Nexans

Solutions and services
to help you deploy a smarter grid

Nexans helps you to evolve towards a Smarter Grid

Whether you have a basic network with essential internal communications, or an expanded network Nexans can help you evolve upward through four technological stages.

STAGE 1

PRODUCTS, SOLUTIONS AND SERVICES

Advanced cables, link design, accessories, energy/data solutions, turnkey installation, ongoing maintenance, wind/ photovoltaic technologies, and recycling.

STAGE 2

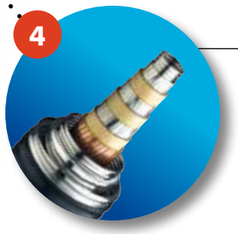
SENSORS

Sensors in overhead and underground lines detect cold & hot spots, and monitor current load and congestion around-the-clock, so that load can be safely increased and congestion can be removed.

STAGE 3

COMMUNICATIONS

Data transmission is enhanced with Field Area Networks using Nexans optical fiber & field Ethernet switches to provide Smart Metering data collection infrastructure and real-time command and control of substations. The robust G3-PLC (Power Line Communication) protocol on MV network allows cost effective data transmission on utility existing power cables. With its new PLC couplers range, Nexans offers a simple, robust and economical solution for helping power grid operators take advantage of smart monitoring capabilities.



STAGE 4

NEW TECHNOLOGIES

Grid connections are enabled through fault current limiters and direct current import/ export. Superconductors allow more power to be carried, especially in dense urban areas, while reducing the impact on the environment in terms of thermal or electromagnetic interference. In general, the same amount of power can be transported at lower voltage levels.

The drivers of the energy business...

While 1.5 billion people worldwide are still without electricity, power generation capacity has been increasing by 3% annually to provide human comforts and create conditions for economic growth. This has been putting undue strain on existing infrastructures, which in many cases date from the 50s and 60s. As a power utility or power provider you want to make your network smarter to deliver the highest level of:

GRID EFFICIENCY

You want to transport the most energy possible, with minimal losses or bottlenecks.

- You need to discover hidden congestion problems due to cable type and capacity, or network architecture, and assess potential risks, like changing climatic conditions.
- Where congestion creates delivery problems, you want to reroute, share or import power.
- You require continuous monitoring, network supervision, and smarter transmission tools to assess a situation and take immediate action.

In addition, you want renewable energy resources feeding into your network at every level, with improved load management, possibly via dynamic control.

You need to access vital user data through Advanced Metering Infrastructure (AMI) and exchange information through high-speed optical fiber.

...demand Nexans' global expertise

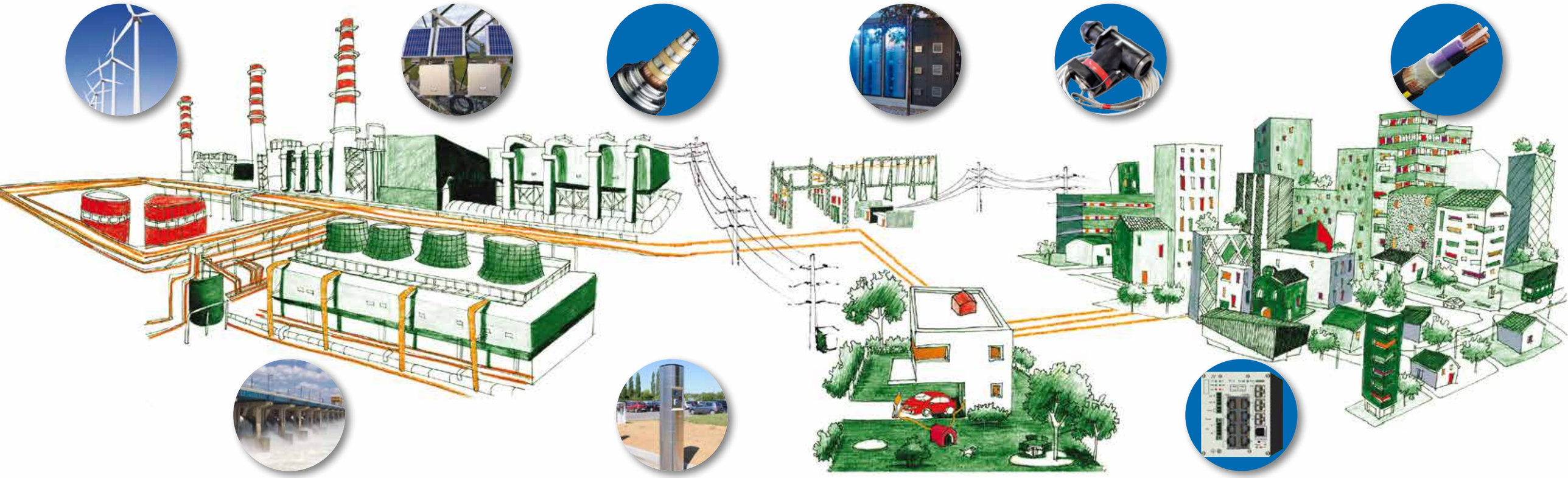
POWER RELIABILITY

You must be certain that electricity is delivered reliably, meaning no cuts, breakdowns, cascading failures or blackouts, and without frequency variations or quality fluctuations.

- You want to reduce equipment failure and decrease the quantity and duration of faults and outages. Safety implies quickly spotting overheating to prevent lines from sagging onto trees, or freezing rain which can lead to ice accretion and power failure.
- You need to discourage energy theft, a major threat to infrastructure, service and profitability.
- You want to fully control substation operations and assure the integrity of your client lists and the security of data.

ENVIRONMENTAL RESPONSIBILITY

- Because your customers are environmentally sensitive, you need to reassure them that buried and overhead lines are safe, and generate minimum losses and CO_2, with low Electro-magnetic Interference (EMI).
- Your network should allow interaction with electric vehicles, clean energy generation, and user-friendly consumption for customers.
- When networks are upgraded, obsolescent cables must be removed with no damage to urban areas or natural habitats, and materials recycled safely and efficiently.



Nexans' solutions and services help you...

GRID EFFICIENCY

To transmit energy in the most efficient way possible over your network requires simulation of actual performance to see where losses and saturation are occurring. Corrective action could include more efficient conductors, real-time monitoring and superconductors. Energy loss can be vastly reduced by new cable designs and highvoltage DC underground and submarine cables.

TRANSMISSION NETWORK: capacity increase solutions

When your network is over-congested, Nexans can perform computer simulation in order to identify bottleneck locations and supply load monitoring solutions. If this is not enough, Nexans proposes the replacement of saturated cables with cables that carry more energy.

Dig into your untapped reserves with Dynamic Line Rating solutions

- Nexans provides Dynamic Line Rating for overhead transmission lines. This technology allows utilities to know the true transmission capacity in real time, it increases transmission capacity significantly for over 90% of the time, and protects the transmission lines from overheating and sagging beyond safety limits.

Nexans has installed the system for over 100 utility customers, including Manitoba Hydro (Canada), Kansas City Power and Light (USA), RTE (France) and REE (Spain). Installations with ONCOR (USA) within the framework of the American Recovery and Reinvestment Act of 2009, has been shown to improve market efficiency by unlocking usable transmission capacity and increase reliability by augmenting situational awareness.

The Oncor Smart Grid Demonstration project in the USA has already saved millions of dollars in congestion in Texas' real time wholesale electricity market. With a new forecasting system, DLR benefits will extend beyond real time to "day of" and "day ahead" operations.

...meet your challenges to build a smarter grid

Increase grid capacity with Nexans Lo-Sag® technology

- After successful installation in Brazil with our customer LIGHT, RTE, France's electricity transmission system operator (TSO), is trialing a new type of overhead power line using Nexans' carbon fibre composite technology in Haute-Vienne, in the Limousin region.

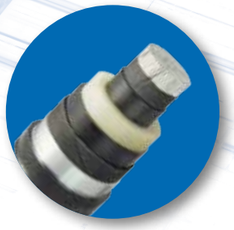
With the advantage of reduced capital investment compared to entirely rebuilding the line, these new carbon core conductors are lighter and offer higher mechanical strength compared to standard conductors.

They can be designed to operate at higher temperatures, thus allowing temporary or permanent increase in capacity, and improving the overall reliability of the network.

This innovation provides TSOs with opportunities to adapt their high- and extra-high voltage networks to meet the needs of tomorrow's energy landscape for redistribution of power generation, especially with the development of renewable energy resources.

Transport electricity over longer distances with HVDC

- High-voltage DC cables deliver high power capacity over longer distances, in both terrestrial and submarine conditions. Nexans HVDC submarine cables are connecting Northern Ireland and Scotland, while another cable runs under the Channel between Dover and Calais. An Integrated Return Conductor eliminates the magnetic field, thus protecting the marine environment.



Nexans' solutions and services help you...

GRID EFFICIENCY

DISTRIBUTION NETWORK: solutions to increase and control renewable power

To respond to growing demand and provide uninterrupted power to customers, networks need to accommodate energy from any source, including minigrids, photovoltaic rooftop arrays, fuel cells, or windparks. Centralized generation and control need to give way to distributed generation and intelligence so that power can be exchanged on the open commodity market.

Allow the existing electricity distribution network to detect, measure & communicate

- To increase the observability of the Distribution Network, Nexans has developed a full range of highly tunable Smart Accessories that allow very precise grid parameter measurement and full data communication using Power Line Communication. Improved load management, possibly via dynamic control, is currently tested in real operational situation with several key Nexans customers.

...meet your challenges to build a smarter grid

TRANSMISSION AND DISTRIBUTION NETWORKS: solutions for monitoring

Increase assets lifetime by avoiding temperature excursions

- Nexans makes it possible for you to adapt HV load management for both OHL (through DLR) and underground cables (through real time temperature rating system).

Cable Distributed Temperature Sensing uses optical fibre units in the surrounding sheath to determine precise temperature profiles, detect cold (due to submarine cable unburied...) or hot spots (due to hot water pipes, etc.) and allow control and monitoring of load over long distances.

Communicate in all conditions

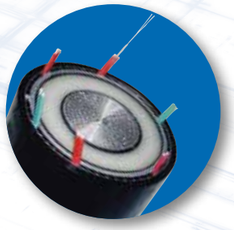
- Its new Smart Grid range of Smart Accessories puts Nexans at the heart of energy transition dynamics through the development of PLC (Power Line Communication) metering and communication solutions for power distribution networks.

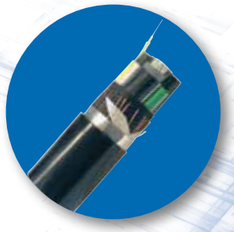
  Nexans is implementing its new solutions in many collaborative projects and particularly in "SoGrid", a consortium established to develop a third generation PLC chain of sensors and communication devices for end-to-end power distribution networks. From smart meters installed at customers' premises, to connection equipment distributed across the medium voltage network to the source substation, a comprehensive chain of devices will be deployed on French Distributor ERDF's network in Toulouse in order to demonstrate the performance of G3 PLC during real-time control of the grid.

- To merge energy and data networks, Nexans has developed compact and ruggedized IEC 61850 Ethernet switches especially designed for energy providers. Within an integrated network (including optical fiber and passive components), Nexans i-switches support all security mechanisms: IEC 61850 protocol, MMS, encryption, customer identity, authentication, access, surveillance, remote control, transformer monitoring, etc, and feature specialty extra fast network redundancy management.

Implement communication solutions for Advanced Metering Infrastructure (AMI)

- Specialty electronic data concentrators allow the information from Smart Meters to flow both ways between LV & MV networks, on power cables, without any transformer impact. Safe and robust, this solution builds on Nexans' ability to master several types of PLC communication systems.





Nexans' solutions and services help you...

POWER RELIABILITY

To ensure network reliability you need to maintain your network in the best possible state and improve it through products, solutions, services and training. Nexans protects the value of your network over time, and facilitates upgrades in the most cost-efficient, logical way, always taking into account factors like climate, population density and available right-of-ways.

TRANSMISSION GRID OPERATORS

Increase assets lifetime with adapted maintenance

- Only an active manufacturer of traditional fluid-filled cables and accessories and latest-generation XLPE cables can provide Through-Life Support, either as single modules adapted to special needs, or as a complete service package which includes predictive, preventive and corrective maintenance, and emergency intervention. Nexans is maintaining networks for power utilities worldwide.

Keep the know how with hands on training

- Nexans is dedicated to keeping expertise alive through special training programs for its customers. The Nexans HV Training Centre, based in Switzerland aims at standardizing installation and methodology, and providing theoretical and basic training for everyone involved in cable systems: jointers, engineers, maintenance personnel, network managers, etc. This service is also available from Nexans Power Accessories in France and Belgium for Medium Voltage Networks.

Avoid outages and restore power faster

- For excessive sag and broken conductor detection, Nexans uses the capability of its CAT-1 solution for overhead transmission lines. This technology allows utilities to identify and fix soon enough ice events creating excessive conductor sag, but also to locate quickly broken conductors resulting from exceptional weather events.

Keep the power on with temporary site cables

- Temporary construction site cables are HV replacement cables – now up to 220 kV - that are used during the maintenance, repair and modification of your overhead lines, transformers and substations. They provide a temporary "bridge" or a source of emergency power. They can either be purchased or rented, and allow you to reduce outages and increase the availability of all your network assets.

...meet your challenges to build a smarter grid

DISTRIBUTION GRID OPERATORS

Increase grid efficiency and realize cost savings with Superconducting Fault Current Limiters

- For Vattenfall in Germany, Nexans installed the world's first High Temperature Superconducting (HTS) Fault Current Limiter in a power plant to provide short-circuit protection for the internal medium voltage power supply (12 kV) that feeds coal mills and crushers in a brown coal power plant.

This system can get a 63 kA short-circuit current down to 21 kA instantaneously and down to 7 kA in less than 10 milliseconds, thus providing unparalleled protection.

Proving that this technology is now fully mature, Nexans recorded in March 2014 a significant commercial order for 2 HTSFCL with Western Power Distribution in UK. Installation of the pioneering technology will be in the frame of the FlexDGrid project, financed by GBP 17 million from the Low Carbon Networks Fund in the city region of Birmingham.

Maintenance works: get the right thing delivered on site on time!

- When you do a repair, you want to have exactly what you need when you need it. Nexans provides MV customized accessory kits on site for greater flexibility. They contain all equipment and pre-connectorized, pre-cut cables needed to splice in replacement cable or make a connection. This decreases outage time, and lowers the risk of error and repeat failures.

Nexans' solutions and services help you...

ENVIRONMENTAL RESPONSIBILITY

To meet public concerns about the environment and energy sustainability, power providers want safe practices at every level: from diverse power generation to domestic household wiring. Nexans not only protects the environment through safe materials, designs and installation, but prolongs your network's lifetime by assuring safe removal, replacement and recycling.

REDUCE YOUR ENVIRONMENTAL IMPACT

Get to know the environmental impact of your purchased solutions

- Nexans Life Cycle Assessment makes it possible to compare and determine the best environmental solution for your network. Using this method, the ecological footprint of a product can be measured, from raw material extraction to end-of-life disposal, and includes production, distribution and use.

Dismantle, recycle and get value back!

- Nexans has patented a safe way for draining oil in cables with a special eco-friendly mixture that reduces residue to a minimum. Cables are recycled as secondary raw materials (copper, aluminum and plastics) through Recycable (owned jointly with Sita).

Less civil works = less impact

- For distribution, Nexans has several MV underground applications. Directly Buried Cables free the skyline from overhead lines, and reduce truck movement and burial activities to a minimum.

  Hybrid power and fiber optic cables provide important multifunction capacity for enhanced monitoring and control. Smart Accessories, able to supply information, allow you to keep a constant eye on your network.

Re-use existing infrastructure

- A Nexans retrofitting solution saves civil engineering, installation costs and the time required to expand your network. Existing pipes for housing fluid-filled cables are reused to accommodate next-generation XLPE cables. With a range of high-voltage cables available, a power transmission network can continue to grow flexibly according to actual power needs, and in a sustainable way.

...meet your challenges to build a smarter grid

CITIZEN BENEFITS

Who said Superconductors are not commercial solutions?

- A combination of 10 kV HTS cable and Superconducting Fault Current Limiter is today supplying power to the city center of ESSEN (Germany), replacing a 110 kV conventional cable. As a consequence, this example demonstrates that it is possible to replace a huge HV substation in a dense city center by a medium voltage substation which requires by far less space. Nexans' customer RWE has highlighted the key improvement for ESSEN citizens, as the system has no thermal or electromagnetic impact on the environment, and is re-using existing right of way, together with pushing the huge HV transformers outside the city limits.
  For the Long Island Power Authority (LIPA) in NY, Nexans had installed in 2008 the world's first high-voltage superconducting cable system. The 138 kV system enables transferring the same amount of power as a standard 345 kV overhead line in urban and suburban areas.

Electric Vehicles: cost is of the essence

- Nexans has developed full cost effective Electric Vehicle infrastructure for both inside and outside parking lots.
  In the frame of French Eco2CHARGE projects, intelligent solutions are experimented together with major partners among which Bouygues Energy Services and Renault. The project aims at accelerating the deployment of electric vehicles by turning tertiary sites equipped with charging infrastructure into fully fledged energy ecosystems where power generation, consumption and storage come together in the same place.

Turnkey solutions for the integration of renewables

- Nexans supplies a full range of WINDLINK™ cables to virtually every wind turbine manufacturer worldwide, and has been instrumental in developing environmentally-friendly infrastructure solutions both onshore and offshore. Technical expertise is often provided at the design phase. We have been present in projects like Horns Rev (Denmark), Sheringham Shoal (UK) and Alpha Ventus (Germany).

Smarter power grids: towards an "internet" of energy

Nexans wants to support its customers in achieving the three drivers of the energy business: Grid Efficiency, Power Reliability, and Environmental Impact in the most cost-efficient way.

With energy as the basis of our development, and a strong telecommunication background, we are uniquely placed not only to supply complete cables and cabling solutions for power generation, transmission and distribution networks, but also to furnish the decisional tools and technical means required to increase capacity, reduce losses and meet the challenges of congestion, bottlenecks and blackouts.

More than just producing cables, Nexans is committed to providing you with the support, expertise, assistance, design input, services, maintenance and planning you need to move upwards towards the information-rich power network through four successive stages:

- Products, solutions and services
- Sensors
- Communications
- New technologies

As experts in network engineering, we can help you build a smarter network today, and a truly smart grid tomorrow offering:

- Faster response to consumer peak demand
- Optimal network design and the elimination of weak links
- Telecommunications for monitoring, control, and management
- Incorporation of "green" energy in bi-directional flows
- Life-time maintenance and timely technological upgrades
- Environmental responsibility and safe recycling

A smarter grid through...

GLOBAL EXPERTISE
With our broad experience in providing energy/ telecommunications cabling solutions worldwide, we are well-positioned to build successive layers of intelligence into your network through testing, simulations, sensors, communications, new technologies and advanced services.

LOCAL PRESENCE
To serve the international needs of power utilities when upgrading grids to handle crossborder or even continental energy flows, Nexans takes a total service approach which includes customization, standards, local manufacturing, logistics, maintenance and even training.

INNOVATION
Nexans prolongs the life of conventional networks and assures a smooth transition to the smarter networks of the future by developing more efficient technologies, promoting information-based solutions, and integrating eco-friendly energy sources, like wind power and photovoltaics.

Nexans

Global expert in cables and cabling systems

Nexans brings energy to life through an extensive range of cables and cabling solutions that deliver increased performance for our customers worldwide.wNexans' teams are committed to a partnership approach that supports customers in four main business areas: Power Transmission and Distribution (submarine and land), Energy Resources (Oil & Gas, Mining and Renewables), Transportation (Road, Rail, Air, Sea) and Building (Commercial, Residential and Data Centers). Nexans' strategy is founded on continuous innovation in products, solutions and services, employee development, customer training and the introduction of safe, low environmental impact industrial processes. In 2013, Nexans became the first cable player to create a Foundation to introduce sustained initiatives for access to energy for disadvantaged communities worldwide. We have an industrial presence in 40 countries and commercial activities worldwide, employing close to 26,000 people and generating sales in 2013 of nearly 6.7 billion euros. Nexans is listed on NYSE Euronext Paris, compartment A.

Nexans S.A. – 8, rue du Général Foy – 75008 Paris – France
Tel.: +33 (0)1 73 23 84 00 – Fax: + 33 (0)1 73 23 86 38 – www.nexans.com/smartgrid
marcom.info@nexans.com

Document printed on paper PEFC 100% Cert. No PEFC/10-31-1592 from sustainably-managed forest 10/2014 PONT11 Credits: © Fotolia - Thinkstock - Nexans - Illustration: Diane Berg