

Nexans



KEYLIOS™

**Complete cable solutions and services
to connect photovoltaic projects**

Growing your photovoltaic potential...

Even in somber economic times, solar energy has given rise to a glowing optimism around the planet. The potential of unused spaces, like rooftops, non-arable land, and deserts is extraordinary – with developing societies often enjoying an abundance of available free sunshine. It has been calculated that less than 1% of the European landmass covered with photovoltaic modules could meet Europe's entire electricity consumption, and that 4% of the world's deserts could fully satisfy global demand.

Countries have set ambitious targets for renewable energy: 25% of total electricity production by 2025 for the US, 15% of total energy consumption by 2020 for China, and 20% by 2020 for the EU. Solar growth forecasts have been largely surpassed already, and installations are set to multiply 2.4 times by 2014, with double-digit growth annually. Led by Germany, Europe is still the market leader; however growth is booming in Japan, the US, Canada, Australia, and soon in China and India, with North African countries, mainly Morocco, waiting in the wings.

The real critical mass or momentum for solar power is grid parity, the point at which photovoltaic electricity is equal in cost or cheaper than electricity available from the distribution

network. Within years, it will be achieved in areas with abundant sun and high electricity costs, like California, Japan and Italy.


As a photovoltaic panel manufacturer, junction box maker, installer, integrator, project developer or wholesaler, you want to be present on this dynamic and growing market. For that you need higher performance cable products, and a host of solutions and services, including monitoring and simulation to find a profitable place in the sun.

What you expect from a cable solution producer:

- Worldwide presence and international and local certifications
- Local resources and plant capacity wherever possible
- Expertise that includes energy, telecommunications and grid connectivity
- Fast response time for urgent technical questions and orders
- Quality and performance, especially for inter-array, inverter, and transformer cable solutions
- Survivability and longevity especially in hot, sunny and ultra-cold environments
- Solutions and services that go beyond cables: monitoring, simulation, training



...requires **KEYLIOS™** cables, solutions and services



Rather than just provide cables and components, Nexans' widely-recognized KEYLIOS™ solutions can outfit a complete solar installation, assuring that all elements are fully interoperable and compatible. Nexans contribution to photovoltaic applications is through high-end, quality products which result in long-term performance, surveillance, monitoring and remote control, operational security and fire safety. In addition, Nexans is dedicated to offering fast delivery and support around the world, and a high level of warranty.

We produce every cable that could be used for residential or commercial or solar farm applications: from photovoltaic LV cables for linking PV panels to copper/aluminum cables carrying energy from array boxes to inverters. And we provide special halogen-free cables for secure rooftop installations, silicone cables to meet the challenge of desert or cold environments, and earth/ground cables to guard against short circuits and fires.

Nexans also has several solutions (including accessories) for reliable inverter-transformer-switchgear connections. Household equipment includes special cabinets for network feed-ins. Copper and fiber-optic solutions for surveillance and control include sensor and bus cables (for tracking systems), advanced LANs, and active switches for communication and monitoring.

Beyond cables, Nexans is unique in being able to add a number of essential services for solar players: from monitoring and control services through Intelligent Internet Gateways to Life Cycle Assessment and Simulation (to design the right architecture).

KEYLIOS™, a wide range of reliable cable solutions and services for quality and performance

- World supplier of all cables for photovoltaic applications
- International certification including UL/CSA, and TÜV
- Fire performance and protection through halogen-free insulation and sheaths
- Innovative and customized coordinated energy/data solutions
- Pre-engineering and simulation for optimal network architecture
- Fast response time and On-Time-In-Full (OTIF) delivery through advanced logistics
- Technical and R&D support for Life Cycle Assessment
- A host of services related to the world of photovoltaics

KEYLIOS™, a full range of cable solutions and services...

Photovoltaic cables

These state-of-the-art 0.6 to 1 KV cross-linked ENERGYFLEX® cables offer exceptional performance, easy installation and long-term reliability for short DC connections. They link photovoltaic panels on rooftops or solar fields, and also connect them to the array box (if one exists), or to the inverter which transforms DC solar energy into usable AC electricity. Resistant to extreme temperatures (-40°C to +120°C), ozone and UV, these zero-halogen cables are low-smoke and flame-retardant for enhanced fire security. Both UL and TÜV-certified, they fit main connectors, are color-stripped for easy installation and phase identification, meet RoHS directives, and are fully recyclable. Through its multiple plant capacity, Nexans is able to provide them anywhere in the world.

For Schneider Electric, Nexans supplied over 1,000 km of ENERGYFLEX® photovoltaic cables in a mere 2½ months for a photovoltaic farm in Sanpietro Vernetico, near Brindisi in southern Italy. In Europe, these cables are used to interconnect panels, and also connect module strings to the inverter.

Solar cables

In the US and Canada, Nexans supplies solar cables for photovoltaic farm wiring, such as 1 KV or 2 KV RHH, RHW-2, 600V USE-2, and RW90 in Canada. These XLPE insulated cables are used to connect module strings or multiple arrays to the inverter. They

are suitable for direct burial. Armored TECK cables can be used in rocky terrain or underneath roads.

Nexans is supplying solar cables to leading Canadian and American providers of PV systems solutions for solar power plants.

LV copper and aluminum cables

These cables also provide reliable, durable links between array boxes and the inverter. PVC-sheathed 95-300 mm² buried cables can carry up to 1,800 V DC current. For installers and project designers who need Class-2 protection, Nexans can also provide cables to meet this demand.

Nexans supplied 20 km of cables to Schneider for a photovoltaic park in the Durance Valley, a region which has a dozen major photovoltaic projects underway.

High temperature cables

For panel-to-panel connections in extreme temperatures, like deserts (very hot in the daytime and cold at night), Nexans produces a wide range of flexible silicone cables that can carry up to 15 KV in temperatures between -60°C to 180°C.

These halogen-free flexible cables, with high fire performance for safety of personnel and equipment, are also anti-UV and ozone stable.

Cabinets for residential and commercial production

Nexans supplies cabinets fitted with fuses and switches enabling the utility to isolate the network,

either from a consumer or producer perspective.

These cabinets are a major node between private and public networks and a security point for maintenance.

Low-voltage DC busbars

For important solar power plants and specific applications, low-voltage busbars connect the panel arrays and the inverter, or the inverter and transformer, and can replace large cross-section buried cables.

Nexans can undertake special studies to design a busbar solution for very specific high-powered photovoltaic farms.

Medium-voltage jumpers

For all ground-based photovoltaic installations, customized medium-voltage jumpers (from one to several dozen meters long, equipped on both sides with accessories) connect transformers to switchgears.

These jumpers are electrically pre-tested to guarantee efficiency in the field and avoid any trouble when energizing the photovoltaic farm.

Earth/ground cables

For protection against short circuits and fire, these copper cables (either shielded or unshielded) securely ground panel frames, assuring that a uniform earth/potential prevails through the photovoltaic park.

French solar energy company and installer, Sunnco, regularly use Nexans green/yellow H07VK (450/750 V) as grounding wire for rooftop installations.



ENERGYFLEX® photovoltaic cables



Solar



Fiber optic cables





cables



LV copper and aluminum cables



High temperature cables



Cabinets for residential and commercial production



Low-voltage DC busbars



Medium voltage cables



Sensor and bus cables for tracking systems



Active switch systems for communication and monitoring



Monitoring and control services



Life Cycle Assessment (LCA) services

...to improve solar performance and power flow



High-voltage
cables



Earth/ground cables



Fiber optic cables

To assure high data transmission capacity for backbones (from solar fields to distant control centers) or for Local Area Networks for monitoring and control, Nexans's Unitube or Multitube cables can be installed in conduits or directly buried. They are waterproof, rodent-resistant and offer Electromagnetic Compatibility (EMC) in energy-dense areas. *Nexans offers a full range of FO connectors, patch cords and panels, indoor/outdoor closures, cabinets and splicing frames for individual fiber management.*

Sensor and bus cables for tracking systems

Controlled tracking solutions can provide up to 40% more efficiency than fixed solar layouts. Nexans provides 2-5 core sensor cables (up to 24 V) to transmit information so as to constantly adjust solar panels to follow the sun, while taking into account ambient weather conditions. Bus cables connected to a Central Processing Unit (CPU) use established astronomical data and positioning software to follow the sun's course. *Nexans rugged and reliable sensor cables eliminate the need for a CPU and extensive data lines. Each panel unit adjusts itself independently for the highest possible yield, and continues to function autonomously if other trackers fail, thus assuring energy continuity.*

Active switch systems for communication and monitoring

These small and rugged iSwitch systems contain up to 3 fiber-optic uplink ports and 8 twisted pair copper ports. With the optical fiber arranged in ring or star structures, they use their copper links to exchange data with and provide Power over Ethernet (POE) to distributed IP surveillance cameras, WLAN access points, VoIP phones or multifunctional terminals. Switches can also be used for control and monitoring applications, and have inbuilt fiber-optic/copper cable diagnostic functionalities. *Nexans's memory card allows non-IT maintenance personnel to replace and reconfigure switch systems quickly and inexpensively.*

Monitoring and control services

With its Intelligent Internet Gateways, Nexans enables power utilities to collect and analyze data on photovoltaic installations. Contained in a compact housing, the KEYLIOS™ gateway gathers indicators from inverters, smart meters and weather sensors (solar intensity, temperature, etc.). The aim is to optimize exploitation, support preventative and remedial tele-maintenance from central control, and monitor power output in real time. *Web-based services include remote control and command, data collection and storage, equipment monitoring and configuration, detection and alarms, multi-site management, archiving and traceability.*

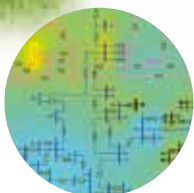
Life Cycle Assessment (LCA) services

Nexans LCA services evaluate the environmental impact of any cable through the cycle of production, distribution, installation, use, and recycling. This allows OEMs and solar park designers to compare cables used in terms of environmental impact to arrive at an informed choice about the best solution.


For a Siemens project in Le Mées in southeast France, Nexans was able to assess its photovoltaic cable according to 11 key indicators which included raw material, energy, water and ozone depletion, global warming (CO₂), air toxicity, air acidification and hazardous waste production.

Simulation services

To find the ideal solar park architecture and the right cables, Nexans uses various simulation software programs to provide points of comparison to improve reliability, reduce losses, increase safety and improve power flow. *With its simulation software programs, Nexans is able to evaluate different photovoltaic product solutions and thus support customers in finding the most suitable photovoltaic product.*



Simulation services



Nexans'
KEYLIOS™
for sustainable
PV energy

GLOBAL EXPERTISE

As the world's leading cable manufacturer, we have a unique geographical, industrial and commercial presence in all markets. We also work closely with the entire chain of solar players, including panel and junction manufacturers, systems integrators, wholesalers, installers and project developers.

LOCAL PRESENCE

Nexans is increasingly a "glocal" company, combining global reach with sensitivity to local production needs and solar projects. Operating on all continents, we are able to follow installers, project developers and OEMs everywhere, often working with local resources to organize technology transfers and training.

INNOVATION

With a long acquired expertise in cable design, materials, standards, and technology, we have continued to expand our offer, moving from being a product supplier to being a responsive provider of solutions and services, backed up by the R&D resources of our Nexans Research Center (NRC).



Global expert in cables and cabling systems

With energy as the basis of its development, Nexans, the worldwide leader in the cable industry, offers an extensive range of cables and cabling systems. The Group is a global player in the infrastructure, industry, building and Local Area Network markets. Nexans addresses a series of market segments: from energy, transport and telecom networks to shipbuilding, oil and gas, nuclear power, automotives, electronics, aeronautics, material handling and automation. Nexans is a responsible industrial company that regards sustainable development as integral to its global and operational strategy. Continuous innovation in products, solutions and services, employee development and engagement, and the introduction of safe industrial processes with limited environmental impact are among the key initiatives that place Nexans at the core of a sustainable future. With an industrial presence in 39 countries and commercial activities worldwide, Nexans employs 22,700 people and had sales in 2009 of 5 billion euros. Nexans is listed on NYSE Euronext Paris, compartment A.

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