THE **AGILITY** EFFECT
MAGAZINE

LIGHTER, MORE RECYCLABLE SOLAR PANELS

DEVELOPING AI AT SCALE WITH DIANE

OPERATIONAL EXCELLENCE IN REACTORS

ENERGY, SAFETY, CONNECTIVITY, PROCESSES – AIRPORT PERFORMANCE IS REALLY TAKING OFF

VINCI ENERGIES

SUMMARY

EDITORIAL

Harnessing technological advances, implementing innovations, and realising the promise of the digital transformation and energy transition are what The Agility Effect is all about. This new issue is packed with practical examples of our teams’ contributions to the environmental transition for the benefit of individuals, wider society and the planet itself.

In Belgium, 50% lighter, 100% recyclable solar panels are maximising the benefits of solar energy. In Portugal, a solution based on artificial intelligence can now warn of impending natural disasters such as forest fires and floods. And in Tahiti, in French Polynesia, climate control at a hospital centre is operated using water from the deep ocean. This offers stable, comfortable conditions for the building’s users and a drastic reduction in energy spending.

Our report on airports and the challenges posed by the boom in air traffic neatly summarises the practical advances behind the implementation of various environmental solutions. It covers everything from the optimisation of baggage-handling systems to greater sustainability in fire-suppression installations, and from the development of more environmentally respectful electrical infrastructure to increasingly secure communication systems, not to mention the reuse of water from HVAC systems for cleaning operations.

Enjoy reading all about it!

The Editorial Team

AGILITY **PICTURE**

ON TRACK FOR INNOVATION!

Twenty students from the Instituto Superior Técnico in Lisbon, Portugal, are part of a team of around fifty involved in developing and building a 100% electric racing car as part of the Formula Student international competitions. They are supported by VINCI Energies in Portugal.

Formula Student is an international design competition offering aspiring engineers the chance to turn theory into intensive practice. FST Lisboa is competing in the electrical (EV) and driverless (DV) categories, two fields directly linked to the VINCI Energies goal of accelerating the digital transformation and energy transition. The competition is also a great way to forge links with highly promising students, here being welcomed to the VINCI Energies *Digitalschmiede* in Frankfurt, following a competition at the Hockenheim race track.

CITY CUSTOMIZATION

USE-BASED CITY LIGHTING

With the current focus on ecological conservation and budgetary restraint, public lighting is a lever for towns and cities to develop connected and sustainable regions based on their residents' expectations, needs and uses.

Public lighting has long been a blind spot in urban policy. It scarcely features in national legislation – and is not even mandatory – yet public lighting is a key component in urban development and the effective operation of public spaces. It is also a lever for showcasing urban heritage and making towns and cities more attractive. The ecological emergency and scarcity of public resources have ensured that lighting now occupies a prominent position in regional economic and environmental decision-making.

This may partly be attributed to improved awareness of the ecological dimension in the renovation and modernisation of infrastructure. But equally, for regional and local authorities, urban lighting weighs heavily on their finances and energy footprints: 32% of their electricity consumption and 12% of their overall energy consumption, according to the AFE (French Lighting Association).

The rise of LED

Against this backdrop, LED (Light-emitting Diode) technology has emerged as the key factor in energy performance strategies for urban lighting. Less costly and significantly more energy-efficient than sodium lamps, LEDs now have an estimated market share of between 20% (according to the National Federation of Local Authorities) and 30% (according to the AFE). Its importance is only likely to increase with the 2027 ban on the sale of gas-discharge bulbs and the rapid return on investment in LEDs – generally between five and ten years.

In a prime example of the benefits of LED, teams from Citeos (VINCI Energies) are currently committed to making energy savings of up to 80% as part of a global public performance contract.

But in addition to the improved energy and financial performance, the switch to LED is encouraging local authorities to introduce smart lighting – public lighting design guided by usage and needs analysis.

"The switch to LED is encouraging local authorities to introduce smart lighting"

With LED, lamp posts and electrical cabinets become ideal network infrastructure for data production and the rollout of IoT: sensors to monitor traffic flows, pollution, noise levels, or human or animal presence; surveillance cameras; and connected objects of all kinds.

The objective for towns and cities is to enhance user comfort, well-being and safety while generating input for regional management and monitoring tools. This means using light of appropriate colour and brightness, and only where and when necessary.

Overcoming technological solutionism

Khadija Tighanimine, Territories Business Line Manager at Omexom, the VINCI Energies energy infrastructure brand, emphasises that while technologically mature and economically proven, the conversion of urban lighting to "smart" technology comes with certain methodological prerequisites. Without these, she warns that it will recreate

KEY FIGURES

32%
urban lighting as a proportion of electricity consumption by regional and local authorities

12%
urban lighting as a proportion of overall energy consumption by regional and local authorities

20% to 30%
of public lighting is currently supplied by LEDs

15% to 20%
of existing light fittings are more than 25 years old

Sources: Association française de l'éclairage (French Lighting Association) and Fédération nationale des collectivités concédantes et régies (National Federation of Local Authorities)

the frustrations born of the smart city concept and associated "magical thinking".

"With every major turn in the evolution of towns and cities, we tend to reproduce previous decision-making frameworks and repeat the error of being blinded by technological solutionism, looking at cities with no consideration for the importance of the social sciences."

This sociologist joined VINCI Energies in 2019. Her roadmap *"Promotes use-based logic even in technical business activity"*. She explains: *"To that end, I developed a method based on the sociology of technique with three main themes: taking a critical approach to technocentrism, restoring control over use, and empowering citizens."*

It was this multifaceted approach that led the city of Lyon to recruit social science experts and forge partnerships with French public bodies such as ADEME and Cerema.

"Every city or town, however small, can organise observation sessions, idea and design workshops, and user journeys, drawing support from partners such as businesses," says Khadija Tighanimine, who studies the relationship between users and urban lighting. She cites the example of Mulhouse, which used night-time walks to imagine how best to use light to showcase its heritage assets. *"Engaging users in policy discussions is like taking out an insurance policy to ensure their support for the decisions made. Consultation, participation and inclusion are critical to the development of connected and sustainable regions."*

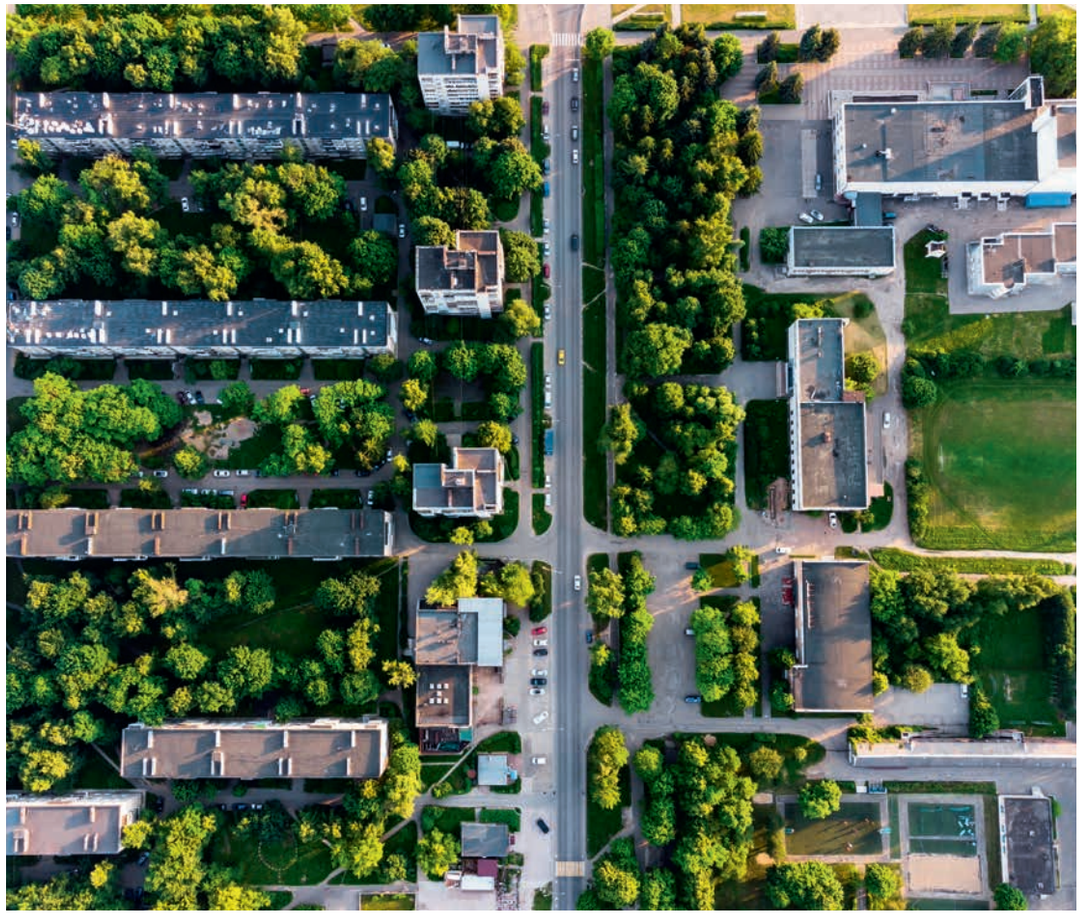
CITY PERFORMANCE

CITIES AND BUILDINGS: INNOVATING TO ADAPT

Because they are particularly vulnerable to the effects of climate change, buildings and infrastructure make an excellent testing ground for innovation in adaptation strategies. The VINCI Group is equipped with specialist tools to support cities and buildings on their journey toward climate resilience.

Plus 4 °C by 2100 – this is what countries are preparing for, including France with the third version of the French National Plan for Adaptation to Climate Change (PNACC), with chronic bad weather (rise in average temperature, more frequent droughts, changing rainfall and wind patterns, etc.) increasingly in evidence, accompanied by more intense acute weather events (heatwaves and urban overheating, extreme drought and rainfall, storms, megafires, etc.).

Towns and cities, which by 2050 will be home to more than two-thirds of the world's population, will play a decisive role in humankind's ability to adapt to climate risks. At a more granular scale, the built environment and the activities taking place



within it will be key to conversations about, and solutions for, resilience.

According to the Institute for Climate Economics (I4CE), the French government spends more than €50 billion a year on infrastructure projects without any systematic assessment of their future climate resilience. *"When we talk about buildings, global warming is most often raised under the heading of 'mitigation', i.e. the idea of reducing emissions,"* says Nicolas Dumas, Environmental Project Manager at VINCI Energies. *"But reflecting on 'resilience' means thinking in terms of adjustment, i.e. limiting the vulnerability of infrastructure. The two approaches are intertwined but also complementary."*

Reflecting on "resilience" means thinking in terms of adjustment.

.Consultancy and modelling

Many suitable techniques exist for addressing climate resilience in cities and buildings. Adaptation solutions may be structural, when applied to buildings, or functional and organisational when concerned with users and their activities. Nature-based solutions are increasingly highly sought-after (see box).

Prioritising solutions according to the expected impacts of climate change is a key mission for the design office Resallience, formed within the VINCI Group in 2019.

Dedicated to adapting projects, cities, regions, infrastructure and their use to climate change, Resallience is a multidisciplinary team of engineers, geographers, climatologists, economists, data scientists, lawyers, architects and city planners, all experts in the field of resilience to climate change.

As Didier Soto, Climate Change Adaptation Project Manager at Resallience explains, *"We offer our customers consulting and digital services relating to climate risk, in particular where it concerns local infrastructure. We perform pre-diagnostic and diagnostic testing, model future climate risks, and help with the development of customised action plans."*

The consultancy, which has worked on around a hundred projects in France and more than 60 other countries, also developed ResiLens, an internal pre-diagnostic tool for the VINCI Group, which performs an initial assessment of infrastructure vulnerability to some 15 climate risks, based on Intergovernmental Panel on Climate Change (IPCC) data. A hundred people have already been trained to use this tool, with the aim of accelerating the wider dissemination of resilience solutions. Its users include the teams at VINCI Facilities Alsace, with their ACDC solution (see section below).

There is now no doubt that the longer we wait to act on climate risk, the harder the work will be.

Nature-based solutions at VINCI Facilities Alsace

One of a number of users of the VINCI Group's ResiLens mapping tool, VINCI Facilities Alsace has spent four years creating and developing a showcase for adjusting to climate change on its own site. The aim was to allow the firm's customers to respond to existing and future government-issued adaptation plans while limiting the risks of interruption to their operations.

"Our solution is called ACDC and helps our customers adapt their fixed assets to the effects of climate change using a combination of technical and nature-based solutions (NbS)," says Noémie Fitterer, Environment and Low Carbon Manager at VINCI Facilities Alsace.

The solution developed by the team at VINCI Facilities Alsace begins with an analysis of a building's vulnerability using the ResiLens tool, which is used to put together a participative design and implementation approach based on the most appropriate actions and methods.

In order to validate and model a solution suitable for rollout to its customers, they initiated testing on the site of their own headquarters. The experiment occupied 2,000 sq. metres and took two years to complete.

The project includes an edible forest garden, nesting boxes and other shelter for animals, a porous parking surface, optimised use of rainwater, planted facades, rooftops with albedo-effect coating, and solar shade canopies. *"Everything is measured,"* says Noémie Fitterer. *"This initiative should allow us to avoid 1.392 tonne CO_2 equivalent in the first year and 1.012 tonne a year in subsequent years."*

The testing was conclusive, and based on its results, VINCI Facilities Alsace developed a modular service solution, which has already been implemented for one of its customers.

Natural solutions and technical solutions

When it comes to climate resilience, it is worth distinguishing between nature-based approaches and technical solutions. The former, generally referred to as "nature-based solutions (NbS)" and defined by the International Union for Conservation of Nature (IUCN), draw upon nature and its multiple services. They make use of, or are inspired by, wild environments or phenomena: urban marshland, orchards, plant propagation zones, extensive vegetation, rainwater storage, plant walls, ponds, edible forest gardens, rain gardens, porous ground coverings, etc.

Technical solutions are developed through human engineering prowess: renewable energies, reversible heat pumps, shade sails, water and energy management, solar panel shade canopies for fleets of electric bicycles, high-albedo roof coverings, electric vehicle charging stations, etc.

ENERGY INNOVATION

50% LIGHTER, 100% RECYCLABLE SOLAR PANELS

Omexom Belgium is involved in the construction of a pioneering solar installation featuring ultra-lightweight, completely recyclable photovoltaic panels. This innovative product can be installed on any roof type and is also part of a circular economy.

"Since 1965, 1,000 GW of solar panels have been installed worldwide," says Huib van den Heuvel, Chief Commercial Officer at Solarge. *"But we are now seeing an additional 200 GW installed every year. This will likely rise to 1,000 GW a year by 2040 onward."*

This Dutch solar panel manufacturer is hoping to take full advantage of strong growth in the market and steal a march on its predominantly Chinese competitors. Solarge, which was formed in 2018 and opened its factory in Weert in the southeastern Netherlands in May 2023, produces next-generation solar panels. *"Our product is totally innovative,"* says Huib van den Heuvel. *"It's 50% lighter than conventional modules and emits 80% less carbon during its production."*

Weight issues

Reducing the mass of a solar panel is no trivial matter given that, in the Netherlands for example, 80% to 90% of commercial or industrial building rooftops (Solarge's main targets) are not equipped with solar panels, and 40% of these cannot support the weight of conventional glass panels. And these figures are similar in most other countries.

Solarge solar panels weigh 5.5 kg per square metre compared with the standard 11 kg or more, thanks to their use of fibre-reinforced polypropylene, a semi-crystalline thermoplastic polymer specially developed by the petrochemical group Sabic (Saudi Basic Industries Corporation).

This collaboration between the two companies came about due to Sabic's plan to equip its site in Genk, Belgium, with a pioneering new solar installation, with 4,600 panels providing total capacity of 2.3 MWp. This is a first using this new type of solar panels on such a scale, and 97% of the installation's 2 GWh annual production will be self-consumed on site.

Unbreakable and recyclable

This innovative installation, which should be operational by the end of 2024, will use the latest Solarge panels, which are ultra-lightweight and also 100% recyclable.

"All the materials that make up our solar panels, which contain no PFASs, are easy to disassemble, reusable and recyclable, with guaranteed value in a circular economy approach," says Huib van den Heuvel. He adds that the supply chain is considerably simplified due to the absence of glass and aluminium.

Another significant advantage is that their polymer components make this type of panel unbreakable and highly resistant to changing climatic conditions, as well as to salt water. And *"Maintenance costs are also reduced thanks to the absence of an aluminium frame."*

Four Omexom engineers

The Genk project also involves other partners, including Omexom Belgium (VINCI Energies) and Engie. Stijn Van Dessel, Project Manager at Omexom Belgium, which has assigned four engineers to the project, explains how *"For installing solar panels on the roof, we developed an entirely new custom-built structure in collaboration with Solarge and Avasco [a manufacturer of rooftop mounting frames].*

One of the main challenges was to find a solution for installing the electric cables where the space between the panels and the roof is a lot smaller than in a conventional installation."

Through its collaboration with Omexom, Solarge hopes to tap into a powerful, international network to accelerate the marketing of its new product. The firm is already working on numerous smaller projects, but is targeting much larger contracts such as the one in Genk.

ENERGY TRANSFORMATION

PIONEERING CONSTRUCTION OF AN EXTREMELY HIGH-POWER ELECTRICAL LINE IN BRAZIL

Omexom Transmission Lines in Brazil has completed the construction of a 230 kV transmission line with the country's largest installed renewable energy capacity of 846 MW. The project featured notable technical and logistical challenges, innovative technological choices and strong CSR commitments.

Launched in June 2023 and completed in April 2024, construction of the Serra do Assuruá wind power complex in Gentio do Ouro, Brazil – 24 farms of 188 turbines, each 90 metres high – was an opportunity to implement a project on an exceptional scale. The purpose of this project 600 km from the Bahia state capital, Salvador, in north-central Brazil, was to address the increase in production flows in the region and the expansion of regional interconnectors.

Implemented by the Engie group in partnership with Omexom Transmission Lines Brazil (VINCI Energies), this remarkable project involved the construction of more than 28 km of a 230 kV transmission line with a capacity of 846 MW, markedly higher than the average power of 230 kV lines, which is approximately 400 MW.

> *"A technological advance, but also a pioneering enhancement to Brazil's electrical infrastructure"*

"This difference in capacity represents not only a technological advance, but also a pioneering enhancement to the country's electrical infrastructure," says Henrique Santos, Project Engineer at Omexom Transmission Lines Brazil.

Challenges and innovations

To meet the challenge of designing and implementing a transmission line of such high capacity, the Omexom team had to address a series of technical and logistical issues, from the selection and installation of materials to the correct sizing of structures and effective management of resources.

They also had to adapt to the unique features of the terrain in this mineral-rich region of Brazil, where it was essential to carry out special geological studies to design the electrical earth connection system. In addition, a particularly drawn-out rainy season had to be managed during the works period.

A notable example of the way in which Omexom, the VINCI Energies energy infrastructure brand, overcame these technical challenges was the tremendous effort by the engineering team to design an effective solution for managing the project's unprecedented power levels.

Henrique Santos explains: *"During the budget planning phase, we realised that no 500 kV connection would be available at one of the two substations involved – namely, SE Gentio do Ouro II and SE Serra do Assuruá. We carried out a study to determine the number of cables per phase and the gauge required, using the software transient electromagnetics."*

The solution? *"We installed four cables per phase, but opted for a single rather than double circuit, which was more economical in terms of the amounts of steel and concrete required for the tower structures and foundations. The latter have to be stronger to support the four cables used per phase. In total, we installed more than 395 km of cables."*

Local resources

Another noteworthy feature of this project was Omexom's decision to make maximum use of local resources. *"The vast majority of the goods and services used i n the execution phase (housing, food, internet, water, energy, civil engineering materials) were sourced from close to the project site,"* says Henrique Santos. *"Only the large supply orders, for example the metal structures, conductor cables and insulation, were purchased from non-local suppliers, due to their complexity."*

The management of human resources was another major challenge of this project. During the works period, 457 direct and indirect jobs were created, with a sizeable local workforce. At the project's height, 265 workers were simultaneously present on site.

"The customer also had strict requirements on employee safety during the works, which aligned perfectly with our own employee safety focus," says the Omexom Project Engineer. *"Before beginning any activity, a pre-task meeting was organised with all the project managers and operatives to familiarise them with the security procedures."*

BUILDINGS TRANSFORMATION

INNOVATIVE NEW CLIMATE CONTROL TECHNOLOGY AT THE FRENCH POLYNESIA HOSPITAL CENTRE

Since 2022, the climate control system at the hospital in Pira'e, Tahiti, has been operating using water from the deep ocean. This offers stable comfort for the building's users and a drastic reduction in energy spending – a saving of 40%.

A saving of almost 9 GWh a year, equivalent to 5,000 tonnes of CO_2 emissions: this is the energy impact attributable to the innovative climate control system in operation since 2022 at the French Polynesia Hospital Centre (CHPF) in Pira'e, on the outskirts of Papeete in Tahiti. This is a particularly significant benefit given that the refrigeration units producing chilled water previously accounted for 35% of the establishment's total electricity consumption.

The driving force behind this performance can be summed up in four letters: SWAC – which stands for Sea Water Air Conditioning, a solution based on using water from the Pacific Ocean as a cooling source in climate control loops. How does it work? The principle behind SWAC is to pump water at around 5 °C from deep in the ocean up to a heat exchanger designed to cool a building's secondary water circulation system. The seawater is then discharged back into the ocean at a depth carefully selected to avoid altering the surrounding ecosystem.

Appropriate seabed topography

"A project of this type requires certain conditions," says Frédéric Dock, a local VINCI Energies director, who was involved in the Polynesian hospital project, working alongside several VINCI Energies Building Solutions business units in Polynesia to install technical equipment in the machine room and automate the regulation of pumps, heat exchangers, etc. Additionally, VINCI Facilities Polynesia was awarded the site maintenance and energy monitoring contract through to January 2029.

The SWAC system at CHPF is the largest installation of its type in the world.

"You have to target buildings with higher climate control needs, such as hospitals, hotels and airports, where there is appropriate seabed topography(*) and easy access to deep ocean water. That's why tropical island environments are particularly suitable."

Multi-year energy transition plan

Boasting 3.8 km of pipes laid to a depth of more than 910 m, and 6 MW of cooling power, the hospital's SWAC system is currently the largest installation of its type in the world. The project, which also involved the VINCI Construction subsidiary Geocean working alongside VINCI Energies, required almost three years of work at a total cost of €31 million, jointly financed by the French government and the overseas territory.

Frédéric Dock continues: *"This project is part of the multi-year energy transition plan in French Polynesia, where carbon emissions per head of population are higher than the national average. The territory aims to halve its emissions by 2030. The hospital alone accounts for 1.8% of Tahiti's electricity consumption."*

Lower bills

Since installation of the SWAC system, the temperature of the secondary circuit feeding the hospital's chilled water network has stabilised at around 6 °C. This constant temperature ensures a comfortable environment in the hospital's various wards and rooms throughout the day, regardless of weather conditions.

Drawing as it does on an inexhaustible, cost-free resource, *"The seawater loop meets most of the hospital's cooling needs, reducing the need for refrigeration fluids at a time when global standards on emissions quotas are tightening and the financial penalties becoming stiffer,"* according to the website of Club SWAC France, a federation of manufacturers promoting SWAC technology. In financial terms, the reduced energy consumption is worth an estimated €2.9 million a year, a saving of 40%.

The French Polynesia Hospital Centre is now planning to connect the new annexe buildings currently under construction. Meanwhile, different research projects are studying how replicable SWAC may be in other comparable building types.

(*) Seabed topography refers to the depth and shape of the ocean floor. The study of seabed topography is known as bathymetry.

Watch the animation:

BUILDINGS PERFORMANCE

DATA CENTRES: WHERE FIRE SAFETY IS A MAJOR CHALLENGE

As the internet, cloud and AI develop on an increasingly massive scale, more and more data centres are required all over the world. These are sensitive sites where fire protection is crucial, but also complex, given the unique features of these installations.

Data centres are springing up like mushrooms. There are more than 8,000 worldwide, according to Cushman & Wakefield, with more than a thousand operated by the giant internet and cloud firms – and this is set to double over the next four years with the explosion in the use of AI, according to market data provider Synergy Research.

But data centres are not the inconsequential buildings they may appear to be. Aside from their enormous energy consumption, fire safety is an issue as crucial as it is complex. We can look back, for instance, at the fire that ravaged the OVHcloud site in Strasbourg in March 2021, completely destroying one of its four data centres. As a result, thousands of internet sites and email servers immediately went offline, with some stored data being irretrievably lost.

In a data centre, there are potential places for a fire to start throughout the electrical system: inverters, batteries, electrical cabinets, servers, etc.). Cyrille Harand, Business Unit Manager at Uxello Risques Spéciaux, the VINCI Energies business unit specialised in fire safety, lists them: *"The sensitive points are the IT rooms (electrical fires), technical premises (electrical and mechanical equipment), generators (electrical fires or combustible fuel and/or lubricants) and commercial areas (solid matter fires)."*

Special requirements

Fire protection in data centres has to meet extremely specific requirements. These sites are effectively separate ecosystems with their own unique features and their own, predominantly English-language, codes. *"An understanding of the environment is essential to marketing, designing, building and maintaining data centres in line with Anglo-Saxon customers' and their insurers' requirements,"* says Cyrille Harand.

"The watchword is service continuity," he adds. *"Which means: redundant systems that keep processes running in the event of a failure; special precautions to avoid phantom triggers while ensuring effective protection; systems that work directly with customer processes (ventilation, fire detection, etc.); multiple fire suppression zones; plus, special precautions to avoid any risk of corrosion and leaks, because while water is needed to make the installation work, it's also a major source of concern for the operators."*

Another peculiarity relates to urban planning for data centres, which requires custom protection for IT rooms that takes into account the numerous impediments to a correctly functioning sprinkler system – ducts, cable runs, etc.

Proven technologies

The solutions and technologies implemented to mitigate these risks fall into two broad categories of data centres: "hyperscale" facilities (at least 5,000 servers with around 3,000 sq. metres of physical space); and small data centres. *"For hyperscale data centres, water-based technologies (sprinkler and fogging systems) are preferred,"* explains Cyrille Harand. *"These systems are the most effective and best suited to the multiple risks and allowing service continuity. For small data centres, gas suppression systems are preferred."*

Cyrille Harand explains that the risks in connection with the use of lithium-ion batteries – which provide immediate backup power in the case of a mains power failure in the data centres – make little difference.

"It doesn't change things much where water-based suppression systems are used. These systems will contain the fire and stop it spreading. However, the systems have to be designed to irrigate battery rooms for a long time. Generally speaking, it is important that suppression systems are integrated with the overall safety strategy: human factors, compartmentalisation, size of the battery rooms, etc."

BUILDINGS INNOVATION

DIANE: THE AI ACCELERATOR

A fundamental focus on business needs and taking existing systems into account: this is the approach VINCI Energies is using with DIANE to design and implement long-term, efficient artificial intelligence solutions.

In 2024, the number of companies investing more than US$100 million in artificial intelligence more than doubled, according to a report from Bain & Company highlighting an AI market set to grow by 40% to 55% year-on-year between now and 2027. But the excitement driving the algorithm industry should not overshadow the major challenge businesses absolutely must address: value creation. Because the goal now must be to move beyond POCs (proofs of concept) to rolling out efficient, useful, profitable models.

Many developments involving artificial intelligence currently struggle to get past the experimental stage. What is the best way to reach the MVP (minimum viable product) stage, apply a solution more broadly to multiple use cases, and move to full-scale rollout to maximise the return on investment?

"Large businesses face a double difficulty," says Alain Grisval, Senior Expert Technical & Innovation at Omexom, the VINCI Energies energy infrastructure brand. *"On one hand, they have to look at their existing systems to identify applications ready to be hybridised, modernised, or simply abandoned. And on the other, they must consider their organisational and operational model to identify diffusion pathways."*

In startup mode

VINCI Energies decided to create a business dedicated to the assimilation of artificial intelligence into its brands, business units and activities. Formed in 2020 with support from Leonard (see box) and opened as a business unit in 2022, DIANE (an acronym for "digital and AI for our business units" in French) now employs 10 people. Their mission is to work alongside VINCI Energies business units to develop solutions that provide a competitive advantage. Their objectives are to roll out at least one solution for each field of expertise at VINCI Energies, and to halve the time currently spent on redundant, time-consuming and automatable tasks.

To achieve this, DIANE is operating like a startup, explains its manager, Stéphane Maviel: *"We start by visiting business units to perform diagnostics. When the opportunity for an AI application arises, we create a specification, which forms the basis for sessions where DIANE works with a technical expert from the business unit. After the initial development, we offer a solution suitable for use by early adopters."*

SprinkIA and Solux

This is how SprinkIA was created. This solution helps design the layout of sprinkler systems – the networks of ceiling-mounted water jets used for fire protection in commercial and industrial buildings. SprinkIA has been used on dozens of projects – for example, it facilitated the installation of 37,000 sprinklers at ACC (Automotive Cells Company) in Douvrin, northern France, having calculated the layout far more quickly than through a conventional study, and with a margin of error of just 0.4%.

Another achievement to DIANE's credit, Solux is a solution for designing urban lighting systems, which was conceived and developed in two years. Citeos Ingénerie Nord submitted the idea to DIANE's experts in 2022, and in 2024, it passed from the MVP stage to validation testing and the creation of a self-funding, subscription-based economic model. In fact, continues Alain Grisval: *"We looked at the solution's international scalability, and VINCI Energies Australia is actually already offering Solux in a call for tenders by the City of Canberra."*

Open digital platform

Numerous calculation models are currently in the design or testing stages across the whole

of VINCI Energies, ranging from counting and installing components based on PDF plans to optimising technicians' rounds, analysing estimates, improving document creation, and even chatbots.

"DIANE's role is to make AI a useful asset to VINCI Energies."

To raise awareness of its projects and disseminate them more quickly, DIANE has opened a digital platform hosting services to make AI available to all VINCI Energies business units. *"DIANE's role is to make AI a useful asset to the Group,"* says Stéphane Maviel. *"To develop AI in a sustainable and profitable way, we must involve the users most affected right from the application design phase. VINCI Energies is based on a decentralised structure, which enables us to work 'bottom-up' and stay agile and ultra-responsive. In the world of AI, that's a real luxury!"*

Leonard: AI firmly rooted in business activity

Since its inception, DIANE has enjoyed support from Leonard, the VINCI Group's future-oriented innovation platform, which is invested in a dual dynamic of promoting and assimilating artificial intelligence technologies in VINCI Energies business units. *"In 2019, Leonard assembled a group of experts to lead a future-oriented debate on how AI can be aligned with the Group's business activities. For the time, it was quite a pioneering approach,"* says Julien Villalongue, Managing Director of Leonard. *"We very quickly understood that artificial intelligence could benefit almost all our business activities, and also that the key was to start from grass roots, with use cases from our business units. DIANE emerged from this genuinely operations-based, grassroots vision. Since 2020, Leonard has been developing a support programme that is unique in its approach and also in the speed of its expansion. The figures are more than encouraging: around 60 projects supported in five years, with another 15 or so in the pipeline for 2025."*

BUILDINGS PERFORMANCE

A MAJOR PROJECT DELIVERED RIGHT ON TIME – SUCCESS AT CHARLEROI HOSPITAL

Construction of the new site for the Grand Hôpital de Charleroi in Belgium is one of those rare hospital projects to have been completed on schedule. Cegelec Belgium takes the credit for several technical batches on this large-scale project.

Operations to relocate from the Grand Hôpital de Charleroi (GHdC) to the Les Viviers Hospital Centre began in June 2024 with the opening of the dental centre, pharmacy and all hospital administrative services. The new infrastructure will consolidate the group's five current sites in one location. The centre's new occupants moved in gradually in the lead-up to its opening on 25 November 2024.

Requiring four years of works, this is one of the largest hospitals built in Wallonia in the past 20 years. With total floor area of 145,000 sq. metres, the complex combines five sites, 960 beds and 27 operating theatres. No hospital project had previously met such tight deadlines while managing to incorporate the modifications and constraints inherent in a project of this nature, arising from things such as regulations, materials costs, stakeholder input or customer requests.

A collective partnership

Cegelec Belgium (VINCI Energies) represented the consortium on a range of technical batches: hospital HVAC, electrical engineering, and later, the clean rooms batch. The business unit was fully aware of the scale of the challenge. *"First, we had to address issues caused by the war in Ukraine and in the aftermath of Covid-19, which included rising prices, forcing us into daily battles to contain our costs,"* says Benoît Gouverneur, Business Development Manager at Cegelec Belgique.

Organisationally, right from the tender stage, Cegelec Belgium was seeking out partners to form a consortium: *"Right at the start of the project, we had to define everyone's role from a legal, administrative and technical perspective,"* says Benoît Gouverneur. *"Weekly feedback in internal meetings between partners was essential to be able to speak to our shared customer with one voice. Meeting the delivery date was also the end result of a series of successes built on strong collaboration between all project stakeholders: the project owner, architects, design teams and contractors."*

An experienced delivery team

On the ground, Cegelec Belgium was able to offer solutions tailored to the requirements of such a large project. *"For every technical batch, we assigned an experienced delivery team of engineers and site personnel, overseen by a project manager specialising in hospital projects,"* says the Business Development Manager.

To optimise its services and maximise its responsiveness, Cegelec Belgium established a monthly project review process, contract remuneration based on project duration, and a BIM team with strong experience in the hospital environment to ensure coordination between all the technical batches.

"In addition to daily monitoring of project progress by our works managers, we set up qualitative monitoring of our work through self-checking procedures during critical phases, such as the sealing of bulkheads and false ceilings."

ENERGY, SAFETY, CONNECTIVITY, PROCESSES – AIRPORT PERFORMANCE IS REALLY TAKING OFF

The air transport sector is moving in the right direction: with more than five billion passengers and over 1,000 billion dollars in sales, airlines are set for spectacular growth in 2025.

Five years after the sudden drop caused by the Covid 19 pandemic, the market is soaring higher than ever. This is an opportunity for the VINCI Group business units (VINCI Airports is the world's largest private airport operator) that have spent years developing solid expertise in the airport market. But is also brings responsibilities relating to security issues, connectivity, process improvements and sustainable development.

From optimised baggage handling systems to sustainability in fire protection systems, and innovations such as digital control towers, site electrification and energy self-consumption, the various VINCI Energies brands and business units involved are working constantly to improve performance in airports across the world.

INDUSTRY | TRANSFORMATION

AIRPORTS UNDER PRESSURE

From process improvement and sustainable development to connectivity, safety and security – growth in air traffic is creating immense challenges for airports. But solutions do exist, and they require specific expertise.

Five years on from the Covid 19 pandemic, the air transport sector is back stronger than ever. According to the International Air Transport Association (IATA), airlines worldwide will carry more than five billion passengers this year. Their revenue is likely to increase by 4.4% to surpass a trillion dollars for the first time. This is a spectacular recovery following losses of over 183 billion dollars recorded between 2020 and 2022.

In the wake of this boom, airport business is also showing strong results. *"Overall, European airports have seen a 7.4% traffic increase in 2024, and we are now above pre-Covid levels,"* confirms Olivier Jankovec, Director General of the Airports Council International (ACI Europe).

But the traffic dynamics have changed. International travel is now clearly driving the market (up 8.8%), with domestic activity only increasing by 2.5%. *"This reflects structural change in the air transport market,"* says Olivier Jankovec, *"with a shift toward rail in domestic travel on one hand, and on the other, international flights boosted by a range of factors: strong demand*

for leisure travel, the business policies of the low-cost airlines, the consolidation of airlines, and heightened geopolitical tensions."

"The airport sector's economic contribution is 5% of European GDP."

Finance needs

This renaissance in the airline sector augurs well economically, judging by the latest ACI Europe study on the economic and social impact[1] of airport activity: *"At European level, the sector's economic contribution is €851 billion, 5% of European GDP,"* says the Director General. *"Air connectivity is clearly a powerful vector for growth in commerce, tourism, productivity and the attractiveness of investments. For every 10% increase in air connectivity, we see a 0.5% increase in GDP and 1.6% more jobs."*

Given the strong growth expected in the sector, airport capacity needs will be considerable. Olivier Jankovec continues: *"If the lack of massive aid to the sector – which has seen its debt rise by 30% since 2019 – continues, in 2050, over a million flights will be lost due to a lack of airport capacity. European airports will require €340 billion in investment between now and 2040."*

Sustainable fuels and process optimisation

In addition to the capacity issue, an equally important challenge is the increasing cost of air transport due to decarbonisation policies, which will need to be further intensified. Olivier Jankovec notes that *"The most pressing issue in this area is to create a manufacturing sector for sustainable and competitive fuels, because these fuels currently cost between two and seven times more than kerosene."*

From 2025, aircraft are required to use 2% sustainable fuel, and this will increase to 20% in 2030 and to 70% in 2050. However, in 2024, just one million tonnes of sustainable fuel were produced worldwide, equivalent to 1% of global fuel consumption. *"The target is to reach 400 million tonnes by 2040,"* says Olivier Jankovec. This type of fuel could contribute up to 56% of the sector's CO_2 reduction efforts.

Another not insignificant lever, pending the invention of carbon-neutral aircraft in the long term, is the renovation of fleets using existing technologies (20% of the decarbonisation effort). But the delays occurring in deliveries of new aircraft are not encouraging. Processes within airports also require improvement in terms of traffic, safety and security. *"In these areas, automation and digitalisation are opening up new horizons, largely thanks to AI, particularly in managing passenger and baggage flows,"* says Olivier Jankovec, though unfortunately *"Europe is lagging behind in this respect and lacks a centralised approach to testing and certifying new technologies."*

But airport operators remain undeterred, implementing solutions to address the challenges facing an entire sector, with the mobilisation of advanced specialist expertise.

(1) Benefits of Airports & Air Connectivity. Unique Drivers of Competitiveness and Sustainable Prosperity for Europe

KEY FIGURES

89.5%
Increase in European air passenger traffic between 2018 and 2040
(Source: ACI World Airport Traffic Forecast)

8
European airports among the top 20 worldwide in terms of hub connectivity
(Source: ACI EUROPE has now released the Airport Industry Connectivity Report 2024)

51%
of the world's most overcrowded airports are in Europe
(Source: IATA Worldwide Slot Guidelines)

€12.3 billion
Investment deficit in European airports 2019–2023
(Source: G20 Global Infrastructure Hub)

"MORE THAN 70% OF THE ELECTRICITY CONSUMED IN OUR AIRPORTS IS CARBON-FREE"

The world's largest private airport operator, with more than 70 airports in 14 countries, VINCI Airports is leading the way on the major challenges facing the sector: decarbonisation, energy efficiency and frugality, safety, and security. Interview with Pierre-Hugues Schmit, Chief Commercial and Operational Officer at VINCI Airports, and Joffrey Maï, Environment & Sustainability Director of VINCI Concessions.

What steps are VINCI Airports taking to reduce the carbon footprint of the airports you manage?

Joffrey Maï. Our environmental policy is directly linked to that of the VINCI Group. Our target was to reduce our Scope 1 and Scope 2 emissions by 50% between 2018 and 2030. Having already achieved this last year, we are now targeting a 67% reduction by 2030.

And we have implemented multiple actions to make that happen. In terms of energy frugality, we are optimising our heating and climate control temperature set points, as we did during the energy crisis by setting the heating to 17 °C rather than 20 °C in our airports.

In terms of energy efficiency, we launched an energy management system project to monitor our water and electricity consumption. We are also replacing our lighting systems

in the terminals and car parks, and on roads and runways. More than 70% of our lights have already been replaced by LEDs. More efficient HVAC equipment has also been installed. We are gradually replacing our gas boilers with heat pumps, sometimes incorporating geothermal systems.

Currently, more than 70% of the electricity consumed in our airports is carbon-free, and we are adding solar installations – with 80 MWp already installed – and promoting self-consumption everywhere. Our vehicle fleet contributes only marginally to our CO_2 emissions, but we are nevertheless in the process of electrifying it.

What about safety and security?

Pierre-Hugues Schmit.
These are clearly vital issues. Among the many actions we are taking, the work on wildlife hazards, also known as bird strikes, are a definite focal point, with an extremely active bird-scaring policy. We also work hard to raise awareness within our teams on topics such as the debris that can get left behind on runways; we are starting to detect it using automatic image recognition. These systems have been installed on our largest sites in Lisbon and London Gatwick.

"Technologies such as image pre-analysis enable us to identify possible threats."

As for security, going beyond the rules in force locally, we are using technologies such as image pre-analysis, which can, for example, identify possible threats such as an explosive device divided between multiple items of baggage, and multiplexing, to allow us to pool our image analysis capabilities.

How do VINCI Airport products and services contribute to stimulating growth in air traffic?

Pierre-Hugues Schmit.
Our products and services have an indirect impact on traffic growth, for example when we offer multimodal services that improve airport access, as is the case at Lyon, London Gatwick, and Kansai International in Osaka.

But our commercial know-how is what has the greatest effect on traffic. The pricing conditions we apply to airlines vary significantly depending on the day of the week or time of year, on the types of aircraft, and on each airline's ability to optimise the time they spend using our infrastructure. This ultimately affects ticket prices and therefore the amount of travel.

Another non-negligible factor, which relates more to image and comfort, is our policy to reduce waiting times, whether during check-in, security screening or boarding. Optimising our security lines with higher-performance scanners, better-trained personnel and improved signage is making the process considerably more fluid. At Kansai International Airport, for example, we have cut waiting times by a factor of four.

ENERGY TRANSFORMATION

MORE VIRTUOUS ELECTRICAL INFRASTRUCTURE FOR PARIS-CHARLES DE GAULLE AIRPORT

ADP Group has commissioned Cegelec Paris Airports to project-manage the electrification of Terminal 3 airside at Paris-Charles de Gaulle Airport. This large-scale project, with its multiple operational constraints, is part of ADP Group's roadmap to building a sustainable airport model.

ADP Group awarded this project, which launched in 2024 and is due for completion in February 2026, to a consortium of three companies led by Cegelec Paris Airports. The business unit is responsible for the electrical engineering work, and for coordinating the infrastructure and building aspects. *"The aim of the project is to decarbonise ground operations by electrifying them 100%,"* explains Victor Weschler, Project Manager at Cegelec Paris Airports. *"This involves rolling out charging stations for all-electric ground-handling and de-icing machinery, and supplying power to fixed air-handling units to warm or cool the cabins of aircraft on the ground at Paris-Charles de Gaulle. These units will be installed as close as possible to the aircraft so they less often need to use their auxiliary engines (located at the rear of the aircraft), which consume a lot of kerosene."*

"Designed to make Parisian airport infrastructure safer, more efficient and more sustainable."

This project is part of ADP Group's ambitious environmental strategy, which includes a target for Paris -Charles de Gaulle of net zero emissions* by 2035.

"The electrification of airport operations does increase its electrical power needs considerably," says Victor Weschler. *"The high-voltage distribution had to be completely redesigned, and future needs planned for. The HV and mains-voltage substations were eco-designed to reduce their carbon footprint using SF6-free high-voltage boards along with materials such as low-carbon concrete and renewably produced recycled steel."*

Cegelec Paris Airports has been working on this atypical type of technical project for more than 20 years, and its teams have solid expertise in this area. These projects, with their phasing defined in advance via airport safety impact assessments, are particularly sensitive. The slightest delay could have a major impact on the terminal's operations.

Cegelec Paris Airports and its partners are working closely with ADP to complete this Terminal 3 airside electrification on time and in accordance with the social, environmental, safety and technical objectives contained in the customer's strategic roadmap, which is designed to make airport infrastructure safer, more efficient and more sustainable.

* Internal ADP Group emissions

Integration and safety: a key challenge

Beside the technical aspects, the electrification of Terminal 3 airside at Paris Charles de Gaulle Airport is providing social employment opportunities for people facing exclusion from work. ADP Group joined forces with ViE, the social and professional inclusion organisation created by VINCI in 2011 to support its business units, including Cegelec Paris Airports, and help them strengthen their social responsibility initiatives. ViE is helping with candidate selection and supporting the process for the entire duration of the project.

Employee integration includes instilling a safety culture, which is essential when operating in the restricted-access environment of an airport project.

ICT PERFORMANCE

SECURE CONNECTIVITY IN SPAIN

Axians Spain is a longstanding partner of Aena Aeropuertos, helping to provide reliable, secure communications at many Spanish airports.

For almost 25 years, Axians Spain has been supporting Aena Aeropuertos, one of the world's largest airport operators, which manages 46 airports and two heliports in Spain, and is directly or indirectly involved in managing another 23 airports worldwide.

Axians, the VINCI Energies ICT brand, works with all the operator's airports in Spain to fulfil their communications network needs. Axians Spain is currently involved in various projects at a dozen different airports, and also working on Aena's central services.

"We play a key role in installing Wi-Fi and corporate networks, as well as SDN [software-defined networking] networks, to facilitate secure data communication throughout the airport," says José Sarabia Arconada, Project Manager at Axians Spain. *"This involves a diverse range of users, from operational teams and firefighters to government forces and security services, not to mention the passengers who use the Wi-Fi and the various airport services: check-in, boarding passes, public information systems, and so on."*

> *"A key role in installing networks to facilitate secure data communication"*

Technical and organisational challenges

Aena has clear expectations: a reliable, robust, scalable and easily manageable network, with project implementations that interfere as little as possible with day-to-day airport operations.

This provides Axians with plenty of challenges. *"Working in airports can be very complicated,"* says José Sarabia Arconada. *"Every airport is unique, and we have to abide by the rules in place at each one, as well as coordinating with numerous services (communications, IT systems, security, operations, etc.) and adapting to operational timetables relating to aircraft movements and passenger flows."*

Added to this, airports are extremely demanding in terms of risk-prevention measures (when working at height, in aircraft transit zones, service galleries, tunnels, etc.).

As part of its close collaboration with Aena, Axians is also currently working on the definition of new data centre architecture compliant with the recommendations of Agencia Estatal de Seguridado Aérea, the Spanish national air safety agency.

BUILDINGS TRANSFORMATION

AN INNOVATIVE FIRE SAFETY SYSTEM FOR A NEW HANGAR AT A LARGE AIRPORT IN THE NETHERLANDS

As part of a project to modernise a maintenance hangar at a large airport, Cegelec Fire Solutions was entrusted with the full design and installation of its fire protection system. They have designed an innovative and environmentally friendly sprinkler, FOAM and fire detection system.

At a large airport in the Netherlands, a major player in MRO (Maintenance Repair & Overhaul) is transforming an existing hangar into a high-tech space for the maintenance of aircrafts of different owners. To completely overhaul this building comprising two 8,250 sq. metre spaces, the company is investing between €80 million and €100 million.

Cegelec Fire Solutions (VINCI Energies) was entrusted with the full design and installation of its fire protection system. *"We are responsible for the design, engineering, construction and certification of the fire protection and detection system,"* says Rick van de Langenberg, Business Unit Manager at Cegelec Fire Solutions Netherlands. *"That includes the installation of sprinklers, fire-suppression foam monitors, detection cameras to activate the monitors and fire alarm, plus all the pipework systems and related cabling."*

Sustainable solutions

In line with the customer's requirement for a low-carbon building, Cegelec Fire Solutions prioritised sustainable solutions. *"On this site, we'll be implementing a PFAS-free foam installation that meets the FM [a property damage insurance provider] requirements,"* says Rick van de Langenberg.

This innovation involves the installation of a foam tank with a built-in monitor and pumps to mix the pure foam with water. This mixture is used to extinguish water-resistant burning substances. *"The difficulty lies in putting together the right components and getting official approval for an installation that is not yet on the market,"* explains Rick van de Langenberg. *"An additional challenge is the physical installation of pipes and sprinklers in a hangar 30 metres high, not to mention the tricky task of coordinating numerous companies working together simultaneously."*

Resource savings and reuse

Again with a view to sustainability, the system has been designed to reduce the number of pipes, cables, detectors and sprinklers. *"Similarly, we will be paying close attention to our Scope 3 environmental impact,"* adds the business unit general manager. *"Transportation will be reduced accordingly for our own teams and also for our suppliers. Thanks to great collaboration with the other contractors on site, we will be able to share and save on resources."*

"On this site, we'll be implementing the first installation in the Netherlands with PFAS-free foam which meets the FM requirements"

Cegelec Fire Solutions also plans to reuse some elements of the existing installation, such as pipework, valves, and possibly cables and cable trays.

Work began on the construction site in March 2024, with the dismantling of the existing facility, and design and engineering work for the new installation. On-site construction will begin at the end of Q1 2025, for completion toward the end of Q2 2026.

BUILDINGS INNOVATION

HOW FARO AIRPORT IS SAFEGUARDING WATER RESOURCES

Periods of drought are regular events in Portugal. To preserve water resources, VINCI Energies is recovering water from Faro Airport's heating and climate control system and reusing it in cleaning operations.

Portugal regularly experiences periods of drought, particularly in its southern regions. As a result, surface water reserves and water tables are at extremely low levels, increasing the risk of public water supply shortages.

In Faro, in the Algarve, the region worst affected by recent droughts, VINCI Airports manages the city's airport, one of ten it is responsible for in Portugal. Meanwhile, VINCI Facilities Portugal is responsible for maintenance of the airport's passenger boarding bridges, as well as those in Lisbon and Porto. *"As a responsible company, we have a duty to reduce water use in our activities,"* emphasises André Parente, Director at VINCI Energies Portugal.

Treating and reusing condensates

For example, the condensed water that drains from climate control units in the airport buildings, which previously ran onto the ground or into drains, is now collected, and reused following treatment to eliminate any biological contaminants present in these HVAC (heating, ventilation and climate control) condensates. This helps reduce both environmental pollution and energy consumption by the airport buildings.

"To begin with, we were collecting the water in a 20-litre container," says André Parente. *"But we soon realised that would not be enough. In collaboration with our customer Faro Airport – ANA Aeroportos de Portugal, we installed tanks next to each of the six boarding bridges. With this solution, we now collect around 2,600 litres of water a week, an average of 433.3 litres per bridge. In 13 weeks, we have collected 33,800 litres."*

The recovered water is reused for airport equipment maintenance, including cleaning operations: washing exterior walls, and the floors and windows on the boarding bridges. It can also be used to water the site's indoor and outdoor plants.

"In time, by increasing our collection capacity, we will be able to share this water with other providers and customers, and so reduce the amount of potable water used," says André Parente.

A scalable initiative

One benefit of an approach like this is its low cost, which boils down to the installation of collection tanks and a pipe system. *"Treating HVAC water has a small environmental footprint and requires very little in the way of on-site work,"* says André Parente.

> *"By reusing condensates from HVAC systems, we can reduce the quantity of water resources extracted from watercourses and aquifers"*

"By reusing this water, we can reduce the quantity of water resources extracted from watercourses and aquifers even as demand increases. This safeguards our water resources and the animal life that depends on them for survival."

The next step for VINCI Facilities Portugal, in collaboration with Faro Airport, will be to connect the six collection tanks alongside the sky bridges to a central reservoir. This will make it possible to store more water from condensation and have a single delivery point to manage, rather than the current six.

André Parente concludes that *"Drawing on our experience and the adjustments we have made, we could extend this solution to other customers and other airports in the VINCI Airports network."*

INDUSTRY | TRANSFORMATION

BAGGAGE HANDLING: A SECURITY AND INNOVATION CHALLENGE FOR AIRPORTS

To support future years of strong growth in passenger traffic, airports need to modernise their infrastructure and how they process hold and cabin baggage. This is a niche market where innovation is key.

We look at the case of TG Concept, a VINCI Energies business unit.

Four years ago, air travel was pronounced dead, but instead is back stronger than ever. After two disastrous pandemic-hit years, worldwide passenger numbers returned to 2019 levels during 2024, and the International Air Transport Association (IATA) now expects passenger numbers to double by 2043. While these projections serve to remind this sector of its environmental responsibilities in light of its high greenhouse gas emissions, they also pose immediate security challenges for airport infrastructure.

Recently, major works have been undertaken to make hold-baggage handling systems compliant with the Explosive Detection System Standard 3, the latest European framework for mandatory minimum detection rates in airports.
To install this new generation of baggage handling systems (BHS), many European airports have been forced to make major structural changes to their baggage sorting facilities, which required several years of skilled engineering input from companies specialising in the design and installation of baggage solutions.

"The indicators are clearly promising for international project development."

Growth market

The IATA expects the number of airports worldwide to increase by 3.6% a year over the next two decades, with particularly strong growth in the Asia-Pacific region, especially India and China.
"The indicators are clearly promising for international project development," says Pierre Varnier, CEO of TG Concept, which specialises in the design, integration and commissioning of baggage sorting and screening systems for airports.

This Lyon-based VINCI Energies business unit is a partner to almost 80% of French airports and also has operations in Switzerland (Geneva), Bulgaria (Sofia), Portugal (Lisbon) and Mexico (Monterrey).

"Our collaboration with VINCI Airports on various projects is proving particularly effective," adds the CEO. *"Our current objective is to confirm our leadership, in France of course, but neighbouring countries as well, in the market for baggage handling systems and screening stations."*

Innovation and automation

This is a niche market in which competition plays out primarily through innovation. The automation of conveyor systems is a priority R&D area, for which TG Concept is drawing in 2025 on the potency of Actemium, the VINCI Energies industry brand, to create a proof of concept (POC) based on robots designed to load and unload hold baggage automatically. *"In the short term, Actemium should be able to scale up this solution to offer customers in the airport sector a significant innovation,"* says Pierre Varnier.

Following two years' R&D, TG Concept has launched an innovative hold-baggage screening (HBS) concept – the X Lane, which offers two key advantages. Line length is reduced to 17 metres, around 10 metres shorter than the lines its competitors currently have to offer. And in addition, X-Lane offers considerable economies of scale by combining two lines into one, allowing airports to reduce both their investment costs and the number of operators required. In other words, it ensures optimised investment (CapEx) and operating (OpEx) costs.

Pierre Varnier adds: *"X Lane includes interactive information screens aimed at frequent flyers, automatic systems angled at 45 degrees under the preparation tables, and buffer zones to allow operators more time to make decisions."* Developed as a prototype in April 2024, X Lane is now in the marketing phase and expected to enter operation in a first European airport during the first quarter of 2025.

Toward a reduced environmental footprint

From an environmental viewpoint, innovation in baggage-handling and screening systems also helps to reduce an airport's carbon footprint. *"TG Concept is naturally aligned with the objectives of the VINCI Group, which is targeting a reduction of over 40% in its Scope 1 and 2 emissions by 2030, compared with 2018, but also going further,"* emphasises Pierre Varnier, CEO of TG Concept (VINCI Energies). *"We are activating a number of levers in support of this: encouraging short loops in our choice of suppliers; applying life-cycle analysis (LCA) methods; and prioritising sustainable materials, especially aluminium, which has a higher recycling coefficient than steel. And to orchestrate this approach, the business unit has introduced the role of environmental project manager."*

ENERGY | TRANSFORMATION

TOULON HYÈRES AIRPORT MODERNISES ITS RUNWAY LIGHTING

Toulon Hyères Airport has entrusted Citeos Toulon with the refurbishment of its runway lighting. This large-scale project came with the constraints inherent in working on an airport site.

VINCI Airports has been operating Toulon Hyères Airport under a public service delegation contract since 2015. This is a 25-year concession contract with the French government, represented by the French Civil Aviation Authority and the Armed Forces Ministry (Navy). Toulon Hyères is one of two French airports in mixed civil and military use.

Following on from this contract, VINCI Airports undertook the task of renovating and modernising the site's two runways and light markers. This represents the largest investment in the airport since its construction in 1967, the aim being to add six new destinations: three domestic (Lille, Nantes and Strasbourg) and three international (Antwerp, Geneva and Southampton).

Within the consortium of VINCI business units formed to achieve this, TP Spada (VINCI Construction) was responsible for renovating the runways and gantry systems, and Citeos Toulon (VINCI Energies) refurbished the ground lighting systems.

"Our initial assignment was to manage the entire design phase for the ground lighting and informational light panels for aircraft," says Edouard Mandin, the head of Citeos Toulon. *"We then proceeded to the installation of around 400 ground lighting markers, a dozen indicators, including four PAPIs [precision approach path indicators], around 80 km of cables and connectors, and lastly, redundant loops to guarantee the electrical supply in the event of a blackout."*

Unique constraints in connection with the civil and military airport setting

Unique constraints

The airport site is hardly unfamiliar territory for Citeos Toulon. In 2016, the business unit was brought in to work on ground lighting in the military part of the airport, specifically the helicopter take-off and landing pads. But this new project is on another level, with a contract worth close to €2.5 million, equivalent to half their typical annual turnover.

The teams also had to adapt to some unique constraints in connection with the airport setting. *"A special technique is required for fixing the lights to the ground, due to the high pressure caused by aircraft taking off and landing,"* explains Edouard Mandin. *"It's a similar story with the energy loops, which require specialist surveying and equipment."*

Unique human experience

The business unit manager also highlights how this project yielded a wealth of learning experiences. *"We had to implement a special methodology for the installation of such a huge quantity of cabling. In terms of project management, we had to take special care over the leadership structure and making sure enough people were available throughout the design phase."*

Added to this, the work took place during the Covid-19 pandemic. Edouard Mandin adds: *"The human experience on this project, which at its height had a hundred people on site at the same time, including around 20 from Citeos Toulon, was definitely unusual."*

An environmental performance approach

In addition to the increased number of destinations now available from Toulon Hyères following the work by Citeos Toulon, the corporate aviation business has grown by 20% over the past seven years. This growth occurred alongside an ISO 14001-certified environmental performance strategy that included: the use of electric runway vehicles, electrical vehicle charging points installed for airport users, 100% LED lighting, zero pesticides used in the maintenance of green spaces, and plastics recycling.

INDUSTRY | ACCELERATION

NUCLEAR: OPERATIONAL EFFICIENCY INSIDE REACTORS

The “France 2030” plan has given the nuclear sector a huge boost, accelerating innovation with the emergence of new small nuclear reactors and more training for careers in nuclear. VINCI Energies business units specialised in nuclear energy are closely supporting the sector’s major customers. Christophe Caizergues, the head of nuclear at VINCI Energies, discusses his methods and ambitions.

VINCI Energies business units specialised in nuclear activities are active players in a growing sector. How would you define their mission?

Chistophe Caizergues. VINCI Energies’ nuclear business took shape in 2012 in response to demand from customers wanting a direct contact with expertise in the extremely specialised nuclear sector. Our area of activity covers the entire nuclear value chain: electric power production plants, factories dedicated to the fuel cycle, nuclear waste storage sites, and even research facilities. We work with customers such as EDF, Orano, Framatome, the French national radioactive waste management agency (Andra), and the French Alternative Energies and Atomic Energy Commission (CEA), drawing on VINCI Energies expertise in four main areas: electrical engineering and control systems, nuclear ventilation, mechanical engineering, and non-destructive inspection.

Recently, we created an Operations and Maintenance unit to provide EDF with enhanced expertise for its reactor unit shutdowns.

In June 2023, the French Parliament passed a law to accelerate development in the nuclear sector. What prospects do you see in relation to this?

Ch. C. Thanks to the decentralised organisation of VINCI Energies and the culture of agility epitomised by its business units, its nuclear business has been growing for the past 10 years. We generate revenue of €320 million and employ 2,000 people in 27 business units across the country, close to our customers’ sites.

The prospects opening up in the field of nuclear energy are extremely favourable. Fossil energies are becoming depleted. Solar and wind power are intermittent, non-controllable energy sources, and France has limited hydroelectric capacity.

Under the double effect of the climate crisis and pressure on the energy market exacerbated by the war in Ukraine, nuclear has again become central to the French energy mix strategy, with the government having announced the construction of six new next-generation (EPR2) reactors by 2050 – the first of which are expected to enter service in 2035 – and commissioned studies for another eight reactors. Work is also under way to extend reactor lifespans beyond 40 years.

“We are looking at a massive programme that will mobilise the sector for the next 30 or even 50 years”

In short, we are looking at a massive programme that will mobilise the sector for the next 30 or even 50 years.

How are you preparing for that?

Ch. C. In a short time, the entire sector has pivoted from closing down sites and reducing nuclear electricity production to launching a large-scale rollout programme. To complete all the new projects while supporting the continuing operation of the existing fleet, the sector will need to meet various conditions in terms of human resources, operational efficiency and social values. To tick all these boxes, in 2021, VINCI Energies launched its AVENIR programme to renew and transform the sector.

What does it involve?

Ch. C. AVENIR directly echoes the Excell plan that EDF introduced in 2020, which most organisations have since rolled out internally. We were determined to build a genuine safety culture, providing training to our 400 managers and 2,000 other employees. We also created the position of Performance and Methods Director to oversee the implementation of this programme. Today, we continue to instil this strategy of excellence, training our teams in the methods and processes of continuous improvement.

To cover our entire value chain, we also enrol our suppliers and contractors – who contribute to half our business revenue – in this programme. Supporting our partners is absolutely essential, the more so in this sector that requires the expertise of numerous niche small businesses and where operational efficiency is directly linked to the harmonisation of standards and working methods. And this harmonisation requires significant effort in terms of digitalisation. The constraints of operational efficiency and the French Nuclear Authority’s (ASN) stringent safety requirements generate enormous quantities of records, documents, guidelines and reports. Nuclear is a sector dominated by a strong paperwork culture, and the migration to digital is a minor revolution in itself.

You mentioned human resources... How will you meet the need for skills created by the sector’s recovery and expansion?

Ch. C. The nuclear sector currently employs 220,000 people. It will need another 100,000 in the next 10 years, which is 10,000 new recruits every year, across a wide range of professions (managers, engineers, technicians, assemblers, welders, boilermakers, and so on). This is a huge challenge, with all

of Europe facing a pressurised jobs market and labour shortages. For our part, we will need to recruit between 500 and 1,000 employees in each of the next five years. We currently recruit 380 people a year, so we'll need to double that figure.

Is it not risky to invest so heavily in such a sensitive business sector, even if it is currently enjoying a certain consensus?

Ch. C. France made the choice 50 years ago to invest in a nuclear fleet, which currently numbers 56 reactors of various capacities. This large-scale industrial programme allowed our country to safeguard its energy independence. Nuclear remains by far the safest, cleanest source of mass-produced energy. It very effectively complements renewable sources such as solar and wind.

VINCI Energies is certified "CSR committed" (at Confirmed level) by AFNOR; three-quarters of our nuclear-sector subsidiaries are ISO 19443 certified, and the rest will follow by mid-2025.

I'll say it again: the pivot toward industrialisation in the nuclear sector can only happen if all those involved meet their commitments to excellence, and their social and environmental responsibilities. The challenge is huge, and the whole sector is mobilising in force to meet it.

BUILDINGS PERFORMANCE

A LESS ENERGY-INTENSIVE HVAC SOLUTION FOR RENOVATION PROGRAMMES

VINCI Energies is launching PRIMATICE, a radiant ceiling panel system that uses ventilation air for heating and climate control.

Enhanced comfort, lower energy consumption, and significantly reduced maintenance costs: VINCI Energies is innovating in the field of heating, ventilation and climate control (HVAC) installations, with a new "virtuous" technology designed for use in existing tertiary spaces.

Developed under the PRIMATICE (VINCI Energies Building Solutions) brand, this patented technical renovation solution is based on a system of radiant ceiling panels using ventilation air as the sole energy vector for heating and climate control.

"Damage caused by HVAC systems is usually due to water. We wanted to design a ceiling using air rather than water, along the lines of the GREENFLOOR® technology we introduced for new builds in 2016," explains Guillaume Rabut, Business Project Manager at I.C.Entreprises (a VINCI Energies company specialising in the design, manufacture and installation of thermal, industrial, sanitary and climate engineering solutions), who is leading the project – see box titled "How does it work?"

Custom solution

Energy transition in the tertiary building sector is largely a question of modifying the existing building stock, and this inspired VINCI Energies to develop a technology that would be easy to install as part of a renovation programme. The ceilings can be customised and installed in any spatial configuration, and their slim profile (6 cm in total) maximises ceiling heights.

Above all, the PRIMATICE inertial system ensures energy savings, evenly distributed temperatures, air quality superior to legal standards, and a smaller carbon footprint, because the installation requires no pipework and has a operational life in excess of 50 years.

How does it work?

The PRIMATICE radiant ceiling solution contains phase change material (PCM) in the form of a saline solution able to change its state from liquid to solid and vice versa. By day, excess thermal energy is absorbed when the outside temperature exceeds the melting point of around 20 °C. At night, when the temperature lowers, the solution resolidifies, releasing the accumulated energy.

INDUSTRY | TRANSFORMATION

WHAT IMPACT IS ENVIRONMENTAL TRANSITION HAVING ON JOBS?

The Organisation for Economic Co-operation and Development (OECD) provides some answers to this question in its latest report *OECD Employment Outlook 2024: The Net-Zero Transition and the Labour Market.* According to the report, climate transition is likely to cause major long-term upheaval in employment. Andrea Bassanini, Senior Economist at the OECD and Chief Editor of the report, explains in more detail.

Which sectors will be most powerfully affected by the transition toward carbon neutrality?

Andrea Bassanini. If we focus on the 2050 net zero target, several sectors with intensive greenhouse gas emissions are still a long way off, starting with agriculture, and livestock farming in particular.

And of course, activities that rely heavily on the production and consumption of fossil energies are also on the front line. Heavy industry (metalworking, chemicals, paper, etc.) is the most affected. For this sector, if planned climate policies are kept up, every model calls for job cuts in the order of 14% by 2030, on average.

The alternatives and "green" solutions for powering heavy industry – such as reassigning gas and oil pipelines to the transportation of green energy like hydrogen, or the development of SMRs (mini nuclear reactors) – are not feasible in the medium term, and are often difficult to implement where production sites are located.

Which other sectors are in the firing line?

A.B. Transport is also affected. If the net zero emissions target for 2050 is met, the air transportation and maritime sectors are highly likely to see strong pressures on jobs, because the solutions to help them make the technological leap required to achieve carbon neutrality currently remain hypothetical.

In the automotive industry specifically, the electrification of vehicle stocks points to a reduction in the labour force, because the production process for an electric motor involves fewer tasks than for a thermal engine.

On the other hand, other highly emitting activities such as construction or recycling will probably not see their workforces shrink, as the needs for infrastructure and waste recovery are only going to increase.

What is the current proportion of people working in sectors with high greenhouse gas emissions?

A.B. The sectors with the biggest impact – heavy industry, construction, transport, extractive industry and agriculture – which between them produce 90% of all greenhouse gas emissions, represent just 7% of jobs. The social impact may seem minimal. But the problem is that this impact is concentrated in a handful of sectors and just a few geographical regions, such as Silesia in Poland or the Rust Belt in the USA. The cost of this contraction in employment is actually extremely high. When an entire sector disintegrates, it is difficult to transfer all the jobs affected into other activities. Also, employees in these sectors, often strongly unionised and fairly well paid, after being laid off, have to reconcile themselves to lower incomes for jobs at the same level of qualification.

Conversely, professions buoyed by the ecological transition, which represent 20% of total jobs, such as engineers specialised in renewable energies, and experts in logistics or forest restoration, along with jobs in construction or energy distribution, will only see a sliver of the positive impact from this ecological shift, because the effects on employment will be diluted across many more sectors and professions.

Professions buoyed by the ecological transition represent 20% of total jobs.

How can transition and professional retraining policies mitigate the impact on employees in the sectors most affected by ecological transition?

A.B. These policies play an essential role. With qualified personnel, it is important

to provide support to help them identify business areas in which to pursue their careers. But at the moment, too few public and private stakeholders are anticipating the effects of the policies in place for achieving carbon neutrality or preparing professional retraining. With unqualified personnel, the task is even more challenging, because you need to provide specific training programmes. Often, the training component is managed by a country's ministry of employment, while ecological transition policy is implemented by the ministry for the environment. And there is insufficient coordination between the two.

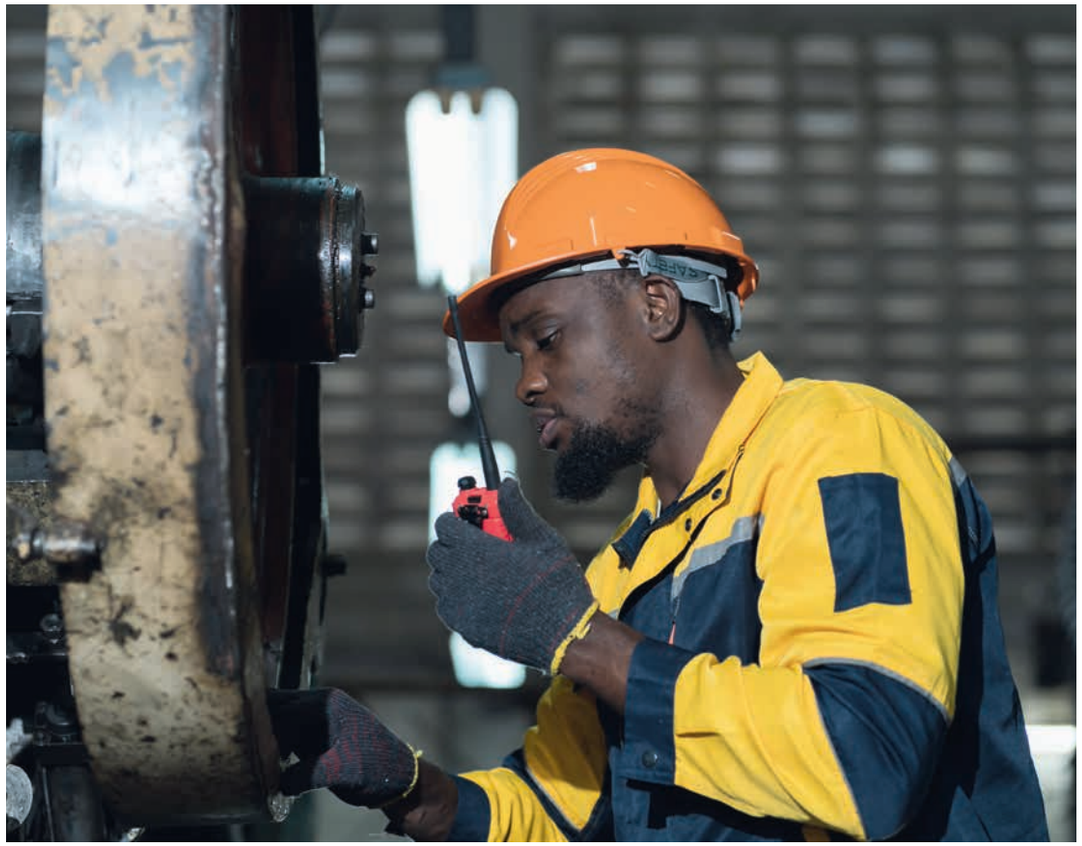
What role should public authorities play in professional retraining?

A.B. There should be more incentives. We could design financial aid systems to compensate the loss of income following retraining linked to ecological transition, like what the United States did with RTAA (Reemployment Trade Adjustment Assistance), created in 1962 and then relaunched in 2009 to cushion the effects of globalisation.

The American experience showed that the cost of these solutions was quickly offset by a reduction in unemployment benefit, reduced investment in social support, and increased tax revenues. Of course, this type of aid must be time-limited, with businesses then stepping up and increasing their new employees' salaries.

Do you think that many countries are sufficiently prepared for this change in the jobs market?

A.B. They all have the means to respond to this change. They know the government policies in place, and therefore, the measures they need to take to achieve the objectives set out in those policies. But that requires big investments. And the effects of whatever they decide to do will only be seen in 10 or 15 years' time. That's a long way off in terms of the political agenda. But the cost of climate inaction is huge, if not ultimately untenable. In purely economic and financial terms, it would be more cost-effective to borrow, for example, to finance this ecological transformation.



ICT TRANSFORMATION

MOBILE COMMUNICATION: MODERNISING THE EUROPEAN RAIL NETWORK

A new communication system based on 5G will revolutionise the use and management of the European rail network from 2035. Axians is positioned to be a key stakeholder, in the role of impartial integrator, in this new ecosystem.

From 2035, the European Future Railway Mobile Communication System (FRMCS-5G) will replace the Global System for Mobile Communications-Railway (GSM-R 2G), which has been in service for more than 20 years. Together with the European Train Control System for signalling, it will be an essential component of the European Rail Traffic Management System (ERTMS) created to modernise the network and facilitate traffic interoperability.

"The FRMCS embodies the future of rail"

Currently in the prototype phase, the FRMCS will capitalise on 5G technology to allow smarter, safer and faster operations. *"The FRMCS embodies the future of rail by facilitating communication between moving trains,"* explains Francesco Abbascià, International Business Development Manager at Axians. *"It's a complete ecosystem incorporating on-board software solutions and everything you need for the railways of the future."*

2035 target

The VINCI Energies ICT brand is positioned to be a key stakeholder in this new ecosystem. The project is both huge (the current GSM R covers 130,000 kilometres in Europe) and urgent, says the Axians expert: *"The GSM R will be completely scrapped from 2035 onward, meaning that any equipment using this standard will no longer be supported. The loss of connection in remote areas is a critical issue for signalling between trains and control centres. It is therefore essential to ensure that everything operates reliably."*

The intention is to introduce a transition period between 2030 and 2035, during which both systems will operate. The FRMCS standard currently being defined is unlikely to be the final version.

Technical and financial challenges

Development of the FRMCS faces two kinds of challenges: technical and financial. *"From a technical point of view, implementing the FRMCS requires greater bandwidth, improved capacities, additional services, and new equipment and infrastructure,"* explains Francesco Abbascià.

"But these new services come at a cost. The shared public and private-sector investment model seems to be a promising avenue for financing this transition," he says, adding that Axians has all the assets to position itself as an impartial integrator in cases like this.

With the GSM-R, a single supplier can provide antennas, base stations, connectivity, etc. *"With the FRMCS, which is far more software-based, it is possible to use equipment from different suppliers. You therefore need to master numerous new areas of expertise, such as cloud computing, data centres, IP networks, MPLS [multiprotocol label switching] and advanced computing."*

New services, new functionalities

The Future Railway Mobile Communication System (FRMCS-5G) considerably expands the range of services and functionality available. This new standard promises to deliver optimised connectivity for passengers, real-time video surveillance, more exact geolocation of trains, and predictive maintenance, by gathering and analysing data in real time. The system also incorporates robust cybersecurity features, which help mitigate the risks associated with cyber threats and safeguard essential rail infrastructure. *"This system will offer smarter, safer and faster travel,"* says Francesco Abbascià, International Business Development Manager at Axians.

ICT TRANSFORMATION

THE INNOVATIVE APP HELPING TO FIGHT DIABETES

In collaboration ith Diabetes League, Axians Belgium developed Zoet Zwanger, a digital tool designed to follow-up women with gestational diabetes after pregnancy.

Pregnancy subjects the body to blood sugar fluctuations, which can contribute to the onset of diabetes. This temporary condition, known as gestational diabetes, can occur in women who are not diabetic or reveal diabetes that had previously gone unnoticed. After giving birth, the diabetes disappears but these women have a higher risk to develop type 2 diabetes.

Gestational diabetes affects around 4,000 women a year in Flanders. In November 2022, Diabetes League, a Belgian non-profit patient organisation for diabetes prevention and support, awarded Axians, the VINCI Energies ICT brand, the contract to design, create and manage an innovative tool to early detect and prevent the development of type 2 diabetes.

In operation since August 2023, the digital solution Zoet Zwanger (lit. "sweetly pregnant") developed by Axians aims to encourage women with gestational diabetes to take the necessary measures to prevent and detect diabetes as soon as possible.

"It is crucial to be aware of risks such as premature labour, pre-eclampsia and high birth weight that can complicate childbirth," advises Arnout Wouters, General Manager at Diabetes League.

Postnatal care and type 2 diabetes

"Zoet Zwanger is a software application that tracks screenings for up to 10 years after childbirth," explains Roel Vermeersch, Business Unit Manager at Axians Belgium. *"This tool encourages women to take a preventive blood test and send their results to the other project stakeholders: healthcare providers and the Zoet Zwanger team."*

The aim of this solution is to improve postnatal care and prevent type 2 diabetes through a simple, user-friendly and secure data collection process.

Roel Vermeersch explains: *"The application is based on a flexible BPM (business process management) solution, which monitors each communication flow, captures the responses and sends automatic reminders. This framework makes it easier to implement future enhancements without complex development work."*

Its advantages include the ability to monitor asynchronous processes involving different people at various stages, record each stage along the way, and show the status of each ongoing process.

Zoet Zwanger now monitors more than 24,000 women.

From cancer to diabetes

Before the Zoet Zwanger project with Diabetes League, Axians was able to build on its experience with the Belgian Centre for Cancer Detection. As Roel Vermeersch, Business Unit Manager at Axians Belgium, explains: *"We've been developing solutions for this customer for 20 years to help them improve the early detection of cancers (of the breast, colon and cervix). We also developed a tool capable of sending every person of the target group in Flanders (1.5 million people every year) a cancer screening recommendation based on their age and sex. The software manages all the follow-up of the results from hospitals and laboratories."*

A multilingual tool with 10-year follow-up

In order to reach the largest number of women, Zoet Zwanger is accessible in several languages: currently Dutch, French and English. *"In the future, Diabetes League hopes to add other languages such as Arabic,"* says the Axians Business Unit Manager.

He emphasises this solution's advantages over conventional methods for gathering data on this type of disease: *"Previously, women had to self-monitor and perform periodic testing over 10 years. Most people tended to forget. Thanks to this application, Diabetes League can remind them better and collect the data in a central database for reporting purposes."* Zoet Zwanger now monitors more than 24,000 women.

ICT PERFORMANCE

AI VERSUS FIRES AND FLOODS

In Portugal, Axians has developed EcoSentinel, a new, highly ambitious solution designed to warn of impending natural disasters such as forest fires and floods.

In Portugal, forest fires are becoming increasingly frequent and intense, often burning thousands of hectares in just a few hours. Flooding in Portugal is also becoming more severe and less predictable. Because of these changes, says Arlindo Ribeiro, Chief Architect Manager at Axians Portugal, *"Our systems for combating climate change urgently need solutions that not only address but can also anticipate these increasingly dramatic events."*

One such solution is EcoSentinel, a new tool the VINCI Energies ICT brand has been developing since 2023. Currently at the POC (proof of concept) stage, this web application is designed to predict the locations and dates of extreme climate events – in this case, forest fires and floods.

AI-assisted prediction

EcoSentinel appears as a dashboard displaying various data linked to these events gathered by weather stations and sensors.

"We are using artificial intelligence and automatic learning for the prediction tasks," explains Arlindo Ribeiro.

"Our technology learns from every fire and refines our modelling. This makes it possible to react more quickly to extreme events, but also to reduce the amount of carbon dioxide released by fires and protect our forests, which are vital for absorbing carbon."

EcoSentinel uses different prediction methodologies depending on whether it is looking at a forest fire or a flood. But the automatic learning models work in the same way. *"We use clustering algorithms to divide the country into geographic zones. Once these zones are defined, we calculate the daily averages of climate indicators in each one, and this data is fed into the pre-trained model.*

Once trained with historical data, the forest fire model is for example capable of predicting a fire based on data from a previously recorded day when the temperature was X, the drought index was Y and the fire index was Z, a combination of parameters that coincided with a forest fire at latitude X and longitude Y in zone A. In the future, if we see the same climate indicators, our model will attempt to predict the fire with the greatest possible precision."

On a global scale

With the project still in development, Axians does not yet have all the data required to maximise the model's precision. It takes time to train the system.

But EcoSentinel is unique, the only solution on the market that attempts to predict the location of a forest fire. Other tools are currently limited to displaying risk attribution maps or predicting the behaviour of forest fires to calculate their spread.

As Arlindo Ribeiro explains, *"One of the objectives of our system is to adapt to different environments and needs on a global scale, whether in regions subject to brush fires, such as Australia, or in zones regularly affected by flooding, such as Southeast Asia."*

As Chief Architect Manager at Axians Portugal, he works closely with Portuguese government agencies (national security agency, forest protection institute, fire-fighting associations, etc.)..

ICT TRANSFORMATION

HOW IS DIGITAL HELPING TO DECARBONISE THE ECONOMY?

Scientific publications seemingly have plenty to say about the environmental footprint of digital services and equipment, but tend to overlook the sector's potential contribution to decarbonising economic activity. A July 2024 study published by France Stratégie (the Prime Minister's assessment and proposals department) offers a number of responses.[1] Anne Faure, Digital Economy Project Lead at France Stratégie, unpacks its contents.

What sparked France Stratégie's interest in the contribution of digital technology to decarbonising the economy?

Anne Faure. The scientific literature is fairly well informed on the emissions caused by the use of digital technology (the ecological impact of the manufacture, use and life cycle of equipment and services). It is estimated that these emissions represent around 2.5% of France's carbon footprint – and 3% worldwide – with projections suggesting a 45% increase between 2020 and 2030.

On the other hand, digital's potential contribution to decarbonisation tends to evade analysis and observation. In this study, we wanted to provide a snapshot of current knowledge levels, acknowledge the issues raised by the sector's contribution to decarbonisation, and highlight the numerous rebound effects complicating the problem. All this should provide fuel for the debate between all the interested parties.

What was your methodological approach?

A.F. The scope and complexity of the topic forced us to make certain choices. There are relatively few digital solutions dedicated to reducing emissions in any sector. Our working hypothesis was that the greatest potential lies in the most energy-intensive sectors, such as energy, building and transport, which are accordingly the most frequently targeted by decarbonisation policies. These sectors are also – by no means coincidentally – particularly closely scrutinised and reported on in the scientific literature.

That is why we chose to concentrate on use cases taken from these different sectors, exploring four digital applications that appeared promising: smart grids, smart household energy management, teleworking, and carpooling.

Let's start with smart grids, or intelligent electricity networks...

In 2017, a study by RTE offered an initial assessment of their impact on the French electricity network. Based on an analysis of four solutions: storage, domestic smart meters, industrial and commercial demand management, and wind production, RTE estimated that smart grid solutions would allow a net emissions saving of approximately 0.8 $MtCO_2$ a year by 2030.

This study is more than seven years old, but there is nothing newer. RTE is working on this and should soon be able to update and clarify certain points. It would be interesting to see more analysis of presumed high-potential applications for which the research lacks reference data, such as smart management of EVCI (electric vehicle charging infrastructure).

"Teleworking will have only a modest effect on reducing emissions."

What were the findings of your study on teleworking?

A.F. Aside from the difficulty of determining precisely what teleworking practices look like now and will in the future – although undoubtedly the most likely hypothesis is that it will stabilise – the key takeaway is that teleworking will only have a modest effect on reducing emissions.

In the best-case scenario – flex-office solutions with a reduction in the office space used – the annual saving amounts to 413 kg CO_2eq.

In the two other scenarios, the median and worst-case, the savings are reduced by some of the rebound effects of teleworking (an increase in journeys other than home-to-work commuting, and increased CO_2 emissions). On this point – and ADEME, among others, is really concerned about this – consumer/user/public behaviour is, and will be, a key factor in how these trends play out.

Through the use cases studied, you describe real but modest potential sources of decarbonisation...

A.F. In its most recent report, published in 2023, the IPCC pointed out that digital technologies could contribute significantly to decarbonisation, but also highlighted the environmental risks inherent in an uncontrolled digital transformation, which could generate steep growth in energy consumption. The use cases we have explored here at French national level also show that the positive effects on emissions levels remain modest compared with what we could legitimately have hoped for in the sectors concerned.

Does that mean the priority must be to minimise the negative impacts of digital?

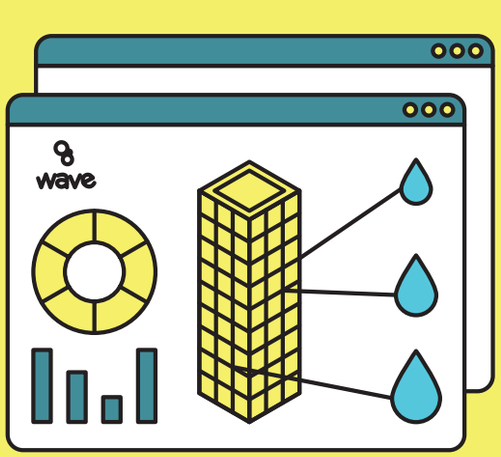
A.F. Yes. But it is important to highlight digital technology's contribution to decarbonisation even more clearly, and as scientifically as possible, because whatever conclusions these analyses end up with, we will absolutely need reliable, reference-based instruments that take account of the complexity of the forces at work and the challenges they bring, to accelerate decarbonisation in line with the French and European Union trajectory, i.e. climate neutrality by 2050.

(1) https://www.strategie.gouv.fr/english-articles/what-contribution-can-digital-technology-bring-decarbonisation

5 SOLUTIONS TO SAVE WATER

Three-quarters of the world's population will feel the effects of drought by 2050. So, what should we do? VINCI Energies has implemented solutions to address the major challenges to more considered and environmentally responsible water management.

1



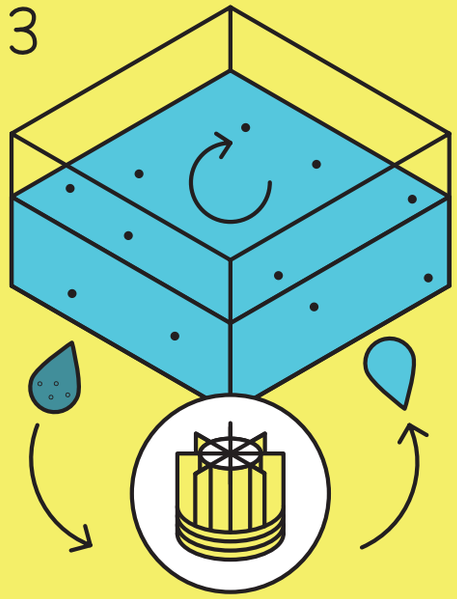
1-**Wave** – a platform for real-time management of energy and water consumption in buildings.

2

2-**Store and reuse** discharged water for cooling steam in industrial boilers.

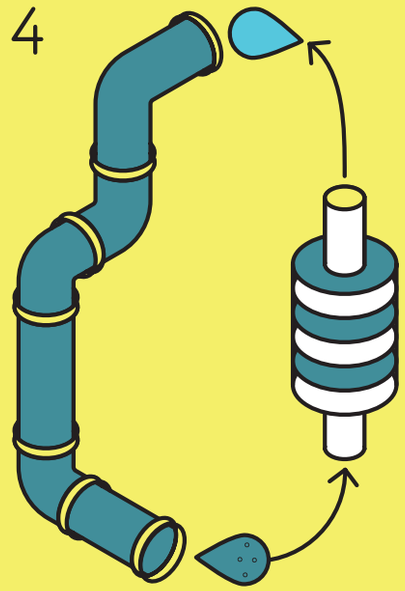
3-**Autonomous dynamic filtration** eliminates the need for drainage and saves 95% of the water.

3



4-**The Skid Filtrage system** can recycle and reuse of pipe rinse water in a closed loop.

4



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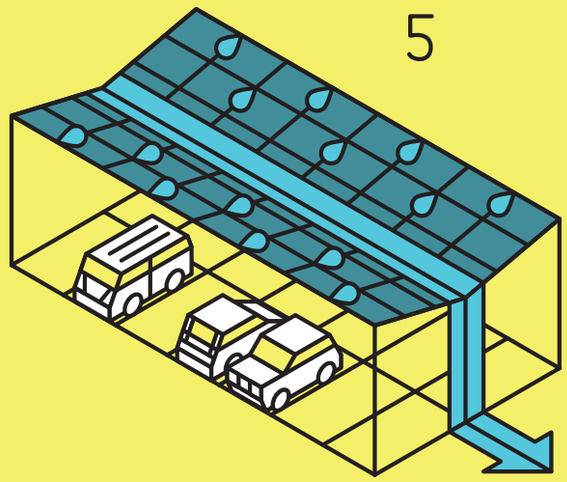

5-**Phot'Eau** captures and distributes rainwater from installations on solar panel canopies.

Watch the animation

ENERGY PERFORMANCE

PROJECT MANAGER AS ORCHESTRA CONDUCTOR

Ansgar Johan Ladstein is a project manager at Omexom Norway. His role sees him managing projects from end to end, with the autonomy and taste for teamwork to match his aspirations.

"The role of project manager is not only essential – it's fascinating!" Ansgar Johan Ladstein has held this position in the HV Power Systems department at Omexom Norway since 2021 and is clearly passionate about his day-to-day work. He manages projects that vary greatly in terms of both scale and content.

"A project manager is like the conductor of an orchestra..." and the VINCI Energies culture makes it possible to *"Reconcile the operational, financial and contractual dimensions of a project while enjoying significant autonomy and broad responsibility."*

At the age of 33, this specialist in renewable energies and electrical engineering recently delivered a contract particularly close to his heart: the installation of 76 electric vehicle charging points and two substations in an Oslo bus depot.

"To reconcile the operational, financial and contractual dimensions of a project while enjoying significant autonomy and broad responsibility"

He explains: *"This was a collective project with five Omexom business units collaborating, but also with a twist, in that there was a strong emphasis on carbon neutrality, so all the equipment used was electrically powered."*

The idea of managing operations sustainably is key for Ansgar Johan Ladstein. This personal interest also prompted him recently to choose, from the many VINCI Energies training programmes available, a course on risk assessment with a focus on environmental risk.

ICT INNOVATION

A WORK-STUDY STUDENT ON COURSE FOR SUCCESS

Katrin Orth has made a success of both work and study. During just over two years at Axians in Portugal and then Germany, where she is working on innovation and technology management, Katrin has relished her role as a student in the corporate world.

As a child at school, Katrin Orth dreamed of becoming a reporter and making documentaries in order to *"Understand and help others understand"*. The young student from Rhineland-Palatinate in Germany ended up following a different path, studying Engineering and Management at the Mannheim University of Applied Sciences. But the ambition was the same: *"I chose this path because I was good at maths. Maths gave me the tools to gain a clearer understanding of complex things."*

Now aged 27, Katrin Orth is studying for her Master's degree while simultaneously managing digitalisation and technological innovation projects at Axians in Mannheim. She is working at Axians Neo, who develops and sells a solution for digital planning for the rollout and management of mobile field operations, and for SAP-based maintenance.

More than two years after her arrival at VINCI Energies, Katrin Orth has the same enthusiasm as in the very earliest days. *"I love the diversity of the projects we work on at VINCI Energies. We've covered everything from problems in connection with high-voltage lines and electric vehicle charging points to AI and digital twins, via airports and the Athletes' Village for Paris 2024. I work on something different every day – it's never the same product. You never get bored and it's so rewarding to be working on enhancing people's life and work through technology."*

> *"I work on something different every day – you never get bored!"*

DATA ACT: WHAT ARE ITS IMPLICATIONS FOR TERTIARY BUILDINGS?

The Data Act, which comes into force in September 2025, will bring significant changes to the production, use and value of data in the European Union. Businesses and professionals in the building sector will play a key role in these transformations.

Published in January 2024, the Data Act creates a framework within the European Union for openness and sharing of data generated in every economic sector, and industrial sectors in particular. The European lawmakers' intent is clearly stated: to stimulate the development of a competitive and fair market for data and so encourage the creation of innovative services.

It will also facilitate user access to generated data, allow public bodies to use data held in the private sector, and offer protection against unreasonable data sharing contracts and illegal access or transfer requests by authorities in other countries for non-personal data held in the EU.

Although the Data Act does not come into force until 11 September 2025, it will certainly bring significant changes to the production, use and value of data.

A key role in the transformations

Businesses and professionals in the building sector will play a key role in these transformations. Regulations governing energy efficiency will encourage buildings to install more sensors and connected objects to precisely monitor and manage their various energy-consuming devices. From 1 January 2025, the BACS (Building Automation and Control Systems) decree, in line with the so-called "tertiary decree", makes it mandatory to install a building automation system (BAS) in any building that uses more than 290 kW of power.

The increasing power of BAS solutions reflects the increased volume of building data to be produced and processed in the future. The proliferation of IoT systems performing various functions in offices and the systematic installation of electric vehicle charging infrastructure (EVCI) around and inside tertiary buildings are contributing to this burgeoning digitalisation of buildings.

Bringing stakeholders together

The use of data from digital systems in buildings will be a crucial concern for the asset managers of the future. But not only for them, because a key feature of the tertiary building sector is that stakeholders work closely together – property managers, tenants, maintenance providers, etc. – all of whom are affected by the spirit and letter of the Data Act.

The Data Act opens up a vast space for discussion about what data governance should look like.

By establishing the right in principle to access, use and reuse data, the Data Act reopens the question of who owns data and opens up a vast space for discussion about what data governance should look like. And this cannot neglect the crucial issue of cybersecurity. The explosion of data will not only affect the function, use and value of buildings – it will make them increasingly vulnerable, exposed to the double risk of internal negligence in digital hygiene and the external threat from cyber attackers.

Together at one table

There is therefore a pressing need to bring all building stakeholders together at one table to discuss governance, cybersecurity, sovereignty, sharing, data transparency, etc. Who does what? Who is responsible in the event of a cyber attack? Is the risk covered, and by what type of insurance (cyber or professional indemnity)? How can asset managers create a building-by-building map of their cyber risk? And for their entire portfolio? What budget should be allocated to data management and protection? Who pays?

VINCI Energies has a central role in the issues raised by the Data Act. We must, along with all stakeholders in the real estate value chain, take command of this situation, to drive the debate, ensure that our assets are robust and develop our industry.

Michael Sigda,
Business Development Director at VINCI Energies Building Solutions

DECARBONISATION "AS A SERVICE" – A LEVER FOR ACCELERATING THE ENERGY TRANSITION

The switch from fossil fuels to renewables requires significant investment, which can be difficult to justify using existing economic models. Decarbonisation "as a Service" offers an innovative and agile solution for businesses.

Manufacturing businesses face major challenges in the current context of ecological transition. To phase out highly carbon-emitting fossil energies, which still represent over 80% of the worldwide energy mix,[1] will require a radical transformation.

Methods already exist for decarbonising the economy, and industry in particular: electrification, use of renewable and low-carbon energies, heat pumps, clean energy storage, etc. But the challenges that industry must address if it is to make this transition are many and complex.

The many challenges of energy transition

The first challenge concerns the difficult balance between competitiveness and sustainability. The pressure to reduce greenhouse gas emissions while maintaining profitability is intense.

The need for large-scale investment is another major issue. Decarbonisation and the adoption of renewable energies tend to require very large capital investments (CAPEX). These investments may be needed to purchase new technologies, modernise existing infrastructure, or train personnel.

The third challenge to overcome involves the financial risks inherent in this energy transition. Significant investment spending may represent a financial risk to businesses, especially if the expected benefits are not reaped quickly. Businesses also have to manage their operational costs (OPEX) in connection with maintaining and operating the new technologies.

Lastly, manufacturers face increasingly stringent regulatory and social pressures pushing them to comply with new environmental standards. There is also growing pressure from consumers and investors for businesses to adopt more sustainable practices.

DaaS – an outsourced and flexible service

In these circumstances, Decarbonisation "as a Service", which allows the purchase of low-carbon energy services from a partner without having to financially support investment in the required infrastructure, is an innovative and tempting solution for many businesses.

This outsourced service model offers a flexible and efficient way to achieve sustainability targets.

DaaS operates in partnership with specialist providers of customised decarbonisation services, such as Greendeed, which offers an on-demand service called EaaS (Energy as a Service) to enable customers to accelerate their energy transition without having to draw on their CAPEX (investment spending).

This allows them to benefit from the advantages of new technical solutions and respond to constantly changing regulations. There are numerous advantages, since the service becomes a cost that can be completely deconsolidated in the company's accounts and thus reduce their tax burden while maintaining greater borrowing capacity for expanding their core business.

This type of solution begins with expert analysis of a company's specific decarbonisation needs and the creation of a bespoke plan to maximise effectiveness and minimise costs.

The technologies and solutions required are then deployed by the service provider. These may include energy management systems, carbon capture technologies and renewable energy sources. Lastly, performance is continuously monitored and improved, optimising processes to ensure sustainable results. Regular progress reports are provided so that strategies can be adjusted as necessary.

Substantial benefits for businesses

The adoption of DaaS offers numerous benefits. A business may significantly reduce its greenhouse gas emissions with no significant up-front investment. This helps it achieve sustainability targets and comply with environmental regulations.

Another considerable benefit lies in gaining access to advanced technologies with the expertise and cutting-edge solutions offered by DaaS providers, which can be difficult to implement internally.

DaaS offers flexibility, allowing businesses to adapt services to their changing needs. Solutions can be scalable, enabling growth with no major constraints.

The ability to adapt is the key to success

While DaaS offers numerous benefits, there are other issues that manufacturers must address once they have adopted this solution.

The integration of new technologies may require organisational changes and training. Resistance to change can be another obstacle that takes some effort to overcome. In addition, while the initial investments are reduced, operating costs may still be significant. It is important to plan carefully and budget for these costs to avoid any financial surprises.

One final point to consider is the changing market. The market for decarbonisation is evolving rapidly with new technologies and regulations. Businesses therefore need to remain well-informed and responsive if they are to take full advantage of DaaS.

Ultimately, Decarbonisation as a Service represents a viable, effective solution for businesses seeking to reduce their carbon footprint. By lightening the financial and technological burden that this transition can impose, DaaS enables them to remain focused on their business model while subcontracting the energy dimension to a specialist, just as digital infrastructure can be subcontracted to a cloud service provider.

(1) *Statistical Review of World Energy (2024, 73rd edition). Energy Institute*

Ali Hamdan,
Environment Market Manager at Actemium

CEGELEC LAUNCHES TEST BENCHES

From their respective sites in Lampoldshausen, Germany, and Vernon, France, Deutsches Zentrum für Luft- und Raumfahrt and Ariane Group are preparing and building test benches for the European Space Agency's rocket engines. The two expert providers are supported in these complex and highly technical operations by Cegelec IMCS (VINCI Energies).

The launch phase is fully automated, because the necessary commands have to be sent with speed and precision beyond the abilities of a human being. To perform all these operations, Cegelec IMCS developed a measurement and command system, the MCS2000, tailored specifically to the rollout of critical real-time testing applications, a context in which robust and reliable tools and systems are crucial.

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Publisher
VINCI Energies SA
2169, boulevard de la Défense
CS 90274
92741 Nanterre Cedex

Printing
Impression & Brochage Snel
rue Fond des Fourches 21
Z.I. des Hauts-Sarts - zone 3
B-4041 Vottem - Liège (Belgique)

Director of publication
Sabrina Thibault

Editor in chief
Roseline Mouillefarine

Design and production
Clarisse de Martène

Date of legal deposit
Avril 2017

ISSN
2554-019X

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