EPC PROJECTS

Infrastructure placing community development first

OCCUPATIONAL RISK PREVENTION

Technology and positive psychology mean safety at work

acciona

N.68 APRIL 2018

PPAs

ENERGY DIRECT
BUSINESS TO BUSINESS

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PRIVATE INITIATIVE, COMMON GOOD

Technology companies restoring mangrove forests in Malaysia, cross-sector partnerships developing hybrid propulsion for commercial aviation, construction and petrochemical companies evolving into renewable energy producers. The private sector is not waiting for external political decisions or initiatives to meet the targets of the Paris Agreement.

Big companies brought together under Alliance of CEO Climate Leaders recently submitted a groundbreaking plan to the World Economic Forum at Davos, setting down the basic pillars to ensure the transition to a low-carbon economy. ACCIONA was tasked with presenting this document as a reference for the paradigm shift. It was an important ethical responsibility and one we must also convert into a business opportunity. And our efforts are not going unnoticed. We recently received further recognition for our endeavors from researchers Corporate Knights, who named us the second most sustainable utility in the world.

The transition we are talking about poses an exciting challenge when we understand our business as one more step toward an economy in which strength and sustainability are not opposing terms, but rather interdependent. This concept permeates all our businesses, from the major and minor infrastructure projects described in an interview with Huberto Moreno, Managing Director of ACCIONA Construction, to renewable energy supply models such as Power Purchase Agreements .

We devote our main report in this issue to PPAs, which are another example of efficient partnership between private initiatives. The end user contracts a secure supply of clean energy directly from a generator in a long-term agreement at stable and competitive prices. A trend in key markets, PPAs facilitate rapid progress for giants like Google, Telefónica and Unilever as they seek to achieve their 100% renewable energy targets, as well as moving us all toward the decarbonization of the economy, with large corporations exerting a pull effect on other companies.

We also take a look at profitable sustainability at ACCIONA Real Estate, which has obtained one of the world's most stringent certifications for all of its housing developments, even going beyond the requirements of the certification itself. ACCIONA has also pioneered the development of smart prevention, using predictive technology tools for safer work, allowing us to minimize accidents in the workplace. Caring for the planet, which is home to us all, begins with caring for the people in our team. ■

> "The private sector is not waiting for external political decisions or initiatives to meet the targets of the Paris Agreement"

www.acciona.com

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Publisher:
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Production:
La Factoría, Prisa Revistas.
Depósito Legal:
M-35.445-1997.

This magazine is printed on chlorine-free paper sourced from sustainable forests. FSC certification, provided by the Forest Stewardship Council, ensures that paper products come from well-managed forests and that the chain of custody remains unbroken throughout the transformation and finishing process.

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TOWARD MORE SUSTAINABLE MINING

ACCIONA SUPPLIES...

... CLEAN ENERGY, DESALINATED WATER AND BUILDS TUNNELS FOR CHILEAN MINING COMPANIES
which comply with all safety and environmental standards

ACCIONA ENERGY

is increasing the supply of renewable electricity via **PPAs (Power Purchase Agreements)**

POWER IS GENERATED IN:

El Romero Solar photovoltaic plant:
Capacity of
500 GWh/year
Avoiding the emission of
485,000 tonnes of CO_2 per year

Punta Palmeras wind farm:
Capacity of **124 GWh/year**
Avoiding **119,164 tonnes** of CO_2 emissions

23,281 M
OF GALLERIES CONSTRUCTED

1,076 M
OF SHAFTS
MEASURING **6 M** IN DIAMETER, USING THE RAISE BORING METHOD

509,653 M^2
OF CONCRETE PLANNED
FOR REINFORCEMENT AND

311,643 M^2
FOR SEALS

SINCE 2010, **ACCIONA INFRASTRUCTURE** HAS BEEN BUILDING **STATE-OF-THE-ART,** SAFER AND MORE EFFICIENT TUNNELS FOR THE **MINING COMPANY CODELCO**

QUICK BRIEF

ACCIONA USES GIANT ELECTRIC TUNNEL BORING MACHINES FOR THESE TASKS. FOR EXAMPLE:

The **Annabell and Joyce** twin TBMs, each of which is **110 m** long and weighs **2,800 tonnes.** And **Dulcinea,** the largest TBM in the world, nearly **150 m** long and weighing **4,200 tonnes**

The water needed for mining operations comes from Copiacó desalination plant (Atacama), built by **ACCIONA Agua.** It desalinates **54,400 m^3** per day and boasts 80 km of water pipelines and **80 km** of slurry pipelines

BARRANCO DEL MORO

MURCIA'S THIRST QUENCHED BY THE TAIBILLA RIVER AND EUROPE'S LARGEST NETWORK OF COVERED CANALS

by Patricia Alcorta

Philip II once sought to supply water to the strategic city of Cartagena, but not even all the riches of his Empire could locate sources at a distance that was "prudent", as the king himself was known to be. In the early 20th Century, cost-effective engineering finally allowed the supply to be drawn from a source much further away, the headwaters of the Taibilla River... at least in theory. But it was between 1928 and 1944 that the project really progressed, albeit in navigating political persecution, war, the post-war period, three mountain ranges, "large expanses of deplorable Eocene loam" and gullies like the one shown in the photo, known as Barranco del Moro. The slimline arches of the aqueduct, built by Entrecanales y Távora, span 18 meters to carry water across the skyline. The main canal is 179 km long, ending in Cartagena, with other canals branching off toward Murcia, Alicante and Lorca. In its heyday, this was the Europe's largest covered conveyance system.

ORDINARY NET PROFIT UP BY 60%

2017 RESULTS

€ **1,275** BILLION

EBITDA (+7%)

ACCIONA's ordinary net profit grew by 60% in 2017 to 233 million euros, compared to 146 million in 2016. The financial year was notable for the solid performance of the Infrastructure division, particularly its international construction projects. However, the impact of extraordinary items arising in 2016 caused attributable net profit to fall by 37.5%, to 220 million. Gross operating profit (EBITDA) was 1,275 billion (+7%), thanks to growth in the Infrastructure division (+33%), which more than offset the slight drop recorded in the Energy division (-1.9%) and Other Activities (-5.2%). Group revenues amounted to 7,254 billion euros (+21.4%) and we invested heavily, with gross investments totaling 920 million (+0.4%) due to the strong pace of construction of new renewable facilities and the acquisition of Geotech, among others.

7,254 BILLION: IN REVENUES **(+21.4%)**

100 MILLION MORE TO DIGITIZE AND INNOVATE

The European Investment Bank (EIB) granted ACCIONA a line of credit of 100 million euros to promote, over the next three years, digitalization of the company and innovation in its main sectors, i.e. renewable energy, infrastructure and water. The loan will be supplemented by an equal contribution to be made by ACCIONA. Among other activities, the funds will be invested in new technology for construction, operation and remote control of power plants, recycling for the circular economy, communication networks and interconnection projects, data analysis and processing, and interconnection of plants.

OBJECTIVE: UPGRADING THE BALLARAT RAILWAY LINE (AUSTRALIA)

This initiative by the Victorian and Australian governments is one of the largest investments in railway infrastructure in Australia, comprising a budget of 360 million euros. Coleman Rail, a subsidiary of ACCIONA Geotech, and its partners Lendlease and SMEC Australia won the tender for extensive modernization of the Ballarat railway line, which will entail duplicating the line between the urban areas of Deer Park West and Melton (Melbourne), renovating and enlarging stations, constructing a parking lot, new passing sidings and train parking facilities, closing loops and removing level crossings. Coleman Rail has developed specific work programs to support the project delivery phase. Completion of the work is foreseen for the end of 2019.

"This upgrade will enable more trains to operate with greater reliability in Melbourne's west and right along the Ballarat line, and will enhance the user experience," explained Bede Noonan, Managing Director of ACCIONA Geotech.

Mexico's huge new photovoltaic complex at Puerto Libertad

The facility will be one of the biggest in Latin America (404 MWp installed capacity, 317.5 nominal MW) and the largest renewable project in the world developed by ACCIONA Energy. Situated near the Gulf of California, in the state of Sonora, it is being built by a 50-50 consortium of ACCIONA Energy and Tuto Energy. Part of the complex will begin to supply electricity to the network in Q4 2018. It will be fully operational by the end of Q1 2019. The plant will have a surface area of nearly 10 km^2, 1,222,800 photovoltaic panels and a solar collection area of 2.4 km^2, equivalent to 33 soccer fields.

BUILDING THE LARGEST HOSPITAL IN VALPARAÍSO (CHILE)

The new Marga Marga Provincial Hospital will have an area of 75,000 square meters, with nine wards, 282 beds, dialysis rooms and intensive neonatal, children's and adult treatment units, among other facilities. It will serve a population of half a million people. The project, which has a budget of 135 million euros and is of medium-high complexity in terms of healthcare capacity, was awarded to ACCIONA by the Viña del Mar-Quillota Health Service. In four years, when the work has been completed, it will be the largest hospital facility in the region of Valparaíso. This new hospital will join the ranks of other health infrastructure projects ACCIONA is building or has recently delivered in Chile, such as the largest pediatric hospital in the Metropolitan Region, Exequiel González Cortés Hospital, and renovation of the Philippe Pinel Psychiatric Hospital.

NEW WASTEWATER TREATMENT PLANT IN SOUTHERN ECUADOR

The city of Loja, a member of the Huella de Ciudades (City Footprint) sustainability project, will have a wastewater treatment plant built by the consortium of ACCIONA Agua and BTD. The turnkey project has a budget of 13.4 million euros and will serve some 350,000 inhabitants.

A DIFFERENT (SUSTAINABLE) WORLD IS NOW POSSIBLE

A GROUP OF 70 BUSINESS LEADERS PRESENTED THEIR GLOBAL PLAN AGAINST CLIMATE CHANGE IN DAVOS. HERE IS WHAT PRIVATE INITIATIVE CAN DO, AND IS ALREADY DOING, FOR THE SURVIVAL OF THE PLANET.

by
Javier Latorre

Shortly before the Davos Economic Forum, the World Meteorological Organization confirmed that 2017 was one of the three warmest years on record, along with 2015 and 2016. All 17 years of this century have been amongst the 18 warmest ever recorded.

The Forum was attended by some 70 business leaders, all members of the Alliance of CEO Climate Leaders, including ACCIONA's president, José Manuel Entrecanales, and they presented the strategic document *Two Degrees of Transformation*. The Paris Summit aspires to limit global warming to less than two degrees by the end of the century, while the transition toward a low-emissions economy must transform necessity into a business opportunity.

The document illustrates this transformation with examples from even before a sense of climate urgency existed. For example, ACCIONA, which two de-

cades ago began to move toward its current business model based on sustainability and decarbonization in response to a number of connected global trends like water stress, population and urban growth, and energy demand.

GREEN ECONOMY

Prior to 2004, 94% of the company's activity was focused on construction and civil engineering in the Spanish market. In just a decade it became a multinational and, today, 72% of its turnover comes from renewable energy technologies, civil infrastructure and sustainable buildings, environmental services and water management, thus contributing value to the Green Economy defined by the United Nations' Environment Program (UNEP).

In 2016, ACCIONA launched its 2016-2020 Sustainability Master Plan (taking over from the 2010-2015 plan), with cross-cutting objectives in areas such as Society, Climate Change, the Environment, Corporate Governance, People, the Value Chain and Innovation.

Davos was also the setting for the presentation of the latest Corporate Knights ranking of the 100 Most Sustainable Corporations in the World, with ACCIONA coming second in the electricity utilities category. The ranking takes into account the company's achievements such as the contribution it made to the Green Economy as defined by UNEP and becoming a carbon-neutral company in 2016, offsetting all its emissions by acquiring credits under the Certified Emission Reductions scheme. This is in addition to other recent distinctions, such as being named the world's greenest electricity supply company (by Energy Intelligence) and obtaining the highest scores for water management and fighting against climate change (CDP).

CORE CONCEPTS FOR CHANGE

To understand the need for this global transformation, especially of the energy model, one piece of data should suffice: the use of fossil fuels for generating power is responsible for 68% of the world's CO_2 emissions, making them the biggest contributor to global warming. These figures have prompted the Alliance of Climate Leaders to put forward a number of core concepts for corporate transformation, such as: bridging sectors to develop low-carbon technology, processes and products; creating sustainable value chains in conjunction with governments and civil society organizations; and, making the most of the Fourth Industrial Revolution to apply smart management of natural resources.

Some of the most dynamic companies are already developing their own initiatives along these lines, including the use of hybrid engines for commercial aviation, the restoration of mangroves to act as natural CO_2 sequesters, the use of artificial intelligence environmental applications and big data, and the reform of supply chains. These are just a few of the many steps being taken by private initiative against climate change. ■

WHO'S PAYING FOR ALL THIS?

This is what writer Josep Pla wondered when he saw Wall Street for the first time. Who's paying for the transformation to a sustainable economy? The Alliance of CEO Climate Leaders believes it is essential to come up with new financial formulas to multiply the flow of investment, such as climate funds or green bonds. In addition to other measures, ACCIONA is backing the urgent application of public-private financing formulas, the setting up of more stable regulatory frameworks, the development of effective carbon price mechanisms and emission reduction programs, as well as long-term plans and technology transfer strategies.

Huberto Moreno Lorente is a Road, Canal and Port Engineer (Civil Engineer) with a degree from the Technical University of Madrid (UPM) and an MBA from IE Business School.

“ We are leaders in specialization ”

HUBERTO MORENO, MANAGING DIRECTOR OF ACCIONA CONSTRUCTION

by **Juan Pablo Zurdo**
photos **Jacobo Medrano**

A MULTINATIONAL CONSTRUCTION COMPANY BUILDS ITSELF WHILE BUILDING FOR OTHERS.

The rigid nature of concrete stands in contrast to the flexibility to adapt to a business that's constantly transforming. "When I started to work 24 years ago, there were things that were impossible to do which are now routine," says Huberto Moreno, the new Managing Director of ACCIONA Construction, as an example of how the business has evolved. In this global market context, "the company responds with its key resource, the talent of its specialized teams", primarily in the areas of railways and tunnels, ports and waterworks, roads and unique construction projects, all of which bear ACCIONA's recognizable stamp. "We are already specialists, that's how we started out, but it's also our future. We want a customer anywhere in the world to say: 'For this project, I'm going to call ACCIONA.'"

What sort of time is it for the business, in terms of you taking on this new role?

It's an enormous responsibility at an exciting time of modernization, change and consolidation of our status as specialists. I think the company is reading the market very intelligently. This is a business that can't take a general approach; we specialize in specific areas in order to add value that sets us apart and to achieve better results, in very diverse countries.

What is the key factor in this evolution?

People. We have grown through our knowledge, investing in the development of specialized talent. At the end of the day, it all comes down to knowledge and experience. Our plan is based on attracting, nurturing and retaining the best professionals. We train our teams so that they are able to navigate a new environment and overcome unprecedented challenges in every contract and in every market.

This entails synergy between Construction and Human Resources...

ACCIONA implements programs to identify talent and leadership, as well as reward systems, environments that enable research, forums, internal mobil-

3,131 billion
EUROS IN TURNOVER

6,758 billion
EUROS OF PROJECTS IN THE PIPELINE

9,412 employees
IN 25 COUNTRIES ON 5 CONTINENTS

> Team spirit is a philosophy that translates into a work model, into value

ity, etc. We actually have our origins in this model: we have been a specialized company since the beginning, with leading-edge technology and ties to universities to attract extraordinary engineering minds. This conducive environment translates into professional – and human – qualities. And that's not just a figure of speech, or a naive view. I've always encountered this generous, collaborative team spirit in the company. It's a philosophy that translates into a work model, into value.

Is innovation increasingly linked to the talent factor?
In every regard. In processes, technology, materials, funding, sustainability, social impact… Specialization also bolsters this phe-

MORE PERSONAL

The human trait that you most admire, and the one you tolerate the least?
I admire honesty and I have little tolerance for lack of commitment.
Human traits in the business of constructing major infrastructure?
Empathy, leadership, organizational skills.
The historical construction project that you most admire?
It depends on the era: the Aqueduct of Segovia, the Pyramids of Egypt, the Cathedral in Florence or the tunnels under the Alps.
A novel or a movie about construction or engineering?
The Pillars of the Earth describes the difficulty of construction, design and its evolution, the importance of trades, labor, quality materials in the Middle Ages… all of it could be relevant today.
If you had to work in another profession?
I thought about studying medicine. Teaching also appealed to me greatly.
A piece of advice you have received which you pass on to your family and teams?
You need to be very rigorous with respect to control, analysis and problem-solving. You can't take a superficial approach. To solve a problem of any sort, you need to explore it and devote time to it in order to come up with a solution.

nomenon, for instance the digital format and new funding models such as PPPs [public-private partnerships], with comprehensive services for clients in complex and changing contracts. I believe we're making a commitment, in terms of time and resources, to digitizing our processes. For example, we make extensive use of BIM [Building Information Modeling] technology and Connected Project Control systems, in regard to the position and functions of people and machines. The incorporation of all of these trends, thanks to a strong Technical Services Division, which boasts its own engineering company [ACCIONA Engineering] and an R&D department, is another competitive advantage.

Specialization is compatible with a wide range of projects... does bigger always mean more important?
We have six strategic projects: subways in Dubai and Quito, a streetcar in Sidney, the Follo Line tunnel (Norway), the Site C dam (Canada) and an international airport in Mexico. All of them have a strong impact on our bottom line and are given specific attention in interactions with customers and partners. They involve the company's entire management team and we appreciate its support. In parallel, with other kinds of issues and another sort of management, we have projects like the

ACCIONA CONSTRUCTION, YEAR 2028

How the company will evolve in the next 10 years, according to its new Managing Director. It will:

- Strengthen its position as a benchmark in the sectors it specializes in.
- Be a motivated, flexible, multidisciplinary team that's mobile and technically excellent.
- Maintain ties to our origins and continue to be a benchmark for Spanish multinational corporations (so Spain continues to contribute as a country, providing technical support all around the world).
- Keep ACCIONA's leading position as a pioneer, developed over the past 15 years, in implementing a truly sustainable approach to projects.
- Be a company with a large pool of talent to tackle the different challenges of each project.

Before taking on this new position, Huberto Moreno directed the Tunnels and Railways Specialized Business Unit.

> This will be a business that's ever more global and at the same time, more specialized... we will build whatever society needs

dams in Aragón, the roads in Galicia and tunnels for the mining company Codelco in Chile. These projects are also fundamental for the company and are as specialized and innovative as the others, with a social impact and very important features.

Several of the projects you've cited are being developed in Spain...

The importance of internationalization is such that it sometimes overshadows our business in Spain, but Spain is our base and we continue to nurture it. I don't agree with the negative connotation that is sometimes applied to the Spanish market. We've done an immense amount of work in order to adapt. We've overcome a spectacular crisis while maintaining the quality of our teams, making an enormous human and financial effort. This partly explains why we are where we are as a company. And why we are in a position to grow now, as we are indeed doing.

In Latin America, too...

It's our natural market for expansion and has been since the beginning due to the cultural proximity. Mexico, Brazil and Chile are the main countries that we focus on and from there we provide support to the other countries we work in. We also act as a key to open the door for other foreign companies. In these regions, we are able to achieve better market penetration, but that doesn't lessen our efforts to adapt to the management models or specific characteristics of each country.

A DREAM PROJECT

What major project would you take on right now, this very instant? "A major subway project for a city in one of our expansion markets, with a large network of tunnels and stations ensuring optimal service for citizens. Because of how much it transforms society, because it's there forever and because it significantly improves people's quality of life. And because we're very good at that."

And the next important markets?

Scandinavia, Southeast Asia and the USA are three strategic regions due to their tremendous investment projects. Foreign companies have a relatively small presence in Scandinavia. We've made a very strong entry with the Follo Line railway tunnel and that's started to open doors for us. The USA is actually 50 different markets. It's tough, but it's size is such that we can find our own niche; there's a demand for specialized companies. And in Southeast Asia we have opened an office. We have great references there due to our base in Australia; they know us and we have forged alliances with important local partners.

That largely covers the future of the company, but what will the future of the business itself be like?

I think it will be more global as well as more specialized, with a more complete, comprehensive service, in more complex and multidisciplinary projects. Technology will be key, of course. There's a lot of room for improvement in materials, treatment of sites and remote support, although this won't remove the need to be present on site and adapt to the requirements of each country and society. Whether it's Hyperloop infrastructure or much more sustainable and environmentally-friendly urban planning, electric vehicle infrastructure, public transport mega-stations or communication corridors between large urban concentrations, we will build whatever society needs. ■

PPA

by
Santiago Gómez López

MORE AND MORE CORPORATIONS ARE BUYING CLEAN ENERGY DIRECT FROM GENERATORS LIKE ACCIONA. STABLE, COMPETITIVE PRICES, LONG TIMEFRAMES, PLANNING IN TIMES OF CHANGE... THE PPA MODEL IS AN EVOLUTIONARY LEAP TOWARDS A SUSTAINABLE ECONOMY ACROSS THE PLANET.

COMPANIES DRIVING THE SHIFT TOWARDS CLEAN ENERGY

BUSINESS TO BUSINESS

N 2010, TECHNOLOGY GIANT GOOGLE SIGNED ITS FIRST CONTRACT FOR BUYING AND SELLING RENEWABLE ENERGY TO REDUCE THE ENVIRONMENTAL FOOTPRINT OF ITS DATA CENTERS, WHICH CONSUME MAMMOTH AMOUNTS OF ELECTRICITY.

Back then, green energy Power Purchase Agreements (PPAs) were somewhat unusual, accounting for barely 0.5 GW of capacity and concentrated mainly in the United States. Today, Google covers 100% of its worldwide electricity consumption with renewable energy, the result of agreements like the one signed with ACCIONA for production from its El Romero Solar photovoltaic plant in Chile's Atacama Desert.

Just seven years on and corporate purchase of renewable energy is becoming one of the biggest drivers of the global development of clean technology, with a record 5.4 GW signed up for in 2017 –25.5% more than the previous year– and an accumulated 19 GW since 2008, 76% of which was signed up for in the last three years. The US is still the leading PPA market, with 2.8 GW in 2017 and a further 60 GW forecast for 2025, although the trend for these contracts is spreading across Latin America and has started to take off in Europe, Asia and Africa.

Next page: El Romero Solar power plant in Atacama (Chile). It has PPAs with several clients, including Google and Falabella.

What has happened to make PPAs a pillar of energy transition? In the words of Angus McCrone, editor-in-chief at prestigious consultancy firm Bloomberg New Energy Finance: "They've become a hot topic at a time when renewable energy subsidies are disappearing and the sector is entering an era of living solely from the income it obtains from the sale of energy."

VIRTUOUS CIRCLE

In other words, the growing competitiveness of renewable technology, companies' keenness to assure themselves of an energy supply at a stable price over time, plus corporate policies on tackling climate change, have come together in a sort of virtuous circle to make corporate purchasing of green energy a powerful leverage in the transition towards a low-carbon economy. This force continues to grow even amid signs from the political sphere – such as the United States' withdrawal from the Paris Agreement on climate change – that point to the opposite.

A clear symptom of this process is that the RE100 Climate Group, a group of companies committed to using 100% renewable electricity, already accounts for over 100 of the world's most influential companies in their sectors (125 by February this year) and continues to grow. The group includes top names like Ikea, Google, Apple, Bank of America, BT, Citi, Facebook, General Motors, Lego, Marks & Spencer, Microsoft, Nike, Telefónica and Unilever, to name just a few.

EU PROGRESS

In 2016, Europe reached a total of 1.5 GW in PPAs (compared to 0.074 GW four years earlier) and Re-Source, the first European-hosted international conference to address this issue, was held in Brussels last October. The conference stressed the importance of removing European Union administrative barriers to make way for a market that is expanding but still confined largely to Scandinavia, the United Kingdom and Holland. The same request was sent to EU energy ministers last December by Re-Source Platform, the multi-stakeholder organization set up by Solar Power Europe, RE100, the World Business Council for Sustainable Development (WBCSD) and WindEurope. The platform comprises more than 50 multinational corporations, including ACCIONA.

REDUCING ADMINISTRATIVE BARRIERS IN EUROPE IS VITAL FOR DRIVING PPAS FORWARD

PPAS PROTECT AGAINST THE RISK OF VOLATILE PRICES AND MAKE COST PLANNING EASIER

WHAT IS A PPA?

It's a long-term (from 5 to 20 years) energy sales contract between a producer and a corporate consumer (a company or another kind of organization) at a previously agreed price. The energy comes from a renewable facility (usually wind or photovoltaic) or from a group of facilities.

There are two main types of PPA depending on their location:

- **On-site PPA.** The renewable energy facility is built inside a client's own facilities (a manufacturing plant, for example), close to the point of usage.
- **Off-site PPA.** The generation facility is away from the point of usage and sends power into the general grid, from where the supply reaches the client.

Advantages for the client

- Covers price risk in the face of a volatile market.
- A highly competitive energy price.
- Long-term cost structure planning.
- Contributes to achieving sustainability targets.
- Enhances corporate reputation as a sustainable business.
- Saves on maintenance investment and costs.
- Ensures a reliable electricity supply.

Advantages for the producer

- Ensures a fixed energy price in the long term.
- Enables new projects to be implemented on a pre-established income model.
- Source of funding for renewable energy projects.
- Facility can be optimized to meet a predetermined demand.

THE ACCIONA OFFER

Customized solutions:

- **On-site PPA.** Building a renewable project on land owned by the client. Generator and purchaser are physically connected.
- **Physical PPA.** Both project and client are on the same electricity system. Physical delivery of energy through a sales agent.
- **Financial PPA.** No need for generator and client to be on the same electricity system, as this involves a financial or virtual transaction. The price is paid under a contract for difference (CFD) in respect of the market price.
- **The seller is the supplier.** Similar structure to the physical PPA but with shorter timescales (normally one or two years) and backed by each country's portfolio of renewable assets, rather than by a specific project.
- **Sale of renewable energy certificates.** In Europe these are known as Guarantee of Origin certificates. They are called RECs in North America and CELs in Mexico.

Our main operations

- **Google.** 80 MW from El Romero Solar photovoltaic plant (Atacama), to feed a data processing center in Chile. From 2017 to 2030, extendable.
- **Aguas Chañar.** Supplying the water franchise holder in the Atacama Region (Chile) since 2018 and with a long-term outlook.
- **Falabella.** Supplying 100 shops owned by the biggest distribution group in Chile. Since 2017, long-term.
- **Cemex.** Supplying from the Eurus Wind Farm, Mexico. Twenty-year contract.
- **ENAMI.** Long-term contract with the National Mining Company, Chile.

RE100: A WIN-WIN MODEL

RE100 is a collaborative, global initiative led by The Climate Group that includes Global Fortune 500 companies from a wide range of sectors. Its aim is to get the world's most influential businesses to commit to using 100% renewable electricity. "It's a smart decision. It helps to keep energy costs under control, increases competitiveness and sends a strong signal to politicians and investors to speed up the transition toward a low-carbon economy," RE100 says.
According to Sam Kimmins, Head of RE100, PPAs are a "win-win model for long-term price stability," which translates into more efficient expenditure, investment capacity and operational expansion. "Lawmakers need to realize that, with the right environmental policy and a fair market, a corporate renewable energy supply holds enormous potential for reducing emissions," adds Kimmins.
Renewable energy supply to RE100 companies via PPAs rose fourfold in 2016, from 3% to 13%.

Chairman of Telefónica José María Álvarez-Pallete (left) and ACCIONA Chairman José Manuel Entrecanales sign the energy supply agreement. Above, Telefónica facilities in Madrid.

SANTIAGO GÓMEZ RAMOS
Director of Energy Management at ACCIONA Energy

"Society will be driving the energy transition with these contracts"

What do PPAs mean for ACCIONA and the sector?
They're a way of promoting growth based on long-term contracts, making our renewable energy projects viable. Clients are normally global companies consuming in countries where we have assets or projects. For more than 10 years now, sustainability has been a core concept in our business decisions. No other company can say this. We are the only exclusively renewable electricity company that's large and solvent enough to be able to offer this kind of agreement. We have a long-term business outlook. We are not an opportunist company that's going to hand over its assets and commitments to others.

How do they benefit society as a whole?
PPAs contribute to companies achieving very high, and therefore sustainable, levels of renewable energy consumption, which is what society (shareholders, clients, etc.) demand of a 21st Century enterprise. If clients of these companies demand that the energy they consume is clean energy, they'll force fossil fuels out of the market and they'll eventually disappear. And all at competitive prices.

So PPAs will be important in the shift towards a sustainable energy model...
They'll be fundamental. Contracting renewable energy at a competitive price is going to be the way forward for taking sustainability policies to society. In fact, the shift towards these contracts will be society-led.

Can the model be applied to administrations or consumer groups?
It will be. Administrations and public organizations have already expressed an interest, although they have to work out how they can sign up to such long-term contracts under current public contracting law. As for smaller consumers, I think the time will come, but further ahead and through demand aggregators.

Why have PPAs only really taken off in the USA, UK, Nordic countries and Holland?
At first this was down to regulatory reasons. In countries with support for renewable energy based on regulated fixed rates, there was no need for PPAs, as renewable producers had a regulated form of income. In the USA this was not the case; they have other kinds of tax incentives and PPAs were the way to ensure a true price in the future. However, PPAs have grown mostly because of demand. The first companies to sign renewable PPAs were technology companies consuming huge amounts of energy. They also represent the new generations of today and tomorrow, who are demanding growth based on clean energy. These companies have pulled many others along with them.

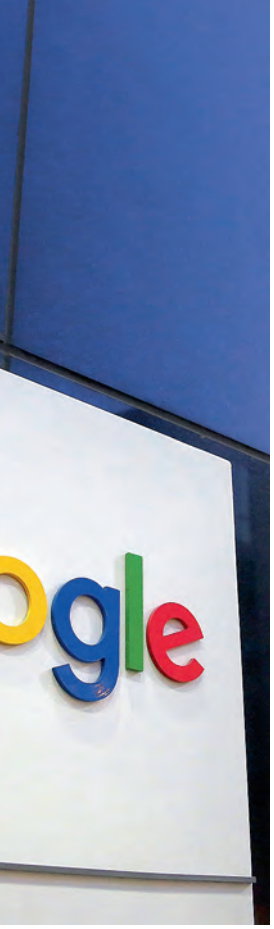
What about the Spanish market?
They haven't grown there because, up until a short time ago, the regime of rates or premiums in place for renewable energy generators wasn't an incentive for these agreements. Also because there has never been a culture of contracting electricity for more than one or two years. But the need to have a reliable price for a large number of renewable promoters has led to the electricity consumer market being offered long-term contracts at highly competitive prices. And these prices have triggered a lot of interest from large-scale consumers.

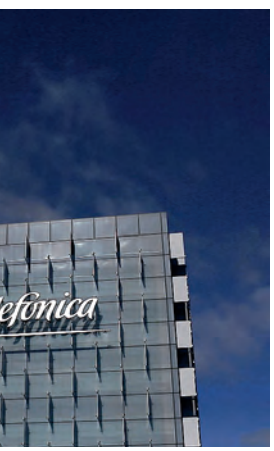
What advantages do PPAs offer when auctions are drastically lowering income?
They're a very good alternative to auctions, as there is less competition due to the entry restrictions. It's not that easy to break into this business. It requires specific experience and expertise only found in traditional utility companies or new companies like ACCIONA.

acciona

IN GOOD COMPANIES

By **Denisse Cepeda**





GOOGLE

STABILITY NOW INTO THE FUTURE

One of the biggest global purchasers of clean energy in the corporate sphere and one of the first companies to use the PPA model when it was practically unknown. The reason? Energy market contractual restrictions and the company's geographical and physical limitations for producing its own electricity.
In 2010, Google signed its first PPA, for 20 years, with Next Era Energy Resources for the supply of 114 MW from Story County II wind farm in Iowa. "PPAs offer the certainty of knowing how we'll be paying for future energy, while also providing stability for generators to finance and build new project, thereby respecting the principle of additionality: each agreement adds more renewable energy to the grid," says Google.
The 20 PPAs Google has now signed have supplied it with 2.6 GW (2/3 in the USA) for a global investment of 3,500 million dollars. A leap forward that has prevented carbon emissions equivalent to 1.2 million cars. "These projects lessen our environmental impact. Technology can help us tackle climate change." In addition to the company's facilities in the USA, it has also signed up to PPAs in Holland, Norway, Sweden and Chile.

UNILEVER

SUSTAINABLE ECONOMY, SUSTAINABLE LIVING

The British-Dutch multinational wants the energy it uses across its entire operations network to be 100% renewable by 2030. To achieve this target, the company has signed a supply contract with ACCIONA, in addition to other measures. "Other suppliers have a generation mix of renewable and thermal sources and it's much harder to guarantee their origin. This gives us huge flexibility in terms of coverage and prices," explains Unilever.
"We're committed to being part of the solution to tackle climate change and we are constantly searching for sustainable solutions for manufacturing and selling our products." Proof of this is that, in Europe and North America, 100% of the energy purchased by the multinational's factories already comes from clean technology. "In 2015 we announced our commitment to becoming a positive carbon emissions company by eliminating fossil fuels from our operations and directly supporting the generation of more renewable energy than we consume," which goes into the system and is also made available to other users. The measure is part of the Unilever Sustainable Living Plan.

TELEFÓNICA

100% GREEN ENERGY IN JUST THREE YEARS

In June 2017, the Spanish multinational was already covering 44% of its electricity usage with clean energy sources, equivalent to the average yearly expenditure of 203,749 homes, and preventing 480,302 tonnes of CO_2 being sent into the atmosphere. Its target is to reach 50% by 2020 and 100% by 2030. "This objective helps us improve our competitive edge, reduce operating costs and keeping growth compatible with a strategy of sustainability," they said.
Four measures for achieving this: acquiring green energy with guarantee of origin, PPA agreements, short-term bilateral agreements and self-generation. Up to now, 79% of the company's electricity usage in Spain comes from renewable sources, whilst in the UK and Germany the figure is 100% and 90% in Costa Rica and Uruguay. "We're noticing enormous benefits and PPAs are our preferred route in Latin America and Spain."
In summer 2017, the company signed a contract with ACCIONA for the supply of 71.6% of the remotely measured high-voltage electricity required by its Spanish facilities in 2018. "We're expecting to save 6% by 2020 and up to 26% by 2030 with our Renewable Energy Plan," says Laura Abasolo, Director of Finance and Control at Telefónica.

KEEPING WATER HEALTHY

SPAIN MIGHT BE THE COUNTRY OF CYCLICAL DROUGHT, BUT IT IS ALSO ONE OF INNOVATION, FOR EXAMPLE IN RECYCLING WASTE WATER AT AUTOMATED, SUSTAINABLE TREATMENT PLANTS… AND IN THE TECHNOLOGY EXPORTED TO THE WORLD'S BIGGEST WATER PURIFICATION FACILITY.

by **Ángel Luis Sucasas**

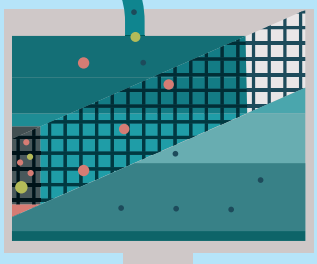
600 BC. THE KING OF ROME, LUCIUS TARQUINIUS PRISCUS, BETTER KNOWN AS TARQUIN *THE ELDER*, ORDERED THE CONSTRUCTION OF A GREAT SEWER, THE VERY NAME OF WHICH REVEALED ITS MONUMENTAL NATURE, THE CLOACA MAXIMA. THE GODDESS CLOACINA WATCHED OVER THE HEALTH OF SANITATION INFRASTRUCTURE. IT'S ONE OF THE OLDEST DRAINAGE NETWORKS IN HISTORY, STILL PARTLY OPERATING TODAY.

A leap forward in space and time. The 1960s. Spain. The start of an unprecedented activity, water treatment. Today, the know-how built up in a country with 3,904 kilometers of coastline, 80 million tourists and a massive demand for clean water, is exported worldwide. "Spanish companies export technology because of everything we've learned during these fifty years," explains Manuel Navarro Agulló, Global Director of the Integrated Water Cycle at ACCIONA Agua. The evolutionary leap can be summed up in one figure: 98% of waste water is purified.

The circular economy, a paradigm in which all industrial waste is re-used, is the next frontier. The targets set by the European Union point to the almost complete re-usage of water purified in three successive processes: primary, secondary and tertiary. Spain, despite its technological leadership, has to tackle this challenge. "We have three areas where we can make improvements: coverage of towns with fewer than 500 inhabitants; sensitive areas where aquifers or wetlands can be affected; and the growth of tertiary treatments, which at present account for only 40% of treated water," he adds.

RETURN TO PURITY

WASTEWATER TREATMENT CYCLE



PRE-TREATMENT

Floating solids are eliminated by a succession of progressively fine filters. This is known as mechanical separation. First, larger debris are removed when water is passed through a coarse screen. Grit, fat and grease are then taken out.

PRIMARY TREATMENT

Other remaining non-dissolved solids are separated from the water after they settle in special sedimentation tanks designed for this purpose.

SECONDARY TREATMENT

Dissolved organic compounds are chemically attacked in large aeration basins. Chemical reactants and aerobic bacteria are used to break down such impurities.
The treated effluent can be used for agricultural irrigation.
Treatment processes generate gases and sludge which are used to produce energy that can supply the plant, eliminating dependence on externally-supplied electricity. ACCIONA's treatment plants are, if necessary, able to operate independently.

TERTIARY TREATMENT

An advanced process which removes chemical elements such as nitrogen and phosphorus. It encompasses multiple techniques such as the use of sand filters, chemical reactants, chlorination, ultraviolet (UV) light and ozone treatment.
After tertiary treatment, 99% of all impurities have been removed from the water.
The treated effluent can be discharged into sensitive areas (aquifers), recreational areas such as parks and even upstream of rivers for subsequent potabilization.

ATOTONILCO, *DEPURĀRE MAXĬMUS*

Even before it was a Republic, Rome boldly created an innovative water supply and sewerage network that survived the Fall of the Roman Empire. A milestone in contemporary water treatment history: the ACCIONA Agua plant in the municipality of Atotonilco manages 60% of water in the enormous metropolis of Mexico City. It is no coincidence that it's the largest in the world; it supplies over 12 million residents.

- It cost **558 million euros** to build.
- Maximum treatment capacity: **50,000 liters per second.**
- 100% of the treated effluent is reused for agricultural irrigation, primarily corn and alfalfa crops.
- **It generates 197 MWh** of energy per year.
- Using this energy equates to a **reduction of 400,000 tons of CO_2 per year.**

THE FLOW OF ACCIONA'S INNOVATION

OFREA. The goal: to improve the quality of water treated for reuse in coastal zones. It uses the technique of forward osmosis, a wastewater treatment that involves passing water through semi-permeable membranes as it flows from a low-salt solution to a more highly-concentrated draw solution. The project is promoted and funded by the European Union.

RENEWAT. Aims to minimize energy consumption at wastewater treatment plants. It uses control algorithms to reduce the level of oxygen required to remove nutrients. High-efficiency equipment and renewable energy facilities work together to achieve this goal.

SWIN. A massive project with 21 partners, part of the European initiative SmartWater4Europe. Objective: to implement a management system for the drinking water supply network that enables instantaneous and remote control of water quality, meter readings and the general status of the network.

NEREDA. A disruptive water technology that causes aerobic bacteria to form concentrated compact granules that settle in the wastewater. This enables an unprecedented increase in the efficiency of the process.

Digital Water, Remote Operation

Big Data. Machine Learning. Internet of Things. All of the technological trends currently in the limelight are used in treatment plants (WWTPs). "Essentially, we automate plants, not only in terms of being able to manage them remotely, but also with respect to optimizing each process. Constant measurement enables us to know exactly how much energy we must consume at any given moment or how much chemical reactant is needed to settle impurities. This translates into huge savings," explains Manuel Navarro, Global Director of the Integrated Water Cycle at ACCIONA Agua. "Automation is undoubtedly the big challenge in treatment. The labor force is growing more professional as we incorporate techniques for control and maintenance of automatons that come at the expense of operating staff." The potential of new technology, however, is not being fully exploited. "We have the means to operate a wastewater treatment plant remotely. Now we need the government to amend the schedule of administrative clauses so that companies that operate in the sector can invest in WWTP automation technologies."

FERNANDO MORCILLO BERNALDO DE QUIRÓS
President of the Spanish Association of Water Supply and Sanitation (AEAS)

"We have the ability to adapt to the surrounding conditions"

What has Spain contributed to the history of water management?
Recognition of the usefulness of comprehensible regulation, geared towards the common good, that is under legitimate control and adhered to. The Water Tribunal of the Plain of Valencia, over 1,000 years old, is one example. It is responsible for the management of the resource in the natural geographic zone where the complete water cycle occurs, with the participation of users, territorial authorities and technical experts. This is the water basin model. Also, our companies have the ability to make use of a range of technologies and knowledge. They can also design complex systems, build and install them, and make them work efficiently over time. And we have the proverbial advantage of being able to adapt to the surrounding conditions.

What about the role Spain plays today in infrastructure and innovation?
I think Spain is bordering on being 'outstanding' in terms of supply, but gets a bare 'pass' for sanitation, that is, sewerage systems, urban drainage and wastewater treatment. Spain is not in compliance with the European Directive in small towns and sensitive areas where treated effluent discharged should have a very low nutrient content. As for innovation, we're on a par with - or above - the leading countries. We must not relax our efforts, though. We need to improve institutional structures and encourage the internal market.

What about disruptive technologies in the medium term?
Well, it looks like it will involve the monitoring of many parameters through mini sensors (multiparametric mini-sensorization) thanks to the Internet of Things. Also, augmented reality will be used to support operations, maintenance and training of specialists. Big data used to benefit citizens. Collaborative information. As for treatment, I think we will end up embracing membranes, micro-materials in a supporting role, and anaerobic conditions, which can drastically cut energy requirements and the production of CO_2.

How can sanitation and treatment be adapted in droughts?
The European circular economy strategy is a good starting point for changing social culture to encourage the reuse of water and its handling as a resource, even in terms of supply. Also, the use of bio-solids as end treatment products, as well as energy recovery. All of this should be encouraged in the fight against climate change, in addition to the desalination of seawater and technologies that cut energy consumption.

How should the sector tackle future challenges?
It's not easy, but I think sustained investment is essential to renew the large inventory of infrastructure and equipment in treatment facilities, as well as investment in new projects. Also, the cost of urban water services should be recovered with tariffs that rise progressively with consumption. All of this requires regulations based on independent, stringent and transparent technical criteria. It is essential to bring these challenges to public attention to make water part of the political agenda and raise the awareness of societies and individuals. ■

ENERGY WITH A SOCIAL IMPACT

THE CONSTRUCTION OF A RENEWABLE ENERGY PLANT IS ALWAYS GOOD NEWS FOR ITS NEIGHBORS. BUT IF IT'S AN EPC PROJECT WHOSE IMPLEMENTATION PLAN INCLUDES SOCIAL IMPACT MANAGEMENT, IT WILL ALSO CREATE STABLE EMPLOYMENT AND IMPROVE THE LEVEL OF TRAINING IN LOCAL COMMUNITIES OVER TIME.

by **Miguel Ángel Bargueño**

IT'S UNLIKELY THAT KATHU, A SMALL TOWN WITH SOME 11,000 RESIDENTS...

... in the heart of the Southern African Bushveld, would be a stop on anyone's sightseeing itinerary. It's rather famous for its iron mines and the mysterious 'camel thorn' trees that give it its nickname "the town under the trees"... and now for the solar thermal power plant that ACCIONA Industrial is building in consortium with SENER, to supply electricity to over 179,000 homes per year in Northern Cape province.

The plant is an example of renewable energy production infrastructure, constructed as a turnkey, or EPC (Engineering, Procurement and Construction) project. Not only do such projects optimize the development of these sorts of energy facilities, they also make positive social impact management a priority, in terms of the local economic fabric, educational development and technical training. ACCIONA is a pioneer and global leader in this area and is responsible for similar projects in Canada, Australia, Mexico, Chile, the United Arab Emirates and now South Africa.

Construction in Kathu began in May 2016, to take advantage of over 2,500 hours of average annual solar radiation, making the sun one of the main pillars of the country's future energy supply. With an installed capacity of 100 MW, the plant uses concentrated solar power (CSP). "It achieves extremely low water consumption, and bearing in mind where it's located, that is very important. Over the 20 years of the plant's useful life, it will save 8 million cubic meters of water," says Juan Manuel Cruz, Executive Director of Labor

SOCIOECONOMIC AND ENVIRONMENTAL FOOTPRINT

- Kathu's useful life: 20 years.
- Over the course of this period, it will contribute some 284 million euros to South Africa's GDP.
- It will create 10,768 jobs per year throughout its useful life.
- It will avoid the emission of 6 million tons of CO_2 and 44,000 tons of sulfur dioxide (SO_2) and nitrous oxides (NOx) during its operational life.
- It will save 8 million m^3 of water over the course of its operational life.

Relations, ORP and Sustainability at ACCIONA Infrastructure.

In addition to these direct benefits associated with the supply of clean electricity, ACCIONA Industrial's EPC project management model also considers local development benefits. Such advantages are not the result of mere chance; they are rather the subject of a prior study phase as rigorous as the technical calculations that are carried out. As pointed out by Juan Ramón Silva, ACCIONA's Chief Sustainability Officer: "Measuring socioeconomic impact enables us to foster contributions to the local economy resulting from our projects in terms of quality employment and GDP, and to gauge other externalities related to our social and environmental performance."

Next page: San Rafael Hydroelectric Plant (State of Nayarit, Mexico), one of ACCIONA's projects featuring social impact management.

DEVELOPMENT AND WELL-BEING

A project of this scope involves the use of a formula that includes several factors: the type of infrastructure that will perform best, the greatest socioeconomic benefits for the environment and the highest level of sustainability. "We work in three major areas of community development: well-being and commitment to the community, education and training, and social and economic development," says Miguel Portilla, Head of Sustainability at ACCIONA Industrial.

The social impact management study analyzes positive and negative consequences that may result from each project in neighboring towns. "It's important to study how we are going to interact with them, how we are going to help train them, what commitments we will take on in terms of local employment, local purchasing, what investments we are going to make, making sure that suppliers meet all of the quality requirements, etc.," explains Cruz. Decisions in these areas are not made unilaterally. According to Portilla, the company "is the fuel that enables these social management projects to be undertaken, but they are approved and developed in conversation with independent entities and the community, which defines its needs."

FOSTERING EMPLOYMENT

Over 5,000 jobs per year have been created in Kathu's construction phase [direct, indirect and knock-on], and there will be a total of more than 10,700 year-jobs over the course of the plant's useful life. "To create jobs with a 20-year outlook is to create truly stable employment." A long-term view is also taken of training. "We are working in very close partnership with communities: in addition to training plant workers, we make donations to schools for computers, for access to the Internet, etc. We want to contribute to ensuring more and more training for local people, because they will be responsible for the facilities in the future. These small hubs of innovation spread outwards. If, after a while, another company were to build a plant with similar technology in another part of South Africa, it would most likely employ staff from this area. In the end, we have created a tremendously valuable hub of knowledge and experience for the country there," adds Cruz.

Kathu is the most recent in a long list of projects that are able to contribute to local development. In 2010, during construction of the Baja California Sur III thermal plant in La Paz (Mexico), which supplies energy to 100,000 people, the company donated wood to build and furnish homes for several local ethnic groups and launched educational campaigns to promote recycling and the conservation of natural resources.

LOCAL TECHNICAL TRAINING CAN HELP DEVELOP A HUB OF INNOVATION IN KATHU

During construction of the San Rafael hydroelectric plant, also located in Mexico, it donated goods and materials for repairs to the parish church, to build an incinerator in a clinic and to clean the septic tank at a primary school. In Bokpoort (South Africa), the launch of another solar thermal power plant enabled a campaign of AIDS prevention talks to be organized (in collaboration with the South African Department of Health, the State Security Agency and various NGOs). It also enabled repurchase of wooden implements, constructed by members of the community, with material that had previously been donated by the company. This wood was also used to build homes.

QUITO SUBWAY

Juan Manuel Cruz points to the Quito subway, which is currently under construction, as an example. "We are going to contribute toward connecting the city, and on a social level as well. Today it can take two hours to travel across Quito, but by subway it will take just 20 minutes. People will be able to work in places they can't right now, and that will change the urban economic framework." 92% of the workers on this project are Ecuadorian.

Cruz has no doubt that this social focus will only grow in the company's future projects, where it will be just one more corporate objective. "Sustainability is a concept that is so often employed it has become almost commonplace in some sectors. For us, however, there is no other possibility but to expand it. We want to continue to be leaders in this area." ■

FOSTERING EDUCATION

In 2017, 113,320 people benefited from social initiatives linked to the Kathu solar thermal power plant.

75% of social funds have been channeled into training the local community.

25% are used to bolster local companies via training and technical support.

Funds have enabled the construction of bathrooms, classrooms and kitchens in schools, the delivery of furniture to four primary schools, the launch of an education campaign and the distribution of feminine hygiene products in 72 schools.

First aid courses have also been held for ambulance drivers and other training courses for schoolteachers.

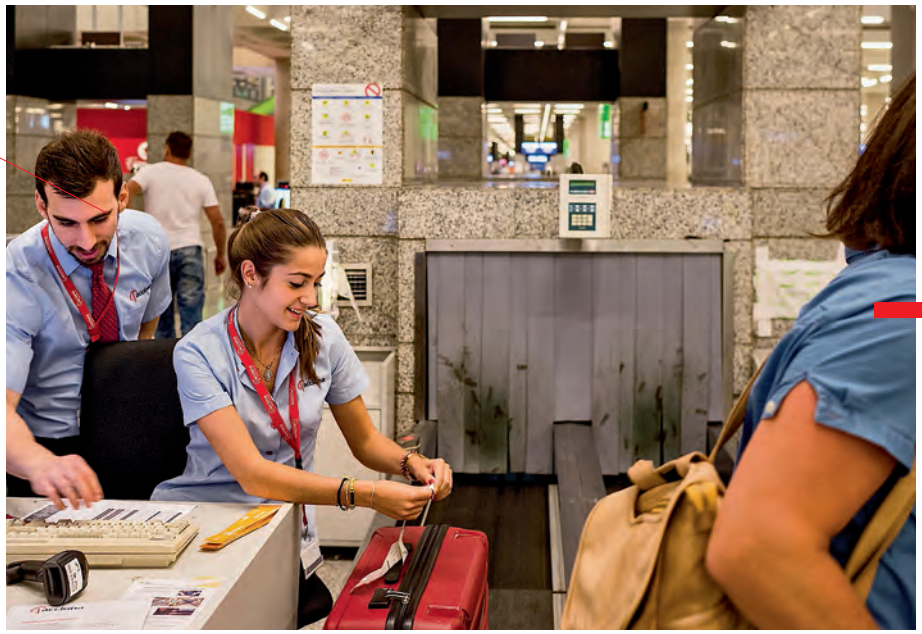
READY FOR TAKE-OFF

AIRPORT SERVICES: PERSONAL ASSISTANCE FOR AIRLINES, CREW AND PASSENGERS. LOGISTICS: FROM DE-ICING AIRCRAFT TO TERMINAL MAINTENANCE.

by
Patricia Alcorta

Travelers sit in an airport watching the hustle and bustle of carriers, passengers, crew, luggage, airlines, aircraft... They think it's a miracle that such apparent chaos could possibly run smoothly. But if they could see the planning work that's put in by airport service companies, maybe they would call that hustle and bustle 'choreography'.

ACCIONA Service has been one of those companies for 24 years and is one of the leading operators in Spain, Germany and Chile, with contracts in other international airports from Oman to Canada. Its portfolio of services is a mosaic reflecting the complexity of human and technology management. From attending to a medical emergency to de-icing aircraft, assisting cabin crew, running VIP lounges and cleaning terminals... right down to providing personal shoppers and outdoor garden maintenance. Plus, of course, delivering essential services like cargo logistics, luggage check-in and passenger boarding, as well as operating telescopic boarding bridges and steps.



PASSENGER SERVICES

Landside attention and assistance, from managing check-in queues to passenger information, as well as flight connections, boarding and assistance with connecting flights.

The company works in five of Spain's busiest airports: Madrid, Barcelona, Palma de Mallorca, Tenerife and Las Palmas.

CARGO

Safe-keeping, handling and delivery of all cargo in the terminal, including special or dangerous goods. And not only air cargo, but also the cargo carried by trucks and land transport vehicles. The mail you receive at home also goes through the company's hands.

OPERATIONS AND CARGO HANDLING SHEETS

The company operates the communication links between land and aircraft flight decks, in addition to planning cargo load distribution, weather information, assistance during engine start-up, coordination with the apron and assistance for cabin crew for whatever they need.

APRON

Significant operations such as towing and pushing aircraft, as well as others like loading and unloading luggage, drinking and wastewater management, transporting passengers and crew to the terminal and aircraft cabin cleaning.

BOARDING BRIDGES AND STEPS

Controlling the telescopic passenger boarding bridges and steps connecting aircraft with the airport terminal.

ACCIONA has provided services in major German international airports such as those of Berlin, Hamburg, Frankfurt and Düsseldorf.

HEALTH CARE

Health care service at Adolfo Suárez Airport in Madrid. Ambulances, mobile Intensive Care Units (ICUs) and emergency units with a team of 39 medical professionals. In 2017 alone, the service treated more than 13,000 people inside the airport and made 500 emergency transfers to local hospitals.

PERSONAL SHOPPER

Major airports are shopping centers with huge customer potential. For example, 47 million passengers went through Adolfo Suárez Airport in 2017. This service advises passengers running short of time where they can find shops selling products they need.

SPECIAL ASSISTANCE

People with reduced mobility needing special assistance get the help they need from their arrival at the terminal through to taking their seat on the aircraft. Assistance is not confined to people with special needs, the company also provides a service for unaccompanied minors and VIP passengers.

AIRPORT WORLD

- In 2016, airport services handled more than 90,000 stopovers for airlines in Spain, Germany and Chile.
- Chile leads the way in Latin America, with services at Santiago Airport and in another 10 of the country's busiest airports.
- Medical staff are permanently geolocated. Medical emergencies can sometimes occur mid-flight, which means top priority for landing.
- In Gran Canaria Airport alone, garden area and airfield maintenance work covers three million square meters.
- Since ACCIONA Service took over cleaning operations at Salalah (Oman), the airport has won the Skytrax award for the world's sixth-best airport.
- At Victoria Airport (Canada), a pioneering initiative has brought in cleaning machines that operate by themselves, using A&K Robotics technology.

ACCIDENT PREVENTION, A COMPETITIVE ADVANTAGE

POSITIVE PSYCHOLOGY AND LEADING-EDGE TECHNOLOGY ARE ALLIES AGAINST OCCUPATIONAL RISKS, BOOSTING PERFORMANCE BY CARING FOR PEOPLE. ACCIONA APPLIES THEM IN ALL OF ITS ACTIVITIES VIA A STRATEGIC PROGRAM.

by
Ángel Luis Sucasas

It was hard to accept that the Earth wasn't the center of the universe. So much so that legend has it that Galileo Galilei whispered the phrase "And yet it moves" to that infamous court determined to censor the truth. In the 21st Century, the world revolves around technology. Big data, machine learning, blockchain, IoT... these words are uttered with an almost religious fervor in forums all over the world. And yet, as occurred in the past, the wrong deity has been placed at the heart of everything. Technology in and of itself is blind, deaf and mute. What matters is the meaning we give it through its use.

ACCIONA's comprehensive safety approach focuses not only on its own companies, but also on outsourced contracts.

ACCIONA has chosen to take an approach based on workers' personal resources in order to tackle a basic challenge: occupational risk prevention. "Digitalization and technology help simplify tasks, but they don't replace human interaction. What's more, in the future, companies' competitive advantages will arise in the context of such

MIXED AND CAPTURED REALITY

Two examples of visualization technology. ACCIONA has a mixed reality platform that enables each user to log on and browse all the different options that merge layers of digital information with the physical world. This enables maintenance operations to be monitored remotely and warnings or corrections to be sent to workers' devices in real time. For its part, the captured reality tool developed by ACCIONA Innovation is able to make a 3D copy of a physical shape with the highest resolution.

interaction, from the use of social, personal and emotional intelligence, from empathy and the ability to inspire trust in others," explains Pablo Yáñez Rodríguez, Director of Occupational Risk Prevention at ACCIONA Infrastructure.

SVG SMART

The ORP (Occupational Risk Prevention) team at ACCIONA Infrastructure deploys all of its technological wherewithal in multiple parallel initiatives. One of its flagship projects is SVG Smart (Management Evaluation System), developed in partnership with the Polytechnic University of Catalonia (UPC). It entails nothing less than the creation of a digital oracle, a predictive tool enabling evaluation of occupational risk in situ and, as a result, development of specific actions to avoid it. "The aim is to use an enormous body of data to identify a percentage of risk posed by a given work activity. In other words, we work with possible futures," says Pablo Yáñez.

SVG Smart, currently under development, pools the results of 200 ACCIONA work centers collected in a test with 101 questions on 958 different information items spanning a period of five years. It must therefore manage over 11 million information items, evaluating each one in depth and coming up with predictions. The ultimate aim is to create tools to diagnose, predict and model possible scenarios. In other words, knowledge gained from processing millions of cases is used to identify risks that have not yet occurred and, consequently, to create protocols to avoid them.

Virtual reality programs are used in the management of La Almunia Wastewater Treatment Plant (Zaragoza).

"This will have an effect on all workers. It's not like you're auditing someone to assess how badly they're performing in some area. What you're doing is telling them, with irrefutable probability data, that if they do things a certain way they will avoid accidents and risk to human lives," he says. They also plan to adapt its diagnostic functions to each specific type of project.

A POSITIVE VIEW

Positive psychology optimizes the potential of each person in order to achieve success, and is an essential component of another preventive strategy. "All of the international organiza-

85% OF WORK-RELATED ACCIDENTS OCCUR FOR HUMAN REASONS

SAFER WORKPLACE PROJECT

Developed by ACCIONA's Innovation Department, the project applies the Internet of Things to safety at work. It entails two consecutive phases: identifying potential risks using all sorts of sensors, and transmitting warnings of these risks to the affected employee, as well as other employees nearby and to control centers. It includes a big data analysis of the system's history to detect recurring problems and design solutions.

Above: a worker on the Quito subway construction project with the Angel smart helmet, which prevents hazardous situations.

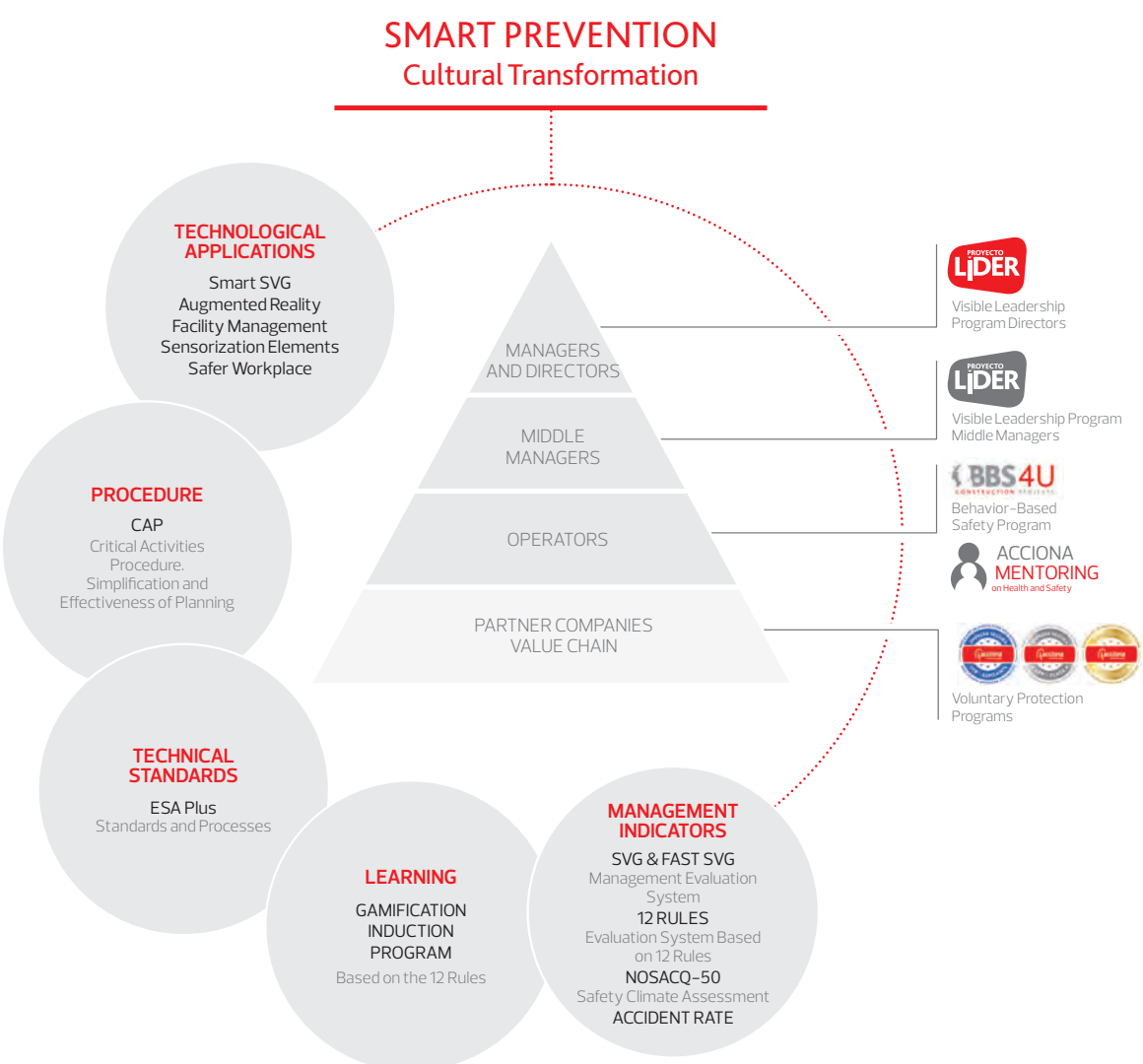
tions agree that outsourcing is a critical factor in occupational risk. If someone doesn't meet our requirements, we encourage them to take part in a program that qualifies them to work with us," explains Yáñez. This program rates users by employing a sports metaphor to describe their progress: contender, silver and gold.

ACCIONA also has its own gamification system, which makes fun and reward-based games part of the work environment. Employees can download apps with board games and video games that bolster a preventive culture through fun and entertainment. Once again, this entails the application of positive psychology and behavioral techniques, because if learning remains solely theoretical and doesn't turn into behavior, it's effectiveness is weakened.

PERSONAL ATTITUDE

The behavior-based safety program BBS 4U aims to improve the preventive spirit among workers for a single reason: 85% of work-related accidents occur for human reasons. It offers a wide range of incentives for employees whose conduct improves. "It has already been shown that money is not an incentive for behavioral change. We need to focus on other stimuli and to encourage each worker to see admission of a mistake as something positive and commendable. In a punishment for error culture, someone who makes a mistake will try to hide it out of fear of the consequences", says Yáñez. ACCIONA Infrastructure has already launched this program in Spain, Brazil, Colombia, Chile, Panama, Mexico, Norway and Ecuador.

The company uses visualization technology to strengthen safety in large international projects. In its Quito subway project, workers have had the chance to try the Angel smart helmet, a safety device that performs real-time sweeps of the worker's environment 1,000 times per second. If a risky situation is detected, it sends visual and aural notifications to the worker in the form of visual displays at eye-level and audio signals by the ears.



SAFE OUTSOURCED CONTRACTS

ACCIONA Infrastructure promotes the health and safety of its subcontractors via PPVs (Voluntary Protection Programs) which encourage the participation of the parties involved. The programs are based on work center evaluations and best practices, and play a role in projects, work conditions and employee conduct. The key aspect of this model is not only the attainment of desirable health and safety conditions, but also continual maintenance of these over time, as work center activities and dynamics are constantly changing.

The warning is also sent to the control center in case the worker is unable to perceive it for some reason. This allows help to arrive immediately, preventing the risk. The helmet stores and transmits the worker's geolocation at all times, enabling precise monitoring.

"The company explores each and every possibility that technology places within its reach. But the real revolution –insists Yáñez– is in cultural transformation through smart prevention, the use of emotional intelligence merged with digital management; this is the differential value offered throughout our pyramid model." ■

A residential property development by ACCIONA Real Estate in Calle Méndez Álvaro, Madrid.

BREEAM, THE GUARANTEE YOUR HOME IS SUSTAINABLE

FOR SALE: COSY HOME
(for the planet)

BREEAM IS ONE OF THE WORLD'S MOST EXHAUSTIVE ENVIRONMENTAL CERTIFICATIONS FOR BUILDINGS. ACCIONA REAL ESTATE IMPLEMENTS ITS REQUIREMENTS AND MORE IN ALL THE COMPANY'S HOUSING DEVELOPMENTS, ANTICIPATING FUTURE REGULATIONS.

by
Kino Verdú

For most people, buying a home is the investment of a lifetime. So it's just as well that, while the real estate sector is one of the country's economic engines, home-building is not without its ethical obligations. One of these is the responsibility to help the global transition toward a carbon-neutral economy, which also happens to be a very good business opportunity. As such, the sustainability of property developments is now growing in strategic importance, laws are becoming stricter and pressure from the market is increasing.

ACCIONA Real Estate is one of the bigger companies using the exhaustive BREEAM (Building Research Establishment Environmental Assessment Methodology) ratings, which assess a building's environmental performance. Indeed, the office building assessment method was first launched in 1990 in UK by the organization Building Research Establishment. "Today, in addition to managing the BREEAM certification all over the world, it continues its research, assessment and testing work for the sector on a private, independent level," explained Félix Rodríguez, Institutional Relations Manager at BREEAM Spain.

TEN CATEGORIES

The certification is used for both the design and construction phases, and has 10 categories: Management, Health & Wellbeing, Energy, Transport,

Water, Materials, Waste, Land Use & Ecology, Pollution and Innovation. "We apply an environmental weighting factor to the scores achieved in each category after they are assessed, because the points obtained in each of them differ in importance. For example, Energy has the greatest weight in the overall score: 18%. Health & Wellbeing has a weight of 14%, Materials of 12%...," said Rodríguez.

In addition to energy efficiency, the model evaluates parameters such as water consumption, reduction of pollutant emissions, interior air quality, the use of materials with low environmental impact, and even the possibility of using alternative means of transport and public transport links in the area around the housing development.

FIRST DEVELOPER

ACCIONA Real Estate has long had its own sustainability guide, which it implemented in all its developments. "But when we decided to relaunch our activities, we realized that this catalog of requirements needed to be updated and strengthened," said the company's Technical Director Pablo Nieto. "In early 2015, we set ourselves the goal of stepping up our commitment to sustainability and decided to certify all our developments with BREEAM, when no other national developer had even considered doing so."

In January 2015, there was only one multi-family building in Spain certified with BREEAM, and it had a 'Pass' rating. Today 42 such developments have been certified in the design or post-construction phases. So far none of them have achieved the overall rating of "Very Good". Of the six that have achieved this rating in the design phase, three are ACCIONA developments. "No other company in the sector has made such a strong commitment to certifying its residential buildings. Not only do we certify 100% of our residential properties, we also aim for a rating of Very Good in all of them," Nieto pointed out.

This goal requires special efforts on the part of ACCIONA Real Estate, which goes beyond the basic requirements for certification in areas such as energy efficiency. "All of our projects include the design of building envelopes [separators between interior and exterior spaces] and installations that maximize the building's energy efficiency. We are developing a residential project in Madrid in accordance with the Passivhaus design standards, which anticipates the regulations that we will see in the coming years. We are also working with ACCIONA Green Energy to facilitate the procurement of a supply of 100% renewable energy for the owners of our homes," added Nieto.

IN NUMBERS

BREEAM was launched in Spain in 2010. Since then it has certified

342 buildings

(150 are currently undergoing certification) in almost every autonomous region.

Seventy percent are in the office, retail and industrial sector, while

23%

are from the residential sector. The latter has experienced sharp growth in the past four years. In 2014, just 40 homes were certified, while today almost

8,000

hold the mark.

GOOD MARKS IN THE EXAM

MEASURES TAKEN BY ACCIONA IN THE MAIN BREEAM CATEGORIES

ENERGY
Designs cut emissions of CO_2 and energy demand in building envelopes. Low-consumption lighting, appliances and elevators

POLLUTION
Lower emissions of NOx (nitrogen oxides) and outdoor light pollution

WATER
Lower water consumption by taps and toilets. Native species, and species with no need for watering, are planted in green spaces

MANAGEMENT
A code of social and environmental conduct governs all developments, reducing the impact of construction sites

MATERIALS
Materials with the lowest environmental impact possible are used throughout the supply chain

HEALTH & WELLBEING
Interior air quality and access to natural light is assured. Thermal zoning, sound insulation and accessibility

WASTE
Waste management for every works site, installation of domestic waste storage systems

‘MOTHER NATURE NEEDS HER DAUGHTERS’

FOUR OF THESE DAUGHTERS ARE TAKING PART IN AN EXPEDITION TO ANTARCTICA TO FIGHT TWO BATTLES AT ONCE: CLIMATE CHANGE AND GENDER STEREOTYPES IN SCIENCE.

by
María Orriols

Let’s play a game using the imagination: quickly let the image of a great scientist take shape in your mind. You’ve almost certainly thought of a man wearing a white lab coat, even if you’re a female reader. Now let’s play it again: a scientific team on a boat sailing between icebergs near the South Pole. Yes, it’s easier to imagine people with beards.

But it should be just as natural for the world to imagine a woman in that lab coat or sailing among icebergs. This is the aim of Homeward Bound, a project launched in Australia in 2016 to fight both climate change and the under-representation of women in the STEM disciplines. This article’s headline is its telling slogan. Its strategic approach is to organize an annual expedition of 80 women to Antarctica with a view to eventually forming a network of 1,000 female STEM professionals who will continue to work together on research, communication and education projects.

This year is another first in that four of the women come from Spain. They have just completed the voyage, which took them to the Argentine city of Ushuaia and five scientific stations operating under the flags of China, USA, UK, Russia and Argentina. Alicia Pérez-Porro is a marine biologist and a member of the MECUSA Commission (Women in Science in the USA). Alejandra Dubini, a native of France who lives in Córdoba, specializes in the development of biofuels from algae and in wastewater decontamination. Ana Payo is an oceanographer whose expertise lies in strategies to fight the impact of climate change on biodiversity. And Uxúa López is a telecommunications engineer who specializes in cybersecurity in renewable energy control centers. Uxúa works at ACCIONA, Homeward Bound's main Spanish sponsor.

WORKING GROUPS

The expedition is nearly four weeks long, which is not enough time for in situ research to be conducted, but enough "to enable first-hand knowledge to be gained on the Antarctic stations' research," explains Alejandra Dubini, and to determine how to apply this knowledge in Homeward Bound's working groups, which address health standards, water supply and the effects of drought, among other topics. And not just in developing countries. As a case in point, 74% of Spain's land is experiencing desertification.

But it is in the poorest countries, points out Uxúa, that natural disasters wreak most devastation, particularly among women farming or who must "walk farther and farther to find drinking water." The same goes for floods. In some countries women typically account for 70% of flooding victims, since they might not be able to swim or remain at home to care for children and the elderly.

Obviously, the biggest challenge our species has faced over the course of its history requires a response that mobilizes all the human resources at our disposal. This is where fostering the role of women in science comes in, not only because we need more scientists, researchers and engineers in general, but also because of the added value that diversity brings to teams. ■

OVERCOMING PREJUDICES

The ACCIONA team. From left to right: Uxúa López, Alejandra Dubini, Ana Payo and Alicia Pérez-Porro, during the expedition to Antarctica.

To achieve equality in scientific decision-making bodies, many more women must be convinced that STEM disciplines are natural options for their future. Moreover, prejudices must be overcome that are more deeply-rooted than they initially seem. Only less than three years ago an European survey yielded worrying conclusions: just 20% of key decision-making posts in the scientific sphere were occupied by women, and 63% of the Spanish population believed that women were less qualified to be top scientists. This view is not exclusive to Spain. In France, Germany, Italy and the United Kingdom, that percentage is even higher.

IN NUMBERS

The **4 professional women from Spain** were selected out of **300 candidates** from **13 countries,** including economists and journalists who specialize in climate change

In Spain, **women** receive **18%** of **scientific awards**

In 2014, just **21%** of **female Spanish university students** were studying **STEM** degrees

BAHRAIN'S HISTORY ON DISPLAY

THE 'QAL'AT AL-BAHRAIN AUDIOVISUAL EXPERIENCE' RECREATES A 4,300-YEAR JOURNEY, FROM THE DILMUN CIVILIZATION TO THE BAHRAIN FORT, AT A WORLD HERITAGE SITE.

by **Patricia Alcorta**

"The land of Dilmun is holy, the land of Dilmun is pure... The lion kills not, nor does the ravening wolf snatch away the defenseless lamb." This is how Sumerian tablets describe their own version of paradise, a place where disease and suffering did not exist, where everything was not only good but also abundant: the mythical Dilmun culture that occupied the current island of Bahrain.

In the late 20th century, however, archeologists proved that this paradise had actually existed. It was a land of tradesmen, a key port for merchandise traveling between the Mesopotamian and Indus civilizations, whose capital was on the coastal strip where the Bahrain Fort stands today. UNESCO declared this archeological site, Qal'at Al-Bahrain, a World Heritage Site due to the extraordinary meeting of cultures with remote origins which had always been considered mythological.

But science can also draw on fantasy. It does so in the audiovisual show created by ACCIONA Producciones y Diseño (APD) for the Kingdom of Bahrain, the country's first permanent cultural engineering project. The aim: to drive tourism, restoring the island to its status the destination of choice in the Persian Gulf region, four thousand years later.

The audiovisual production is projected onto the fort's walls and towers (of Portuguese origin, 16th century) every night, offering a review of the myths and history of the island with immersive animations: Cuneiform script and the monarchs of the earliest known civilization (Sumer), the orchards that grew alongside hundreds of natural springs, the sea that brought riches and therefore invasions, construction of the castle itself which serves as a giant screen... until the journey reaches its final destination: 21st century Bahrain.

VIDEO
https://youtu.be/oKA-3CIhwxs

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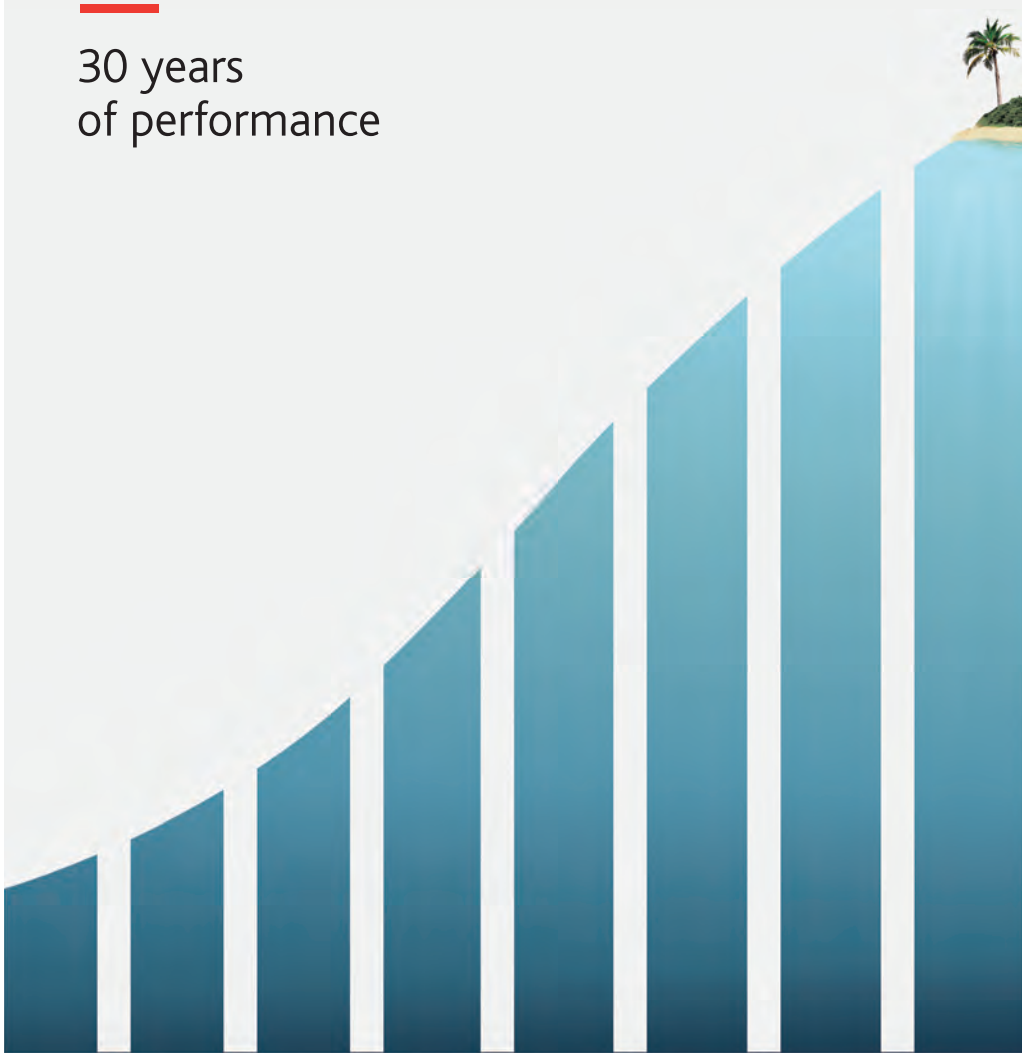

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