



ZEFES

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

Omar Hegazy
Ben Kraaijenhagen
Vrije Universiteit Brussel (VUB)

www.zefes.eu



Content



-  ZEFES project
-  ZEFES demonstrations
-  ZEFES Cold Chain use case
-  What's next

Project facts and figures



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

ZEFES Final Event

- Date, 24-25 November 2026
- Location, CFL Multimodal Luxembourg
- Registration, www.zefes.eu



Cross projects cooperation towards zero emission



- Energy infrastructure
- LCA/TCO
- Digital Twin
- Collaboration & synergies with other initiatives, e.g.,

Gefördert durch:
Bundesministerium
für Digitales
und Verkehr
aufgrund eines Beschlusses
des Deutschen Bundestages

Finanziert von der
Europäischen Union
NextGenerationEU



European
Commission

Connecting Europe Facility

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

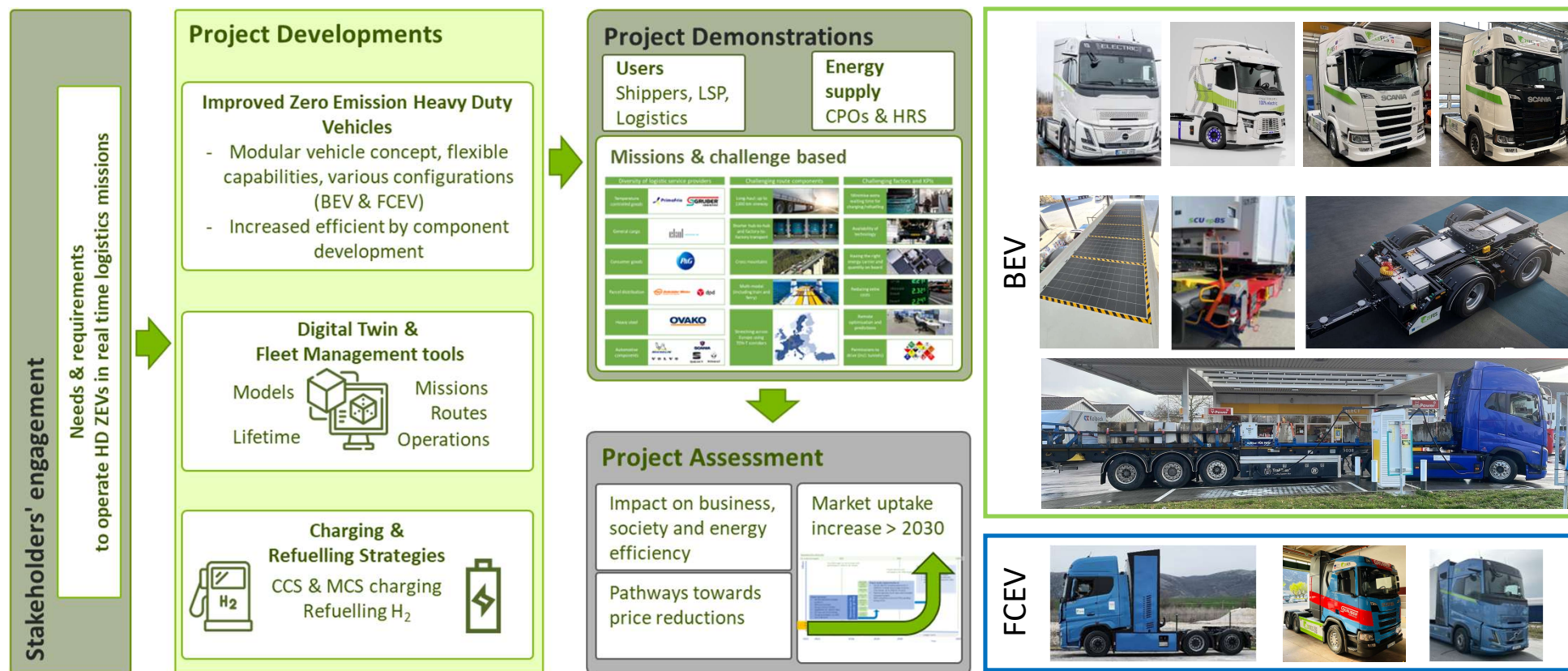
*Coordinator

08.09.2026

ZEFES | Grant Agreement 101095856 | Cold Chain Webinar by
ALICE



Project concept



Project demonstrations



Diversity of logistic service providers	
Temperature controlled goods	
General cargo	
Consumer goods	
Parcel	
Heavy steel	
Automotive components	

From ZEV purchase...



Buying Decision Tool

...through operational planning...



Mission Planning



Right Vehicle for Right Duty



Dynamic Correlation

...& maintenance



Predictive Maintenance



ZEFES Cold Chain use case



Company, PrimaFrio

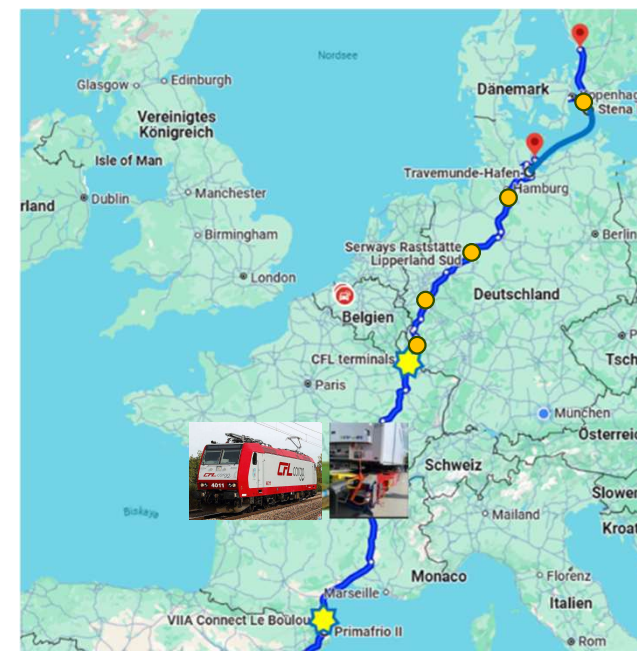
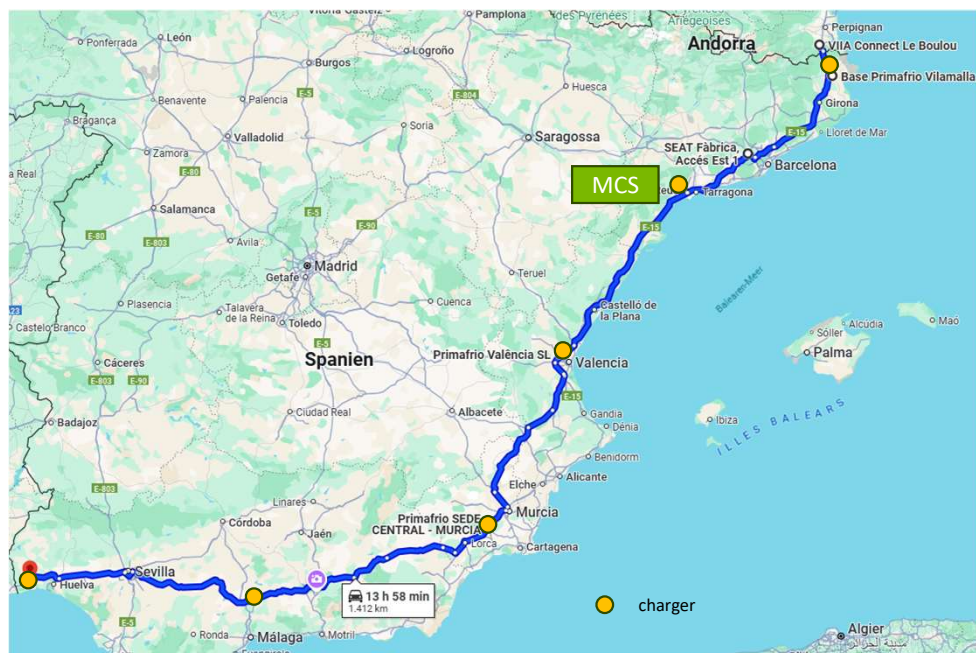
Use case,
Fresh fruit chain, **5 days** from the
field to the supermarkets

Equipement

- BEV tractor
- SCB e-reefer
- PRI n-reefer



The corridor Lepe SP – Halmstad SE



Corridor Murcia to Halmstad by eTruck



- Scania ZEFES truck, 728 kwh battery
- 2 Driver deployment
- Considering a round-trip scenario
- Sufficient charging stations are available
 - Considering that Primafrío Belfort has a charging possibility
 - One location is critical, supply in Lyon/Beaune



The corridor, 4 options

-  Route 1:
Road using the Ferry Travemünde – Trelleborg
-  Route 2:
Road corridor, via Denmark using the Ferry Puttgarden - Rödby
-  Route 3:
Pre haul from Murcia to Le Boulou.
Intermodal service Le Boulou – Bettembourg.
Bettembourg to Halmstad using the Ferry Travemünde – Trelleborg
-  Route 4:
Pre haul from Murcia to Le Boulou.
Intermodal service Le Boulou – Bettembourg. Bettembourg to Halmstad via
Denmark using the Ferry Puttgarden - Rödby

Intermodal road-rail-road-ferry-road, D3.4



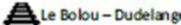
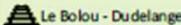
Charging on ferry

TASK	USE CASE	ROUTE	OEM	BEV	TRUCK INFORMATION	TRUCK CHARGER	TRAILER + CHARGING	TRANSPORTED GOODS
7.2.2	2	Göteborg - Gent  Rødby-Puttgarden	VOLVO	BEV-1	Battery capacity: 728kWh	CCS2 (ISO 15118 - 2 2016) MCS (ISO 15118-20)	1 semi-trailer (no charging required)	Automotive parts
7.2.3-2.4	4	Le Boulou - Halmstad  Le Boulou - Dudelange  Travemünde – Trelleborg/Malmö		BEV-2			E-reefer, SCB (S.KOE Cool) Battery: 32kWh (530-660 VDC), 4.5h operating time Charger: CEE 22kW (400V, 32A, 50Hz), 2h charging time	Temperature-controlled goods
7.3.1	6	Sodertälje - Zwolle  Rødby-Puttgarden	SCANIA	BEV-4	Battery capacity: 624 kWh Max. cont. power: 400 kW Tare weight: 11.000 kg	CCS2 (ISO 15118 - 2 2016) 375 kW MCS (ISO 15118-20) 750 kW	1 semi-trailer as range extender (e-trailer), Kaessbohrer/ZF Battery capacity: 200 kWh CCS2 140 kW	Automotive components

- All EV charging services currently available onboard are designed for passenger cars, not for trucks.
- Many ferry operators have opted to provide EV charging in terminals at port facilities rather than onboard, often in partnership with third-party providers.
- Electrification of ferry lines highly depends on the trip durations, composition of ferry fleets, availability of energy storages systems, safety concerns, additional equipment due to spray water and salty atmosphere.

Intermodal road-rail-road-ferry-road, D3.4

Charging on rail

TASK	USE CASE	ROUTE	OEM	BEV	TRUCK INFORMATION	TRUCK CHARGER	TRAILER + CHARGING	TRANSPORTED GOODS
7.2.3-2	4	Le Bolou - Halmstad  Travemünde – Trelleborg/Malmö	VOLVO	BEV-2	Battery capacity: 728kWh Range: 600km	CCS2 (ISO 15118 - 2 2016) MCS (ISO 15118-20)	E-reefer, SCB (S.KOE Cool) Battery: 32kWh (530-660 VDC), 4.5h operating time Charger: CEE 22kW (400V, 32A, 50Hz), 2h charging time	Temperature-controlled goods
7.3.3	8	Huelva - Dudelange 	SCANIA	BEV-4	Battery capacity: 728 kWh Max. cont. power (mech.): 400 kW	CCS2 (ISO 15118 - 2 2016) 375 kW MCS (ISO 15118-20) 750 kW	E-reefer, SCB (S.KOE Cool) Battery: 32kWh (530-660 VDC), 4.5h operating time Charger: CEE 22kW (400V, 32A, 50Hz), 2h charging time	Temperature-controlled goods
7.3.4	9	Martorell - Dudelange 	SCANIA	BEV-5	Battery capacity: 624 kWh Max. cont. power (mech.): 400 kW	CCS2 (ISO 15118 - 2 2016)	Lowliner trailer + dolly NO CHARGING REQUIRED	Automotive components

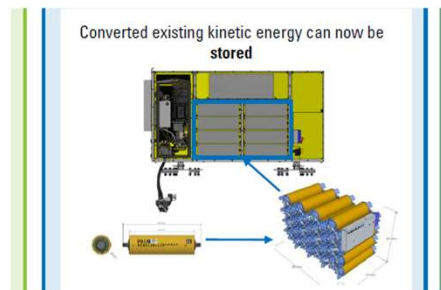
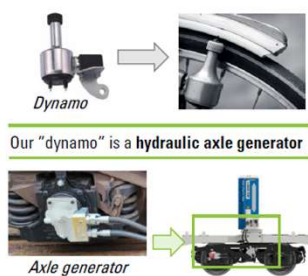
-  A promising design concept for charging on rail is the SWS-PowerBox, a self-contained, rail-mounted energy system
-  A second system is designed by WASCOSA, powering refrigerated containers using electricity from the trains' head-end power (HEP) system
-  Collecting all necessary approvals is seen as one of the main risk factors for a successful execution of the test

Intermodal road-rail-road-ferry-road, D3.4



Promising design concepts for charging on rail

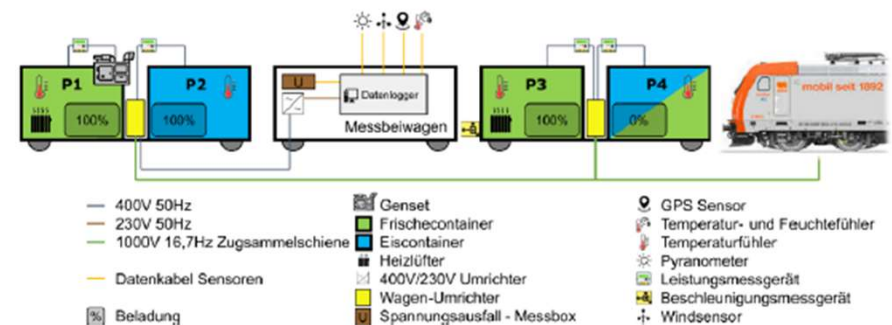
SWS-PowerBox, a self-contained, rail-mounted energy system.



SWS-PowerBox® is a **net-zero, rechargeable power bank** on a freight wagon



Head-end power solution by WASCOSA, powering refrigerated containers using electricity from the trains' head-end power (HEP) system



Thank you for your attention!



ZEFES Final Event

-  Date, 24-25 November 2026
-  Location, CFL Multimodal Luxembourg
-  Registration, www.zefes.eu

Disclaimer



**Funded by
the European Union**

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the granting authority can be held responsible for them.

Project funded by



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

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

This work has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI)