Partnering for reliable distribution

Our solutions for municipalities and distribution system operators (DSOs)

siemens.com/municipalities

Today's main challenges of the energy system

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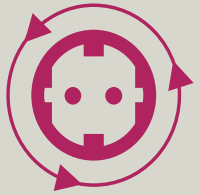
Economic efficiency

"Over the past century, affordable energy has been a significant component of global economic growth and development."

World Economic Forum



Reliable power supply

"Inefficient, antiquated energy supply stifles productivity."

United Nations Foundation, »Achieving Universal Energy Access«

Climate protection

"Europe will cut its greenhouse gas emissions by 40% by 2030 and will produce 27% of its energy from renewable sources."

The Guardian

Resource efficiency

"Decentralized generation will call for changes to the electricity network and, to ensure flexibility, the power sector will need to become more intelligent and computer-controlled."

Kelvin Ross, PEI

Acceptance

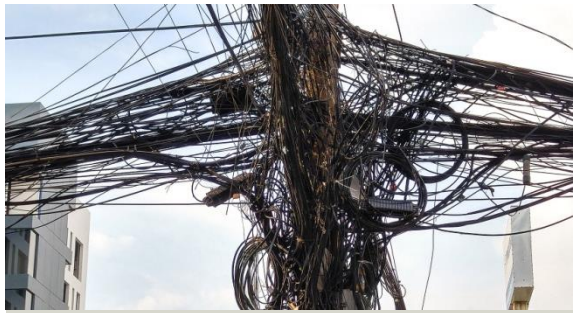
"The concept of achieving public awareness, positive experience and acceptance as a prerequisite for the successful full scale roll-out of a smart grid has not only delivered a positive stakeholder response …"

2013 Global Impact Report

Main challenges for Municipalities and DSOs

Growing demand

Global demand for electricity continues to grow. In many emerging countries with high population there is growth of basic supply. Stability of supply and security are also of major importance.



Reduce losses

Energy theft, also known as non-technical losses, causes avoidable costs to society. Weak and aging infrastructure leads to technical losses. Many components are in need of maintenance or need to be replaced.

Distributed generation

In many countries “prosumers“ can create their own electricity and market it through the grid causing capacity and stability constraints. Continued growth in distribution/small scale applications with focus on power electronics, automation and IT add to the challenge.

Digitalization & changing business environment

The digitalization of the grid and new market players for smart IT solutions pose a threat to today’s business models. Creative solutions/ideas are needed to profit from changes.

Municipalities & DSOs’ main task is to ensure reliable and economic power supply – related challenges are depending on the development status of the existing energy system and the regulatory framework in the respective country

Municipalities & DSOs face high customer expectations

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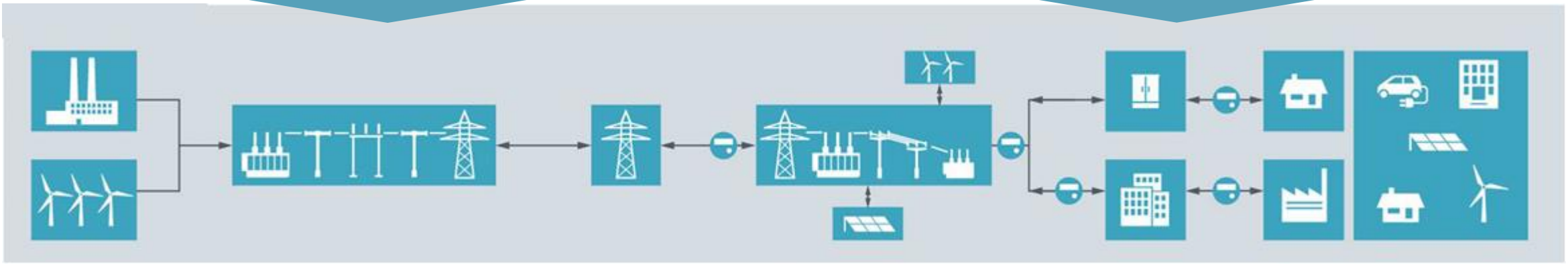
Citizens and industries expect…

- Reliable, safe & secure supply at all times
- Cost efficient electricity and environment friendly energy
- Low visibility/low impact of equipment on environment
- Easy handling of own energy generation and marketing support

Municipalities and DSOs have to provide…

- Grid stability and high availability
- Efficient eco-friendly electricity infrastructure
- Easy grid access, and electricity marketing services
- Management and protection of increasingly complex energy systems



An intelligent overall solution from a trusted partner

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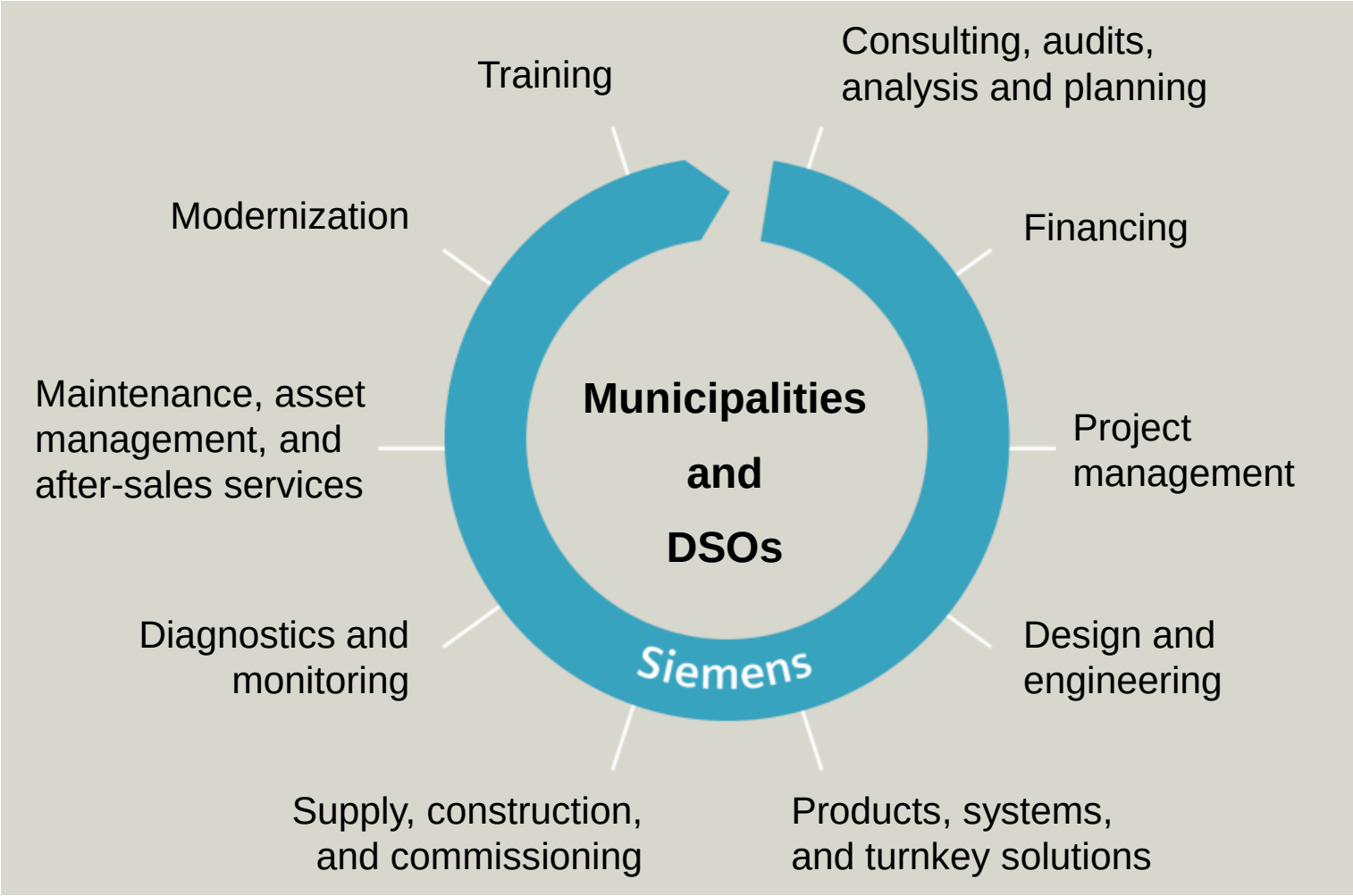
Siemens – uniquely positioned to support you across the entire project lifecycle

With a comprehensive portfolio

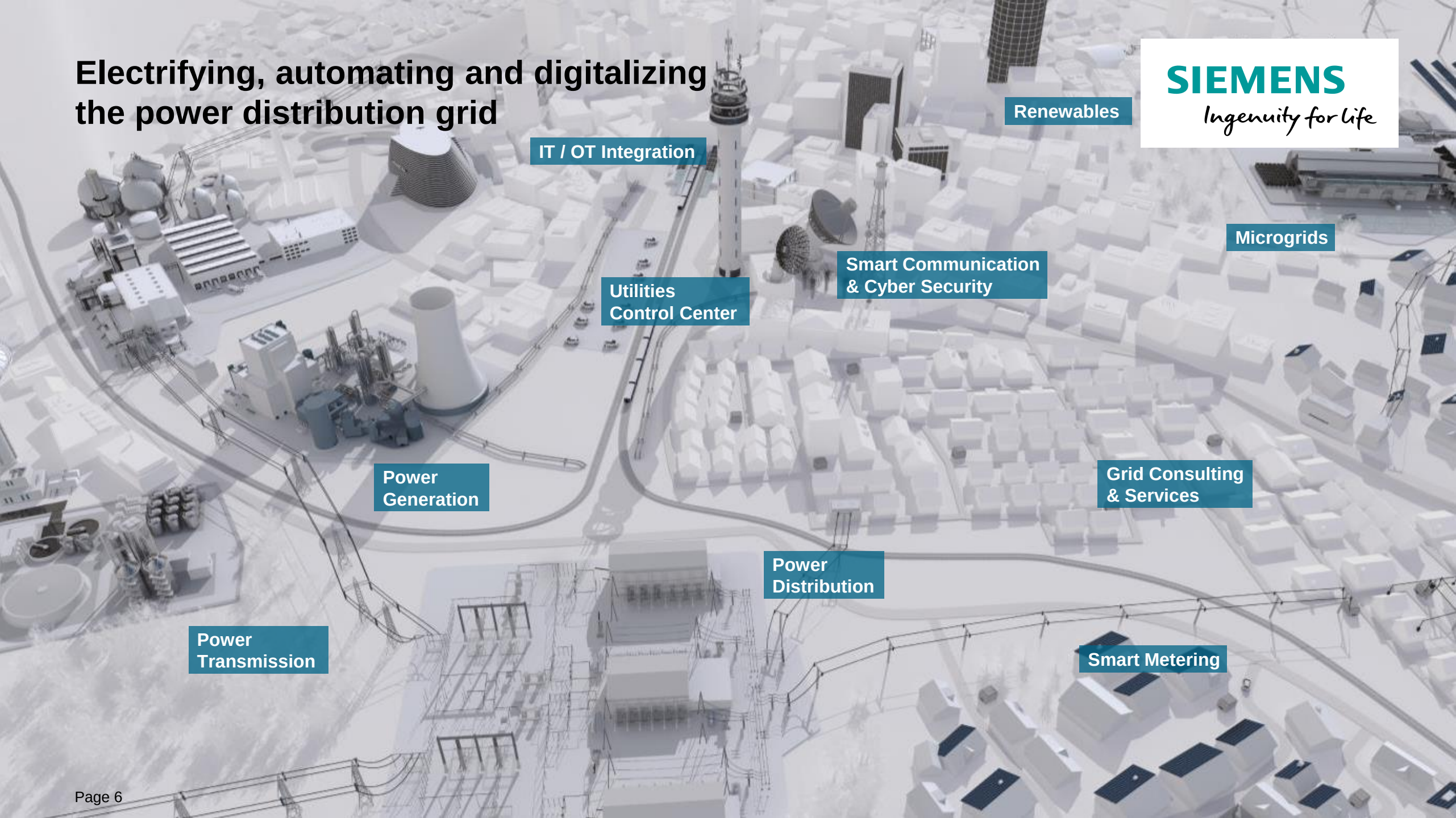
…to design, implement and service your future-proof solution

…based on

- long-term experience
- in-depth understanding of your needs



Electrifying, automating and digitalizing the power distribution grid



Challenge

Plan, build, expand & maintain your distribution network infrastructure

Solution

- Network analysis and calculation
- Intelligent substations – smart switchgear (e.g. GIS), transformers, intelligent distribution and feeder automation, and protection solutions
- IT solutions like SPECTRUM POWER Advanced Distribution Management System & Active Network Management
- Product-related services such as diagnosis, monitoring, maintenance, refurbishment and modernization
- Stationary energy storage solutions like SIESTORAGE (Li-ion batteries) and SILYZER 200 (Power-to-gas)

Benefits

- Reliable power supply to your customers
- High grid availability, fewer blackouts
- Reduce service cost

Power Distribution

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Power Transmission

Challenge

- Connect your distribution grid to transmission level
- Improve transmission quality and efficiency

Solution

- High voltage products (e.g. circuit breakers, bushings, coils, surge arresters, disconnectors, gas-insulated switchgear, and instrument transformers
- High voltage substations, both gas and air insulated
- Transformers from compact distribution transformers to large power transformers with ratings over 1000 MVA
- SPECTRUM POWER transmission grid control system
- Gas-insulated Lines (GIL) for safe and EMC-compliant transmission of bulk power into urban load centers

Benefits

Safe, reliable and consistent transmission & distribution of electricity

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Power Generation

Challenge

Technical prerequisites to cope with the changes in regulations and to become energy independent

Solution

- Small to large scale power generation systems such as gas turbines, wind turbines, and turnkey solutions for combined heat and power plants
- Vacuum Generator Circuit Breakers up to 90 kA short circuit breaking current
- Air-insulated Generator Breaker Switchgear with vacuum technology for indoor and outdoor applications
- Grid connection substations incl. air- or gas-insulated MV or HV switchgear and power transformers

Benefits

- Extension of business models by entering into the lucrative power generation market
- Less dependence from external power supplies
- Active management of CO_2 reduction and sustainability goals of your community

Renewables

Challenge

- Integration of renewable energy sources (e.g. wind, sun, and biomass) into your existing distribution network
- Stabilization and control of the network due to intermittency issues

Solution

- Network analysis and consulting (PSS SINCAL)
- Integration into existing protection schemes (SIGUARD PSA)
- Network modernization with a regulated distribution transformer FITformer REG, intelligent switchgears including feeder condition monitoring & remote control
- Active Network Management with SPECTRUM POWER
- Network control with SICAM Smart Grid Unit, and Distributed Energy Management System (DEMS)
- Design and installation of microgrids and energy storage solutions such as the SIESTORAGE (Li-ion batteries) and SILYZER 200 (power to gas)

Benefits

- Maintain grid stability despite volatile infeeds from natural resources (wind, sun)
- Ensure secure energy supply independent of weather conditions
- Manage distributed renewable generation to ensure CO_2-neutral power supply as far as possible

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Microgrids

Challenge

- Reliable and stable operation of a grid with distributed energy resources, loads, and storage by controlling grid assets (e.g. intelligent switchgear and transformers)
- Independent, sustainable, and highly reliable power supply (e.g. island grid)

Solution

- Products and solutions for microgrids, energy storage, load management and virtual power plant (VPP) applications
- SPECTRUM POWER Microgrid Management System
- SICAM Microgrid Manager (planning, monitoring, and control)
- Distributed Energy Management System (DEMS) incl. Demand Response (DRMS), and virtual power plant (VPP) applications
- Energy storage solutions, e.g. SIESTORAGE (Li-ion batteries) and SILYZER 200 (power to gas)

Benefits

- Maintain grid stability and security of supply despite volatile infeeds from natural resources
- Possibility to trade power surplus
- Safeguard power quality

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Challenge

- Support in defining your smart grid strategy
- Professional network performance evaluation
- Effective monitoring of your grid assets
- Responsive servicing of your grid

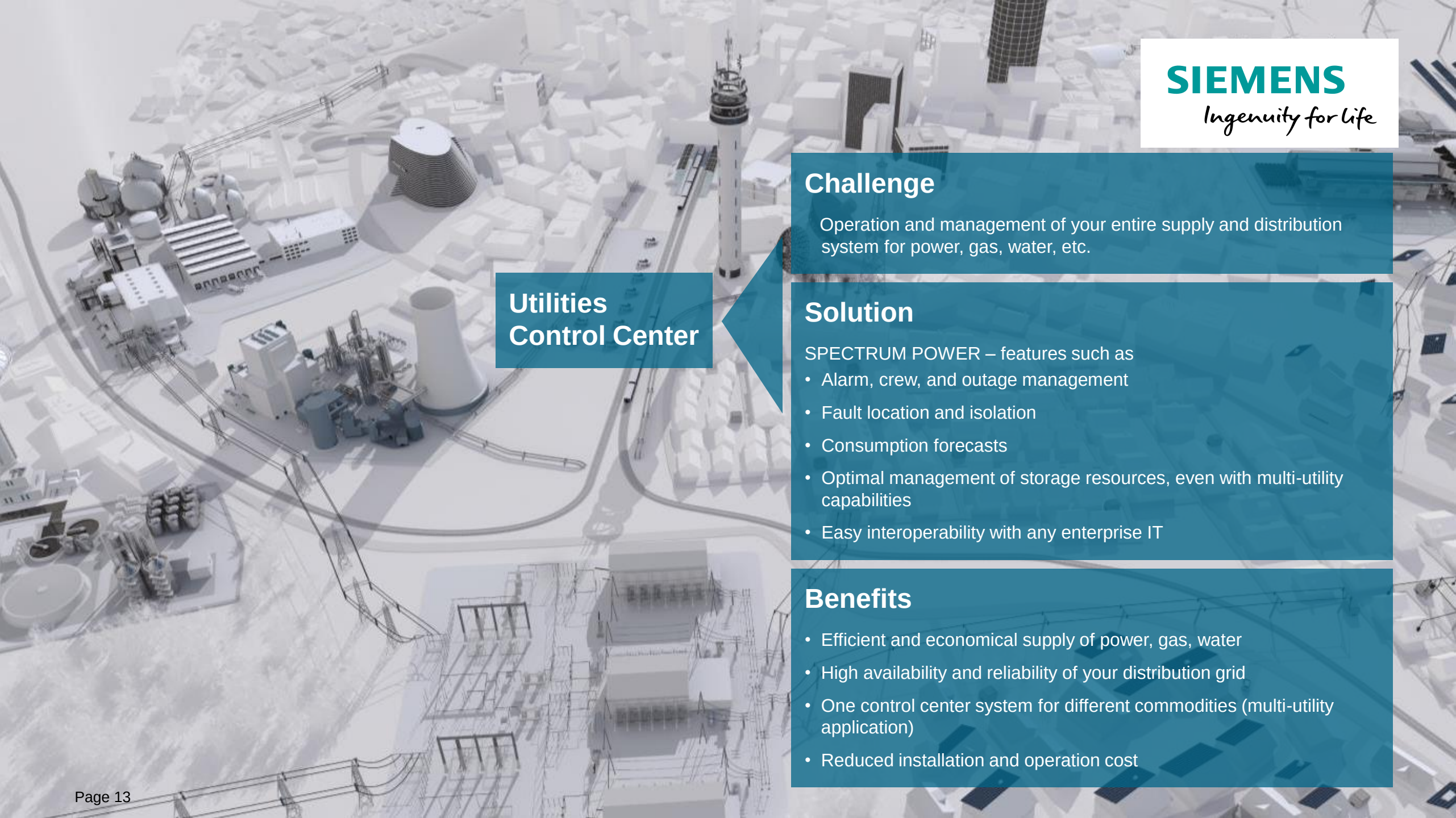
Solution

- Network analysis & consulting (PSS Sincal, Smart Grid Diagnostic Kit, Smart Grid Compass, Siguard PSA)
- Grid monitoring and diagnostics (condition monitoring products)
- Maintenance and repair
- Asset performance management

Benefits

- Guidance on how to develop your smart grid
- Continuous information on overall network conditions and dedicated devices
- Preventive maintenance and modernization only when needed
- Lifetime extension of grid installations
- Reduce CAPEX and optimize OPEX

Grid Consulting & Services



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Utilities Control Center

Challenge

Operation and management of your entire supply and distribution system for power, gas, water, etc.

Solution

SPECTRUM POWER – features such as

- Alarm, crew, and outage management
- Fault location and isolation
- Consumption forecasts
- Optimal management of storage resources, even with multi-utility capabilities
- Easy interoperability with any enterprise IT

Benefits

- Efficient and economical supply of power, gas, water
- High availability and reliability of your distribution grid
- One control center system for different commodities (multi-utility application)
- Reduced installation and operation cost

Challenge

- High OPEX caused by manual meter reading
- Energy theft (non-technical losses)
- Increasing distributed generation endangers grid stability creating demand for permanent information on capacity / stability constraints

Solution

- Standardized smart meters support multiple communication modules (e.g. GPRS, PLC, RF,...)
- Tailored communication solutions (incl. cyber security) for high-, medium- and low-voltage networks
- Highly available universal head-end system with multi-vendor support
- Leading Meter Data Management (MDM) system
- Monitoring and detecting of deviations in load profiles remotely
- Flexible grid application platform (e.g. load forecasting, analytics)
- End-to-end advanced metering infrastructure (AMI) from consulting to field services

Benefits

- Automated meter reading reduces OPEX
- Early theft detection minimizes non-technical losses
- Reliable power supply in an environment of distributed generation
- New business models based on data analytics

Smart Metering

IT / OT Integration

Challenge

- Convergence of operation and information technology
- Enhancement of your business model & services against the digital transformation background of the grid

Solution

OMNETRIC Group, Siemens‘ joint venture with Accenture

- Develops and delivers advanced solutions focused on data management and systems integration
- Brings together operational technologies – such as distribution management and real-time grid operations – with IT systems supporting smart metering, energy consumption as well as work and asset management
- This combination can provide utilities with an integrated view of their systems and data as well as support advanced analysis and decision making

Benefits

- Improved reliability and efficiency in the grid
- Improved asset management and customer service
- Improved data management and insight
- Capture opportunities of a digital grid/new business models

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Challenge

- Monitoring and managing many components of an energy grid all the way to the consumers via highly secure data exchange
- Use & interoperability of different communication technologies and systems
- Cyber security (confidentiality, integrity, availability)

Solution

- Rugged switches and routers using fiber optics, broadband powerline carrier or WiMAX
- WiMAX and wireless mesh solutions from consumer access to RMU backhaul applications
- Cyber security including product / system / solution security and integrated processes & services for the setup and the operation of a secure network
- Build / care and professional services (e.g. cyber security consulting and training; security assessments and compliance audits; network penetration tests)

Benefits

- Tailored communication infrastructure complying with energy industry standards
- Hardened IT infrastructure to minimize risk of intrusion
- Highest level of protection though holistic cyber security

Smart Communication & Cyber Security

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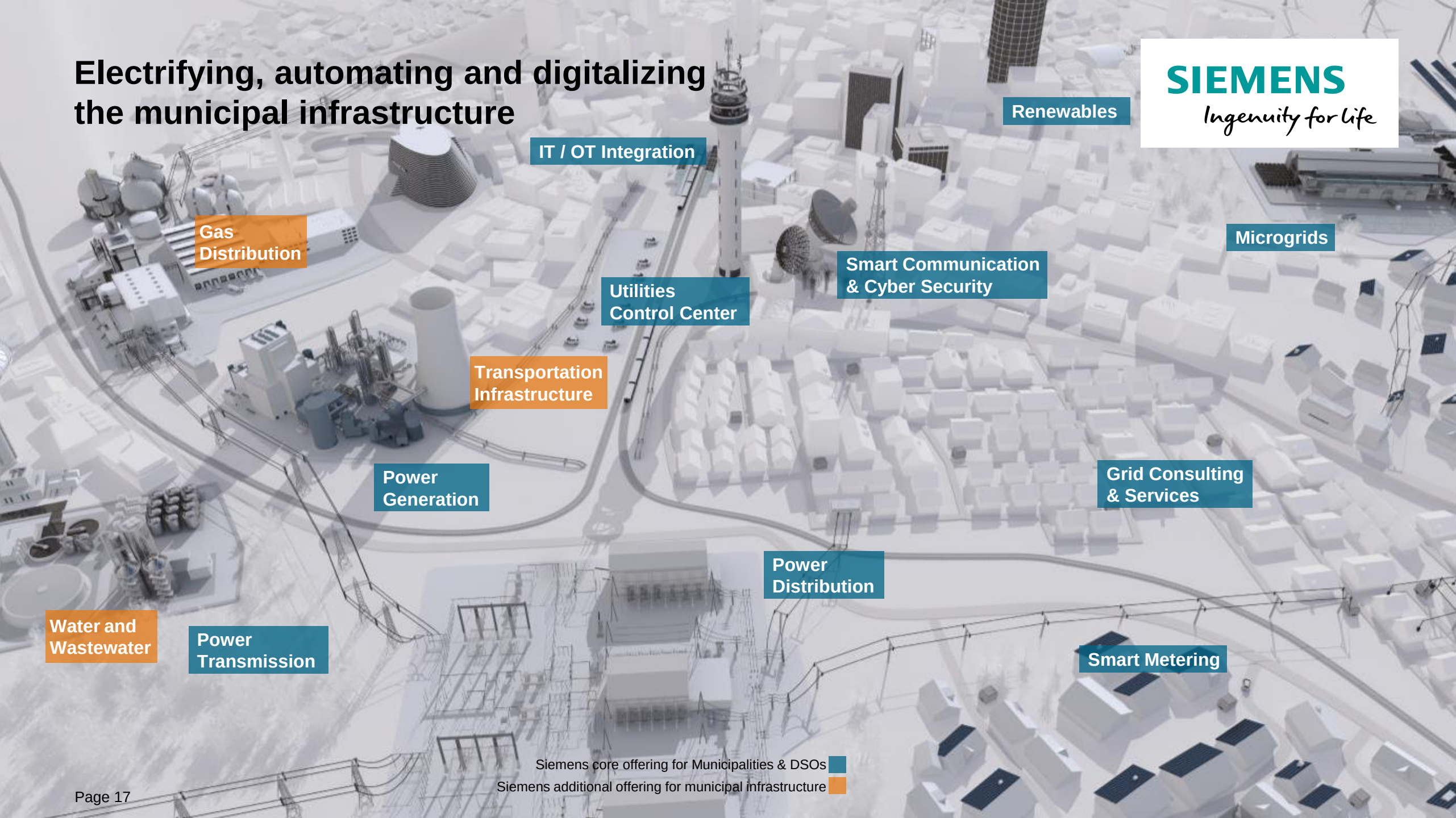
Electrifying, automating and digitalizing the municipal infrastructure



Siemens core offering for Municipalities & DSOs

Siemens additional offering for municipal infrastructure

Gas Distribution

Challenge

Solutions for a reliable and safe domestic gas supply

Solution

- Powering gas facilities
- Managing gas distribution
- Reliable forecasting
- Condition analysis

Benefits

- Optimal use of gas purchases
- Holistic consideration of dispatchable loads and own generation
- Uninterrupted supply

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Water and Wastewater

Challenge

Solutions for a safe and cost-efficient water production, drinking water treatment and distribution, and water sewage

Solution

- MV and LV power supply installations
- Pumps and motors
- Process automation equipment and software
- Modular water management system incl. leakage identification and localization simulation of network behavior

Benefits

Efficient operation, control and automation of water / wastewater facilities

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Transportation Infrastructure

Challenge

Well organized and efficient public transportation and traffic management systems

Solution

- Rolling stock from trams to metros
- Rail electrification and automation
- E-vehicle infrastructure
- Intelligent traffic control systems
- Parking space management

Benefits

- Manage ever-increasing traffic in cities
- Satisfy citizens' needs for fast and comfortable transportation
- Reduce CO_2 emission and air pollution

Siemens Energy Management lives up to future challenges with the most comprehensive portfolio

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Large power generation | TSOs | Municipalities and DSOs | Distributed generation | Oil and gas | Industries | Infrastructures / construction

Digitalization

Software/IT
Grid control – big data analytics – grid application

Automation

Communication, automation, protection, and field devices

Electrification

Electrification solutions
High-voltage direct current (HVDC) transmission – grid access – FACTS – air-insulated/gas-insulated substations – power systems solutions – microgrids / nanogrids

Products and systems
High-voltage switchgear – power transformers – medium-voltage switchgear – distribution transformers – low-voltage circuit breaker

Services and security

TSO: Transmission system operator DSO: Distribution system operator

The Siemens Municipality Suite (Electrification)

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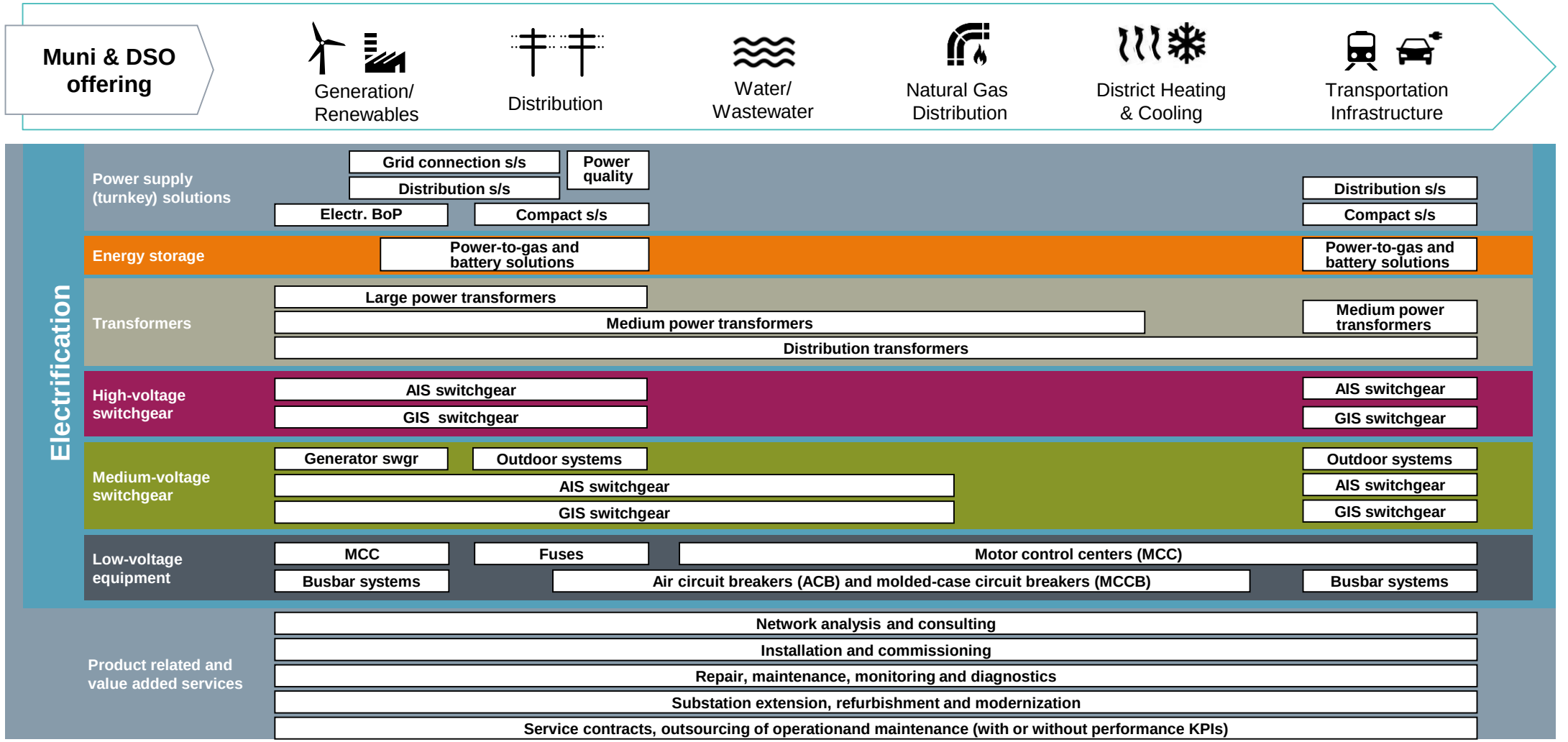

AIS – Air insulated switchgear
HIS – Highly integrated switchgear
BoP – Balance of Plant
swgr – switchgear
GIS – Gas insulated switchgear
s/s – substation

The Siemens Municipality Suite (Automation & Digitalization)

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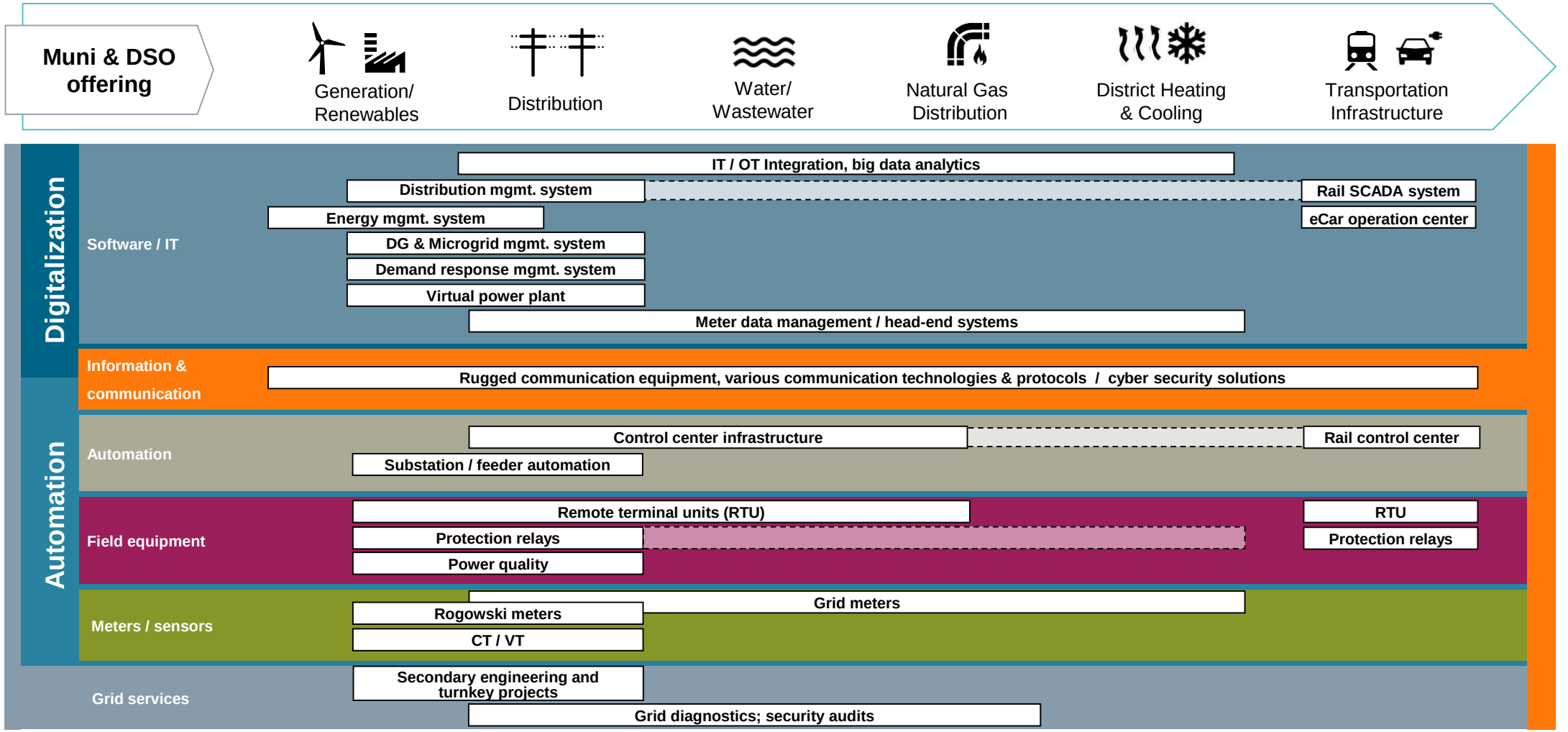

DG – Distributed generation
VT – Voltage transformer

CT – Current transformer
IT / OT – Information & operational technology

Municipalities & DSOs
Portfolio highlights

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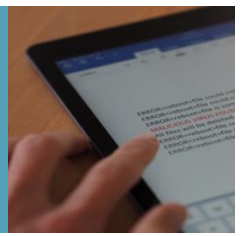
Transmission substations		Integration of renewables		Control centers	
Distribution substations		Smart grid applications		Multi-utility technologies	
Compact substations		Grid-related services		Site safety & security	
Outdoor distribution equipment		Financing services		Cyber security	

Municipalities & DSOs
Transmission and distribution substations

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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

HV: high-voltage MV: medium-voltage

Municipalities & DSOs
Compact substation and outdoor distribution equipment

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Compact substations (Secondary distribution, MV/LV)

Bridging “the last mile” – with our MV switchgear, LV switchboards, distribution transformers, remote control, and protection equipment

Outdoor distribution equipment

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

MV: medium-voltage LV: low-voltage

Municipalities & DSOs
Integration of renewables and smart grid applications

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Integration of renewables

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

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

Municipalities & DSOs
Grid-related services and financing services

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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 contract and outsourcing of operations and maintenance

Financing services

Commercial finance, tailor-made project financing; insurance and other innovative financial solutions from Siemens Financial Services (SFS) – for your invest in infrastructure

Municipalities & DSOs
Control centers and multi-utility technologies

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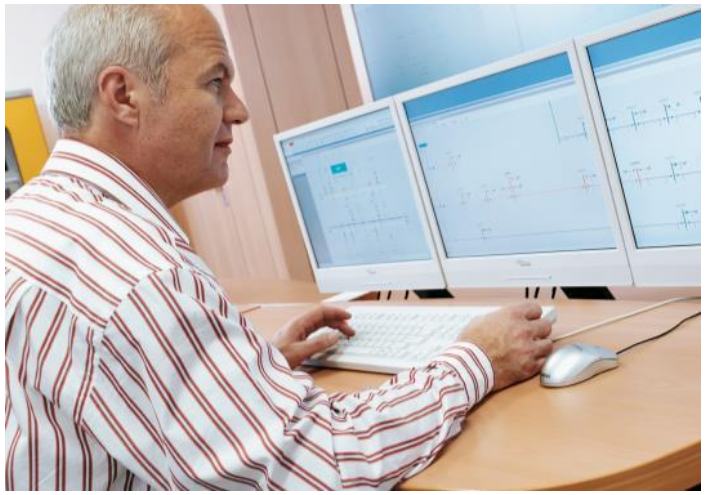
Control centers

Efficient network operations – with our control center in multi-site 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

MV: medium-voltage LV: low-voltage

Municipalities & DSOs
Safety & security applications

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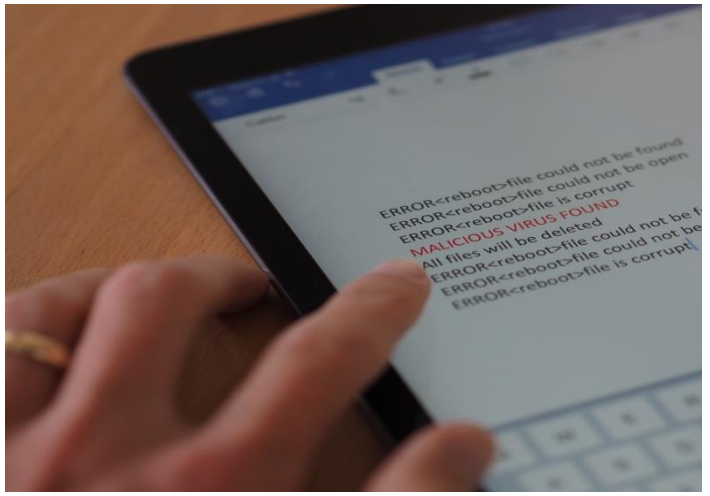
Ingenuity for life

Site safety & 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 for security standards, network penetration tests, access control and password management, security patch management for SCADA, and cyber security training



Municipalities & DSOs References

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New Brunswick Power, Canada

University Campus of Savona, Italy

Stadtwerke Krefeld (SWK), Germany

Hydropower plant, Zurich (ewz), Switzerland

EWE NETZ, Germany

Netze BW, Germany

Troms Kraft, Norway

İSU, Turkey

Aare Energie (a.en), Switzerland

Riverside Memorial Hospital, United States

CEMIG, Brazil

Bashkirian Power Grid Company, Russia

Municipalities & DSOs reference:
Smart solutions – New Brunswick Power, Canada

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Challenge

- Modernize the electrical supply system
- Allow greater customer choice, control and education
- Balance consumption and generation
- Become “utility of the future”

Solution

- Reduce and Shift Demand (RASD) modernization plan in July 2012, a multi-year agreement to integrate smart grid technology into New Brunswick’s electrical system
- Backbone of the system is Siemens Demand Response Management System (DRMS) and Decentralized Energy Management Suite (DEMS)

Benefits

- Created Smart Grid Center of Competence (40 new local jobs immediately created)
- End customers receive more choice on electricity use
- Improved image
- Clear return on investment

Why Siemens?

- Experience in smart cities / infrastructure
- Know-how in integrating all components
- Image as a leader in the market
- Customer already worked with Siemens
- Similar long-term vision

Municipalities & DSOs reference:
Smart energy supply – University Campus of Savona, Italy

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Challenge

- High degree of efficiency in power generation
- Optimization across different energy sources
- Better management of renewable energy sources
- Reduction in emissions
- Increased system resiliency

Solution

- Siemens Microgrid Manager integrates renewable (rooftop photovoltaic and concentrating solar generation) and traditional power generation sources
- Siemens e-car operation center

Benefits

- Increased energy efficiency
- Reduced operation costs and CO_2 emissions
- Improve image of campus and increase attendance
- New R&D opportunities jointly developed with industry and DSOs
- Be a prototype for similar applications in urban or industrial districts

Why Siemens?

- Clear plan to reduce costs & C02 emissions
- Experience with decentralized energy
- Best technical evaluation in tender process
- Global company, but works locally
- Leader in microgrid development

Municipalities & DSOs reference: A smart grid for Wachtendonk – Stadtwerke Krefeld (SWK), Germany

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Challenge

Modernize aging infrastructure and increase grid capacity to intelligently integrate renewable energy sources while guaranteeing reliable power supply

Solution

Comprehensive, integrated solution that includes all components for intelligent distribution substations and smart meters, as well as measuring, monitoring, and communication

Benefits

Cost efficiency through:

- Avoidance of grid extension while increasing capacity by 35 percent
- Reliable operation of grid infrastructure
- Compliance with federal regulations
- Reduction of CO_2 emissions by integrating renewable energy sources

Why Siemens?

- Best solution to reduce costs and avoid grid expansion
- Experience in working with renewable energy sources
- Image as best-in-class player

Municipalities & DSOs reference: Tinizong hydropower plant upgrade in Zurich (ewz), Switzerland

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Challenge

Siemens upgraded the Hydropower Plant Tinizong in Switzerland, including the replacement of a majority of the electromechanical system components in the plant. Built about 60 years ago, the Tinizong hydroelectric plant's 70-megawatt capacity makes it the most powerful station owned by ewz, the utility company of Zürich and Mittelbünden, Switzerland

Solution

- VB1 – Generator breaker switchgear
- Transformers
- Various other switchgear units
- Secondary systems for control and protection purposes
- High-voltage components

Benefits

- High level of operational safety by means of clearly arranged switching operations
- Solution-oriented special plant business with a Siemens-wide portfolio
- The generator switches are configured with proven switch technology for the highest operating currents

Why Siemens?

- Established very good, trusted, long-lasting relationship with the customer

Municipalities & DSOs reference:
Intelligent transformer substation – EWE NETZ, Germany

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Challenge

- Increasing number of wind and solar power plants has an significant impact on the power flow in the grid
- The components of the grid have to deliver numerous information and must be able to regulate different situations

Solution

- Delivery of an intelligent 8DJH, 24kV, 16kA, 630A
- Switchgear combined with a regulated distribution transformer
- Flexible e-house concept

Benefits

- Reliable partner for flexible intelligent transformer substations
- Flexibility of the switchgear if upgrade of existing stations would be necessary

Why Siemens?

- Siemens is a trusted partner in the area of medium-voltage switchgear for intelligent transformer substations

Municipalities & DSOs reference:
Area voltage control and self-healing grid – Netze BW, Germany

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Challenge

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

Solution

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

Benefits

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

Why Siemens?

- Proven energy automation technology
- Seen as innovative leader in this field
- Experience with decentralized energy and renewable energy sources

Municipalities & DSOs reference: Legacy substation migration to new system solution – Troms Kraft, Norway

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Challenge

- Migrate the legacy control unit to a new state-of-the-art control and monitoring system
- Visualization system based on SICAM SCC provided the customer with total central control and monitoring of the substation

Solution

- Replace the old system by a SICAM PAS and SICAM SCC system
- The field devices were replaced by SIPROTEC 4 devices, which offer IEC 61850-based communication

Benefits

- With the new substation monitoring, control, and protection system, data communication far exceeds standards in terms of speed and ease of maintenance
- Self-monitoring, flexible redundancy concepts, and simple remote maintenance ensure high availability

Why Siemens?

- Leader in energy automation field
- Clear three step approach for migration
- Legacy devices could be connected to SICAM PAS, ensuring a smooth migration

Municipalities & DSOs reference:
Integrated water network control system – İSU, Turkey

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Challenge

New waste water SCADA system:
Provide complete solution for the entire monitoring and control system for wastewater and integrating into already existing freshwater control system

Solution

The system is based on SIMATIC WinCC OA for the SCADA system, which also controls a number of high-definition (HD) cameras, on SICAM TM RTUs, and on third-party RTUs

Benefits

The new system makes İzmit the only municipality in Turkey that manages all freshwater supplies as well as wastewater treatment with a single integrated control system

Why Siemens?

- Quick time frame for completion – 8 months
- Proven solution provider for sustainable growth of large cities
- Proven integrated technology company
- Experience with metropolitan municipalities

Municipalities & DSOs reference:
Modernized protection system – Aare Energie (a.en), Switzerland

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Challenge

Modernize the 16-kV medium voltage substation and equip with state-of-the art, reliable, efficient protection system

Solution

- 9 x Distance protection 7SA86 (feeder)
- 3 x Overcurrent protection 7SJ85 (transformer, coupling)
- Medium-voltage switchgear: 8DJH

Benefits

- Provide an innovative and reliable energy automation system regarding protection and automation functions, communication interfaces and physical realization of the substation
- Modularity of hardware and functionality of SIPROTEC 5 enables customer a customized and cost-efficient protection solution over the entire life cycle
- Rely on a proven technology with SIPROTEC devices

Why Siemens?

- Leader in the market for protection devices
- Proven technology
- Cost-efficiency

Municipalities & DSOs reference:
Reliable power supply– Riverside Memorial Hospital, United States

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Challenge

- A&N Electric Cooperative (ANEC) provides Riverside Shore Memorial Hospital with power
- Riverside Share Memorial Hospital had multiple service interruptions that lasted up to 40 seconds before being restored, which could be life-threatening in a hospital environment
- ANEC needed to ensure the hospital received reliable, consistent power

Solution

- Together with ANEC and RuggedCom, Inc., Siemens successfully deployed an ultra high-speed distribution feeder automation (DFA) system
- The scalable DFA system acts as an extension to a substation. The system performs the functions of fault detection, isolation and restoration.

Benefits

- This feeder automation system helps the hospital through optimized fault detection and by transferring to alternative power sources in less than half a second
- This solution minimizes the extent of power outages by quickly detecting affected areas and enabling the hospital staff to focus again on the patients

Why Siemens?

- Highly scalable solutions
- Minimal investment – maximum effect
- Partnering for innovative solutions

Municipalities & DSOs reference: Smart meter solution – CEMIG, Brazil

SIEMENS
Ingenuity for life

Challenge

- Challenge: High cost with individual and manual reading on HV-MV industrial consumers
- 10,000 geographically dispersed consumer units
- High non-technical losses

Solution

- Metering Center with Siemens MECE Software and AMI (GPRS RTU)
- Remote and near real-time monitoring and control of around 18,000 (0.5% of total) consumer units that represents around 46% of CEMIG's revenues;
- Smart metering solution in all of the 18,000 consumer units
- Algorithms and alarming systems anti-tampering and anti-theft

Benefits

- Direct cost savings/OPEX reduction (field and back office workforce labor optimization, energy loss reduction)
- Better data management and enhancement of fraud and theft detection by accessing customer load profiles and reports
- Non-technical losses reduction of ~48 GWh and US$ 7.5 million
- CEMIG recovered their investments in the metering center in less than a year

Why Siemens?

- Software and hardware was best fit for customer requirements
- Shared spirit of innovation
- Trustful partnership with strong and experienced supplier

Municipalities & DSOs reference: Electrical network modernization – Bashkirian Power Grid Company, Russia

SIEMENS
Ingenuity for life

Challenge

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

Solution

- Design of strategic long-term development plan for Ufa electrical network
- Innovative automation, protection and metering concept
- Development of transition roadmap to year 2020 network model
- Proof of outstanding network performance

Benefits

- Plan for complex network modernization
- Improved reliability of power system
- Development of the network with smart grid elements
- Optimal investment strategy

Why Siemens?

- Wide experience in strategic power system development
- High competence in technical as well as economical evaluation
- Supplier of innovative smart grid solutions

Contact

Sales Support and Customer Service for Power Transmission and Distribution

You can contact us 24/7.
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* Charges depending on provider