

Irizar Group magazine



**COACH
OF THE YEAR
2018**

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you can trust***

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We are continuing to develop our strategy of seeking synergies among all Group companies. Every day there are closer relationships between all the companies and, in addition to developing the products and markets in the business areas of each company, we are achieving great technological advances in our entire range of coaches and electric buses with their main systems.

We continue to move forward with a focus on the development and strengthening of the brand based on our own products. The manufacture of Irizar brand coaches at our parent plant already accounts

for a third of our output and we are convinced that this trend will continue and we will generate new growth in the coming years.

In May this year we opened the new Irizar e-mobility plant in Aduna, Guipuzcoa, Spain.

Because of our good position in the market and the good performance of our 100% zero emissions electric buses, we are already confident that customers will place new orders with us, as is currently the case for Bayonne, Amiens, Luxembourg, Barcelona (TMB and AMB), Madrid, Aix en Provence, etc.

We are still involved in important R & D programs in electric mobility, as we are convinced that this activity is key to the Group's growth.

Our parent plant in Ormaiztegui has again surpassed 1400 production coaches and the manufacture of integral buses has grown 30%.

The Brazil plant is already manufacturing 700 coaches for export, mainly to Chile, Australia, Peru and South Africa.

The Mexican plant is continuing to manufacture around 900 coaches a year for the Mexican market. Half of the coaches are the Irizar i8 - our flagship model.

"This year we are enjoying the recognition of our Irizar i8 as the best coach of the year in Europe".

We are continuing to expand our Irizar sale and services network. We have already established our own companies in the USA and the Benelux countries and we have signed distribution contracts in Sweden.

This summer we began delivery of our new generation of efficient, smart coaches with the integration of the Paccar-DAF engines and the new ZF transmission range. The coaches are more sustainable, consume less and have lower emissions, they are connected, predictive, reliable, silent and offer a 6% reduction in Total Operating costs.

Of course, we continue our unshakeable commitment to the sustainability and well-being of our customers and citizens. After the technological breakthrough of the launch of the new Irizar product range in the last two years, with its two star models, the Irizar i8 and the Irizar i6S, and with the range of hybrid products that we are expanding to add electric

mobility features, the time has come to complete the range of electric buses.

In the most recent Busworld fair we presented our articulated 18 metre model, Irizar ie tram, which like the Irizar iebus, is supplied in 12 or 18 metre versions with in-depot charging or opportunity charging, based on customer need.

The new vehicles are fully fitted with the Group's technology in electronics and communications as well as in its main systems: power train, batteries and charging systems.

We are starting to feel that we are already important in Europe; that our efforts of recent years in technology, sustainability and customer proximity, in short in strengthening our brand, are now starting to produce results.

We are therefore continuing along our path of solid growth with a commitment to our customers and to society, which we demonstrate by trying to offer more value added in key areas in the world today such as safety, comfort and sustainability.

We want to say a warm thank you to our customers for bringing us to this position. Thank you very much to everyone - we will do our best, we will to the impossible, not to disappoint you in the future.

Many thanks to all of you,

José Manuel Orcasitas
CEO of the Irizar Group

Irizar Group

Irizar is a business group with an international presence, which is currently involved in six sectors - passenger transport, electromobility, electronics, electric motors and generators, connectivity and energy.

The Irizar Group is comprised of 7 brands (Irizar, Irizar e-mobility, Alconza, Datik, Hispacold, Masats and Jema) that have production operations in 13 production plants in Spain, Morocco, Brazil, Mexico and South Africa in addition to its own R&D centre.

It is a well-established Group made up of more than 3,300 people, with a commercial presence in the five continents and with a turnover of 700 million euros.

Irizar, S. Coop is the parent company of the Group and its central headquarters is located in Ormaiztegui (Guipuzcoa, Spain) where Creatio, the Group's Research and Development Centre, is also located.

Founded in 1889, today, the Irizar Group is a well-established Group. It is geographically and industrially diversified, continuously growing and firmly committed to the brand, technology and sustainability

 **Founded in 1889**
(129 years of history)

 **1 R&D centre**

 **7 companies**
leading in each sector

 **More than 3,300 employees**

 **Financial stability**

 **700 M euros**
estimated turnover in 2018

 **Present in 5 continents**
in more than 90 countries

 **13 production centres**



Irizar Group Business Areas

The Irizar Group is present at the following business areas:

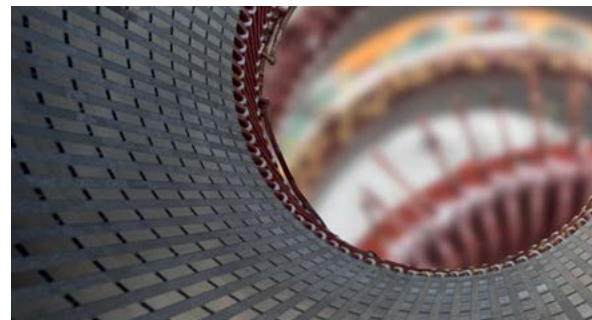
Passenger transport



Electromobility



Motors and generators



Electronics



Connectivity



Energy



Wide range of biodiesel, hybrid, electric and conventional integrated coaches and buses.



Turnkey electromobility solutions for cities. 100% zero emissions, electric vehicles, charging systems, electric traction, energy management and storage.



Accessibility systems for public transport vehicles.



Climate control systems for buses, coaches and rail vehicles.



Engines and generators for the marine, hydroelectric and industrial sectors



Power electronics applied to network and transport quality. Power supplies for Big Science.

Renewable energy, storage and Smart grids

Electronics for coaches.



Integral fleet management

IoT connected systems.

ADAS (Advanced Driver Assistance System) solutions.

Driverless vehicles



Irizar Group's Research and Development Centre which was created in order to enhance the Group's applied research and technological development capabilities both for its own-brand products as well as for the main coachwork components.

Passenger transport

Irizar offers a wide range of coaches and buses ranging from integral coaches and 100% electric buses, to hybrid technology in Class II vehicles for urban and intercity services, as well as conventional coaches.

Components and systems are also being developed within the Group for road and rail passenger transport. **Masats** is a specialist in accessibility and infrastructure, while **Hispacold** develops climate technologies, air purifiers and defrosters. **Datik** develops devices that monitor and manage information generated by vehicles to make driving, diagnostics and preventive and predictive maintenance easier.



Irizar, a brand you can trust

Advancing towards a great future

The brand is our greatest asset and an undisputed icon of our strategy to maximise the value of our customers, providing them with the best products and services tailored to their needs and offering them the guarantee of a solid project in which to trust. Our strategy is based on customer proximity and direct relationships with them in order to gain their loyalty and trust.

Irizar brand complete coaches and buses are the ultimate representation of our brand. Currently, the manufacture of Irizar brand coaches at our parent plant already accounts for a third of our output and the upward trend continues.

At the electric bus plant, recently inaugurated in May of this year, we are already producing one zero-emission electric bus a day for the European markets with very good growth expectations.

The development of Irizar's brand strategy based on the brand, technology, sustainability and customer focus, which has been developed in recent years, is proving very fruitful. And this is supported by the awards that the Irizar brand has earned in recent months such as the Best Constructor of the Year Award by the Busworld Academy Awards the Irizar i8, Coach of the Year 2018 and the Best European Company Award in the sector.

The sales and service network is still in the process of expansion and it is currently possible to locate an exclusive point of sale for quality and warranties offering personalised R&M packages in all places where its coaches operate. The service is run, as well, by people hired locally, which contributes to the creation of wealth and employment in countries where we are expanding.

New implementations of the brand in markets:

Irizar in Sweden

Irizar is already present in Sweden after the agreement with the strong Swedish group, Lecab. It does so with a wide range of products including Irizar brand complete coaches, hybrid coaches, HVO (hydrogenated vegetable oil), conventional coaches with Scania chassis, as well as integrated electromobility solutions customized for cities, both in terms of zero-emission electric buses and in the installation of primary charging, traction and energy storage systems.

Irizar Benelux

Irizar has also created Irizar Benelux with headquarters in Luxembourg from where it will undertake sales and after-sales of both its complete coaches and electric buses as well as complete electromobility solutions already operating in the capital of the Duchy.

In addition to the sale of several dozen complete coaches, the group has recently received an order for 14 articulated electric buses of 18 metres and 6 units of 12 metres with which Luxembourg becomes the group's largest market within Benelux.



Germany, Austria Switzerland

In Germany, Austria and Switzerland the electromobility solutions of the Irizar brand will be offered through Ferrostaal Equipment Solutions.

Irizar and Ferrostaal Equipment Solutions provide their clients with a holistic approach that includes analysis, study and selection of the best solution adapted to their needs.

The line of products is complemented by intelligent financing products from MPC Capital, sister company of Ferrostaal Equipment Solutions, in order to mitigate the extraordinarily high cost involved in the purchase of electric vehicles.

The objective of the company is to offer a complete logistics chain in Germany, Austria and Switzerland in the form of integral solutions. The combined effort of both companies will facilitate the presentation of the electric bus to potential customers.

Ferrostaal Equipment Solutions is part of Ferrostaal Trading Group, an international commercial and industrial services company.

In Italy

In Italy, where Irizar has been a benchmark in the coach market for the past 25 years under the Irizar Italia brand the offer of coaches has been extended to include complete coaches after taking control of the majority of the company this year.

This year, 75% of total sales in Italy will be Irizar coach brands. Furthermore, the expansion of the sales and after-sales network, customer proximity and the availability of R&M agreements will continue in order to achieve higher market shares.

Additionally, as a result of the Irizar Group's commitment to this market, Irizar Italia is expanding

its current line of products and services incorporating integral electromobility solutions customized for cities, both in terms of the manufacture of zero-emission buses as well as the manufacture and installation of major infrastructure systems necessary for charging, traction and energy storage.

In the USA

In response to the interest and acceptance in the American market, Irizar takes another step forward and creates its own company in the United States, IRIZAR USA LLC.

The company is headquartered in Las Vegas, Nevada and has a team of qualified personnel, some of whom were already working for the firm.

With a consolidated product properly adapted to the US market, a new stage is now beginning in which, with renewed anticipation, Irizar will reinforce its presence with a greater involvement in the project.

There is complete conviction from the Irizar Group that quality and service, as well as commitment to customer proximity, in order to adapt to their needs, will be the key to strong growth in the future.

In this way, Irizar deepens its strategy of working hand in hand with operators in order to provide them with the best products and services that better suit their needs and to position the company in the market as a premium coach brand.

The Irizar group would like to thank the people from the previous team for the work carried out introducing the brand into the market and the great relationship they have had with the people of the Irizar team, both during the phase of introduction into the market as well as in that which has led to the beginning of this new stage.

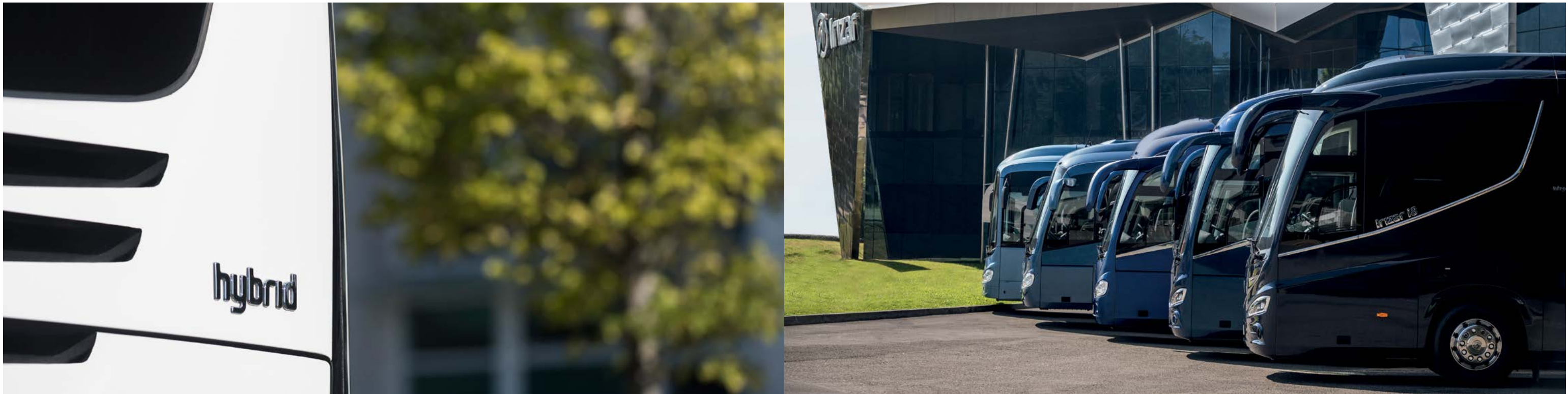
Traditional markets: Spain, France and UK

If, in addition, we add the positive evolution of the Spanish, French and English markets where Irizar grows and obtains great notoriety due to the fact that customers appreciate the reliability, design and service provided by the brand, there is no doubt that Irizar has become a great benchmark for both long-distance or occasional service operators with the

Irizar i6S as well as for large tour operators and VIP coaches with the Irizar i8.

Thus, Irizar continues its path of solid growth with committed people, strengthening its commitment to the brand, technology and sustainability.





Our hybrid coaches offer a 20% reduction in fuel consumption compared to a conventional diesel coach

The best range of products ever seen

We have a new generation of high-tech coaches for the premium sector, based on the i8 and i6S models, intercity coaches with hybrid or biodiesel technology and class I zero-emissions electric coaches.

A catalogue of products which aims to provide competitive advantage in safety, reliability, sustainability, technology and profitability for our customers.

All of this enables us to cover all sectors of public passenger transport, from occasional services to regular public commuter services, encompassing urban, intercity and long-distance routes and to position ourselves at the head of the mobility market.

Our hybrid coaches offer a 20% reduction in fuel consumption compared to a conventional diesel coach.

Only Euro 6C engines that can operate with state-of-the-art diesel (10 ppm sulphur content) or HVO (hydrogenated vegetable fuels) are available.

The whole range of buses and coaches has the most advanced active and passive safety systems and technologies on the market.

Designed to meet the most demanding parameters, Irizar coaches are robust, light, quiet and reliable.

Now comes the intelligent and efficient generation

Irizar presents the efficient and intelligent coach generation born from the integration of the new Paccar-DAF engines and the new ZF transmission line. This innovation has resulted in a generation of more sustainable coaches, with lower consumption and emissions, connected, predictive, reliable, silent and with a reduction in total operating cost.

The new engines pursue the minimum fuel consumption possible to achieve maximum reduction in emissions. Likewise, the new ZF-Traxon transmission goes beyond efficiency in consumption with advanced functions offering more economic and easier driving.

The new features include PreVision GPS, the transmission/GPS system interface that enables a predictive driving strategy that adapts the gear-shifting sequence to the route topography. Additionally, a new generation of "direct drive" drive shafts will also be available starting at the end of 2018, which will reduce noise and consumption.

In light of these innovations, Irizar focuses on the concept of "power on demand", by going further with systems that consume power only when demanded by the service. The optimization of the behaviour of the engine cooling system, the new steering pump or the compressed air system are the initial solutions where work is taking to place in search of real fuel consumption savings.

This new generation of engines will set new standards in efficiency, with improvements in consumption in excess of 6% compared to current kinetic chains and consequently reducing CO2 emissions.



KEY ATTRIBUTES

Total operating costs

Thanks to Irizar's smart technology, total operating costs have been reduced by more than 6 %.

6% fuel reduction

Greater efficiency and optimum performance of the engine and all its components achieving a reduction in fuel consumption of up to 6%.

Repair and maintenance

Improved engine compartment access to reduce repair and maintenance costs.

Computer vision

Our computer vision technology intelligently integrates information from radar, camera and GPS for predictive driving. To adapt driving to the topography and road conditions and to use the smartest gear changing strategy.

More sustainable

Integration of the most advanced emission reduction technology in advance of the new European regulations.

Comfort

Increased comfort by reducing noise and vibrations.

Power on demand

Thanks to our power on demand technology, consumption has been further reduced, component life increased and maintenance intervals lengthened as much as possible.

Passenger capacity

Improved weight distribution and increased passenger capacity and manoeuvrability. Overall weight has been reduced by more than 300 kilos.

Irizar virtual cockpit

Another innovation incorporated into the coaches is the new virtual cockpit by Irizar. The cockpit provides innovative functions in terms of both technology and quality. The high resolution 12.32" display has a colourful, dynamic and intuitive design and displays comprehensive information in flexible form that can be adapted to any needs arising at any time.

The Irizar virtual cockpit offers all the necessary information in an attractive colour design, with fixed elements on the screen combined with dynamic elements that are shown in the central window, depending on the information requested by the

driver at the time. Controlled by the multifunction steering wheel, the switches on the steering wheel are used to navigate through the different system menus.

This new Irizar technological commitment means that the driver can interact with the vehicle and constantly quickly obtain all the information needed for safe, comfortable driving.



Pioneering spirit: State-of-the-art technology and innovation

In the Irizar Group we have our sights set on the future. In addition to the innovations presented related to the integration of new motors, we are involved in important and ambitious projects at the European level to outline future directions in mobility and other business areas where we operate. Projects are being carried out with the knowledge and contribution of our own technology from Group companies as well as significant collaboration with technological centres.

These projects relate to driverless vehicles, electric mobility, energy storage systems, energy efficiency, standardization of charging systems, connectivity, big data and artificial intelligence, which are basic

in the new generation of clean, efficient, fast, standardized and smart transportation.

Smart technology

It is worth highlighting the interior and exterior full LED lighting, the multiplexed architecture and CAN communication protocol that harmonises all of the coach's electronics, enabling diagnosis and data collection using the OBD connector, and provides the operator with intelligent systems. It is also worth noting the driver assistance systems (AEB-LDW), integrated via the touchscreen control and

HMI console, from where the driver can manage the entertainment and comfort systems.

Irizar's artificial intelligence technology applied to predictive maintenance, online monitoring and our customer service philosophy play a part in creating a new generation of smart and efficient buses and coaches with the highest levels of reliability.

The integration of new Paccar-DAF engines and the new ZF transmission range brings about the concept of a more sustainable coach, with lower consumption and lower emissions, and that is connected, predictive, reliable, silent and offers a 6% reduction in Total Operating Costs. A generation equipped with new features, such as PreVision GPS, a transmission/GPS system interface that enables a predictive driving strategy by adapting the gear changing sequence to the terrain of the road. For

its part, the "direct drive" option for the drive axle reduces noise and consumption. Irizar is making progress with the "power on demand" concept by looking further into systems that consume power only when demanded by the service.

The new virtual cockpit offers innovative functions both in terms of technology and quality. It allows the driver to interact with the vehicle and to quickly receive all the information they need for comfortable and safe driving.



Service Commitment. Support throughout the process with maximum efficiency

In addition to its wide range of reliable and sustainable products, the Irizar service offers custom solutions, designed and created to offer you the best: (financing, repair and maintenance contracts plus collection of your used vehicle).

Having an integral repair service, tune-ups and maintenance with a maximum guarantee 24 hours a day 365 days a year is still a value that cannot be beat.

At Irizar we know that fuel is the major cost component for operators, so Irizar makes every effort to reduce consumption. The new generation of coaches offers the minimum TCO (total cost of ownership), with the following basic elements: minimum fuel consumption, long oil and filter change intervals (up to 150,000 km), particle filter with automatic regeneration and without maintenance up to 700,000 km, very competitive spare parts price and a large number of service points throughout Europe.

We have a help desk in each European country and a central help desk with 24h support, 365 days of the year.

As a consequence, the residual value of our vehicles is very high which also reduces their financing cost.

In summary, a very competitive TCO, below-average CO2 emissions and an after-sales service which is a benchmark in the sector.

Moreover, we can equip coaches with the most advanced technology for comprehensive monitoring and control of costs and efficiency, which helps transport companies to optimise the performance and profitability of each fleet.

Irizar offers customers close follow-up and advice that translate into optimization of vehicle reliability and availability. It includes integrated electronic management, Irizar connectivity, as well as fleet management solutions and remote diagnosis that result in a considerable reduction of consumption and emissions.

All in all, Irizar is ready to respond to current and future service and sustainable mobility needs of passenger transport.

Irizar is ready to respond to current and future service and sustainable mobility needs of passenger transport.

Leaders in design and customization

The spectacular design, at the service of aerodynamics that optimizes consumption and confers prestige on its owners, is one of the strengths of Irizar. At the same time, it offers exceptional comfort for driver, guides and passengers, thus guaranteeing an unforgettable and exhilarating experience.

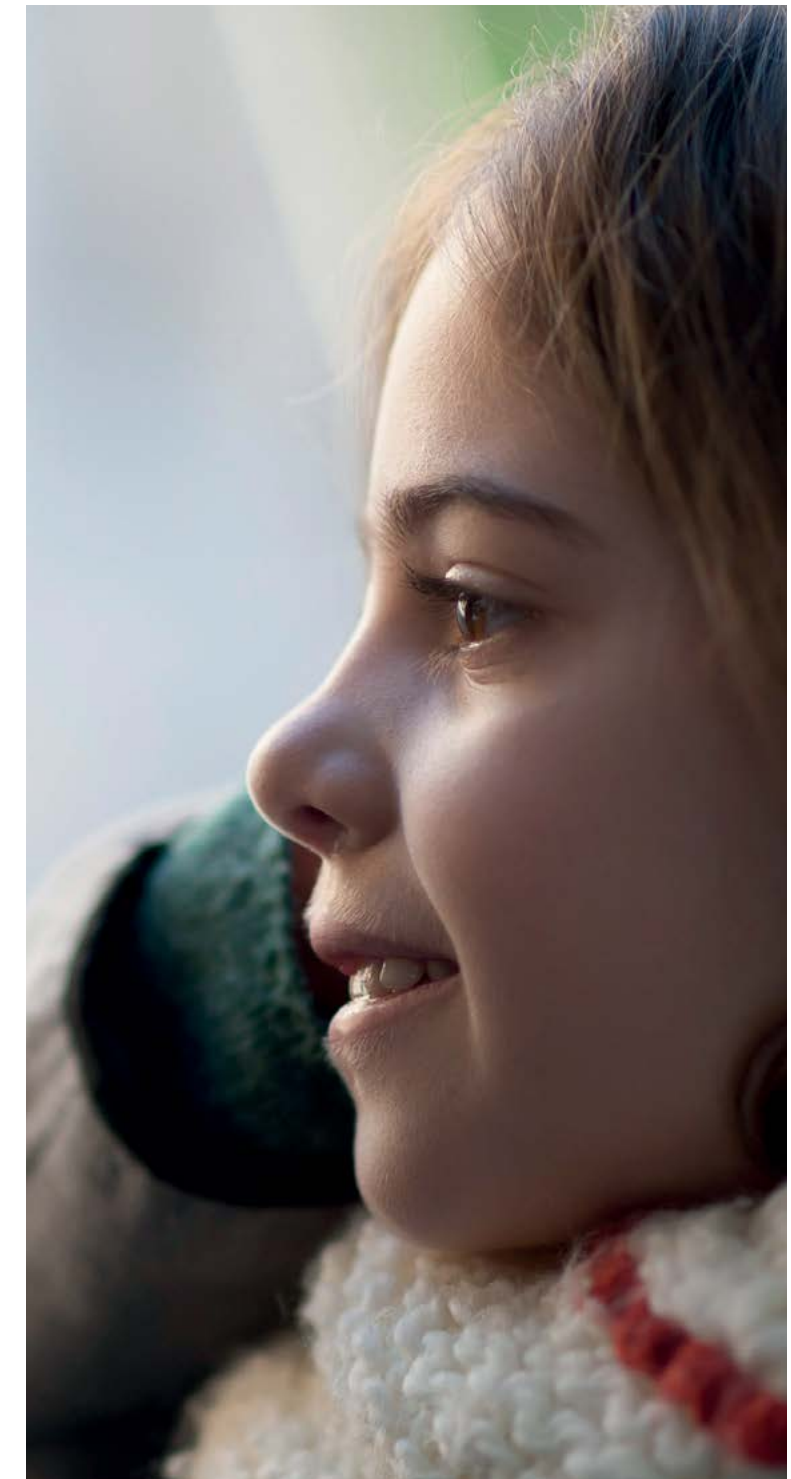
Consequently, all Irizar vehicles stand out for their large and distinctive personality and overwhelming visual impact.

Another Irizar maxim is the unlimited customization option that it offers to the market and to operators, which is undoubtedly a competitive advantage.

Sustainability in capital letters

Our commitment to the sustainability and well-being of our customers and citizens leads us to go much further.

Proof of this is the Irizar Group's major commitment in the fields of electromobility, artificial intelligence, hybrid technology and autonomous driving.



“The future is today”



is "powerful, with great scope for customization, ergonomic armchairs, comfortable, spacious interior..." and performance, "unbeatable in braking, radius of rotation ..." Environmental considerations are very positive in relation to the "maximum capacity of the vehicle, its reduced energy consumption, minimum vibration levels and noise, even in very tight corners". Regarding technology, "the dashboard is a benchmark, multiplexing keys and adding an HMI for the first time as standard. Safety: Full LED headlights, pioneering systems such as AEB, LDW, TPTMS, ACC and DFT as options. In addition, it meets R/66.02. In the section on total vehicle costs the evaluation is: "the purchase price, depreciation and residual value, consumption and repair and maintenance costs make the i8 a benchmark".

Euro Coach Test 2017

The Coach of The Year award for the best coach of the year was established more than five years ago and this was the first time in history that Sweden has hosted the Euro Coach Test. Specifically, the city of Linköping, 240 kilometres south of Stockholm, hosted the test, where six maximum world-class competitors all gathered with their coaches: Irizar's integral i8, the Iveco Bus Evadys, the Mercedes-Benz Tourismo, the Neoplan Tourliner, the Scania Interlink HD and the VDL Futura FDD2-141 double decker.

The meeting brought together more than 60 professionals as members of the Jury of the Coach of the Year Award and managers of the manufacturing brands.

Both the presentations as well as the start and finish lines of the road tests took place at Mantorp Park, a circuit built in 1968 that was used for Formula 2 races during the 1980s. Currently, its facilities host different events such as exhibitions, driving tests and speed competitions.

The road route test, in which all drivers participated at the wheel of each participant coach at least once, was 30.6 kilometres long and took about 40 minutes to complete.

The Irizar i8, the best of the best

For the first time in its history, the Irizar brand is the winner of the most prestigious European award

The Irizar i8 bus has been nominated as the BEST COACH OF THE YEAR 2018 in Europe

A jury of specialist journalists from the most prestigious magazines in the sector in 22 European countries has decided to award the prize to Irizar i8 for its countless attributes and the high added value it offers.

The award recognises the great strategic leap taken by Irizar in recent years, to position itself among the best independent European manufacturers (OEM).

The Irizar i8, together with the other coaches of its range, is the pillar on which this brand is building its future prospects in the long-distance and occasional service sector.

It can be affirmed therefore, that Irizar currently has the best range of coaches in Europe as affirmed by the numerous customers who have new generation Irizar vehicles.

The exceptional performance and response of the vehicle during the Euro Coach braking and acceleration tests and the open road driving tests on a mixed 30 km route between dual carriageways and secondary roads have given Irizar i8 a victory. It should be mentioned that this first position is even more meritorious given that the vehicle submitted was a 3-axle, 14-metre version and was competing with three other 12 m, 2 axle vehicles, which are significantly lighter.

The Irizar i8 is a thoughtful combination of design, technology and sustainability that offers exceptional comfort to the driver, guide and passengers and confers prestige on its owners. It is also the maximum expression of quality, safety, profitability, robustness and reliability in a sector in which its strong personality and visual impact stand out.

The comments of the jury and of the specialized press refer to an exterior and interior design that



Number one as well for sports teams and operators

The Irizar i8 has quickly become Europe's number one choice for football, rugby and high specification corporate coaches.

Ellisons is the VIP client with the highest number of i8s in the UK. All these units carry premier league players. Ellisons is so satisfied with the vehicles that it is renewing its fleet with the i8. In the words of Andy Magowan, "The Irizar i8 is a big coach with an aisle height of more than 2.1 metres and a flat floor making it the perfect mode of transport for a front-line football team and Irizar's support from the moment of purchase until the end of the vehicle's life, makes it the perfect choice.



The Irizar i6S – The best seller

The generation of Irizar coaches is reaping a harvest of new successes. Major operators worldwide remain loyal to the Irizar brand given the attractiveness of Irizar vehicles for implementing their different service strategies. Because it is very easy to find the vehicle that best suits their needs at Irizar.

The Irizar i6S, released to the market in late 2016, follows in the footsteps of the Irizar i8, with successes wherever it goes.

Like the Irizar i8, the Irizar i6S has been named "Coach of the Year in Spain 2017". The new Irizar i6S replaces the emblematic Irizar pb and is similar in its aesthetic features to the Irizar i8 with which it shares the new incorporated technology.

The Irizar i6S is a coach designed for medium and long distance and discretionary lines and is the best-selling coach in the Irizar range. In just ten months more than one thousand units have been sold.

New operators and operators loyal to the Irizar brand have chosen this coach model for incorporation into their fleet.

The main reason why this new coach model is selected by our customers is because they wish to be at the cutting edge of technology, to be benchmarks in their image and offer passengers a service that is unique, safe, modern, personalized and comfortable.

The Irizar i6S in the UK

The right-hand version of the Irizar i6S, adapted to the needs of the UK market, presented at the end of last year during the Coach & Bus 2017 in Birmingham 4 - 5 October.

The Irizar i6S in Peru

The Irizar i6S has also been introduced to the market in Peru. On November 8 of last year, this new model

was presented in the City of Lima, Peru. Among the guests were representatives of transport companies from various regions of Latin America.

The official ceremony included speeches from the Managing Director of the Irizar Group, José Manuel Orcasitas, and the Sales-Export Director of Irizar Brasil, Abimael Parejo, who, in addition to expressing the group's forecasts for the future, also presented specific details about the i6S model.

Three units were presented in versions of 13.2 metres, 14 metres and 15 metres long, with a height of 3.90 metres, fully adapted and equipped to the needs of this Latin American market. Customer proximity and providing products and services that are best suited to their needs is one of the pillars of Irizar's strategy.

In Australia this year

The Irizar i6S arrived in Australia this year. In an event held on July 19 at the Melbourne Exhibition Centre, Irizar Asia Pacific presented three units of different versions to the more than 200 guests including operators, press and collaborators in attendance.

The Irizar i6S is positioned as the top of the Irizar line in that market. A vehicle totally adapted to local needs offering distinguishing attributes such as the multiplexed electronic system, maximum safety and wide array of customization possibilities.

And in South Africa

it has also been presented, with great success, this year.



The Irizar hybrid - exceptional consumption

In 2016 Irizar launched its hybrid class II vehicle in its i4 (only high floor vehicle in the world market) and i3LE models. This is the parallel hybrid technology comprised of the Cummins Euro 6C diesel engine and 6.7l HVO 6 cylinders, 320 hp and 1166 Nm and Eaton - e drive hybrid package with 6-speed robotised box, 65 kW electric motor and 5.5 kW/h lithium ion batteries

After more than a year of operation and more than a million km, the reliability of the vehicles as well as their low consumption have been confirmed, reducing consumption by more than 20% compared to exactly the same vehicle with a 100% combustion engine in short-distance intercity travel, as has the high reliability of the hybrid group.

These variants have also been presented in the UK and at the Busworld trade fair last year, thus they are already available in all European markets.

Irizar Mexico still the leader

The great acceptance that the Mexican market has had for the Irizar i8 model and the perfect positioning of the Irizar i6 and Irizar i5, underscore the consolidation of the most profitable product line, developed to meet the needs of passenger transport in the Aztec country.

These models are consistent with the values of the Irizar brand, such as safety, comfort, reliability and profitability for its customers.

The leadership of Irizar Mexico, which transmits brand values in its models, such as safety, comfort, reliability and profitability for buyers, is a mere reflection of its customer proximity, quality, competitiveness and profitability of its products.

Sales during the first half of the year indicate that Irizar Mexico will continue as a leader in the market, producing four coaches per day; around 900 units. This figure, similar to that of 2017 enables maintaining a market share above 60%, thus confirming the preference of customers for the Irizar brand.

Investments that improve productive facilities

Investment in new paint facilities and process redesign have resulted in Irizar Mexico having the latest booths which undoubtedly contribute to improved quality and customer service; a more sustainable process, with greater energy efficiency and lower emissions that comply with the standards required by European regulations.

Likewise, a new 3,500 square metre warehouse has been constructed that includes an exclusive space for the finishing process of the units as well as quality reviews. It includes a new tunnel for sealing tests, two paint booths and spaces for cleaning and final tuning of the coaches before delivery to the customer.

These investments demonstrate the importance of Mexico for Irizar, in keeping with the Group's key strategy of proximity and direct relationships with customers in order to win their trust and confidence.





Irizar Brasil

Strong growth

In this case, it has been demonstrated that at times crises are good for renewing strategies and forcing companies to reinvent their approach and change their products to survive in a competitive environment.

Brazil is experiencing one of the most intense economic and political crises of the last 20 years. Uncertainty has cast a shadow over the future of the country, recognized as the eighth world economic power.

It is in this environment where Irizar decided to radically shift its strategy to manufacturing exclusively for export markets, investing heavily in commercial presence, strengthening post-sales and innovation of every aspect of the transport sector.

Today we can proudly say that we are reaping the benefits of this new strategy given that we are

growing and reaching higher production levels, similar to periods before the crisis.

In **Chile**, following two years of crisis in commodity prices, Irizar has consolidated its involvement in the tourism and long-haul sectors. The change in legislation, authorizing 15m vehicles, was a major turnaround for the single-floor coach market. Irizar's market share grew to 20% in 2017. The launch of the Irizar i6S has also contributed to this growth.

After almost a decade of poor figures for Irizar in that country, **Peru** was consolidated among the three main export markets of Irizar Brasil.

As a result of a business and after-sales and customer proximity strategy, Irizar's share has grown from less than 5% to 30% in 2017. Innovative solutions such as the first Business class seat with electric reclining were key to conquering new territory and

consolidating Irizar as the preferred supplier for the Tourism Sector.

The safety and comfort features of the Irizar i6 are key factors for increasing Irizar's presence in mining transportation, the fastest growing transportation sector in Peru.

The high costs associated with double-decker operations have helped Irizar to win new customers with the i6S, which is designed for freight transport.

In **Australia**, Irizar Asia Pacific, owned 100% by Irizar, after acquiring a new distributor in the country, has established strong communication links with Irizar Brasil, focusing on improving reliability and new local customization options. This, coupled with a new after-sales strategy, has resulted in, for the first time in 10 years, Irizar becoming market leader this year with a 20% market share, ahead of Volgren, the main local manufacturer.

The launch of the Irizar i6S in July has been a success and is sure to contribute to new growth.

South Africa and West Africa have involved major effort and much satisfaction for the Irizar team.

Changes in South Africa's regulations consolidate 15m single-decker coaches, so operators have decided to abandon costly double-decker operations and are adopting the Irizar i6 as an innovative solution for fleet renewal.

Strong commercial presence in South Africa has led Irizar to become market leader in 2017 doubling the volume of units with respect to the previous year

In July of this year the Irizar i6S was also introduced into this market with very positive acceptance, thus the situation seems excellent.

In difficult times and in competitive environments, the Irizar Group has shown that it is able to find opportunities and grow, confirming that a strong commercial presence and after-sales service are the keys to keeping current customers and conquering new fleets.

A new range of electric climate control systems

To address the needs and technical specifications of its clients, Hispacold has developed a range of climate control devices for very diverse climate conditions (warm, cold and extreme climates), and devices adapted to different kinds of vehicles of different lengths up to 24 metres.

The 12EN model, (which is that type of device) is climate control equipment for drivers and passengers. It was designed for 12 metre vehicles and intended for warm climates. The thermal power can be biased using a solution that has either two independent cooling circuits or a single cooling circuit controlled with frequency variation.

San Sebastian and Barcelona were the first cities to see electric vehicles equipped with this climate control system on the road. The electric vehicles in operation currently incorporate this system.

Likewise, Hispacold has specific variations for cooler climates that also include reversible heat pumps and air conditioning systems for articulated and double articulated buses.

In this way, the completely electric systems developed for articulated and double articulated buses have been added.

Thermal conditioning with electric batteries

In addition, Hispacold is launching different thermal conditioning solutions on the market that use electric batteries for both opportunity charging and overnight charging and that can generate both cooling or heating. The goal of these devices (BTMS) is to avoid a reduction in the useful life of electric batteries due to working outside their optimum temperature range.

Hispacold is also developing electric equipment for zero emissions double-decker buses that it expects to start marketing early next year and that it already has 36 units for.

Energy strategy and lowering life cycle costs

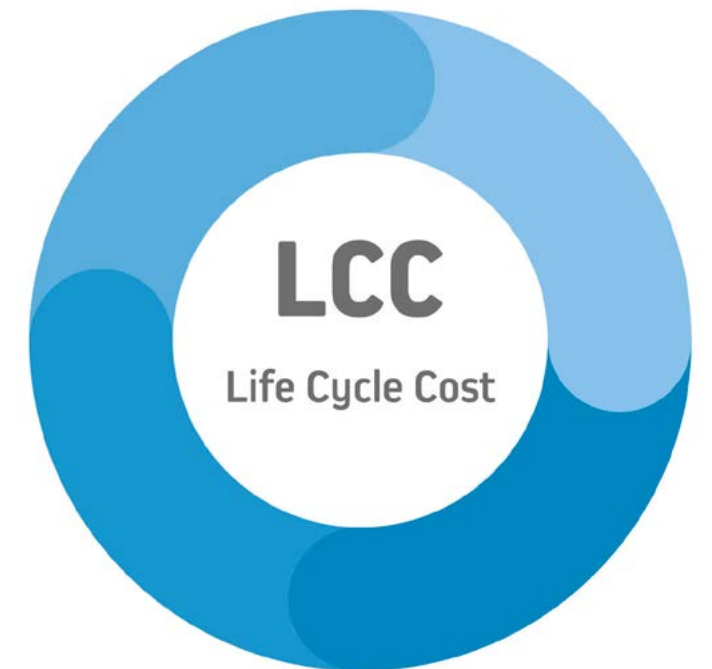
With a basis in the company's environmental commitments, Hispacold developers are always designing with the premises of optimising energy consumption and lowering life cycle costs.

The design of the devices, which are small and lightweight, and the tests they are put through under highly demanding climate conditions and using CO2 sensors to monitor air renewal, have made it possible to reduce consumption by 30%.

Maintenance costs and operating times have also been reduced thanks to the Web Diagnostics Monitoring technology.

At Hispacold, we continue to consolidate our commitment to efficient, high quality public transport with less environmental impact that contributes to making cities sustainable and liveable spaces with lower levels of acoustic and air pollution so residents can have a decent quality of life.

We continue our commitment to climate control systems for electric vehicles through developing new versions that respond to market demands and expanding the models available for new applications like trolley-buses, articulated vehicles and double-decker buses.



Masats strengthens its position in the rail industry

Masats, which is a leader in doors and accessibility for buses and coaches, is currently strengthening its position in the highly demanding rail industry.

A few years ago, Masats began its course in the rail industry by developing accessibility products for people with reduced mobility. Its goal is to create a world that is more accessible for more people using its accumulated experience in manufacturing and installing pneumatic and electric doors for roadway transport vehicles.

The sliding-plug doors have become top products in the sector. These doors are a technological leap in quality in terms of both the product, which is long-lasting and reliable, and the project management systems that comply with the highest safety standards and ensure total client satisfaction.

The efforts undertaken in this period have resulted in obtaining a major order from Germany for electric sliding-plug doors for "light EMU" trains. Deliveries are expected in 2018 and 2019.

Masats develops PSD platform doors for train stations. The system provides safety for passengers and, because it is located on the edge of the platform, it acts as a barrier between passengers and the tracks and prevents accidental falls and

improves climate control in stations. The modular and customisable system makes it possible to make the most of the large surface available for different uses, like informational screens, advertising or first aid among other things.

In the same area, this year Masats also presented an automatic device called the Platform Gap Filler that is placed on station platforms to cover the gap between the platform and the train. It is especially useful for people with reduced mobility, however it also provides safety and quick access for all passengers when getting on or off the train.

In the road transport sector, Masats is still providing products with extremely high availability and they are also developing new electronic controls that provide value to clients by providing information for maintenance, resulting in lower LCCs for vehicles.

Masats also shows its commitment to developing new mobility through manufacturing opening systems for autonomous vehicles, which are already on the road in several cities in Europe and the Americas.



Masats aims to keep one step ahead of clients' needs and certify a reliable product that is submitted to the strictest testing and meets the highest expectations.

At its facilities near Barcelona, Masats continues its commitment to high quality products that provide added value for clients. With the creation of the product strategy team, the company aims to keep one step ahead of clients' needs and certify a reliable product that is submitted to the strictest testing and meets the highest expectations.

Electromobility

With **Irizare-mobility**, the Group provides comprehensive electromobility solutions to cities with 100% electric vehicles and the main infrastructure systems needed for charging, traction and energy storage.

for a better life

 Irizar e-mobility

Irizar e-mobility

The first European electromobility plant

In May of this year, the Irizar e-mobility plant, the first European electromobility plant, was inaugurated in the Guipuzcoa town of Aduna.

The plant will not only manufacture electric buses, but also other types of industrial vehicles that complement the electromobility needs of cities. This plant has an initial capacity to produce 1000 vehicles per year and both vehicles and their main components and systems will also be manufactured there.

Innovative elements and cutting-edge solutions have been used in the construction, with a special emphasis on concepts that define eco-sustainability such as the floor planimetry without contraction joints; induction welded sheet roofing; LED lighting of both the inside and outside of the building; centralised control of the building's facilities as well as the production process facilities (lighting, air conditioning, heating, pneumatics, paint booths, etc.; management of rooms with touch controls, etc.

It includes a warehouse and domestic hot water heating system that works by using the surplus steam from a company located in the adjoining plot.

These features have earned the plant a class A energy efficiency certificate, the highest currently available in Europe.

All electrical energy consumed at the plant is generated in solar photovoltaic power plants owned by the Irizar group.

The facilities have their own test tracks and test benches in order to guarantee the reliability and efficiency of the equipment and to check the technology that is incorporated into the vehicles, as well as their components and systems.

An innovative and state-of-the-art plant which is open to knowledge and talent

An innovative and cutting-edge plant that generates wealth and employment and is open to knowledge and talent, a priority for the development of our capabilities for innovation and technology in order to solve future challenges.

The first 200 jobs have already been created and is forecast to reach between 300 and 500 new jobs in the next five years.

The average age of the company's technicians, people who are committed to and passionate about large-scale projects that are going to transform mobility, is around 28 years old.

Inauguration Event

The event, held in May of this year, with more than 500 attendees from around the world, included the highest authorities of the Basque Country, as well as different institutions, customers, press and collaborators.

The staging included an on-stage display of the three vehicle models of the Irizar e-mobility line, the Irizar ie tram, the Irizar ie bus and the Irizar ie truck, out of which stepped José Manuel Orcasitas, CEO of the Irizar Group, Hector Olabe, Managing Director of Irizar e-mobility as well as Teresa and Josu, two young engineers representing the team of people who comprise Irizar e-mobility, who through their effort, passion and dedication are making this reality possible.

The large LED screen installed for the occasion unveiled each and every one of the secrets and strengths of the Irizar Group brand and Irizar e-mobility. A display of images and resources transmitting strength and energy, the future, nature, life, purity, freshness and technology, values intrinsic to Irizar e-mobility and its primary claim "for a better life".





Electrification of European Cities

Four years after the delivery of the first 100% zero-emission electric buses to the cities of San Sebastian and Barcelona, we can now proudly say that we are fully prepared for the electrification of the public transport service in European cities with a wide range of comprehensive mobility solutions tailored to the needs of each customer, with products and services that have state-of-the-art technology developed entirely by the Irizar Group.

It should also be noted that we have decided to implement an exclusive high quality after-sales service that will provide personalised R&M packages in all the cities with zero-emission Irizar bus route services.

The service will be run by people hired locally in each region where we operate, thus contributing to the creation of local wealth and employment.

Since 2014, more than one hundred zero-emission Irizar buses have been operating at full capacity in various European cities.

The **Cote Basque-Adour conurbation, France** has chosen Irizar for a major avant-garde transport project. It has purchased 18 18.73-metre zero-

emission Irizar ie Tram articulated buses to be implemented in two new creation lines, charging stations at the end of each line through fast charging infrastructures, or slower in-depot charging stations. An R&M agreement is also included.

TMB (Transportes Metropolitanos de **Barcelona**) beginning this year has four 18.73 metre Irizar ie articulated buses. These new units are added to the two 12-metre buses that operate in the city since August 18, 2014, which were part of the European Commission project, ZeEus.

With these vehicles, the Barcelona-based transport company is tackling the first phase of transforming the H16 line to a 100% electric, zero-emission route. For its part, the Municipal Transport Company, EMT,



and the City of **Madrid** in February presented 15 Irizar ie buses of 12 metres, as well as 15 chargers for in-depot charging.

This trust in the Irizar brand is due to the satisfactory results in tests carried out on Irizar vehicles.

Currently the vehicles operate along lines 1 (Prosperidad-Cristo Rey), 26 (Tirso de Molina-Diego de León) and 44 (Callao-Marqués de Viana).

Valencia also has its first electric bus model, the Irizar ie bus of 12 metres. Valencia's Municipal Transport Company (EMT) has incorporated this vehicle into its fleet which will operate in the centre of the capital of Valencia. The excellent results of the tests carried out in Valencia last June and July led to the purchase of this vehicle with a slow in-depot charging system.

Bilbao adds two buses to its fleet, another two Irizar ie buses of 12 metres in length. With these, there are now 6 buses that the city owns; these last two have become the first buses manufactured in the facilities recently inaugurated by Bilbobus. Baixbus is another repeat operator purchasing 13

additional buses of the ie bus model of 12 metres in length after having verified the reliability and autonomy of the vehicle it incorporated in 2016. These zero-emission buses will provide service in the **12 municipalities of the province of Barcelona** where they currently operate.

At the end of 2017, **Amiens** Metropole France selected the Irizar brand to sign the largest zero-emission articulated bus contract of 18 m (BRT system) in Europe. It consists of 43 buses, the Irizar ie tram model of 18.73 m, equipped with a fast-charging system by pantograph for the line, as well as all necessary infrastructures for proper functioning and smart in-depot charging pantographs as well as the repair and maintenance agreement for the entire system.

The announcement of this decision was made in October by Mr. Alain Gest (President d'Amiens Metropole) within the framework of the International Bus and Coach Fair held in Kortrijk (Belgium). These units will operate in April of 2019 in Amiens. With this acquisition, the Amiens "BRT" project becomes the most ambitious for BRT lines in Europe. In the words of Alan Gest "With this project, Amiens

Métropole acquires the title of 'land of positive energy in terms of sustainability and as a green city' announced in February 2015 by Ségolène Royal, Minister of Ecology of Sustainable Development and Energy. Our community is positioned as one of the pioneering regions for the development of electric power and the search for new means of innovative and sustainable mobility in the face of future environmental challenges".

A total of 21 units will be circulating in **Luxembourg**. Seven were presented last June in the city. These initial six units are 12-metre Irizar ie bus models with two doors, and the remaining 14 will be 18 m with exclusively in-depot charging. These buses operate on the 290 route which runs between Mersch (Gare) and Luxembourg (Terminus: Badanstalt), which provide service from 5:20 to 23:43 with a range of over 200 km guaranteeing 16 hours of driving in heavy traffic conditions.

The latest city to rely on the Irizar brand is the city of **Aix-en-Provence**, France, with 15 zero-emission buses of the Irizar ie tram model, in this case 12 metres long, with corresponding charging infrastructure. These buses will link the west and south of the

city Aix-en-Provence. This line extends 7.2 km and includes 19 stations spaced approximately 350 m apart, with departures every 5 minutes, covering the nerve centres of the city. For this project the installation of opportunity charging stations by pantograph is anticipated, at the beginning and end of each of line, and other in-depot smart charging stations.

San Sebastian has become the first city in which the first Irizar ie tram has been put into real service with passengers. Use of this bus as one of the vehicles of the operating fleet of Dbus comprises part of the overall strategy of San Sebastian to promote all forms electric transportation. The vehicle operates on line 28-Amara-Ospitaleak, the most used line of Dbus and the bus line with the most travellers register annually in Euskadi. This vehicle, in pilot testing, is added to the three 12-metre ie buses currently in operation in the city.

Much more than buses

Turnkey products and services

Irizar e-mobility was founded with the aim of providing comprehensive electric mobility solutions for cities, both in terms of manufacturing 100% electric buses, and in terms of manufacturing and installing the major infrastructure systems necessary for charging, traction and energy storage, all of which have been designed and manufactured using 100% Group technology and come with the Irizar guarantee and service quality.

The operator therefore has the added benefit of having a single point of contact at every stage of the project, including after-sales service, maintenance and repair which are tailored to the customer's needs and include comprehensive vehicle care.

Irizar e-mobility's vehicle range currently includes three models: Irizar ie bus, Irizar ie tram and Irizar ie truck.

Irizar e-mobility also does **consulting** with the data obtained from Irizar's energy studies on the operator's service routes (operating data, speed, climate, terrain...), Irizar is able to advise on the amount of energy to load, optimisation strategy, power parameters, charging times and battery life.

Irizar e-mobility carries out **predictive and comprehensive maintenance** of the vehicle's main systems and components, which is reflected in the impact on life cycle costs, improvement of vehicle availability or performance and residual value of the asset. It does so, in essence, by using tools that are capable of monitoring the vehicle (doors, batteries,

air conditioning and heating, pantograph, power train, etc.) and which provide bus availability and reliability statistics, optimise maintenance time and carry out real-time monitoring of the system.

Smart technology. We offer profitable and cutting-edge solutions and carry out constant updates to the in-built systems to respond effectively to the challenge of maximising the service life of each vehicle, thereby optimising the value of your assets.

Lastly, Irizar e-mobility provides a **fleet management system** that, in addition to comprehensive fully customizable monitoring of costs and efficiency, can optimise the performance and profitability of every fleet and provide safety while driving.

Irizar ie bus

Proven autonomy and efficiency

This bus model is a totally safe, reliable, profitable product, with a tried and tested range and efficiency that also offers operators significant customisation options both in terms of the product and in terms of the comprehensive service and maintenance for the entire service life of the vehicle.

The 12-metre long bus operates with a range between 200 and 220 km at an average speed of 15-17 km/h, guaranteeing between 14 and 16 hours of driving in heavy city and intercity traffic conditions and different weather conditions, which attests to the autonomy and efficiency of these vehicles.

Since 2014, more than one hundred zero-emission Irizar buses have been operating at full capacity in various European cities.

The 12m version is now being joined by the 10.8m version and the articulated 18-metre version, all with 100% electric motorisation and zero emissions.





Irizar ie tram

A tram on the tarmac

This model is developed in versions from 12m up to the 18m articulated version with a maximum capacity of 155 people. It is a bus with the appearance of a tram that combines the large capacity, ease of access and internal configuration of a tram with the flexibility of a city bus

The Irizar ie tram offers a clean, minimalist design and all its features correspond to specific functional aspects allowing it to create an identity and an image that are easily recognisable to its users. Accessibility, safety, passenger flow and passenger comfort are the inspiration behind the interior design architecture, resulting in a bright, comfortable, spacious, pleasant and safe interior.

Accessibility and passenger flow are further enhanced by up to 8 sliding doors, the integral low floor, the seating arrangement, the interior distribution with wide aisles, the signage on the seats reserved for wheelchairs and/or pushchairs, the audible stop request information, the installation of ticket validation devices, the design of the driving position and the "kneeling", with heights of between 250-270 mm, which enables comfortable and effortless access.

For entertainment, Irizar enables the installation of a wide range of solutions: USB chargers, Wi-Fi, Braille buttons, luggage racks, passenger information, interior vinyl, etc.

The first units of this bus model operate in the cities of San Sebastian and Barcelona.

This year, **the Irizar ie tram received the Bus of the Year and Ecological Industrial Vehicle of the Year awards in 2018 in Spain.**

The jury, made up of entrepreneurs from the passenger transport sector, associations, technical specialists and experts in the automotive sector and the fields of electromobility and the environment, decided to name the Irizar electric tram (ie tram) the Coach of the Year and Environmentally Friendly Industrial Vehicle of the Year.

In the words of José Manuel Orcasitas, "These two awards recognise the great strategic leap taken by the Irizar Group in recent years that positions us as a leading brand for integral, cutting-edge technological solutions focused on sustainability and the welfare of citizens".

For his part, Hector Olabe said "We're very proud that the Irizar ie tram has won these two awards because it's a vehicle that incorporates technology developed within the Group, such as the propulsion system, the energy storage system, all the software development and even the vehicle-to-vehicle and/or vehicle-to-infrastructure communication. The charging stations are also developed in-house which enables us to offer comprehensive customised turnkey electromobility solutions to all European cities"

This is the first time that a single Irizar vehicle has received two awards during the same year and the second time that an Irizar electric bus has received both awards.

Irizar ie truck

Power versatility

The global vision of the electrification of cities and the search for synergies with freight infrastructures together with the technological capability created in the Group has allowed us to extend our range of products to industrial vehicles for cities.



This led to the birth of the Irizar ie truck, a truck designed for different industrial uses in cities with a focus on electromobility. It will initially be used for collecting municipal waste.

The Irizar ie Truck is not a conventional truck. Its aesthetics, which break with the aesthetic concepts of the current trucks, recalls the Irizar brand's product lines.

The main attributes of this product, designed to operate in urban environments, are its smooth and innovative aesthetic design, operator safety and ergonomics, technology and flexibility for adaptation to market needs.

This unprecedented technological innovation was presented within the framework of the inauguration of the Irizar e-mobility plant as proof of the great technological capacity of the Irizar Group.

The version released is 6x2. It has an electric motor and lithium ion batteries. For more exhaustive applications, or intercity use, the vehicle may be equipped with a CNG range extender, technology that will enable it to deal with the most demanding working days. The vehicle lengths will be around 8 metres and carrying capacity is around 18Tn.

The Irizar ie truck vehicle has been fitted with the latest active safety technology and therefore has stability control, adaptive suspension levelling, involuntary lane change warning and emergency braking assistance.

With regard to passive safety, access to the cab is via a single accessible step, which provides safe movement for the driver and companions and makes it the vehicle

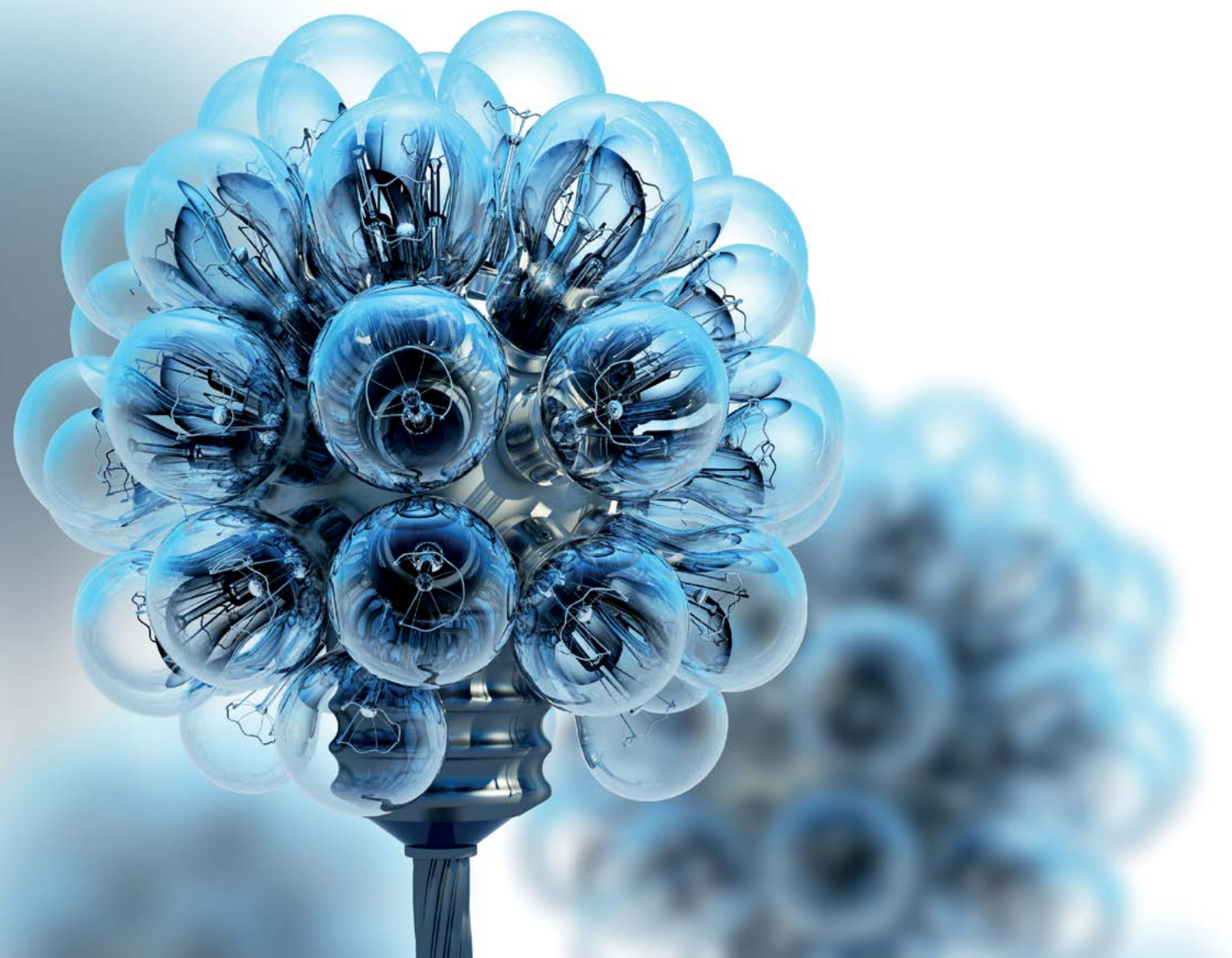
with the lowest access height currently on the market. Furthermore, special emphasis has been devoted to the driver's position, ergonomic reach of all switches, commands and the dashboard display and certain unsurpassable conditions of his/her field of vision.

The Irizar ie truck has electrical traction which enables it to move round cities and urban environments generally without causing atmospheric or acoustic pollution. Because its noise level is low, it can operate at night, thus reducing traffic during the hours of greatest congestion.

It incorporates group technologies already used in our electric buses in the aspects of electric traction, energy storage and operating electronics as well as the other systems supplied.

The Irizar ie truck is designed for use both in urban and intercity environments. Thanks to its chassis design, all types of bodywork currently available can be installed with hardly any adaptation. The axles and steering, specifically developed for the application, provide the vehicle with certain major facilities with regard to load capabilities and manoeuvrability.

Durability and approval testing for this vehicle is currently being carried out and will be presented to the market early next year.



The Irizar hallmark: Pioneering Technology

The technology developed and applied by the Irizar Group is based on the experience and vast knowledge of each of the areas involved in each installation and in collaboration with the most prestigious research and development centres in Europe.

Irizar e-mobility's product range, its buses and zero-emissions electric vehicles, are developed using Group technology; cutting-edge, reliable, European technology, with an advanced design that integrates pioneering technical contributions in the sector produced in collaboration with the most prestigious research and development centres in Europe.

These technologies comply with all European regulations and have been thoroughly tested in Irizar's laboratories and test benches as well as in vehicles that have been operating in cities since 2014.

The Irizar Group is currently actively involved in major European projects for the future electrification

of cities and public passenger transport. This international dimension can be seen in projects such as autonomous driving, improvements in energy storage systems, energy efficiency, standardisation of charging systems, connectivity, big data or artificial intelligence..., which will be essential in the new generation of clean, efficient, fast, standardised, smart and connected transport.

With innovation and Group technology, the intention is to definitively promote mobility in cities by using the bus as the best alternative for mass passenger transport in urban environments and to position Irizar at the forefront of European technology with a 100% electric, zero-emissions city bus.

In order to give customers the maximum added value by enabling them to deal with a single supplier for vehicles and their main systems, Irizar has developed the major vehicle components using own-brand technology.

IG (Irizar Group) energy storage and management

The Irizar battery system uses a modular concept, designed to meet the needs of any operator. A robust, safe and recyclable system that complies with the latest European regulations: R100, R10 and UN38.3 and also allows easy isolation and fast replacement in the event of an error in one of the modules, without affecting the operation of the remaining modules.

The batteries incorporate different chemicals depending on how the operator intends to use them.

IG electric motor

Unlike other projects which are constrained by more standardised motors, the motorisation of the vehicles has been developed using own-brand technology that is developed exclusively for our products so that it adapts perfectly to the products' requirements. The powertrains are manufactured by Alconza and Jema, two companies that belong to the Irizar group.

IG climate control

The Hispacold (Irizar Group) electric climate control system is designed specifically for zero-emission electric vehicles.

IG doors

The vehicles have been equipped with electric or manual ramps developed by Masats, a company belonging to the Irizar Group.

IG Driver assistance system.

This system enables safe communication with the driver which helps them to be more efficient, improving their daily work as well as the service provided to the passengers. This Datik (Irizar Group) solution assists the driver when approaching stops, at stops and when pulling out.

Datik Autodock also contributes to performance optimisation, since the braking and starting intervals offer the greatest consumption variability based on the drivers and given that their driving style, their stress level or rushing to finish the service may lead to increased consumption at stops. It also improves safety, comfort and punctuality.

IG charging systems

Jema Energy, a group company with 60 years of experience in the field of industrial power electronics designing robust, reliable, safe and high-performance solutions, offers different charging options in response to the different constraints customers face in terms of power limits, as well as space and operating restrictions.

In-depot charging

The easiest and most traditional way of charging, which involves plugging the bus in, usually overnight while the bus is stopped. Available for use outdoors as well as indoors.

Pantograph charging

This innovation was also presented within the framework of the Busworld 2017 trade fair. It is a charging system recommended when the vehicle does not have sufficient range to complete the journey and it is necessary to charge vehicles during travel as well as in the depot.

The new Irizar pantograph allows the vehicle to be charged in just a few minutes during its journey. Its modern and minimalist design offers easy integration into the urban landscape.

The charging stations are installed at strategic locations in the city, at the beginning or end of each line. The system is equipped with an articulated arm that enables the charger to be automatically or manually connected to the bus batteries and charging only takes around 5 minutes. Smart charging system.

Control centre that efficiently manages all the charging conditions/restrictions in the depot. The system identifies the different charging requirements of each bus in order to optimise the total power required.

Pantograph in depot

It also offers the possibility of complete automation of the slow load in garages through the commissioning of structures with contact vaults installed above the parking spaces, replacing the outlet solution that needs a manual connection by part of an operator.

Interoperability

The Irizar charging solutions are interoperable

ISO 15118, DIN70121, OCPP 1.6 CE mark, EMC 61000-6-2, 61000-6-4, IEC 61851, IEC 61000



Profiling the future of mobility. Autonomous vehicles

The various companies that form part of the Irizar Group actively participate, hand-in-hand with major European brands, in key European projects for the future of electrification of cities and public passenger transport.

These projects relate to driverless vehicles, improvements in energy storage systems, energy efficiency, standardization of charging systems, connectivity or big data, which are basic in the new generation of clean, efficient, fast, standardized and smart transportation.

Autonomous driving

The goal of the **AUTOMOST** "Dual Transport System Automatic Guidance" is to develop technologies that make it possible to automate vehicles for urban and industrial transport applications in order to significantly increase efficiency, safety and sustainability. It is financed by the CDTI (Centre for Industrial Technological Development) of the Ministry of Economy of Spain.

The demonstrator of a dual-mode bus will function as a commercial shuttle at the cruise terminal in the port of Malaga. Testing will take place during a number of months in real traffic conditions.

AUTODRIVE is a programme financed by the European Commission in which a consortium of more than 40 automotive industry companies participate (Mercedes, Bosch, Infineon, VDL, Irizar, AVL, Murata, ZF, Tecnalia, etc.). AutoDrive brings together companies, suppliers, manufacturers, research centres and leading European

semiconductor companies in order to create a Pan-European ecosystem with the critical mass needed to initiate standards and provide components and sub-systems for autonomous driving.

The results of AutoDrive will significantly contribute to safer and more efficient mobility.

Energy efficiency

EBSF2 (European Bus System of The Future 2)

The European Bus System of the Future 2 project, financed by the H2020 programme of the European Commission, involves the development and validation of different solutions combining the efficiency of bus systems in an organized way with the objective of reducing the energy consumption of electric buses.

Currently work is taking place to demonstrate

advanced energy efficiency techniques in electric vehicles (A/C system, eco-assistant and smart management of auxiliary elements). This great European demonstrator is testing, among other things, technologies developed by Irizar in the area of assistance for efficient driving.

Power storage

SADE: Safe Storage Systems

This project has been co-financed by the Ministry of Energy, Tourism and Digital Agenda as part of the National Plan for Scientific Research, Development and Technological Innovation.

The project aims to research and develop a battery-pack solution designed for the urban mobility opportunity charging strategy. The development will have a working prototype, to be validated and tested on a laboratory scale.

Fast and smart vehicle charging infrastructure

ASSURED: Fast and smart vehicle charging infrastructure for large vehicles.

The ASSURED project proposal addresses "The integration of electric commercial vehicles into the fast-charging infrastructure" of the Green Vehicle work programme. A consortium of 40 participants from 12 EU member countries will carry out the work.

The general objective of ASSURED is to analyse the needs of cities, operators and end users in order to derive the characteristics and requirements of the new generation of heavy-duty electric vehicles (like buses), medium-duty trucks and light vehicles to operate in urban areas.

In this way, we can obtain better cost improvements, as well as developing the new generation of high voltage modular charging systems for electric vehicles and develop innovative charging management strategies.

Connectivity - Big Data

eFleet

Based on the premise that the electrification objectives of urban bus transport are not achievable with current technology, the Irizar Group is proposing the eFLEET project to develop technologies and strategies to create eMobility solutions (100% electric buses for public transport) that are modular, flexible and scalable to make feasible the mass deployment of medium / large fleets of electric buses, while minimizing the impact on the electricity grid and reducing initial and operating costs.

eFLEET is an important strategic challenge as it seeks to unlock the limitations of a booming market in which the Irizar Group has been positioning itself since 2011.

Motors and generators



Development and manufacture of drive or power generation systems for the marine, hydraulic and industrial sectors.



The Vessel of the Year 2018 sails with Alconza engines and generators

Efficiency and reduced environmental impact of the engines have contributed to receiving the *Offshore Support Journal* award

The awarded vessel of the year 2018 sails with Alconza engines. The Maersk Master (first vessel of 6 from the Starfish class, all equipped by Alconza) received this award in London at the annual Offshore Support Journal conference, which is an important international recognition for the engines designed and manufactured by the Basque company.

The vessel is equipped with two PTI type propulsion engines (Power Take In), five manoeuvre engines and four main generators, all supplied by Alconza. These are reliable state-of-the-art engines with efficient consumption, which enable Class 2 Dynamic Positioning.

The hybrid propulsion enables selection of the optimal operating mode for each specific task, which provides the vessel with great versatility while contributing to the reduction of emissions. Efficient fuel and energy consumption help keep vessels working during a particularly difficult time for the oil sector.

The fundamental challenge for the professional team of Alconza has been to design and manufacture engines and generators while taking into account structural details and limitations of space in the engine room; customised to the special requirements of a vessel that is designed to efficiently handle any task under the most difficult sea and deep-water conditions.



Designed for the most extreme conditions

Maersk Master is an AHTS (Anchor Handling Tug Supply) vessel; meaning, supply and management of anchors, able to operate in the most hostile environments. This vessel has been designed and equipped to perform anchoring tasks of semi-submersible oil drilling platforms with complete confidence and efficiency. Additionally, it is conditioned for the transport of goods and merchandise.

The Maersk Master, built in the Norwegian shipyards of Kleven, will support the drilling campaigns of Quadrant Energy's Phoenix South and Van Gogh oil fields, located north of Exmouth, Australia, in campaigns of 150-200 days. In particular, it will supply and facilitate the anchoring of the Transocean DD1 platform, which is an opportunity to demonstrate its great technical capabilities with reduced environmental impact, due to the electric propulsion provided by Alconza.

Electronics



Jema offers power electronics applied to network and transport quality and electronics for coaches.

In the sector of buses and coaches with 100% multiplexed electronic architecture that makes every system intelligent to provide new functionality, reduce wiring and facilitate vehicle diagnostics. Also of note are the AEB-LDW driving assistance systems and the HMI control and console.



The Irizar HMI, with Irizar Group Technology

The Irizar HMI is an on-board information and entertainment device that is incorporated into Irizar i8 and Irizar i6S coaches and was developed by Jema, a company within the Irizar Group.

It currently supplies more than 700 units per year to be fitted into i8 and i6S coaches, for both the Ormaiztegui and Mexico plants.

In both models, the HMI comprises a carrier card where a QA3 COM module (Computer On Module) with INTEL® ATOM™ microprocessor is installed.

The operating system used is Windows Embedded 7. The hardware design of the card was developed in conjunction with Ulma Embedded, whilst the development of applications was done internally in Jema. The result was a product that is fully customised for Irizar.

In the Irizar i8, the device relies upon a 10.1" integrated touch screen, whilst in the i6S the 7" screen connects remotely through a HDMI connection.

The new HMI offers the passenger detailed route information via GPS as well as improved monitor displays. The new innovations in electronic systems provide the passenger with quality information with precise and up-to-date data at every point in the journey.

Auxiliary HMI Keyboard - Joystick

The HMI is a device which interacts with the user by way of a resistive touch screen. Furthermore, it can be operated through a keyboard that has a navigation wheel in the centre of it and direct access buttons. The HMI will respond to direct access buttons being pressed from any screen. Communication between the HMI and the keyboard joystick happens through a standard USB cable.

Functionality

Multimedia

The HMI connects with the Bosch or Actia audio/video equipment through a proprietary protocol to operate in both the driver area and the passenger area. The audio source can be selected, playback can be fast forwarded and rewind and the volume can be adjusted.

Climate control

The HMI interacts with the HC climate control equipment that is connected to the vehicle's CAN bus. The driver or passenger area can be selected, the temperature of both areas can be controlled, air flow can be controlled, air recirculation flaps and dehumidification can be managed, etc.

GPS Navigation

The HMI enables GPS navigation with maps of the whole of Europe.

Telephone

The HMI allows interaction with a mobile phone connected by Bluetooth to the hands-free system included in its own HMI. Functions included are: direct dialling, phonebook management and recent numbers.

Camera display

The HMI provides automatic display from up to three cameras located at different points: rear view, footboard, etc.

WiFi access point

The HMI enables connections to the Internet via WiFi.

Settings

The diagnostics screen offers detailed On-Board information about the condition of the electronic devices in the bodywork. Access to this screen is reserved for authorised personnel and is password restricted.

The HMI allows the language, date and time, electronic device diagnostics etc. to be adjusted.

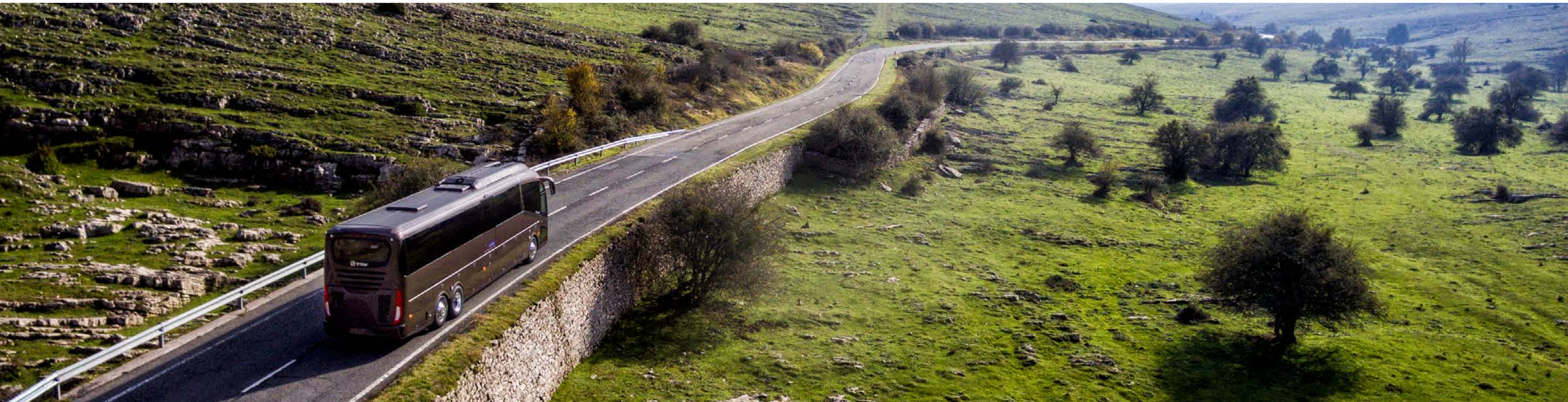
Radio option

The HMI offers the possibility of tapping into power stages through audio output to play back music in mp3 or radio format (a radio chip is incorporated into its carrier).

Connectivity

Datik combines intelligent driver assistance systems with a range of optional equipment to offer the driver and passengers an optimal form of mobility. Extensive experience in machine vision and deep-learning enables Datik to offer fleet management, preventive and predictive maintenance and autonomous driving systems.





Datik: towards the driverless bus

Datik, an Irizar Group company, is leading several R & D projects to try to introduce different levels of automatism in Irizar coaches and buses in the coming years.

The goal of the **Automost** "Dual Transport System Automatic Guidance" is to develop technologies that make it possible to automate vehicles for urban and industrial transport applications in order to significantly increase efficiency, safety and sustainability. It is financed by the CDTI (Centre for Industrial Technological Development) of the Ministry of Economy of Spain.

In this case, Datik will design a demonstrator electric urban vehicle, the Irizar ie bus with dual driving modes - manual and automatic (autopilot for urban environments) - that will function as a commercial shuttle at the cruise terminal of the port of Malaga. Testing will take place during a number of months in real traffic conditions.



Datik has accumulated a wealth of experience in the development of artificial visionbased sensors for the detection of hazards in the vicinity of the vehicle.

The **HiAdvice project**, funded by the SPRI, aims to design a prototype intercity hybrid vehicle with autopilot for highways and express ways.

The vehicles equipped with autopilots will still require the attention of the driver, but it is hoped that the experience accumulated will lead to the development of specific automation functions in which the driver can move away from his position, for cleaning purposes, or for parking and manoeuvres in depots.

Since launching its first involuntary lane change detector in 2012, Datik has accumulated a wealth of experience in the development of artificial visionbased sensors for the detection of hazards in the vicinity of the vehicle. The ongoing R & D projects have taken the knowledge accumulated in all these years as their starting point.

Both projects will come to light in 2020, and will position Datik as a world-class technology supplier.

Datik implements interoperable and integrated systems for public transport

The Operations Help System (SAE) and the Passenger Information, Ticketing, Passenger Count, Video Protection and Eco Driving systems adhere to standards that make more profitable solutions available to operators.

Datik has joined the Information Technology for Public Transport initiative known by the Spanish acronym ITxPT. ITxPT originated out of the EBSF 2 project and was launched in 2013 by UITP (The International Association of Public Transport). The goal of ITxPT is to implement standards for plug-and-play IT systems with applications in public transport.

Datik is one of the fastest growing engineering companies in Spain that works exclusively for regular passenger transport operators. The primary solution developed by Datik is the iPANEL®, which is an interoperable and integrated fleet management solution for bus and coach operators based on ITxPT standards. Its integrated focus helps public transport operators do more with less.

Being a member of ITxPT gives Datik the opportunity to work more closely with bus and coach manufacturers and public transport operators. Public transport operators currently have several systems working independently resulting in redundancies

and increases in maintenance and investment costs. Openness and integration helps operators lower operating costs, improve service and provide more benefits to passengers. Becoming a member of ITxPT is another step for Datik in its commitment to its mission. Datik supports clients with a cloud platform and all-in-one multi-service hardware that hosts a wide range of applications like Video Telematics, OHS, Ticketing and Passenger Services.

As Anders Selling, General Secretary of ITxPT, says, there is a lot of interest in ITxPT right now because digitalisation is becoming more and more important in public transport. The interoperability of systems is the key to profitability and future smart mobility services and ITxPT provides this kind of standards based open architecture that lets systems communicate with each other and incentivises cooperation among providers.



Implementations

Datik provides personalised services to operators ranging from remote diagnostics for fleets to analysing driving behaviour. It is currently monitoring more than 3000 vehicles in Spain, France, England, Mexico, the United States and other countries. Datik's strategic plan foresees doubling that number in the next three years.

IoT applied to transport and the Datik engineering team's extended knowledge of transport management processes means its portfolio of products and services is continuously growing and improving. The flexibility and adaptability of the iPANEL® solution means a general solution for all our clients can also be a specific solution for each one of them.

Energy



Jema is mainly involved in the design and manufacture of power supplies for Big Science and the conversion of renewable, solar, wind and hydroelectric power into energy that is suitable for storage and subsequent injection into the grid.



JEMA grows significantly in all areas

Jema continues to grow in the renewable energy sector. After the successful start-up of solar plants in Chile and Panama, Jema strengthens its position in Mexico with the supply of 500 megawatts in equipment for different projects throughout the country.

Additionally, during 2018 and driven by international policies developed in the photovoltaic solar energy sector, it has focused on the development of the European market with special attention to business in Spain and France.

Likewise, JEMA has experienced remarkable growth in nuclear fusion research projects for private companies seeking clean energy. Currently, it is supplying second-generation private fusion laboratories.

The ability to customise and offer solutions adapted to each project and client have been key to positioning ourselves as a benchmark in this highly competitive market.

Fusion companies have a very demanding program in terms of time, results and deadlines. The capacity for adaptation and integration that these projects demand is fundamental to success, and an example of this is the work that Jema has carried out for Tri Alpha Energy (TAE), a world leader in the sector.



The project required a new way of working with tight deadlines, very demanding technical specifications and requirements that emerged throughout the process itself. This was affirmed by the team supervisor, Dr. Slepchenkov: "Collaboration between TAE Technologies and Jema Energy has been crucial for the successful completion of this challenging project". These projects are at the forefront of international technology and innovation.

In the area of electromobility, since 2014 Jema has been developing charging infrastructures for urban electric buses. This last year, it incorporated the integration of medium voltage equipment and the validation of opportunity charging systems by different electric operators.

One of the pillars of Jema is based on the provision of comprehensive and customised service for each of its customers. The range of customised services offered is adapted to increasingly geographically remote environments, and due to synergies with

the IRIZAR group, Jema is able to provide services in more than 90 countries.

To offer high-quality service, Jema tests all equipment in its facilities. These facilities are adapted to accurately simulate real environmental conditions for each project while increasing the reliability of the equipment once installed.

Jema works with the rest of the Irizar Group companies for the development of new solutions and business lines. This last year, Jema has developed 12 products for group companies and continues to focus on network quality solutions with STATCOM systems and battery storage. For Jema Energy, this has resulted in strong growth and development in all business areas during this last year.





For a more sustainable world

Through the development of our brand, technology and sustainability strategy, we have turned Irizar into an industrial group strikingly different from the Irizar of the past. The Group is highly diversified and currently has a presence in the passenger transport, electromobility, electronics, energy, electric motors and connectivity business areas.

Electromobility for cities is our primary goal in terms of both strategy and innovation in sustainable mobility. However, our Sustainability strategy goes beyond electromobility and is integrated into the global strategy of the company.

Progress in sustainable competitiveness

Our Sustainable Competitiveness takes shape through initiatives and actions with all the groups we interact with, including the people who make up Irizar, clients, passengers, external collaborators, society and the environment. In addition to describing our progress in detail, the 2017 SUSTAINABILITY REPORT is a renewal of our firm commitment to the United Nations Global Compact on Human Rights, Labour Rights, the Environment and the fight against Corruption for the fourth consecutive year.

All of our sustainability reports are available on the United Nations Global Compact website and the Irizar website.

In addition to the items already mentioned in this magazine regarding Our Commitment to Clients, Passengers and Citizens (product innovation, participation in European projects, electromobility, awards and external recognition), we will summarise our recent progress in relation to the other interest groups Irizar works here.

Our commitment to people

The people in the Organisation are undoubtedly the key factor for achieving sustainable economic, social and environmental results in the medium and long term.

- Irizar promotes an open and transparent culture out of the firm conviction that engaging in business activities with the highest integrity is the only possible foundation for achieving sustainable success. For that reason we are developing a Code of Conduct that will give everybody in the Irizar Group a roadmap that outlines the fundamental principles for behaviour in terms of human rights and it will help us better deal with any legal and ethical challenges that may arise in our day to day work.
- Our Commitment to Employment is shown by our ongoing creation of employment and maintaining existing jobs even during the hardest times of the 2009 crisis. The Irizar Group has grown by almost 1000 people in the last 5 years, which constitutes 40% growth. In the last year, we have kept attracting talent and we have increased our staff by 300 people (10%), of which 110 have joined Irizar e-mobility.
- We defend equal opportunity, non-discrimination and respect for diversity.
- We support a Healthy Work Life Balance through shortened work days and flexible schedules.
- Our Commitment to Training can be seen in interdisciplinary and polyvalent training plans.
- Our Commitment to Health and Safety means we always give priority to safety over other management concerns. We analyse 100% of accidents and incidents and we devote the economic resources needed.

Our commitment to external partners:

Alliances with different kinds of external collaborators play a growing strategic role in Irizar's Sustainable Competitiveness.

- We maintain a high degree of Integration and Alliance with Suppliers in the development of our products and processes through mobilising and exchanging knowledge, specialisation, technology and resources.
- Our deep commitment to our local environment means that 15% of our purchases in materials and services are made from companies in our province (Gipuzkoa).
- We maintain stable social partnerships with suppliers oriented towards social and workplace integration of people with disabilities, promoting youth employment and promoting employment for people with social integration issues.
- We frequently collaborate with Technology Centres in our projects.
- We actively participate in cooperation with other local organisations in different Clusters in Euskadi, most notably in the automotive, mobility and logistics sectors.

Our commitment to the environment

Our commitment with the environment began in 1998, when Irizar became the first coach manufacturer to obtain ISO 14001 certification. The most relevant principles of our environmental policy are the progressive reduction of CO2 and other contaminants, applying environmental criteria in the design of our products and instilling in our staff and collaborators an attitude of respect for the environment.

In addition to everything we have already written about in this magazine about our Electromobility business, our commitment to the environment can also be seen in:

- Our adoption of Eco-Innovation. In 2017, we began to lay the groundwork for researching and developing new technologies for manufacturing coaches and into new materials that will put us at the vanguard of eco-design in our sector.

We did a Strategic Environmental Observation study to learn about the situation of our competitors and the industry in Europe and identify opportunities or threats and initiate actions.

We hope to become an industry leader in environmental issues. We are already the first company in the industry to publish an environmental product declaration.

- We have also done a Life Cycle Analysis (LCA) for a coach. The analysis will be the starting point for creating our upcoming certified Environmental Product Declaration (EDP), in accordance with the ISO14025 international standard, and it will also add a new dimension to the market by providing information about the environmental performance and impact of products and services.
- We keep evolving in energy efficiency, optimising waste treatment and reducing the environmental impact of our activities and products. This is shown in our Environmental Indicators for consumption of natural resources (water, electrical energy and natural gas), consumption of chemical resources (paint and solvents) and waste production (hazardous and non-hazardous).

Our commitment to society

We collaborate in creating wealth and employment, education, culture, sports and domestic and international cooperation.

- We make great efforts both financially (more than 1.5 million euros a year) and in terms of dedicating our staff to contributing to building a better local socio-economic environment and improving the society we are part of.
- We regularly collaborate with Universities and Professional Training Centres. We promote professional internships and thesis projects at Irizar. We participate in incubators for promoting business initiatives.
- We constantly share our experience in strategy, management and sustainability in both open door events and external forums in order to spark interest and awareness and inspire progress in other people and organisations. Along these lines, we would like to highlight that, in 2018, we participated in two major sustainability forums to make progress in this field.

Socially responsible brand

We are continuing our course of solidity and growth with people committed to customers and society to provide the maximum added value in terms of brand, technology and sustainability, creating wealth and employment. We feel very proud of our progress because it is a reflection of the work we have done and because it was an important step forward in our contribution to a more sustainable world, even though we are very aware that there is a lot left to be done.

We understand responsible business as the way of coherently integrating sustainable development into all areas of management. To those ends, we will keep working hard so we can be recognised as a SOCIALLY RESPONSIBLE BRAND.



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