

# *Irizar Group* magazine

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No. 3

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“I am proud to see the current situation of the Irizar Group; to see its robustness, its growth, its brand image, the image of its plants ... I’m proud of everything.”

After 26 years at Irizar as an active contributor to its strong growth, geographical diversification and the creation of a large group, the time has come for me to start a new stage in my life. Inevitably my mind is flooded by good memories of everything achieved throughout that time.

It’s true that the last 10 years have been the most significant. These have been wonderful years in which we have redesigned and strengthened the group; years in which we have designed and rolled out a clear strategy and created a great group and a great brand. Years of focus on technology and sustainability. In brief, years of major change and progress for our group.

Years filled with work and satisfaction in which I have enjoyed the wonderful opportunity to meet many of you and make great friends.

I am proud to see the current situation of the Irizar Group; to see its robustness, its growth, its brand image, the image of its plants ... I’m proud of everything.

I am also convinced that the development of the group will continue or even accelerate because it is in very good hands. Rafael Sterling, the new CEO of the Irizar Group, is the right person to lead the group in this new stage.

Undoubtedly, a great amount has been achieved, with an enormous amount of support from all of you, from

customers, journalists, suppliers, press and partners in all areas. It’s quite obvious that without this shared effort, Irizar would never have got to where it is today.

I therefore want to use these lines to express my thanks and appreciation of the effort of all of those of you who have supported and continue to support this project, who have been there when needed. I want to tell you that I am sure that the Irizar Group will continue its growth and will continue to be able to provide significant added value to customers and society in terms of brand, technology and sustainability.

I will now be spending my time mainly with my family, with time also for music, travel, golf and, perhaps a little time also contributing my management experience to some projects and continuing to see how Irizar continues to grow and bring value to society.

What I can assure you is that, in this new stage that I am now beginning, I will be at your disposal, as always, for anything that you need.

Thanks again, a big hug to all.

Best regards,

José Manuel Orcasitas



“I assume this leadership with great pride because Irizar is a very stable and consolidated industrial project but, at the same time, very alive, with great challenges ahead”

In May 2007, I joined the Irizar Group. I will always remember my beginnings, and even more when, after a training process, I was offered the challenge of heading Irizar Mexico. It was a moment of great responsibility and much greater enthusiasm and pride. And I sincerely thank Irizar and its management team for the trust placed in me.

For 12 years, I have been responsible for the international plants and a member of the Irizar management team. Now, having learned so much about buses and coaches, from training in mobility and verifying the differences in the sector among different countries, after having enjoyed all the professional clients that I have met throughout the world and the teams with whom I've collaborated to achieve the objectives set, I, now, find José Manuel Orcasitas giving me a new opportunity: the challenge of leading the Irizar Group.

I assume this leadership with great pride and, again, thank you, because Irizar is a very stable and consolidated industrial project but, at the same time, very alive, with great challenges ahead. It is a project comprised of valuable people, fully committed to customers, and based on innovation as a sign of identity. It has the absolute conviction that the way of the future is sustainable solutions and is committed to the talent of people who, accordingly, become ideal partners that will accompany transport operators into the future.

These words are to ensure that, in the future, Irizar will continue on the path of growth, committed to the values that strengthen our brand, investing in new technological developments that place us as a global leader in the bus and coach market, and committed to sustainability as an indispensable value for present and future mobility. To meet the milestones established by the previous objectives and to maximize the profitability that our products and services offer, we will continue to place customers at the centre of all our activities.

As Irizar also means proximity, I want to use this opportunity to make myself available to customers, partners, the press, institutions, and to all members of the Irizar project and to support you in everything within my power. Furthermore, I request everyone's collaboration to continue their commitment to safe, comfortable, reliable, and sustainable mobility.

Thank you again for your trust. Those of you who already know me, know that my energy, work, and enthusiasm are guaranteed.

Rafael Sterling  
Irizar Group CEO

130  
years

Envisioning a future of  
excellence and sustainability



Irizar was created and its founder, the Gipuzkoan entrepreneur José Antonio Irizar, was the one who decided to take the company from manufacturing iron fittings for carriages into the world of passenger transport.

1898



1928



The first mechanically powered vehicle was built. It was a 22-seat vehicle with bodywork on a chassis a customer acquired in France.



1963

Irizar becomes a cooperative. This decision was adopted to involve people in the future of the company, thus, enabling members to participate in management.



The Century, the symbol of design.

1970  
1980



Irizar continues to be immersed in constant innovation and is positioned as one of the best companies in the national coach building sector.

1995

In the 1990s, Irizar experienced strong growth and began its internationalisation process. Irizar Mexico, Irizar Brasil, Irizar Maroc, Irizar Asia Pacific and Irizar Southern Africa were created.

2009



At the height of the crisis, a strategic revolution took place as Irizar made the decision to become an integral coach manufacturer with a sustainable vision.

2009-2013

An enormous effort towards industrial diversification and technology was undertaken because they were seen as urgent needs for carrying out the strategy. As a result of this policy, Jema Energy, Datik and Alconza were incorporated into the Group between 2009 and 2013. These companies are engaged in power electronics, ITS solutions for transport management, and electric motors and generators.

2011



The full range of Irizar integral coaches was launched. At the same time, the electromobility division for the cities was created.



2012

Creatio, the Irizar Group's Research and Development Centre, was founded to enhance the Irizar Group's applied research and technological development capabilities, both for the firm's integral products and its major bodywork components.

2014

The Irizar Group's first 100% electric, zero emission bus was launched



125th anniversary



The new facilities

2017

The complete range of sustainable mobility solutions was presented and Irizar won the International Award for Best Coach of the Year and was nominated coach manufacturer of the year in Europe. These events were followed by the Bus of the Year and Ecological Industrial Vehicle of the Year awards.

2018



The Irizar e-mobility factory was inaugurated, the first factory designed entirely for electromobility solutions in Europe.

2019

Moving forward  
130  
years



# Irizar Group

The Irizar Group 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) with operations in 13 production plants in Spain, Morocco, Brazil, Mexico, and South Africa, in addition to its own R&D centre.

A Group comprised of more than 3350 people, with a commercial presence in five continents and with an aggregate turnover of 750 million euros. Irizar, S. Coop is the parent company of the Group and its central headquarters is located in Ormaiztegui (Gipuzkoa, Spain) where Creatio, the Group's Research and Development Centre, is also located.

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

## Creatio

Creatio, the Irizar Group Research and Development Centre, enhances the Group's capacity for applied research and technological development for products and systems. Creatio works on long term innovation, with the aim of improving sustainable competitiveness in the future and generating wealth and employment as it grows.

Creatio is the result of the constant commitment to industrial innovation as a key part of the Irizar Group's strategy. 2009 saw a strategic revolution take place, which helped Irizar to grow and become stronger. It was committed to the brand, so it became a manufacturer of integral buses. It was also firmly committed to technology, which led to the creation of an R&D Centre that reinforces the capabilities of the entire Group.

## Business areas

### Passenger transport

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

Components and systems are also being developed within the Group for road and rail passenger transport. Masats specialises in accessibility and infrastructures and Hispacold develops climate technology, air purifiers, and defrosters. Datik develops devices that capture and manage the information generated by vehicles that assists driving, diagnostics, and predictive and preventive maintenance.



### Electromobility

With Irizar e-mobility, the Group provides comprehensive mobility solutions to cities and citizens, including both 100% electric zero emission buses as well as the main infrastructure systems needed for charging, power, and energy storage. Irizar e-mobility has also launched a truck designed for different industrial uses in cities.



### Motors and generators

Alconza is dedicated to the development and manufacture of drive and power generation systems for the marine, hydraulic, and industrial sectors.



### Electronics

Jema offers power electronics applied to network and transport quality and electronics for coaches. In the bus and coach sector, it develops 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.



### 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 use in the grid.



### Conectivity - Artificial Intelligence

Datik unites intelligent driver assistance systems with a range of optional equipment to offer drivers 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.



## A group in continual sustainable growth



**Founded in 1889**  
130 years of history



**More than 3,350 people**  
(2018)



**7 leading brands**  
Irizar, Irizar e-mobility, Hispacold, Masats, Jema, Alconza, Datik and Creatio



**750 M euros**  
turnover 2018



**13 production plants**  
Europe, Mexico, Brazil, USA, South Africa



**Commercial presence on 5 continents**



**1 R&D centre**



**Sales and after-sales networks**  
worldwide



**Financial stability**



**9 distribution and after-sales companies**  
Irizar France, Irizar UK, Irizar USA, Irizar Benelux, Irizar Asia Pacific, Irizar Italia, Datik Mexico, Jema USA, Hispacold Mexico

### 6 activity sectors

Passenger transport, electromobility, electronics, energy, electric motors and connectivity

# Passenger transport





130  
years

**Moving  
forward**

## Moving forward

**Stronger and younger than ever," was the motto we used to celebrate Irizar's 125th anniversary. Five years later, we're still in a position of financial strength and stability that enables us to continue advancing and developing new solutions and services while ensuring a more sustainable future economically, socially, and environmentally.**

Brand, technology, and sustainability are the three main axes of success and on which the Irizar Group's future strategy is based.

The reality today of the family business founded in 1889 far exceeds what its founders dreamed. Today, Irizar is a business group comprised of more than 3,350 personnel, with an aggregate turnover of more than 750 million euros, a commercial presence in 5 continents, 13 production plants, an R&D centre, 8 proprietary distribution and post-sale companies, worldwide sales and post-sales networks, and carries out its activity in 6 sectors with 8 proprietary brands.

We are a global company that, in addition to manufacturing buses and electric buses, supplies systems for the railway, electronics, energy, electromobility, and connectivity sectors. We are a company that challenges ourselves every day because we want to deliver customised solutions where and when they are needed. We are a company driven by ideas. Our approach is to contribute our two cents to the progress of constructing a better

world. We are a company with great aspirations, which continues to advance because the future is today.

Irizar is also safety, efficiency, flexibility, customization, and design. These values not only identify our products but also, with respect to the most important technological challenges, the integral service we provide to our customers.

The Irizar group offer personalised solutions, designed and created to offer the best service: financing, repair and maintenance contracts and pick-up of your used vehicle. Irizar has a helpdesk in each European country and another centre that is open 24 hours a day, 365 days a year and offers customers close support and advice that results in optimised reliability and availability of vehicles. Finally, our electronic management solutions, Irizar connectivity, fleet management and remote diagnosis that result in a considerable reduction of consumption and emissions.



## Irizar coaches

Ten years have passed since this comprehensive technology was presented at the Busworld fair in 2009, and five years since we delivered the first electric buses. Currently, we have Irizar coaches and buses operating in Spain, UK, France, Italy, Poland, Benelux, Israel, USA, and Mexico, with significant commercial presence.

Year after year, we are becoming a benchmark for coaches and buses by consolidation in very important markets with a high degree of demand for products and services. We are already leaders in Spain and France in the urban electromobility market.

We increasingly offer more products and services from vehicles to the main infrastructures customers require.

“Through continual customer proximity, we offer the services they need, making their businesses easier and more profitable”.

This strategy does not prevent us from continuing to work closely with chassis manufacturers, with whom we have common interests, and with whom we continue to increase our presence in both European markets and in the rest of the World. We are also convinced that Irizar is an ideal partner for all of them and, thus, to take on the challenges that sustainable mobility poses.




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“Through continual customer proximity, we offer the services they need, making their businesses easier and more profitable”

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## More brand presence

### Poland

In Poland, the company Wanicki has managed to consolidate the Irizar brand with 130 units sold since 2013, when it began distributing our integral vehicles. With an updated and well-motivated sales team, an increase in purchases is expected in that country.

The integral vehicles in Poland include Irizar i6s and i8 models and some i4 units for miner rescue teams, as well as the first hybrid coach in the country, a 12.75m i3 that we delivered in September.

We are currently focusing our efforts in Sweden and Israel; two highly relevant markets.

### Israel

In the coming months, Irizar will celebrate 40 years of activity in the Israeli market. The activity that began in 1980 marked a new era in the coach market in the young country formerly dominated by local industry and opened the door to many new international brands.

Irizar’s entry into the market set a new standard for innovation, technology, and design. Currently, Irizar is represented by Emcol (a subsidiary of the Allied group). The company is one of the leading importers and suppliers of engineering systems and technical equipment in Israel.

2018 marked the beginning of a new era, as the Irizar integral coach was introduced in the local market, launching the new generation of buses in Israel.

This 40th anniversary is celebrated in one of the best years Irizar has seen in Israel; it is estimated that 2019 will achieve a 50% market share.



## More efficient, more sustainable and safer coaches

Coinciding with the 130th anniversary, the Irizar Group will display its great capacity for innovation and technology at Busworld, where it will also present its future strategy.

At Irizar, we continue on the path of innovation taking great steps in the development of new solutions, technologies, and services that reduce consumption and emissions, improve sustainability, and add more value to customers.

We will present our full range of integral, hybrid and electric buses and coaches and a host of technological innovations that will be key to our future.

At the stand, Irizar and Irizar e-mobility will come together to present the latest generation vehicles: two Irizar brand integral units (Irizar i8 and Irizar i6S), hybrid coaches (the new Irizar i4) and two electric buses (the new ie bus and ie tram). All include innovations in terms of accessibility, safety, technology, and sustainability.

The engines presented are the Euro6 Step D. Fuel consumption, and consequently, CO2 emissions of Irizar integral vehicles are at their best levels and increasingly close to 20 l/100 km or 5 km/l for 12.2 m and 19.5 m maximum weight units.



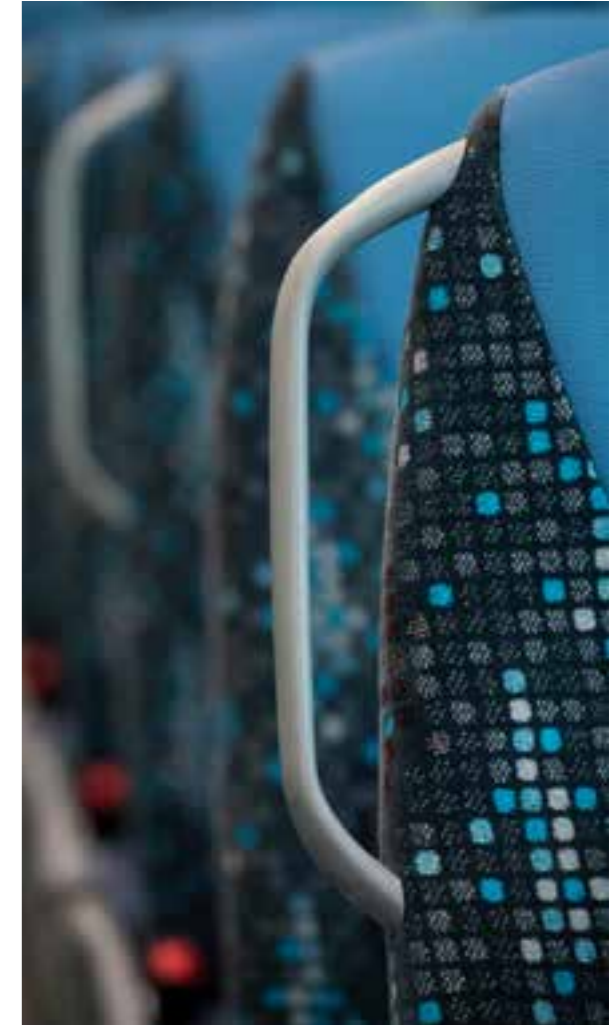
## Latest generation of Irizar i4

The Irizar Group versatility also extends to urban and intercity spaces and makes them the ideal environment for the Irizar i4 to showcase its features and personality. The i4 is an ideal vehicle for metropolitan, commuter, school or business transport.

The new lighter and more aerodynamic Irizar i4 generation is available with integrated radar in the centre of the front end, new optional full-LED headlights that provide up to 30% more lighting capacity, rectangular end-outline marker LED fog and pilot lights, full LED tail lights, new windscreen with greater curvature, more robust windscreen wiper system, updated lever design, rear end to reduce bumpiness, and a three-section rear bumper.

In the interior, the use of new materials and modern manufacturing technologies improve durability, ageing, and recyclability of side panel, interior visors, and roof centre materials. Notable, also, is the new design of the dashboard that enables modular integration of vending machines and SAE systems, aesthetic redesign of seats and partitions to create a warmer and modern environment, a new line of more robust and functional diffusers, new lighter luggage racks, full LED lighting integrated in the central part of the roof, and panel covers made of stainless steel for improved reliability and access for maintenance tasks.

The structural redesign of this version, the incorporation of new and lighter materials and corresponding reduction of weight, along with a more aerodynamic front end, provide this Irizar i4 with significant fuel savings.



## New door opening system

The new SWYNCRO (Swing Synchro door system) door for coaches and EVOLUTION control electronics is an important evolution in door opening systems. It is not just another evolution. This is the new generation of doors for vehicles, a change in the concept of door opening systems for coaches.

The smoothness of movement, completely horizontal without wedges or stabilizer bars, enables perfect sealing and the elimination of friction noise, which increases the comfort of passengers and drivers.

The door is tamper-proof and incorporates different systems in the interior which, combined with manufacturing simplicity, enables a reduction of assembly time by 50%.

The Swyincro system also substantially improves the MTBF (mean time between failure) of the product, increasing reliability and availability of the vehicle. It has been designed with maximum passenger safety in mind.

## Irizar i6S, unit number 2000 in Europe

At an event held at the Ormaiztegui facilities in July, Irizar delivered the 2,000th unit of its i6S coach model to the Gipuzkoan company Autocares Aizpurua.

The trust and close relationship that has united both companies for more than 45 years are demonstrated with a single fact: since its foundation, Aizpurua has always purchased Irizar brand vehicles.

Since its presentation in 2016, the Irizar i6S has been consolidating as a benchmark in the sector for medium, long-distance, and discretionary

## Lightened PMR system

A new system with a significant weight reduction that incorporates an indication detector for deployed barriers, and a safety device to prevent pick up if the platform is full.



lines. The Irizar i6S, which received the "Coach of the Year in Spain 2017" award, has similar aesthetic features to the impressive i8 and has the cutting-edge technology of the new Irizar brand models. Quality, safety, robustness, comfort, design, and reliability are some of the characteristics that define this model with its own personality, with more than 2,500 units operating around the world.



## Irizar i6, unit number 5000 in Europe

The delivery of the 5,000th unit of this model in Europe has also been accomplished, although more than 11,000 vehicles have been sold worldwide.

This unit, the tall version of a 13 m vehicle, with 59 seats fitted with USB sockets and the standard technology used in the series vehicle ended up at Autocares Julia.

## Rafael Sterling, New CEO of the Irizar Group

Beginning September 1, 2019, he will be replaced by Rafael Sterling. Born in Bilbao on March 22, 1975, and married with three children, he is a Senior Telecommunications Engineer from the Universidad del País Vasco and an MBA Executive from the Universidad Comercial de Deusto. Prior to his appointment, Rafael Sterling was the International Business Director of the Irizar Group.

At Irizar, there is no doubt that he will continue the work of his predecessor and will lead the group along its current path of stability and growth, surrounded by a large team of personnel committed to its customers, society, and its partners that will strengthen the fundamental aspects of Irizar's strategy for the future.

## Retirement of José Manuel Orcasitas

After 26 years of dedication to Irizar in different capacities, José Manuel Orcasitas, current Managing Director of the Irizar Group, has decided to end his professional career at Irizar and devote himself to his family, friends, and hobbies.

His capacity for leadership and vision, together with the great team of people he has had, led Irizar to its current position.

The legacy Orcasitas leaves behind is that of an international business group comprised of seven brands (Irizar, Irizar e-mobility, Alconza, Datik, Hispacold, Masats, and Jema), immersed in six sectors of activity (passenger transport, electromobility, electronics, electric motors and generators, connectivity, and energy). A group that carries out its productive activity in 13 plants in Spain, Morocco, Brazil, Mexico, and South Africa, in addition to its own R&D Centre. A group of more 3350 personnel committed and identified with the future strategy; A group that turns 130 this year in a situation of great financial strength, geographic and industrial diversification, and in continuous growth, and which is firmly committed to the brand, technology, and sustainability.

# Irizar, in the forefront

**At the Irizar Group, we are committed to having more talent, more passion, more enthusiasm, more ideas, more inspiration, and more capacity for innovation and technology.**

We invest to remain on the forefront, to innovate, to create new products, to continue being pioneers, to strengthen our global business, to continue our profitable growth in the Group, and to move towards a more sustainable future.

We do this by activating the primary motors of our success: vision, risk capacity, and innovation, projecting ourselves from solid foundations to develop new business models and future projects.

In addition to conceiving products with differentiating designs that are attractive to operators, our focus is currently on the development of increasingly safe, efficient, and ecological technologies (diesel, HVO, electrical technologies, hybrids, batteries).

## Electromobility and smart mobility solutions

We share an integral vision of mobility of the future where zero emissions are combined with intelligent information. We are investing in technologies, such as the development and manufacture of batteries to offer the best solution for every need.

Additionally, we follow a consistent path towards smart connectivity of our coaches, autonomous driving, and new mobility concepts. Because we see fulfilling our responsibility to society and the environment is a must.



## Safety is first

Avoiding safety problems on the road is a requirement for our vehicles, and active and passive safety are strategic aspects for new product and service developments. From the design phase, we invest the maximum in technology and innovation to be leaders in this field and to guarantee the highest levels of safety for both drivers and passengers.

All Irizar brand coach and bus models comply with safety standard R.66.02 and are equipped with the most advanced active safety technologies on the market in order to help, warn, and assist drivers and avoid hazardous situations. Highlights include stability control (ESP), adaptive and predictive cruise control (ACC + PCC), advanced emergency braking systems (AEBS), involuntary lane change (LDW), detection and monitoring of tire pressure (TPTMS), full LED headlights, driver fatigue detector (DFT) and optional predictive shifting (PS), as well as video surveillance for image recording and anti-theft device.

These active safety technologies also include the possibility of remote down-load of driver and vehicle cards and audible alerts for pedestrians in the case of silent buses and coaches.

## New assistance systems

To advance in this field, Irizar has reached collaboration agreements with the world's leading companies in the sector to jointly develop advanced features aimed at addressing the different levels of automation for Irizar Group buses and coaches while improving safety, efficiency, and connectivity (5G).

One of these features is an accident prevention system that identifies potentially dangerous situations and provides visual and acoustic warnings to help drivers avoid or mitigate a collision, acting as a "third eye" that constantly monitors the road ahead of the vehicle.

## Digitization

At the Irizar Group, we have begun to move towards digital transformation or industry 4.0, further developing our corporate culture to be even faster, more flexible, and more open to innovation.

Digitization is implemented as a project for the future, which affects all the work areas of our organisation. This is a new phase for industrial development indicating significant changes. It is in this context that the analysis and diagnosis recently initiated in several Irizar Group companies is framed.

The objective is the definition of the future transformation plan, which will begin by identifying and assigning actions and priorities in the short term. The methodological approach of this transformation, the conceptual framework of Industry 4.0, is based on detailed analysis of business and market strategies, processes, organization, personnel, infrastructure, products, and services.

The application of Industry 4.0 in a company provides advantages such as productive efficiency, quality improvement, cost savings, and increased sustainable competitiveness.



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**“ The Irizar Group is working to introduce different levels of automation for both buses and coaches. ”**

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## Towards autonomous driving

Connectivity and digitalization will play a crucial role in the future of mobility. Autonomous vehicles and new and more efficient services will shape this future.

At the international level, six levels (from 0 to 5) are defined to classify autonomous driving. This classification system describes the degrees of automation of vehicles as well as the requirements that drivers must meet.

The Irizar Group is working to introduce different levels of automation for both buses and coaches.

As for zero-emission urban vehicles, we are currently actively participating in local and European projects with the objective of reaching level 5 of autonomous driving.

As regards automation of medium and long-distance coaches, we continue to invest in advanced driver assistance system (ADAS) projects. Accordingly, certain functions that are being developed are the recognition of traffic signals; intelligent headlight control; signal recording; detection of bicycles, animals, and pedestrians; and lane change assistance, among the main ones.

## Connectivity We make easier and more efficient

The Group offers intelligent driver assistance systems with a range of optional equipment to provide drivers 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.

Additionally, at the Irizar Group, we are immersed in projects to develop technologies and strategies that enable the creation of e-mobility solutions (urban public transport based on 100% electric buses) that are modular flexible and scalable in order to make viable the mass deployment of medium/large electric bus fleets, thus minimizing the impact on the power grid and reducing initial and operational costs. These projects are an important strategic challenge as it seeks to unlock the limitations of a booming market in which the Irizar Group has been positioning itself.

Driver assistance and autonomous driving are implemented as key aspects for the future of mobility. At the Irizar Group, we are already taking steps for both buses and coaches to shape this future.



# Our sustainable focus

**The impact that CO2 emissions from transportation means have on global warming is a fact. Therefore, every day, we continue to focus all our efforts on advancing and investing in the creation of different technologies in order to offer pioneering solutions to the different mobility needs for the future worldwide. Reducing the impact of our vehicles and eliminating greenhouse gasses and noise emissions is our priority.**

We currently have one of the widest ranges of products and technological solutions on the market including zero-emission electric buses, integral and conventional buses, and hybrid or biodiesel technologies. Accordingly, we cover all sectors of public passenger transport, from occasional services to regular public commuter services, encompassing urban, intercity, and long-distance routes.

## Free CO2 emissions

The European Commission has a computer simulation program (VECTO) that aims to provide truck and coach manufacturers with a standard tool to measure fuel consumption and CO2 emissions and, consequently, establish objectives for drastic reductions.

While currently VECTO declarations are directed at the truck sector, Irizar is already investing heavily in a new generation of diesel and hybrid vehicles, to reduce the level of CO2 emissions (fuel consumption), using truck targets as a reference, ahead of future regulations.

In this area, Irizar participates with major European brands in national and European projects for the research and development of a new generation of vehicles with lower pollutant emissions. The main lines of research are currently focused on aerodynamic improvements; reduction of weight; HVAC systems; efficiency of the kinematic chain; and electrification, control, and efficiency of all auxiliary components.



## Life Cycle Analysis (LCA)

At Irizar, we continue to make significant progress in all aspects related to the improvement of the environment, in both the treatment and reduction of waste, as well as in emissions, etc.

We have been applying Life Cycle Analysis (LCA) methodologies for more than four years while establishing Product Category Rules (PCR) to evaluate the environmental profile of our combustion, hybrid, and electric coaches, as our focus is to make efficient and cutting-edge environmental products and technologies applied to the entire product life cycle available to all. The result of this work is the achievement this year of the first Environmental Product Declaration (The International EPD System), which makes us the **first company in the sector worldwide to achieve this certification in the environmental area.**

Environmental Product Declarations (EPD) have been developed in accordance with ISO 14025 and they add a new dimension in the market, given that they enable information to be provided on the environmental performance or scope of products and services. They are created and registered in the context of the Type III Eco-Labeling Programme under the International EPD System, based on the following reference standards. UNE-EN ISO 14040:2006. (Environmental management. Life cycle analysis. Principles and frame of reference). UNE-EN ISO 14044:2006. (Environmental management. Life cycle analysis. Requirements and regulations). UNE-EN ISO 14025:201. (Environmental labels and declarations. Environmental declarations type 111. Principles and procedures). Product Category Rules for preparing Environmental Product Declarations for Public and private buses and coaches (PCR 2016-04).

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**“ The result of this work is the achievement of the first Environmental Product Declaration, which makes us the first company in the sector worldwide to achieve this certification in the environmental area.”**

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EPD declarations provide differentiating advantages to customers and markets as they scientifically and independently evaluate the coach from an environmental perspective in terms of impact throughout the life cycle, energy consumption of renewable fossil resources at each stage of the life cycle, and pollutant emissions or hazardous substances from manufacturing. It also evaluates the environmental benefits of the product and environmental management or eco-design systems in the organisation or the way to manage the end of life of the product.

Furthermore, it contributes to establishing measures aimed at reducing CO2 emissions and other pollutants of our products throughout the life cycle, based on the use of materials that are increasingly respectful of the environment, weight reduction, and fuel consumption. Efficient and sustainable driving habits also result in the achievement of these objectives.

Ecological design implies the integration of environmental aspects from conception. This integration, based on a global approach, must take into account all stages of the product life cycle and the mechanisms aimed at reducing its environmental impact, identifying technologies, ways to improve the choice of materials, and encouraging the use of clean materials.

This life cycle analysis project has been carried out on the Irizar integral i4 model, at 13 metres in length, 55 seats, and DAF MX 11 E6 diesel engine, and is being applied to the rest of the Irizar Group's product range.



# CERTIFICATE

## EPD REGISTRATION

This document is to confirm that

**IRIZAR, S.COOP.**

has published an Environmental Product Declaration for

### IRIZAR I4 INTEGRAL COACH

with registration number S-P-01571  
in the International EPD® System.

The EPD has been developed in accordance with ISO 14025, the General Programme Instructions for the International EPD® System and the reference PCR 2016:04. Verification was performed by Tecnalía R&I Certificación, S.L.

This document is valid until 2024-05-17, or until the EPD is de-registered and no longer published at [www.environdec.com](http://www.environdec.com).

Adam Lewrén  
Secretariat of the International EPD® System  
Gothenburg, Sweden, 2019-06-03

## Environmental Product Declaration (EDP)

Irizar has done a study to gain insight into the environmental behaviour of the Irizar i4 integral, in which it examined all the phases of its life cycle according the ISO 14040:2006 and ISO 14044:2006 standards. The Environmental Product Declaration (EPD), (ISO 14025:2010), takes into account every step involved in the Life Cycle Analysis (LCA).

- Definition of goals and scope
- Compile inventory
- Evaluation of life cycle impact
- Draw conclusions and courses for environmental improvement



Carbon footprint: : **0,0228 kgr of CO2/person/Km**



**EcoAssist** - System that makes it possible to reduce fuel waste by providing signals to drivers



**Automatic reports** that identify areas for improvement to reduce fuel consumption



**96,03%** Recyclability ratio  
**98,26%** Recoverability ratio



Optimal performance of the **climate control equipment**



Interior lighting using **LED technology**

Potential environmental impacts			1 p km transported			
Concept	Unit		Upstream	Core	Downstream	Total
Global potential warming	Fossil	Kg CO2 eq	6,21E-04	1,62E-04	2,20E-02	2,28E-02
	Biogenic	Kg CO2 eq	1,95E-05	1,11E-05	4,75E-05	7,81E-05
	Land use / Land transformation	Kg CO2 eq	1,56E-06	5,57E-07	1,81E-06	3,92E-06
	<b>TOTAL</b>	<b>Kg CO2 eq</b>	<b>6,42E-04</b>	<b>1,74E-04</b>	<b>2,21E-02</b>	<b>2,29E-02</b>

Potential environmental impacts





# The 20th anniversary of Irizar Mexico

## New generation of integral, hybrid and gas coaches

Coinciding with the 20th anniversary, 2019 has been the year of the introduction of major innovations that once again demonstrate Irizar's commitment and robustness in Mexico.

The introduction of the new Irizar i6S completes a product range that meets all the needs of the Mexican market.

Additionally, with the idea of contributing to more sustainable cities and as part of the Group's commitment in that framework, Irizar Mexico has developed vehicles with different technologies, thus entering the new motor transport market.

The new generations of Irizar Mexico integral units have a new Euro 5 engine, based on the successful MY2017, with all the improvements in fuel efficiency that have already been tested and validated in Europe. The new integral units will be available in MX13 355 KW and MX13 390 KW engine versions, with Traxon gearboxes and ZF axles, as well as the latest active safety systems.

They also offer active safety systems, AEBS (Advanced Emergency Braking System), advanced emergency braking system and ACC (Adaptive Cruise Control), adaptive system control. This will continue to strengthen the active safety of both passengers and driver, thus minimizing risks in unforeseen circumstances. These systems complement those already included in the unit: LDW (Line Departure Warning), lane departure warning system and DFD (Driver Fatigue Detector).

The first Irizar i4 hybrid, a short-distance commuter and suburban bus, has been delivered. It is a 2-axle version, 12.90 metres long, 2.55 metres wide and 3.40 metres high. A sustainable and eco-efficient urban and interurban mobility solution.

The first Irizar i5 unit has also been launched it is 12.20 metres long, 3.30 metres high and 2.55 metres wide, on a Scania chassis, with a compressed natural gas E6 engine. This vehicle has a range of more 400km

This bus, in addition to providing an economic benefit, as the cost of this fuel is lower, also offers an environmental benefit, leading to an improvement in air quality, since it reduces pollutant emissions by up to 85% compared to coaches that work with conventional diesel. It also substantially minimizes noise pollution, with a 50% reduction in perceived noise emission and vibrations compared to diesel engines.



## A tour of its history

Irizar Mexico was founded in 1999 in the city of Querétaro, the product of Irizar's commitment to geographical diversification. During its 20-year history, Irizar Mexico has experienced continuous growth and is today the market leader in the bus and coach manufacturing sector with a share of over 50%.

Throughout these years, the surface area of the production plant has doubled, with major investments in improvements to processes and streamlining deliveries to the customer. It has developed from a coach company to a coach manufacturer with a total volume of more than 12,000 units during these years.

The success of Irizar Mexico is mainly due to the initial commitment to adapting and customizing products and services to the needs of the country's operators, a key aspect for entry into the market. The commitment to technology and innovation, sustainability, talent recruitment and the deep commitment to customer orientation are also values that have generated stability in the country.

Production initially focused exclusively on the iconic Century model coach and obtained good positioning in the tourism and road lines. During this period, Irizar Mexico consolidated, growing both in production volume and in its number of workers.

2001 saw the introduction of the Intercentury, a model that enabled Irizar to secure some large orders and - as a result - to expand the plant for the first time.

In 2007, the emergence of Irizar PB led to Irizar Mexico growing significantly. In 2011, the PB Confort version was developed. The PB Confort was a coach that enjoyed an excellent reception and catapulted Irizar Mexico into the position of undisputed leader in the foreign coach market. It has maintained this leadership since then with a market share of over 60%, reflecting Irizar's significant popularity in the Mexican market.

In 2009, the Irizar i5 arrived, once again demonstrating the importance of Mexico for the Irizar Group, as the product was developed exclusively for the Mexican market.

In 2012, the Irizar i6 completed the range of products, short to long distance, including the tourist coach. In this way, all the segments that the Mexican market demanded until then were covered.

The 2015 arrival of the Irizar i8, the most successful bus in history in Mexico, is a milestone in Irizar Mexico's journey. It was the first model in the history of Irizar introduced simultaneously in Europe and in this country, thus confirming the great importance of Mexico for the Irizar Group.

At the same time, the Irizar i8 and Irizar i6 integral coach range was launched, thus completing the technological options of the group's own products.

# Mining projects leader

In mid-2009 Irizar Brazil began to create innovative projects related to the manufacture of coaches destined for the mining industry for the transport of people and sub-contracted workers that provide services in the mineral fields. Irizar was therefore specializing in a different segment from its previous trajectory, focused on the production of road buses for the tourism sector and regular lines

The possibility of selling buses with the brand's same level of quality, but with components fully adapted to the possible adverse conditions on the route between cities and the mines, enabled this segment to become an area of expertise for Irizar Brazil.

Gradually, after understanding the real needs of customers and undertaking a thorough analysis of the market to examine the conditions of the sector and the need to provide buses with safe and reliable technologies, equipped against risks for passengers and drivers was established, the first operations related to this segment were agreed.

Taking advantage of the fact that Irizar was already complying with the most demanding safety standards in the world (R14 for seats and R 66.02 for structures), efforts focused on adapting to the needs of mining operations, characterized by long routes and rough terrain. One of the solutions, for example, has been the pressurization of the boot that uses the circulation and renewal of air to prevent the entry and propagation of dust in the vehicle.

In this sense, the precursor market was Chile. With a significant number of mines in its territory, currently 80% of the units delivered to Chile are for the mining sector. This country is therefore becoming the main market of Irizar Brazil.

More than 20 mines in Chile are served by Irizar buses, including: Los Pelambres, Codelco (Salvador, Radomiro Tomic, Chuquicamata, Andina), BHP Billiton, Bechtel Quebrada Blanca Phase I and Anglo los Bronces.

Based on the Chilean experience, attention is now focusing on Peru, a country with an extremely important mining sector, that is currently in the process of improving the requirements for the transportation of

personnel. This scenario is a perfect match for Irizar Brazil's strategy to serve this niche customer group in the Peruvian market.

Currently, Irizar buses are present in the most important mining operations in Peru, the main ones including the mines of Cerro Verde, Minsur, Quellaveco and Las Bambas.

Based on Irizar Brazil's expectations, especially in Peru, the production of the next three years will need a strong increase in mining buses, as there are many Peruvian projects in the bidding phase, which will surely require Irizar buses.

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**“Today, Irizar Brazil is increasingly present and is already considered a consolidated brand in the mining transport segment, especially in Chile and Peru.”**

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## Safety, it's what makes the difference

Winding roads, gigantic precipices plunging from narrow, unpaved roads, altitudes that can reach up to 5,000 metres, long travel times and a wide range of temperatures. These are just some of the conditions to which a mining bus can be exposed during its routes or even in some situations inside the mine. Accordingly, safety avoiding passenger exposure to risks is vitally important.

In mining operations, Irizar buses incorporate a range of safety elements, including the three-point safety belt, safety belt sensors buckle with buckle, boot pressurizer, integral air conditioning with floor and ceiling heating, protection at the bottom, semi-bed seats with three-point belt, fatigue sensor and breathalyzer.

In addition, all Irizar coaches have active and passive safety systems and a structure designed taking account of rollover resistance and frontal collision, which optimizes weight distribution. In addition, they have the most advanced lighting technologies to improve visibility.



## Irizar's presence in Africa intensifies

**Irizar's presence in Africa dates back to 1996, the year in which the company started operations in Morocco, in the north of the continent. From 2002, the first sales in West Africa and southern Africa took place, through Irizar Brazil.**

The Irizar brand has become a benchmark in the African countries where it is present due, undoubtedly, to investments in the development of products and services and adaptation to geographical conditions, customers and users. Proof of this is the development of coaches with a front engine without reducing quality, design, comfort, safety and operating cost.

Irizar is currently present in more than 20 countries in Africa and is continuing to expand into new territories and regions.

### North Africa

Irizar's position of absolute leader in Morocco is well-known, but perhaps its mission to export to North African countries such as Senegal, Nigeria, Egypt is less well-known.

### West Africa

Nigeria is the African country of greatest penetration of the Irizar brand. It currently has more than 250 luxury coaches travelling its roads. Nigeria is followed by Cameroon, Burkina Faso and Gabon.

Irizar coaches are recognized as among the best long-distance coaches in these countries and users do not hesitate to request an Irizar coach due to the comfort, luxury and safety they provide. Operators praise their quality, durability and performance in the harsh African conditions and, after years of experience, they position Irizar as one of the most reliable and profitable brands.

### South Africa

Irizar began its journey in South Africa in 2003 and in 2004 it was established in Johannesburg - Centurion. Since then, more than 1000 units have been sold in the region. Currently the catalogue of products offered also includes the Irizar i6S.

The main routes in South Africa are dominated by Irizar coaches, operated by the main long-distance travel providers. From Cape Town to Malawi, a trip to the Kruger National Park forest, a visit to Table Mountain or some other route, there will always be an Irizar coach enabling you to enjoy the experience and luxury of long-distance travel. With the same standards as in Europe.

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**“The Irizar brand has become a benchmark in the African countries where it is present due, undoubtedly, to investments in the development of products and services and adaptation to geographical conditions, customers and users.**

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## Growth of Irizar in Australia

Irizar Asia Pacific has consolidated and, so far this year, it has managed to double its market share digits, reaching a new record of 24% share.

The team of staff in the commercial, after-sales and administration services has grown from two in 2014 to 20 in 2019.

2018 and 2019 have been Irizar Australia's best years par excellence. The strong growth in the school bus market and contracts with mining companies have been paramount for this growth.

The Australian mining sector is currently operating 60% more gold, iron ore, copper and magnesium. This growth in operations demands major, qualified dedication of people. There has been a significant exodus of labour from metropolitan areas to mining sites in the last 12 months. This has had a major impact on the transport system, with the logical consequence of demand for more buses.

Greyhound, a well-known Irizar customer, is the main long distance and resource (mining) operator. The units delivered by Irizar to Greyhound

during 2018 and 2019 account for more than 50% of mining vehicles in Australia. They transport more than 6000 passengers every day.

The second half of 2019 promises to be a productive time for Irizar for two reasons: the rise of the mining industry associated with government investment in infrastructure that may double the receipt of Irizar orders in 6 months and, also, the announcement of the government of New South Wales that it will subsidize testing for electric vehicles with AUD 10 million (7 million euros).

With the latest investment in after-sales and customer relations, the Irizar brand is perceived in Australia as the best service brand in the market.



## Double-decker buses for use in the city of London

**Hispacold fits 37 E400EV 100% electric double-decker ADL buses for use in the city of London. The ADL buses will feature two integrated electrical appliances, developed by Hispacold, one for passengers, model DDE HP E400 EV, and another for the driver, model DCAB HP E400 EV.**

The relationship between Hispacold and ADL takes us to London, where the British brand has received the order of 37 E440 EV double-decker buses, equipped with our state-of-the-art air conditioning systems.

On 20 May, 2019, in London, ADL presented its new electric vehicle to numerous journalists who were able to witness the delivery of the first E400 EV double-decker buses to London public transport, with capacity for 83 passengers, and with two integrated Hispacold electrical devices with reversible heat pump.

Both devices, fully developed and manufactured by Hispacold, are 100% electric, and thanks to their innovative heating management, they increase the operating range in winter to less than -10°C.

These devices, model DDE HP E400 EV for passengers and model DCAB HP E400 EV for the driver, have been developed with our latest

technology, as they are the most efficient systems, and, therefore, those on the market that consume the least.

Our state-of-the-art air conditioning systems will be integrated into the ADL E400 EV double-decker electric buses, which offer highly efficient fuel consumption, are quiet, environmentally friendly and with a considerable increase in seating capacity.

At Hispacold we continue to focus on air conditioning systems for electric vehicles, by developing new versions in response to market demand, and expanding the models available to new applications, as in this case, of integrated systems for double-deckers, with a very low weight.



## “Breeze”, the new wave of air conditioning

The new systems in the Breeze range are adapted to all types of vehicles: urban, intercity and discretionary, combustion, hybrid and zero emissions.

Combining design, power and sustainability, Hispacold has developed Breeze: a new range of air conditioning systems covering all the needs of electromobility, urban, intercity and discretionary vehicles, for all climatic and environmental zones.

The equipment of the range is more compact and lightweight and its design has been completely overhauled. The new Breeze equipment is lighter than the latest generation equipment on the market, offering a weight reduction of more than 35% compared to previous ranges. Its modularity promotes adaptation to the customer and means that delivery times to be reduced. The equipment adapts to any radius of the roof of the vehicle.

With the launch of this equipment range, Hispacold is raising its quality standards based on the highest technical requirements in the sector and also contributing to a reduction in the equipment life cycle cost.

The mechanical anchoring of the equipment on the roof of the vehicle minimizes installation times and costs, and ensures greater cleanliness in use.

The reduction of the cooling load is another important feature of this new range. The Breeze range equipment reduces cooling load by more than 60% compared to previous ranges, and achieves a reduction in GWP (Global Warming Potential) of up to 75%, which translates, together with a reduction in refrigerator connections under IMACA regulations, in a significantly lower contribution to global warming. The Breeze range equipment is set up to work with R134A and R513A.

The Breeze range equipment offers the option to incorporate an air extraction system to keep the

renewed air inside the vehicle, avoiding the need for manufacturer to install a specific independent extraction system.

The Breeze range design provides greater efficiency of the air conditioning system without compromising comfort or quality. This is achieved by reducing the weight of the equipment; by lowering the Kg / kW ratio we achieve lower consumption; the flow of renewal air is increased to ensure more hours' operation in free-cooling mode, thus air conditioning the vehicle without the need to connect the compressor; it is possible to install a CO2 probe (optional) to control indoor air quality, thus avoiding the need for any more renewal flow than strictly necessary when environmental conditions are adverse; It is possible to install our eco3 air purifier (optional) to increase the concentration of oxygen inside the vehicle, in addition to cleaning, disinfecting and eliminating odours, thus contributing to improved indoor air quality and, finally, brushless motors are installed as standard, for lower consumption and optimized regulation.

The air conditioning systems of the Breeze Range also reduce the Life Cycle Costs (LCC) by choosing high-end components for equipment optimization, reducing the number of connections to avoid any gas leaks, also complying with the IMACA regulations, the balanced configuration of the equipment with optimized operating pressures, easy servicing (maintenance friendly), the use of brushless motors, easy to assemble and disassemble components and fewer connections; also by installing motors and fans with self-diagnosis capability for predictive maintenance.





## Masats consolidates its growth

**Masats achieved record sales in 2018. The confidence of its bus sector customers in different countries and its gradual consolidation in the railway sector are the main contributors.**

The company's diversification towards the railway began sector a few years ago and has been rewarded with a major order of sliding-plug electric passenger doors for an EMU train for the German city of Stuttgart, to be commissioned in 2020, as well as another major passenger door project for FGC.

Masats has also successfully completed the approval tests for its Platform Screen Doors, at a station on Barcelona Metro line L10. This project involves collaboration with Ifercat, the public infrastructure agency and TMB, the line operator. This is an important milestone for the company, which has also required the execution of public works, the placement of three modules in the station, and testing of the interface with the Siemens signalling system.

Diversification towards the railway sector has required the involvement of all Masats staff in order to meet the demanding DIN6701 certifications for the glass bonding used in the railway sector, as well as the important IRIS railway systems quality standard.

In the field of innovation for the road sector, Masats is preparing three major launches in the coming months. First, for long-haul vehicles, Masats will present the O20 system at Busworld. It is a door for long-distance coaches, with improved seal, safety and reliability thanks to an innovative system with no vertical movement, resulting in rapid assembly and smooth and precise movement. The system is also vandal-proof. The pre-assembly of the closure, locking and emergency systems on the same leaf, makes it an attractive "plug and play" element for the vehicle manufacturer.

In the urban sector, the company is continuing to move towards electronics that offer added value to the operator, with the launch of EVOLUTION electronics, a DCU set up for predictive maintenance, which improves product life cycle cost, vehicle availability and maintainability.



In urban transport, the opening speed, reliability and availability of the doors are indispensable. That is why Masats is preparing the launch of a new interior opening system, the O29i Tilt-and-Slide Door. The launch is planned for 2020.

In the area of accessibility, it is continuing to advance with lifts such as the firm and comfortable KS8 and is already working on new projects that combine the lightness needed for vehicles with the requirements of greater resistance demanded by new mobility systems.

Masats is therefore consolidating its firm objective of reliable products and high availability for the operator. The organizational change made a few years ago with

the creation of the Product Strategy, Product Validation team and the creation of a new Innovation Project Management area, has led to progress towards the creation of highly reliable products, ensuring the final quality of the project from its inception and going beyond all expectations.

The creation of the Product Configurator, in addition to offering product adaptations within well tried and tested options, has also produced speedy project management and excellent customer service.

Masats is continuing to make progress with its main objective, customer satisfaction, and is working to improve people's lives, through better mobility



# Electromobility

*for a better life*





## One year later

**One year since the launch of the Irizar e-mobility facilities in 2018, we continue to advance and innovate with the firm conviction of contributing to the transformation of cities in terms of mobility.**

We have expanded the range of electric vehicles with the Irizar ie tram 12-meter bus models and the second generation of the 12 m Irizar ie bus. We have introduced the first Irizar ie truck prototypes, and we continue to develop new versions for different applications.

For 2019, in addition to facilitating a strong boost in the development and manufacturing of different battery solutions and investing in photovoltaic energy, we are implementing turnkey electromobility solutions in the cities of Bayonne, Aix en Provence, and Amiens.

Our workforce has grown from 150 to 200 employees, which underlines the steady pace at which the company is taking on the challenges of the future and confirms the commitment to local employment and the creation of wealth in the territory.

Irizar e-mobility presents, within the framework of the Busworld fair, the second generation of the Irizar ie 12 m bus. This bus has been operating since 2014 in different weather conditions for different European cities, and its performance data demonstrates its reliability and autonomy.



## Expanding the Irizar ie tram range

Irizar e-mobility presented the 12 m Irizar ie tram at the Global Public Transport Summit organized by UITP in Stockholm from June 9 to 12.

The first vehicle in the Irizar ie tram range, which is completed with this 12 m unit, was presented at the Busworld international fair in 2017. The 18 m model, the brand's flagship, has become the best seller to date and operates in cities such as Amiens, Bayonne, Barcelona, and Las Palmas.

The Irizar ie tram is a 100% electric, zero-emission 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.

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.

# Irizar ie bus, a new generation

## More autonomy, greater passenger capacity

In addition to its attractive aesthetic design, this new generation, available in 10, 12, 15 and 18 meters, incorporates innovations in terms of weight, capacity, and new batteries, achieving homologation for Class II. Its weight has been reduced by 10%, achieving space optimization and, consequently, greater passenger capacity and improved modularity. A new generation of more efficient batteries is combined with a regenerative braking system, reduce consumption, and greater vehicle autonomy.

In urban environments, driven by 350 kWh in a SORT 1 cycle and in standard climate conditions, it offers an approximate autonomy of 250 km, which means about 17 hours of operation.

The new Irizar ie bus has greater flexibility in terms of charging point positions (slow, fast, or ultra-fast) as well as increased charging power (up to 600 kW).

Charging speed has decreased with the ability to perform slow charge of the vehicle in three hours. There is also the option of fast charging via pantograph.



## Futuristic design

We have carefully reworked both the exterior and interior design of the bus, achieving a more attractive, efficient, reliable, and safe vehicle.

The front end, with a more pronounced and elegant touch, is increasingly similar to the aesthetic features of Irizar products. When it comes to the interior design, although the standard version has a more conventional specification, some of the Irizar ie tram options may be incorporated, including large windows, side lighting or screens above the windows, among others.

Additionally, the interior is modular, which facilitates interior configuration by the customer. Additionally, the customer may replace the rear view mirrors with cameras that show images on two screens located inside the vehicle on both sides of the driver.

## A safer vehicle

We were pioneers in complying with the ECE-R66/02 rollover regulations for electric vehicles; the European regulations that measure the structural resistance of large vehicles for passenger transport.

Currently, we incorporate the AVAS (Acoustic Vehicle Alerting System); an acoustic warning system that complies with R138.

Also included is a new dashboard with quality materials, which comply with fire regulations 118R annex 6, 7, and 8.

## Improved vehicle maintenance

The new generation of the Irizar ie bus enables easier, safer, and more ergonomic vehicle maintenance. The experience of recent years has led us to optimize and improve access to different points to facilitate vehicle maintenance.

## With Irizar Group technology

As with the rest of the range, the new 12 m Irizar ie bus responds to the Group's technology in terms of charging, drive, and energy storage systems. This highly tested and proven technology enables our operators to offer comprehensive maintenance service for the entire life of the vehicle.

In short, a more reliable vehicle has been achieved, with more personality and style than ever. This fully electric vehicle eliminates tons of polluting emissions and creates a healthier and more sustainable environment for citizens.



“A new generation of more efficient batteries is combined with a regenerative braking system, reduce consumption, and greater vehicle autonomy.”



## The first Irizar ie truck in operation

After the presentation of the first Irizar ie truck, within the framework of the Sustainable Urban Mobility Congress (SUM) in Bilbao, from February 20 to 23, this vehicle was used to collect waste in Pamplona. Currently, it operates in different cities.

This is an 8-metre 6 × 2 version with a load capacity of 18 tons. It incorporates a CNG range extender which allows it to operate in electric mode in cities and the possibility of increasing its autonomy with a natural gas engine.



## First application, waste collection

The Irizar ie truck has been designed to operate in both urban and interurban environments without generating atmospheric or acoustic pollution. Because its noise level is low, it can operate at night, thus reducing traffic during the hours of greatest congestion.

Thanks to its great versatility and flexibility, this truck may be used for different industrial uses with the aim of electric mobility. All types of bodywork currently available may be installed with hardly any modification. The axles and steering, specifically developed for the application, provide the vehicle with certain major facilities with regard to load capabilities and manoeuvrability.

## More models in development

New versions are currently being developed in terms of both zero-emission electric motorization and different applications beyond waste collection.



## Sustainable energy installations

The Irizar Group integral environmental policy includes the use of renewable energy in its production plants.

An example of this is the Irizar e-mobility production plant, which has already been awarded the Type A energy efficiency certificate, the maximum currently available at the European level. This is the first European electromobility plant where all the energy consumed will be supplied by the largest solar photovoltaic park located in Alava, Basque Country, where Irizar has invested, acquiring three megawatts. The plant will be located in the Arasur logistics platform, in Ribera Baja (Alava).

The park, operated by the Basque Energy Agency (EVE) and the Krean group, will have 67,000 panels of 355 watts each. The installed power will be 24 million watts and will double the photovoltaic power installed in Euskadi. It will generate 40 billion watts per year, equivalent to the annual electricity consumption of 15,000 families.

## Irizar Group technology batteries

At Irizar, we have developed, using proprietary technology, a battery management and storage system incorporated in hybrid and electric vehicles. The Irizar battery system uses a modular concept, designed to meet the needs of any operator. Also included are liquid cooling systems that enable optimisation of useful life and the possibility that vehicles can operate in extreme weather conditions. This is a robust and safe system that complies with the latest European regulations: R100 v2, R10, and UN38.3.

The different solutions we offer on the market are:

- Energy pack for slow charging. Designed so that the vehicle can travel the maximum number of kilometres and complete the operation with a single daily charge.

- Nano pack for fast charging. The perfect ideal pairing between battery charge and power for mixed operations, where the vehicle has sufficient battery life to operate during peak hours. The charge may be both slow and fast.

- Power pack for ultra-fast charging. This is the solution for 24/7 operation with charging of up to 600 kW.

The Irizar battery pack is a highly recyclable product. Treatment of all its components is ensured through a controlled process with the possibility of use for other types of applications being evaluated. Additionally, Irizar is constantly searching and researching increasingly efficient products with the least environmental impact.

## Second life and recycling

Irizar e-mobility, in collaboration with the Cidetec Technology Centre, participates in projects related to the analysis of the second life of batteries, which are used in urban electric buses. It is estimated that these batteries will reach their end of life at an approximate SoH (State of Health) of 80%. They must then be replaced and repurposed for other uses with less demanding electrical specifications, such as stationary applications including electrical storage for photovoltaic systems or electric vehicle charging systems.

In parallel, the issue of recycling is also being addressed in collaborations with several European companies, to ensure final treatment of each component, controlling each process for safety and environmental aspects.





## Europe's largest electric BRT fleet with interoperable fast-charging

For the ambitious project of the new Ametis BRT service lines in the city of Amiens, 43 Irizar ie tram model zero-emission electric buses and charging infrastructures, developed and supplied by the Irizar Group, have been put into operation.

The electric buses operate on three of the four new Nemo lines. These BRT lines (Bus Rapid Transit) ensure service from four in the morning until midnight, with a frequency of 8-10 min., and are charged en route in four min. via six fast-charging pantograph infrastructures installed at different points of the city. For over-night charging, an additional 43 smart chargers have been installed in the new Rivery depots.

This is a key project for the Irizar Group. A turnkey project, with the fast-charging infrastructure, the largest in Europe. Amiens is our first network of this scale for design, manufacturing, and charging systems, which will undoubtedly serve as a showcase for future projects"

## Success in the European market

The Irizar Group continues to achieve success in European markets. The signing of the recent contracts in the northern European cities of Dusseldorf in Germany and Schaffhausen in Switzerland is followed by agreements signed in Madrid and in Vitoria-Gasteiz, currently the largest zero-emission electric bus projects in Spain.

Madrid EMT relies on Irizar e-mobility and after the incorporation of 15 buses last year, it signs an agreement for the supply of an additional 20 Irizar ie 12-meter new generation electric buses.

In the case of Vitoria-Gasteiz, within the city's Smart Electric Bus (EIB) project, the contract includes the implementation of the city's first 100% zero-emission electric line with the supply of 13 zero-emission buses, electric charging systems, and maintenance.

The first vehicles will be delivered by the middle of 2020.

With the implementation of this Smart Electric Bus (BEI) project, Vitoria-Gasteiz takes a firm step in its commitment to sustainable mobility.

## The Bayonne project (France)

On September 2, ten 18 m, 100% zero-emission Irizar ie tram electric buses were put into operation in the Basque Country. Specifically, on the T1 line, with a total of 12 km, linking Bayonne with the centre of Biarritz in 30 minutes.

This project includes the installation of two ultra-fast charging stations via Irizar pantograph in Biarritz and Bayonne that will charge vehicles in four minutes as well as in-depot smart charging stations for overnight charging.

This will be completed in 2020 with an additional 8 units that will service the T2 line between Bayonne and Tarnos.

## BRT in the city of Aix-en-Provence (France)

Also, on September 2, 16 12-meter Irizar ie tram buses were put into operation in the French city of Aix-en-Provence; the first to incorporate this version of the vehicle.

These rapid transit buses (BRT) connect, in less than 30 minutes, a distance of 7.2 km, the western and southern districts of the city, making stops at 19 stations. The charging of these vehicles is also carried out in four minutes via fast charging stations located at the beginning and end of each of the lines, and in-depot smart charging units.

This line offers an attractive, innovative, and efficient alternative to the car.



# Electric motors





# Committed to sustainability

**The world of marine motors and generators in all its sectors is committed to sustainability. This is where Alconza, a strategic supplier in this sector, feels comfortable while increasing its partnerships with the leading manufacturers in the sector.**

Its launch into the sector of permanent magnets for electromobility in the cities where Irizar e-mobility is present has made it possible for Alconza to master this technology and become a reference in these products for the naval sector.

It is a fact that diesel engines will completely disappear in the marine world. And that makes Alconza, the flagship for these products within the Irizar Group, stand out as the ideal supplier for large shipping companies.



Alconza has adapted its facilities and processes to the manufacture of these permanent magnet motors through strong investment in its facilities, which places it in a privileged position for this product range.

Thus, the manufacture of permanent magnet electric motors and generators for the marine, hydraulic, industrial generator, and electromobility sectors has become one of the pillars of Alconza's activity.

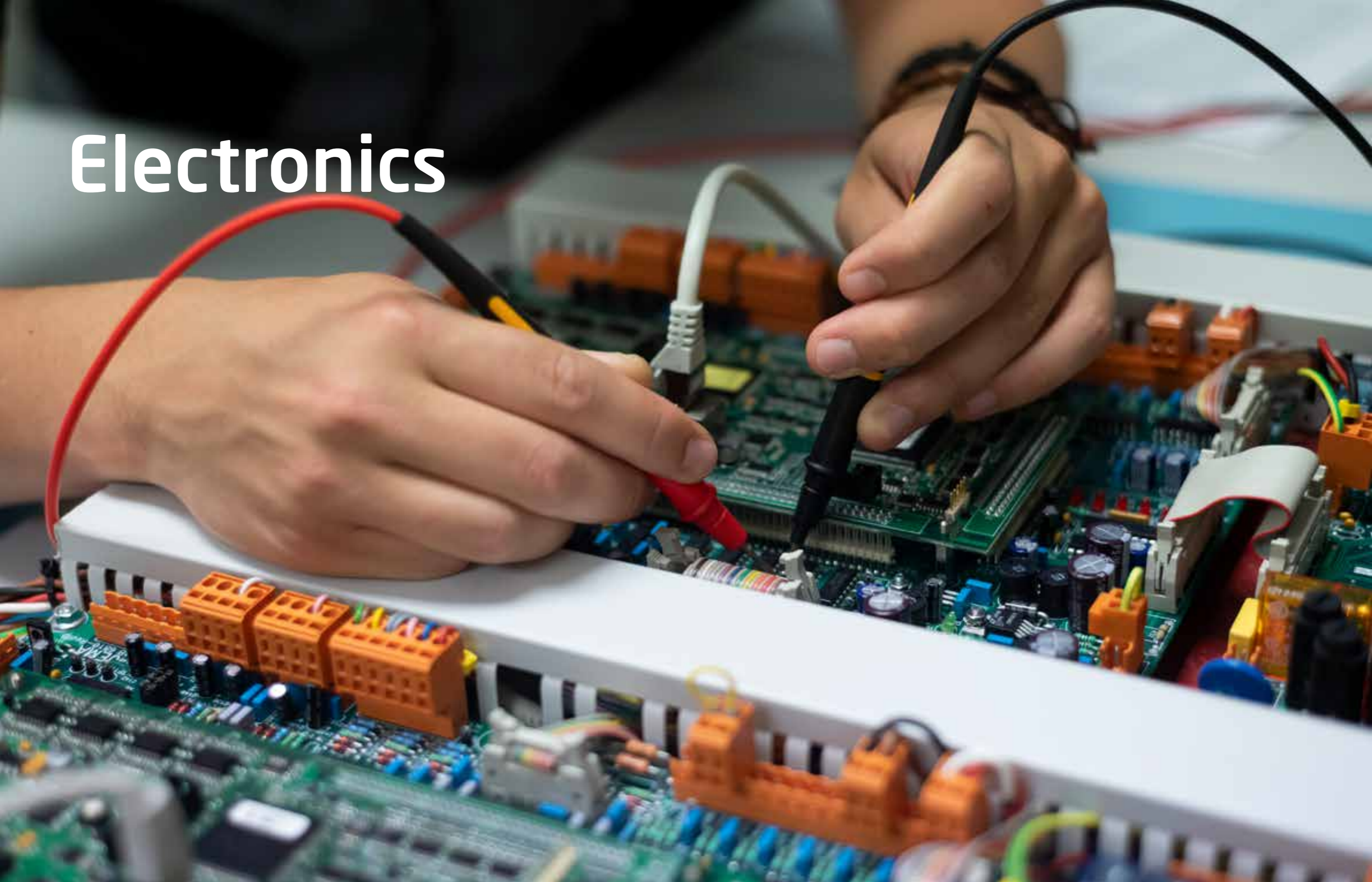
Beyond the manufacture of 100% electric motor groups, Alconza supplies innovative hybrid propulsion systems that include batteries for energy storage and provide significant emissions and maintenance savings. For example, Alconza has installed this system in the icebreaker tug with the world's most powerful hybrid-electric propulsion in its size.

Manufacturing was carried out within the pilot project for the maritime industry of the HY Hybrid System of Wartsila, where Alconza's permanent magnet design and improvements in size and efficiency are the heart of the solution implemented. Other improvements within the project include: "Green mode" to operate silently and with zero emissions, a "Power Boost" that provides more power than any tugboat of its size, and a "smokeless operation" work mode.

This project demonstrates the company's commitment to sustainability with its customers for the marine sectors.



# Electronics





# Interoperability

**Jema continues to play a very important role in the energy transition towards electromobility where decarbonisation and electrification are already here.**



Depending on power, space, and operational needs and restrictions, it conducts studies of electrification and dimensioning for smart charging systems.

It is currently working with a new range of interoperable ECI chargers for overnight in-depot charging and has launched several opportunity charging stations that enable buses to be charged in just four minutes without diverting from their route. In this way, the bus fleet is able to offer uninterrupted service throughout the day.

An example of the largest interoperable BRT system in Europe may be found in Amiens, where buses are charged during a 4-minute run through six quick-charge pantograph infrastructures installed in different parts of the city. For overnight charging, there are 43 in-depot smart chargers installed.

The Amiens project is followed by projects in Aix-en-Provence, Bayonne (France), Vitoria-Gasteiz, and Schaffhausen (Switzerland). In total, there are more than 250 charging systems in projects developed in Europe.

It should be remembered that different charging options are offered to respond to the different needs of cities and operators: charging by pantograph, where charging is carried out during routes; in-depot charging for slow charging vehicles; and in-depot pantographs for complete automation of in-depot slow charging. Additionally, as an option, there is a smart charging system, to efficiently manage all in-depot conditions and/or charging restrictions to optimize the total power required

All these solutions are interoperable in accordance with ISO 15118, DIN70121, OCPP 1.6 CE mark, EMC 61000-6-2, 61000-6-4, IEC 61851, IEC 61000.



# Connectivity







## New family of products

**Datik Computing Brain (DCB) is a family of devices installed in fleets in which iPanel® applications are installed. The DCB-T is the new member of the DCB family, an automotive device that connects to any vehicle brand, offering the operator the necessary services for efficient fleet management. iPanel® integrates tools to enable the operator to be more profitable, safe and sustainable.**

### DCB-T certified with the ITxPT seal

The DCB-T is certified with the ITxPT seal, which guarantees its quality and interoperability with other on-board systems. These new electronics follow the automotive standards, incorporating functionality for fleet management, remote maintenance, advanced fuel consumption analysis and driving safety management based on artificial vision.



## 10th anniversary

Datik provides customized services to operators, from fleet management solutions providing advanced driving style analytics to behaviour analysis during driving, measuring risk due to fatigue.

Recent implementation projects in DBus - San Sebastián (Spain), Bus Urbano in El Ejido (Spain) and BRT in Puebla (Mexico) - have led to progress in IoT applications in transport. The expert knowledge of transport management processes in the Datik Engineering team, means that the portfolio of products and services offered to its customers are continuously improving and expanding. The flexibility of the iPanel® solution means that a general product for all customers can become a unique solution for each of them.

Currently, Datik monitors more than 4,000 vehicles in countries such as Spain, France, England, United States or Mexico, where a branch has recently been opened with the intention of closer contact with customers.

The Datik strategic plan provides for a twofold increase in the number of vehicles monitored in the next two years.



The DCB-T connected to the iPanel® adds value to the transport operator by bringing the following management processes into a single tool and device:



Buying vehicles based on their performance and reliability



Improving quality by reducing response times to service incidents and providing quick responses to customer complaints



Reduce purchase, fuel and maintenance costs



Increasing passengers number by adapting the service to their needs



Reducing risk by improving driver driving attention

# Energy





## An active player in power generation

**Power generation is one of the great challenges facing humanity in the 21st century. A clean, inexhaustible energy that does not create radioactive waste or use non-renewable fuels.**

Humans have always looked for ways to generate energy, from the discovery of fire to nuclear fusion, that is, until they obtained energy the way it is generated by the stars.

With more than 20 years' experience in nuclear fusion, Jema Energy has positioned itself in the market as a reference both for its research and for the reliability of its equipment and for its involvement in private projects. Some of these private laboratory projects are the Tokamak Energy ST-40 in the United Kingdom or the Tri Alpha Energy C2W in the United States, or state projects, such as MAST & MAST-U in the United Kingdom, W-7X in Germany and JT60-SA developed between Japan and the European Union.

## Nuclear Fusion Emulating the stars

To make nuclear fusion a reality, since 2006 several countries (Japan, USA, South Korea, India, Russia, China and the EU) have been working on the ITER project for the development of a revolutionary installation: the fusion reactor. Furthermore, in recent years different private laboratories have developed pioneering projects in which Jema Energy has actively participated, supplying converters and power supplies enabling the operation of these reactors.

The main challenge is to achieve the right pressure and temperature. The biggest difference is in the temperature, as the reactor requires 150 million degrees Celsius to achieve the fusion when in the stars it is 10 million degrees Celsius.

The increase in financing by private laboratories and state projects, the lack of resources, the problem of climate change or events such as Fukushima have given further impetus to the development of the nuclear reactor and for Jema to continue working on it.

## Solar plants

Until the energy of the future finally arrives, Jema will continue to collaborate in the energy transition and will reap successes in solar plant projects such as in Mexico, where it generates more than 1 GW.

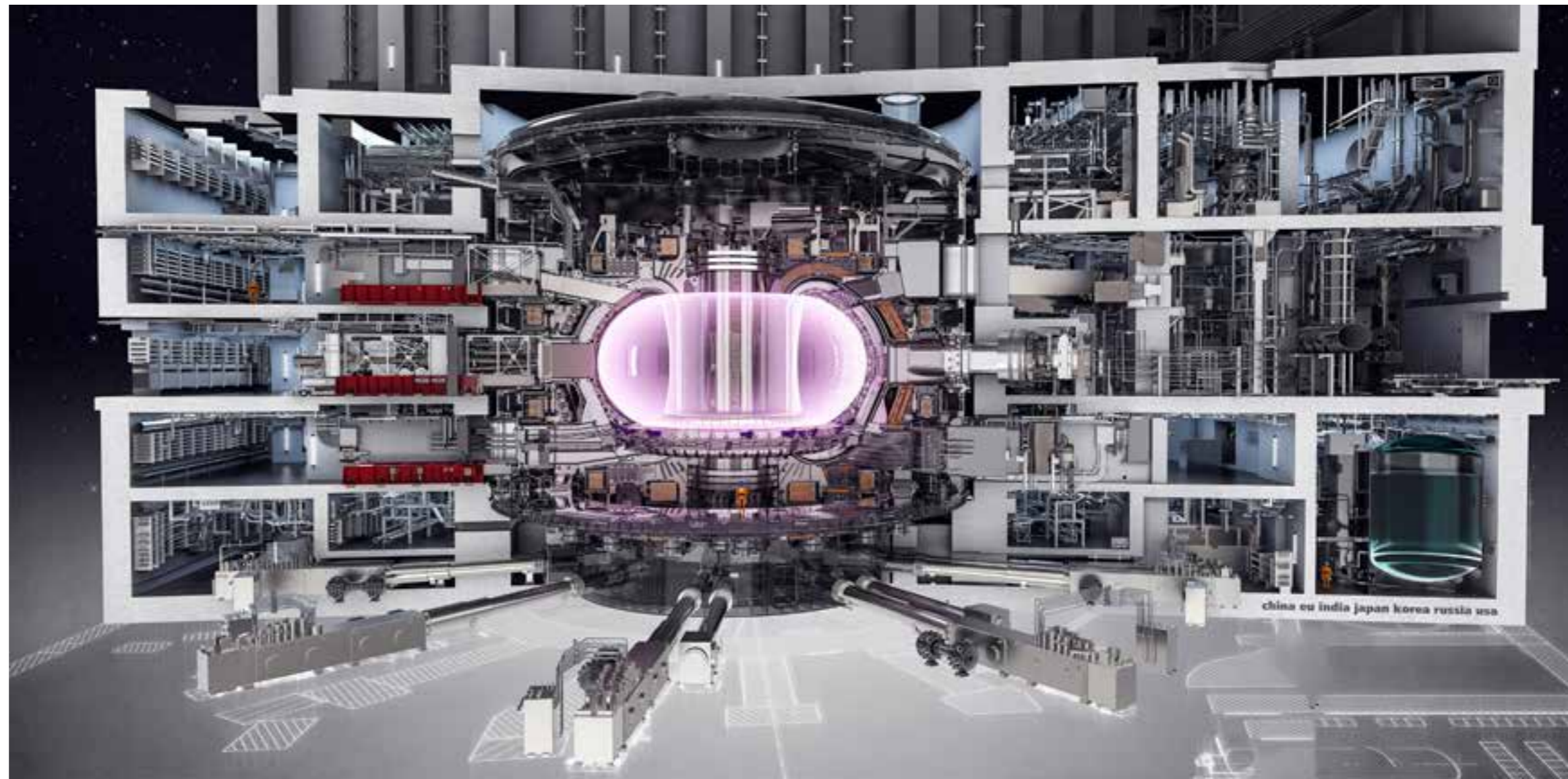
We have 11 projects developed in the country, to which we must add the one that to date is the largest project awarded to Jema Energy in Mexico: 210 MW in the new Nueva Xcala photovoltaic plant in the state of Tlaxcala.

For the development of this project, 80 IFX6 inverters and maintenance service will be provided from its base in Querétaro, from where it operates.

Thus, Jema Energy SL, is continuing to generate large volume growth in all its business units, most notably secure power sources for its advanced systems area.

The supply of components and electronic integration software for electric coaches and buses is also contributing to its growth.

Source: Iter



# Sustainability, a holistic vision of the future

**Sustainability, as a fundamental pillar of our strategy for the future, drives us and commits the entire Group to contribute to the construction of a better and more sustainable world.**

Our future success depends on all the organisations that comprise the Group going far beyond the search for economic profitability and compliance with applicable legislation (local, regional, national, foreign, and international laws) and internal regulations.

Sustained long-term business success is only possible if our culture and business performance are governed by ethical principles. We strive to create a true culture of sustainability (economic, social, and environmental), integrated at the Group level in the daily management of all the organisations that comprise it and in our relationships with all stakeholders (personnel, customers, passengers, citizens, external partners, the environment, and society in general).

At Irizar, we adhere to the United Nations Global Compact, which demonstrates our commitment to the 10 proclaimed principles (referring to Human Rights, Labour Rights, the Environment and the fight against Corruption), driving us to progress in our responsible action, helping us to better manage the risks to which the Group is subject.

In 2018, we began our approach to the United Nations Agenda 2030 and recognised the opportunity of the 17 Sustainable Development Goals (SDGs) and the involvement of the private sector to overcome the main challenges that the global society faces, including the fight against climate change, the eradication of poverty, and economic and social progress. We are convinced that contributing to the advancement of the United Nations Agenda 2030 will not only give us the satisfaction of being able to contribute our two cents to making the planet a more sustainable and prosperous place, but that it will also provide significant business opportunities, if we combine our contribution to the SDGs with our context and business objectives.

We focus all our efforts towards the search for long-term Sustainable Competitiveness, economically, socially, and environmentally. As well, we act sustainably so as to be more competitive, generate wealth and long-term employment, and meet the needs of our customers, external partners, our personnel, and society as a whole, every day. Furthermore, we are committed to protecting the environment and preserve our surroundings for future generations. We establish annual priorities and define actions with the objective that the Group's strategy is aligned with everyone's expectations.

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**“ We strive to create a true culture of sustainability (economic, social, and environmental), integrated at the Group level in the daily management of all the organisations that comprise it and in our relationships with all stakeholders”**

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We are continually committed to permanent dialogue with all stakeholders for all Group companies. This dialogue helps us to listen to their concerns and needs and to identify future trends to build and consolidate, increasingly if possible, our relationships with them while transparently demonstrating and exchanging our concerns and our fields of action as well as joint challenges that we face in terms of sustainable growth management.

We seek to ensure that this commitment and sustainable action, beyond the personnel who work at each Group company, is extensive at the level of customers, suppliers, other external partners, and stakeholders. Because risk reduction is vital to guarantee our reputation and the success of the long-term corporate strategy.

Transparency, good governance, and integrity are the principles of our actions, based on our open culture and our firm belief that only business activities that respect corporate ethics and sustainability constitute the only possible foundation for successful sustained business.

The customer is the heart of our strategy. Satisfaction and loyalty of our customers, passengers, and citizens; continual proximity; and offering the best products and services are our maxim.

Aware of the environmental and health damage to which industrial development and public transport has subjected the planet and people, the Irizar Group has begun to lead the transition of change by developing and manufacturing premium proprietary brand products and technologies with a holistic focus to protect the environment. All our efforts are aimed at minimizing the emission of pollutants and noise and the impact of our vehicles on the environment.

The life cycle of our products includes development, choice of materials and the supply chain, production, use, and finally, the end of vehicle life.

At the level of personnel who comprise the Group, we advocate for fair and attractive working conditions, the possibility of continuous training, guarantees for the development of professional life, work and personal life balance, building trust, communication, teamwork, equality, diversity, and participation in management and business profits. In the daily management, we continue to prioritize and dedicate resources to Occupational Risk Prevention systems that emphasise occupational safety and health over other aspects. We also actively

contribute to the environmental balance, working to minimise any impact derived from our activities while preserving the natural environment.

As for external partners, supply chain, and alliances, our priority is to establish stable relationships with them, always based on ethical principles and maximum professionalism, as they help us improve our brand and sustainable competitiveness.

We are committed to reducing social, ethical, and environmental risks in the supply chain, and we work to ensure compliance with our environmental and social sustainability policy and also in our businesses. For us, it is essential that our suppliers and business partners have the same environmental and social standards that we have established for ourselves.

We make special effort to adequately use natural resources so that our activities have the least possible impact on the environment. We collaborate with society, the environment, and institutions in the design of

positive socially and environmentally sustainable development. We make efficient cutting-edge environmental products and technologies applied to the entire product life cycle available to all. And above all, we continue to make significant progress in all aspects related to the improvement of the environment, in both the treatment and reduction of waste, as well as in emissions, etc.

The best reflection of our commitment to society is our concern for the growth and creation of wealth and quality employment for people in the local environments and countries where we are present. We focus efforts on socio-economic improvement of the local area and society in which we are integrated, in terms of economics and human resources. Our relationship with society is based on respect, is open and participative while collaborating with culture, sports and education in our immediate area as well as on solidarity actions.

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## Initiatives carried out in 2018

Among the innovations and advances made in 2018, we highlight

- Our approach to Agenda 2030 to address our contribution to the **Sustainable Development Goals (SDGs)**.
- Significant **reductions in consumption** and emissions of our integral buses, for both hybrid and diesel engine models.
- We obtained the **Environmental Product Declaration (EPD)**, making us the first coach manufacturer with an EPD certified by the International EPD System based on international Standard UNE-EN ISO 14025.

- We continue to strengthen our focus and continuous effort in **Circular Economy**.

- We continue to participate in **major European projects** to shape the future of mobility.

- We are progressing towards **digital transformation** of Industry 4.0 as a future project, which will affect all work areas of our organisation. It is in this context that the analysis and diagnosis recently initiated in several Irizar Group companies is framed. The objective is the definition of the future transformation plan, which will begin by identifying and assigning actions and priorities in the short term.

- We continue to incorporate **talent and create employment** in the local area.

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***Moving forward***



***Irizar Group***

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