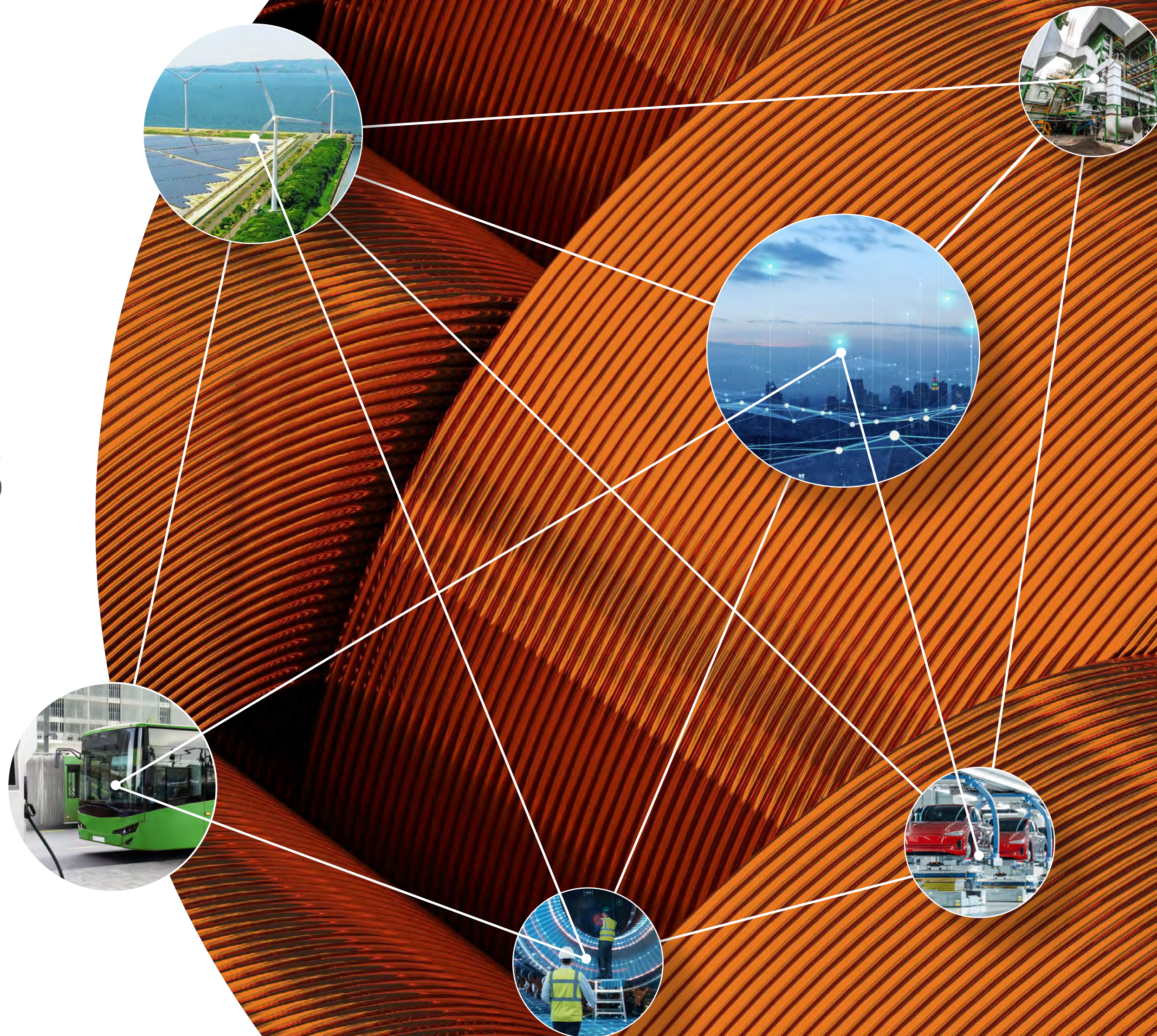


WHAT ARE THE EMERGING TRENDS SHAPING THE CABLE INDUSTRY?



INTRODUCTION

Modern technology, environmental challenges, and new levels of connectivity: all factors driving demand in the cable industry.

Cables are often overlooked - they're hidden from sight, buried in the ground or in cable management systems - yet without them the wider systems and equipment are useless. It's these cables that deliver the power and control that supports efficient operations and deliver nature-net-positive changes.

These critical infrastructure components are used across every industry yet there are common themes - we look at just a few:



RENEWABLE ENERGY

The rise of renewable energy sources such as wind and solar power are decarbonising the energy landscape but they must operate within harsh environmental conditions.



DIGITALISATION

Learn how digitalisation is transforming cable manufacturing and installation processes through advanced data analytics and Building Management Services (BMS).



ELECTRIFICATION

The push towards electrification is revolutionising public transport networks and driving increased uptake of electric vehicles.



INDUSTRIAL AUTOMATION

The impact of industrial automation sees robotics and AI are taking over repetitive tasks to enhance efficiency and safety.



SUSTAINABILITY

The cable industry and wider industry alike are looking at how to support sustainable procurement, aid system longevity, and meet compliance reporting requirements.



CABLE TECHNOLOGY

Advancements in materials and technology is supporting operational longevity and reliability in an increasingly connected world.



TRENDS IN RENEWABLE ENERGY

According to the International Energy Agency (IEA) the share of renewable energies in global electricity generation will exceed a third by early 2025.¹ As global policy shifts towards a more sustainable approach, the solar and wind energy markets have been booming. Five year forecasts show large-scale projects scheduled for grid integrations, boosting that figure further. They're all projects requiring extensive amounts of low and medium voltage cables to connect equipment and distribute the generated energy from site to where it's needed.

Planned projects are getting larger, with 10MW solar farms now commonplace, and even 100MW farms given the green light to proceed. The solar cable market was valued at USD 2.15 billion in 2023, while the wind energy cables market size is estimated to grow by USD 16.58 billion between 2023 and 2028,² as a result of both onshore and offshore projects.

Wind turbines

The nacelle, turbine tower, motor and rotor blades have a raft of power and control cables to deliver efficient operations. They must withstand mechanical and torsional stresses as a result of the blades rotation as well as environmental challenges such as salt-water spray in offshore installations.

The ability to meet both performance and installation demands is closely linked to efficiency and system longevity, and the reduced need for onsite maintenance on equipment in often remote-located turbine fields.

Solar energy

Unsurprisingly, cables for solar installations must be able to withstand the continued effects of UV exposure, but there are other environmental conditions they will face during their lifetime operations.

Cable advances mean options ranging from fully submersible EN 50618 H1Z2Z2-K Photovoltaic cable (string cables) and additional waterblocking layers on medium voltage power

distribution cables used in the underlying grid, to cables with enhanced CPR classifications to comply where part of buildings and construction, cables can be specified to match the specifics of site. This is vital in order to minimise the need for maintenance or replacement during the average 20-30 year land lease or installation lifespan.

Energy Storage

Supplementing the increasing number of renewable energy installations are battery energy storage solutions (BESS). With solar and wind energy created on a use-it-or-lose-it basis, these large scale batteries mean it can be used at will. For industrial users, this may mean supporting operations around the clock, whilst on a utility grid scale it can help optimise availability, balancing to defer peak generation demands and relieve grid congestion

1. the share of renewable energies in global electricity generation will exceed a third in 2024.
2. <https://www.giiresearch.com/report/info1393322-global-wind-energy-cables-market.html>

TRENDS IN DIGITALISATION

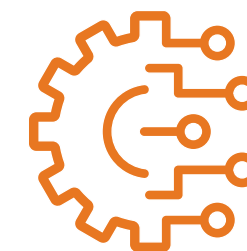
On-Demand Communications connectivity

Consumer demand continues to grow for bandwidth-intensive digital services such as ultra-HD video streaming, gaming & VR, interactive TV, and advanced mobile data services. From 5G mobile networks to super-fast fibre connections, the network infrastructures delivering these services require significant investment to deliver upgrades and expansion.

Examples of successful roll-out include Shanghai, China with over 83,000km of fibre cable laid. The Baltic states of Europe are similarly advanced in their fibre optic rollout as they had no legacy copper network they had to adapt.

Building Management Systems (BMS)

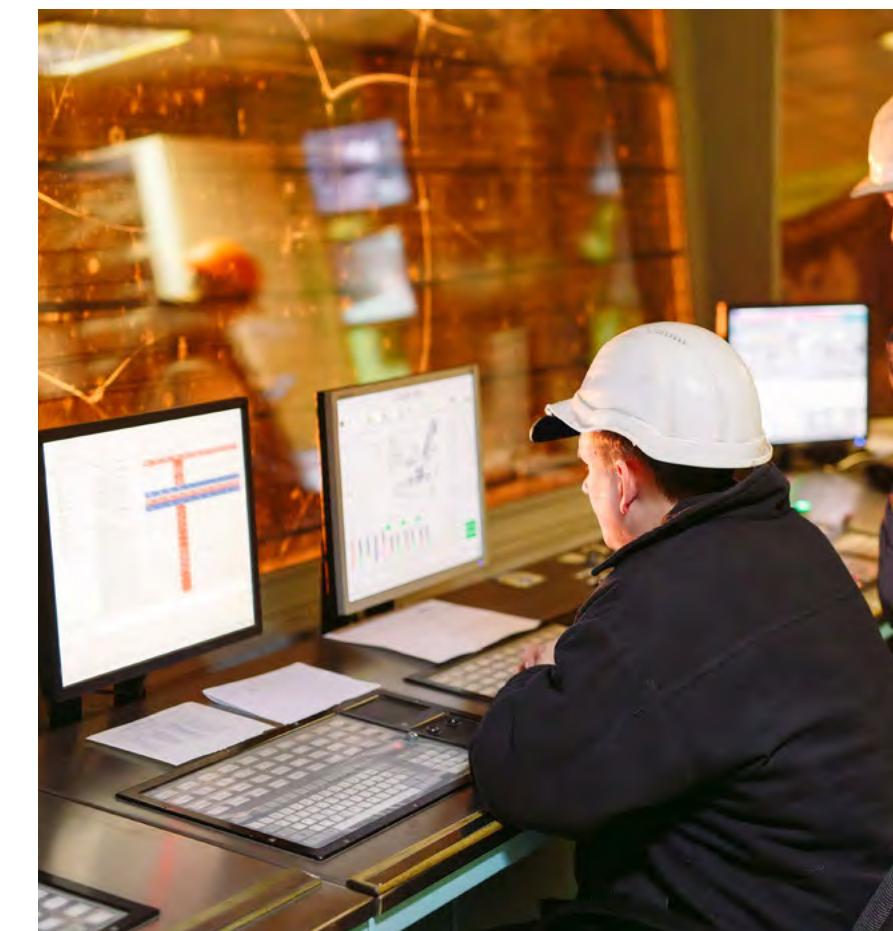
Smart buildings are also part of the digitalisation transformation. Building Management Systems (BMS) can manage access control, heating, ventilation and air conditioning (HVAC), smart lighting and other building services to automate the functionality and comfort of the building's environment. These flexible and scalable smart solutions to support integrated systems, combine sustainability measures with power efficiencies.



Data centre construction

The rise of hyperscale datacentres, alongside enterprise sites and edge networks, are a direct result of data consumption and connectivity demands from both commercial and personal sources. Their power-intensive operations across server rooms, HVAC systems, switchgear and more, require hundreds of thousands of metres of low and medium voltage power cables running from substations via transformers and into the datacentre itself to connect equipment.

The International Energy Agency (IEA) suggests datacentre power demands could exceed 1,000 TWh by 2026.¹ Several countries have signalled that future builds may not be possible due to power limitations within their national grids. It means the big tech giants and corporations are starting to look outside the traditional FLAP-D countries, with particular note for where renewable energy and natural resources can be harnessed, such as Norway's hydroelectric and Iceland's geothermal power.



The advance of AI

Whether for commercial applications or personal use, AI is now a part of everyday life. Nvidia is the headline AI chip manufacturer and it is estimated to take 5x more processing power - that means more datacentres are needed, with a denser concentration of server banks that need to be powered and cooled, along with all their redundancies and fail-over protections, all pulling more power from the grid.

It's a hot topic of conversation within the data centre industry as to how AI will shape and change the design and operation of sites - it's one we'll have to wait and see as things evolve!

TRENDS IN ELECTRIFICATION

Railways

The electrification of railway networks is well underway across Europe. Italy has over 72% of its routes (12,160km) electrified, whilst Germany tops the table in terms of volume with 19,000km in total, accounting for around about 55% of their lines. Spain (65%), France (55%), Sweden (75%) and, further afield, Japan (75%) are all taking similar steps. Decarbonising the rail networks worldwide is essential to continue to provide mass passenger transit and for the transport of goods across large distances.

According to the UK Department for Transport, electric trains are over 35% cheaper to operate and emit 20-35% less carbon per passenger mile than a diesel train.¹ Electric trains can offer a higher power to weight ratio than diesels, resulting in better acceleration, reduced journey times and an overall enhanced passenger experience.

Just 38% of the UK rail network is currently electrified with overhead lines - work on aged infrastructure to raise low bridges and rebuild or repair tunnels in order to safely install the OHL equipment means it is both slow going and costly.

Electric Buses

Electric bus networks are rising in popularity, too; the European e-bus market saw a 53% growth in registrations in 2023 – and in Denmark, 3 out of 4 newly registered buses are electric². Fast-charge charging stations are similarly needed to support this transport network.

e-Mobility (EVs)

Most automotive manufacturers ranges are now electric-first as the transition from petrol and diesel combustion engines continues. February 2024 saw new EU registrations of battery-electric cars hold a market share of 12%, while plug-in hybrid-electric cars captured nearly 29%.³

Despite recent push-back against subsidies applied in some non-EU countries, ongoing growth is seen to be

linked to ease of charging, be it at fast-charge stations along highways, charge-points at places of work, or via domestic charger installations.

There is growing standardisation in cable specification across Europe for low and medium voltage cables for chargepoint connection and grid integration as major players in infrastructure installation come to the fore.

Increasingly, industrial and commercial eMobility charging solutions are considered as part of a package alongside renewable energy installations (solar & BESS) so as to provide practical fleet solutions that can be powered from onsite sources at no additional cost to the business.

The European electric bus market saw a 53% growth in registrations in 2023

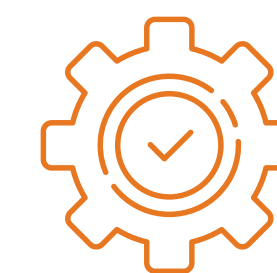


1. <http://news.bbc.co.uk/1/hi/uk/8164942.stm>

2. <https://www.sustainable-bus.com/electric-bus/electric-bus-public-transport/>

3. <https://www.acea.auto/pc-registrations/new-car-registrations-10-1-in-february-2024-battery-electric-12-market-share/>





TRENDS IN INDUSTRIAL AUTOMATION

Requiring a range of low voltage power, control, instrumentation and data cables, these are instances of industrial automation

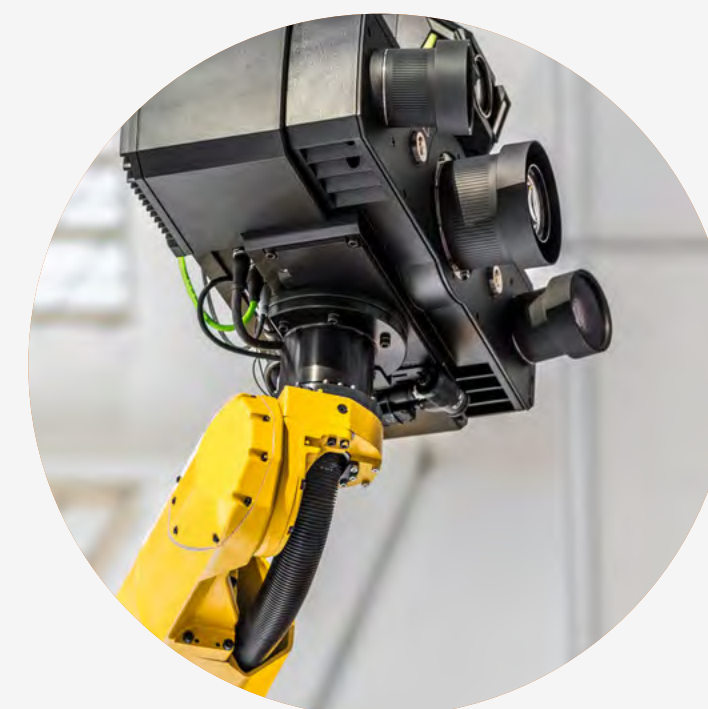
Frequently referred to as 'Industry 4.0', industrial automation, the use of robotics, machines and control systems to automate tasks traditionally performed by humans aims to improve safety, and increase standardisation and efficiency in industrial settings. Here too, efficiency is also linked in many cases to more sustainable operations.

From warehousing systems that 'pick and pack', baggage handling systems at airports that use barcodes to route luggage, to automated manufacturing lines, many of these cables are designed with flexible conductors to support repetitive movement.

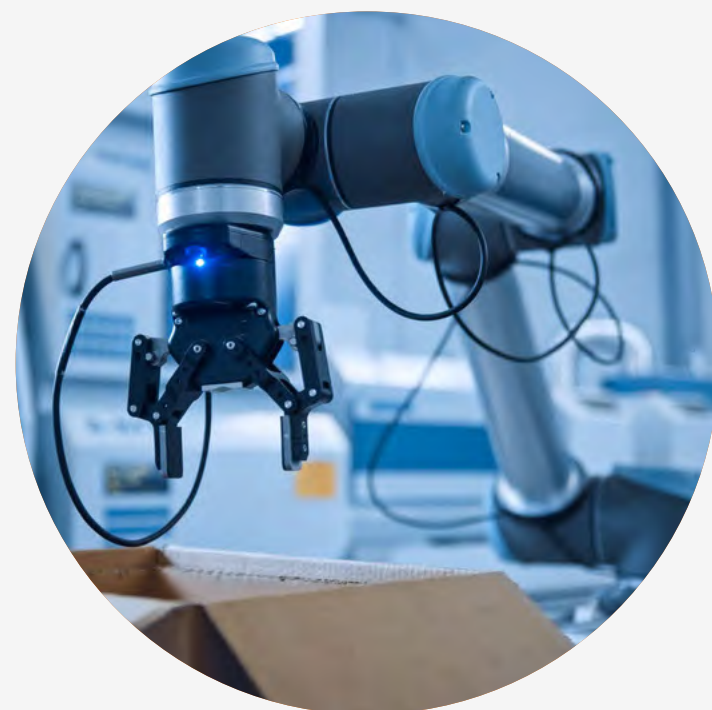
c.75% of global companies use a degree of automation already for standardising daily workflows. The global industrial automation market is estimated to reach a value of \$115 billion (£91 billion) by 2025¹, with the fastest growth anticipated in the development of cloud-based software and platforms that facilitate connectivity.



Computer numerical control (CMC) machinery has been in use since the 1940s. The integration of these systems allows manufacturers to make parts and components with exact precision, speed and repeatability to meet ever-increasing production demands.



Machine vision refers to the capability to perceive and comprehend the industrial environment using cameras, analog-to-digital (ADC) conversion and digital signal processing (DSP). These technologies allow computers to understand the processes that are taking place so necessary measures can be taken to enhance employee safety and productivity.



Autonomous mobile robots (AMR) are being increasingly used in factories to pick, pack and sort goods and install or produce machinery parts. They take over a great share of monotonous and repeatable tasks, allowing humans to avoid interactions with dangerous equipment or hazardous areas. In the automobile industry, the installation of pistons into the engine used to be performed manually with an error rate of 1-1.5%. Using automated machinery, this task has now achieved an error rate of 0.00001%.



In heavy industries such as manufacturing and mining, **machine learning** algorithms can support efficient operations by analysing machinery to locate faults and improving yield due to increased accuracy. In turn, this improves productivity and enhances health and safety by preventing equipment failures that could lead to accidents.

1. <https://www.investorchronicle.co.uk/content/843188ce-07f0-5ecb-8e2e-abc710c08f93#>

TRENDS IN SUSTAINABILITY

Sustainability and sustainable procurement are key considerations in many projects, particularly those with their own green energy credentials. Whilst protecting the environment shouldn't be a trend, some of the requirements are perhaps currently more commonly considered:

Recycling

The construction and built environment industry creates around 120 million tonnes of waste each year in the UK alone – approximately 60% of the national total. Cable waste, leftover from new installation or pulled out from legacy projects, can be recycled in accordance with WEEE regulations and returned to the circular economy. (It's why we've got our own recycling plant to process these materials)

Specification

Tightly matching performance demands, installation design, and environmental conditions, and assuring quality and compliance, will support system longevity - a sustainability measure in itself as it prevents the need for premature replacement due to cable failure. The right cable also has a knock-on effect on the equipment and system components, aiding overall installation health and operations.

Supply Chain practices

Every little helps, and the choice of supplier can have a big impact on the sustainability credentials of a project. From the use of renewable energy and sustainable HVO biofuels for delivery, to recycled packaging, and practices such as cable drum and cable waste collection can all help reduce embodied emissions in the cable installed.

Green Copper and Recycled Copper

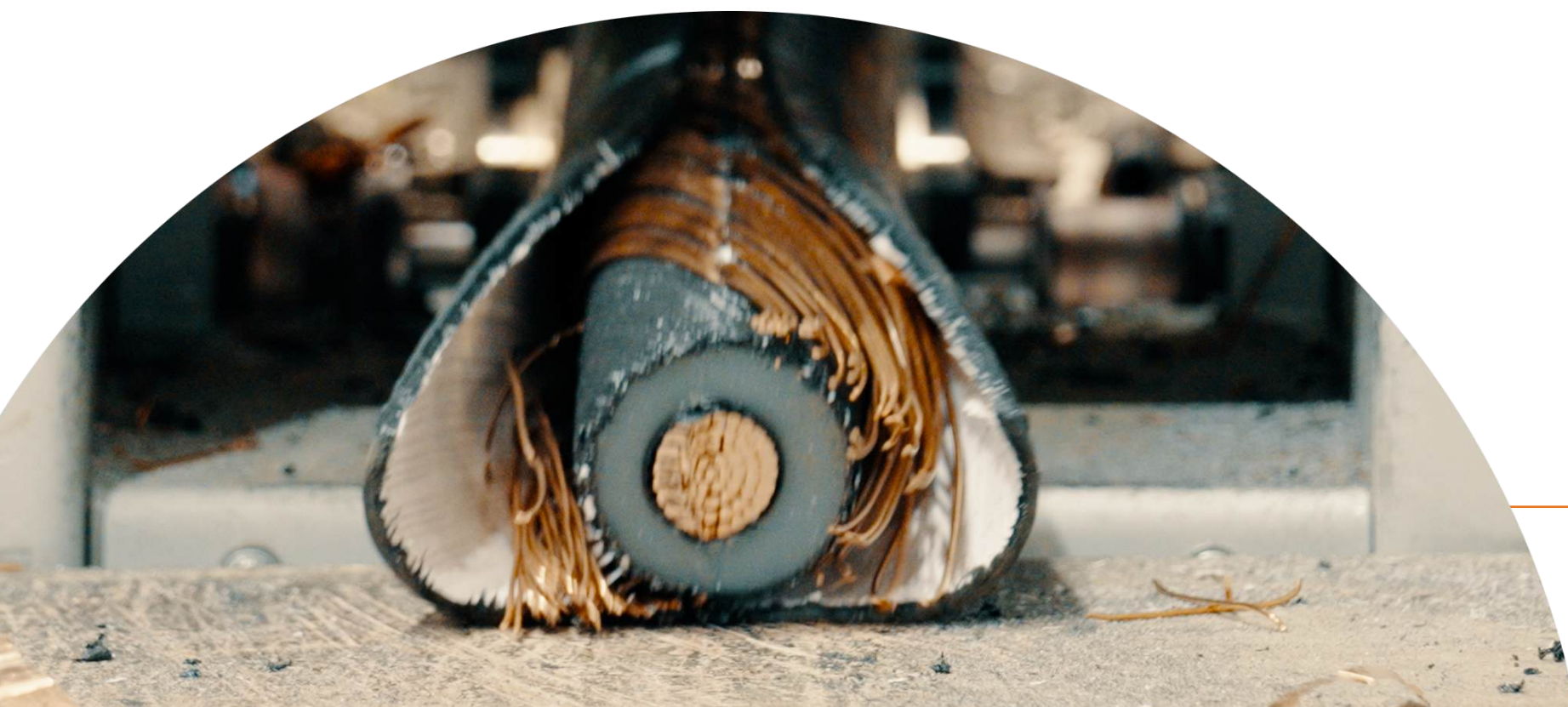
The use of renewable energy in the manufacturing process is helping make cables 'greener', and the wire and rod producers report c.15% of recycled material in their products (the component that goes onto become the conductor in the manufacturing process). There is risk of 'greenwashing' around whether one cable is more sustainably produced than another, but it remains true that copper cables have a lower embodied carbon content than their aluminium equivalents.



Sustainability Reporting Compliance

The European Green Deal, CBAM (Carbon Border Adjustment) legislation, and the upcoming CSRD (Corporate Sustainability Reporting Directive) compliance are all heightening awareness of sustainable procurement, with mandatory filings making them legal and financial requirements as well as good practice actions.

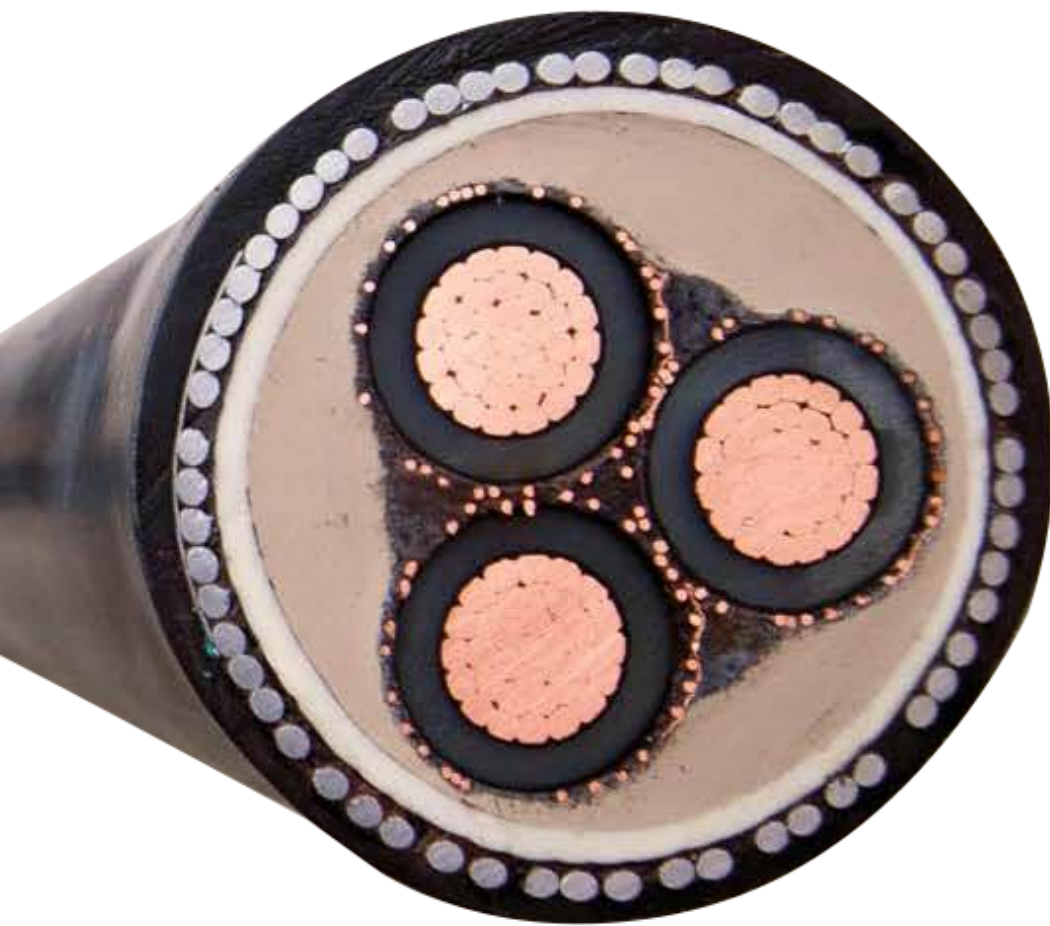
Understanding the amount of embodied carbon in products; the double materiality assessment to prioritise actions; accurate Scope 3 assessments - none of them easy to do, and all requiring specialist expertise to calculate accurately. It makes the choice of supplier ever-more important as provision of sustainability information becomes just as vital as product supply.



TRENDS IN CABLE TECHNOLOGY

Material Advancement

Innovations in cable materials could have positive implications for energy consumption and sustainability efforts. From Borealis' XLPE insulation from recycled materials (Borcycle¹) to high temperature thermoplastic insulation materials which enable improved recyclability, there are increasing options for manufacturers.



Graphene cables

Graphene, a one-atom-thick sheet of carbon atoms, boasts exceptional electrical conductivity, thermal conductivity, and strength. Researchers are exploring its potential in creating ultra-thin, ultra-light wires, which could reduce energy losses.

High-Voltage Direct Current (HVDC) Cables

HVDC technology is becoming increasingly popular for long-distance power transmission, especially between regions or countries. HVDC cables are more efficient over long distances and can carry large amounts of power, with their increased voltage and power-carrying capacity, enabling the integration of renewable energy sources in remote locations.

Testing and diagnostics

Enhancements in on line diagnostic methods such as on-line partial discharge testing, dielectric spectroscopy and distributed temperature sensing (DTS) are enabling a better view of cable network health and providing insight for proactive maintenance.

Automation

Automation, particularly AI and machine learning, is having a real impact on the design, maintenance and operation of industrial cables. By analysing data from sensors and other sources, AI algorithms can detect when a power cable is likely to fail – and alert maintenance crews to take action before an outage occurs.

HVDC technology is increasingly popular for long-distance power transmission, especially between regions or countries.



1. <https://www.borealisgroup.com/circular-economy/borcycle>

OUR ROLE IN SUPPORTING INDUSTRY

As the world embraces technological transformation, and with sustainability firmly in mind, so the demand for cables to power and connect these solutions grows.

Eland Cables is leading the way in supporting cable projects across renewable energy, electrification, digitalisation, and industrial automation. Our cable experts are coupled with industry specialists to deliver a tailored service that precisely matches the

performance demands, installation design and environmental challenges a cable project will face.

What's more, our quality assurance is truly unique. The Cable Lab, our specialist in-house testing facility, provides a rigorous testing regime accredited to IEC 60840 and ISO/IEC 17025, with all our medium and high voltage cables having the additional scrutiny of the BSI Cable Verification Kitemark.

Contact us today to learn more about our innovative cable solutions and for more information on how we can work with you to achieve project goals and sustainability targets.

GET IN TOUCH

Need help specifying the right cables for your project? Speak to the Eland Cables team today.

Call **020 7241 8787**
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