

Futureproofing the grid for the 21st century

Nexans
ELECTRIFY THE FUTURE

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Over the next decade, global electricity consumption is set to grow six times faster than total energy demand. Refrigeration, medical care, light at the flip of a switch: electricity powers our daily lives. And its demand is only rising in our world of datacenters, electric vehicles, digital technology, and growing populations and cities—putting enormous pressure on electrical power grids.

Electrification is the clear way forward to meet unprecedented energy demands while also moving towards a net-zero future. But some of the paths proposed to get there are utopian, requiring massive disruption, austerity, energy rationing, and personal sacrifice.

At Nexans, we believe that the best approach to reach net-zero is one that relies on realism and innovation—and starts with electrical power grids, the backbone of the electricity value chain. Grids are critical infrastructure of our societies whose future-proofing offers a way to combat climate change without compromising human progress.

Electric grids are in need of a paradigm shift, from passive infrastructure to dynamic systems. Their modernization is essential to meeting the energy challenges of today while building a smarter, more connected future for generations to come.

The critical need to modernize the grid



Electrification: the only path forward

The world is at a crossroads: we need more energy, but we cannot continue to emit CO_2 at the current level. Stabilizing the climate, according to scientific projections, would require a 95% reduction in current emissions levels sustained for between 30 and 50 years.

Electrification is the path to decarbonization, but its success will require a pragmatic, business-led overhaul of our energy assets.

The electric grid offers a promising, and urgent, place to start.





Power grids, increasingly at risk

Much of today's grid infrastructure was created decades ago, even in the previous century—making these assets close to, if not already beyond, their lifespans. This includes accessories: an estimated 60% of Europe's grid components are over 30 years old. Failures linked to decaying equipment can lead to major disruptions. In 2025, London's Heathrow Airport, one of the world's busiest, closed for a full day: moisture ingress caused a substation transformer to catch fire. The same year in Chile, a transmission system malfunction affected 99% of the country's population for 17 hours.

The aging grid is also facing escalating risks from major weather events that are only increasing in intensity. Following severe winter storms in Texas in 2021, 4.5 million homes and businesses were left without power, some for days. Triggered by extremely high demand on vulnerable, non-winterized power equipment, this was the worst energy infrastructure crisis in the U.S. state's history.

The grid has also become a geopolitical target. Cyberattacks on global grid infrastructure have increased by 30%, with Europe alone recording 48 successful breaches in a single year.



Booming demand

This vulnerable infrastructure is facing unprecedented energy demand, amplified by growing digitalization and the emergence of artificial intelligence. Just one datacenter requires the same energy as 100,000 family homes. And just one power outage can cause the permanent loss of user data, ranging from critical business information to family photos stored on servers on the cloud, as was the case in Belgium following a blackout at a Google datacenter in 2019.

The shift to renewable energies is also putting unprecedented demands on energy grids. Wind and solar are expected to make up over 80% of new capacity to reach net zero, adding new complexities to electricity management—but grid investment is lagging behind. Globally, $400 billion is invested in grids each year compared to some $1 trillion in electricity generation.

In short, our grids are not able to handle the energy demands of modern life. The reality of this is that urban areas will start to see more regular outages and downtime, a major issue for people and economies. Reliability metrics that indicate frequency and duration of outages (SAIFI/SAIDI) are rising in developed economies.

The key to improving resiliency and reliability is to modernize the grid: not just investing in energy production, but also in transmission and distribution. Initiatives like the EU's €1.2 trillion upgrade plan signal a starting point, but true futureproofing requires a systemic overhaul of how we connect the world.

An expert analysis of pathways





Making the market work

The most realistic path towards net zero is for sustainable technology to become more economically competitive than fossil fuels. Renewables and battery storage must win the cost battle. This requires a pragmatic "all-of-the-above" strategy, where the choice between nuclear, offshore wind or solar is based on the levelized cost of energy (LCOE) and geographical reality.

Although the LCOE of nuclear power may be higher than that of offshore wind, there is no one-size-fits-all solution; optimization depends on local resources and the ability to let the market drive innovation and economies of scale.

Reversing the planning model

To effectively modernize the grid, the Nexans approach is to reverse the traditional value chain. Instead of starting with production, we must plan backward:

- **Consumption**
  Identify where critical demand is located (e.g. datacenters, cities) to clearly define needs.
- **Transmission & distribution**
  Determine how to transport electricity to these areas, treating transmission as the essential link in the chain.
- **Production**
  Build the most appropriate energy source for the need and geography.

This process should incorporate the recovery of "stranded assets." For example, existing transmission corridors from decommissioned coal plants can be retrofitted to serve as interconnection points for offshore wind, transforming inactive infrastructure into clean energy hubs without the need for costly new lines.

(Re)building a smarter grid

One way to counteract the vulnerabilities of aging infrastructures is by optimizing their intelligence. The energy sector has a definitive transition to make, from reactive maintenance to proactive grid management through digital tools and AI.

This shift is already in progress: the grid reliability software market is expected to reach $30 billion by 2032.

Grid modernization projects must focus on:

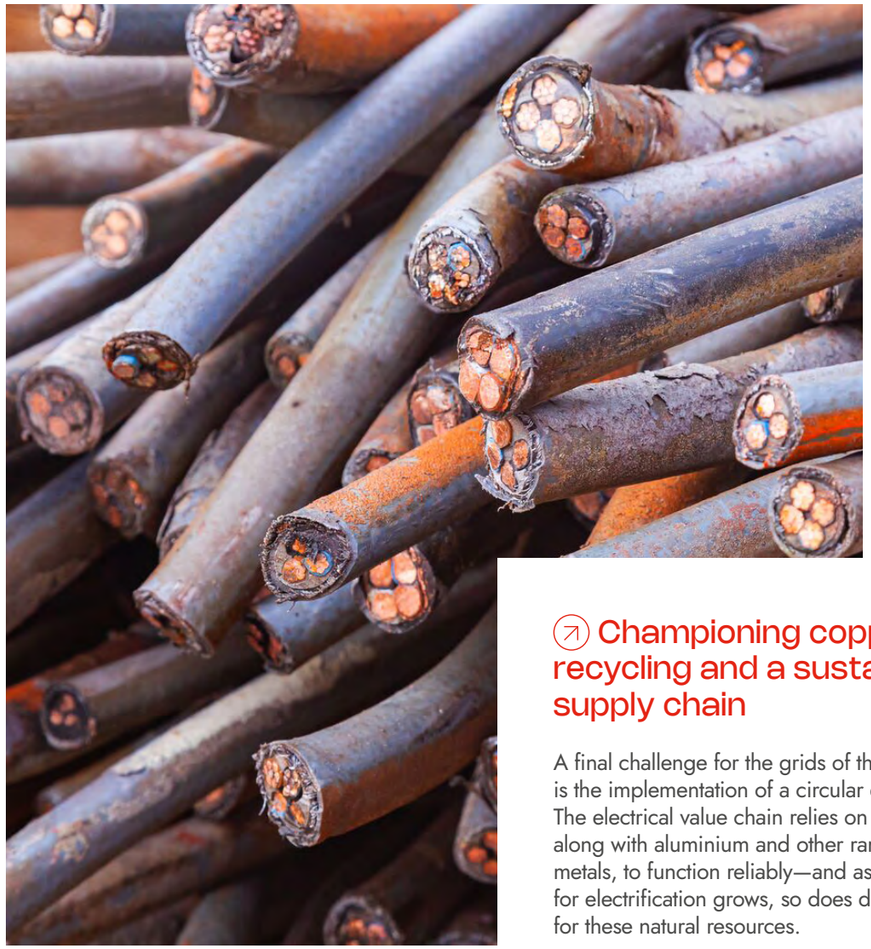
- **Ensuring real-time visibility**
  Smart monitoring and real-time data can transform grids from static systems of cables and transformers into dynamic, self-monitoring, and self-regulating networks. By continuously analyzing large streams of data, AI-powered models anticipate problems, balance power loads, and dramatically reduce system downtime.

- **Turning connecting accessories into strategic resilience enablers**
  Today, innovations are changing accessories and components, previously overlooked links, into intelligent assets. Equipped with embedded sensors and linked to digital twins, they can provide real-time performance insights and early fault detection.

- **Shifting from one-size-fits-all accessories to tailored component systems**
  The smart accessories revolution is especially vital for the integration of variable renewable energies, which are expanding into remote and harsh environments. Breakthroughs such as sensorized accessories and offshore-ready modular connectors are specifically engineered to anticipate downtime risks, extend infrastructure lifespan, and reduce overall operating costs.

By embedding intelligence down to the smallest connection point, Nexans is pioneering a smarter grid architecture. This approach ensures that electrical networks are robust, flexible, and capable of meeting the complex electrification challenges of the 21st century.





Championing copper recycling and a sustainable supply chain

A final challenge for the grids of the future is the implementation of a circular economy. The electrical value chain relies on copper, along with aluminium and other rare-earth metals, to function reliably—and as demand for electrification grows, so does demand for these natural resources.

Ethical mining is non-negotiable. But what about copper recycling and collection? Nexans is pioneering an ethical supply chain for the industry, and the future will rely on closing the loop. Through RecyCâbles, a joint venture between Nexans and Suez, and CableLoop, a B2B service, Nexans is improving the recycling of used copper, starting with collection from clients and the exploitation of "urban mines": end-of-life electrical grid infrastructure.

Operational excellence: Innovating for grid resilience and efficiency



Modernizing the grid involves every link in the electrical chain. Nexans is a committed partner for innovating and implementing solutions for resilient, efficient, and sustainable networks.



Global

Supporting grid operators in their digital transformation

Distribution network operators looking to modernize their infrastructure with intelligence and precision have a full-spectrum digital toolbox at their disposal, thanks to a strategic partnership between Nexans and the Swiss company Zaphiro. The comprehensive suite of digital tools is designed to continuously improve operational awareness, enhance power quality monitoring, minimize outage impacts and support preventive and predictive maintenance as well as long-term grid planning.



Netherlands

Leveraging smart accessories for tangible performance gains

Time spent dealing with grid outages is costly—what about the time gained? Alliander, a Nexans partner, deployed more than 3,000 Smart Cable Guard systems across its medium-voltage grid to tackle aging infrastructure and outage risk. Field data shows that each unit prevents over 600 customer hours lost annually, with fault localization accurate within 1% of cable length.

Global

Redefining reliability for renewables with innovative materials

Wind and solar grid installations face harsh realities: UV exposure, salt spray, sand, moisture ingress, hot ambient temperatures, thermal cycling... Nexans integrates high-performance polymers (such as EPDM Material) and sealing materials into its technologies, engineering them to maintain integrity under the toughest environmental conditions, whether buried, exposed, or submerged. These accessories can withstand decades of exposure without degradation.

Global

Supporting early fault detection for offshore substations

For remote wind farms, silent component failures can go undetected until a power outage occurs—making sensor-generated data integrated into predictive operation and maintenance schedules more valuable than ever. Nexans partner Ørsted, global leader in offshore wind and one of the world's largest renewable energy companies, integrates cable diagnostics and performance monitoring into its offshore substations to reduce unplanned downtime.





France

Boosting scrap copper recycling capacity

Nexans is the world's leading vertically integrated cable manufacturer, with four metallurgy plants worldwide. The Group most recently invested €90 million in a copper rod recycling plant in Lens, France. Not only will it increase Nexans' wire rod production capacity by over 50%: the plant boosts the Group's copper scrap recycling capacity, to manage up to 80,000 metric tons of cable scraps from construction sites or "urban mines" per year.



Sources

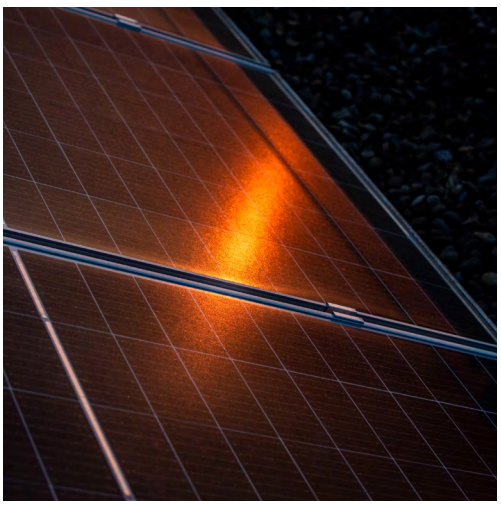
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The energy that powers our societies has allowed enormous technological advances—advances that are accelerating at a dizzying speed.

Yet this progress has come at a cost. Climate change from fossil fuel use poses threats greater than any faced in human history. To reduce CO_2 emissions, the energy transition is essential.

In a context in which the need for electricity is rising exponentially, Nexans takes an approach of realism and innovation. Through smart planning, infrastructure upgrades, and integration of new technology, we believe innovation throughout the electrification value chain is the best way to combat climate change and make our societies future-ready.



"The demand for electrification is set to grow dramatically in the coming years, and innovation is essential to meeting this challenge. Our role is to provide cutting-edge, practical and rapidly deployable solutions to help countries overcome the challenges of electrification and roll out large-scale, resilient grids that are under increasing strain and incorporate renewable energy."

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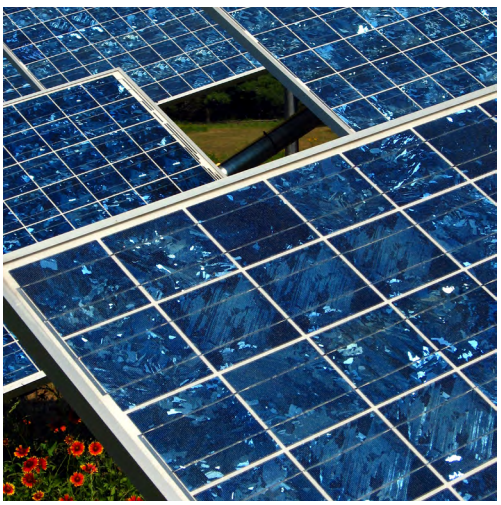
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