

CLEAN ENERGY

More than 1.3 billion euros, a record investment in renewables

HOW IT WORKS

The evolution of machinery that's ever more autonomous



N.69 OCTOBER 2018

HIGH-SPEED RAIL

NEXT STOP: THE WORLD

Discover
the new
Ribera
del Duero



Almudena Alberca MW
First Spanish female Master of Wine
Technical Director Bodegas Viña Mayor.

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and different wine, reinterpreting the Ribera del Duero since the respect for our roots
and seeking the maximum expression of our land.

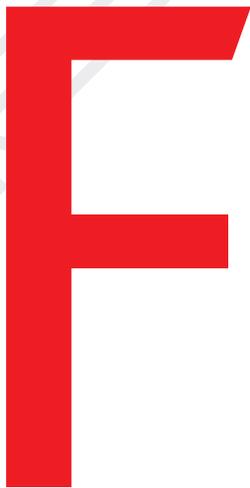

VIÑA MAYOR

VERY RIBERA. VERY DIFFERENT.

Bodegas y Viñedos Viña Mayor. Carretera de Valladolid a Soria, Km 325.6, 47350 - Quintanilla de Onésimo, Valladolid.

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A HIGH-SPEED WORLD



lying on track toward the transition to renewable energy and the evolution of new mobility models. This is the destination of rapidly expanding high-speed rail travel. Half the world is opting for it. In a few decades' time, the global network of high-speed railway lines will have doubled in consolidated and emerging economies. And in little more than five years, two-thirds of the Spanish population will be connected by high-speed rail links.

Why is this, when it demands tracks, tunnels and viaducts that are substantially more costly and complex than conventional railways? The reason is a combination of sustainability, safety and energy efficiency that cannot be matched by other means of transport. And because cities along the high-speed networks stimulate their development with the free-flowing exchange of people, goods and business.

ACCIONA maintains its leadership in the sector with more than three decades of experience. The company plans and builds strategic infrastructure in Spain and Norway and contributes engineering expertise, developing its own, unique in-house techniques on international projects in Croatia, Bulgaria, Brazil, Philippines and Costa Rica. This same commitment to sustainability and decarbonization is reflect-

ed in the unprecedented amount and scope of our global investment in renewable energy sources.

For example, in key markets like Australia, as the new Director General of ACCIONA Energy in the lucky country explains. We also take a look at the commitment to technological innovation in infrastructure digitalization and remote control of machinery with surgical precision.

Plus the most important commitment, our commitment to human beings: we support the exciting experience of the What Really Matters Foundation, which promotes the dissemination of eternal values (love, effort, responsibility, honesty, to name a few) among young people across half the world. It is proof of our faith in the future of the planet. Our best investment. ■

“ Cities along the high-speed networks stimulate their development with the free-flowing exchange of people, goods and business ”



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IN NUMBERS
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A project

spanning five centuries that has become a reality. Water from the Pyrenees for the arid regions in the south of Navarre and Aragón. The Bardenas Canal.

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132.1%. New contracts: construction of a large desalination plant in Saudi Arabia and supply of 100% renewable energy to Latam Airlines and Adif.

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CLEAN ENERGY
RECORD INVESTMENT
Over 1.3 billion euros

invested by the Group in wind and photovoltaic technologies in countries on four continents.

INTERVIEW

“AUSTRALIA IS AN OPPORTUNITY FOR US TO BECOME GLOBAL LEADERS IN RENEWABLE ENERGY”

The lucky country is on the other side of the globe, but very close to the Group's heart. ACCIONA Energy's new Managing Director in Australia, Brett Wickham, gives his assessment of a market that's particularly open to changing its energy model... and its mindset.



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INFRASTRUCTURE FAST, EFFICIENT, GROWING AND CLEAN: HIGH- SPEED RAIL

Immense turning radii, wider tunnels, higher and more extensive viaducts. Why should we have such expensive and complex infrastructure? Because high-speed rail drives urban, economic and social development.



A 100-ton bulldozer seems to be working on its own, but it has a driver. It's being operated, however, from a distance of 9,000 kilometers. ACCIONA's machinery is becoming more and more autonomous.

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Familiar, the mobile app that looks after the physical and emotional wellbeing of the elderly.

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MOTOR

The Ecopowered rally car makes its mark at the Tatts Finke Desert Race.



EXPERTS IN DESIGNING A BETTER PLANET

Infrastructure that encourages progress, water management to ensure access to clean and reliable resources and renewable energy aimed at reducing CO₂ emissions.

At ACCIONA we believe there is a different way of doing business.

Find out more at invest-intheplanet.com

#InvestInThePlanet



BUSINESS AS UNUSUAL



ALLIES OF THE SUSTAINABLE DEVELOPMENT GOALS

ACCIONA CONTRIBUTES TO...

...achieving the 2030 Sustainable Development Goals (SDGs), a global initiative developed by the United Nations to end extreme poverty, fight inequality and injustice and combat climate change. It furthers these goals through its leadership role as a business.

Direct contribution to 4 SDGs through its lines of business:

ODS



The company has purified, treated and desalinated water for more than **100** million people across the world.

ODS



Investment of at least \$ **2.15** Bln in the development of renewable technologies by 2020. ACCIONA produces clean and emission-free energy for the equivalent of **6 million** homes.

ODS



The Company provides innovative solutions that meet the growing demand for infrastructure, access to water and energy, among other things. It has an innovation over sales figure of € **209.4** M

ODS



The company has been carbon-neutral since 2016. Through the production of **100 %** renewable energy, it has avoided the emission of **14.4** million tons of CO₂

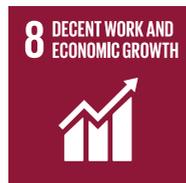
More contributions to the SDGs via the 2020 Sustainability Master Plan

ODS



30% of the total workforce are women. And more than **27%** on the Board of Administration.

ODS



It has achieved a reduction in the accident frequency rate for employees and contractors, cutting it from **3** to **2.7**

ODS



94% of suppliers are local.

ODS



Ethics and integrity the foundation for management with:
Code of Conduct and Policy Book. Sustainability risk management. Respect for and protection of Human Rights.

ODS



Presence in international organizations such as:
United Nations Global Compact, Corporate Leaders Group (CLG), World Business Council for Sustainable Development (WBCSD), World Economic Forum and Alliance of CEO Climate Leaders, among others.



**ENTRECANALES
Y TAVORA S.A.**

OBRAS Y PROYECTOS

WATER FOR THE DESERT

THE BARDENAS CANAL, A HISTORIC PROJECT BRINGING THE TWO SPAINS TOGETHER

by Patricia Alcorta

We're not talking politics here, we're referring to the dry Spain and the wet Spain. In fact, the current Bardenas channel, which takes water from the Aragon river in the Pyrenees all the way through the desert down to the south of Navarre and the Aragonese region of Cinco Villas, is a recurring dream in irrigation terms. Once a dream of Ferdinand the Catholic King, the project was picked up by his Hapsburg descendants in the 17th century and then by the Bourbons in the 18th and 19th centuries. It continued to make slow progress until it was given a boost in the 20th century after intervention by Entrecanales y Tàvora. The evolution of water supply infrastructure reflects the evolution of human endeavor, from the time that drops of sweat were first invested in exchange for drops of water. You can see it in this picture from 1957: wagons driven by muscle power alone, those sandals made from tire rubber, the electricity poles that look like a prayer procession begging for rain. ■

FINANCIAL RESULTS FOR THE FIRST HALF OF 2018

NET PROFIT RISES BY 132.1%

€ **618** MILLION EBITDA (+ 6.7%) | € **3.53**_{BN} REVENUE (+4.1%)

Net attributable profit rose to 186 million euros in the first half of the year, spurred by a growth in activity and capital gains from the divestment of Trasmediterranea and solar thermal power plants in Spain. Excluding these gains, ordinary net profit amounted to 100 million euros (+25.6%). In the same period, earnings before interest, tax,

depreciation and amortization (EBITDA) rose by 6.7% to 618 million due to the combined effect of growth in Energy (+6.7%) and Infrastructure (+8.3).

Revenues totalled €3.53 billion (+4.1%) and net debt amounted to 4.61 billion, 11.7% less than in 2017, while gross investment rose to 254 million euros.



CLEAN ENERGY FOR TWO ADIF RAILWAY LINES

ADIF (Administrador de Infraestructuras Ferroviarias) has awarded ACCIONA Green Energy Developments the contract to supply 100% certified renewable energy to the Madrid-North and Medina de Campo-Basque Country suburban rail networks in 2019 and 2020, with an estimated consumption of 271.4 million kWh per year and associated revenues of 47.3 million euros.



WATER FOR 350,000 PEOPLE A DAY
CONSTRUCTION OF
A LARGE DESALINATION
PLANT IN SAUDI ARABIA

The plant, to be called Al Khobar, will be located in Dhahran on the west coast, roughly 400 kilometers from the capital. It will be one of the largest in the country with a capacity of 210,000 m³ per day, enough to meet the needs of some 350,000 people and to provide services to Aramco, the world's biggest oil company. ACCIONA Agua submitted the most competitive bid for the contract put out to tender by Saline Water Conversion Corporation (SWCC), the public company tasked with transforming and modernizing the water sector in Saudi Arabia. The turnkey contract entails an investment of over 200 million dollars and is the first of this sort awarded to a Spanish company by SWCC.



100% RENEWABLE
SUPPLY FOR LATAM
AIRLINES IN CHILE

ACCIONA has signed a contract with LATAM Airlines Group to supply 100% renewable electricity to the airline's main facilities in Arturo Merino Benitez Airport in Santiago de Chile: its corporate building and the operations and maintenance base of its air fleet. This supply will cover 80% of LATAM's consumption in Chile and will avoid the emission of 5,850 tons of CO₂ per year, equal to the cleaning effect on the air of almost 300,000 trees.

LEADERS IN WORKPLACE
DIVERSITY AND INCLUSION

The Thomson Reuters Diversity & Inclusion Index ranks ACCIONA among the top 10 companies in the world for diversity and social inclusion, due to its creation of work environments that reflect the increasingly open, diverse and plural nature of the communities it operates in.

CUT GREENHOUSE
GASES BY 16%

One more step in ACCIONA's fight against climate change: the commitment to cut its greenhouse gas emissions by 16% by 2030, a target that has been validated by the Science Based Targets (SBT) initiative. ACCIONA is the first Spanish utility to join this global initiative that promotes decarbonization of the economy. The commitment is in line with the aim of its 2020 Sustainability Master Plan and its adoption of the Paris Agreement.

ACCIONA rolls out an unprecedented investment in wind and photovoltaic technology: more than 1.3 billion euros.

THE FUTURE OF SUN AND WIND

WIND AND SOLAR TECHNOLOGY ARE LEADING THE MOVE TOWARDS A SUSTAINABLE ENERGY SYSTEM AND BY 2050 THEY ARE EXPECTED TO ACCOUNT FOR CLOSE TO HALF THE WORLD'S ELECTRICITY SUPPLY. ACCIONA ENERGÍA IS CONCENTRATING ITS INVESTMENT ON BOTH TYPES OF INFRASTRUCTURE IN ORDER TO BE A KEY PART OF THE ENERGY MIX IN THE FUTURE.


by **Santiago Gómez López**

NOBODY DOUBTS THAT RENEWABLES ARE KEY TO THE DECARBONIZATION OF THE ENERGY SUPPLY SYSTEM

And to the economy as well. But not everyone is moving at the same pace in the race towards clean energy: wind and photovoltaic are proving to be the most efficient and profitable forms of technology for gradually replacing the old coal-fired power plants.

For every new megawatt installed in coal or gas fired plants last year across the world, two renewable megawatts were connected. In terms of total figures, there were 70 fossil gigawatts (GW) compared to 157 renewable (not counting large-scale hydropower), mostly photovoltaic (98 GW) and wind (52 GW).

In 2017, for the second consecutive year, implementation of photovoltaic solar power exceeded net growth in the combined capacity of coal, gas and nuclear, illustrative of the spectacular development spurred on mainly by China, a giant that accounts for half the photovoltaic power added last year and 45% of the close to 280 billion dollars invested in renewable technology across the world.

The figures disprove the myth that renewable energy is a luxury that only the wealthy can afford. In fact, 63% of that enormous investment came from developing countries (more than



Construction of the photovoltaic plant in Puerto Libertad, Mexico. It will be fully operational in the first quarter of 2019.



8 LAUNCH PADS

The main factors driving global renewable deployment:

1 Falling costs

Between 2010 and 2016 the costs of generating photovoltaic solar power fell by 70% and wind power by 25%. And they are expected to drop further: by an additional 66% and 47% by 2040.

2 Improvements to efficiency

Wind turbines that are more powerful, taller and have blades with a larger rotor diameter and more efficient photovoltaic modules contribute to reducing energy costs.

3 Corporate energy purchasing

Long-term renewable energy power purchase agreements (PPA) with companies like Google, Apple and Amazon rose by 26% in 2017 and combine sustainability with profitability.

4 Electrification

Electricity, which at present accounts for 19% of final global energy consumption, should reach 27% by 2040 to meet the International Energy Agency's most sustainable scenario.

5 Climate change

In the 2015 Paris Agreement, 195 undertook to limit the increase in the temperature of the planet during the 21st century to below 2 degrees Celsius. Achieving this requires a massive renewable energy rollout.

6 Energy security

Renewable energy sources reduce energy imports and dependence on supplier countries. In Spain, they prevented fossil fuel imports to the value of close to 6 billion euros in 2016 alone.

7 Employment and local development

More than 10 million people work in the renewable energy sector. According to the International Labor Organization (ILO) the energy transition will create 24 million jobs by 2030, four times more than will be destroyed by the same process.

8 Atmospheric pollution

The World Health Organization (WHO) estimates that seven million deaths are caused by atmospheric pollution each year.





50% alone from China, India and Brazil), whose investment in the sector has exceeded that of other developing countries since 2015. They are followed by Europe and the USA, with close to 15% each. However, developed countries maintain their leading position in innovation. Of the nearly 10 billion dollars invested in R&D, Europe earmarked 2.2, followed by 2.1 billion by the USA and 2 billion by China.

FORECASTS UP TO 2050

Leading forecast analyses agree that the sustained growth of renewable energy led by solar and wind power will be maintained in the long term. The Bloomberg New Energy Finance (BNEF) forecast, one of the most renowned, expects the global electricity demand to rise by 57% by 2050, and to be met largely by clean energy sources. That year, wind and photovoltaic power alone will account for 48% of total production (compared to the current 5%).

This progress will mobilize enormous investment in new electrical power capacity that BNEF estimates at 11.5 billion dollars, with 73% going to solar and wind. Twenty years earlier, by 2030, wind and solar photovoltaic power will be cheaper than many coal-fired plants, which will speed up the development of renewable energy sources and the decline of this kind of fossil fuel power generation, which still today produces 37% of the planet's electricity. Only 35% of the new coal-fired plants currently planned will actually be built. In other words, projects equivalent to 369 GW will be cancelled.

"It's starting to make less economic sense to build new coal or gas-fired plants," says Elena Giannakopoulou, Head of Energy Economics at BNEF, in view of the dramatic drop in the costs of wind, photovoltaic and battery storage power.

According to BNEF analysts, gas will go from supplying 22% of the world's electricity to 17% by the middle of the century, and will be increasingly linked to making the electricity system flexible and enabling it to adapt to the growing penetration of wind and solar energy sources. ■

ACCIONA ENERGY: UNPRECEDENTED INVESTMENT AND PARITY FOR NEW WIND AND SOLAR PROJECTS

1,320 MW, eight projects, seven countries, four continents and an investment of 1.3 billion euros, with a nearly equal split between wind and photovoltaic projects. ACCIONA is building and completing five wind farms that total 673 MW, and three photovoltaic complexes that add up to 647 MWp. Wind power has historically been the focus of ACCIONA's work in renewable energy technology. It accounts for more than 80% of its cumulative capacity and the company is still firmly committed to it, but it has been complemented by a strong push towards photovoltaics in recent years.

In 2013, ACCIONA generated a total of 7,139 MW from company-owned wind farms and only 49 MWp from photovoltaic installations. At the close of 2019, it will produce close to 8,000 MW of wind power and 1,036 MWp of photovoltaic power.

As for construction projects in 2018, Mexico stands out with 587 MW, putting the country second in terms of ACCIONA's renewable energy implementation. Mexico will have doubled its power by 2019, reaching 1,143 MW. The list includes projects in chief countries like Chile, Australia and the US, the renovation of a farm in Spain, and installations in two new markets: Egypt and the Ukraine. ■

ACCIONA-OWNED RENEWABLE FACILITIES UNDER CONSTRUCTION IN 2018

Technology	Facility	Country	Power (1)	Launch Date
Wind	El Cortijo	Mexico	183	3rd quarter
Wind	Mount Gellibrand	Australia	132	2nd half of 2018
Wind	El Cabrito	Spain	30	End of 2018
Wind	San Gabriel	Chile	183	End of 2019
Wind	Palmas Altas	USA	145	End of 2019

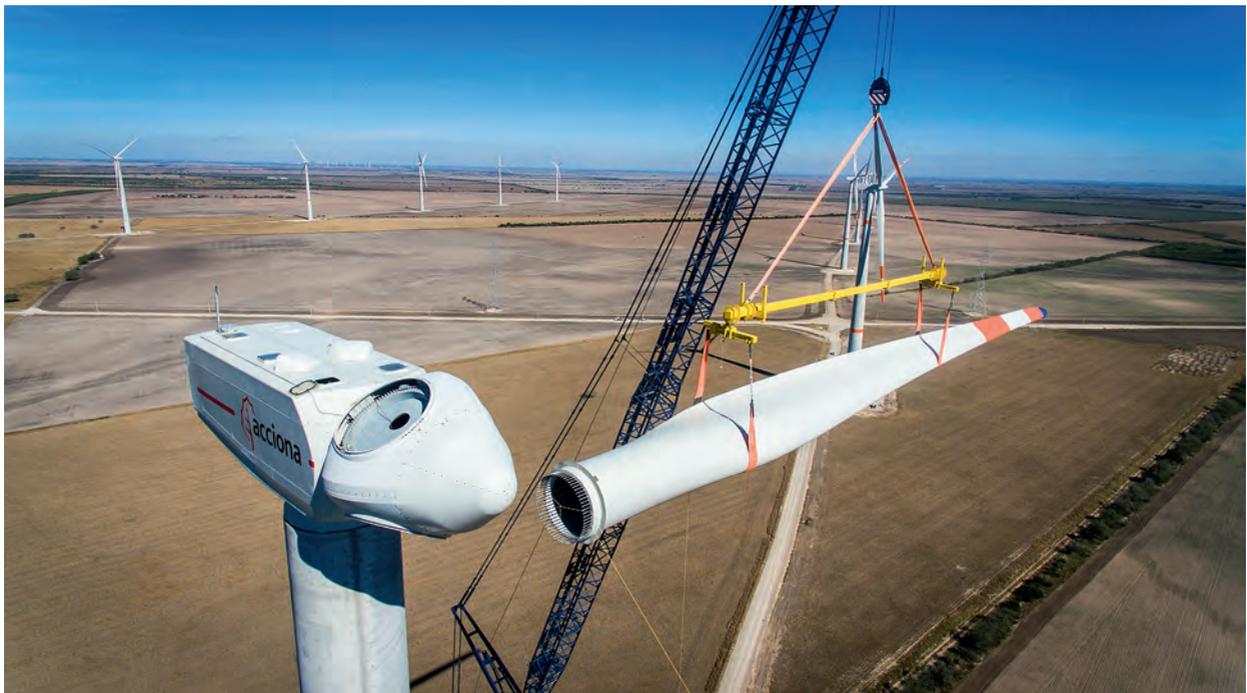
Total wind 673

Photovoltaic	Puerto Libertad	Mexico	404	1st quarter, 2019
Photovoltaic	Benban	Egypt	186	1st quarter, 2019
Photovoltaic	Dymerka	Ukraine	57	2nd quarter, 2019

Total photovoltaic 647

Total renewable 1,320

(1) Wind power capacity in MW; Photovoltaic capacity in MWp..



BRETT WICKHAM
MANAGING DIRECTOR OF ACCIONA ENERGY IN AUSTRALIA



Brett Wickham, an engineer with international experience in the energy sector, joined ACCIONA in 2006.

A large, white, stylized opening quotation mark on the left side of the page.

Australia is an opportunity

by **Juan Pablo Zurdo** photos **Lizzie Halloran**

for us to become
global leaders
in renewable
energy”

TS CONSIDERABLE SIZE, VAST SOLAR...

... and wind resources and numerous business opportunities make it “the lucky country”.

For ACCIONA Energy, Australia and Spain are complete opposites—but only geographically. In fact, Australia is drawing nearer by the day; it is an international market with one of the best prospects for expansion, showing tangible results like the recently inaugurated Mount Gellibrand wind farm or the recently-awarded Mortlake South wind farm project, which will increase the company’s renewable power capacity in the country 36% by 2020. Brett Wickham, ACCIONA’s new managing director, explains the company’s development objectives in a global context that favors the transition to renewable energy. Public institutions, increasingly more companies and society in general see this evolution towards clean energy as a one-way street. Wickham’s profile is up to par with the challenge: he is an engineer from regional Victoria and the father of three children. Being an Australian himself, he is an expert in the local market and, due to his direct experience in management and energy engineering (20 years working for the Royal Australian Navy and 12 in ACCIONA, among others), he is also an expert in the global arena, having resided across three continents, living in Australia, South Africa and Spain.

Australia is known as “the lucky country”. Besides its considerable natural resources, what are the other reasons for this?

It is an open and democratic society with a stable system of government, and it has a strong economy for its size and low sovereign risk. In addition, the country’s agriculture, education, tourism and financial services contribute a lot to its prosperity.

It also seems lucky due to its location in one of the most prosperous areas on the planet...

That’s true; the Asia-Pacific region offers a lot of opportunities. Its economic development, population growth and varying degrees of industrialization suggest a growing need for cleaner energy. As a global company with vast experience in international markets, I believe the conditions are ripe to expand our business, and Australia is certainly a good place to start.

What is the main thing you have learned from your own international experience?

Meeting new people and being exposed to a variety of cultures has been wonderful for both me and my family, and I have learned that, despite these different contexts, the issues are the same wherever you work. Creating great teams, setting common goals, celebrating victories and acknowledging defeats; I have experienced these things in a similar way all over the world. I have worked in many countries but always with the aim of improving the planet for future generations, and that is a great common thread.

Why is Australia a strategic market for ACCIONA?

Because of its stability, its size, and its solar and wind resources—which are not just confined to a single area. It is a vast country that seems tailor-made for renewable energy assets. We have available space for wind and solar farms, robust regulatory and planning processes, and a pool of skilled labor to build new facilities. This means that we can be confident in investing in Australia: it is a low-risk environment with the potential for very encouraging long-term revenue streams.

And what are the challenges of competing in a sector that is so open to foreign investment?



15

COUNTRIES
THROUGHOUT
5 CONTINENTS:
ACCIONA ENERGY'S
GLOBAL PRESENCE

750

million dollars
in Australian
assets and
230 million in
construction

500

MW: AUSTRALIA'S
TARGET FOR
2020, DOUBLE
ITS CURRENT
CAPACITY

TECHNOLOGICAL GROWTH

The wind and photovoltaic projects in Australia reflect the rapid technological growth in the company and the sector; for example, the installation of turbines with an unprecedented capacity.

“The recently completed Mount Gellibrand wind farm in Victoria has deployed 44, 3MW turbines for a total of 132 MW. They are twice the capacity of the turbines at our Waubra wind farm, which is a decade old, and this shows just how technological progress can improve productivity while decreasing visible impact and construction costs. Our next phase will be a 4.5 MW turbine,” explains Brett Wickham.

“We’re also ensuring that all new projects have the potential to include energy storage, which is a key development for managing electricity production and offering greater flexibility for both ourselves and our customers.”

There are always challenges, but that’s business. Investment in the renewables sector is rising again after several difficult years due to some uncertain policies. ACCIONA is in a strong position though. Our first Australian wind farm has been operational for over a decade, and we have maintained our business presence through good times and bad. Our customers want to see long-term investment, reliability and experience, and that’s what we can demonstrate.

What are the economic and social benefits involved in transitioning to renewable energy?

Renewables are becoming more and more competitive. Currently, the cheapest source of MWh in Australia is either wind or solar PV. In addition, storage prices are lowering, the growth of renewables is increasing, and the transition away from fossil fuels in the energy sector is speeding up. Australian households and businesses are currently suffering from very high electricity prices, but over time the transition to renewables should help lower them. Let’s not forget that the construction and operation of wind and solar farms creates skilled jobs, often in outlying areas where they are most needed. And



Long-term investment, flexibility and experience. That’s what we can demonstrate





Solar and wind farms
create skilled jobs, often in
outlying areas where they
are most needed



MORE PERSONAL

Your favorite hobby...

I really enjoy cooking and eating meals with friends as a way of relaxing after work.

Your trick for handling pressure...

I think the answer comes with experience, but my trick is understanding that pressure is an internal choice. When you are facing a problem, it remains the same with or without the pressure you add to it.

What you most value about living in Australia...

Our natural resources, environment, health and education systems, economic opportunities and even political participation are all proof that we are lucky to live and work in Australia.

What you miss the most about your life in Spain...

Both my family and I really miss Spanish culture and

food, as well as our family and friends. We also miss how everything in Europe is much closer compared to Australia. The opportunity to live in a city like Pamplona was simply wonderful; we enjoyed every moment.

A historical figure that inspires you...

Sir Edward *Weary* Dunlop. *Weary* was a surgeon in the Australian Army during World War II. He is legendary for his care of soldiers while being held prisoner by the Japanese. His nickname might have been *Weary* but his character certainly wasn't. Even in the most horrific conditions, *Weary* found the energy to fight for the wellbeing and, many times, the lives of these men. Even after the war he strongly supported reconciliation with Japan.

companies like ACCIONA invest directly in local communities, supporting their organizations and making lasting contributions to civic life.

ACCIONA Energy has proven itself capable of undertaking major projects. How can it strengthen this position?

We have a clear objective for our business: to double our capacity in Australia by adding 500 MW of new generation by 2020 with an investment of 600 million Australian dollars. I believe that this figure represents our level of commitment. In fact, 132 MW have just become operational at our Mount Gellibrand wind farm and we were recently received notification from the Victorian State Government that our Mortlake South Wind Farm was one of six projects selected as part of the Victorian Renewable Energy Auction. This project alone will generate more than 157 MW of clean energy and alongside this we are also currently evaluating other solar and wind development projects that will move us forward. We are also keeping an open mind about potential acquisitions, so our strategy will remain flexible and adaptable to the circumstances.

What role will PPAs [Power Purchase Agreement] play in reaching these goals?

There is a growing need for PPAs in the Australian energy market and I do not foresee this need diminishing anytime soon. For companies looking to reduce their carbon footprint or their energy costs, signing a PPA with a company such as ACCIONA can achieve one or both of these targets. Our team here is discussing PPA opportunities with many companies and we hope to close our first agreement in the near future.

Let's imagine that future...Where do you see the company in the next 10 years?

Decarbonization in Australia represents a great opportunity for ACCIONA to become one of the leading global players in this field. We aim to boost our project portfolio and earn our customers' trust and respect. We want to be seen as a trusted partner for their renewable energy needs; a safe, reliable and competitive company with experienced professionals that is backed by strong technological innovation. The message would be: ACCIONA delivers solutions. ■

HIGH-SPEED RAIL

**FASTER
FARTHER
CLEANER**

COUNTRIES THAT DON'T HAVE HIGH-SPEED RAIL WANT IT. SUSTAINABLE, SAFE, EFFICIENT, A DRIVING FORCE FOR DEVELOPMENT, AND SO QUICK THAT IT MEASURES DISTANCE IN TIME. AN OVERVIEW OF ITS GLOBAL DEVELOPMENT AND THE ROLE OF ACCIONA.

by
**Miguel Ángel Bargeño /
JP Zurdo**





GEOERGE STEVENSON'S
NINETEENTH-
CENTURY
LOCOMOTIVE WAS—
IN 1830 AND IN
ITS OWN WAY—AN
ARROW AT 50 KM/H.

It couldn't overtake a galloping horse, but it could maintain a steady speed. Today, high-speed rail (HSR) is entirely different: it soars at 351 km/h and is the railway sector's five-star specialty. It is rapidly pushing us towards new transportation models due to its economic benefits, sustainability and drastic reduction of distance/time.

We're talking about an integrated passenger and freight transport system that is in a constant state of development (over half a century has passed since Japan's Tokyo-Osaka bullet train began to operate in 1964). According to the Spanish Railway Association (Mafex), there are public and private plans until the mid-century to expand the network by 30,000 kilometers—almost double the current number. These plans not only involve China, the



United States and Europe, but also Turkey, India and Malaysia. Another added incentive for Europe is the liberalization of the railway market in 2020. New operators will enter the playing field, leading to foreseeable improvements in the sector.

INTERCITY CONNECTION

According to economists at the University of California, Los Angeles (UCLA) and China's Tsinghua University, HSR promotes real estate development (just look at cities like Zaragoza and Ciudad Real, far from the major hubs of Madrid and Barcelona), improves quality of life and is a highly efficient way to connect large urban areas where the majority of the world's population tends to settle. "Cities that have high-speed rail will be more competitive

Viaduct built by ACCIONA on the high-speed line from Malaga to Granada, the section between Antequera and Peña de los Enamorados.

and better positioned to attract tourism, business, employment and quality personnel," states the US High Speed Rail Association.

It has the lowest accident rate of any mode of transport, with an environmental impact that only bikes can top. "In Spain, 30% of the energy it needs comes from clean sources with zero carbon emissions. And if you purchase green energy, you reduce that carbon footprint even more. Several countries are already planning the construction of their railway lines near wind or solar farms as a way to power them," states Antonio Muñoz, Director of the Specialized Business Unit for Railroads and Tunnels at ACCIONA Construction. In addition, the systems that recover braking energy and feed it back into the railway's power grid optimize



HOUSE BRAND TECHNOLOGIES

ACCIONA IS ONE OF THE LEADING COMPANIES IN HSR INFRASTRUCTURE. IT HAS DEVELOPED ITS OWN TECHNOLOGIES AND ADAPTED OTHERS TO ITS METHODOLOGY.

Bridge deck launching. A patented technique to construct viaducts. A deck (a flat surface on which the tracks are placed) is built behind each abutment of the viaduct, and construction progresses by sliding it over piers until it reaches the next abutment. It lowers costs and reduces lead times.

Bi-component mortar. A type of cement containing additives that form a water-resistant barrier, as well as regulate the product's density and setting time. It fills in the gap between the excavated soil and the ring of concrete segments lining the tunnel. If water is present in the soil, it can set in just 20 seconds to immediately prevent leaks.

Future advances in tunnel construction. Development of a multidisciplinary team of engineers and the RDI department. The system will make it possible to analyze several meters of terrain in front of the tunnel boring machines to avoid unplanned stops, or worse, machine breakdowns.

Drilling of extreme terrain. The Follo Line project (railway tunnels between Oslo and Ski) involves drilling through very challenging terrain made of particularly hard granite. ACCIONA is using two of the world's biggest TBMs with cutterheads that are specially suited for this type of rock. It's the first Norwegian railway tunnel built exclusively with this technique, eliminating the use of explosives. It also combines the use of TBMs with pre-grouting techniques for ground treatment.

HSR REQUIRES MUCH LARGER RADIUS CURVES THAN CONVENTIONAL TRAINS, AS WELL AS LONGER TUNNELS AND VIADUCTS

“When you look at it this way, there’s no comparison. It’s clearly the most sustainable form of transportation,” adds Muñoz.

Historical date: April 14th, 1992; inauguration of the Madrid–Seville high-speed line (AVE). ACCIONA, which was created by the merger between Entrecanales and Cubiertas, was one of the leading engineering firms working on the project and it participated on more than 50% of the line—the first step of many on its way to becoming an HSR specialist. In fact, that milestone marked a radical change in the model for rail transport infrastructure in Spain.

DESTINATION EUROPE

The development of the Spanish rail system was ahead of the curve worldwide, not only for its record speed —capable of reducing the share of the passenger market enjoyed by other modes of transport like the airplane—but also for being the first to run on the international track gauge of 1,435 millimeters. It’s currently the second most-extensive network in absolute terms (3,000 kilometers) despite a major pending issue: it focuses almost exclusively on transporting people and not freight, although this would help ease highway congestion caused by vans and trucks, reduce dependence on oil and lower export costs to Europe.

Economic historians tend to claim that one of the reasons for Spain’s sluggish economic growth during the industrial revolution of the 19th century was its mountainous terrain, making it six times more expensive to lay a kilometer of railway track than in more fortunate, virtually flat countries like France and Belgium. Times have certainly changed because that difficulty—far from being an insurmountable barrier—has stimulated the competitive capacity of Spanish companies on complex projects. It’s not only investments that move mountains, it’s also engineering.

“The technical challenge was, and continues to be, enormous. HSR involves a radical change in mentality when constructing railway infrastructures. As the track design has such a demanding plan and profile, it’s much more complicated to adjust to the terrain, so the length of tunnels and viaducts is much greater than conventional railways,” says Antonio Muñoz.

“On numerous occasions, the best solution involves highly complex jobs like excavating large base tunnels, which are long tunnels built through mountain passes. We have to deal with very diverse, and sometimes risky, geotechnical conditions,” adds Maximiliano Arenas, Technical Director of the Specialized Business Unit for Railroads and Tunnels at ACCIONA Construction. Another job related to HSR track design for rugged terrain is the construction of large viaducts, which are essential for the trains to maintain their top speed. Which countries are major players in HSR? China, of course. It has the most extensive rail network (21,000 kilometers), the fastest trains (up

THE ELEMENT OF COMFORT

High Speed Rail preserves the romantic charm of saying goodbye on train platforms and gazing out the window to admire landscapes. But not much else. It requires a more generous—and at the same time complex—track design, with much larger radius curves and more limited gradients. These

elements make it possible for such high speeds to be nearly imperceptible inside the train in terms of vibrations and inertia. Passengers mustn’t feel like they are on a roller coaster. And, just like airplanes, the air pressure inside the coaches also meets this need for comfort.

THE US AND CANADA ARE BEGINNING TO DEVELOP HSR WITH LINES IN CALIFORNIA AND THE GREAT LAKES AREA

to 351 km/h) and the most ambitious expansion plans. The 1,318 kilometers that separate Peking and Shanghai, China's largest urban centers, are covered in less than 4.5 hours by 100 million passengers a year.

Many countries that do not yet have HSR are beginning to develop it. The United States has planned the West Coast Corridor, a strategic line that connects population centers and economic hubs like San Francisco, Los Angeles and Sacramento. The only remaining task is to finish the environmental feasibility study and put it into operation. The Canadian Great Lakes area is also planning a project that is currently being researched.

SPANISH NETWORK

As for Spain, the original plan to link nearly all the provincial capitals by high-speed rail is once again underway after a decade on hold. According to ADIF (Administrator of Railway Infrastructures), the state plan is to build another 1,500 kilometers of high-speed line so that three-quarters of the population will be connected by 2023. Antonio Muñoz comments that "to achieve a powerful network, we need to finish the Basque Y and connect

ACCIONA'S TRACK RECORD

CONSTRUCTION OF HSR LINES. ACCIONA HAS TAKEN PART IN:

More than **60** sections that exceed 850 km

More than **170** km of tunnels

More than **43.5** km of viaducts

IT HAS ALSO CARRIED OUT:

PRELIMINARY STUDIES FOR 1,150 KM.

A detailed design of 615 km. An environmental impact assessment for 631 km.

IN 2017, ACCIONA COMPLETED TWO PROJECTS

(the Hernialde–Zizurkil railway and the Antzuloa tunnel) and it is currently working on

THREE HSR ROUTES

(one with a tunnel) and the high-speed train station in La Sagrera.

INTERNATIONAL PROJECTS:

ACCIONA is currently constructing the Follo Line (Norway) and has built the railway crossing in Bologna on the high-speed Rome–Milan line. In addition, it has conducted engineering studies for the Medina–Mecca project (Saudi Arabia), Bulgaria, Croatia, the Philippines, Brazil and Costa Rica.



it to the Meseta. The Madrid–Valladolid line is up and running. We need to complete the Madrid–Burgos line, which is under construction, and link Burgos to Vitoria. That will take about two years. We also need to connect Zamora and Ourense and finish the AVE to Galicia. Work is progressing on the line linking Almería to Murcia and Alicante, as well as the AVE to Extremadura and the lines joining León and Asturias. After all this is finished, the map will be very complete.”

Next stop: faster and more profitable service. In the short term, several sections of the Spanish network could allow speeds of 350 km/h, according to some experts like Miguel Rodríguez Bugarín, a university professor of railway systems. In the medium term, France is already testing speeds of 500 km/h.

Madrid–Barcelona line, the Sant Boi de Llobregat segment, one of the track designs built by ACCIONA.

And in the long term—which is much more uncertain—rumors continue about Elon Musk and his Hyperloop project, which, thanks to its vacuum tube system, is able to reach 1,000 km/h. We’ll see if Tesla, his more demanding company, will give him some time to devote to HSR 3.0.

Muñoz believes that the sector will evolve towards a concept similar to the Hyperloop, based on new train and track construction technologies. “The track designs will be more demanding, with minimum radius curves of perhaps 40 kilometers. The train’s structure will change, becoming much smaller. And as it will compete with air travel, its profitability will soar. No matter what, HSR will become increasingly faster and will reach more locations. There’s no doubt about that.” ■

LEAVE THE MACHINES ALONE

A 100-TON BULLDOZER LOCATED 9,000 KILOMETERS AWAY FROM ITS DRIVER. AUTONOMOUS VEHICLES THAT MAKE THEIR OWN DECISIONS. THE FUTURE? YES, BUT IT'S CURRENTLY BEING TESTED FOR ACCIONA'S MAJOR PROJECTS AND LOGISTICS SERVICES.

by **Angel Luis Sucasas**



THE STEREOTYPICAL SELF-DRIVING IMAGE OF THE FUTURE IS A SPACE INSIDE A VEHICLE WHERE PARENTS AND CHILDREN PLAY, DINE AS IF THEY WERE AT A RESTAURANT OR SLEEP IN THEIR RECLINED SEATS AS THEIR CAR GUIDES ITSELF.

But the future of automated vehicles is much more complex and impressive. For instance, in the construction sector. Carlos Crespo is touching this future today. As manager of the Robotics and Artificial Intelligence Skill Center in the Advanced & Digital Innovation Hub run by ACCIONA's Corporate Innovation Division, he travels the world to test out the latest developments in machine automation in person.

A few months ago, he experienced the magic of teleoperating a bulldozer to move and level terrain. He did so, however, at a distance of over 9,000 kilometers, which is how far Arizona is from Málaga. The act of pulling the lever to start the vehicle was transmitted over the network in barely half a second. "It's a lag that the operator's brain has no problem getting used to. The important thing is that you're avoiding any physical risk from these heavy machines over bad terrain."

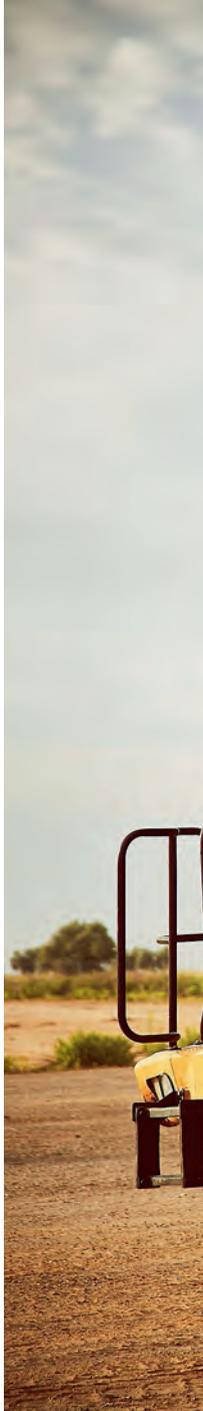
COMPLEX TASKS

Elimination of occupational risk and innovation of the way that major projects are conceived are one of the goals set by ACCIONA in its machine automation plan. It's a future that's just around the corner, where drivers comfortably operate fleets from an office using sensorization, artificial intelligence and network infrastructure. "We'll

hardly have any operators on land, just new maintenance staff (for hardware, software and planning) deployed to supervise machines that will perform much more complex tasks."

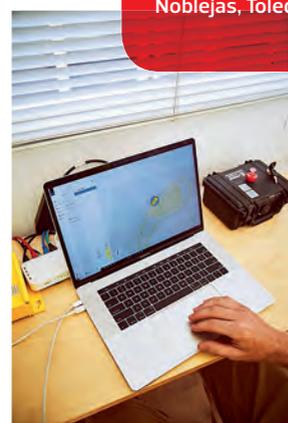
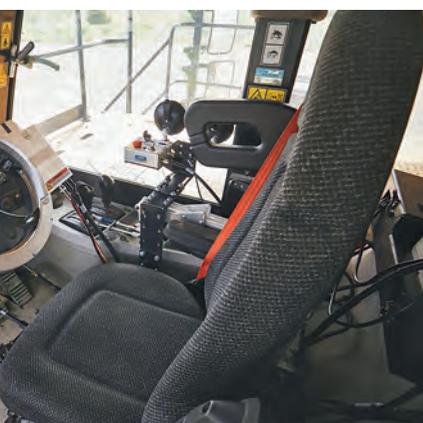
A distinction must be made between autonomous vehicles, which perform tasks for themselves, and teleoperated vehicles, which are driven remotely by a human. Another fundamental distinction: vehicles that have been transformed and vehicles designed from scratch by the manufacturer. The former essentially entails tuning a conventional vehicle and converting it into an unmanned vehicle through retrofitting, with automation hardware and software. "For complex machines such as a backhoe, retrofitting is not as effective due to the complexity of emulating the handling of the bucket that is achieved by an expert. For simpler tasks, however, such as driving an articulated truck or a heavy-duty dump truck, it is possible," explains Crespo.

ACCIONA is launching pilot projects in all areas of automation, for vehicles of all sizes and types. "Caterpillar is the largest global manufacturer of construction machinery, with total assets of 50 billion euros, and it's precisely in automation that it foresees the most growth. They assure us that only three companies in the world from the sector have approached them about implementing this technology. We are one of them," says Crespo.





Self-driving tests with heavy vehicles in ACCIONA's fleet of machines in Noblejas, Toledo.



AUTOMATED ACCIONA

PILOT PROJECTS DEVELOPED BY THE COMPANY:

Machines at work. ACCIONA Construction. The company is developing various retrofitting and teleoperation projects that are already in the advanced stage. In the fleet of machines in Noblejas (Toledo), a 773F dump truck (weight of 40 metric tons and GVW - Gross Vehicle Weight - of 100 metric tons) has already been automated. The aim is to replicate this same adaptation soon in another 40 of the same machines as well as 40 model 745 articulated trucks made by the American manufacturer Caterpillar, the global leader in the sector.

Pristine floors. Tennant T 500. ACCIONA Service. Cleaning of a surface area of 1,300 square meters in a shopping center in Barcelona, with an autonomous robot that worked fully autonomously 45 out of every 60 minutes. As a result, efficiency rose by 30% and the company expected to substantially exceed this functionality level when the system was implemented in larger and faster machines.

5G mobile technology. The fifth generation of mobile telecommunications will drastically increase bandwidth and reduce latency, i.e. the lag between an order and its execution, to the bare minimum. It will be possible to increase the number of cameras and sensors in both remotely operated vehicles and autonomous vehicles to improve their effectiveness. ACCIONA, in collaboration with the Mobile World Capital congress in Barcelona, is working on a pilot scheme for the use of 5G in its machinery for projects and industrial logistics.

Automated industrial logistics. MIR-200: ACCIONA Service is developing and testing this system to automate some logistical processes using robots, which will be responsible for fully autonomous transportation of some supplies to the production lines in the Nissan factory in Barcelona.





TELEOPERATED VEHICLES

- 1.** From a remote chair, the operator moves the same controls—levers, wheels, engines—that are found in the machine being teleoperated.
- 2.** This action is transmitted over the internet by cable (fiber optic, etc.) to a point as close as possible to the project.
- 3.** From this final point, the action is transmitted by 4G WiFi. Soon 5G will begin to be implemented to minimize the lag between order and execution.
- 4.** After the signal arrives at the machine, it is interpreted by automation software.
- 5.** The action is executed remotely; the required movement is transmitted to the machine's electrically operated valves.

Between steps **3** and **4** the Quality Service is carried out: a telecommunications service to ensure that the packets arrive within the correct time lapse, with network priority (that they're the ones originally sent by the operator) and maximum cybersecurity deployment.

AUTONOMOUS VEHICLES

In descending hierarchical order:

Autonomy Layer: The set of hardware and software that enables the vehicle to understand an action plan and adapt it to the requirements of each moment in real time, sending specific instructions to the Execution Layer.

Execution Layer: Allocates the what and when of each action to be executed. Sends commands on how the vehicle must move to the Functional Layer, based on the task list sent and modified in real time by the Autonomy Layer.

Functional Layer: All of the vehicle's functions (mobility, on-site actions, etc.). Encompasses all of the SLAM (Simultaneous Localization and Mapping) sensorization systems, which allow the vehicle to generate a 3D map of the terrain with information that is continually updated in real time to enable the Autonomy Layer to operate.

SENSORIZATION

Sensors for the mapping system that maps the terrain where vehicles are operating:

GPS: A filter with multiple sensors that can estimate the vehicle's position with minimal error (10 centimeters for a 10-meter truck). Able to assess the quality of the information it receives for its calculations.

IMU: Inertial Measurement Unit. Accelerometers and magnetometers which enable pinpointing of the truck's absolute orientation and its orientation with respect to the Earth's gravity vector. Communicates changes in land elevation to the computers that guide driving in real time.

LIDAR: Light Radar. Despite its name, it's not a radar. It's a device similar to sonar, but in 3D. It shoots a laser pulse at its environment, which returns a point cloud to enable the vehicle to draw its immediate environment in real time.

DEGREES OF AUTOMATION

From least to greatest autonomy:

Level 1: Driver Assistance. Steering, acceleration and deceleration can be performed autonomously by the vehicle, as can cruise control. However, this does not make it an autonomous vehicle.

Level 2: Partial Automation. Steering, acceleration and deceleration can be controlled by the machine. However, a human driver is required who must be alert at all times and ready to take over control.

Level 3: Conditional Automation. The car performs all mobility tasks but the presence of a human driver is required for specific situations: a passing truck, abrupt changes in weather, a sudden obstacle, etc.

Level 4: High Automation. Vehicles that don't need a steering wheel and make appropriate decisions in the face of any unforeseen circumstance.

Level 5: Full Automation. Includes complex management tasks like automatic refueling and adaptation of driving to suit variable weather conditions, in addition to all Level 4 capabilities.

NEW-ERA VEHICLES



There is still no rival for humankind in terms of its ability to adapt to change, but mobile robotics is incorporating more and more learning and predictability algorithms in order to bridge this gap.

In the world of construction, the need to standardize different types of vehicles and their connectivity will make each project a little smart city where all of the equipment works together, moves, communicates and acts under the same standard of communication and supervision. Total automation of predictable movements puts us on a path to safer, more competitive and more precise projects with quality that's sustainable over time, in addition to shorter time frames and jobs that add more value (supervision, decision-making in the face of unforeseen events, anticipation, creativity, etc.) and are less vulnerable to inclement weather and poor ergonomics. It cuts final costs and execution times, improves the customer experience and gathers data to simulate future scenarios, improve efficiency with respect to historic data patterns and design more visual models that enable early involvement of the customer.

We live in an exciting time, with technologies that are increasingly accessible. Virtual reality and growing simulation capabilities, artificial intelligence and machine learning algorithms enable us to develop vehicles and manage fleets that are ever more intelligent, flexible and adaptive to their environments. Given this constant progress, it won't be long before new technological developments appear, driven by blockchain or wide-scale incorporation of aerial robotics (drones) and portable technology.

We also live in a changing era, in which connectivity with consumers enables us to customize products to make them much more suitable for their needs. But what good is a much more customized product if we continue to manufacture thousands of kilometers away, lengthening supply times? This new era is thus an opportunity for Europe to reindustrialize, supported by regulation, technology and different regions' talent for attracting investment.

We are in the midst of the fourth industrial revolution, and like its predecessors, it creates fear of the unknown, terror of change and panic in the face of the unprecedented. Despite this, we must view it as an opportunity, taking a positive view and adapting to progress ahead of time. Only in this way can we take full advantage of its benefits. ■



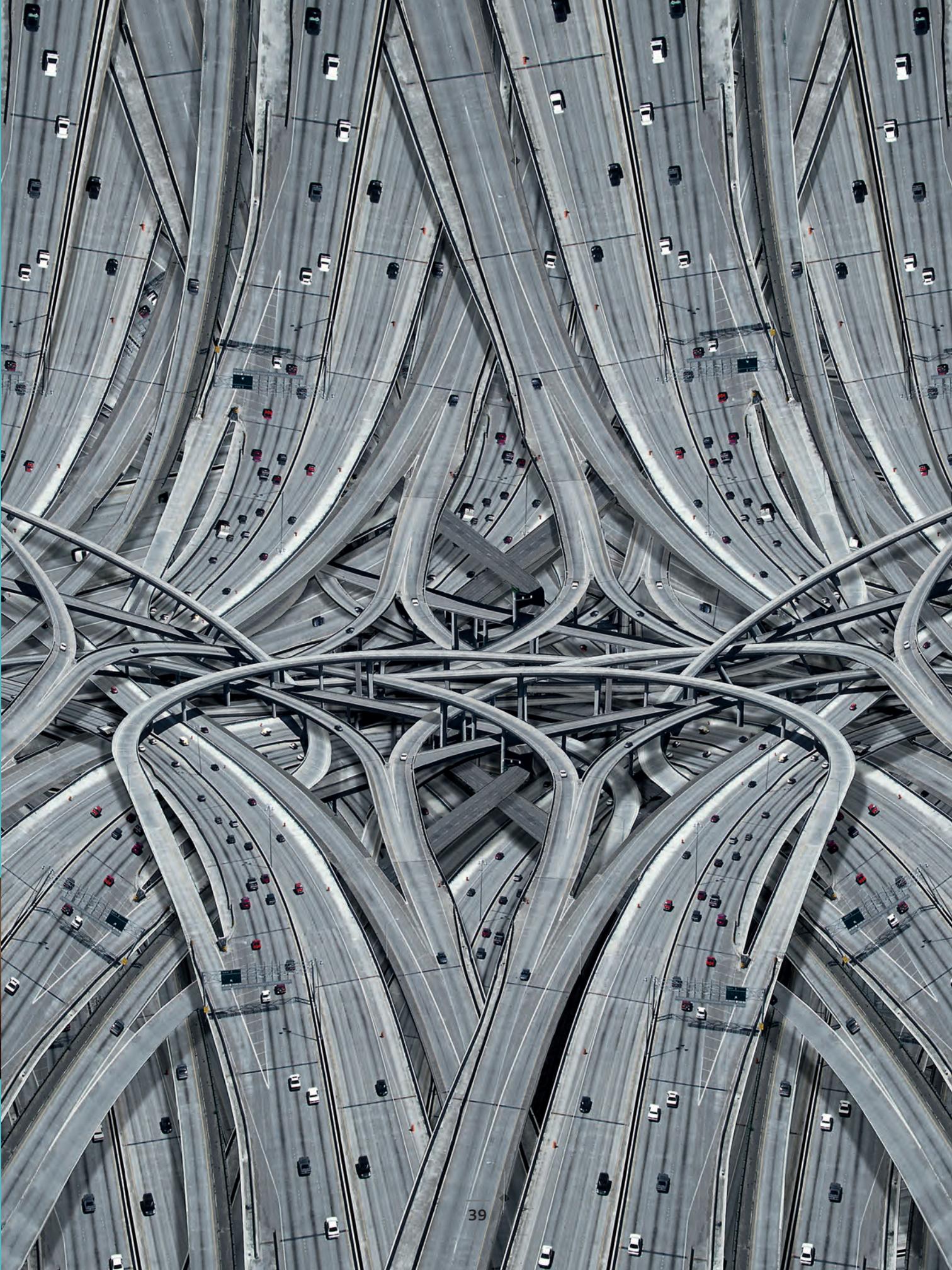
VERÓNICA PASCUAL BOÉ

CEO of ASTI
TechGroup and
President of the AMETIC
4.0 Industry
Commission.

PHYSICAL STRUCTURES, DIGITAL MINDS

THE CONSTRUCTION
INDUSTRY IS
PREPARING TO MAKE
A TECHNOLOGICAL
LEAP. WORK VESTS ARE
TEAMING UP WITH LAB
COATS, MACHINERY
WITH ALGORITHMS,
PHYSICAL MEGAPROJECTS
WITH DIGITAL
MICROINFRASTRUCTURES.

 by **Ángel Luis Sucasas**



100

TRILLION EUROS— THAT'S TRILLION WITH A 'T'. THIS IS THE COMBINED VALUE OF DIGITALIZATION THAT THE DAVOS FORUM HAS CALCULATED FROM NOW TO 2025.

That means that the cumulative effect of industrial renewal through digital disruption will generate the equivalent of the world's entire economy. It's an enormous opportunity— in fact, it's an absolute must.

This is how Miguel Ángel Heras Llorente, Director of Digital Transformation at ACCIONA Infrastructure, defines the construction sector's effort to reinvent itself. "The most prestigious studies tell us that in recent decades many industries have boosted their productivity by more than 150%," and construction is beginning to reflect this trend with cutting-edge digital applications that are reaching unprecedented levels of efficiency.

Gone are the days when technology was advancing somewhat slowly in relatively stable markets. Today the sector faces the added challenge of global competition. "Digital transformation is key. Studies show that digitalized companies earn 8% more revenue and are 20% more profitable than those that aren't."

This shift is illustrated by an iceberg metaphor that Heras uses in his internal presentations. "The 10% that emerges from the water is technology. The other 90%—what you don't see—is people. The biggest part of the entire process is changing the mentality and work philosophy of the employees." With this in mind, multidisciplinary teams play a key role. ACCIONA Infrastructure hires candidates as diverse as young video game developers, special-

ists in robotics and automation, and experts in BIM (Building Information Modeling). This is a 3D (and even 4D and 5D) model-based process for construction, the new standard that is replacing traditional design methods. "Forming teams with multiple backgrounds is essential because you can't have a good base in everything," explains Heras. Collaborating with start-ups, both internal and external, also forms part of the process of digital disruption.

ON-SITE R&D

This change not only concerns those who are at the front line of international markets. R&D departments are also improving the way they reorient projects towards the company's future needs. The first step is to put on a helmet and some boots and go into a tunnel. "The members of these technology departments change their perspective completely when they're on-site. They understand what is involved in day-to-day construction work, as well as the problems that construction managers face," says Heras.

This cooperation is reciprocated. "There's always someone on-site with a special interest in the innovation department who's proactive. That worker comes to us with a practical problem that requires a solution or improvement, and asks us to develop an app or provide them with specific technology for that challenge. And that's exactly what we're here for." ■



DIGITALIZATION IS TOUCHING DOWN (FOR TAKE-OFF)

THEORY WITHOUT PRACTICE IS LIKE A KITE WITHOUT A TAIL. ACCIONA INFRASTRUCTURE IS CARRYING OUT ITS OWN DIGITAL DISRUPTION THROUGH SPECIFIC PILOT PROJECTS IT HAS LAUNCHED IN MAJOR INFRASTRUCTURES AROUND THE WORLD. THE GROWING LIST INCLUDES:

GOTA (Automated Work Order Management).

It manages the maintenance of the water distribution network in eight districts of the peruvian capital to provide drinking water to nearly eight million people. It was a job that began on paper and required a lot of advance planning. With GOTA, a management protocol is set up on a platform in real time. To understand how it works, it helps to imagine a common situation: A worker has to perform a specific task on a construction site, so he takes a photograph of the place he is going to work and sends it to the central office. There, they have real-time maps that can geolocate workers, allowing optimization of routes taken by different work teams so they can react to any unforeseen circumstance or breakdown. This is a tangible improvement in the service provided to the people of Lima every day.

Augmented Reality. At La Almunia de Doña Godina (Zaragoza) Wastewater Treatment Plant (WWTP), the workers' peace of mind is two-fold. It doesn't matter how complex a repair may be, because the company's experts are with the workers every step of the way. This shows how cutting-edge technologies like augmented reality can achieve a level of efficiency and security that was previously impossible for infrastructure projects. The system works with HoloLens glasses, Microsoft's ingenious creation

that projects 3D holograms into physical reality. They offer the advantage of allowing on-site workers to communicate remotely with the control center where the expert engineers are located. Since the engineers have access to a camera that transmits the entire operation in real time, they can suggest adjustments to the workers as they go. La Almunia also uses virtual reality to train its employees, who can explore all the nooks and crannies of the facility without any risk.

Connected work sites. The Follo Line: two twin 19.5-kilometer tunnels that will connect the Norwegian cities of Oslo and Ski; the Site C dam in Canada: a 1,100 MW hydroelectric plant that will power 450,000 homes; and phase 3 of the Mohammed bin Rashid Al Maktoum Solar Park in Dubai containing more than 3 million PV panels: the world's largest single-site solar park. This trio of projects has introduced an amazing model: connected work sites. Materials, operators and machinery can be geolocated in real time and managed via a single platform to aid decision-making, improve performance and avoid invisible bottlenecks that slow down and make construction more expensive. It has already been implemented in 80% of the Follo Line project, and it is in the conceptualization phase for the other two megaprojects.

Several engineers work on a digitalization project at ACCIONA Construction's R&D Center in Madrid.



Junta General
Ordinaria de

Shareholders' Annual General Meeting

ACCIONA CALLS FOR MARKETS TO SHOW GREATER COMMITMENT TO SUSTAINABILITY

THE SHAREHOLDERS' ANNUAL GENERAL MEETING APPROVED THE BALANCE SHEET AND ACCOUNTS FOR 2017, WHICH EXCEEDED EXPECTATIONS, AND TURNED THE SPOTLIGHT ON THE GREATEST BUSINESS CHALLENGE IN HISTORY: GETTING THE FINANCIAL COMMUNITY TO TAKE RESPONSIBILITY FOR DECARBONIZING THE PLANET.

by
Patricia Alcorta

The Annual General Meeting (Madrid, 30 May) approved the Group's results against a global backdrop that gives them their full significance: the responsibility of private initiative in the fight against climate change.

The balance sheet for the previous financial year, which exceeded forecasts, will enable a dividend of 3 euros per share to be paid, 4.3% more than in 2016. However, the financial results of any company in any sector can no longer be separated from this major environmental objective.

This prompted ACCIONA Chairman and CEO José Manuel Entrecanales to call on the investment community once again to make a commitment to ensuring that decarbonization moves forward at the required pace. The Paris Agreement target to limit the increase in average global temperature to less than 2°C by 2100 means that by 2020 emissions will reach a historic high before they start to drop.



Anything that delays this first milestone means this target will be dangerously compromised. Some signs invite cautious optimism, especially transport electrification and the leap forward in wind and photovoltaic power, but other key factors are slowing progress down. Although companies like ACCIONA lead the way in developing the sustainable economy, this “still does not guarantee the recognition of most of the financial sector or the global investment establishment,” the Chairman and CEO said. “As long as shareholders and financiers fail to make social and environmental responsibility key variables in their investment decisions, progress [in decarbonization] will be slow.”

ACCOUNTS FOR 2017

In the last financial year, the company met its target of making sustainability more profitable, and vice versa, judging by economic indices: EBITDA rose by 7% (€1.275 billion); sales were 21% higher (€7.254 billion); ordinary net profit before tax was up by 22% (€382 million) and the workforce grew by 14%, reaching more than 37,000 employees. The forecast for this year points to a similar rise in EBITDA and a continued reduction in debt going forward.

The Chairman and CEO also reviewed the outlook for ACCIONA’s main markets. In Spain, now that the economic crisis is over and the country is much more competitive, there must be greater investment in infrastructure and “enthusiastic” development of the renewable energy sector.

The outlook reflects the company’s dynamic approach in various specialist areas. The Mexican market is particularly promising: this year the company is expected to exceed 1,000 MW of installed wind power capacity and is developing a number of projects for power plants and infrastructure. In South America, Chile is particularly strong in terms of this type of business, in addition to others like airport handling.

Business activity in Australia is set to move up a notch with the acquisition of Geotech, the construction of a new wind farm in Victoria and the government project of dismantling old coal-fired



A CARBON-NEUTRAL ASSEMBLY

The Annual General Meeting proved that environmental commitment can spread to all business activities, not just to those that have a direct impact on greenhouse gas emissions. The organization, led by ACCIONA Productions and Design (APD), has once again met its carbon-neutral target. How? It plans all the organizational phases as a continuous process (venue, power consumption, mobility, transport, technical services, catering, etc.) and offsets unavoidable emissions by purchasing carbon credits. In fact, APD has been pioneering this new business model since 2012 and so far it has succeeded in preventing the emission of 1,048 tons of CO₂ at events like Music Day (winning an award for Best European Sustainable Event) and the 2018 Santalucia Sales Convention (using recyclable materials and offsetting emissions in the Tuppadahalli Wind Energy project in India).

IN FIGURES

Dividend of
€3 (+4.3%)
per share

Rise
in:

EBITDA **+7%**
Sales **+21%**
Ordinary net
profit **+22%**
Workforce **+14%**

power plants and investing in renewable energy. The situation is similar in the USA, where the social prestige of clean energy has struck a chord with public opinion and is attracting investment by companies and institutions. Canada is stepping up its water treatment activity with two large-scale desalination plants and the Site C mega dam, while the Middle East is consolidating its position as a strategic region for all areas of the business, from the world’s largest photovoltaic power plant through to urban and transport services.

Lastly, the assembled shareholders appointed two new independent directors, Javier Sendagorta and José María Pacheco, to replace Jaime Castellanos and Fernando Rodés. ■



WHAT REALLY MATTERS

REAL-LIFE HEROES WHO LEAVE FICTIONAL HEROES IN THE DUST. THE WHAT REALLY MATTERS FOUNDATION SHARES EXTRAORDINARY TALES OF OVERCOMING HARDSHIP WITH YOUNG PEOPLE ALL OVER THE WORLD.

by
Juan Pablo Zurdo

Why is it only when life knocks us down that we realize what really matters? This important question, posed at a pretty unimportant moment, a coffee date between girlfriends, led to a project which, 11 years down the road, has turned into a huge success for these women, for the young people and teenagers who participate in it and –in all modesty– for the planet.

During that coffee date, someone recommended a powerful book: Nicholas Forstmann’s diary. He wrote it when he was sick with cancer, to leave the best advice he could for his children. He reminded them that living boils down to a few simple truths:

Juan Pablo Escobar, one of the inspiring stories told at the conference in Hermosillo (Mexico). He dedicates his life to ensuring that young people are not lured into drug trafficking.

love, hard work, generosity, honor... and that only these values can make sense of the rest. The book is called What Really Matters.

María Franco was one of these women. She decided that all human beings needed to answer this question, especially young people, who face the uncertainty of building a life. So why not devote herself to the cause? She shared the idea with friends like Carolina Barrantes and Pilar Cánovas, and together they created the foundation. Its name was a foregone conclusion: What Really Matters.

Pilar, Director of International and Institutional Relations, explains that they decided to give it the



structure of an informal discussion. They didn't want coaching, or agents to spin the message into a self-help miracle: "We prefer direct communication from people with motivational stories, extraordinary examples of overcoming hardship, some of which are extremely stark. The only secret: speaking to young people heart to heart."

Stories like that of Bosco Gutiérrez Cortina, a young Mexican architect who was kidnapped and held for 257 days in a hideout measuring roughly ten square feet. After a month of captivity, he felt utterly defeated, but he found the inner strength to pull himself together, survive and escape by fashioning a lock-pick out of a spring. Bosco didn't hesitate to collaborate with the foundation at its first event in Madrid, in 2007.

"They told us it would be impossible to fill, that not even professional conferences could do it, and that with young people there was even less chance..." remembers Pilar. But no project of this sort existed in Spain, and the response was overwhelming. "Completely full, a waiting list, a magical atmosphere..." They received thousands of calls: young people offering to be volunteers, teachers asking if they could bring their teenage students, business owners who wanted to send the message to their teams.

They haven't stopped since. "What drives us the most is the gratitude shared with us in confidence. A disabled girl told us she smiled for the first time in years when listening to these stories; another boy, that he stopped contemplating suicide; an executive, that he started talking to his brother again ..."

THREE INSPIRING LIVES

The foundation is highly active in Mexico, where its work is sponsored by ACCIONA, and one of its last conferences (in May in Hermosillo, state of Sonora) was full to capacity once again. The three main guests make it easy to see why:

Pepe Villela, a brilliant medical student, dreamed of being a surgeon. But one night, because of an accident caused by a drunk driver, Pepe was left quadriplegic. He was 23 years old. Defying all of the doctors' prognoses, he regained some mobility. Today he is a psychiatrist who is planning to have a family with his girlfriend, as well as a member of the Mexican Paralympic Committee's swim team.

FIGURES

More than **100 conferences** in Spain, Mexico, Peru, Ecuador, Portugal and Austria

160,000 youth and teens attended

WHAT REALLY MATTERS IS THE PLANET



For ACCIONA, sponsoring the work of What Really Matters means working hand-in-hand with a better world. "Our premise is that investing in the planet is the smart decision, and that includes the social contributions we make through experts like those at the foundation. By sharing stories of real, inspiring lives, they show us that there's a different way of doing things and resolving issues," said ACCIONA Energy's Country Director for Mexico, Miguel Ángel Alonso (pictured), at the conference in Hermosillo (Sonora).

When she was little, Karla Wheelock would ask her mother why there was "no one important" in her family. She decided it would be her. "All right, my girl, but remember that one who is constant in the little things will also be constant in the big things; you must work hard every day." Karla is the first Latin American woman to have climbed the highest peak of every continent as well as Everest's north face.

Juan Pablo Escobar, son of Pablo Escobar, the world's most famous drug trafficker, has devoted his life to pacifism and to recovering the human values that were blasted to bits by narco-terrorism, especially now that movies and TV series are sugar-coating the tragedy and millions of young people are confusing fiction with the ugly reality. ■



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THE LIGHT THAT PRESERVES CUEVA PINTADA

THE MOST FRAGILE LEGACY OF CANARIAN ABORIGINAL ART IS PROTECTED INSIDE THE EARTH. A LIGHTING PROJECT PAMPERS, CONSERVES AND ENHANCES IT.

by
Miguel Ángel Bargueño

Gáldar, in the north of Gran Canaria, houses a treasure right in the middle of town: a cave decorated with expressive geometric drawings from pre-Hispanic culture that may represent an ancestral calendar. Some look like tiles from a multi-colored kitchen, whereas others have a more abstract style. Along with the Altamira cave, this mysterious pictorial museum is considered the most valuable legacy of Spanish cave paintings.

Discovered in the 19th century, Cueva Pintada opened to the public in 1972 and, due to deterioration, closed again in 1982. It was reopened in 2006 after 20 years of restoration and, in 2016, lighting improve-

Cueva Pintada is one of ACCIONA's most complex lighting projects. It helps increase visits and preserves the collection of paintings.

ments began that are still in progress. ACCIONA Industrial is responsible for the lighting installation inside this unique, extremely delicate space, making this one of the most complex projects the company has taken on. Among other tasks, it is replacing the old lights with state-of-the-art LEDs that do not alter underground temperatures or the paintings' natural colors. It is also replacing the wiring with halogen-free cables, which minimizes consumption and the visual impact of the equipment by reducing and grouping the connections.

This is a constantly evolving project—just like the technology. “LEDs have developed so much

since the beginning of the project that there are infrastructural differences between the first phases and the one we're installing at the end," explains Néstor Gil, head of the project at ACCIONA Industrial.

Cueva Pintada is a Historic-Artistic Monument and a masterpiece of the island's ancient aborigines. Its lighting cannot jeopardize its conservation; quite the contrary, it should contribute to it. "Workers follow various protocols. For example, we check the site before we go in to guarantee that it's the same when we leave. There cannot be the slightest trace of our work," adds Gil. Since this is a very sensitive area, no more than two people can work at the same time and for no more than 90-minute stretches, with a two-hour break until going back in.

A SURGICAL PROCEDURE

"We have to protect the ground and walls so we don't damage the cave. Some areas are so jagged that to access them we need restoration specialists who can prepare them beforehand and then cover up the infrastructure. The lighting has to remain as hidden as possible."

The Cueva Pintada Museum and Archaeological Park is the most important evidence of the aboriginal cultural transition that took place between the 12th century and the European world of the 16th century, when the island was incorporated into the Crown of Castile. Therefore, it is also one of the main assets of Gran Canaria's cultural tourism. In fact, attendance grew by 31% in 2016 attracting a total of 71,024 visitors.

Renovating the complex has a lot to do with it, in addition to making the cultural experience more appealing thanks to specific lighting for each area. The park consists of the main building, where the rescued objects are exhibited, the archaeological site itself and Cueva Pintada—the crown jewel. As visitors pass through each of these spaces, the lighting—which is controlled automatically—highlights the information to make it memorable. ■

THEATERS, STADIUMS, SQUARES AND PALACES

Lighting large infrastructures and unique buildings has been a specialty of ACCIONA Industrial for more than 25 years, and in places as diverse as:



The City of Culture, Santiago de Compostela. Lights on the roads connecting car parks, paths and gardens.

The new San Mamés Stadium, Bilbao. Lights built into the modulation of the building, and facade and undercover lighting through LED lines and flash spotlights.

Miradero de Toledo. Calculation, design and specification of the entire electrical installation.

Paseo de la Independencia, Zaragoza. Electrical and lighting installations (in the photo).

Plaza del Óvalo, Teruel. Replacement of networks and artistic lighting.

Villahermosa Palace, Madrid. Skylights and lateral lighting on inclined structures. It combines artificial and natural motion-sensor lights.

Julio Prestes Theater, São Paulo (Brazil). Stage and ambient lighting.

AN 'APP' THAT'S LIKE ONE OF THE FAMILY

A MOBILE APPLICATION AND COMPANIONSHIP FOR ELDERLY PEOPLE WHO LIVE ALONE: THE APP FACILITATES CONTACT BETWEEN THEM AND THEIR FAMILY, FRIENDS, AND SOCIAL SERVICES THAT LOOK AFTER THEIR PHYSICAL AND EMOTIONAL WELL-BEING. IT'S FREE AND IT'S CALLED FAMILIAR.

by
Miguel Ángel Bargaño



Teresa Gómez is 82 years old and lives alone. Like so many others in the same situation, she feels vulnerable. Ailments aren't good company, and she fears getting sick. "My children come to visit me but they have jobs and can't stay very long. The loneliness is hard." Even so, she remains very active, as she always has, attending culture and leisure workshops in Alcobendas (Madrid). And since February she has more companionship thanks to the app developed by ACCIONA Service.

According to a study by the Health Service of the Community of Madrid, chronic pathologies like high blood pressure, diabetes, dyslipemia and obesity are on the rise. 88.9% of people over 65 and 93.4% of people over 75 take medication, and those with chronic conditions almost always need various treatments. As the WHO has warned, "all

There are more than two million people over 65 years old in Spain; they represent 41.7% of single-person households.

countries face major challenges to ensure that their health and social systems are ready to make the most of this demographic shift."

INTOUCH

That's Familiar's goal, to fight isolation by facilitating fast contact with family and with social and health services. It also provides users with access to information and entertainment, alerts on certain dates like birthdays and the ability to share photos. "It helps people like me a lot," says Teresa. "Patricia, my therapist, calls me every week to see how I am and we chat for a while. If I don't answer because I'm not by my tablet (where the app is installed), she calls on my land line until she reaches me. That gives me peace of mind. I can also speak to my children or to a

friend who also has a tablet, and we can see each other with video calls.”

The City Council of Alcobendas was the first to implement the service, and so far it has distributed devices containing the app to 30 elderly people in the city free of charge. In the future, the plan is for the app to be downloadable to any compatible tablet. “We hold events to give them out which are attended by users joining the program as well as existing users who come to clear up doubts, see how things are progressing and meet new members. It makes them feel like they belong to a group, ‘the people with the tablets’, which is something that all of us like,” says Concepción Ortiz, coordinator of Elderly Services at the City Council.

Most users are women (“they’re generally more active and more willing than men,” says Ortiz), and although they’re from an era that precedes the digital boom, the application’s simple interface makes things easy for them with large icons and images. In fact, it was designed for people who’ve never used a cell phone or have some sort of sensory impairment.

SUPPORT NETWORK

“Familyar presents technology as something useful that will help them in their daily lives, something that brings them closer to younger generations and helps them take the digital leap. Just like when we changed over to euros, some will find it harder than others, but they are able to adapt and it’s essential for society to include them and not close doors to them,” adds Ortiz.

The app creates a safe and private network that prioritizes health. It reminds elderly people of

medical appointments and provides them with test results, to cite one example. As far as social services go, the app is a tool that can be used for communication, prevention and monitoring, cutting costs and improving productivity. In addition to calling once a week, Familyar’s occupational therapists visit old age homes to answer questions and they draft monthly reports on the state of mind, habits and physical and emotional needs of each elderly person. ■



Pictured above: tablets are handed out to various users in Alcobendas in the presence of representatives from the City Council and ACCIONA Service.



CITIES FOR CITIZENS

Today, 50% of the world's population lives in cities. According to the United Nations, this figure will rise to 75% by 2050. Through its Smart City Services business line, ACCIONA Service implements a preventive vision for this trend towards urban concentration. It has four main aims: to improve quality of life, to reduce the impact of human activity, to optimize costs and to promote social participation. These aims coincide with the agenda of its Healthcare Services, which have been awarded contracts in the city of Barcelona to run the health services at Palau Sant Jordi Arena, Sant Jordi Club, the Olympic Stadium, the esplanade in the Olympic Ring and the Forum of Barcelona, among other contracts, and the healthcare and health transport service in Adolfo Suárez Airport as well as inter-community land transport for SUMMA 112 in the Community of Madrid.



TATTS FINKE DESERT RACE

ECOPOWERED BY ACCIONA. THE FIRST 100% ELECTRIC RACING CAR IN THE CLASSIC AUSTRALIAN RALLY. THE FIRST EVER FEMALE DRIVER AND CO-DRIVER DUO IN THE RACE.

by **Patricia Alcorta**

The quintessential legendary rally: Dakar, 2017. Then the Italian Baja. Followed by the Tijuana Desert Challenge. Now a northern Australia classic, the Tatts Finke Desert Race: from June 8 to June 11, more than 600 kilometers, 135 cars and 631 motorbikes.

The EcoPowered is the first to race in the 100% electric cars category in Australia, plus it's the first ever in this rally's history to be driven by an all-female team: Andrea Mayer (on the right in the photo), a driver with 10 Dakars under her belt, and Emma Clair (on the left), co-driver and Bajas TT quadbike world champion. On the second day they drove all 230 kilometers on a single charge.

A milestone. "We knew the distance would test not just the battery capacity but also our driving strategy and how we handle the vehicle," said Emma. "It's not like anything we've ever experienced before, with that amazing number of people cheering us on at the sides of the roads. We've enjoyed the challenge with all the heat and the really tough, dusty terrain," added Andrea. "We're ahead of what the world of rallying is set to become: electric, green and demanding. Plus, we've proved the competitiveness of renewable energy whereas the other participants consumed an average of 25 liters

of fossil fuel every 100 kilometers," commented Brett Wickham, Director of ACCIONA Energy in Australia.



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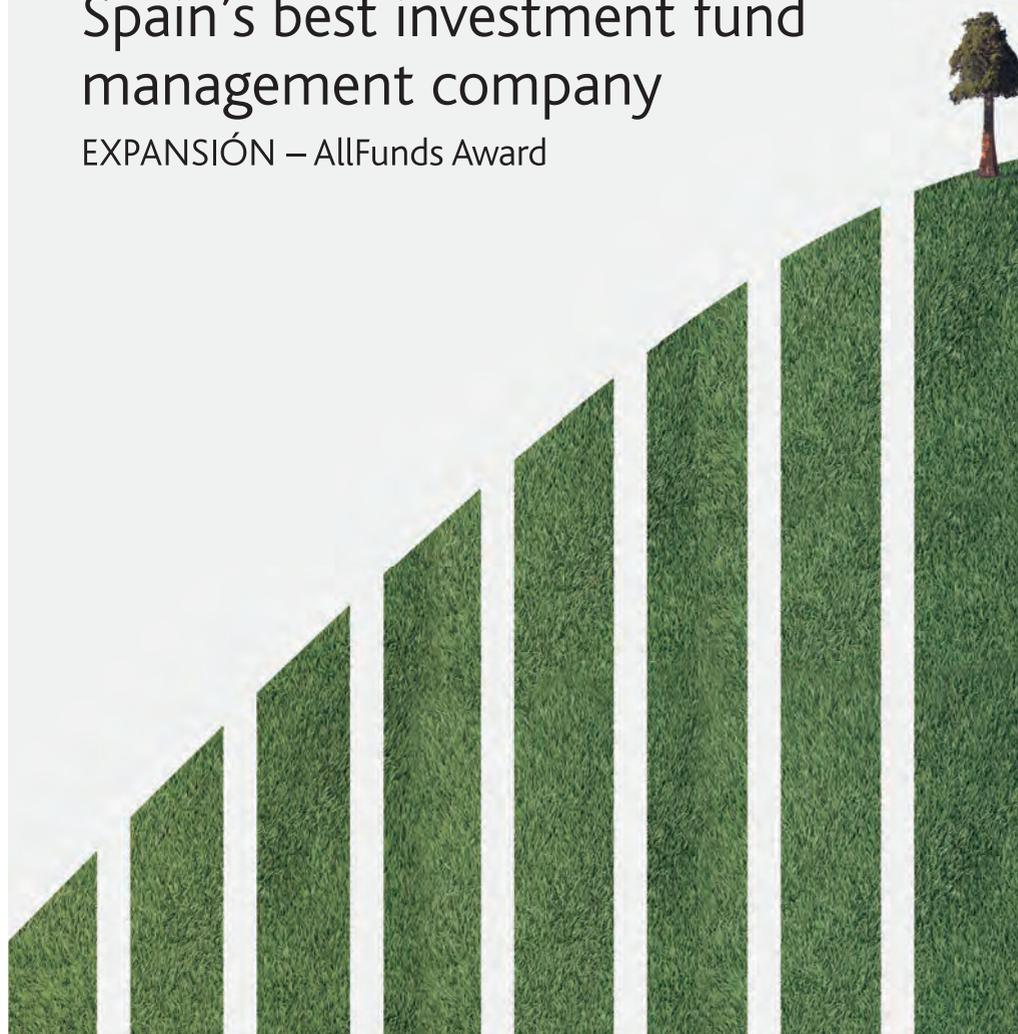
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