THE **AGILITY** EFFECT
MAGAZINE

INTEGRATORS AND GENERATIVE IA

MEET FANNY BARDÉ INNOVATION POWERHOUSE

COPENHAGEN'S REINVENTION AS A "SPONGE CITY"

RENOVATING SCHOOLS: INVESTING IN THE FUTURE

VINCI ENERGIES

SUMMARY

EDITORIAL

Increment or disruption? Renewal or replacement? Baby steps or a giant leap? Definitely all of the above. It’s a sector of activity, maturity and momentum. The new edition of your magazine is devoted to this subject.

The rise of artificial intelligence is an unstoppable wave, overturning one domain after another, just like digital before it. In industry, by maximising performance in quality control and predictive maintenance, AI is opening up undreamed-of horizons for manufacturers and the businesses that support them (see page 6). It is also affecting the design and organisation of the cities in which populations are becoming increasingly concentrated (page 51).

The education sector is a focal point for these issues (page 25), at the intersection of environmental, social and academic concerns. In Europe in particular, the schools market is undergoing a radical transformation for growth, including the renovation of building assets.

In Belgium, a former bank headquarters transformed into a multifunctional campus; in Poland, a university modernized thanks to next-generation ERP; in Sweden, a brand-new school combining functionality and sustainability: the wealth of examples indicates a fundamental shift.

In response to climate challenges and constraints, some capital cities, including Jakarta, Indonesia, are opting for radical approaches. Others are choosing continual transformation, massively focused on engineering. One such is Copenhagen, Denmark, which under threat from coastal flooding and frequently the victim of torrential rains, is reinventing itself as a “sponge city” (page 54).

Food for thought!
The Editorial Team

AGILITY **PICTURE**

EXCEPTIONAL INFRA-STRUCTURE

Five years was not long to deliver construction of the Salzburg high-voltage line project, the largest electricity infrastructure project in Austrian history, in May 2024. A key component in the country's energy transition, this project assigned to Omexom came with unusual requirements related to the altitude, mountainous terrain, environmental constraints, privately owned land, etc. The literal high point of this atypical project was the assembly of the Nockstein tower at 915 metres above sea level, which at 34.40 metres high and 42.20 metres wide, and weighing 111.69 tonnes, represents a major technical achievement. Its design – by a specially selected architect – has created a unique and iconic structure for the region.

INDUSTRY INNOVATION

GENERATIVE AI: A NEW VALUE PROPOSITION FOR INTEGRATORS

By maximising performance in quality control and predictive maintenance, artificial intelligence is opening up promising new horizons for manufacturers and the businesses that support them.

Will ChatGPT, Deepseek, Gemini and Le Chat become indispensable assistants in the industrial manufacturing chains of tomorrow? According to McKinsey, production operations will be one of the four main fields in which generative AI will add value. Manufacturers appear to have caught on: according to Deloitte, 56% of them are using AI solutions to improve the efficiency and productivity of their manufacturing chains.

"Industrial businesses of every type are taking a keen interest in the reported benefits of these computing models," says Antoine Béron, Brand Business Support & Development Director at Actemium. However, he points out, *"In many respects, it's still in the exploration stage. While some large organisations are in large-scale testing, many SMEs still have plenty of questions: How and where to begin? What is the return on investment (ROI)? Is my organisation ready?"*

Building highly polished and profitable models

Supporting industrial businesses in the gradual rollout of generative AI applications is fast becoming a mandatory new string to their bow for integration and consulting firms. Within VINCI Energies, the creation in 2020 of DIANE (Digital et Intelligence Artificielle pour Nos Entreprises), an organisation dedicated to the co-development of solutions offering a competitive advantage, has stimulated innovation and broadened the horizon of what is possible.

DIANE's mission is to help Group business units embrace AI, and to meet experts in each business activity to perform diagnostics, identify each application opportunity and co-build POCs (proofs of concept, or demonstrators) to be developed into highly polished and profitable models.

Today, use cases relating to observation and surveillance predominate in terms of applications that combine processes and industrial manufacturing flows: instrumentation, literature reviews, operator dashboards, quality control and predictive maintenance.

Identify the risk, predict the fault

Generative AI uses large language models (LLM) and natural language processing (NLP) to analyse astronomical quantities of data (figures, text and images) from varied sources: inspection logs, customer complaint histories, and the multitudes of sensors and cameras covering production lines.

This capacity for processing and learning enables it to form an idea of what constitutes a perfect product, and by induction, to detect the slightest production defect in real time. Even better, it can identify pockets of defect risk and target inspection sequences at these critical areas.

AI can detect the slightest risk of deviation from the norm, and can therefore predict and flag the fault before a failure occurs. The benefits are considerable: stoppages are prevented, maintenance schedules optimised, and equipment life maximised.

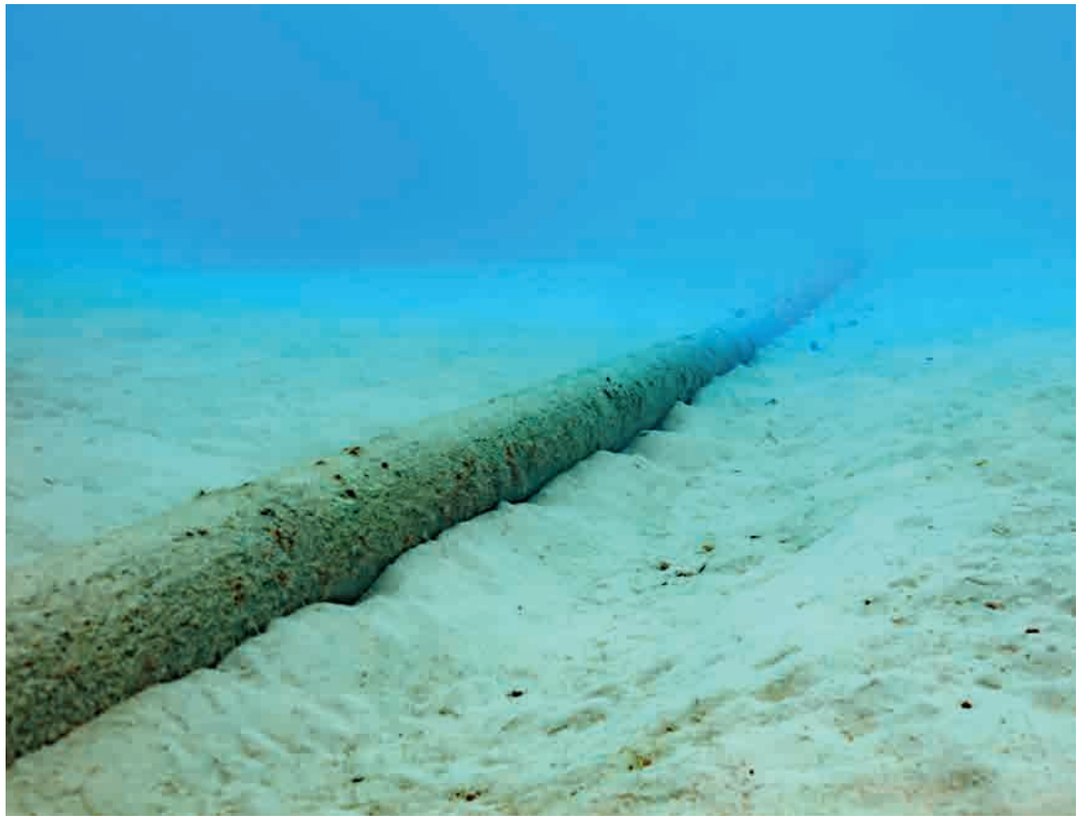
"Generative AI is a catalyst for diversification and an additional lever for boosting our business units' competitiveness," says Antoine Béron.

"Unprecedented opportunities to enhance their industrial performance."

"With this expertise, they are strongly placed to offer their customers a new value proposition, with unprecedented opportunities to enhance their industrial performance."

INDUSTRY | CUSTOMIZATION

IN AFRICA, SCALABILITY IS THE KEY TO CONNECTIVITY



In Gabon, Actemium recently installed an MCLS, a key piece of modular infrastructure for connecting undersea internet cables to support digital development in Africa.

In October 2024 in Gabon, Actemium finalised the installation of a new modular cable landing station (MCLS) to connect an undersea fibre-optic cable. This installation marked a key milestone in a series of projects undertaken by the VINCI Energies industry brand as part of the 2Africa programme to connect the African continent via a 45,000 km undersea cable – the longest in the world.

"Since 2020, we have installed six MCLS on the African continent: in Kenya, Tanzania, Côte d'Ivoire, DR Congo, Congo Brazzaville, and now Gabon," explains Efflam Moysan, Project Manager at Actemium Le Mans Energies & Process. Since 2018, the business unit has installed around twenty of these stations around the world.

"Greater agility and flexibility than a conventional station, but still competitive in terms of costs."

Agility and flexibility

So, what exactly is an MCLS? These modular steel-and-concrete buildings designed to last for over 50 years are used to connect an undersea fibre-optic cable to the terrestrial internet network.

This infrastructure provides a reliable landing point for the internet connection, especially in remote locations or areas subject to severe constraints. It secures the link, and processes and transmits data to local infrastructure while powering the undersea cable.

"The MCLS offers greater agility and flexibility than a conventional cable landing station (CLS) but remains competitive in terms of costs," says Efflam Moysan

Designed and assembled in a controlled environment in France by a team of experienced operatives, these MCLS can provide a rapid response to the specific needs of a given project. Their modular nature makes them easily adaptable to local constraints, be they technical (power needs), geographical or topographical (accessibility), administrative (delays in obtaining permits), security-related (bulletproof armour), aesthetic or climate-related.

And they can be configured to any required size. Landing stations are typically becoming larger, epitomised by the station most recently installed in the United States, which measures 210 sq. metres.

This flexibility allowed the station in Gabon to be built even before the construction permit had been obtained. From there, commissioning took less than two months, compared with more than six for a conventional CLS.

Digital resilience

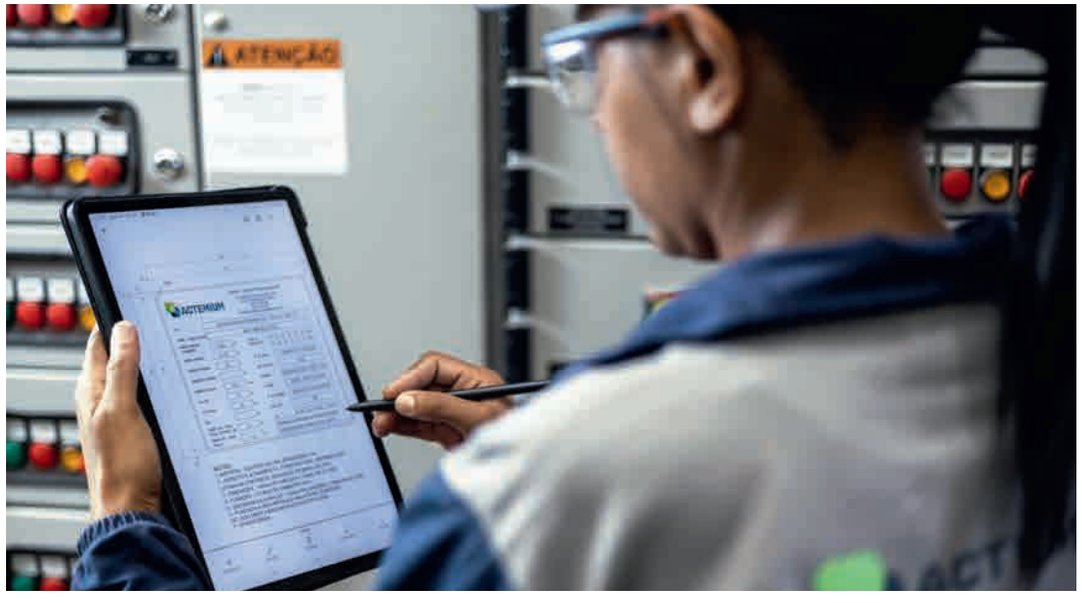
MCLS are robust and capable of withstanding natural disasters, security threats and system failures. They are equipped with critical services including cooling, backup power, fire detection, video surveillance, and access control. Some have already proved their effectiveness in extreme conditions, such as when Super Typhoon Yutu struck the Pacific region in 2018.

MCLS form part of a constantly evolving network architecture, incorporating technologies such as 100G coherent optical lines, smart mesh networks and packet switching. These stations can accommodate submarine line terminal equipment (SLTE) and hybrid systems with data centres to ensure end-to-end connectivity, particularly in emerging markets.

"MCLS is a sustainable and strategic solution, crucial to the expansion of broadband internet and digital infrastructure in different countries," says Efflam Moysan, emphasising that the expertise of VINCI Energies as an integrator is key to success in such projects.

INDUSTRY TRANSFORMATION

“THE INDUSTRIAL ECOSYSTEM IS INCREASINGLY DETERMINED TO ACCELERATE ITS DECARBONISATION”



The industrial sector, which accounts for around one-fifth of European Union greenhouse gas emissions, must accelerate its energy transition. What progress have businesses made in the various aspects of this complex process? An analysis Oliver Kelch, Director Knowledge & Insights at Actemium.

In your opinion, is the industrial ecosystem determined to accelerate its decarbonisation?

Oliver Kelch. We are seeing that the industrial ecosystem is increasingly determined to accelerate its decarbonisation. This mobilisation is apparent in sectors such as chemicals, metalworking, and also agrifood, where many companies are trying to reduce their footprint, optimise their energy efficiency and incorporate circular solutions into their processes.

These companies have several levers available at each stage of the decarbonisation process: regulatory audits, energy monitoring, waste heat recovery, electrification of industrial processes, renewable energies, and circular economy solutions. When offered technological solutions and effective tools, manufacturers are ready to actively engage in this transition. But the level of maturity varies depending on the sector and the size of each business.

What are the main obstacles to this movement?

O.K. Culturally speaking, resistance to change and a lack of awareness of climate issues often limit engagement, especially in more traditional sectors. Added to which, although public policies do exist, they often lack clarity, stability and suitable incentives, which has a braking effect on initiatives. In technological and economic terms, the high cost of some solutions, such as CO_2 capture or a conversion to renewable energies, plus what are seen as overlong return-on-investment times, are hampering their adoption.

Is carbon accounting more or less difficult depending on whether it involves Scope 1 or Scope 2?

O.K. Scope 1 covers the greenhouse gases (GHGs) the company generates directly through its activities (factories, offices, installations, vehicle fleets, etc.), so Scope 1 carbon accounting is naturally the least difficult. Scope 2 concerns the indirect emissions resulting from energy purchased and consumed (electricity and heat/cold networks). These emissions are generated by energy producers and distributors away from the company’s installations. Measuring and acting on this scope may therefore be seen as more complex because these factors depend largely on the energy suppliers and the composition of the energy mix, over which the companies concerned have only indirect control. In France, the electricity mix is already strongly decarbonised – due to its high proportion of nuclear and renewable energy – which clearly benefits industry in terms of its Scope 2. This situation reduces the carbon footprint associated with electricity consumption and allows businesses to focus their efforts on optimising their energy consumption and making the transition to even more sustainable sources.

In other countries where the electricity mix is more carbon-intensive, reducing Scope 2 becomes more complex and requires actions such as the purchase of renewable energy certificates (the Guarantee of Origin type) or the installation of renewable energies on site.

Is Scope 3 the most difficult to invest in?

O.K. Scope 3 includes indirect GHG emissions outside the company’s direct control because they occur upstream or downstream in the value chain (products bought and sold, transportation, etc.). Each company is therefore dependent on other stakeholders, their maturity levels, and how well equipped they are to account for their own emissions. Quite often, the lack of environmental data available from suppliers reduces a company’s room for manoeuvre and its ability to calculate, and therefore to optimise and reduce, its Scope 3 emissions.

The ambitious objectives of VINCI Energies

Decarbonisation is a key concern for VINCI Energies, which intends to play a key role in the energy transition and has set ambitious targets: a 40% reduction in its Scope 1 and 2 emissions by 2030 (compared with 2018).

“To honour these commitments, VINCI Energies is performing large-scale assessments, developing low-environmental-impact solutions, and adapting its infrastructure, projects and activities to improve their resilience to climate change,” says Oliver Kelch.

The results speak for themselves with the reductions in Scope 1 and Scope 2 emissions. VINCI Energies emitted 303 kT CO_2 eq, which represents a 16% reduction in CO_2 eq emissions between 2018 et 2023. Also in 2023, 30% of the electricity consumed was from renewable energy sources. The Group also strengthened its electric mobility capacity with a 77% increase in its fleet between 2022 and 2023.

ENERGY ACCELERATION

NORDIC COUNTRIES LEAD THE WAY TO ZERO-EMISSIONS CONSTRUCTION SITES

In Norway, Sweden and Finland, Omexom is increasing the number of its construction sites using 100% electric vehicles and machinery. The benefits include fewer CO_2 emissions and reduced noise pollution.

In the Nordic countries, the reduction of greenhouse gas emissions has entered a highly active phase. VINCI Energies has taken a strong lead regionally in the development of ecological and sustainable construction sites. As Kim Okfors, Innovation and Environment Manager at VINCI Energies in the Nordic countries, explains: *"The electrification of our vehicle fleets and construction machinery reflects the underlying trend in the Nordic countries, particularly Norway and Sweden, where equipment electrification rates are 20% and 29% respectively. But some of our business units can already boast far higher rates."* A similar trend can be seen in Germany (see "Pilot project in Germany" below).

Examples include the electric tramway project at the Aitik copper mine operated by the metals company Boliden in northern Sweden, led since 2018 by Omexom, the VINCI Energies energy infrastructure brand. But a number of recent projects also serve to highlight the contribution VINCI Energies is making to construction-site electrification.

Winning synergies

In April 2023, Omexom E-Mobility delivered complete charging infrastructure for a total of 76 buses to Nobina, the public transport operator in Oslo, Norway, in its Mortensrud depot. This project, which included the design and construction of 5 MW substations was organised *"As an almost emissions-free sustainable worksite,"* says Kim Okfors. *"All the vehicles used for transport of personnel to site (fitters, engineers, project managers) was electric"*

"The electrification of vehicle fleets and construction machinery is an underlying trend in the Nordic countries"

Ansgar-Johan Ladstein, Business Unit Manager at Omexom HV Power Systems Oslo, highlights the synergies created within the Omexom network: *"Four business units worked on this project to ensure full handover to the customer within the deadlines. We carried out all the project work from A to Z, including the 24 kV high-voltage system and the 76 160–240 kW DC chargers, as well as the construction work itself, the lighting systems and temporary electrical supply."*

Extending zero emissions

A few months later, on behalf of the Swedish electricity distributor Ellevio, Omexom, in partnership with VOLVO CE, completed another project in central Stockholm – the construction of charging stations for electric cars in the Kungsholmen district – more modest in scale, but with equally ambitious aims in terms of reducing greenhouse gas emissions.

"Apart from one suction excavator, which was not available in an electric version, all the machinery and all vehicles and tools used on the site were electric," says Kim Okfors. The result was a 2.3-tonne reduction in CO_2 emissions over the six-week works period. To say nothing of the technical complexity of the operations: Ali Yuusuf Abdullahi, the project manager from Omexom Stockholm E-Mobility, notes *"The machines' high performance, even in extremely cold -17 °C conditions."*

This more environmentally friendly approach has since been adopted with other contracts, such as the one Omexom Oslo Lighting is currently engaged in for the maintenance of some 30,000 public light fixtures in Oslo. Since the first quarter of 2024, Omexom has been using only 100% electric vehicles and machines in their work on this contract. Two more zero-emissions projects (substation installations) are currently in the design phase in Sweden and Finland.

Pilot project in Germany

In Bönnigheim, in southwestern Germany, an innovative pilot project is helping to usher in the age of fully electric construction vehicles and machinery.

In Bönnigheim, a small town in the Ludwigsburg area of southwestern Germany, a pilot project has been trialling fully electric construction vehicles and machinery, in collaboration with Omexom GA Süd GmbH. The site is one of the "NETZ worksites of the future", a series of innovative projects by Netze BW GmbH, an electrical distribution network operator, whose aim is to make construction sites more environmentally friendly and more sustainable.

"The project began in late September 2024 and was completed in October," says Ralf Langer, Head of the Middle Neckar Nord and Pipeline Construction Division at Omexom GA Süd. *"For Omexom, this was civil engineering work, including the installation of a primary cable and domestic connection, which required directional drilling.*[1]*"*

Solar-powered break room

In order to minimise CO_2 emissions and noise, only electric construction plant was used on this site. *"We used a Suncar excavator, a Renault truck, an Opel service vehicle, and a Terra drilling rig,"* says Ralf Langer. *"We also used smaller electric tools, including a plate compactor, a cutter, a piledriver, a rammer, and a battery pack."*

The all-electric principle was taken to the extreme with the installation of a solar-powered trailer as a break room for the teams, who were able to run their laptops and coffee machines on self-generated power.

This project is intended to serve as an exemplary innovative solution in environmental terms, but also for its benefits to local residents, whose day-to-day lives are undisturbed, thanks to the silent construction equipment in use. Omexom hopes to develop this type of all-electric worksite and sustainably revolutionise construction practices. *"Some of the equipment we used has proven extremely effective,"* concludes Ralf Langer, *"while some is still being refined."*

(1) Directional drilling is an installation technique for ducts and cables, which removes the need to dig trenches.

ENERGY ACCELERATION

GERMANY'S HIGH-VOLTAGE NETWORK: A STORY OF MODERNISATION AND COOPERATION

Germany is modernising its power supply network to integrate renewable energies. This massive and challenging undertaking requires close cooperation between the organisations involved. Omexom is playing a key role in the project.

In line with its resolute commitment to energy transition, Germany is comprehensively reworking its power supply network. With a decentralised structure featuring more than 800 distribution network operators (DNOs) and four transmission network operators (TNOs), the Federal Republic of Germany faces an unprecedented challenge of coordination.

"This historical organisation promotes local provision and competition, but requires a high level of coordination to ensure stability and efficiency across the network," says Frank Westphal, Chairman of VINCI Energies Deutschland Industry & Infrastructure.

A network under pressure

The massive-scale integration of renewable energies, which already represent over 50% of electricity production in Germany, is creating imbalances across the network. Green electricity, predominantly from wind (in northern Germany) and solar, requires unprecedented flexibility. *"The network has to adapt to considerable fluctuations in production,"* explains Frank Westphal. *"There are not many countries facing this challenge on such a scale."* Geographical imbalance is one of the major challenges in Germany: most of the electricity is produced in the north, while consumption is concentrated in the south, primarily in Bavaria and Baden-Württemberg. This creates a need for vast long-distance transmission infrastructure, such as SüdLink, SüdOstLink and NordWestLink.

Germany's central role in Europe

Germany is connected to each of its neighbours via high-voltage lines, making it a hub in the European electricity market, which therefore plays a strategic role in cross-border trade. To achieve its climate ambitions and maintain a reliable supply, Berlin has established a detailed schedule for expanding the network.

This network development plan, drawn up by the TNOs under the coordination of the Federal Network Agency, lays out a roadmap to carbon neutrality by 2045. It is the result of detailed forecasts, public consultations and a strict regulatory approval process.

ENERGY TRANSFORMATION

THE ELECTRIFICATION OF HEAVY TRANSPORT: THE NEW FRONTIER IN SUSTAINABLE MOBILITY

Road haulage has begun its electric revolution, with a major challenge to be addressed: the need to build infrastructure capable of supporting its energy requirements. The number of initiatives is growing – we find examples in the United Kingdom, Norway and France.

As the world steers toward a low-carbon future, the electrification of heavy transport – trucks, buses, trains and ships – has emerged as one of the biggest challenges & opportunities of the energy transition. Private electric vehicles have quickly taken hold, but the decarbonisation of freight and public transport remains a challenge.

One of the main obstacles identified is the charging infrastructure – an electric truck can take up to 728kWh with the typical battery size currently range is 250kWh to 600kWh for a full charge, compared with 50 to 100 kWh for a car. Current charging networks were not initially designed to handle such high-capacity requirements. Integrated solutions combining renewable energies, battery storage and intelligent charging systems have therefore become essential to an electrification process to support capacity requirements and to enhance availability of the local grid networks.

> *"Actemium has been at the forefront of the electric vehicle revolution in the UK since 2010"*

United Kingdom: the Electric Freightway programme

This is precisely the large-scale transformation the United Kingdom is seeking to achieve with the £200 million Innovate UK programme. By uniting over 400 companies around tangible projects, this government-supported programme covers three main areas: the rollout of zero-emissions heavy goods vehicles; the installation of charging network infrastructure; and the collection of operational data. The recent announcement of 54 new infrastructure platforms strategically located across the country marks a decisive turning point.

One of the programme's flagship projects is Electric Freightway, an industrial consortium with

"The new coalition government has made modernisation of the network a national priority," says Frank Westphal. *"That involves not only an accelerated extension of the existing infrastructure, but also intelligent integration between the electricity, gas and hydrogen networks."*

Huge challenges: authorisations and acceptability

Planning high-voltage lines, especially when using high-voltage direct current (HVDC), means negotiating multiple obstacles, including high costs, administrative complexity and local resistance. *"An underground HVDC line can cost up to ten times as much as an overhead line, but is often essential to getting the public on board,"* says Frank Westphal.

Despite laws designed to accelerate the process, these projects often take more than 10 years to implement. Environmental assessments and consultation processes add to the delays. The total cost of modernising the network is estimated at more than €100 billion by 2045.

Unlike the transmission network, the distribution network lacks a national development plan. Managed by local operators, it needs to accommodate a growing number of producers and consumers of decentralised energy (solar, storage, charging stations, etc.). The current priorities are clear: digitalisation, the rollout of smart grids, and the flexibility to integrate new technologies.

Omexom's key role in major projects

Omexom, the VINCI Energies energy infrastructure brand, is playing a leading role in the transformation of Germany's network. It is active in the overhead and underground line and substation segments, and is working on major projects, such as the 525 kV Corridor B, in partnership with Amprion. *"This project aptly illustrates Omexom's involvement in the planning, design and implementation of underground HVDC lines,"* explains Frank Westphal. *"It will be an essential link in Germany's future power supply network."*

This project links Heide with Polsum (460 km) and Wilhelmshaven with Hamm (210 km). Omexom's role encompasses the technical planning and regulatory documentation, along with intersection management and execution planning.

For the VINCI Energies Deutschland Industry & Infrastructure Chairman, successful energy transition in Germany can only be ensured through a collaborative approach: *"The Omexom Technology Forum showed that close cooperation between energy suppliers, manufacturers, politicians and the wider community is the only way to meet the challenges facing the network. It's a collective mission."*

the aim of creating the world's most extensive and most advanced charging network for electric goods vehicles. With more than £100 million in funding, including £62.7 million of public finance, the project target is to install 200 ultra-high-power (350 kW) charging stations on motorways and in goods depots across the country.

Over 140 electric trucks will be added to transport fleets to test the effectiveness of this large-scale network. All public charging infrastructure will use 100% net-zero energy to create an entirely decarbonised logistics chain.

With more than 15 years' experience in Charging Infrastructure Design & Build in the UK, Actemium, the VINCI Energies industry brand, is one of the Electric Freightway's industrial framework suppliers to deliver charging infrastructure builds at various locations .

"Actemium has been at the forefront of the charging infrastructure requirements for the electric vehicle revolution in the UK since 2010," says Malcolm Hughes, Head of Mobility Development at Actemium EV Mobility. *"And We're now bringing this expertise to the heavy transport sector, with solutions capable of managing the complex energy and logistical needs of these new fleets."*

The business unit is taking a comprehensive approach: *"We are working with integrated energy solutions that combine smart charging, renewable energies and battery storage to ensure a sustainable power supply even during peak demand periods."*

This vision is central to the Electric Freightway project, which will also include charging points shared between fleets, and opportunity charging solutions on major roads. *"Innovation is essential to meeting the network's capacity, range and availability needs. Megawatt chargers, which are currently in development, will transform the logistics landscape,"* says Malcolm Hughes.

By centralising data collection over five years, the Electric Freightway project hopes to provide a solid base for the development of future public policies.

Subsidies and other government incentives, together with the increasing power infrastructure availability in the grid, are key to triggering large-scale change.

Norway: infrastructure designed for heavy logistics

In Norway too, innovation is central to the electrification of heavy haulage. The country is targeting the complete decarbonisation of road transport by 2030, but in 2024, just 2% of the Norwegian truck fleet was electric, despite strong sales growth (12.6% of new trucks sold that year were zero-emissions models).

To support this transition, innovative charging solutions are necessary, and that is where Omexom Norway enters the picture. Since 2025, Omexom Samferdsel SØR has been installing overhead charging points in logistics depots. This equipment is designed to meet the specific requirements of goods transport: restricted space, safety in manoeuvring and operational efficiency.

"Some of the major challenges in charging heavy goods vehicles in depots are the space and safety constraints," explains Geir Aabel, E Mobility Manager at Omexom Samferdsel SØR. *"With our solution featuring overhead charging points, we free up floor space, avoid collisions, and facilitate charging while loading and unloading."*

This is the technology that ASKO, Norway's largest food wholesaler, has chosen to fully electrify its fleet by 2026. In collaboration with Omexom and two other partners, Saferoad and Kempower, the company has installed a modular charging system in its depot, directly above the loading bays. *"For ASKO, a compact installation was crucial,"* says Geir Aabel. *"The loading bays are extremely high-activity areas. The overhead charging points allow trucks to manoeuvre freely with no obstacles on the ground."*

This approach offers multiple advantages: enhanced safety when reversing; charging while loading or unloading to reduce waiting; scalability thanks to a modular structure adaptable to different types of depots; and sustainability, with equipment well protected against collisions and bad weather.

"Omexom offers a turnkey solution covering everything from design and engineering to installation, along with project management, operation and maintenance," explains Geir Aabel. *"As the energy transition gathers pace, solutions such as Omexom's can not only reduce transport's carbon footprint, but also maintain logistical fluidity in a sector where every minute counts."*

Impactful initiatives, such as those created by Actemium EV Mobility in the United Kingdom and Omexom in Norway, show that heavy, clean, high-performance logistics are possible. The electrification of heavy transport is no longer a distant prospect but an industrial reality. This new frontier in sustainable mobility is not just technological – it is collaborative, systemic and profoundly strategic for a carbon-neutral future.

ENERGY TRANSFORMATION

THE EU BAN ON SF_6 GAS IS TRANSFORMING THE ELECTRICITY SECTOR

The European Union has decreed an end to SF_6 gas in electrical equipment from 2026. Omexom (VINCI Energies) business units, along with the sector as a whole, will need to redesign its technical solutions while maintaining the reliability of its networks. This change poses challenges, but also offers opportunities for leadership.

The unobtrusive but problematic gas sulphur hexafluoride (SF_6) is used primarily in switchgears and circuit breakers for its excellent dielectric properties. Because it is non-toxic, this gas has quickly found a place in industry, in particular for insulating high-voltage electrical equipment, which alone accounts for 80% of SF_6 production.

The problem is that while it is largely unknown to the general public and has thus far evaded media attention, SF_6 is the most potent greenhouse gas known, with global warming potential more than 23,000 times greater than that of CO_2 and an atmospheric lifetime of around 3,200 years.

The European Union has therefore implemented a total ban on its use in new medium-voltage equipment (up to 24 kV) from 1 January 2026. This measure is part of a series of regulations intended to reduce fluorinated greenhouse gas emissions – Regulation (EU) 2024/573 – in line with targets laid down in the Kyoto Protocol signed in December 1997.

Training teams and adapting the supply chain

European legislators have created a precise schedule for the phased elimination of SF_6, with specific deadlines for different categories of equipment. *"The ban will initially cover electrical equipment in the distribution network,"* explains Geoffroy Deygas, Project Manager at Omexom (the VINCI Energies energy infrastructure brand). *"From 2026 for equipment up to 24 kV, then 2030 for the 24 to 52 kV range. In 2028, it will be extended to the transmission network (52 to 145 kV). For the very highest voltages (over 145 kV), the deadline is not until 2032."* This staggered approach reflects the technical realities on the ground and the varying maturity of alternative solutions at each voltage level.

To address these changes, sector stakeholders will have to manage the integration of substitute technologies: alternative insulating gases or vacuum switchgears, which will gradually replace SF_6. The first challenge is therefore to develop the new skills needed across our teams: *"Training them will be crucial to incorporating this equipment in our new projects. Vacuum switchgear, for example, is a very different technology compared with gas, which can have an impact on sizing in our projects,"* says Geoffroy Deygas. The second challenge concerns the supply chain. It will be necessary to anticipate the purchasing strictly necessary for the new installations, allowing for supplier price increases on equipment compliant with the new regulations over the next few years.

Anticipating to take the lead

In the European Union, legislators are leaving no room for choice: customers will have to adapt, regardless of any additional costs incurred. Other regions worldwide are following Europe's lead, such as in California, which already has plans to ban SF_6, and New York State, which is examining a similar proposition, but they remain a small minority.

The challenge for Omexom therefore awaits mostly outside Europe, in the form of encouraging and incentivising change. Omexom business units intend to base their leadership on a proactive approach: Geoffroy Deygas emphasises *"The need to connect with manufacturers, to show the way in the installation of new equipment, and also to map out the various existing and future market regulations so we can anticipate them and advise our customers accordingly."*

> *"Improving infrastructure to enable the electrification of more and more uses"*

This approach should enable us to acquire early expertise in the new technologies while contributing to their development. In any event, Omexom has already stolen a march: working on behalf of SSEN Transmission in Kintore, eastern Scotland, an Omexom business unit is currently building the first SF_6-free 400 kV GIS substation for the power network, using Green Gas for Grid (g3) technology. With global warming potential (GWP) of less than 500 – 50 times lower than SF_6 – g3 could reduce the unit's carbon impact by over 95% over its life cycle. However, like any fluorinated gas (GWP >1), it will not meet the future requirements of the F Gas regulation for post-2032 applications. This project is nevertheless a key step in establishing the technical feasibility of alternatives to SF_6 in high-voltage applications.

One final concern is the management of existing assets. Though the European regulation allows existing SF6 installations to continue operating, the sector must now begin planning their gradual replacement. These changes are a necessary part of the global energy transition. As Geoffroy Deygas concludes: *"Installing solutions with a lesser environmental impact is a way for us to support this energy transition. Improving infrastructure to enable the electrification of more and more uses, using green electricity wherever possible, is our core mission."*

INNOVATION

MEET DR FANNY BARDÉ, INNOVATION POWERHOUSE

The Agilty Effect Guest Feature

Recently a finalist in the European Prize for Women Innovators 2025, Dr Fanny Bardé is determined to revolutionise electrical batteries. Her entrepreneurial research startup, SOLiTHOR, is working on a safer and better-performing solid-electrolyte technology to meet the mobility challenges of tomorrow.

The name SOLiTHOR is a portmanteau of solid, lithium, and Thor – the god of thunder. It encapsulates the objective of this startup, created in 2021 by Fanny Bardé and her associate Huw Hampson-Jones: to develop the battery of the future. This is a *"solid-electrolyte battery made from composite hybrid material, which solves the safety problems of conventional batteries and improves on their performance,"* says Fanny Bardé. *"Compared to conventional batteries available on the market today, solid-state batteries are lighter,smaller, and significantly safer—especially when it comes to fire risk. They open up a range of possibilities beyond the electric car, in the realms of sea, air and even space travel, with real benefits in terms of decarbonisation."*

For the Chief Technology Officer of SOLiTHOR, this ambitious project

was born at imec, the interuniversity microelectronics centre based in Leuven, Belgium. But long before that, two pivotal meetings led her to devote herself entirely to the study, research and development of electric batteries.

The first occurred when she was a young chemistry student at the University of Picardy Jules Verne in Amiens, in northern France. *"I found nature intriguing from an early age, so I was naturally attracted to chemistry. At university in Amiens, I was lucky enough to meet an exceptional professor, Jean Marie Tarascon, now teaching at the Collège de France, who came from a background in the energy storage industry in the United States. I worked on batteries in his lab, and he was my thesis supervisor for three years,"* recalls Fanny Bardé. *"I entered applied research on an equal footing, which suited me perfectly, having always wanted my work to have an impact on everyday life".*

From academia to industry

Her second mentor was Maria Rosa Palacin Peiró, a specialist in the application of solid-state chemistry and electrochemistry to batteries, and a professor at the Barcelona Institute of Materials Science (ICMAB), where, when not working in Amiens, Grenoble and Slovenia, Fanny Bardé completed part of her doctorate in the early 2000s.

"Rosa Palacin was an inspiration to me, showing me it was possible as a woman to become a high-level researcher," says Fanny Bardé. Recently a finalist in the European Prize for Women Innovators 2025, the scientist, who leads a 40% female R&D team, is in turn working to pass the baton to young female researchers by visiting universities to talk about her experiences.

And this French, English, Flemish and Spanish-speaking polyglot certainly boasts an inspirational career path. Under her post-doctoral contract, Fanny Bardé worked in the United States for the Duracell research centre in Needham, Massachusetts, focusing on the development of new materials for hearing-aid batteries. There, she filed her first patent. *"I learned a lot about transferring technologies from the academic world to the industrial sector."*

> *"In an extremely fast-changing world, you have to remain focused on your objectives while maintaining a good balance between the short and long term."*

In 2004, she signed her first permanent contract with Toyota. *"At the time, with the Prius, they were one of the rare carmakers developing a hybrid electric vehicle. My very specific profile was exactly what they were looking for."* She soon found herself in the R&D department at Toyota's European headquarters in Brussels, where over 15 years, she occupied every post from engineer to technical manager. *"I worked with all the world's greatest battery specialists. But I also discovered the world of industrial manufacturing and the challenges of mass production, quality control and standardisation. That experience afforded me direct contact with end users and their expectations."*

Staying agile and anticipating

In 2019, Fanny Bardé felt the need to explore this link between research and industry from a different angle, via imec, which specialises in technology transfer and its successful application in industry. It was there in Leuven, Belgium, that she would spend three years developing solid-state batteries, mostly as part of a consortium of a dozen partners supported by the European Union. *"I then had the opportunity to create a spinoff via the imec incubator and launched SOLiTHOR with my associate, the former CEO of a UK battery company, who taught me a great deal about entrepreneurship."*

Since their startup launched in September 2021, the team, which now comprises 34 people based in the Belgian town ofSint-Truiden, north of Liège, has made enormous strides and is now preparing its second round of fundraising. *"Three to five years from now, we should be seeing the first actual industrial applications, no doubt for drones or robots,"* suggests Fanny Bardé, who however has no intention of building a gigafactory: *"Our business model will be based on licensing."*

Fanny Bardé's watchword is agility: *"In an extremely fast-changing world, you must be able to anticipate and have the ability to manage unforeseen situations while remaining focused on your objectives and maintaining a good balance between the short and long term."* As a half-marathon runner, Fanny Bardé knows a thing or two about consistency and perseverance.

RENOVATING SCHOOLS: INVESTING IN THE FUTURE

The renovation of schools represents a major strategic undertaking for Europe, with energy performance, student comfort and attractive school settings among its objectives.

The needs are huge and vary from country to country. In France, ambitious plans are afoot to renovate thousands of schools considered "thermal sieves", while in Belgium, regional programmes are helping modernise school buildings in line with fixed sustainability criteria.

In Sweden, some regions are planning a reduction in school sizes, with targeted strategies to optimise their renovations. In Germany, local initiatives are emphasising energy efficiency and the rollout of modular solutions to ensure educational continuity while the works take place.

But if we look past this variety, the educational construction market is being driven by unique convergence factors: regulatory obligations, public priorities, and the pursuit of academic excellence – making school renovations an essential lever in preparing students to face the challenges of tomorrow.

BUILDINGS | TRANSFORMATION

RENOVATING SCHOOLS TO TRANSFORM LEARNING AND PREPARE FOR THE FUTURE

At the intersection of environmental, social and academic issues, the European schools market is undergoing a radical transformation for growth, including the renovation of building assets. There are obstacles, but also real levers for acceleration. VINCI Energies Building Solutions is championing an integrated global partnership approach.

The educational establishments sector in Europe is undergoing a radical transformation and now represents a major strategic opportunity for construction companies. With added momentum from the *Renovation Wave*[1] initiative and the increasingly stringent requirements of the Energy Performance of Buildings Directive, this overhaul goes far beyond a simple energy standards upgrade to encompass the quality of teaching, the well-being of building users, and the international reach of these establishments.

A booming but fragmented market

A key characteristic of the educational establishments market in Europe is how disparate it is. *"While the education segment overall is growing rapidly at European level, there are major variations between countries,"* says Lydie Marchand, Head of Marketing and Communications at VINCI Energies Building Solutions. *"For example, Italy is looking at a 25% expansion in space given over to education by 2027, while Sweden is expecting a 10% contraction."*

This disparity is due to contrasting national dynamics arising from diverse asset bases, different educational models, and unequal opportunities for financing. Additionally, the term "educational establishments" covers a huge variety of venues – from primary schools and high schools to public universities and private graduate schools, all with different needs and available means.

> *"Public educational establishments have become the spearhead of national energy renovation strategies."*

Renovation on the front line

Another key feature is that, although new builds continue, most investment in now focused on renovations. *"Public educational establishments have become a symbolic element in some national energy renovation strategies,"* says Lydie Marchand.

The French government, for example, has launched a huge plan to modernise the thousands of schools designated "heat sieves". Higher education also has massive needs, with more than €118 million required just to upgrade universities to current standards.

For private establishments, other factors are encouraging renovation, including competition to attract international students. *"Universities and private schools are investing massively in increasingly large, modern, connected, low-cardon campuses,"* says Lydie Marchand. *"These projects are part of their efforts to move upmarket and directly support their competitiveness in international rankings."*

Persistent structural barriers

Despite this potential, numerous barriers are slowing the market's momentum. The first is financial: the European Commission estimates that an additional €275 billion a year is needed to achieve decarbonisation targets.

Then there are diverse regulatory barriers, operations often taking place on occupied sites with rigid deadlines, and pressures in some countries on the availability of skilled workers.

Levers for acceleration

Numerous avenues exist for meeting these challenges. Special contract models (public-private partnerships, global energy performance contracts) make it possible to mutualise risks and investments. European financial instruments such as NextGenerationEU and European Investment Bank loans are also available.

Public stakeholders also have a crucial role to play. *"In a country like France, schools represent on average 31% of energy consumption. They are visible and socially strategic, and often prioritised in renovation plans."*

Industrialisation and digitalisation are also key levers: off-site prefabrication to limit disruption to occupied sites; digital twins to plan and simulate renovations; and using data from the IoT to improve air quality and optimise energy performance.

Integrated approach for global partnership

In this context, VINCI Energies Building Solutions is positioned as a leading player. Lydie Marchand explains: *"We have all the know-how required to support the transformation of educational establishments across Europe, whether meeting the environmental challenges or reinventing learning spaces."*

This support goes beyond construction work alone to include: performing site audits; putting together financial reports; seeking out subsidies; and drawing up contracts to ensure energy performance, design and operation over many years. This integrated approach is part of a long-term vision of supporting local authorities as well as private companies.

With the European schools market located at the point where environmental, social and academic challenges meet, it offers VINCI Energies a remarkable playing field for innovation and partnership, where every project becomes a showcase for energy transition and educational quality.

(1) Renovation Wave: an initiative launched by the European Commission in October 2020 as part of the Green Deal. Its primary objective is to accelerate the energy renovation of buildings in Europe.

BUILDINGS | TRANSFORMATION

A FORMER BANK HEADQUARTERS TRANSFORMED INTO A MULTIFUNCTIONAL SCHOOL CAMPUS

In Brussels, the former Beobank headquarters is transforming into a school campus and community centre. Cegelec HVAC is providing innovative and sustainable HVAC solutions, offering comfort, energy performance and timely installation.

The former Beobank headquarters in the Ixelles municipality of Brussels is learning to live a second life. With over 7,000 sq. metres of outdoor space and excellent accessibility, the building is to be transformed into a large multifunctional learning campus. From September 2026, it will accommodate two secondary schools with a total of 1,150 students.

GO! Atheneum Etterbeek will offer an ASO (general education) programme for 700 students, while the nonprofit KatOBA's Institut Imelda will develop TSO and BSO (technical and professional education) courses for 450 students.

Across its 14,165 sq. metres, the infrastructure will feature just under2,000 sq. metres dedicated to sport, which will also be available to local clubs outside school hours. The campus will also include a community centre, De Maalbeek, with a 375 sq. metre theatre and several multipurpose halls.

At the heart of energy performance with Cegelec HVAC

BAM Interbuild is carrying out the work for this renovation project led by Befimmo for VGC (the Flemish community commission). It is based on a circular economy approach, retaining and repurposing the existing structure.

Cegelec HVAC is playing a key role in the technical success of the project, with responsibility for execution studies, installation, commissioning and tuning for the entire HVAC system.

"The campus will be heated entirely by renewable energies via two air-to-water heat pumps with combined power of 522 kW," explains Sebastiaan Smits, Project Manager at Cegelec HVAC Commercial North (VINCI Energies Building Solutions). "One of these heat pumps will also provide cooling to the air-handling units to ensure perfect comfort all year round."

Furthermore, a water-to-water heat pump of 129 kW will produce domestic hot water for the sport complex.

Ventilation is provided by five air-handling units creating total airflow of 95,120 cubic metres an hour and equipped with high-performance filters, a thermal wheel for recovering heat and moisture, and heating and cooling coils. *"Rooms with variable occupancy will have VAV valves, which can adjust depending on CO_2 rates to optimise air quality and energy consumption,"* says Sebastiaan Smits.

The Building Management System will be provided by an ABB Cylon system, the engineering and programming for which will be handled in-house by Cegelec.

A tight schedule and ambitious technical choices

"We were appointed in April 2025 and immediately started the execution study. Work on the site will begin in October," says Sebastiaan Smits.

> *"This project perfectly illustrates how to combine energy efficiency, user comfort and intelligent reuse of the existing building fabric."*

The timetable remains one of the main challenges: everything needs to be completed by August 2026 to allow the school to open in September. The technical installations will be visible in the classrooms and so require particular care in their design and execution.

In addition to technical performance, the project has a strong environmental aspect, with a circular renovation preserving the existing structure, a building that uses no fossil fuels for HVAC (there is gas for the labs classrooms), and exterior solar reflectors to reduce overheating, all complemented by top-down cooling from the air-handling units.

For Sebastiaan Smits, *"This is a project that perfectly illustrates how to combine energy efficiency, user comfort and intelligent reuse of the existing building fabric."*

Project on behalf of Vlaamse Gemeenschapscommissie (VGC), GO! Scholengroep Brussel, Scholengroep KatOBA en het gemeenschapscentrum De Maalbeek
Developer: Befimmo – Architect + engineering: B2Ai – Contractor: BAM Interbuild

BUILDINGS TRANSFORMATION

SCHOLEN VAN MORGEN: BUILDING THE FLEMISH SCHOOLS OF THE FUTURE

In Belgium, AG Real Estate, BNP Paribas Fortis and the Flemish government have joined forces to transform the educational landscape with 182 construction and renovation projects. And Cegelec HVAC is providing its technical expertise.

Launched under a public-private partnership (PPP), the Scholen van Morgen [lit. Schools of Tomorrow] programme is designed to meet the urgent need for modern education infrastructure in Flanders. Created by the company DBFM Scholen van Morgen NV, this 30-year scheme incorporates the design, construction, financing and maintenance of 182 school projects. At the heart of this approach, Cegelec HVAC has contributed to two flagship projects: one in Heist op den Berg (Antwerp Province) and the other in Beringen (Limburg Province).

Solutions tailored to each project

On its Bierkofstrat site in the Antwerp region, the new Heilig Hartscholen campus includes two secondary schools and a sports hall, while the neighbouring site has a fully renovated primary school with new classrooms for nursery and primary pupils.

Cegelec HVAC supplied and installed the heating, ventilation and climate control systems, as well as electrical installations. *"We designed and installed robust, easy-to-maintain solutions to the latest safety and comfort standards,"* says Gust Voeten, Project Director / Technical Manager at Cegelec HVAC Commercial North (VINCI Energies Building Solutions).

The Beringen project, named "Spectrum College", is composed of 11 buildings, each with its own heating system. Cegelec HVAC installed a demand controlled ventilation system for the classrooms, special units to extract smoke and dust from welding, 11 boiler systems, centralised ventilation, and specialised installations for the technical workshops.

Expertise, organisation and sustainable technical choices

Cegelec HVAC formed a dedicated team for each project, each with a project lead, project and design engineers, site supervisor and site engineers. *"What makes this programme special is the way we were involved from the design phase, which allowed us to optimise the HVAC installation in advance,"* explains Gust Voeten. Cegelec carried out also the electrical work, and VINCI Facilities is now providing building maintenance under the PPP.

"What makes this programme special is the way we were involved from the design phase, which allowed us to optimise the HVAC installation in advance"

The two projects also stand out for their environmental approach, with air handling units equipped for heat recovery, and no active cooling in the school buildings. The Heist op den Berg site has been upgraded from System C to System D ventilation. *"This modification makes it possible to recover heat and moisture from the extracted air and use them to heat and humidify the fresh air taken in, which improves comfort and energy efficiency,"* says Gust Voeten.

With Scholen van Morgen, Flanders is acquiring not only modern school infrastructure, but also efficient technical installations designed to last.

BUILDINGS | TRANSFORMATION

TECHNICAL EXCELLENCE DRIVING EDUCATIONAL INNOVATION

In the new Learning & Innovation Center at the Université Libre and Vrije Universiteit Brussel in Brussels, the focus is on educational innovation, thanks to state-of-the-art audiovisual equipment designed by Axians.

Opened on 14 May 2025 at the heart of the campus shared by the Université Libre de Bruxelles (ULB) and the Vrije Universiteit Brussel (VUB), the all-new Learning & Innovation Center (LIC) offers a hybrid collaborative space with a resolute focus on innovation.

This 9,000 sq. metre building is the fruit of a €37.1 million investment, and stands out not only for its avant-garde architecture and sustainable approach, but also its integration of cutting-edge technological infrastructure, the design and implementation of which were entrusted to Axians, the VINCI Energies ICT brand.

The LIC, designed as a bridge between the two universities, symbolises their ambition to strengthen their collaboration and provide a framework conducive to interaction between students, researchers, teaching staff and external partners.

With its 35 study and meeting rooms and 7 active teaching spaces (collaborative and active), and extended opening hours from 8 a.m. to 11 p.m., the new centre is intended to be an incubator for ideas and innovative learning methods. But its audiovisual and digital infrastructure, designed and installed by Axians, is what really makes this a model establishment for Belgium and Europe.

Early in 2024, Axians was assigned the crucial mission of creating an AVoIP (audio-visual over Internet Protocol) network and equipping the LIC with an integrated audiovisual system designed to support hybrid teaching, videoconferencing, recording and interactive sessions.

"This was a considerable task, which our dedicated team composed of a project manager, project engineer, lead programmer and solutions architect completed in less than a year," says Thor Van Driessche, Sales & Bid Manager at Axians Audiovisual Belgium.

An ambitious technical project

The project, which launched in August 2024 and concluded in June 2025, involved the installation of cutting-edge equipment across five floors of a building still under construction. The main challenges included the connection to the university's existing audiovisual infrastructure and ICT networks, strict security policies, and tight schedules for handover in time for the 2025 new university year.

"As an integrator, we handled the installation of all the hardware including the cabling, the programming design, and the test phases leading up to handover," explains Thor Van Driessche.

Axians deployed a wide range of technological solutions: rooms for collaboration and active teaching (4K screens, touchscreens, videoconferencing systems and smart booking displays); recording studios and auditorium (LED walls, PTZ cameras, professional streaming and recording systems, dedicated operating desks); an immersive experience hall (360-degree projection and edge-blending technology, surround sound, touchscreens); and digital signage (screens throughout the building, controlled by a centralised content management system).

Public success

"Our objective was to create a modern, flexible and inspirational learning and working environment, perfectly integrated with the existing on-campus audiovisual standards," says Thor Van Driessche.

> *"Creating a modern and flexible learning and working environment"*

Developed in three languages (Dutch, French and English), the AVoIP solution installed by Axians has a simple and intuitive interface with touchscreens using a range of pictograms: *"This tool can be used by someone with zero technical knowledge".*

The new Learning & Innovation Center is already a success. Even before the university year began, the centre was welcoming more than 1000 unique visitors a day on average, double the initial target.

BUILDINGS | TRANSFORMATION

COLLABORATIVE PROJECT FOR A SUSTAINABLE SCHOOL IN SWEDEN

In Tranås, Sweden, a brand-new school is combining modernity, functionality and sustainability. The expertise behind the school's innovative and ecological electrical installations belongs to the VINCI Energies subsidiary Emil Lundgren.

When they went back to school in 2025, students in the town of Tranås, Sweden, discovered a brand-new establishment: Granelundsskolan, located in the Norraby. district.
The fruit of a collaboration between the municipal authority, AB Tranåsbostäder (the town's property management firm), the construction company NCC, and various architects and consultants, the designed to combine functionality, sustainability and aesthetic appeal.

Covering 8,400 sq. metres across three interconnected blocks, the school can accommodate up to 600 pupils from nursery age to Year Six. It includes classrooms, childminding facilities, a large canteen and a 300-seat sports hall, and was built in line with the Swedish Green Building Council (SGBC) Silver criteria.

The VINCI Energies subsidiary Emil Lundgren was closely involved in this collaborative project, taking responsibility for all the electrical installations. Its project manager, Alexander Almegård, looks back at a human and technical adventure that lasted more than two years. *"We were involved from the earliest stages, working on the design and the creation of technical documents,"* he recalls.

The Emil Lundgren team set to work on the design phase in spring 2023, moving on to production from January 2024. *"At the project's height, we had 12 or 14 installers working. It was completed in May 2025, ready for school to start again in the autumn."*

A technical, ecological and organisational challenge

Emil Lundgren mobilised all its expertise for this project, providing interior and external lighting, the electrical power supply, optical fibre, security and communication systems, and parts of ventilation and climate control, not to mention a sizeable solar installation.

"We installed 400 solar panels with combined power of 172 kWp, which produce energy throughout the day. We have also prepared the equipment for adding storage batteries in the future," says Alexander Almegård.

As well as the technical performance, the project's ecological dimension was embraced immediately. *"In the design phase, we suggested luminaires with low environmental impact. Compact cardboard enclosures reduce the carbon footprint of some by 81%, while others use pine plywood with birch veneer."*

The challenge was not only technical and ecological, but also organisational. *"As electrical installers, we depend heavily on the other trades making progress,"* explains Alexander Almegård. *"Planning and collaboration were the keys. We worked with exclusively digital plans, which facilitated checking and reduced errors."*

> *"We were able to team up experienced installers with younger employees so the latter could acquire hands-on experience of a complex sustainable project"*

He adds that the cooperation with NCC and the other partners was exemplary. *"This was a collaborative project. The project managers, customers, consultants and installers all shared the same vision. Other providers helped us with some tasks in a real demonstration of valuable mutual aid."*

This project was also an opportunity for sharing expertise. *"We were able to team up experienced installers with younger employees so the latter could acquire hands-on experience of a complex sustainable project."*

BUILDINGS | TRANSFORMATION

A UNIVERSITY IN POLAND IS TRANSFORMING ITSELF WITH NEXT-GENERATION ERP

The Military University of Technology in Warsaw (WAT) is modernising its management systems in partnership with Axians IT Poland, which has developed strong expertise in the education and defence sectors.

The Military University of Technology in Warsaw (WAT) educates more than 9,000 students, including 4,000 military students. It recently launched a comprehensive modernisation of its management systems. To meet the challenges posed by an ageing and unsuitable ERP (business management software) system, the university decided to implement a new integrated management system, SAP S/4HANA, with support from Axians, the VINCI Energies ICT brand.

Previously, WAT had used an ERP system that was showing its limitations in a lack of scalability and integration between systems, and difficulties meeting growing needs in terms of management and compliance. The university has to manage a wide variety of complex processes, relating not only to education but also to its relationships with the Ministry of Defence, its scientific partners, and public services.

Since 2020, discussions have been under way about new digital infrastructure. Having compared the products available and consulted with other universities, WAT selected the SAP S/4HANA solution to replace its old Egeria Comarch system. This choice was based on the reliability and flexibility of SAP, which is widely used in public institutions and known to meet the required quality, security and compliance standards.

An ambitious project

Axians IT Poland was selected to manage the project. *"Through its experience with other universities in Poland, including the University of Warsaw, the Warsaw University of Technology, and the University of Silesia, Axians has acquired considerable expertise in the implementation of complex systems,"* says Patryk Borzęcki, Business Unit General Manager at Axians IT Poland. *"The contract is worth around 16 million Polish złoty [€3.7 million] after tax and covers the integration of numerous modules and the use of SAP Analytics Cloud for its advanced reporting functions."*

The first phase of the project launched in Marz 2024 and was completed in a record time of nine months. This stage included system configuration, data migration from the old ERP, integration with existing systems, functional testing, and training for over 300 users.

Rapid, concrete results

The system has been proving its effectiveness since day one. By the end of March 2025, the FIORI user interface had already processed over 3,700 requests. As Lena Wójcik, Project Manager at Axians IT Poland, explains: *"Management processes such as ZUS [Polish social security] payments and VAT declarations have been executed with no problems. The digitisation of administrative documents (tax forms, purchase invoices, etc.) has brought improved traceability, faster processing times and resource savings."*

This transformation is not limited to digital tools – it marks a structural and cultural evolution within the university. By opting for centralised, automated management compliant with modern standards, WAT has strengthened its ability to adapt and its resilience in a tense geopolitical and security context. Despite the challenges (tensions at the border, cyberattacks, the war in Ukraine), the university has chosen consistency, modernity and transparency.

Two dynamic phases

The successful conclusion of the first phase opened the way for the second, which was completed on 1 August 2025. This included the optimisation of the existing system and the addition of some new SAP modules:(1) FI-TV (travel management), PM (maintenance), CRU (central contract register), ECM by OpenText (advanced document management), and extended reporting capabilities with SAP Analytics Cloud. The aim was to further develop the digitalisation of internal processes while ensuring the solution's long-term scalability. *"We will continue to provide WAT with maintenance and full support of the solution for 36 months to ensure its long-term stability and performance,"* says Patryk Borzęcki.

> *"WAT is asserting its commitment to being an agile, innovative and effective player"*

He adds that with this project, WAT is doing more than adopting a new computer system: *"It is redefining its operations, modernising its processes and asserting its commitment to being an agile, innovative and effective player in the interest of research and national defence"*.

(1) SAP modules make it easier to manage various specific internal business activities: purchasing, maintenance management, accounting, management control, human resources, and more.

ICT TRANSFORMATION

INNOVATION FOR AN AUGMENTED VISITOR EXPERIENCE TO THE RIJKSMUSEUM

A historic partner to the Rijksmuseum in Amsterdam, Axians Netherlands recently signed a new three-year contract to make the museum's collection even more accessible to visitors and staff.

For more than 15 years, Axians the VINCI Energies ICT brand, has been responsible for managing networks, data centres and cybersecurity at the Rijksmuseum Amsterdam, which has more than 8,000 works of art on permanent display, including internationally renowned pieces by Rembrandt, Vermeer and Van Gogh. For the past two years, Axians has also been providing the museum with NaaS (Network-as-a-Service) with guaranteed connectivity and security.

"For the Rijksmuseum, one of Europe's most-visited museums with more than 2.5 million visitors a year, the IT infrastructure has to be very sophisticated," explains Edwin Kanis, Chief of Marketing & Innovation at Axians Netherlands. *"Each visitor can pay for and receive their tickets, find information and access audio guided visits via the network. That requires maximum cybersecurity, excellent stability and high bandwidth."*

An unusual characteristic of the Rijksmuseum's IT network, which is designed to offer the best possible museum experience, is that it is completely invisible to the visitor. *"You will not see a single access point anywhere, even though the network is available to thousands of visitors every day,"* says Edwin Kanis. *"The same goes for the security systems in and outside the public areas."*

"For the Rijksmuseum, one of Europe's most-visited museums, the IT infrastructure has to be very sophisticated"

Improving the digital experience

Having achieved this level of performance, the next step was to find new ways of using the network for intelligent operations. Continuing its long and fruitful collaboration with Axians, in January 2024, the famous museum signed a three-year contract with Axians to further work on transformation and digitalization to optimally facilitate employees and visitors for both an authentic and a digital experience.

The idea is to take advantage of the huge quantity of data generated in the museum, for example via the WiFi network, to create a smart building. *"By analysing the way visitors move around, it's possible to further enhance their experience,"* explains Edwin Kanis. *"We're currently working on that, and also on using the network to support restoration projects, in which artworks are photographed in 'ultra-mega-high resolution' and this data analysed before the conservation work begins."*

Smarter support and maintenance

Within their partnership, the Rijksmuseum is supporting Axians Netherlands in the development of its AIOPS (AI for IT Operations) platform by adding its own datasets to the platform. Edwin Kanis, Chief of Marketing & Innovation at Axians Netherlands, explains that *"AIOPS is an Axians NL development in which we are using artificial intelligence to make all our support and maintenance activities smarter for customers, and give them a better overview of their network usage, cybersecurity platforms and data centres."*

ICT PERFORMANCE

CHURCH OF SWEDEN: LESSONS LEARNED FROM A MAJOR CYBERATTACK

In November 2023, the Church of Sweden was subjected to a massive cyberattack. We review how thanks to its provider Axians, it was able to protect its data, restore its servers, and ultimately strengthen its information systems.

The Church of Sweden has more than 5.5 million members and employs 20,000 people. It plays a major role in this country of 10.5 million inhabitants. As well as religious services including baptisms, confirmations and funerals, it offers a wide range of services such as the management of nursery schools and choirs. The church is also Sweden's largest landowner.

On 23 November 2023, with Sweden engaged in the process of joining NATO, the church was subjected to a major cyberattack, in which BlackCat ransomware operated by a group of cybercriminals paralysed its data centre, bringing its computing operations to a complete standstill.

A few months earlier, Axians Sweden had signed a renewal of its contract with the Church of Sweden following a five-year collaboration. Its managing director is well placed to explain the scope of this cyberattack: *"This incident threatened to disrupt some of the institution's core activities,"* says Stefan Kulhanek, Managing Director of Axians Sweden.

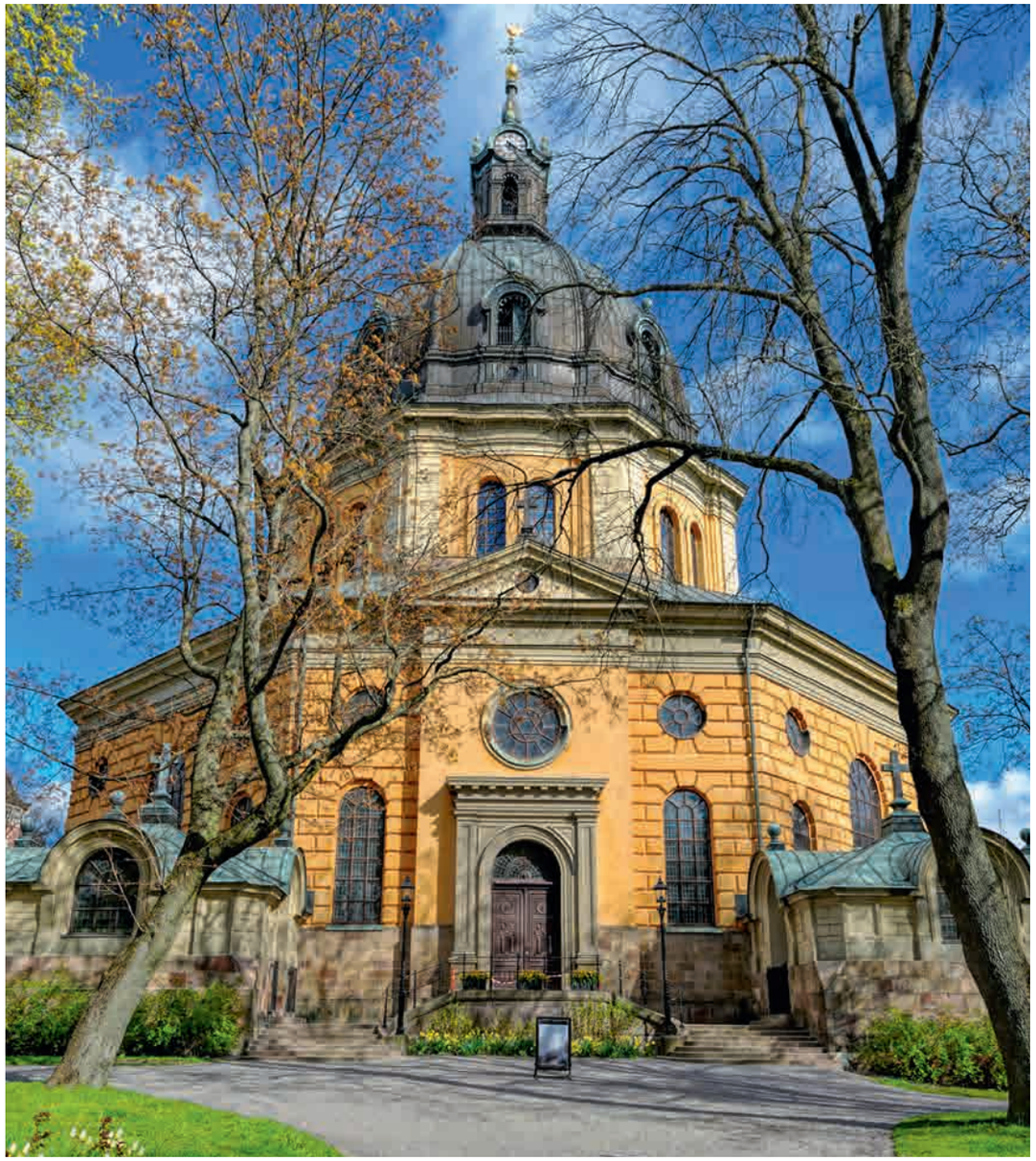
Working the old-fashioned way

"The attack came via a piece of network equipment from another provider, which contained vulnerabilities outside Axians management," explains Stefan Kulhanek. *"But thanks to our network monitoring, we were able to see that something unusual was happening. We immediately took the decision to isolate the system in order to prevent a fraudulent export of data."*

As a result, 27,000 users were unable to access the computing systems in what is a highly digitised institution. For a month, its teams had to manage church operations the old-fashioned way, resorting to pen and paper while priority applications were restored. *"The 30 to 35 people from our teams mobilised for this operation spent around three months restoring the 900 or so servers affected by the attack,"* says Stefan Kulhanek.

Unified for greater reliability

Building on this experience, the Church of Sweden, whose IT environment is dispersed across various sites with multiple providers and systems, together with Axians – which has become a key player in its IT strategy – set about consolidating and unifying its information systems with a definite emphasis on cybersecurity.



"We organised a two-day workshop on the subject of security, then implemented a whole procedure to make the system more reliable and enable a faster response," says Stefan Kulhanek. *"We reported back to senior managers on areas for improvement and expanded the range of services we provide to the Church of Sweden, including the implementation of an SOC [security operations centre] in February 2024."*

"Three months to restore the 900 servers affected by the issue"

And the biggest lesson learned from this incident? *"It is crucial to have the most complete control possible over your IT environment and to identify in advance which are the priority applications in your information system."*

ICT ACCELERATION

RAISING THE BAR ON CYBERSECURITY

To harmonise and strengthen information security in businesses, the new European NIS2 directive imposes more stringent requirements on a wider group of economic agents. Vincent Bazillio, Global Business Development Manager – Cybersecurity at Axians, helps make sense of this development.

An important milestone has been reached in the strategy to prepare and protect economic organisations against cyber risk. The European NIS2 (Network and Information Security) Directive came into force on 17 October 2024, ensuring that businesses face up to their primary digital security responsibilities.

This new legislative shield supersedes the 2016 NIS1, with a broader scope and more exacting requirements for organisations. While the first version mainly targeted operators of essential services in seven business sectors, NIS2 widens its scope to include private companies, local authorities, research centres, healthcare establishments, etc. across 18 business sectors.

Rather than the few hundred organisations affected previously, the law reportedly now applies to over 15,000 entities, divisible into two major blocks: essential entities, which include large businesses, and important entities, which tend to be SMEs.

Change of scale

"NIS2 introduces genuine 360 degree risk management to these businesses, which are now required to implement cybersecurity at all functional and operational levels, from R&D and support services to their industrial activities and infrastructure," explains Vincent Bazillio, Global Business Development Manager – Cybersecurity at Axians, the VINCI Energies ICT brand. *"And with the requirements of the new directive also extended to subcontractors and suppliers, we are moving away from the fortress approach toward a secured network model – a very open network extending well beyond the company's walls."*

This change of scale is forcing companies to create solid roadmaps and painstakingly organise their action plans. NIS2 does more than just impose a framework – it also stipulates financial sanctions for failures to comply with the new rules. These can amount to €10 million or 2% of total worldwide revenue for essential entities and up to €7 million or 1.4% of annual revenue for important entities.

Businesses are now required to report any "significant" incident within 24 hours. For essential entities, this warning must be followed by a full notification within 72 hours and a detailed final report within 30 days.

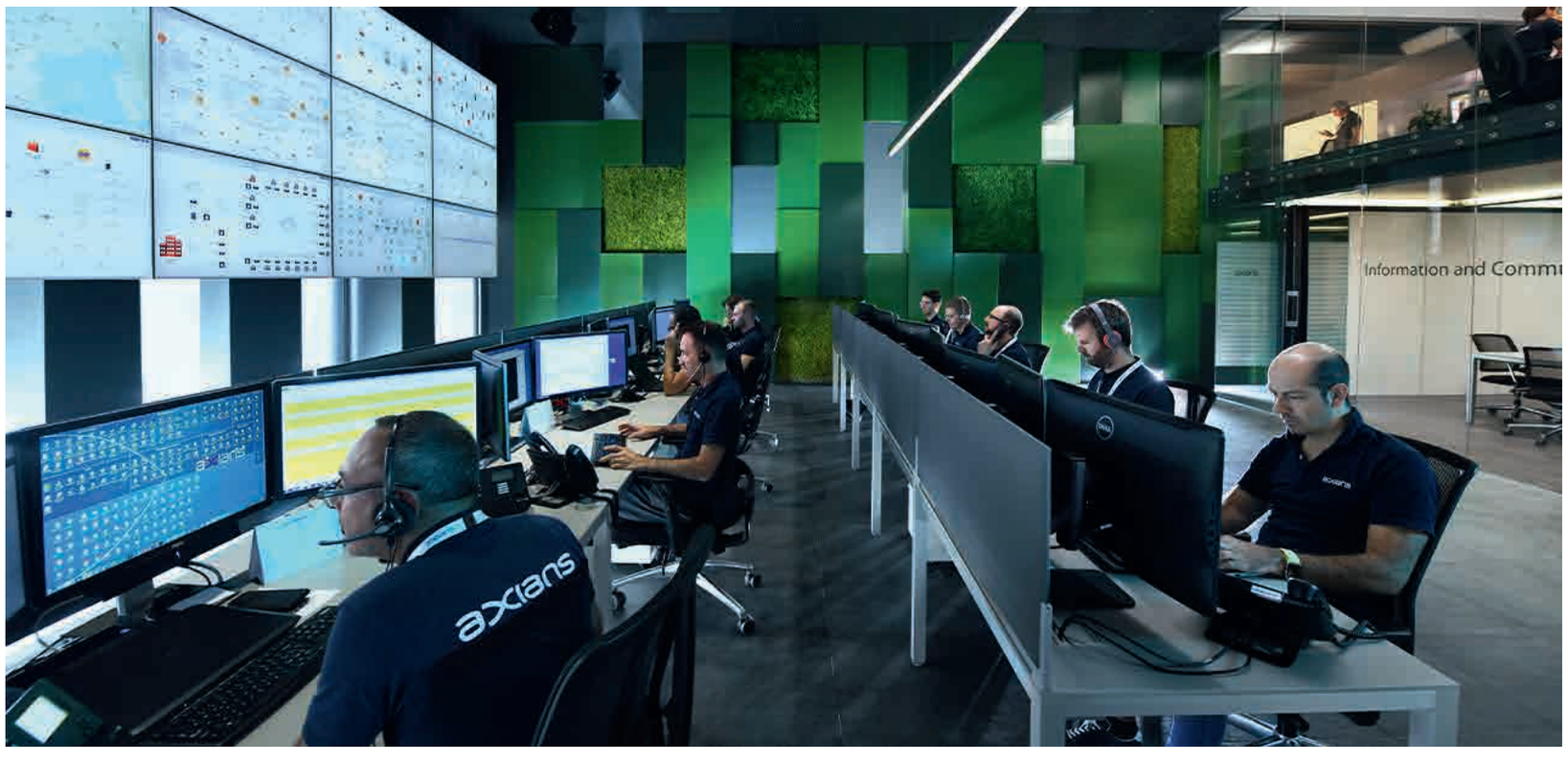
Cyber risk culture

There is no cause to panic – the aim of NIS2 is not to overwhelm businesses, but to accelerate their transition to a true cyber risk culture, though undue haste is to be avoided: *"Cybersecurity is a continuum, based on a progressive, constantly updated approach. We must therefore proceed step by step. This starts with mapping all business activities and identifying security needs specific to each company, assessing the impacts of an attack on business activity and defining continuity plans,"* says Vincent Bazillio.

However, not all companies start on equal footing. While most essential entities have long since addressed their compliance position and have the internal resources needed to manage the tools and processes involved, many SMEs will need additional support.

> *"Cybersecurity is a continuum, based on a progressive, constantly updated approach."*

"Here again, each organisation has its own specific needs," says Vincent Bazillio. *"It's no longer a question of installing firewalls all over the place; it's about teaching businesses to think in terms of risk analysis, to identify priorities and focus their actions in strategic areas, with an organic long-term vision. This ensures their security, but also their resilience in the event of an attack."*



BUILDINGS INNOVATION

THE "TINY" DATA CENTRES MEETING REGIONAL NEEDS

Thanks to structures not much larger than shipping containers and located close to end users, the world of data is becoming accessible to local authorities and mid-sized companies. We look at an example with Cegelec in Angers.

With the explosion in household and industrial data use, the expansion of 5G and the proliferation of connected objects, the digitalisation of society is driving an increasing need for data storage, aggregation and transfer. In France, an estimated 250 commercial data centres are in operation, a number projected to double by 2030.

Similarly, the total available power has been increasing by more than 16% a year since 2016, reaching 566 MW in 2022 according to a report from EY, which predicts year-on-year growth of 11% over the next 10 years to top 1.8 GW in 2033.

This surge in capacity is related to a change in the nature of the demand. The IoT, connected mobility and the geographic atomisation of digital interactions require increasingly rapid data exchange with the servers involved. The only solution is to bring data management centres closer to the end users.

Local datacentres are therefore likely to proliferate in our suburban, and even rural, landscapes, to enable mid-sized companies, public facilities such as hospitals, regional and local authorities, towns, and villages to offer new uses that require low latency.

Land, budget and ecology: a triple challenge

"The market will take shape around two major influences," explains Jules Dufour, Business Unit Manager at Cegelec Angers Data Center. *"On one hand, the hyperscale facilities, developed by major manufacturers and heavily concentrated in Ile de France or around Marseille, and on the other, the edge data centres."* These local mini data centres tick several boxes: an alternative to cities already saturated in terms of suitable locations; lower up-front costs; and reduced carbon emissions.

It was this triple land, budget and ecology challenge that Angers Data Center wanted to address in developing a technological solution packed into recycled 15 sq. metre shipping containers, which are easy to install and scalable according to requirements.

"Our tiny data centres combine a high level of energy efficiency with a reduced carbon footprint," says Jules Dufour. *"Factoring in the reused containers, replanting, free cooling, water reclamation and use of renewable energy sources, there is 2.5 times less soil artificialisation than with a conventional concreted solution, and the carbon impact from civil engineering is halved. Our solution even won a prize at the VINCI Environment Awards."*

With advanced protection systems (secure electrical supply with backup generators, surveillance and control systems) built in, these local data centres provide regionally based public bodies, mid-sized companies and small hosting providers with access to the world of data via flexible, economical and energy-efficient infrastructure.

BUILDINGS PERFORMANCE

A NEW TUNE FOR CAMAC HARPS

The harpmaker Camac has entrusted Tunzini Le Mans with the HVAC installations for its new workshops in western France. They are combining climate engineering with artisanal expertise to guarantee an exceptional sound.

The world of music is not somewhere we would generally expect to find climate engineering, and yet here we have the two in perfect harmony. From Mouzeil, deep in the countryside of western France, Camac, France's only maker of classical and Celtic harps, has been selling its instruments internationally for more than 50 years. Even today, although some precision machinery is used, the work is essentially done by hand in this family-run certified "living heritage company".

The harpmakers' workshop has become too small, despite several enlargements since its construction in 1972, and they have decided to treat themselves to more suitable premises. This will include an extension to the workshop and the installation of process booths. These ultra-controlled spaces are where the most delicate operations are performed: assembling, gluing and varnishing the instruments. Behind the manual woodworking process lies an unexpectedly complex technical operation in which every degree matters for the final quality of the sound.

"To ensure perfect harp acoustics, the temperature has to be precisely regulated in each booth," explains Maxime Pertuzon, Design Office and Business Development Manager at Tunzini Le Mans (VINCI Energies), the supplier chosen to install the HVAC, plumbing, compressed air, fire hose reels and sprinkler system.

Production-based approach

The booths are the beating hearts of the creative process, each equipped with an autonomous air handling unit and air heaters. These work according to an intelligent air compensation principle – in order to save energy, extractors are only switched on when solvents are being used: *"We don't want to disturb the air for no reason,"* laughs Maxime Pertuzon.

For the Tunzini teams, this production-tool-based approach differs from their usual projects, which more often focus on ensuring employee comfort than that of inanimate objects. *"Usually, we install heating and ventilation systems for user comfort. Although we were working on the heating for the offices and the workshop, the process was the priority. The focus was on the company's production base, and it was naturally imperative that we fitted in around the customer's production schedule."* Equipment for the Camac workshop was also selected to allow the installation of a building management system (BMS) if the need arose in the future.

> *"To guarantee perfect acoustics in the harps, the temperature in each booth must be constant."*

An evolving project

The project was completed in January 2025 after six months of intensive work and having gradually evolved in scope, with the budget rising to more than €700,000. *"We kept adapting as the service provider's studies progressed,"* says Maxime Pertuzon.

"The architect and the customer were working jointly from the start of the project. The customer had an extremely detailed understanding of their process, and we had numerous discussions with them to explain what technical solutions we could apply to meet their exact needs."
These technical and human interactions are all the more valuable when they are more than simple routine. *"The nature of the business and the unique features of the project led to our becoming partners rather than operators. That's relatively unusual. Our capacity for generating new ideas sets us apart and enables us to make the difference."*

BUILDINGS | CUSTOMIZATION

DISABILITY AND EMPLOYMENT: A SAFE BET WITH VINCI FACILITIES ENTREPRISE ADAPTÉE

Since 2008, VINCI Facilities Entreprise Adaptée has been providing personalised support to help employees with disabilities build their professional careers.

Some realities are stubbornly persistent. Despite 20 years of successive reforms, people with disabilities are still heavily penalised in the professional world. The figures say it all: an employment rate of 39% (compared with 68% of working-age people as a whole) and an unemployment rate of 12% (compared with 7%), according to Agefiph, the French employment support association for people with disabilities. They face a double penalty in their greater exposure to long-term unemployment and their reduced access to education and qualifications.

Given the enduring nature of these obstacles, the response must be multifaceted and involve public policy makers, non-profit organisations and businesses. Since 2008, VINCI Facilities Entreprise Adaptée (VFEA) has been working to facilitate access to employment for people with disabilities and keep them in work in suitable conditions, through the provision of building maintenance and end-user services.

Like all adapted businesses, this VINCI Energies Group entity employs people with RQTH (official disabled worker status in France). Its mission is to support them in setting and achieving their career goals and to develop their skills with other employers with the aim, where possible, of helping them into "mainstream" employment.

Adapted management

VFEA employs 150 people, 85% of whom have disabled worker status, recruited on the basis of two criteria: exclusion from employment (older people, people without qualifications, those ineligible for unemployment benefits, etc.) with the help of bodies such as France Travail, Cap Emploi and local organisations. Christelle Bullio, Business Unit Manager at VFEA, explains: *"We train them in our businesses in three types of provision: Level 1 and 2 building maintenance (electrical engineering, plumbing, HVAC, metalwork and joinery); end-user services (reception, mail handling, hospitality, administrative assistance); and global archive management (auditing, digitisation, document destruction)."*

To fulfil its mission, which is defined in a multi-year targets and methods contract agreed with DRIEETS (Regional and Interdepartmental Directorate for the Economy, Employment, Labour and Solidarity), VFEA has developed a management approach tailored to the specific needs of each individual.

One manager to 25 employees is not excessive when there is training to organise, regular interviews to hold, work placements to arrange, and skills assessments to schedule. *"We have to adapt to each set of social and medical circumstances,"* says Christelle Bullio. *"We work with people who live with incapacitating illnesses, and people with physical, psychological and mental disabilities. They can't all be given the same assignments. The support period also varies greatly. Some employees have been with us for 10 years; others are ready for mainstream employment after two years. And some people have to change career when their condition worsens."*

This professional support is accompanied by social assistance: with finding accommodation, handling formalities (retirement, social security), requesting household debt support, obtaining a driving licence, etc. Christelle Bullio mentions Emma, who was recruited four years ago, and had having been living a solitary existence in substandard housing. *"We paid for three months' accommodation while we found her a place in new-build social housing. She really reconnected with life and absolutely thrived at work."*

Growing beyond Ile-de-France

The business is mostly focused on growth in the Ile de France area, with hopes of expanding into other regions, where the teams operate across more than 110 sites through joint-contracting and subcontracting agreements, framework contracts, and staffing or fixed-rate support contracts. VFEA's customers include major groups in the industrial, services and building sectors.

"In the past two years, we have trained and helped 24 people into mainstream employment."

"Each time, we create an adaptability report to identify the unique features of the building and access to workstations, taking account of each employee's medical needs," explains Christelle Bullio. *"Our customers are generally extremely caring and involved, giving us the time we need to develop our employees, who may one day be their employees. In the past two years, we have trained and helped 24 people into mainstream employment."*

VFEA may be an adapted business, but it is also an incorporated company whose primary objectives are to win customers, conduct business, and grow. It has grown continuously since its formation in 2008, and now generates annual revenue of €8 million. Other regional accreditations are in the pipeline and will enable VFEA to expand its activities beyond the Paris area.

CITY TRANSFORMATION

“AIS ARE HELPING TO OPTIMISE THE URBAN FABRIC”

They continue to increase in number and are becoming increasingly diversified, but are urban artificial intelligences succeeding where the smart city has failed? For Hubert Beroche, director of the think tank Urban AI, we still need to understand its uniqueness and complexity, and organise its governance.

What has shaped your thinking and actions in the field of urban artificial intelligence?

Hubert Beroche. In 2019, I set off to explore the world of AI applications in urban environments. From this investigative work, during which I studied the reality of AI developments in twelve cities on three continents, I drew two initial conclusions, namely that AI developments are proliferating massively and also diversifying.

Artificial intelligence in towns and cities was initially embodied in smart city projects. Then, with the emergence of ChatGPT and the reduced price of entry to algorithm technologies, multiple stakeholders have been driving the gradual proliferation of applications.

How do you define urban artificial intelligence?

H.B. From this initial proliferation and diversification, another, even more crucial, factor has emerged: the uniqueness of urban AI. AIs are born and developed in virtual environments (social networks, streaming platforms, etc.) or closed, private environments (businesses, factories, etc.). The city is by definition a physical, open space. Unlike other AIs – I’m thinking for example of trading algorithms or recommendations on e-commerce sites – the existence of urban AIs is expressed in materiality, embodiment, a grounding in the physical world and our day-to-day life. From drones to sensors to connected terminals, these instruments used to control, map and supply our systems are eminently visible. This simple fact of their elementary appearance – the physicality of urban AIs – has had huge repercussions on the way these technologies are developed, governed and implemented. To give one example: an error from Waze can quickly lead to traffic jams.

In that context, what has become of the smart city concept?

H.B. The smart city did not work because people rejected it, either explicitly or simply by not adopting the applications. But the narrative around the smart city is still relevant.

More precisely, there are two main narratives. One is driven by high-

technology businesses and North American government agencies, promising a city optimised by technology and citizen well-being contingent on access to services essentially provided by private entities. We should note that this narrative has seriously waned in influence since the Sidewalk Labs project in Toronto was abandoned.

And the other narrative?

H.B. The other vision is the one China is seeking to impose, that of a safe and secure world, in which urban technologies are the vehicles and regulators of social and political order.

Between the American techno-solutionist vision and the Chinese techno-security narrative, there are questions we need to ask. What alternative narrative can we offer? What kind of AI do we want in and for our urban environments? What urban AIs do we collectively want?
This is an area we are actively investigating at Urban AI and alongside several international partners with our Global Observatory of Urban AI Narratives.

So, how do we answer these questions?

H.B. First, we must understand what urban AI is. Contrary to what our spontaneous representations often suggest, it cannot be reduced to sensors on one hand and dashboards on the other.
It feeds complex systems composed of multiple layers, owned and used by a hugely diverse range of stakeholders to serve different – often divergent – interests.
Understanding the systemic dimension and architecture of urban AI is a prerequisite for controlling and regulating these technologies.

Is governance not key here?

H.B. It is crucial. If we want to implement considered policies that take account of local cultures, are based on constructed visions, and mobilise identified skills and resources, we absolutely must think about governance.
AI is not an end in itself. It must be an instrument in the service of a political vision and action, of an urban social contract.

Today, AIs are increasingly being used locally in energy, waste management and architecture. They are helping us understand urban dynamics, map mobility patterns and organise logistical flows. In short, to optimise the urban fabric. But all that supposes that we are involving, uniting and organising the presence and roles of the maximum number of local stakeholders, public and private, individual and corporate, in this technological expansion.

Should we not establish certain principles right from the application design stage?

H.B. The physical presence of urban AIs is not given sufficient consideration in their design.
One example that will speak to everyone is the omnipresence of smartphone screens. These interfaces have so absorbed our attention that they have concealed our presence in the city.

We are becoming "smombies" – a portmanteau of "smartphone" and "zombie". This neologism, which is central to my book Smombies, la ville à l'épreuve des écrans(*) [Lit: Smombies – screen-proofing the city], refers to those people who are constantly looking at their phones while walking, while driving, to the point they are oblivious to the signals the urban environment is sending them.
As we know, this blindness causes many accidents. In Seoul, 61% of road accidents involve a pedestrian using a smartphone. The city ended up installing LED panels in the pavement, synchronised with the traffic lights, to give pedestrians the red or green light without their having to look up.

How can we free ourselves from this screen monopoly?

H.B. By inventing other materialities for urban AIs and digital more broadly. By cultivating alternatives to screens. We can use walls, lights, street furniture and water surfaces to display the more artistic, poetic expressions of AI, in a greener and less energy-intensive way.

Take the Green Cloud in Helsinki, for example. Every evening for a week, a green cloud formed above a thermal power plant in the Finnish capital, the result of a laser projected on the steam emitted from the plant. Each day, the size of the cloud changed to reflect the quantity of energy being consumed by the district's inhabitants. This sensory experience was virtuous in more ways than one: it delivered data of public interest on a surface other than a screen, and it inspired curiosity and wonder, creating opportunities for discussions and interactions.

(*) Editions de l'Aube, 2025.

"Urbanising AI"

Urban AI brings together an international ecosystem and multidisciplinary community. *"Rather than creating smart cities, our ambition is to urbanise artificial intelligence and equip stakeholders accordingly,"* explains Hubert Beroche.
To this end, the organisation produces books, white papers, trend reports, analyses, and more. It enjoys support from Leonard, the VINCI Group's future-oriented innovation and acceleration platform.
Urban AI also provides consultancy to urban stakeholders, and recently launched a training platform – the Urban AI Academy.
Urban AI aims to be a hub for meetings and discussions: *"A debating space that welcomes diverse points of view around AI and the future of towns and cities; an ideas laboratory that helps citizens, public decision-makers and businesses grasp the possibilities of Urban AI".*

CITY TRANSFORMATION

COPENHAGEN'S REINVENTION AS A "SPONGE CITY"

Threatened with the risk of coastal flooding and regularly subjected to torrential rain, the Danish capital is undertaking colossal engineering works to absorb the effects of climate change.

An artificial lake, cool islands, cyclable motorways, absorbent pavements – rarely has a city undertaken such an engineering effort to defend itself against the effects of climate change. With more than 300 projects in effect, Copenhagen has emerged as a worldwide laboratory for urban resilience.

But the Danish capital really has no other choice. Built on drained wetland alongside the Øresund strait, Copenhagen is one of the world's cities most at risk of flooding, with sea levels potentially rising 42 cm by the end of this century and water tables full to capacity.

Added to which, Copenhagen is regularly subjected to torrential rain. Many of the city's 660,000 inhabitants (more than 10% of Denmark's population) still remember the day of 2 July 2011, when in just two hours, its streets and buildings were engulfed by 135 mm of water. This was the most violent rainfall recorded in 55 years, and the damage cost a billion euros.

Fully learning the lessons from that disaster, the local authorities launched an ambitious project to manage future torrential rainstorms. Its aim is to protect the city from the potentially devastating effects of water for the next hundred years. The project involves colossal development works, both on the surface and underground.

Emergency reservoirs

One of the most spectacular infrastructure projects is an artificial lake, large enough to store 22,600 m^3, in the century-old Enghaveparken public park. All the city's parks are now considered potential emergency reservoirs.

Formerly a marshy area avoided by local people, the Karens Minde green space has been transformed into a rainwater containment zone. In the event of severe storms, the City of Copenhagen and the water company HOFOR plan to use it for the runoff and storage of 15,000 m^3 of rainwater in underground basins. This project forms part of a wider plan to redevelop an entire 35,000 sq. metre district.

In 20 years, GHG emissions have been reduced by 3/4.

In Copenhagen, the climate transition involves both the regeneration of working-class areas and the transformation and rewilding of concreted-over spaces. The city has decided to take control of water and redesign its urban spaces.

In its all-encompassing strategy to combat the effects of climate change, the city is also trialling perforated paving slabs capable of absorbing rainwater and runoff. Water can be stored in a mini water table beneath these "climate tiles" and later reused to water nearby plants.

Underground tunnels

In a city where population density (7,559 people per square kilometre

– comparable with São Paulo, Brazil) complicates direct water management, the key battle against flooding is being waged underground.

Copenhagen sits above a network of gigantic underground tunnels designed to absorb, store, redirect and redistribute massive water flows. One of these giant arteries, built under the Valby district, proved its worth in the torrential rains of August 2024. Another 1.3 km tunnel is currently under construction between Copenhagen's inland lakes at the edge of the port, and is scheduled to open in 2026.

Urban heat and bicycles

The Danish capital has always been in the forefront of the environmental struggle (see sub-article). This calls for strong – and not always consensual – political choices. The construction of Lynetteholm, the huge artificial island between the Nordhavn and Refshaleøen districts intended to be a barrier against rising waters and a location for 35,000 residents and the same number of jobs, has been highly controversial.

The policy on clean energy has proved less contentious, featuring offshore wind turbines, and solar farms on surrounding land. The Danish capital boasts the world's largest urban heat network, powered almost exclusively by the combustion of waste and biomass, and connected to 99% of the city's housing.

Copenhagen is a worldwide laboratory for urban resilience.

In terms of mobility, half of urban journeys are made by bicycle. The city invested early in this area, with cyclable motorways and the famous Cykelslangen cycle bridge that winds between the banks of the canal. Around €10 million a year are targeted at cyclable infrastructure. This is not enough, according to some analysts who say that cycling is no longer increasing compared with the use of cars, which are still a significant presence in Copenhagen, especially on the outskirts.

However, in many respects, Copenhagen is setting the standard in the fight against the effects of global warming. As Denmark's only large city, the capital is inevitably the main focus of the country's efforts to defend itself against flood risk. In 2023, a new national adaptation plan placed clear emphasis on coastal defences and decentralised governance, with significant delegation to municipal councils. All of which strengthens Copenhagen in its battle for climate resilience.

In the forefront of decarbonisation

The Danish capital has always been in the forefront of the environmental struggle. Housing, transport, waste, alternative energies: every lever for decarbonisation has been applied more quickly and on a larger scale here than elsewhere. In 2009, the city set a target of carbon neutrality by 2025. At the time, this was the world's only such target.

But neutrality will yet take a while longer: 2027, 2028, 2030? Exactly when depends in large part on the carbon capture and storage potential of Amager Bakke, the iconic waste incinerator with a 465-metre-long ski run on its roof. But Copenhagen has made significant progress toward its objective. In 20 years, greenhouse gas emissions have been reduced by three-quarters, despite the city's population growing by a quarter in that time, not to mention significant economic growth.

KEY FIGURES

660,000 people
live in Copenhagen (and twice that in the wider urban area)

50% of urban journeys
are made by bicycle

99% of the city's housing
is connected to the world's largest urban heat network, powered almost exclusively by the combustion of waste and biomass

€10 millions
a year are targeted at cyclable infrastructure

BUILDINGS PERFORMANCE

THE PROJECT MANAGER: THE KEY TO ANY CONSTRUCTION PROJECT

Marie Laure Canonne is a project manager at VINCI Energies. This is a key role that offers ample autonomy but requires remarkable adaptability.

"An accomplishment" is how Marie Laure Canonne describes the construction of the Laboratoires Servier Research and Development Centre on the Plateau de Saclay. *"I'm extremely proud of this operation because I found it really challenging, as it was my first project in the role of project manager and the second-largest VINCI Energies contract in the Ile-de-France region at the time."* Since then, she has been involved in another major project: Austerlitz A7A8, an extremely large-scale tertiary structure built for Kaufman & Broad as part of the Paris Rive Gauche ZAC (joint development zone).

This 44-year-old engineer believes that the crucial skills required to do her job are listening, anticipating, understanding technical professionals and their needs, and above all, adaptability. These are qualities she has acquired and cultivated throughout her varied and world-spanning 20-year career.

"Getting my boots on and heading to a construction site is way more exciting!"

After several years' experience, she wanted to reconnect with the world of construction. *"Getting my boots on and heading to a construction site is way more exciting! You meet such passionate people doing so many different jobs."*

In 2019, Marie-Laure joined VINCI Energies Tertiaire Ile-de-France as a project manager. *"This job suits me perfectly,"* she says. *"A project manager doesn't have a hierarchical relationship with all the stakeholders they're coordinating; it's more about collective management. It's more demanding but also more rewarding!"*

ENERGY | TRANSFORMATION

COMMITMENT ALL ALONG THE LINE

As the lead designer of high-voltage and extra-high-voltage electrical lines at Elektrotrans in the Czech Republic, Luděk Krba helps supply electricity to millions of homes and businesses.

Since 1999, Luděk Krba has worked at Elektrotrans, a company formed a year earlier in the Czech market for electricity transmission and distribution services. Since then, as Lead Designer for this business, purchased by VINCI Energies to become part of the Omexom network in 2008, he has managed a team providing comprehensive design services for new and reconstructed electrical lines.

In addition to the renovation of aging power lines, an increase in transmission capacity is required to meet increasing demand for electricity, improve the network's operational capacities, and accommodate the development of new energy sources.

Luděk Krba's largest ongoing project is the *"Brand-new V406/407 line linking Kočín, near the Temelín nuclear power plant, and Mírovka, a substation close to Havlíčkův Brod"*. A key milestone will be reached in spring 2025 with the delivery of installation documentation for 121 km of electrical lines – *"The longest in the Czech Republic"*.

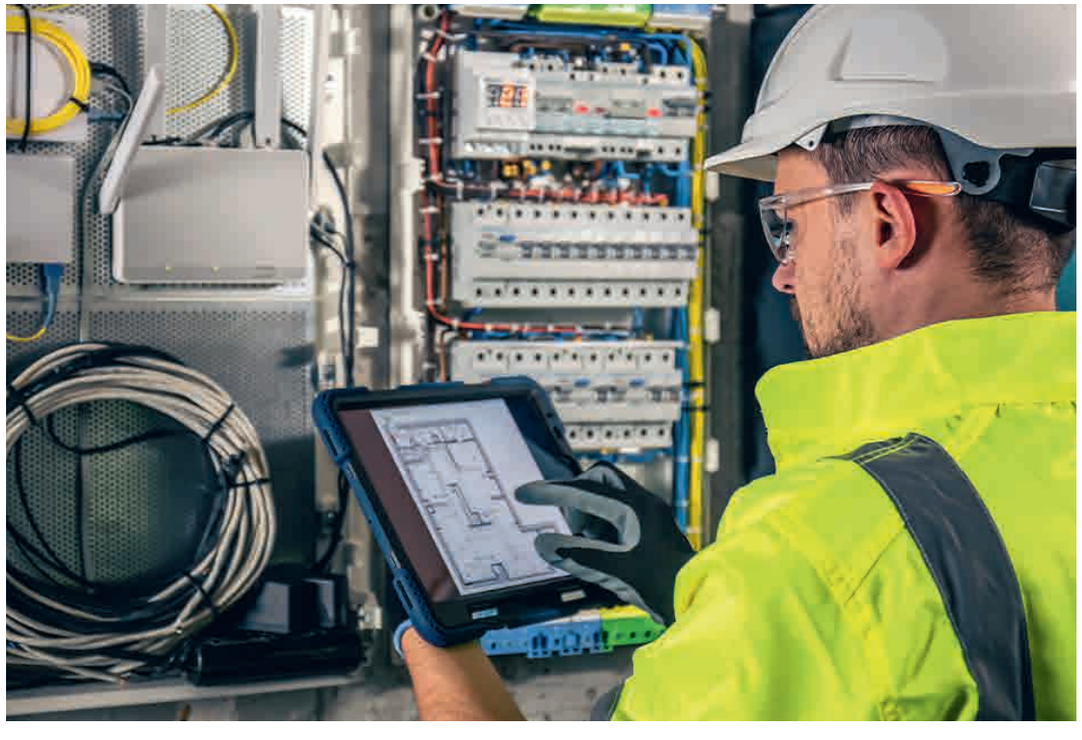
"BIM, digital twins and modelling the life cycle of power lines: a significant change is under way."

But the biggest project to come will be the digitalisation of his profession. *"We are increasingly talking about BIM [Building Information Modelling], digital twins, advanced design, and modelling the life cycle of power lines,"* explains the lead designer. *"This is a significant change that will definitely help in our work."*

INTELLIGENT NETWORKS: PREDICTIVE AI BETWEEN "DIGITAL INHERITANCE" AND ETHICAL ADAPTATION

Thanks to AI, networks are becoming "intelligent" – capable of anticipating problems, self-optimising, and making ethical decisions. Infrastructures such as telecommunications networks are becoming more reliable and more adaptive, just like living systems.

In recent years, the evolution of artificial intelligence (AI) and telecommunications networks has reshaped the communication and automation landscape. The challenge today is not only to implement autonomous networks, but also to make them predictive and capable of evolving and cooperating effectively while upholding ethical standards. To meet these requirements, concepts drawn from such diverse areas as Mendelian genetics, fuzzy logic and evolutionary theory are being applied innovatively to the creation of autonomous, predictive networks with the ability to continually adapt and govern themselves ethically.



Mendelian theory and evolutionary AI

Mendelian theory was established by the botanist Gregor Mendel and introduced the concept of genetic inheritance as a process in which traits from preceding generations are passed on to their descendants through combinations of dominant and recessive genes. In the context of AI, this principle can be adapted to the creation of evolutionary machines, in which beneficial traits are "inherited" by consecutive generations of AIs. In predictive telecommunications networks, this concept of "digital inheritance" could be applied to the development of machines with hybridised traits optimised for specific tasks, such as traffic management, security, or quality of service (QoS). The result of applying Mendelian inheritance to AI in networks is a continual learning model, in which the network adapts and evolves with each iteration to create a system that is not only predictive but also resilient and autonomous.

Fuzzy logic and managing the digital ego

Fuzzy logic is an extension to classical logic introduced by the scientist Lotfi Zadeh, which allows intermediate values between true and false, and thus provides a framework for the management of uncertainty and ambiguity. In AI networks, fuzzy logic offers an innovative way to handle interactions between machines with separate or overlapping objectives, in a concept known as "digital-ego management". One practical example would be a network congestion scenario, in which a machine responsible for quality of service (QoS) might prioritise its own "ego" to ensure that high-priority traffic continues to flow, while another machine focused on security might be temporarily demoted down the fuzzy scale to conserve resources.

Predictive networks with continual learning and evolution

The concept of predictive networks is based on the analysis of historic data and models to anticipate events and behave proactively. With genetic algorithms, it is possible to create a network able to continually re-evaluate and improve its own operating rules. For example, in a telecommunications network serving a town with a fluctuating population, data traffic models are constantly changing. In an adaptive network, AI machines could analyse and identify the most successful configurations by "inheriting" and "mutating" algorithms tuned to specific traffic needs.

"Network AI transcends the ability to predict and becomes a system that evolves, adapts, and makes decisions in keeping with ethical principles"

Adaptive governance and ethics in evolutionary AI

With the introduction of evolutionary AI to telecommunications networks, it is essential to consider governance and ethical principles. Adaptive governance enables AI to evolve within a set of ethical principles, using fuzzy-logic rules to balance performance and ethical compliance. This new evolutionary AI paradigm brings in a network model capable of adapting and operating ethically and safely, fostering confidence in autonomous networks.

This integrated approach reveals new potential for autonomous or predictive networks, in which evolutionary characteristics, digital inheritance and fuzzy logic facilitate adaptive and collaborative functionality. This network AI transcends the ability to predict and becomes a system that evolves, adapts, and makes decisions in keeping with ethical principles. The concepts of Mendelian inheritance, fuzzy logic and adaptive governance open the way to a new generation of AI networks that go beyond prediction, rather than being merely reactive. These networks can continually respond and adapt to changing conditions while remaining resilient and autonomous. By incorporating ethics and governance, these networks provide a robust model for sensitive and critical applications.

Rui Roccazzella,
Associate Specialist at Axians Portugal

INNOVATION AND HERITAGE

The Château de Bagatelle, Villa Windsor and Villa Amélia in the Bois de Boulogne are benefitting from an ambitious energy transition project undertaken by the Fondation Mansart. These three historical buildings, previously heated using fuel oil, are now equipped with modern geothermal systems designed and installed by the VINCI Energies subsidiary Valentin. The old CO_2 emitting equipment was replaced with a heat pump system to provide heating and climate control with a 90% reduction in greenhouse gas emissions. This was essential, since these spaces will soon be hosting exhibitions and events that require thermal comfort all year round.

Château de Bagatelle, Paris (France)

AGILITY **PROFILE**

VINCI ENERGIES ACCELERATOR OF ENVIRONMENTAL TRANSITION

In a world undergoing constant change, VINCI Energies contributes to the environmental transition by helping bring about major trends in the digital landscape and energy sector. VINCI Energies' teams roll out technologies and integrate customised multi-technical solutions, from design to implementation, operation and maintenance.
With their strong local roots and agile and innovative structure, VINCI Energies' 2,100 business units have positioned themselves at the heart of the energy choices of their customers, boosting the reliability, efficiency and sustainability of their infrastructure and processes. VINCI Energies strives for global performance, caring for the planet, useful to people and committed to local communities.

The Agility Effect explores everything that drives acceleration and transformation, with a focus on the energy transition and digital transformation.
Through analyses, testimonials, and reports, it highlights the expertise of VINCI Energies and its brands, as well as exemplary and/or significant topics and initiatives.
The Agility Effect is both a www.theagilityeffect.com web content platform and a magazine published twice a year.

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