ZEFES

The role of EMS in the ZEFES project

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www.zefes.eu

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Content

- ZEFES project
- ZEFES demonstrations
- ZEFES EMS use cases (ambition)
  - 722 VOL/ASS
  - 723-1 VOL/PG/ECS
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  - 725 VOL/ERI
  - 734-1/2 SCA/GSS
- What´s next

Project facts and figures
Zero Emission, flexible vehicle platforms with modular powertrains serving the long-haul Freight EcoSystem

ZEFES

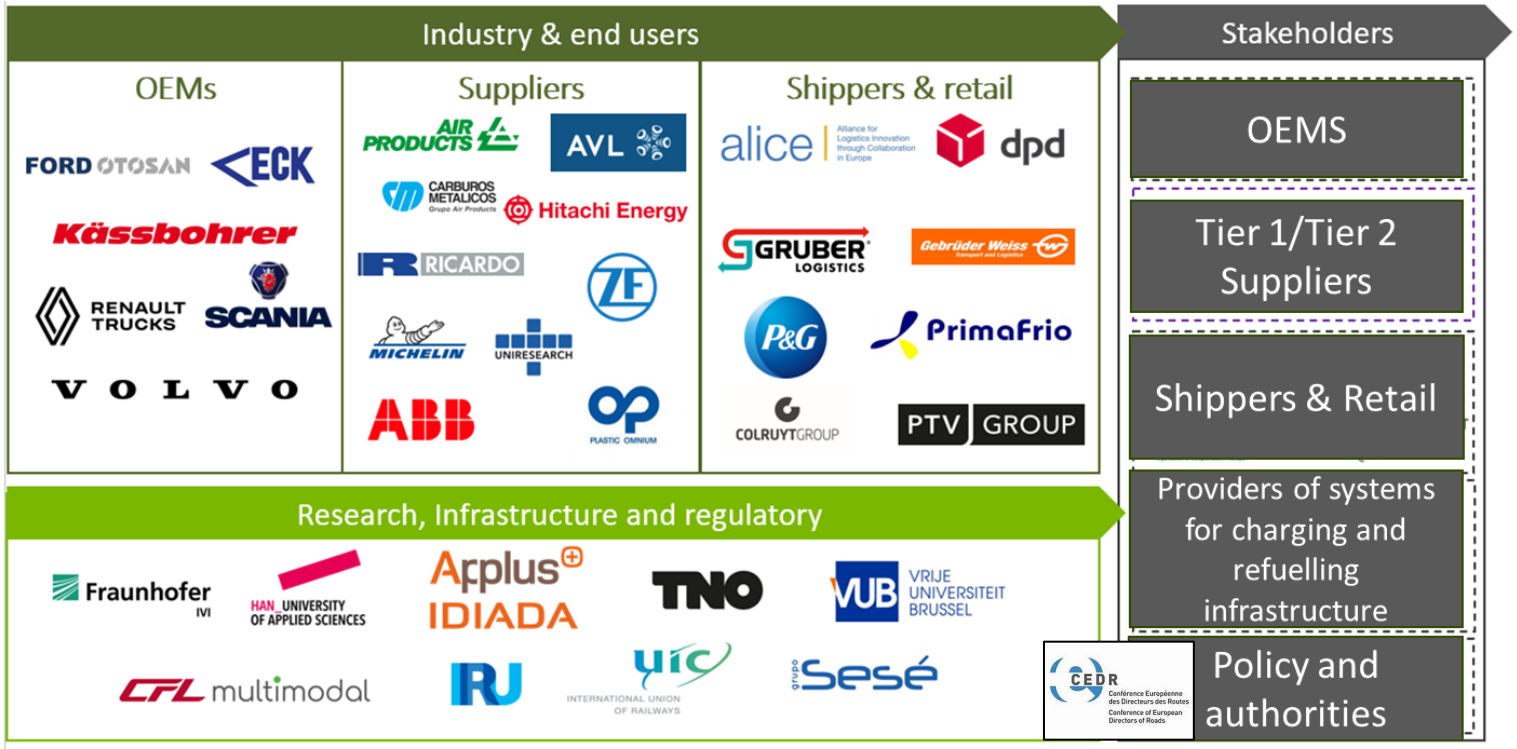
40 Partners
- 6 OEM's
- 14 Suppliers
- 11 Shippers & retail
- 9 Research

23 Million EU funding

39 Million project costs

Start date 01 January 2023

Duration 42 > **48** Months



AEVETO
Zero-Emission Road Freight Transport

www.zefes.eu

AEVETO; Advanced Electric Vehicles (trucks & coaches) for Efficient and Economic Transport Operations

*Coordinator

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Project concept

Stakeholders' engagement

Needs & requirements to operate HD ZEVs in real time logistics missions

Project Developments

Improved Zero Emission Heavy Duty Vehicles
- Modular vehicle concept, flexible capabilities, various configurations (BEV & FCEV)
- Increased efficient by component development

Digital Twin & Fleet Management tools

Models
Lifetime
Missions
Routes
Operations

Charging & Refuelling Strategies

CCS & MCS charging
Refuelling H_2

Project Demonstrations

Users
Shippers, LSP, Logistics

Energy supply
CPOs & HRS

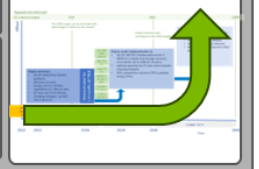
Missions & challenge based

Project Assessment

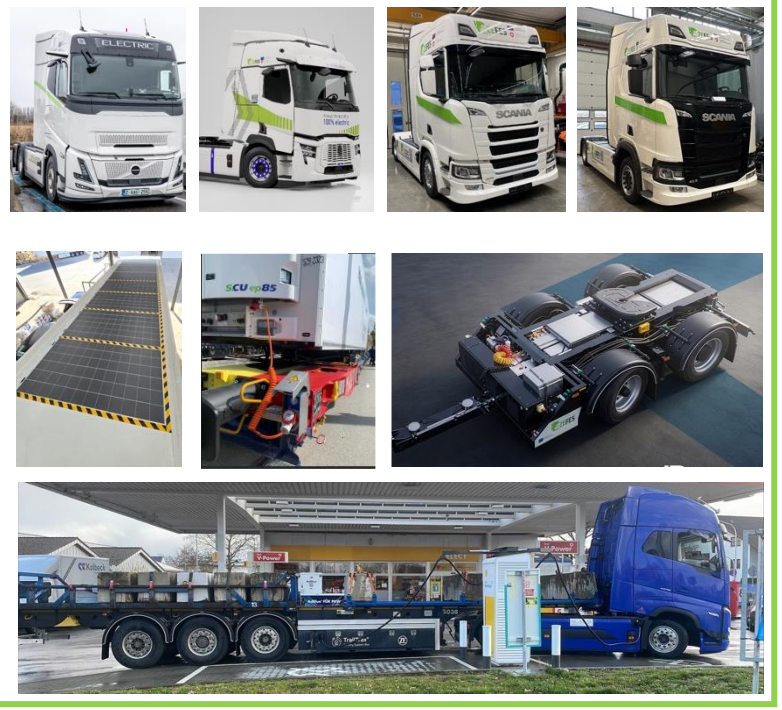
Impact on business, society and energy efficiency

Pathways towards price reductions

Market uptake increase > 2030



BEV



FCEV

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Project demonstrations

Diversity of logistic service providers	
Temperature controlled goods	PrimaFrio
General cargo	ekol LOGISTICS 4.0, GRUBER LOGISTICS
Consumer goods	P&G, colruyt
Parcel	Gebrüder Weiss, dpd
Heavy steel	OVAKO
Automotive components	MICHELIN, SCANIA, RENAULT, VOLVO, Sesé

From ZEV purchase…

Buying Decision Tool

…through operational planning…

Mission Planning

Right Vehicle for Right Duty

Dynamic Correlation

…& maintenance

Predictive Maintenance

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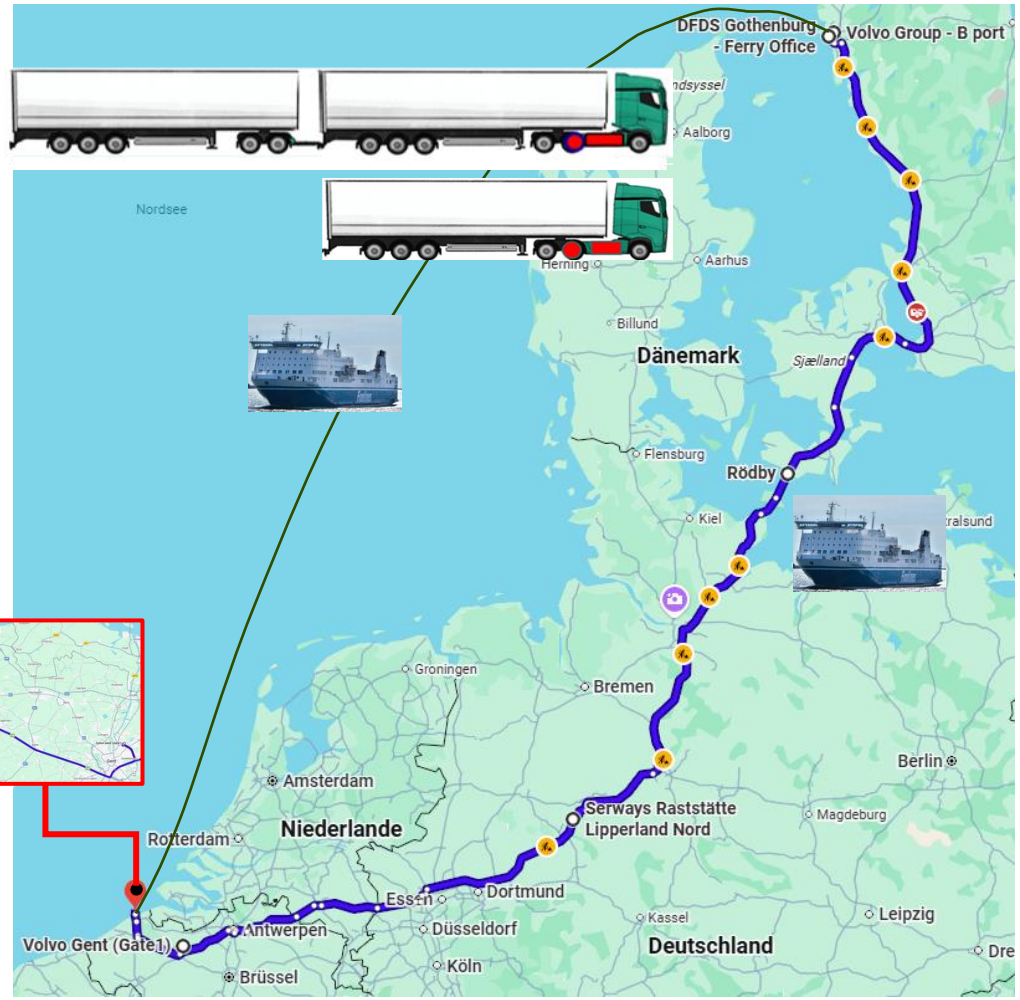
ZEFES EMS UC 722 Gothenburg-Gent

- Automotive chain factory SE to factory BE
  - Option 1, EMS2 road 1280km using ferry Rödby – Puttgarden. Combination of CCS and MCS charging.
  - Option 2, EMS2 road 75km Zeebrugge-Gent using short sea Gothenburg-Gent. Depot charging only.
- No realisation to perform a road test for option 1 as every country and federal states have their own regulation on EMS (GCW, axle weights, turning circle, (non-) steered axles, electronic systems)
- Discussions and timing option 2 not in line with ZEFES project end date



ZEFES EMS UC 723-1 VOL/PG/ECS

- Chain base products for FMCG
  - Option 1,
    EMS2 Amiens-Dourges to deliver trailer 1
    by e-dolly remoted controlled within the terminal,
    single truck Dourges-Zeebrugge to deliver trailer 2.
  - Option 2, 2 single trucks
    1 Amiens-Dourges v.v.
    2 Amiens-Zeebrugge v.v.
  - Depot charging CCS at PG Amiens,
    depot charging MCS at ECS Zeebrugge.

- Attempts discussions with local and national authorities not successful as EMS
  - is seen as rail competition,
  - fear loss of smaller fleet operators.

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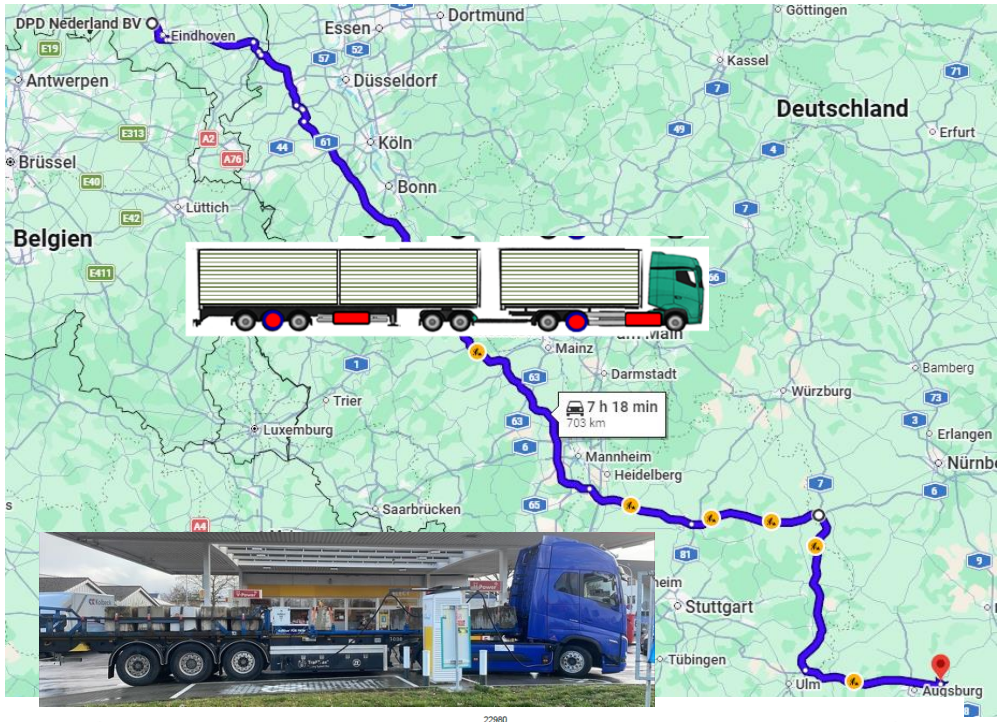
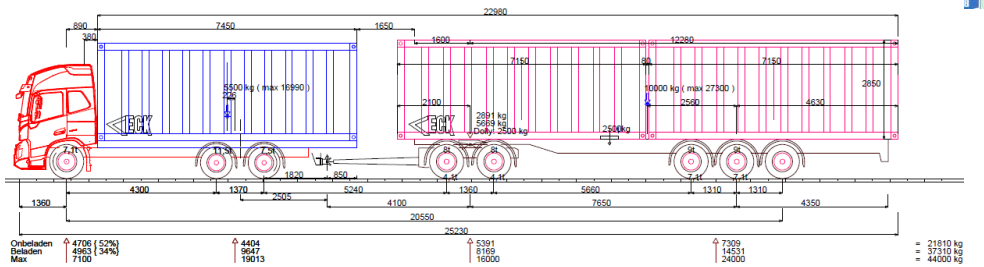
ZEFES EMS UC 724 VOL/DPD/REB

- Parcel chain between DPD depots DPD Oirschot and DPD Aichach.
- Challenges to design a vehicle layout meeting both NL and DE regulation for EMS1, 6x2 rigid and 14,3m e-trailer
- Vehicle design and layout was successful!
- Charging at public charges successful!
- Regulation for e-trailer ongoing, a 2-step approach will be followed. Details in next slide.

- Unfortunately, ZF decided to stop the homologation process for use on public roads in a commercial logistics service





UN Reg 13 amendment for e-axles and self-propelled trailers

Submitted by the experts from CLCCR/CLEPA/OICA

Informal document **GRVA-21-41**
21st GRVA, 20-24 January 2025
Agenda item 8(c)

UN Reg 13 amendment
for e-axles and self-propelled trailers
CLCCR / OICA / CLEPA
Industry Task Force

GRVA-21
20-24 January 2025

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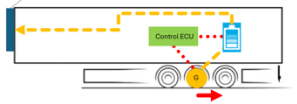
Background and scope

Dynamo trailer

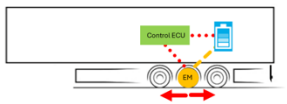
The trailer recuperates energy for trailer users, e.g. a cooling unit (usually energy consumption ≤ 20 kW)



Data communication
Power flow
force

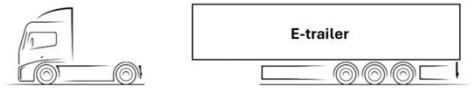
E-trailer

The trailer recuperates energy and provides propulsion. Trailer users (cooling unit) may be installed as well.



The proposed amendment regulates both dynamo trailers and e-trailers, limited to categories 03 and O4. Light O2 trailers will be considered in a second step.

General concept



Variant 1:

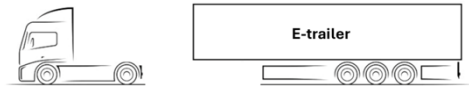
- The motor vehicle controls retardation / recuperation and propulsion of the e-trailer.
- The e-trailers sends a feedback to the motor vehicle on the actual status.

Variant 2:

- The e-trailer builds its own retardation / recuperation and propulsion demands and transmits the actual status to the motor vehicle.
- The motor vehicle integrates e-trailer information in its own braking and propulsion strategies and has the capability to cut-off e-trailer forces whenever needed (e.g. cut-off propulsion in case of braking or an ESC intervention).

The concept could also be a mix of variants 1 and 2.

Implementation issues



- Current version 2014 of ISO 11992-2 (specified in R13) does **not** support e-trailers; the general concept described in a previous slide **cannot** be implemented.
- The ISO version 2023 was developed to support e-trailers, but it **cannot** be used, due to errors and omissions.
- An ISO working group is on-going to deliver an **updated version in 2026**.
- Industry cannot wait until 2026. An intermediate step needs to be developed.

Definitions

UN R13 (proposal)

2.x "e-trailer" means a trailer that is able to contribute to the propulsion of the vehicle combination by using its own electric powertrain.

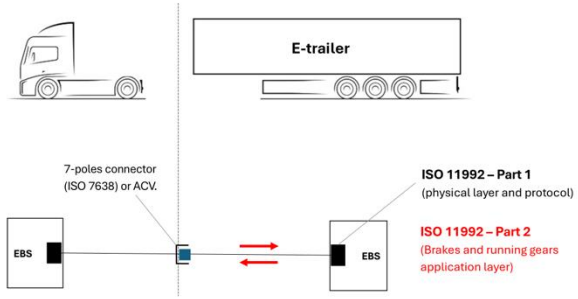
R.E.3. (current)

1.5. "Trailer" means any non-self propelled vehicle, which is designed and constructed to be towed by a power driven vehicle and includes semi-trailers.

An e-trailer is not a trailer...

An update of R.E.3. is needed.

Implementation



The digital link and the electric connector are regulated by UN R13.
This ensures the interoperability of vehicles.

Strategy for regulation update

- Rationales (reminder):
  - Current version 2014 of ISO 11992-2 does not support e-trailers.
  - Updated ISO version supporting e-trailers is planned for 2026.
  - Industry cannot wait until 2026.
- Proposal to proceed in 2 steps:
  - Step 1 Require ISO 2014 for e-trailers, and implement **technical restrictions** to ensure safe operation with existing motor vehicles.
  - Step 2 Require ISO 2026 for both tractor and trailer.

The motor vehicle has only limited control on e-trailer forces. The challenge is to maximize the use of e-trailers, while setting necessary restrictions to ensure e-trailers will not disturb the operation of the motor vehicle.

The way to implement the general concept described in the previous slides (i.e. the motor vehicle controls / can cut-off the e-trailer forces).

The text presented today is a draft proposal implementing the step 1.

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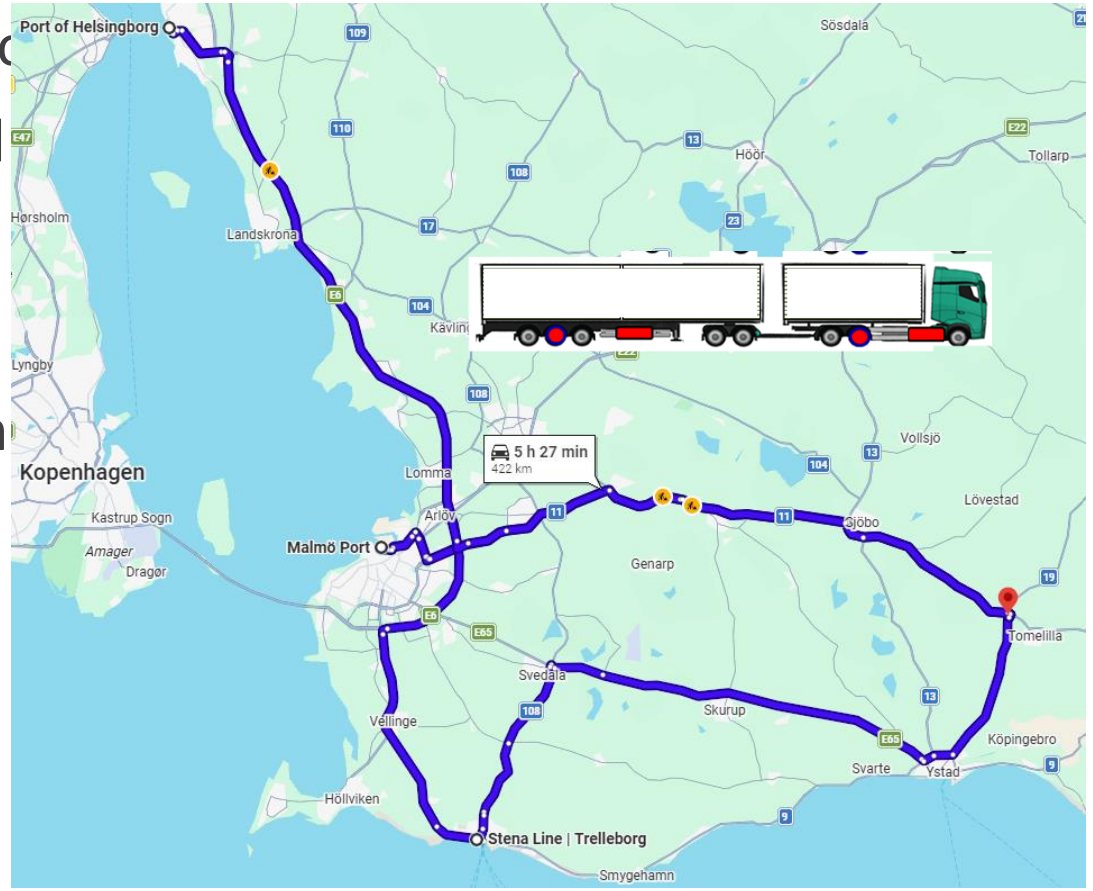
ZEFES EMS UC 725 VOL/ERI

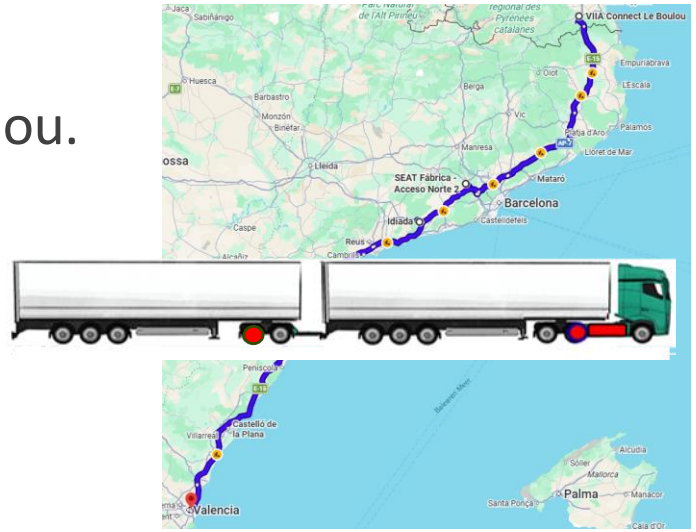
- Supply chain of general cargo between pc
- EMS1, 6x2 rigid with a VOL e-trailer build
- Depot charging at Eriksson Tomelilla

- Smooth operation as the vehicle is a com

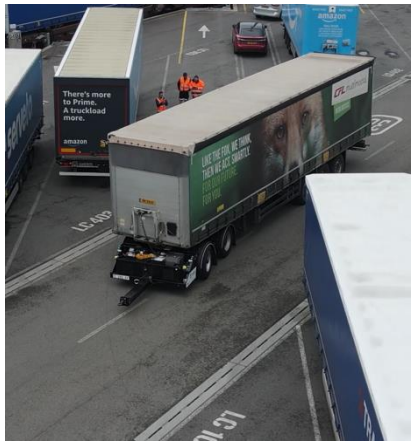


ZEFES EMS UC 734-1/2 SCA/GSS

- Automotive chain factory SE to factory DE
- Route South, EMS2 road up to 700km to rail terminal Le Boulou. MCS charging at IDIADA and use of depot CCS charging
- Rail connection Le Boulou FR - Dudelange LU
- Route North, std truck trailer from CFL terminal to Heilbronn to 320km depending traffic and weather conditions. Public charging along route.



- Smooth operation in Spain since 03/26
- No EMS2 allowed in Germany and Luxembourg
- Successful demonstration at CFL terminal 06/2026



Take aways

- EMS in Europe not yet seen as an opportunity to lower operational cost of freight transport
- Harmonisation of legislation at EU, country, regional level is lacking
- Fear for modal shift
- High system barriers between rail and road
- EMS on defined routes and specific missions can speed up implementation of ZE-HDVs
- Intelligent Access for EMS vehicles can overcome critical infrastructure issues
- EMS in a multimodal context support better use of both modes, road-rail

Thank you for your attention!

- **ZEFES Final Event**
- Date, 24-25 Nov. 2026
- Location, CFL Multimodal LU
- Registration,
  www.zefes.eu

Disclaimer

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Project funded by

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Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

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