BLIKSUND

Whitepaper

Crash Recovery System

The new reality of vehicle incidents: Insights from the field and support from the Crash Recovery System.

Disclaimer

This whitepaper is based on data, case studies, and first responder challenges from the Netherlands. While many of the insights are likely relevant elsewhere, specific figures, legislation, or examples may not directly apply outside the Dutch context.

Colofon

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Foreword

The purpose of this document is to provide insight into the key problems and challenges that first responders face on a daily basis when arriving at an accident or other dangerous situations involving vehicles.

Technical rescue at traffic accidents is one of the four core tasks of the fire service and forms an essential part of incident response. Fire service, ambulance, and police work closely together to quickly and safely free victims from the vehicles involved.

The rapid developments in modern vehicle technology, including new drive systems, various fuel types, the use of high-grade materials and plastics, reinforced vehicle constructions, and numerous passive and active safety systems and complex deactivation methods, create ever greater challenges for responders during an accident.

Fast and reliable vehicle information is crucial in this regard. Being able to easily access the exact locations of safety components and the possible deactivation procedures has become vital for efficiently securing modern vehicles and reaching the victim. Without this accurate vehicle information, emergency services are forced to take risks, whereas safer, adequate, and confident action is absolutely possible.

Challenges for first responders

Safety challenges upon arrival at an accident

After the victim assessment (determining the number of victims and their condition, coordination with ambulance/police, making contact with victims), it's time for a plan of approach. A decision must be made whether to go for a rapid or controlled extrication. As well as a trade-off between medical necessity and technical risks. Tasks are divided within the team.

After surveying the situation on scene, the priority is to block the vehicles, possibly stabilize them, and secure them. This is the first moment at which the first responders must know exactly which vehicle or vehicles they are dealing with. This is crucial before the vehicles are stabilized.

Questions that must be answered beforehand:

- What make and model is/are the vehicle(s)?
- What type of drivetrain does the vehicle have?
- Where are the direct hazards or risks located?
- How do we make the vehicle safe?
- Where can and may cutting be carried out, if necessary?

Challenge 1: Identification

Identifying a vehicle at the scene is no longer straightforward. Modern vehicles increasingly lack a visible brand logo or model designation, making identification difficult right when every second counts. Without it, first responders can't reliably determine the drivetrain type, locate potential hazards, or secure the vehicle safely.

Challenge 2: Stabilisation

Stabilising a damaged vehicle raises questions that need immediate answers. Where can wheel chocks, wedges, or stabilisation blocks be placed safely? Which components, such as the HV battery and cables in electric vehicles, must be avoided at all cost? And where exactly are the lifting points? Getting this wrong can compromise both the rescue and the first responder's safety, so accurate, easy-to-find information matters.

Complexity of modern vehicles

To free victims from a modern vehicle quickly, safely, and without additional risks, first responders need access to the right vehicle information. However, the massive rise of electric and hybrid vehicles with a high-voltage system or other alternative drivetrains (LPG/CNG or hydrogen vehicles) makes this increasingly complex for first responders. Vehicles equipped with a high-voltage system carry unique risks in the event of fire. Besides being difficult to extinguish, there is a risk of thermal runaway and delayed (re) ignition, sometimes occurring hours/days/weeks later. It is crucial to recognize technical hazards and know where the danger lies:

Vehicles with combustion engine, LPG/CNG, or hydrogen

- Where are the gas tanks located (for LPG or CNG), and which safety and pressure relief valves are present?
- Where are the hydrogen systems, such as H2 tanks, lines, and safety valves (for hydrogen-powered vehicles) located, and where is a pressure relief line vented to?
- How is the vehicle secured or de-energized?
- Where is/are the 12V battery(ies) located?

Electric and Hybrid Vehicles

- Location of the HV battery,
- Voltage of the HV battery,
- Location of HV cables and (super) capacitors,
- How is the vehicle deactivated?
- Emergency release of charging cables,
- Location of 12V battery(ies),
- Solar cells,
- HV battery access points.

Safety systems (active)

- Airbags (steering wheel, passenger, side, seatbelt, knee, door, hood, rear window, center, anti-dive, curtain airbags),
- Seatbelt pretensioners,
- Gas generators and their locations,
- Crash sensors,
- SRS unit,
- Pre-crash systems (e.g. automatic seatbelt tensioning or seat adjustment),
- ROPS,
- Automatic fire suppression systems,
- Automatic window-breaking system,
- Active battery terminals,
- Pedestrian protection systems.

Safety systems (passive)

- Reinforced cage structures, roll bars,
- Bumper dampers,
- Contact keys.
- Glass; laminated, double, tempered, plastic, panoramic

Vehicle information

- Refrigerants for air conditioning systems,
- Hydraulic oil,
- Response to a vehicle on fire or in water,
- Air suspension, air tanks, air-sprung seats,
- Gas cylinders,
- Sleeping areas in buses.

Challenge 3: Deactivation

In an accident involving airbag deployment, the vehicle's SRS control unit normally shuts down the drivetrain automatically. But first responders can't simply assume this has happened. A number of steps must be followed to manually shut down the drivetrain, the high-voltage circuit or the 12-volt circuit. The start/stop button is usually easy to find, but the exact location of the HV battery, 12V battery, service plug or emergency disconnect switch/cable is often difficult to determine without the correct vehicle information. That uncertainty can cost valuable time, or introduce unnecessary risk, while every second counts.

Access to and extrication of victims

Extricating victims from a vehicle is ultimately what it all comes down to. Once the vehicle involved has been blocked, stabilized, and de-energized, attention can turn to the victims. However, gaining access to the victims is sometimes complicated by the fact that they are trapped by bodywork that has been deformed during the crash. In that case, hydraulic tools are deployed to remove, for example, the doors or the roof. However, the use of hydraulic tools brings with it various technical challenges and risks.

Challenge 4: Gaining access

Before hydraulic tools can be used on a vehicle, it's essential to know exactly where cutting or sawing is possible, and where it isn't. Modern vehicles are fitted with reinforced parts that are nearly impossible to cut through, and components of the passive safety system, such as gas generators, cylinders, seatbelt pretensioners and airbags, can pose a direct risk to first responders if cut or spread into. Knowing the exact location of these components in advance, as well as the type of glass fitted (laminated or tempered), is essential before starting.

There is a chance that victims are trapped because their seat has been pushed forward by the impact during the crash, or because the steering column and/or dashboard have been pushed inward in the case of a frontal collision. In order to properly reach the victims for care, and to relieve the pressure being exerted at that moment on the victim's chest, abdomen, or legs, it is necessary to create space safely and quickly.

Challenge 5: Creating space

With access to the occupants gained, the next challenge is space. First responders need to adjust the steering wheel and seats to reach a trapped victim safely. In many vehicles, manual adjustment works the same way across brands, but modern vehicles increasingly use electric adjustment, and in a growing number of EVs, physical buttons have disappeared altogether: adjustment is done entirely through a menu on the centre display. Without the right information, this can delay freeing a trapped victim, at a moment when every second counts.

Real-world examples

Example 1: Standard vs. complex

A collision between a Ford Focus and a Volvo XC90 without (serious) injuries resulted, for the fire department, in securing both vehicles ahead of the handover to the police and the recovery service.

The Ford Focus, fitted with a combustion engine, is fairly straightforward to hand over safely, but the Volvo XC90 is a plug-in hybrid and therefore a vehicle of an entirely different caliber. Given the pre-existing damage, allowance must be made for the possibility of leaking air-conditioning refrigerant, visible as a white cloud or mist, and for the fact that the driver's and passenger's airbags have been deployed. This provides an initial indication that the vehicle's high-voltage system has been automatically shut down by the SRS control unit.

It is important to verify that the vehicle has indeed been shut down by working through the deactivation procedure. Having access to reliable digital vehicle information is of great importance in this regard.

Example 2: Severely damaged EV

In a collision with a truck, the left side of a Tesla Model S was severely damaged and the vehicle ended up in the guardrail. It was unclear to the first responders on scene whether the high-voltage system was still active, since the airbags had not deployed. It was also visible that the charging port had been struck, which may have broken the Interlock circuit and deactivated the high-voltage system. It was decided to shut down the high-voltage system using the procedure prescribed in the CRS.

The Tesla smoked briefly, possibly caused by heating of the high-voltage battery pack. Fluid leakage was also visible. This type of leakage can prompt first responders to check the battery pack for heating, which can trigger a thermal runaway. As shown in the digital interactive CRS Rescue sheet, this Model S is equipped with air suspension. The air suspension system was likely damaged during the accident, causing the Model S to sit extremely low to the ground, which made it more difficult to extinguish the battery in the event of a fire. The CRS supported the first responders in acting quickly and safely using digital vehicle information at the scene of the accident.

Example 3: Hydrogen-electric bus stuck under viaduct

A Van Hool A330 Fuel Cell bus became stuck under a viaduct. The viaduct turned out to be lower than the height of the bus, meaning the bus could not move forward or backward. The roof of the bus sustained significant damage in the process, exposing the hydrogen tanks to the first responders on scene.

Using the license plate, the first responders looked up the hydrogen bus in the Crash Recovery System, which immediately led to the correct search result. Confirmation that it was a hydrogen bus made them extra alert.

Using the crucial information under the “Deactivation” button in the vehicle’s interactive CRS Rescue sheet, the first responders were able to begin immobilizing the vehicle and disconnecting the high-voltage circuit. Because all safety-related components are also clickable in the Crash Recovery System, the first responders had access to additional information about the compressed hydrogen tanks and the hydrogen vent pipe.

Facts and figures

To gain more insight into incidents involving alternatively powered vehicles, the Netherlands Institute for Public Safety (NIPV) and the Fire Investigation Teams of the safety regions worked together to collect as much data as possible, resulting in a published report.

In 2025, a total of 430 incidents involving alternatively powered vehicles occurred at which the fire service was present. This involved 176 accidents and 254 fires*.

Incidents*

NIPV | 2025

Number of incidents

430

176 accidents
254 fires

Number of vehicles

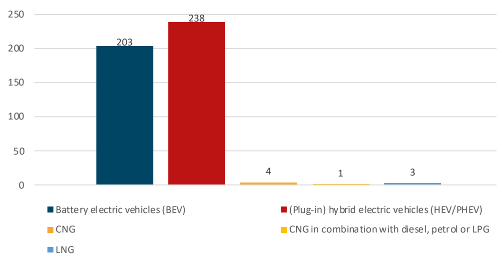
449

185 accidents
264 fires

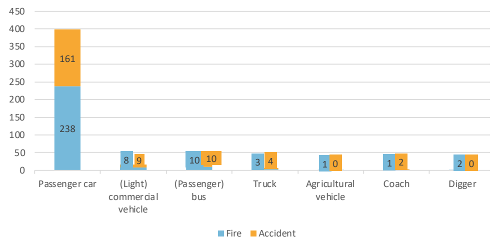
Drive and type*

NIPV | 2025

Number of vehicles involved in incidents, by type of propulsion



Number of vehicles involved in incidents, by type of vehicle



* These facts and figures are based on data from the Netherlands.

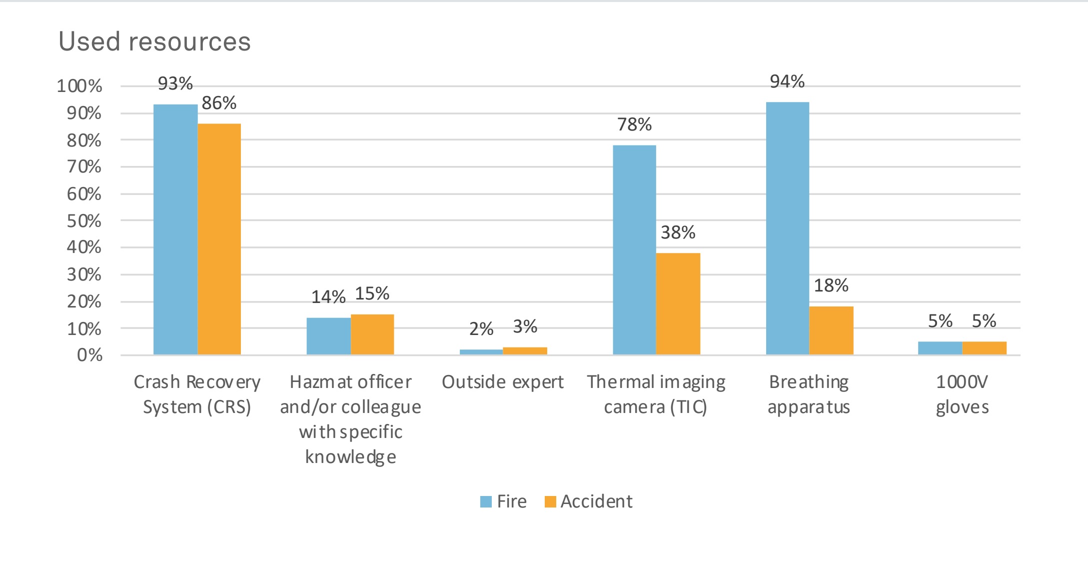
These figures show that alternatively powered vehicles are no longer the exception: on average, more than one incident per day occurred in 2025 in which the fire service dealt with an EV, hybrid, LPG, CNG, or hydrogen vehicle. The diversity of vehicle types makes it practically impossible for emergency responders to know all vehicle-specific information by heart. Digital support at the scene of the incident is therefore not an addition to standard procedure, but a precondition for safe operation.

Incident response in accidents

According to the report, the Crash Recovery System was deployed in 93% of vehicle fires and in 86% of incidents involving alternatively powered vehicles.

Resources*

NIPV | 2025



* These facts and figures are based on data from the Netherlands.

Acting with confidence

For every challenge mentioned above, the Crash Recovery System offers a solution, enabling emergency responders to act with full confidence and without hesitation.

Challenge 1: Identification

CRS removes that guesswork. The app enables real-time vehicle selection based on the license plate or chassis number (VIN), so the correct CRS Rescue Sheet is pulled directly from the database. License plates and VINs can be scanned automatically (OCR) or entered manually, so first responders can start securing the vehicle immediately. Is the license plate or VIN not readable? Select the vehicle manually by choosing the correct vehicle category and work through it step by step, or use the Search button directly from the home screen. Either way, an interactive, model-specific CRS Rescue Sheet appears on screen within seconds, so first responders can act with full confidence.

Challenge 2: Stabilisation

After selecting the digital CRS Rescue Sheet for the correct vehicle, the Crash Recovery System shows all components present in the vehicle at a glance. This immediately reveals the exact location of the lifting points and, for vehicles with alternative drivetrains, exactly where the HV battery and HV cables are located, so first responders know what to avoid before they start.
One click on 'Deactivation' shows everything needed to stabilise the vehicle further: how to operate the (electric) parking brake, how to select the P position (park), and how to use the start/stop button. First responders can act with full confidence.

Challenge 3: Deactivation

Once the hybrid or electric vehicle has been safely stabilised, the 'Deactivation' button in the Crash Recovery System (CRS) shows all the information needed to shut down the HV drivetrain. This section describes exactly how to shut down the HV drivetrain, the high-voltage circuit and, if necessary, the 12-volt circuit. CRS shows and describes exactly where the relevant components are located, such as the HV battery, 12V battery, service plug or emergency switch/disconnect cable, so the vehicle can be secured quickly and without guesswork.

Challenge 4: Gaining access

The Crash Recovery System (CRS) shows exactly what to avoid before the first cut is made. All locations of safety components and reinforced parts, including gas generators, cylinders, seatbelt pretensioners and airbags, are clearly indicated and described in the interactive CRS Rescue Sheets. CRS also shows the type of glass fitted, laminated or tempered, so first responders know how it will behave under pressure. With this information available in advance, first responders can gain access with hydraulic tools safely and with full confidence.

Challenge 5: Creating space

CRS shows first responders exactly which method of adjustment applies, no matter how the vehicle is fitted. After selecting the correct vehicle, the interactive CRS Rescue Sheet opens automatically with clickable components and symbols. Clicking the steering column and/or seat adjustment symbols next to the vehicle drawing shows and describes exactly how to adjust them, whether that's manually, electrically, or through the centre display menu. With this information available immediately, first responders can create space for trapped victims quickly, safely and with confidence.

Conclusion

CRS is the solution for all extrication challenges

The figures from the NIPV report speak for themselves: in 93% of vehicle fires and 86% of extrication incidents involving alternatively powered vehicles in the Netherlands, the Crash Recovery System is already deployed as a standard tool. Emergency responders working with CRS don't have to guess about the type of drivetrain, the location of HV cables, or safe cutting points. They act immediately, confidently, and safely in a situation where every second counts.

Modern vehicles are equipped with high-voltage batteries, reinforced bodywork, and safety components that are not visible from the outside. Every vehicle model has a different configuration. The electrification of vehicle fleets is accelerating across Europe, and the number of alternatively powered vehicles on the road continues to rise. For fire departments, this means that more and more operations involve vehicle technologies that require specific information in order to act safely.

Would you like to know how the Crash Recovery System can support your department or organization? Get in touch via www.bliksund.com or request a no-obligation demonstration.

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