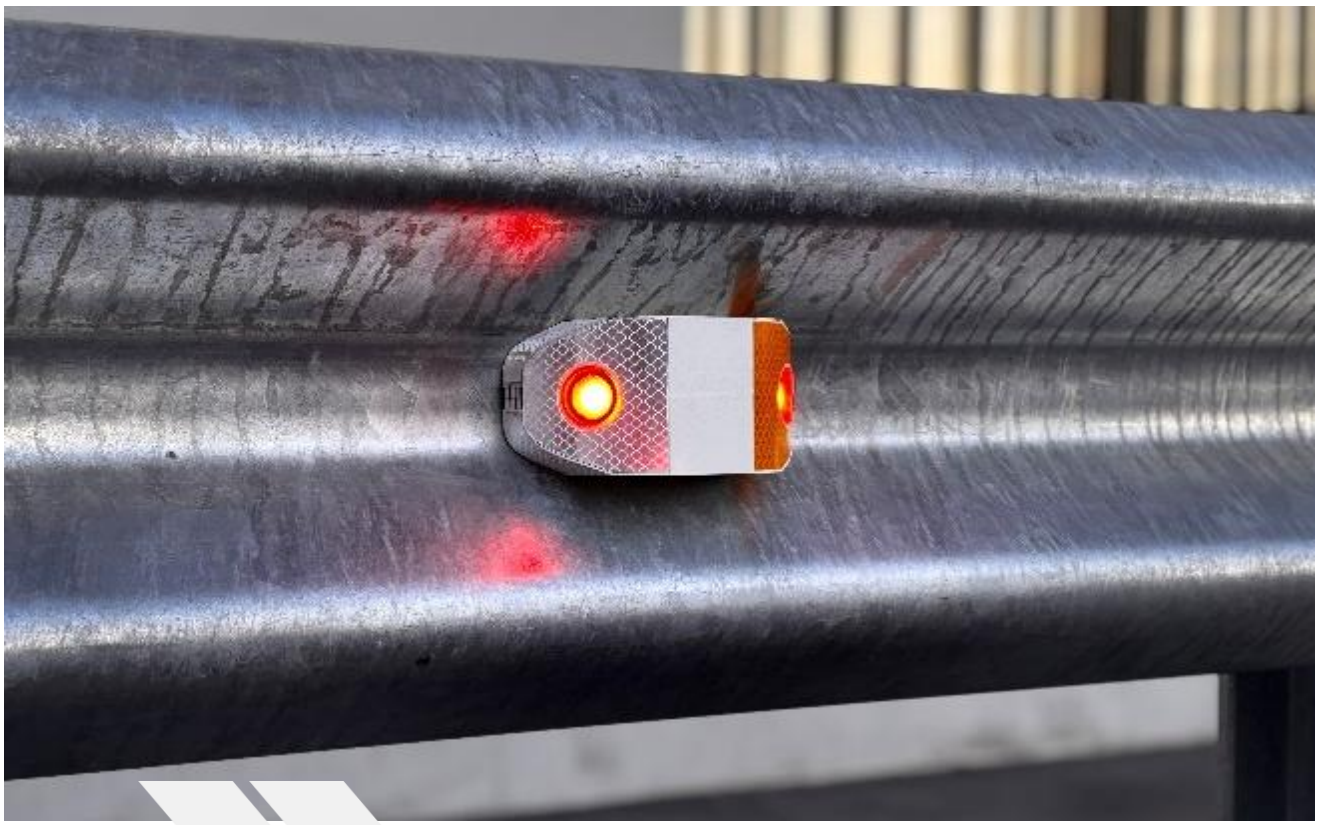
PlugSmart® Pro

THE DEVICE THAT TRANSFORMS ROAD SAFETY EQUIPMENT INTO INTELLIGENT AND CONNECTED SYSTEMS FOR THE PREVENTION AND NOTIFICATION OF ROAD INCIDENTS.



Detects
risks

Signals
accidents and incidences

Reports
events on the road

METALESA SEGURIDAD VIAL

Intertraffic Awards 2026

SUMMARY

Road traffic accidents associated with infrastructure continue to represent one of the main road safety challenges in Europe. In particular, **run-off-road crashes** continue to account for a high number of fatalities, even on road sections where containment systems are already in place, clearly demonstrating that traditional solutions based exclusively on passive safety are insufficient. In this context, the evolution towards **intelligent infrastructure** capable of **anticipating risks** and actively cooperating with road users emerges as **a strategic priority.**

Within this framework, the **PlugSmart® Pro device** has been developed as **an innovative solution** created by Metalesa Seguridad Vial that **transforms conventional road safety equipment into intelligent, connected, and active infrastructure.** The device **operates as a Road-Side Unit (RSU) integrated directly into the physical infrastructure, providing the roadway with advanced real-time detection, signalling, and notification capabilities.** These capabilities are aligned with European C-ITS standards and are fully interoperable with the National Access Points (NAPs) of different European countries, such as DGT 3.0 in Spain.

The development of the solution is supported by **solid scientific evidence**. **A pioneering study** conducted by Metalesa in collaboration with the Universitat de València, based on the **analysis of more than 80,000 official accident reports in Spain**, concludes that Intelligent Transport Systems could intervene preventively in 49.5% of run-off-road crashes and in 59.7% of serious or fatal incidents. **These findings confirm the significant potential of intelligent infrastructure as a key tool for saving lives.**

PlugSmart® Pro does not merely mitigate the consequences of an accident; **it acts before it occurs.** Through specific sensors and intelligent light-based signalling, the system **detects and issues real-time alerts for high-risk scenarios** such as wrong-way vehicles, hazardous curves, wildlife presence, excessive speed, or adverse environmental conditions. When an incident cannot be avoided, the system **automatically notifies the competent authorities, significantly reducing response times and the risk of secondary collisions.**

PlugSmart® Pro further stands out for its universal, modular, and scalable nature, its simple installation without the need to modify existing infrastructure, and its continuous 24/7 operation, even in remote locations, thanks to its low energy consumption and compatibility with photovoltaic power supply. Its unique combination of active and passive road safety, incorporating RA3-grade reflectivity that remains visible even without electrical power, reinforces its effectiveness under all environmental conditions.

The solution has reached a technological maturity level of TRL 9 and is currently being validated through **official pilot projects promoted by the Spanish Ministry of Transport and Sustainable Mobility, the Spanish Traffic Authority (DGT)**, and other public administrations, as well as through international projects. Its impact and **innovative character have been recognised through awards, distinctions**, and a strong presence at specialised forums and in the media.

In conclusion, **PlugSmart® Pro represents a paradigm shift in road safety by transforming infrastructure into an active, cooperative, and connected agent. It not only significantly enhances the safety of road users and maintenance personnel but also establishes a new standard in the digitalisation of road infrastructure, thereby contributing to the advancement of safer, more efficient, and more sustainable mobility. It is an innovation with real, measurable, and scalable impact, ready for implementation on a large scale.**

CONTENTS

Introduction

The development and application of **technological innovations** in the field of traffic plays a crucial role in **improving road safety**. These innovations have been deployed both in vehicles—through Advanced Driver Assistance Systems (ADAS)—and in infrastructure, driven by the advancement of Intelligent Transport Systems (ITS). ITS have become key tools for optimising transport efficiency, safety, and sustainability, integrating solutions ranging from intelligent infrastructure to mobile applications, and providing capabilities to prevent accidents, mitigate their consequences, and improve traffic management more effectively *(Badi, Bouraima & Muhammad, 2023).*

Within this context of technological transformation, there is a clear need to base the evolution towards intelligent infrastructure on scientific evidence that allows the precise identification of scenarios in which technology can have a real impact. To this end, Metalesa Seguridad Vial (hereinafter, Metalesa), in collaboration with the Universitat de València, developed **the most extensive study conducted in Spain on infrastructure-related road incidents.** This **pioneering analysis** constitutes the technical foundation for guiding the application of ITS on-road networks.

Over seven consecutive years, **more than 80,000 official accident reports from the Spanish Traffic Authority (Dirección General de Tráfico – DGT)** were analysed, making this research a national benchmark due to its scale, rigour, and capacity to characterise risk patterns associated with vehicle behaviour and road conditions. Owing to its methodological depth, the study provides a clear understanding of where and why infrastructure needs to evolve towards more intelligent systems capable of anticipating risks and cooperating with users through C-ITS (Cooperative Intelligent Transport Systems) technologies.

The study results show that **run-off-road crashes constitute one of the most critical issues from an infrastructure perspective in Spain due to their severity and high lethality.** This conclusion is reinforced by the DGT Annual Road Safety Report 2024[1], which confirms that run-off-road crashes continue to be the type of incident with the highest number of fatalities. In 2024, **35% of road traffic fatalities were caused by run-off-road crashes**, equivalent to **630 deaths**, maintaining the trend of previous years and representing a 10% increase compared to 2019. On interurban roads, the severity is even more pronounced: **523 fatalities**, accounting for **41% of all deaths** on these roads.

At a national level, road traffic incidents in 2024 resulted in a total of **136,430 victims**, a figure that confirms the persistence of the problem despite a slight reduction in mortality relative to 2023 (-1%). The weight of run-off-road crashes remains extremely high and stable over time, clearly evidencing their lethality: **a single type of incident accounts for more than one third of all fatalities**, underlining the urgent need to adopt new infrastructure-based solutions.

Furthermore, the study enabled the identification of the main factors influencing the occurrence of these crashes, including **excessive speed**, **reduced visibility**, **driver distraction**, **adverse weather conditions**, or **fatigue**. All of these factors generate scenarios in which drivers have very limited reaction time and where current infrastructure does not provide adequate tools for early warning or detection.

Once the highest-risk scenarios had been identified, the study assessed to what extent infrastructure equipped with intelligent technologies could have altered the outcome of these crashes.

[1] DGT Annual Report 2024: Key Road Safety Figures - 2024

The results are conclusive: **ITS could potentially intervene in 49.5% of all run-off-road crashes and in 59.7% of serious or fatal incidents**, acting as a high-impact preventive mechanism. This highlights their effectiveness in reducing road crashes and improving road safety [2].

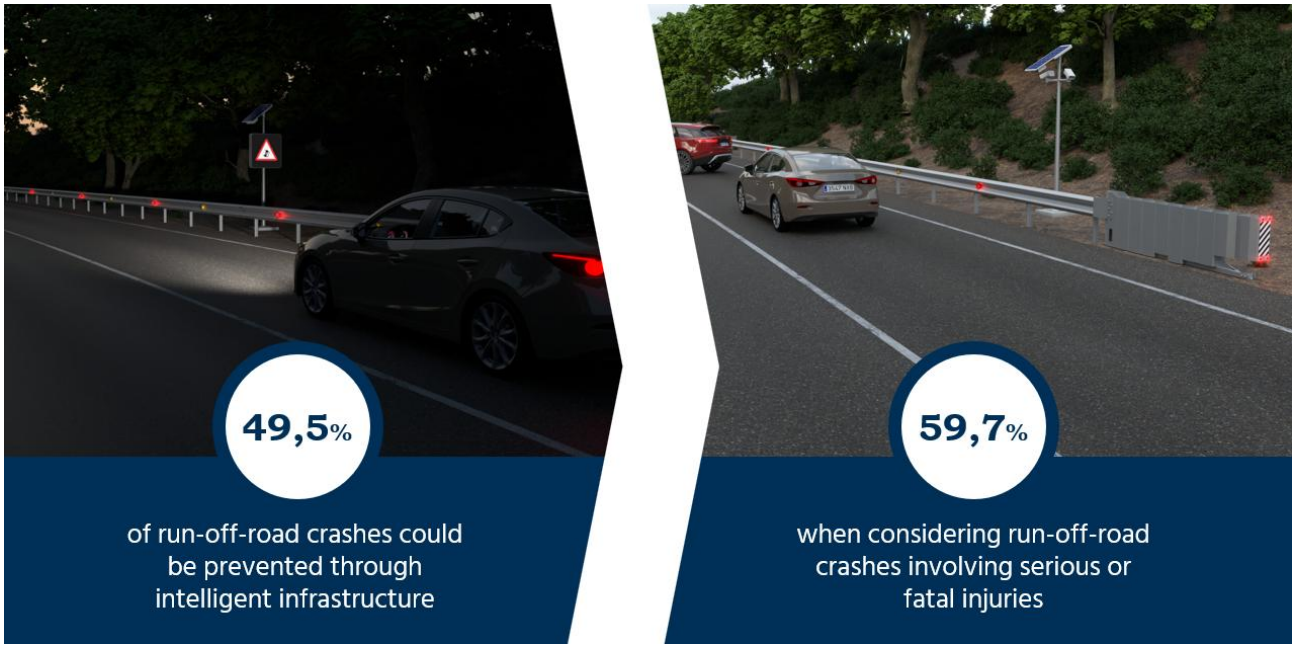


Figure 1. Data obtained from the study "Run-Off-Road Crashes and the Importance of Containment Systems for the Reduction of Road Crashes, Fatalities and Injury Severity in Urban and Peri-Urban Environments with Impact on Vulnerable Road Users", Metalesa and Universitat de València. Own elaboration.

These findings fully justify the importance of ITS within the DGT ITS Plan, which establishes a catalogue of technologies aimed at improving road safety and traffic management. The evidence demonstrates that, although passive safety barriers are essential**, they are not sufficient on their own**: between 2017 and 2023, **15.5% of fatalities and serious injuries** occurred on road sections where a containment system was present but lacked early warning, detection, or communication capabilities.

In this regard, **C-ITS** technologies enable infrastructure to move beyond a passive role and become a **cooperative agent capable of anticipating risks, alerting users, activating intelligent signalling, and notifying incidents in real time.** Their deployment therefore represents a strategic priority for reducing the most severe forms of road traffic crashes.

The combination of these technologies with user awareness initiatives and integration with national platforms such as DGT 3.0, Spanish National Access Point (NAP), makes it possible to create a safer, more cooperative, and more efficient mobility ecosystem. ITS not only help reduce the number of road incidents but also lessen their severity, reduce secondary collisions, optimise operational management, and improve emergency response capabilities.0

[2] Study on Run-Off-Road Crashes and the Importance of Containment Systems for the Reduction of Road Crashes, Fatalities and Injury Severity in Urban and Peri-Urban Environments with Impact on Vulnerable Road Users", Metalesa and Universitat de València.

PlugSmart® Pro device

The development of **PlugSmart® Pro** arises as a direct response to this technical and operational challenge, reinforced by the need to advance towards connected infrastructures aligned with DGT 3.0 and with the European guidelines on C-ITS (Cooperative Intelligent Transport Systems). It promotes a road environment capable of interacting with users, control centres and other elements within connected mobility. The creation of PlugSmart® Pro addresses the need to provide the infrastructure with advanced **real-time detection, signalling and notification** capabilities, enabling the mitigation of road crashes through anticipation rather than relying solely on post-impact containment or mitigation.

The device designed by Metalesa integrates PLUG&META® technology —both fully developed in Spain— and constitutes a universal system capable of adapting to any road safety equipment to make it intelligent and connected, acting as a **Road-Side Unit (RSU) integrated directly into the physical infrastructure**. In this way, it strengthens **Active Road Safety** by anticipating risk and helping prevent run-off-road crashes.

PlugSmart® Pro, patented worldwide and with a TRL 9 maturity level, is already available on the market. Its innovative nature lies in its ability to **interpret the environment, identify hazardous situations and issue real-time alerts to users through variable light signalling**, decisively increasing their reaction time.

Figure 2. PlugSmart® Pro device in daytime and night-time conditions. Own elaboration

If a crash does eventually occur, the system **immediately sends a notification** to the competent authority, enabling the prompt activation of preventive and corrective measures, as well as emergency services, an action that the driver or other users may not be able to perform. Additionally, the system **automatically warns the rest of the road users** about the incident, reducing the risk of secondary collisions and improving safety in the affected area.

These intelligent devices are monitored and configured remotely by the road authority through the PLUG&META® TRACE management platform, also developed by Metalesa, which allows flexible configuration, adapting operation modes to changing road or traffic conditions. Moreover, through an API, integration with other systems and management platforms is enabled, including control centres and connected services such as the DGT 3.0 platform, facilitating interoperability and real-time data exchange.

PlugSmart® Pro is an innovative intelligent signalling device designed to optimise safety and connectivity in road infrastructures. Enabled by the PLUG&META® technology, the system transforms new or existing infrastructures into connected and intelligent environments, providing an advanced system for risk detection, incident signalling and data collection for analysis by authorities.

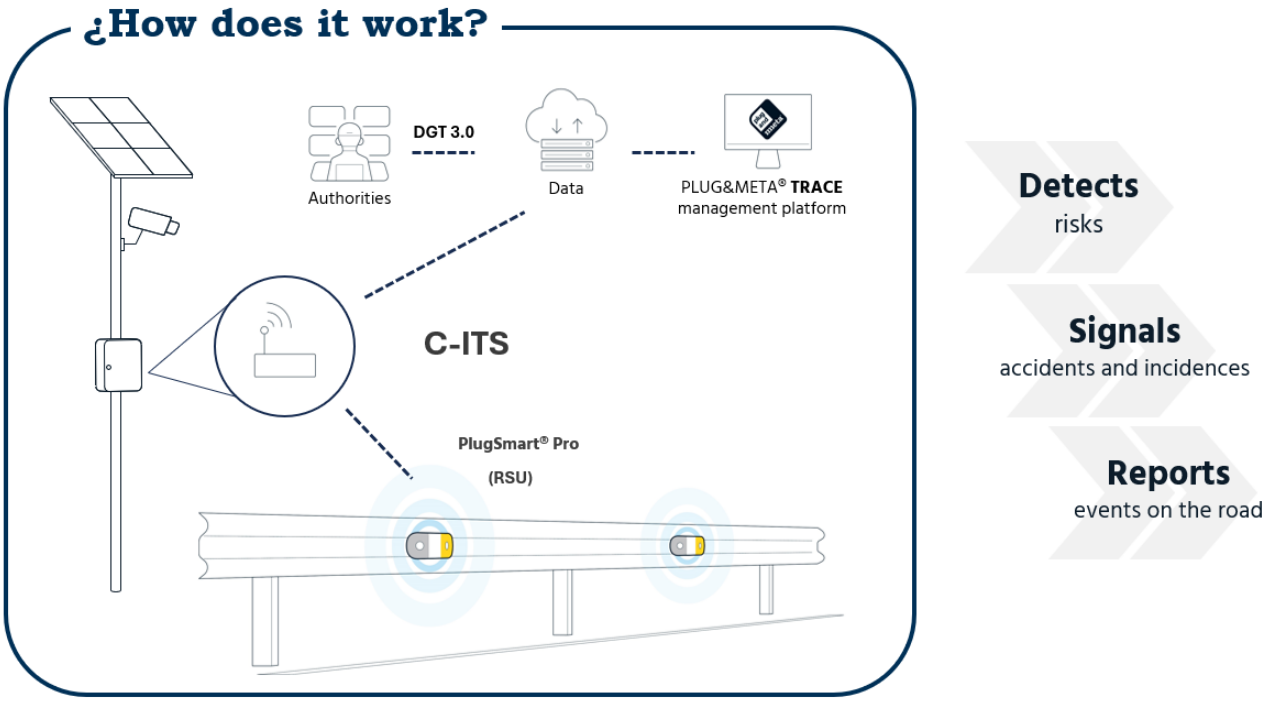


Figure 3. How the PlugSmart® Pro device works. Own elaboration.

This innovative system can be integrated into various environments such as roads, bridges, viaducts, tunnels, and roadwork zones, providing an efficient and reliable solution for traffic management and road safety.

It is **engineered with high-strength and durable materials, ensuring optimal performance under demanding environmental conditions**. Its structure combines materials that provide the device with both robustness and lightness. In addition, it features an IP65 rating, which guarantees full protection against dust and water from any direction, while its IK08 impact resistance ensures high protection against shocks and vibrations.

PlugSmart® Pro enhances road visibility under any environmental condition, both day and night, enabling efficient traffic management. Thanks to its quick-connect system with IP65 protection, **installation is simple** and does not require specialised tools, reducing both implementation time and costs.

It incorporates an **advanced dual-beam system** designed to operate independently. This means that one light, the other, or both can be activated simultaneously, **adapting to different signalling scenarios and optimising energy consumption.**

It is a **highly scalable system**, meaning it can be easily expanded according to project needs. Its **modular and universal design makes it adaptable to different types of safety barriers** without

requiring modifications to existing structures. Moreover, additional units can be added without affecting system performance, allowing it to adapt to infrastructures that are constantly evolving. This capability makes it an efficient solution for both small-scale road interventions and large traffic management projects.

Below, we present the most notable features of the **PlugSmart® Pro** device:

Figure 4. PlugSmart® Pro device features. Own elaboration

It is designed for uninterrupted 24/7 operation, thanks to its low energy consumption and **compatibility with photovoltaic power supply**, making it ideal for **remote locations or areas with limited access to the electrical grid**. Clean energy, maximum performance. In addition, **its mesh network connectivity** enables communication between multiple devices without the need for extensive wired infrastructure. In other words, devices can communicate with each other, exchanging real-time information to optimise road safety and traffic management in a decentralised manner. If one device detects an issue, it automatically alerts the rest of the network, creating a safer and more efficient traffic environment.

PlugSmart® Pro not only acts as an Active Road Safety system, intelligently signalling risks in real time, but **also enhances passive road safety through its RA3 reflectivity in orange, white, or red**. This ensures visibility even without electrical power, allowing the device to function as a substitute for traditional road studs and reflectors, significantly improving road environment perception under low-visibility conditions. Dual safety, double efficiency.

Remote management via mobile devices enables real-time monitoring, while compatibility with APIs and traffic control systems allows seamless integration with existing infrastructure.

PlugSmart® Pro is not merely an incremental improvement in road safety; it represents a fundamental shift in how road infrastructure is protected and managed. Its combination of active and passive safety, intelligent lighting, advanced connectivity, modularity, energy efficiency, and versatility makes it a comprehensive solution for both new and existing infrastructures.

The solution is available in two configurations designed to adapt to different levels of road safety management and operational requirements. The **standard version** is the baseline solution, which includes full installation, impact detection on the equipment, and the ability to schedule activation times or enable the system manually. It also provides remote access to the PLUG&META® TRACE management platform, enabling real-time monitoring and control of the system.

For infrastructures requiring a higher level of safety and analytical capability, the **modular version** offers a scalable and configurable solution, allowing one or multiple risk types to be selected for detection according to specific needs. This option enables the anticipation of hazardous road scenarios, improving accident prevention and proactively enhancing road safety.

		Capabilities of the installation	Hardware	Management platform	Additional Services
Standard	**Remote road safety management** **It connects the equipment** for remote activation of LED warnings. It **detects impacts**, signals and **notifies them.**	• Remote manual control • Accident against the equipment & notification • Programmed time slots	• PlugSmart® Pro • Electric cables • Post • Control and communication gateway. • Electric box	• PLUG&META® TRACE. The management platform for your SMART equipment. • API available to export alarms and events.	
Modular	**Risk anticipation & accident prevention** **Detects risk** scenarios on the road, alerting the user and improving decision making.	• Event detection like: Excessive speed, Wrong-way vehicle, Low visibility, Wind gusts, ...	• Sensor/Radar • AI Camera • Vertical hidden signal • Photovoltaic power supply		• Maintenance / Repair • Costumer service • Reporting & consultancy

Table 1. PlugSmart® Pro solution modules. Own elaboration

Beyond its advanced road safety and connectivity functions, PlugSmart® Pro delivers **strategic benefits for the efficient management of road infrastructure. Its real-time data collection and analysis capabilities** enable road authorities to obtain key insights into traffic flow, road conditions, and the identification of critical risk hotspots. These data not only optimise traffic planning and the implementation of preventive measures but also facilitate integration with urban management platforms and intelligent mobility systems.

From a mobility perspective, PlugSmart® Pro also enhances interaction among different road users. Its ability to alert to the presence of vulnerable users, such as cyclists and pedestrians, supports

improved coexistence in urban environments and on road networks, promoting safer and more inclusive mobility. At the same time, its wireless communication capability ensures immediate response in the event of incidents, coordinating alerts and light signalling in a decentralised and automated manner.

Different risk scenarios have been addressed in which, through specific sensors, the device is capable of detecting, alerting, and notifying users to prevent road incidents. Below are some examples of the many possible detectable scenarios:

- ✓ Excessive speed: alerts drivers to the need to reduce speed in high-risk areas, due to various underlying causes.
- ✓ Wrong-way vehicle: early detection of these situations enables the activation of immediate alerts to warn both the driver involved and other vehicles on the road.
- ✓ Presence of vulnerable road users: activating signalling upon detecting users such as pedestrians, cyclists, or motorcyclists helps to prevent collisions and run-over accidents.
- ✓ Sharp or hazardous curves: tight curves can lead to accidents if drivers do not adjust their speed. Intelligent warnings improve visibility and help prevent dangerous manoeuvres.
- ✓ Strong wind gusts: dedicated sensors detect intense wind conditions and issue alerts so that drivers can take appropriate precautions.

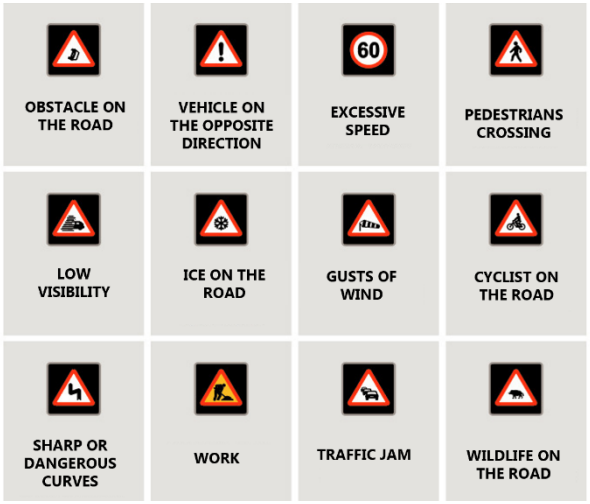


Figure 5. Detectable road risk scenarios

Examples of PlugSmart® Pro road applications

As shown in Figure 5, **PlugSmart® Pro** is capable of detecting and signalling a wide range of risk scenarios through specific sensors. However, three representative examples are highlighted: **the detection of wrong-way vehicles ("kamikaze" drivers), sharp or hazardous curves, wildlife detection, and tunnels with sharp curves without lighting, as these scenarios represent the main concerns identified by road authorities and offer the greatest potential impact on road safety.**

1. Wrong-way Vehicle Detection

Each year, accidents caused **by drivers travelling in the wrong direction**—commonly referred to as "kamikaze" drivers—**result** in an average of **10 fatalities**[3] on road networks. These incidents are typically caused by orientation errors, driver distraction, or driving under the influence of alcohol or drugs, posing a serious risk both to the offender and to other road users.

[3] Source: The Spanish Newspaper, March 2024 https://www.epe.es/es/reportajes/20240309/crece-numero-conductores-kamikazes-espana-99043395

Below, an image illustrates a potential wrong-way driving scenario, together with the sequence of actions implemented by **PlugSmart® Pro** to prevent such **incidents and activate alerts aimed at mitigating the risk of collision.**

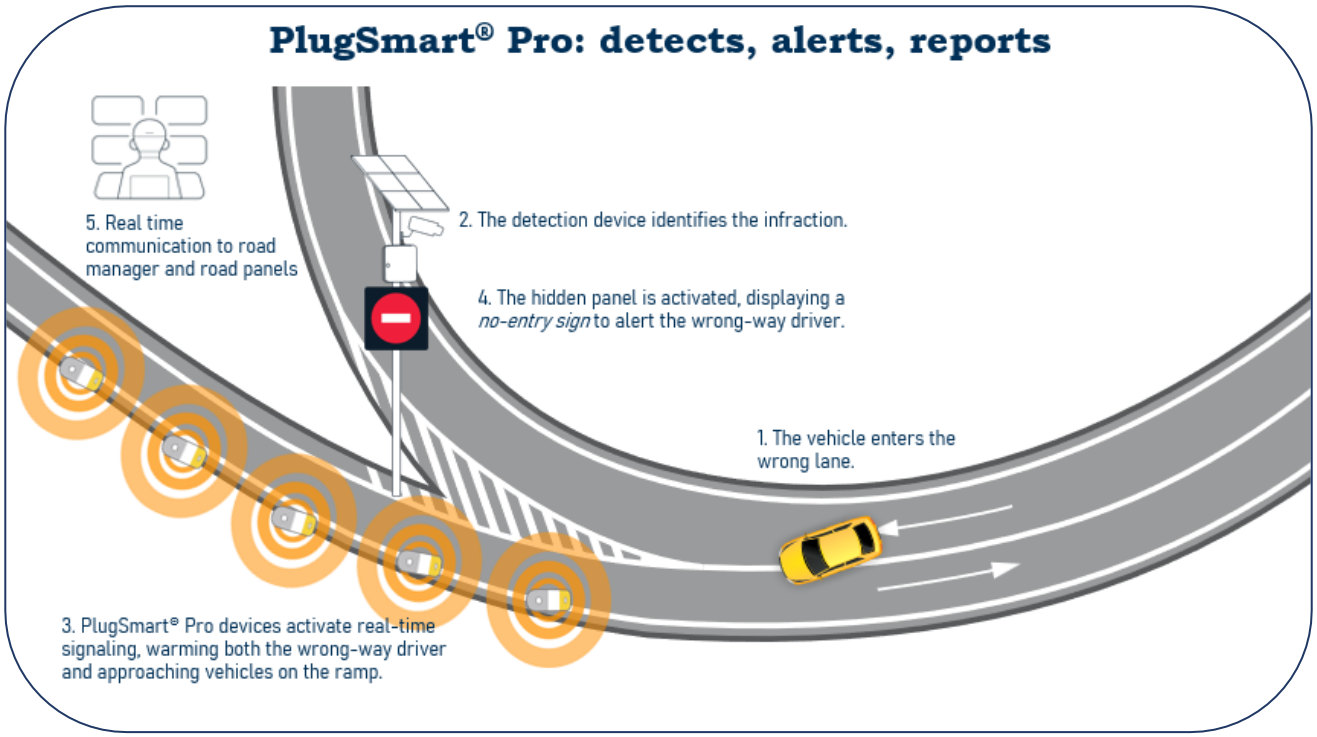


Figure 6. Wrong-Way Vehicle Scenario with Smart Solution.

2. Run-Off-Road Crashes on hazardous curves

Sharp and hazardous curves represent a significant road safety risk, particularly on road sections where the road geometry requires a reduction in speed that many drivers fail to apply in time, **causing vehicles to lose control if speed is not properly adjusted.**

The main causes[4] are related to reduced visibility, either due to adverse weather conditions or the road layout itself, as well as excessive entry speed into the curve, which can lead to skidding, run-off-road crashes, or collisions with other vehicles.

The PlugSmart® Pro solution detects these risks and provides early warnings to drivers through intelligent signalling, improving safety and reducing accident risk.

[4] Source: DGT Magazine. October 2024 https://revista.dgt.es/es/reportajes/2024/10OCTUBRE/1015-Siniestralidad-2023.shtml

Figure 7. Sharp curve scenario with Smart solution. Own elaboration

3. Wildlife Detection

The presence of wildlife on the roadway represents **another major road safety challenge**. According to the study "Road Traffic Accidents Involving Animals" conducted by the Spanish Road Association (AEC)[5], crashes involving animals occur primarily on interurban roads, during night-time hours or under low-visibility conditions, and show a high recurrence rate in specific road sections. These incidents result in both material damage and serious injuries, and in some cases fatalities.

The following image illustrates a potential wildlife presence scenario, together with the **PlugSmart® Pro** operational workflow **for risk detection, alert activation, and collision risk reduction.**

[5] Source: Road Traffic Accidents involving animals. Spanish Road Association (AEC). 2024 https://www.dgt.es/export/sites/web-DGT/.galleries/downloads/conoce_la_dgt/conocimiento-e-investigacion/Siniestralidad_vial_con_implicacion_de_animales.pdf

Figure 8. Wildlife detection scenario with Smart solution.

4. Unlit Tunnels with sharp curves

Tunnels that include sharp curves and lack adequate lighting represent **a high-risk scenario for road safety**. The combination of reduced visibility, abrupt changes in road alignment, and delayed visual adaptation can lead to loss of vehicle control, run-off-road crashes, or collisions, particularly when drivers do not adequately adjust their speed.

In such environments, **the PlugSmart® Pro solution enhances road perception and enables drivers to be alerted in advance through intelligent light-based signalling**, increasing reaction time and reducing the risk of accidents in particularly critical sections.

The following image illustrates a representative example of an unlit tunnel with sharp curves, together with the PlugSmart® Pro operational workflow for risk detection and the activation of preventive signalling.

Figure 9. Unlit Tunnel scenario with Smart solution

Currently, within the framework of the Innovation Challenge Program, several **installations** are being deployed, by the Spanish Ministry of Transport and Sustainable Mobility (MITMS), as well as other regional road authorities in Madrid, Valencia or the Basque Country. Equally, a number of projects are being studied and deployed by road authorities from other countries such as Italy, Ireland, Greece, the United Kingdom, Poland, France, and Paraguay. These pilots aim to prevent accidents and improve road safety on selected road sections.

Each pilot enables **the evaluation of the solution's performance under real-world conditions**, assessing the system's technical effectiveness, its operational impact, and the benefits it delivers in terms of safety for road maintenance and conservation activities.

The following table summarises the main objectives, scenarios, and key performance metrics for each pilot:

Pilot	Objective	Scenario	Metrics	Operation	Benefits for Road Maintenance Personnel
Ministry of Transport and Sustainable Mobility (MITMS)	Mitigate crashes caused by repetitive impacts on sharp curve sections.	Monitoring of safety barriers at black spots with a history of incidents.	Detection and signalling time, number of valid alerts, reduction of secondary impacts, system availability.	Automatic activation of LED patterns and event transmission to DGT 3.0; coordination with road maintenance protocols.	Fewer emergency interventions and arrival with prior information, reducing exposure and time spent on the roadway.
Spanish Traffic Authority (DGT)	Provide immediate alerts for the presence of wrong-way vehicles ("kamikaze" drivers).	Local detection through speed and direction analytics.	Detection rate, false positives, time to remote alert, event traceability.	Dual warning channel (barrier lighting + navigation alert), event logging and transmission to DGT 3.0.	Reduced need for initial manual signalling and improved resource prioritisation through real-time data.
Valencia Provincial Council	Prevent crashes and head-on collisions caused by wildlife presence.	Road sections with a high probability of animal crossings.	Number of alerts, false positives, response time.	Activation of signalling, notification to the control centre, integration with dynamic signs; data analysis.	Reduced need for preventive night patrols and emergency interventions under adverse conditions.
Government of Aragón	Prevent crashes on tunnel sections with sharp curves and low visibility	Tunnels with complex geometry, variable lighting, and reduced visibility	Event detection time, signalling activation, reduction of secondary incidents, system availability.	Automatic activation of LED signalling on tunnel walls and transmission of alerts to control centres; integration with tunnel management systems via API.	Improved safety for maintenance teams in confined environments, reducing manual interventions and exposure to traffic within tunnels.

Table 2. Official PlugSmart® Pro validation pilots conducted in collaboration with public authorities.

Recognition

PlugSmart® Pro has consolidated its position as a benchmark solution in intelligent infrastructure thanks to its continued presence at leading international industry events and the recognition granted by both public and private entities. Its pioneering nature as a device capable of providing intelligence and connectivity to vehicle restraint systems, together with its direct contribution to Active Road Safety, demonstrates a high level of technological maturity and a growing international outlook. This positions PlugSmart® Pro as a strategic solution within the C-ITS ecosystem, fully aligned with the DGT 3.0 platform.

Awards and Distinctions:

- **Ponle Freno-AXA Award for Innovation in Road Safety, 2024**.
- **XXI ACEX National Award for Safety in Road Maintenance, 2025.**
- **Good Practice of the Month in October 2025, European Road Safety Charter.**
- **PlugSmart® Pro accredited as a "Ponle Freno Recommended Product"**, a distinction awarded to solutions with proven impact on improving road safety.
- Selected by the **Spanish Ministry of Transport (MITMA)** under the **Innovative Public Procurement programme – Challenge 9**, as a strategic technology for intelligent vehicle restraint systems.

Public visibility:

- Permanent exhibition at **Mobility City** (Ibercaja Fundation) as a reference example of intelligent and preventive infrastructure.
- Extensive media coverage, including **reports on national and regional television channels** such as TVE, Antena 3, La 2, Telecinco, and À Punt, highlighting its ability to prevent up to 60% of run-off-road crashes.
- National press conference presenting **the innovative study on run-off-road crashes in Spain**.

Trade fairs and conferences

PlugSmart® Pro has been showcased at leading innovation, ITS, and connected mobility forums:

- Intertraffic Amsterdam, participation confirmed for 2026
- Global Mobility Call 2024
- ITS Europe Congress, Seville 2025
- Koelnmesse Cologne exhibition centre, Germany 2025
- ITS Spain Congress 2025
- UPV Conference "Safe, Connected and Sustainable Cities" 2024 & 2025
- ATC Exhibition, Segovia 2025

- AEC/ATC conferences, 2024 & 2025
- ITS Mobility City Ibercaja 2025
- SeguCITY Congress, Valladolid 2025

Operational validation

- Official pilot projects in Spain in collaboration with the **Spanish Ministry of Transport, DGT, and the Valencia Provincial Council**.
- Official pilot projects **in other countries.**
- International reach through **distribution agreements.**
- Prominent national media presence linked to the **deployment of the first intelligent bridge in Europe (Elche)** and the **first intelligent crash cushion (Valencia).**

Conclusions

The purpose of the innovative **PlugSmart® Pro** device is to alert road users to the presence of risks on the roadway through active light-based signalling while simultaneously **transmitting the generated information to National Access Points (NAPs)** in accordance with **European Cooperative Intelligent Transport Systems (C-ITS) standards**.

This communication enables incidents to be processed by C-ITS platforms and disseminated in real time to other drivers through variable message signs and navigation systems.

Designed to prevent risks and notify incidents, this solution stands out for its ease of installation and its adaptability to any type of road environment, whether urban or interurban. **It makes a decisive contribution to saving lives** and reducing the economic and social impact derived from traffic accidents, both severe and minor. Its patented technology enables **the real-time detection of multiple risk situations** and the immediate alerting of drivers, acting as a highly effective preventive system and as a key element in infrastructure safety.

Beyond its intelligent signalling function, **PlugSmart® Pro transmits each event to the competent authorities**, facilitating a precise and rapid response and providing high-value data for planning, decision-making, and the implementation of improvements in mobility. By operating as a **Road-Side Unit (RSU) integrated into the infrastructure**, it reinforces its strategic role in intelligent road management, enhancing user safety and contributing to societal well-being.

The device incorporates advanced connectivity, energy efficiency, and sustainability principles, positioning itself as an essential component in addressing current and future mobility challenges. Its **modular design**, adaptability, and compatibility with existing infrastructure make it an **accessible and scalable solution**, ready for large-scale deployment.

In conclusion, **PlugSmart® Pro not only enhances road safety** but also **establishes a new standard in infrastructure digitalisation** by combining prevention with intelligent response. It represents a decisive step towards safer, more efficient, and more sustainable roads: **an innovation that protects lives and transforms the way mobility is managed across our road networks.**

Audiovisual documentation

- PlugSmart® Pro video: https://www.youtube.com/watch?v=rOIkoqCxBbw
- PlugSmart® Pro real-world operation under night-time conditions: https://www.youtube.com/watch?v=RTaH6UgpyHY
- National Press Conference: https://www.youtube.com/watch?v=yqeBkvEpUTU
- Winners of XXI ACEX National Award: https://www.acex.eu/ganadores-del-xxi-premio-nacional-acex-a-la-seguridad-en-conservacion/
- Atresmedia "Ponle Freno Recommended Product": https://www.atresmedia.com/ponle-freno/carreras/2025/Madrid/plugsmart-pro-lleva-infraestructura-seguridad-vial-activa_20250721687e3779f4ec026a96b51ef8.html
- Antena3 News: https://www.antena3.com/noticias/sociedad/dispositivos-viales-que-salvan-vidas-estas-luces-pueden-evitar-60-salidas-via_2025092268d17c5b31b8a3479b74fed3.html
- PlugSmart® Pro exhibition at Mobility City: https://www.elperiodicodearagon.com/aragon/2025/11/07/funciona-barrera-inteligente-hablara-conductores-123436315.html
- Video of the Smart Bridge in Elche: https://drive.google.com/file/d/15Uk7552rPhZkVkHUsQIOINnjUf7FOdP5/view?usp=sharing
- Las Provincias "*Road signalling device enables the detection of 'kamikaze' vehicles in roads*": https://www.lasprovincias.es/comunitat/dispositivo-senalizacion-vial-permite-localizar-coches-kamikazes-20250919110732-nt.html
- Levante-EMV "*I Road Safety Forum*": https://www.levante-emv.com/comunitat-valenciana/2025/06/13/foro-seguridad-vial-siniestralidad-cero-valencia-118545374.html