BREST LIFE

CAMPUS MONDIAL DE LA MER

SEA TECH WEEK

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Energy transition in port and port logistics

State of art and vision

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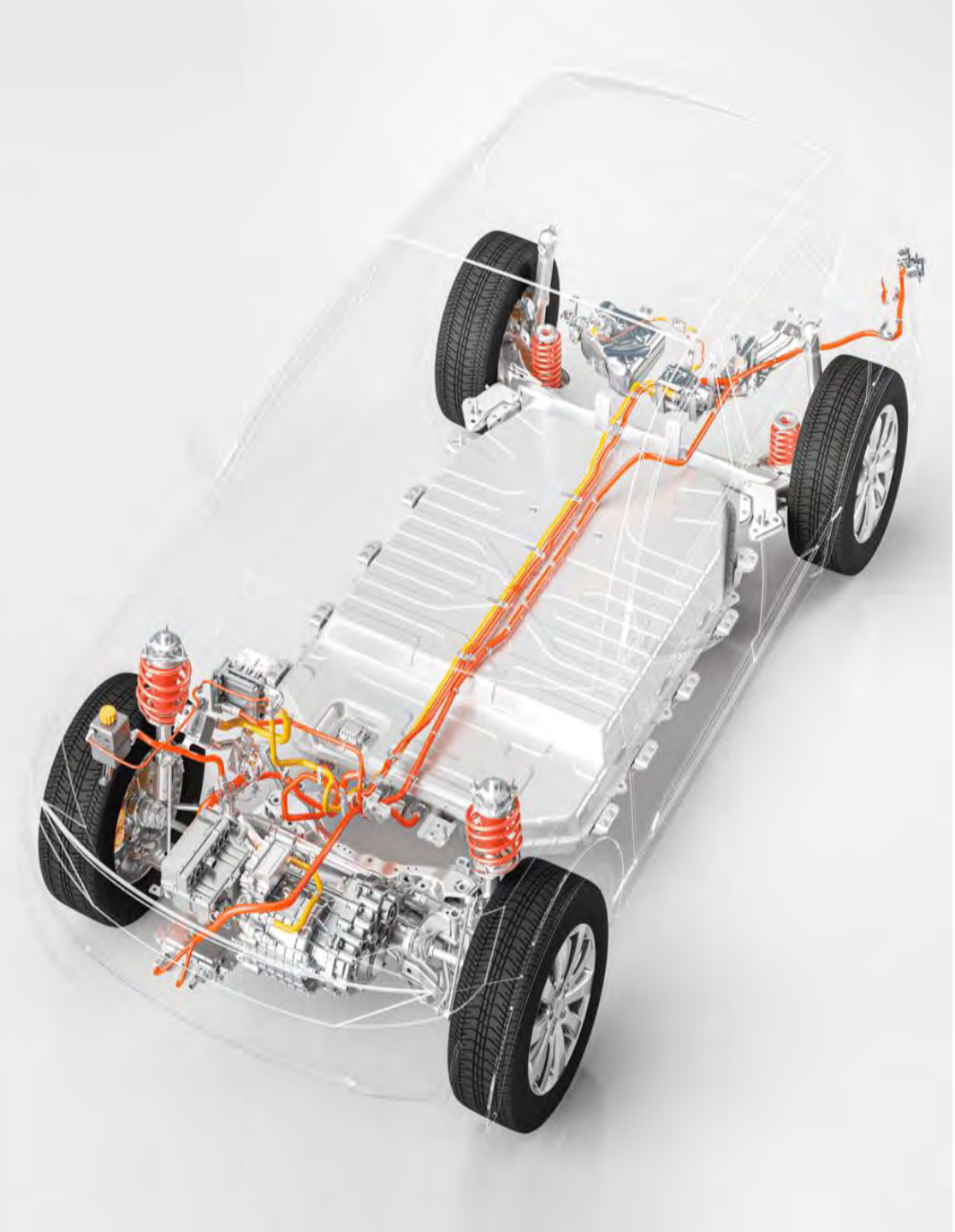
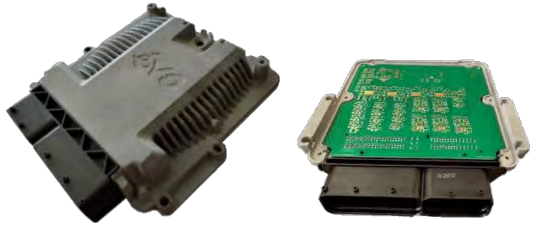
évolution synergétique!



EVO: Leader in Sustainable Mobility

- **Engineering and Consulting:** electromobility
- **Innovative solutions:** ECUs, 5G, DT, Big Data, AI
- **Electric vehicles:** FCEV

More than **40 projects** developed



Current EU Context

EU Green Deal

The first climate-neutral continent
by 2050

At least 55% less
net greenhouse gas emissions by 2030, compared to 1990 levels

3 billion
additional trees to be planted in the EU by 2030

EU H2 Strategy

1 M ton | 10 M ton | Large scale

REPowerEU Plan

Challenges

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- Regulation and Directives
- Operation
- Safety
- TCO
- Performance
- Infrastructure

Cargo Handling Equipment at Ports

Project MOVE

Revolutionising Transport with H2

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EVO tractors – Main Features

"Zero Everything"

The H2 fuel cell tractors guarantee **zero emissions** (CO2, Nox, PM2.5, PM10), **zero vibrations** facilitating driving and improving the confort for its users, and **zero noises**

Great Versatility

The H2 fuel cell terminal tractors are highly versatile, with a **wide variety of uses**: for port and airports, distribution, industrial uses, etc.

High Range

These vehicles have a great range of at least 8 hours, thus ensuring a work shift

Short Refuelling times

These hydrogen vehicles are the ones with the shortest refuelling times, similar to the refuelling times of a diesel or gasoline vehicles

Maximum reliability and safety

These tractors have been tested in a series of validations and demonstrations in real environments, meeting the highest standards of reliability and safety

IPCEI HYDROGEN

H2YDEA

Financiado por la Unión Europea NextGenerationEU

IDAE

Plan de Recuperación, Transformación y Resiliencia

Hidrógeno renovable Cadena de valor

Hydrogen IPCEIs

Commission approves up to €1.4 billion of State aid by 7 Member States for an IPCEI in Hydrogen Mobility and Transport (IPCEI Hy2Move)

Mobility and transport applications | Fuel cell technology | Hydrogen onboard storage solutions | Hydrogen production technologies

- Contributes to key **EU objectives** (i.e. European Green Deal, Hydrogen Strategy, Smart and Sustainable Mobility Strategy)
- Boosts breakthrough **innovation**
- Generates **positive spill-over effects** across the EU
- Ensures fair competition via **proportionate public spending and safeguards**

- **7** participating **Member States**:
- **11 companies** of all sizes
- **13** research, development and first industrial deployment **projects**
- Collaborations with 1 **associated partner** and **200+ indirect partners**
- Expected to unlock **€3.3 billion of private investments**

IPCEI Hy2Move Ecosystem

11 companies with 13 projects as direct participants

Mobility and transport applications	Fuel cell technology	Hydrogen onboard storage solutions	Hydrogen production technologies
Air Products	Airbus DE	Airbus DE	Air Products
Airbus DE	BMW	Airbus ES	Gen-Hy Cube
Airbus ES	Hydrogène de France	Airbus FR	Michelin
Airbus FR	Michelin	BMW	Neumann & Esser
BMW	UFI	Tomark	
Évolution synergétique			
Hydrogène de France			
Skeleton			
Tomark			

Associated partner: Breuer Technical Development

200+ indirect partners: universities, research technology organisations, SMEs, etc.

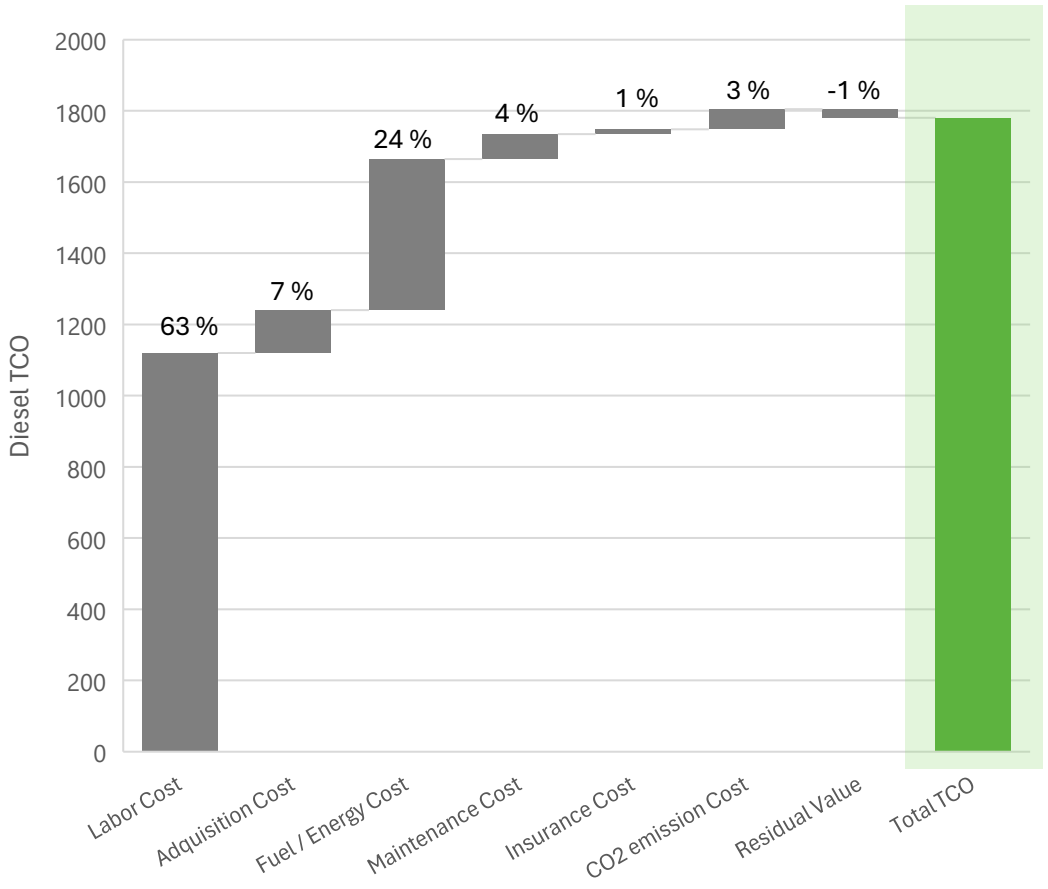
Competition

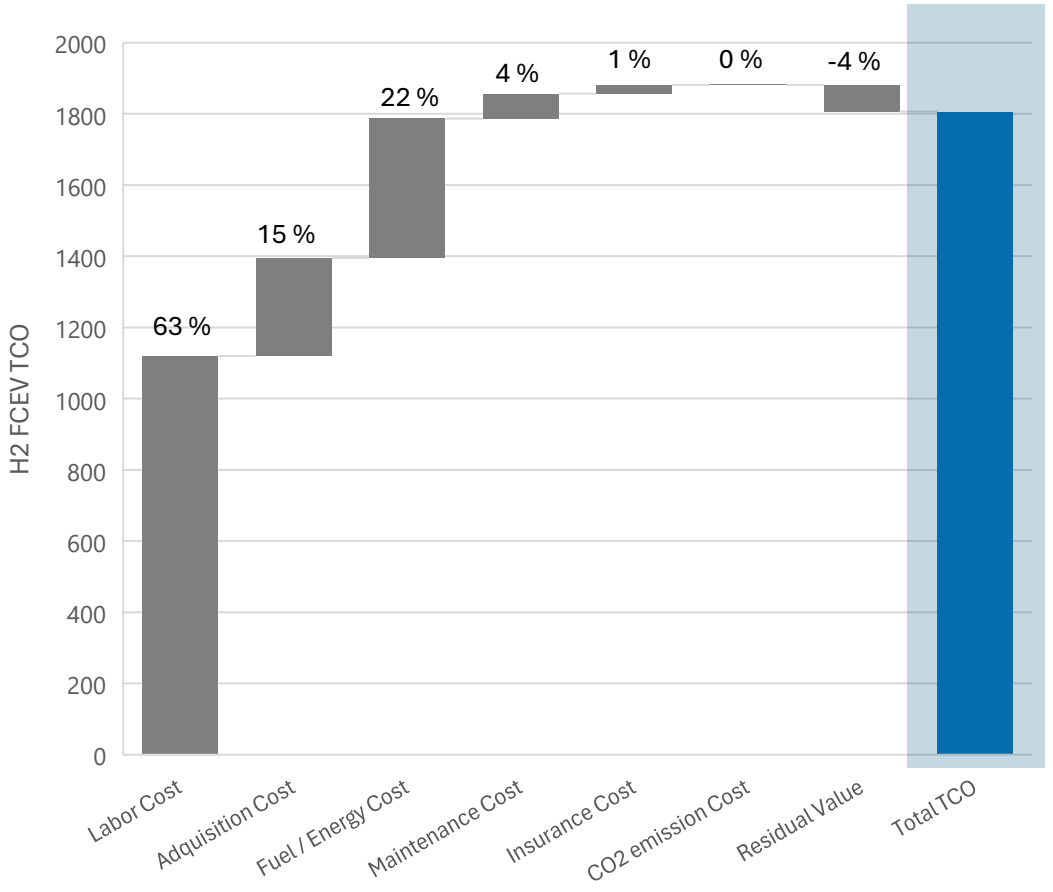
Approved Integrated Important Projects of Common European Interest (IPCEI)

	Participating companies	Participating projects	State aid approved (EUR billion)	Expected private investments (EUR billion)	Participating Member States
First Hydrogen IPCEI - Hy2Tech (2022)	35	41	5,4	8,8	
Second Hydrogen IPCEI - Hy2Use (2022)	29	35	5,2	7	
Third Hydrogen IPCEI - Hy2Infra (2024)	32	33	6,9	5,4	
Fourth Hydrogen IPCEI - Hy2Move (2024)	11	13	1,4	3,3	

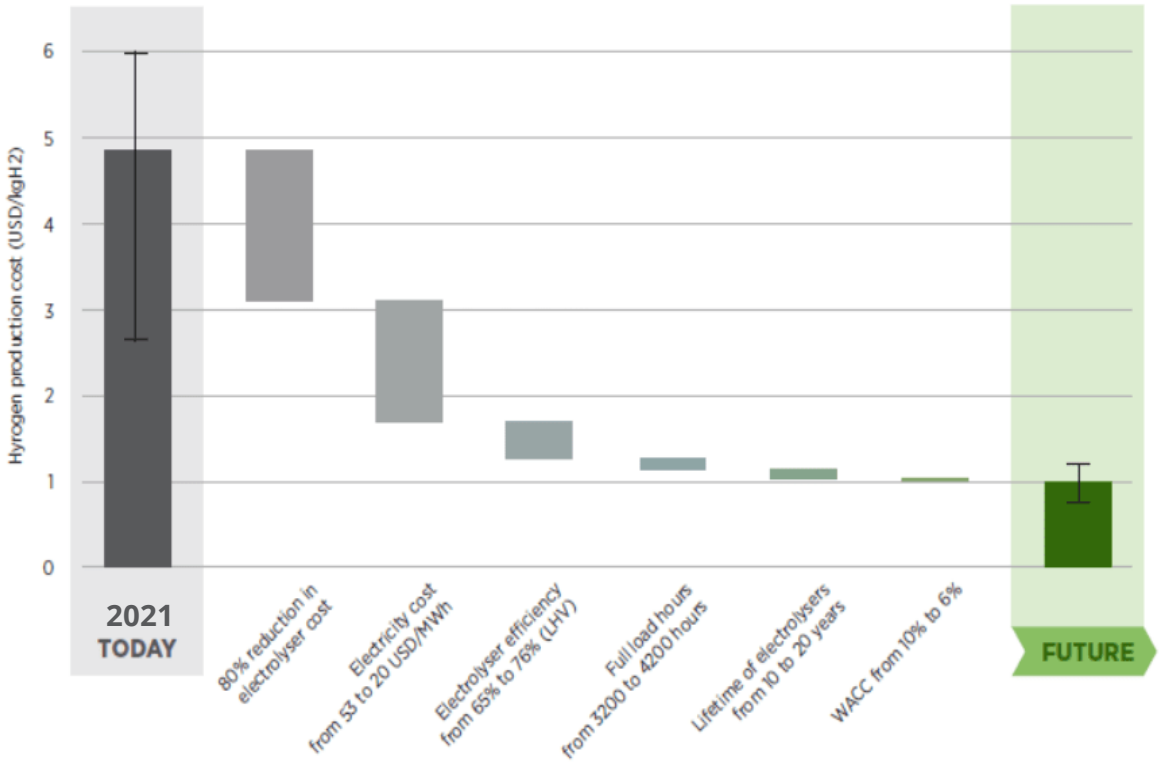
Diesel vs Hydrogen FCEV TCO

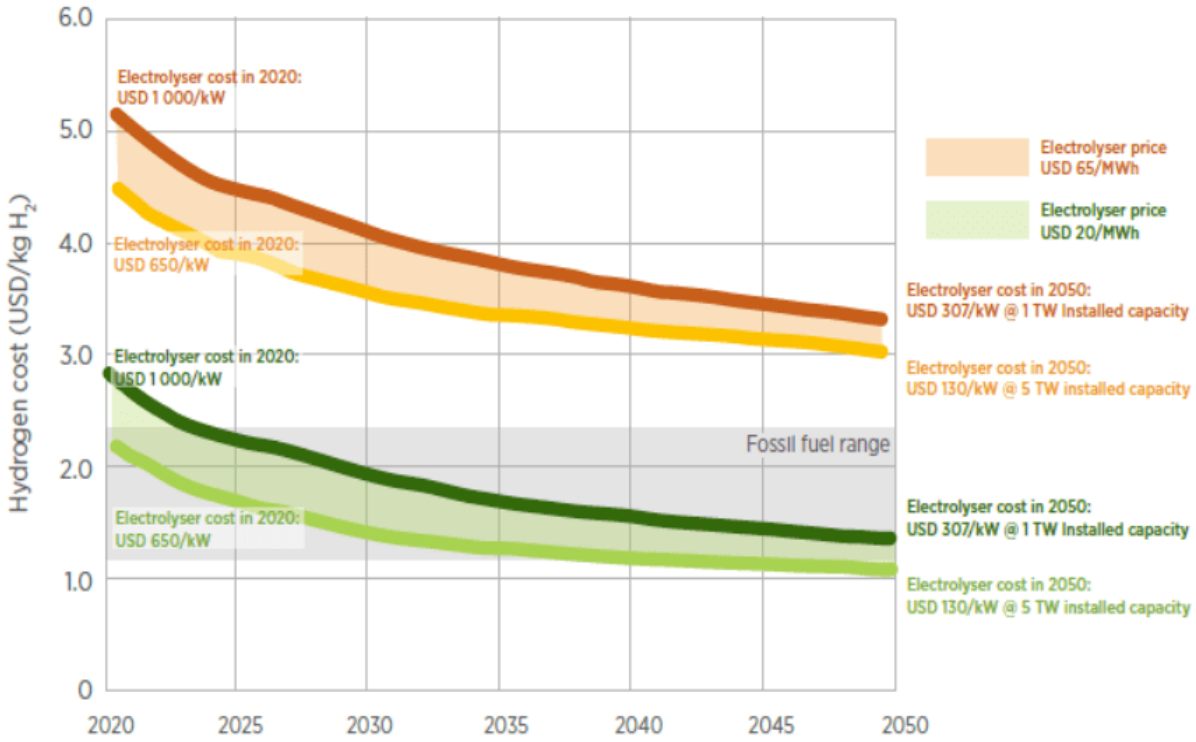
Based on 7 years operation, 2 shifts, 1.3 €/l diesel vs 6€/kg H2





Hydrogen Cost Forecast





Impact of Automation

Safety and Efficiency Improvements

Accident Prevention:

- Avoids collisions with pedestrians and obstacles.
- Early hazard detection.

Operational Efficiency:

- Optimizes port movements and task coordination.
- Syncs with truck, train, and ship schedules.
- Automated container handling and vehicle recharging.

Safety & Resilience:

- Integrated with port management systems.
- Ensures secure communication in critical areas.

H2TT: EVO Terminal Tractor

- FCEV powered by H2 – **Hydrogen** technology to revolutionize transport of loads within ports with **zero** emissions.

- How **safety** can be guaranteed in H2 vehicles?

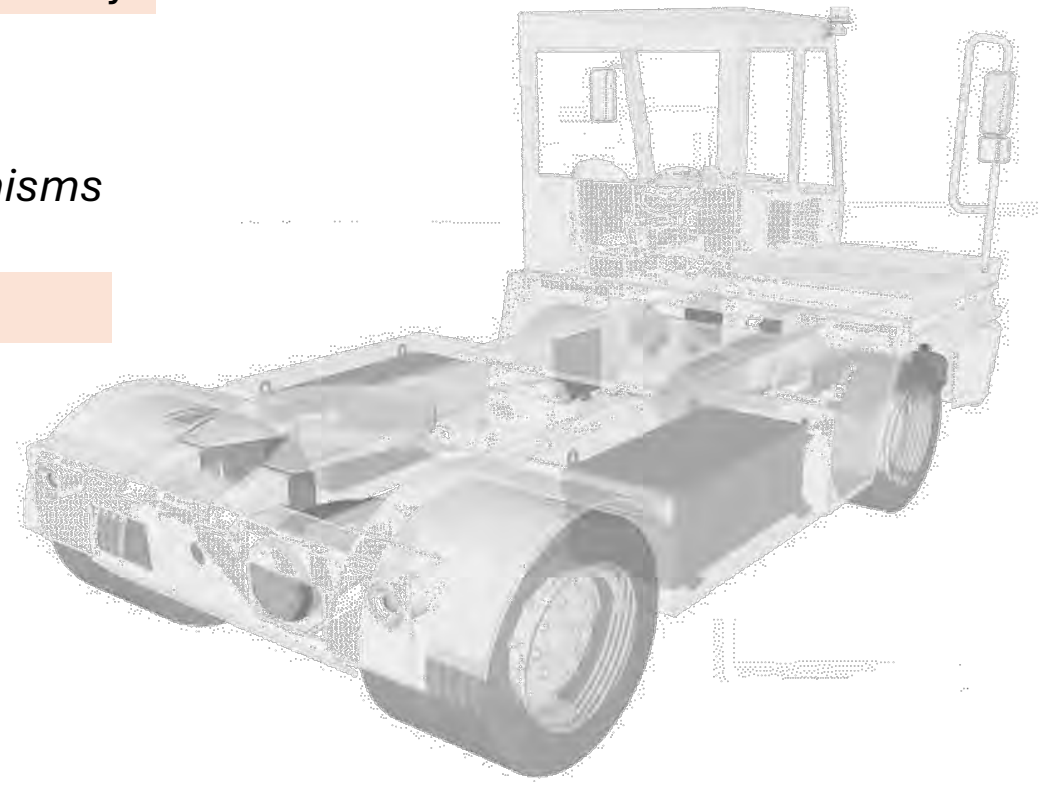
  ✓ State of the art - **ISO 26262** – Road vehicles: Functional Safety

Prevent E/E malfunctions and their associated risks

Safety analysis and implementation of safety mechanisms

  ✓ **UNECE R134** – Safety in hydrogen vehicles

Motor vehicles and their components with regard to safety-related performance of hydrogen-fuelled vehicles



Safety Measures in H2TT

OVERVIEW OF GENERAL SAFETY MEASURES

- Physical Protection Barriers
  - ✓ Isolation of components from heat sources
- Crash Protection Barriers
- Robust Storage of Hydrogen
  - ✓ Regulation 134
  - ✓ Pressure Equipment Directive 2014/68/EU
- Components selection based on:
  - ✓ Automotive-grade
  - ✓ ISO 26262 metrics

Safety Measures in H2TT

OVERVIEW OF KEY SAFETY MEASURES CONTROLLED BY E/E

- Safe start-up sequence
  - ✓ Components initial check
  - ✓ Leaks routine
- System continuous monitorization
- Driver warnings
  - ✓ Visual & Acoustic
- H2 Management System
  - ✓ Cooling management system
  - ✓ Hydrogen leak sensors
  - ✓ Automatic shut-down
  - ✓ Automatic H2 release (TPRV)

ANY deviation brings the vehicle to a **Safe State**

Safety systems of H2 shall be designed so robustly that they function reliably even in the event of human error

EVO ecosystem

Towards a Sustainable Future

- **Technological innovation:** V2X, ADAS, DT, 5G, IoT, Big Data and AI
- **Sustainability:** Decarbonisation, emissions and circular economy
- **Commitment:** social, environmental, equality and excellence

Join the Sustainable Mobility Revolution!

EVO-SYN.COM **E-MOBILITY SOLUTIONS**