is intelligently evaluated and utilized, is a goal of many grid operators today.

Intelligence replaces copper – making power grids ready for the future

Reference: Netze BW, Germany



Ref+4096

Key portfolio elements:

- Self-healing grid application
- Wide area voltage regulation
- Power quality systems

Challenges

- Distribution grid with long feeders and long outage times
- Integration of distributed renewable generation
- Problems with voltage stability

Solutions

- Grid monitoring and fault management with intelligent measuring technology
- Long-range control for active voltage stability
- Semi-distributed intelligence with a self-healing functionality
- Installation of two medium-voltage in-phase regulators, including power quality measurement on the primary and secondary side

Benefits

- Semi-distributed grid intelligence makes operation highly energy and cost-efficient
- Reduction of outage times
- Improvement of voltage stability, including voltage optimization

Further opportunities to improve the grid



Transmission substations (HV/MV)
Bringing power to the city – with our HV and MV switchgear, power transformers, control and protection equipment, and substation automation



Distribution substations (primary distribution, MV/MV)
Ensuring a safe supply within the city – with our MV switchgear, distribution transformers, control and protection equipment, and substation automation



Compact substations (secondary distribution, MV/LV)
Bridging “the last mile” – with our MV switchgear, LV switchboards, distribution transformers, remote control, and protection equipment

Enhance and manage increasingly complex dynamic distribution networks

Reference: Northern Powergrid (NPG), United Kingdom

Challenges

- Integration of energy sources in the existing distribution grid
- Voltage band violations
- Thermal overload of primary equipment

Solutions

- Multilevel hierarchical solution incorporating a central application system with a data warehouse and several autonomous substation controllers using a wide area communications system
- Spectrum Power™ Active Network Management brings together battery storage, enhanced voltage control, demand response, and real-time thermal rating in a closed loop for grid operation

Benefits

- Integrated multilevel hierarchical solution
- Cost reduction and accelerated implementation of grid technologies



Key portfolio elements:

- Spectrum Power™ Active Network Management
- SICAM automation products
- Integration of renewable generation

Ref:4-2803



Outdoor distribution equipment

Supplying peripheral areas – with our vacuum circuit breakers, reclosers, disconnectors, and grounding switches with remote control and protection equipment



Smart grid applications

Building your smart grid – with our solutions for grid consulting and diagnostics, smart metering and communications, microgrids, demand response, and virtual power plants

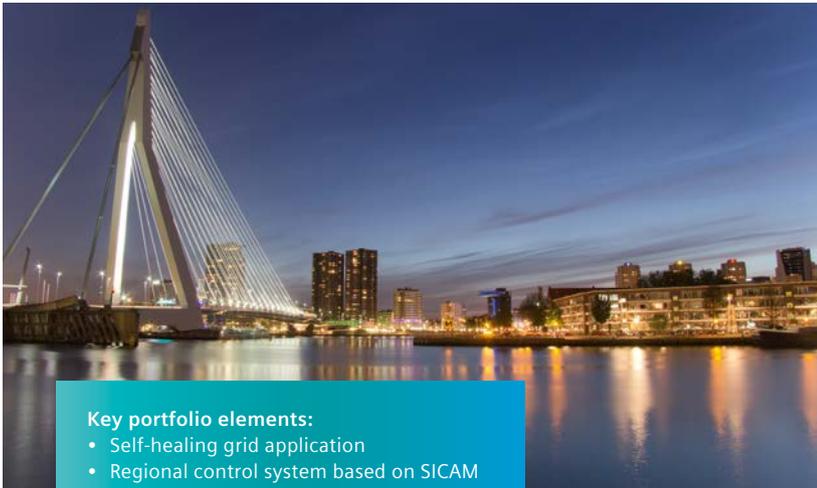


Grid-related services

Everything under control – with our switchgear, transformer and cable services, monitoring diagnostics, substation modernization, network analysis and consulting, as well as service contracts and outsourcing of operations and maintenance

Self-healing grid for a reliable power supply

Reference: Stedin, the Netherlands



Ref+2740

Key portfolio elements:

- Self-healing grid application
- Regional control system based on SICAM automation products

Challenges

- Provide uninterrupted power supply for Rotterdam's harbor district to ensure undisturbed operations
- Reduce SAIDI (system average interruption duration index) to significantly minimize outage times

Solutions

- Development of a self-healing grid
- Automatically handle fault location, isolation, and service restoration

Benefits

- Resupply most customers with power in less than a minute
- Cost savings for Stedin: contractual compensation payments for power outages can be avoided
- Reliable power supply for customers, and thus safe operations

Further opportunities to improve the grid



Integration of renewables

Zero-emission generation becomes a reality – thanks to our grid integration experience including energy storage, load flow management, power quality solutions, and microgrid deployment



Control centers

Efficient network operations – with our control center in multisite configuration for power, heat, domestic gas, and drinking water suppliers and rail operators (SCADA)



Multi-utility technologies

Reliable drinking water, domestic gas, and heat supply – with our MV and LV switchgear, motor control centers, drives, automation equipment, and control centers

Modernizing a complex network with smart grid elements

Reference: Bashkirian Power Grid Company, Russia

Challenges

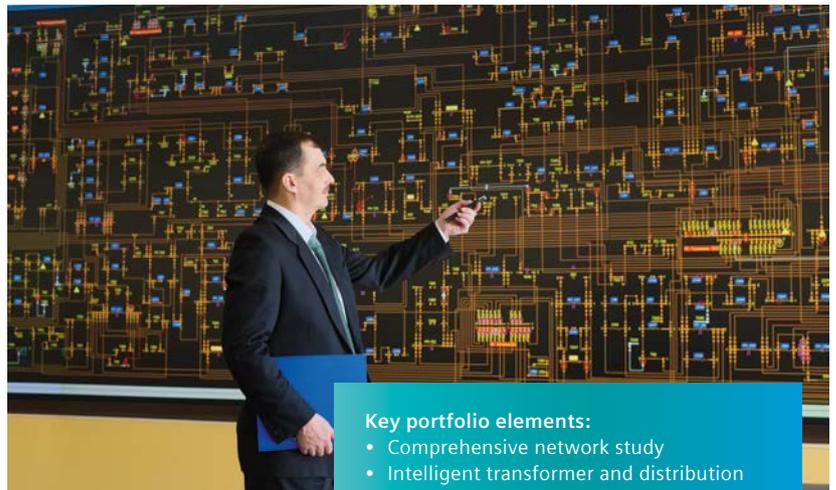
- Low level of electricity network automation
- Poor reliability and aging equipment
- High technical and non-technical losses

Solutions

- Design strategic long-term development plan for Ufa electrical network
- Innovative control, automation, protection, and metering concept
- Development of transition roadmap for network model over next five years

Benefits

- Concrete plan for network modernization
- Smart grid for improved reliability and resilience
- Optimal investment strategy



Key portfolio elements:

- Comprehensive network study
- Intelligent transformer and distribution substations

Ref-3858



Site safety and security

Protecting people and assets against fire, crime, and theft – with our fire detection and extinguishing systems, perimeter surveillance and intrusion detection, central access control as well as command and control center solutions



Cyber security

Protecting your IT/OT infrastructure and data integrity – with our holistic approach comprising security assessments, compliance audits, network penetration tests, access control and password management, security patch management and training



Financial Services

Equipment and technology financing, project and structured financing solutions like debt financing, equity investments and export financing from Siemens Financial Services (SFS) – for your investment in infrastructure

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