2ZERO

PROJECT PORTFOLIO

CALLS 2021 - 2023

21

23

2ZERO

Co-funded by
the European Union

ed.: EGVIAfor2Zero aisbl, Av. de Cortenbergh, 66, 1000 Brussels

2ZERO
Forward

The «Towards zero-emission road transport» (2Zero) partnership is the successor of the successful European Green Cars Initiative (EGCI) and European Green Vehicles Initiative (EGVI) which provided a unique support to the road transport eco-system in its decarbonisation transition. Through Horizon Europe, the EU framework programme for Research & Innovation, the European Union continues to work hand in hand with stakeholders to build a zero-emission road transport system that is sustainable, efficient and circular. This is in line with the ambition of the European Green Deal and the European Commission's Sustainable and Smart Mobility Strategy.

The 2Zero partnership provides a unique opportunity to cooperate on the interconnected systemic aspects of vehicles, charging infrastructures, use cases and circularity which are all necessary to be successful in the transition towards zero-emission mobility. Moreover, this partnership contributes to strengthening the competitiveness of the EU automotive industry. Rethinking the road transport system is a tremendous challenge, and all different aspects should be carefully investigated. This is already undertaken in the first 32 projects funded under 2Zero and presented in this new edition of the project portfolio.

This publication presents the ongoing efforts to make EV charging smarter and more convenient for the users. Projects presented in this portfolio also focus on the use of less materials while building EVs, including a specific attention to rare earth materials and on the development of new trucks and buses, allowing efficient and economically viable operations while continuing to strive towards a higher energy efficiency of vehicles and at system level.

Some of these projects have been jointly funded with other EU-funded partnerships or initiatives, in alignment with 2Zero's holistic approach.

"Let's continue to work together to build a better future for road transport, our citizens, and for the EU industry!"

Rosalinde van der Vlies
Clean Planet Director
DG Research and Innovation
European Commission

"Join us to continue developing innovative solutions to accelerate the transition towards zero emission road mobility"

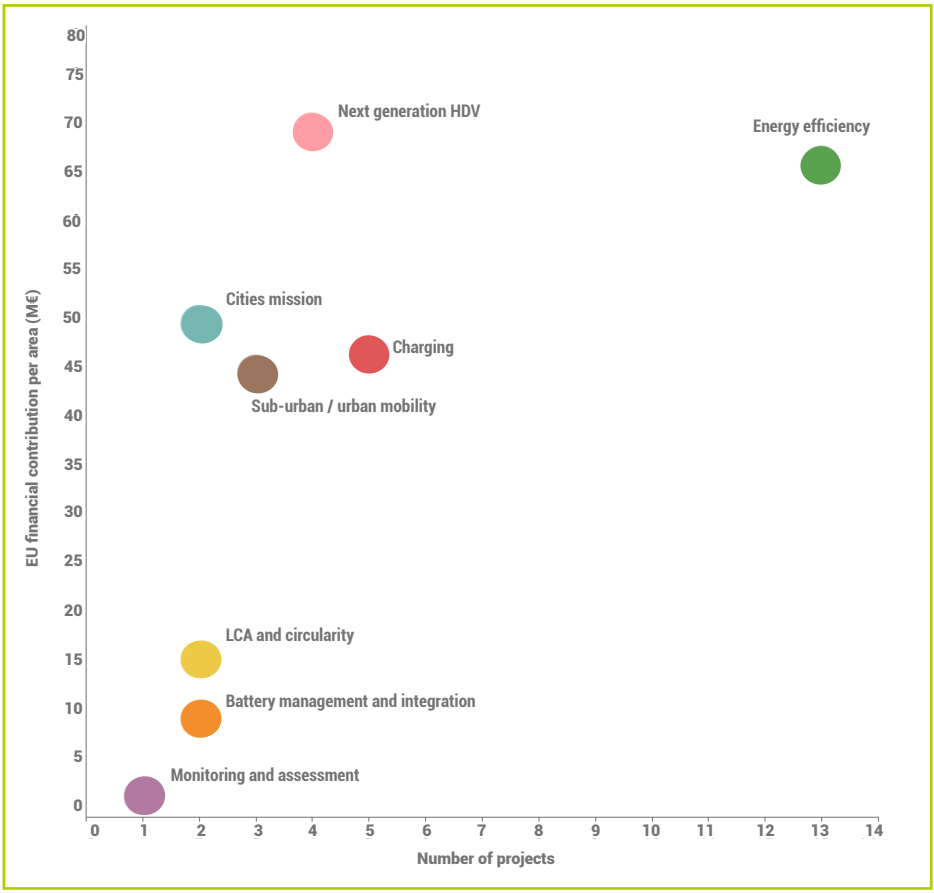
Stephan Neugebauer
EGVIAfor2Zero
Chairman


EV CHARGING..
TIME REMAINING..
75 %
80 MIN

2ZERO
FACTS & FIGURES 2021 - 2023

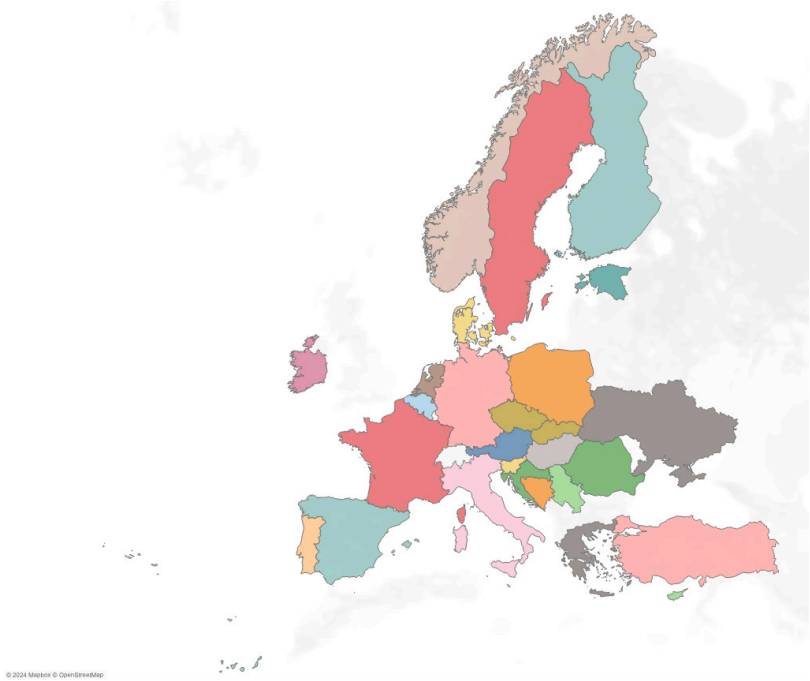
Clustering of 2Zero projects

EU financial contribution & numbers of projects per area



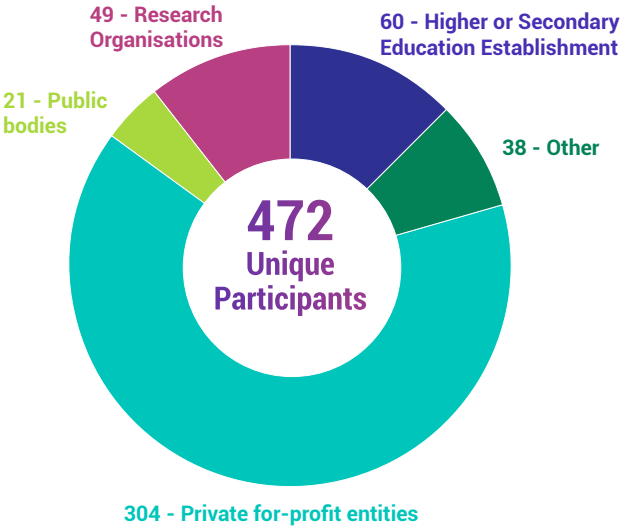
EU Financial Contribution per country in 2Zero Projects

In Horizon Europe, legal entities from Associated Countries can participate under the same conditions as legal entities from the Member States



- Austria - M€ 22,5
- Belgium - M€ 29
- Bosnia & Herzegovina - M€ 0,31
- Croatia - M€ 0,82
- Cyprus - M€ 5
- Czechia - M€ 4,4
- Denmark - M€ 5,8
- Estonia - M€ 0,32
- Finland - M€ 11,5
- France - M€ 18
- Germany - M€ 50
- Greece - M€ 8
- Hungary - M€ 2,5
- Ireland - M€ 0,98
- Italy - M€ 35,7
- Malta - M€ 1,2
- Netherlands - M€ 23,3
- Norway - M€ 1,5
- Poland - M€ 2,3
- Portugal - M€ 5,1
- Romania - M€ 0,94
- Serbia - M€ 0,37
- Slovakia - M€ 0,36
- Slovenia - M€ 6,6
- Spain - M€ 35
- Sweden - M€ 13,2
- Türkyie - M€ 14,5
- Ukraine - M€ 0,12
- **Received subsidies of M€ 0,68:**
  Colombia
  Kenya
  Pakistan
  Philippines
  South Africa

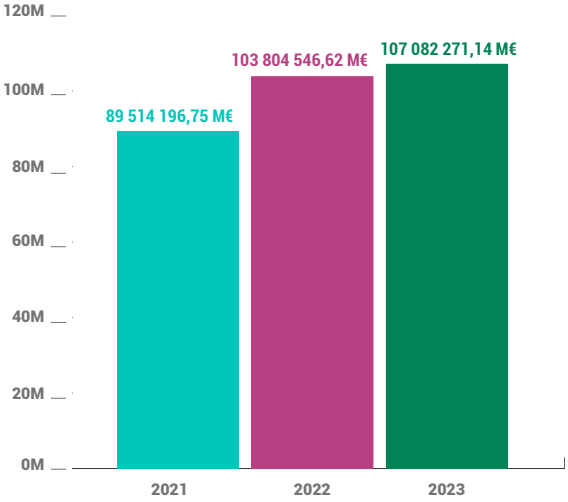
WHO PARTICIPATED TO THE CALLS?



90
SMEs

382
Non SMEs

EU FINANCIAL CONTRIBUTION PER YEAR IN 2ZERO PROJECTS



2ZERO
HORIZON EUROPE FUNDED PROJECTS

2021

HORIZON-CL5-2021-D5-01-01

Nextgen vehicles: Innovative zero emission BEV architectures for regional medium freight haulage	NextETRUCK

HORIZON-CL5-2021-D5-01-02

Nextgen EV components: Integration of advanced power electronics and associated controls	SCAPE
	PowerDrive
	RHODaS
	HiPE
	HighScape

HORIZON-CL5-2021-D5-01-03

System approach to achieve optimised Smart EV Charging and V2G flexibility in mass-deployment conditions	FLOW
	EV4EU
	SCALE
	XL-Connect
	DriVe2X

HORIZON-CL5-2021-D5-01-04

LCA and design for sustainable circularity - holistic approach for zero-emission mobility solutions and related battery value chain (2ZERO & Batteries Partnership)	TranSensus LCA

2022

HORIZON-CL5-2022-D5-01-08

Modular multi-powertrain zero-emission systems for HDV (BEV and FCEV) for efficient and economic operation	ZEFES
	EMPOWER
	ESCALATE

HORIZON-CL5-2022-D5-01-09

Nextgen EV components: High efficiency and low cost electric motors for circularity and low use of rare resources	EM-TECH
	MAXIMA
	HEFT
	VOLTCAR
	CliMAFlux

2ZERO
HORIZON EUROPE FUNDED PROJECTS

HORIZON-CL5-2022-D5-01-10

New generation of full electric urban and peri-urban Bus Rapid Transit systems to strengthen climate-friendly mass transport	EBRT2030

2023

HORIZON-CL5-2023-D5-01-01

User-centric design and operation of EV for optimized energy efficiency	SmartCorners
	MINDED
	EFFEREST

HORIZON-CL5-2023-D5-01-02

Innovative battery management systems for next generation vehicles (2Zero & Batteries partnership)	InnoBMS
	iBattMan

HORIZON-CL5-2023-D5-01-03

Frugal zero-emission vehicles concepts for the urban passenger challenge	GIANTS
	ZEV-UP

HORIZON-CL5-2023-D5-01-04

Circular economy approaches for zero emission vehicles	ZEvRA

HORIZON-CL5-2023-D5-01-05

Measuring road transport results towards 2ZERO KPIs	*Le*Mesurier

2ZERO
HORIZON EUROPE FUNDED PROJECTS

HORIZON-MISS-2023-CIT-01-01

Co-designed smart systems and services for user-centred shared zero-emission mobility of people and freight in urban areas (2Zero, CCAM and the Cities mission)	MOBILITIES FOR EU
	metaCCAZE


EV CHARGING..
TIME REMAINING..
75 %
80 MIN

NextETRUCK

Efficient and affordable Zero Emission logistics through the Next generation of Electric TRUCKs

Project Scope and Objectives

NextETRUCK provides a sustainable solution to bring zero-emission electric medium freight haulage, playing a pioneering role in the decarbonisation of vehicle fleets and accelerating sustainable market replenishment. Research organisations, business strategists, technology companies, vehicle and component manufacturers, and associations work together to advance zero-emission vehicles and ecosystems that are holistic, innovative, affordable, competitive and synergetic.

To achieve its objectives, NextETRUCK will develop three pilot sites in Istanbul (Turkey), Barcelona (Spain) and the United Kingdom. NextETRUCK deploys three demo sites in real-world cases to validate feasibility and superiority to the existing medium freight haulage systems. Each site will demonstrate 200 km of average daily operation for six months.

Project N°: 101056740	**Total budget:** 14 672 510 €	**Coordinator:** René Corbeij TNO rene.corbeij@tno.nl	
Start date: 01.07.2023 **End date:** 31.12.2025	**EU Contribution:** 11 365 811.50 €		

Partners

HORIZON-CL5-2021-D5-01-01

Expected Outcome

The overarching objective of the NextETRUCK project is demonstrate next generation e-mobility concepts consisting of holistic, innovative, affordable, competitive and synergetic zero emission vehicles and ecosystems for tomorrow's medium freight haulage, while aiming significant leap of knowledge at component, vehicle, fleet, infrastructure and ecosystem levels, via innovations at e-powertrain components and architectures, smart charging infrastructure and management, improved thermal design of the cabin, fleet management systems with IoT and digital tools. Therefore, NextETRUCK seeks to:

- Build concepts tailored for regional medium freight haulage with at least a 10% increase in energy efficiency compared to existing highest-end benchmark electric vehicles.
- Develop new fleet management tools and charging infrastructure to reach full electrification in the operation of zero-emission vehicles, safeguarding energy efficiency.
- Prepare concept and infrastructure demonstrators for fast charging.
- Offer new business models to increase end-user acceptance and foster the market uptake of the project solutions.
- Contribute to climate goals, particularly on local air quality.

NOTES

SCAPE

Switching-Cell-Array-based Power Electronics conversion for future electric vehicles

Project Scope and Objectives

In power electronics, the traditional design approach of power converters involves a range of power semiconductor devices with different ratings, optimized to operate at different conditions, where different suitable ancillary circuitry and power circuit topologies are also required. This dispersion in power devices and circuits leads to significant engineering efforts, the inability to take full advantage from scale economies to reduce costs, and the inability to concentrate efforts to improve performance. In the electric vehicle (EV) market, this is translated to a lack of standardization on the EV power conversion system designs across the different models and types of vehicles available, meaning that nowadays EV OEMs invest billions of euros to develop their own solutions.
SCAPE aims at achieving three main objectives:

i) propose a standardisable, modular, and scalable approach, based on multilevel technology, for the design of the EV power conversion systems
ii) develop highly-compact and integrated building-block implementation.
iii) propose intelligent modulation and control strategies, online diagnosis, and digital twin for predictive maintenance with machine learning.

Reaching these objectives will enable reducing the cost of the EV power electronics thanks to scale economies, improving its performance features (reliability, efficiency, power density, etc.), and enabling advanced functionalities. This will allow satisfying the user's needs, increase the acceptance and affordability of zero-emission vehicles, reduce green-house gasses emission, and enable a full-market penetration of the EV. Having this approach adopted by EU automotive manufacturers will allow creating a cost-efficient production chain in the EU based on economies of scale and advanced integration technologies, as a competitive advantage against other manufacturers.

Project N°: 101056781	**Total budget:** 5 999 750 €	**Coordinator:** Àlber Filbà IREC afilba@irec.cat	
Start date: 01.07.2022 **End date:** 30.06.2026	**EU Contribution:** 5 999 750 €		

Partners

IREC – Shaping Energy for a Sustainable Future
CSIC
UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH
UNIMORE – UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA
AVL
TEKNE
deep concept
BAX & COMPANY – VALUE FROM SCIENCE AND TECHNOLOGY
isis – INNOVATION FOR SUSTAINABILITY

Expected Outcome

NOTES

PowerDrive

Power electronics optimisation for next generation electric vehicle components

Project Scope and Objectives

POWERDRIVE is submitted in the framework of Horizon Europe's Cluster 5 "Climate, Energy and Mobility", whose main focus is to "accelerate the twin green and digital transitions and associated transformation of our economy, industry and society to achieve climate neutrality in Europe by 2050".
To comply with the described policy framework and meet the work programme requirements and EU policy goals, POWERDRIVE aims to develop a next-generation, highly efficient, cost-effective, and compact power electronics solution that integrates a portfolio of technologies for multi-objective optimisation of electric powertrains of battery electric vehicles (BEVs). These integrated solutions can be applied to both low and high-performance vehicles, and they will be suitable for diverse types of electric vehicles (EVs).
The main goals related to this overall objective are:

- 28% cost reduction
- 35% loss reduction
- Power densities of around 26.4 kW/kg and 50.3 kW/litre

These targets are related to the Inverters & Onboard charger systems.

Below are the specific objectives of PowerDrive:

1. Optimise components (connectors, semiconductors, magnetics, cooling circuitry, etc.) and converters (traction inverter and OBC)
2. Reduce the overall cost of the advanced power electronics solutions (inverter and OBC) using SiC and GaN components and advanced passive devices
3. Integrate traction inverters and OBC into motors and batteries, respectively
4. Model, simulate, and predict the operation of the advanced power electronics solutions under different load, charging, and real driving profiles to increase its reliability and quality
5. Integrate components and converters in one integrated powertrain platform
6. Test, validate, and demonstrate the developed integrated advanced power electronics solutions implemented in a BEV platform.

Project N°: 101056857	**Total budget:** 5 998 877 €	**Coordinator:** Wilmar Martinez KU Leuven wilmar.martinez@kuleuven.be	
Start date: 01.05.2022 **End date:** 31.10.2025	**EU Contribution:** 5 998 877 €		

Partners

KU LEUVEN Energy Ville · Tampere University · CHALMERS · VOLVO · SMA · infineon · S.C.I.R.E. Scientific Consortium for Industrial Research and Engineering · Trinity College Dublin, The University of Dublin · MathWorks

Expected Outcome

Expected Outcome #1: Cost reduction (affordability)

By successfully achieving the implementation of the ultracompact and integrated SiC inverter, the ultracompact on-board charger and the EV test data, POWERDRIVE will be able to reduce by 25% the costs of power electronics modules, inverters, and chargers and increase the overall affordability of key EV components for mass production.

Expected Outcome #2: Efficiency (range, charging, thermal performance)

POWERDRIVE will handle efficiency as the ratio of the output and input energies over realistic load profiles as well as the charging profile of the battery. Instead of just considering efficiency at the peak power, this innovative approach will consider the effects of light loads and regeneration of kinetic energy for an EV performance insensitive to driving style. A 33% loss reduction will be achieved through the integration and use of extremely low on-resistance semiconductors with sensors and gate drivers, the accurate design of magnetic components, and a proper utilization of heat in the powertrain.

Expected Outcome #3: Size and weight reduction

POWERDRIVE will achieve both volumetric and gravimetric power densities of around 16.4 kW/kg and 24.9 kW/litre through the drastic reduction of magnetic components and cooling systems, which are the largest contributors to size. The extensive integrated power electronics solutions combined with the use of emerging materials will significantly reduce the size and weight of the inverter (by 33%), the OBC (by 42% and 25%), and the whole EV powertrain (by 33% in the set inverter OBC).

Expected Outcome #4: Easier integration in batteries and motors

POWERDRIVE will develop advanced power electronics converter arrangements in the motor drive to assure full integration of the inverter into the EV machines. Two motor arrangements will be explored to evaluate possible inverter integration. As a result, enough knowledge will be acquired to evaluate the integration of on-board charger in 800 V batteries.

Expected Outcome #5: Increased reliability and availability (through simulations & control)

A holistic and accurate model of all power electronics components of the powertrain will be improved and integrated with a wide range of digital twins of semiconductors, magnetic components, and cooling systems. This model will be complemented with innovative model order reduction techniques for easy simulation of power electronics architecture. The reduced model, along with the charging and load profiles, will make possible the lifetime estimation and predictive maintenance of not only the motor and inverter set but also the whole electric powertrain. Therefore, the reliability and availability required for highly efficient operation of EV will be improved.

Expected Outcome #6: Higher quality levels (functionalities and materials)

POWERDRIVE will drastically improve the quality level of different key EV components through the use of new semiconductor materials such as SiC and GaN, the exploration of novel magnetic materials for magnetic components, and the implementation of innovative advanced control techniques and highly integrated solutions. Novel functionalities, such as the integration of real driving profiles and real-time driving profiles in the powertrain operation, will increase the quality level of the EV by optimising its performance and energy consumption.

NOTES

RHODaS

Reinventing High-performance pOwer converters for heavy-Duty electric trAnSport

Project Scope and Objectives

To reduce harmful emissions and protect the environment, organisations and citizens are turning to eco-friendly modes of transportation like electric vehicles. However, the switch to electric vehicles has caused strain on electric grids that are not technically ready for this new reality. The EU-funded RHODaS project will develop an innovative topology of power converters utilising digital technologies and novel semiconductor materials to reduce their overall cost and improve their durability and sustainability. It also plans to use multidisciplinary methods for modular power electronics to develop integrated motor drives, which can be utilised in heavy-duty vehicles and improve their overall sustainability.

Project N°: 101056896	**Total budget:** 5 956 938 €	**Coordinator:** Luis Romeral UPC luis.romeral@upc.edu	
Start date: 01.05.2022 **End date:** 31.10.2025	**EU Contribution:** 5 956 936 €		

Partners

UPC

Kneia

TU WIEN TECHNISCHE UNIVERSITÄT WIEN

AARHUS UNIVERSITY

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

BOSMAL

Valeo Service

Valeo

nvision

Expected Outcome

RHODaS project aims at developing disruptive topologies of power converters using new semiconductor materials as well as cutting-edge digital technologies to improve architecture efficiency, power density, reliability, cost and sustainability. Moreover, multi-disciplinary approaches of modular power electronics for Integrated Motor Drive (IMD) and ecodesign considerations are addressed, to create compact solutions that can be integrated in a wide range and heavy-duty vehicles, enabling these electric vehicles to be more sustainable and autonomous throughout the entire lifecycle of their components. Nevertheless, power electronics solutions that use Wide Band Gap (WBG) devices can also be applied to light-duty vehicle types M and L, with competitive advantages on the efficiency and power densities compared with current technologies. Finally, the RHODaS project targets the validation of the proposed solutions in electric drivetrains of 1200V for zero emissions class N3 (carriage of goods > 12 tonnes) and O4 (trailers >10 Tonnes), which correspond to USA Class 7-8 heavy duty vehicles (>12 Tonnes) and beyond.

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HiPE
High performance power electronics integrations

Project Scope and Objectives

The HiPE project is part of the EU Call "HORIZON-CL5-2021-D5-01-02. Nextgen vehicles: Nextgen EV components: Integration of advanced power electronics and associated controls (2ZERO)" and aims to develop a new family of highly energy efficient, cost-effective, modular, compact and integrated wide bandgap (WBG) power electronics solutions for the next generation of battery electric vehicles (BEVs) and will facilitate a significant market penetration of WBG semiconductors in the automotive sector.
The project pursues the following objectives:

1. Improve the efficiency of integrated WBG-based power electronics (PE) components and systems
2. Reduce the cost of power electronics components and systems
3. Reduce size and weight of power electronics and electric powertrains
4. Increase reliability and dependability through integrated design and intelligent control
5. Implement WBG-based power electronics meeting automotive quality levels

Project N°: 101056760	Total budget: 5 481 273.75 €	Coordinator: Bernhard Brandstätter Virtual Vehicle Research bernhard.brandstätter@v2c2.at	
Start date: 01.11.2022 End date: 31.10.2025	EU Contribution: 5 481 273.75 €		

Partners

virtual vehicle, TENNECO, University of Surrey, nexperia, Marelli, ŠKODA, i&m Ideas&Motion, IESTA, Ford Otosan, Fraunhofer ENAS, AVL, ÚTIA, Technische Universität Ilmenau

Expected Outcome

The project outputs will include:

i) **a scalable and modular family of WBG-based traction inverters** with significantly improved specific cooling performance, suitable for 400V, 800V and 1200V applications, with power ratings from 50 to 250 kW, integrated into electric drives including the high-to-low voltage (HV/LV) DC/DC converters, thus enabling drastic size and weight reductions;

ii) **a family of integrated WBG-based bidirectional on-board chargers (OBCs) and HV/LV DC/DC converters**, with optimised innovative topologies, including use of GaN; and

iii) **integrated, fault-tolerant and cost-effective GaN-based power electronics for high-voltage ancillaries and chassis actuators**

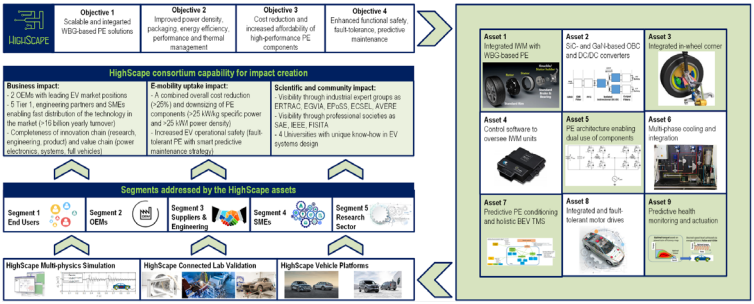
NOTES

HighScape

High efficiency, high power density, cost effective, scalable and modular power electronics and control solutions for electric vehicles

Project Scope and Objectives

Battery electric vehicles (BEVs) are powered entirely by electricity. Since BEVs are not designed like gas-powered vehicles, there is no reason the architecture should be the same. The EU-funded HighScape project will explore the feasibility of a family of highly efficient power electronics components and systems, including integrated traction inverters, onboard chargers, DC/DC converters, and electric drives for auxiliaries and actuators. To pave the way for zero tailpipe emission road mobility, the project will test its proposed solutions on two differently sized BEV prototypes. For instance, the project will introduce new solutions for the auxiliaries and chassis actuators, as well as higher levels of power density, specific power and energy efficiency.



Project N°: 101056824 **Start date:** 01.01.2023 **End date:** 31.12.2025	**Total budget:** 4 589 292.50 € **EU Contribution:** 4 589 291€	**Coordinators:** AVL List Martin Weinzerl martin.weinzerl@avl.com Jasmin Kniewallner jasmin.kniewallner@avl.com

Partners

AVL, TOFAŞ, Audi, elaphe Propulsion Technologies, Universiteit Gent, University of Surrey, BLUWAYS, Technische Universität Ilmenau, Politecnico di Torino, TENNECO, Armengaud Innovate

Expected Outcome

The project will result in:

i) component integration with the incorporation of the WBG traction inverters within the in-wheel machines to achieve zero footprint of the electric powertrain on the sprung mass; the functional integration of the traction inverter with the on-board charger, and the incorporation of the latter and the DC/DC converters within the battery pack; and the implementation of multi-motor and fault-tolerant inverter solutions for the auxiliaries and chassis actuators;

ii) novel solutions, including the implementation of reconfigurable winding topologies of the drive, as well as integrated and predictive thermal management at the vehicle level, with the adoption of phase changing materials within the power electronics components;

iii) the achievement and demonstration of significantly higher levels of power density, specific power and energy efficiency for the resulting power electronics systems and related drives;

iv) major cost reductions thanks to the dual use of parts, subsystem modularity, and model-based design to eliminate overengineering; and

v) increased dependability and reliability of the power electronics systems, enabled by design and intelligent predictive health monitoring algorithms.

Through HighScape, the participants will establish new knowledge and industrial leadership in key digital technologies, and, therefore, directly contribute to Europe's Key Strategic Orientations as well as actively support the transformation towards zero tailpipe emission road mobility (2Zero).

NOTES

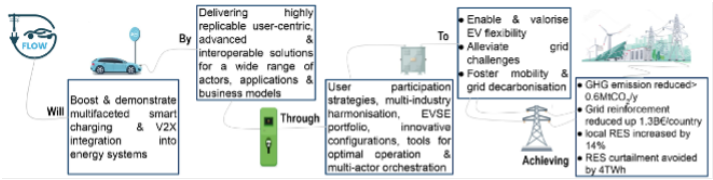
FLOW

Flexible energy systems Leveraging the Optimal integration of EVs deployment Wave

Project Scope and Objectives

FLOW enables and valorizes EV flexibility through user-centric V2X smart charging and orchestrates their integration into energy grids to provide flexibility assets to enhance penetration of renewables and alleviate grid challenges. FLOW has 30 partners from across 9 countries and covers the entire value chain: OEM, tech. providers, CPOs, aggregators, DSOs, TSO, ICT developers, RTOs with expertise in users, mobility, optimisation tools, energy integration. FLOW aims to achieve the following objectives:

- Create and validate user-centric smart charging EV experiences
- Promote harmonisation, standardisation and interoperability
- Improve and validate a portfolio of EV smart charging technologies and strategies
- Deliver advanced tools for planning, design & operation of integrated charging solutions
- Enhance EV flexibility by improved orchestration across actors.
- Demonstrate and validate solutions in 3 demonstrations and 2 testbeds.
- Boost Replication and scalability of EV/EVSE



Project N°: 101056730

Start date: 01.01.2022
End date: 31.06.2026

Total budget:
9 873 630 €

EU Contribution:
9 873 630 €

Coordinator:
Josh Eichman
IREC
jeichman@irec.cat

Partners

IREC, Acea energia, AVERE The European Association for Electromobility, BMW, DTU, EATON, E.DSO, e-distribuzione, e-distribución, enel, enel x, endesa x, enel x way, endesa x way, eng, heliox power products, Maynooth University National University of Ireland Maynooth, R2M Research to Market Solution, RWTH Aachen University, Spirii, Technische Universität Chemnitz, Terna Driving Energy, TU Delft Delft University of Technology, UCD Dublin, RSE we move research, gridspertise

Expected Outcome

Outcomes for FLOW focus on comprehensively validating user experiences in various use cases, including user interaction with EVs and charging interfaces, user acceptance of solutions, and participation in smart charging programs through testing and deployment in 3 demos in Rome, Menorca and Copenhagen and 2 testbeds in Dublin and Prague. FLOW also examines EV users' satisfaction with services, reward/penalty structures, and their ability to switch between technology and service providers. Additionally, FLOW focuses on ensuring interoperability compliance, exploring distributed data governance and architectures. Grid integration is optimized through controllability and connection with renewable energy sources (RES) and energy storage systems (ESS), resulting in increased aggregated EV power and energy available for flexibility services. FLOW aims to enhance overall EV energy flexibility aggregation through smart and bidirectional charging (V2X), with an emphasis on forecasting accuracy and quantifying multiple benefits for deployment scenarios. V2X control and optimization functionalities are incorporated into energy management systems (EMS), aiming to increase the flexibility of bidirectional charging systems through scalable V2X charging. By managing grid/user charge power imports, the project seeks to reduce congestion, balancing, and reinforcement issues while maximizing user satisfaction, revenues, and savings. It also seeks to streamline communication between stakeholders through the devleopment of an orchestrator, which facilitates data sharing, leveraging Equigy's Crowd Balancing Platform. This supports the ability to provide grid services transparently via certified mechanisms. Demonstrating functionalities and integrating solutions are key project objectives, aiming to maximize EV flexibility service provisions and alleviate grid challenges such as balancing and congestion. The project emphasizes coordination and integration, offering multiple benefits for users, mobility, energy, and grid stakeholders. Beyond the completion of FLOW, exploitation and replication plans are outlined, along with regulatory recommendations and the definition of pricing schemes and incentives for different scenarios. Through these efforts, the project seeks to advance smart charging, enhance grid flexibility, and promote sustainable mobility solutions.

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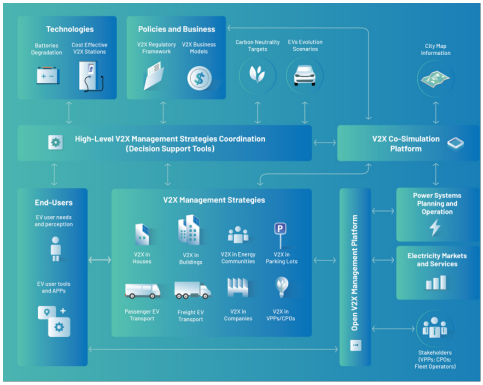
EV4EU

Electric Vehicles Management for Carbon neutrality in Europe

Project Scope and Objectives

EV4EU accelerates EV adoption in Europe via V2X strategies to minimize battery impact and improve power systems management. It tests V2X, evaluates tech, and develops tools, aiming to propose new EV services, demand response programs, and supportive regulations.



Project N°: 101056765 **Start date:** 01.06.2022 **End date:** 30.11.2025	**Total budget:** 8 989 682 € **EU Contribution:** 8 989 682 €	**Coordinator:** Hugo Morais INESC ID hugo.morais@tecnico.ulisboa.pt	

Partners

Participant Partners

Associated Partners

Expected Outcome

- User-centric V2X for EV deployment
- Battery, system, user impact evaluation
- V2X tests in cities
- EV user tools/apps development
- Interoperable, private open platform
- Grid, infrastructure co-simulation tool
- EV adoption services, policies
- Scalability, resilience focus
- Smart charging, V2X real-world evaluation
- VPP market, services demo
- Public charge infrastructure testing
- Autonomous, V1G/V2X charging study

NOTES

SCALE
Smart Charging ALignment Europe

Project Scope and Objectives

SCALE is a three-year project (2022-2025) co-funded by the new Horizon Europe Programme with a budget of around 10 million EUR. It aims to advance smart charging infrastructure and facilitate the mass deployment of electric vehicles. The project will reduce uncertainties around the roll-out of smart charging, interoperable and V2X (Vehicle-to-Everything) solutions, whether these are technical, organizational, economic, social or policy-related, and help shape a new energy eco-system wherein the flexibility of EV batteries' is harnessed. A consortium of 29 partners composed of leading European cities, universities and knowledge partners, charging infrastructure companies, electric vehicle (EV) industry pioneers and more will steer the project.

1. To develop an open system architecture by 2023 for smart charging & V2X which ensures interoperability, connectivity, openness of the system and fair market conditions. An architecture resulting in at least 30 innovations during the project (number of new technologies, products, standards, protocols, software and services being developed.
2. To deploy a user-centric approach, systematically collecting knowledge, removing existing acceptance barriers and developing solutions in line with 800 users directly involved in SCALE pilots.
3. To reduce the need for grid reinforcement by a minimum of 50%, leveraging the existing grid better and thereby limiting time-to-market in quality & quantity to ensure a timely transformation.
4. To prepare a mass-market and eco-system for smart charging & V2X paving the road for Fit-for55 ambitions, ensuring all newly procured chargers are V2X-enabled from 2025 onwards.
5. To create the necessary momentum across Europe and maximise exploitation, securing impact beyond the project lifetime through SCALE's V2X Alliance incl. 50 committed members and mobilise a total of at least 150 organisations through the networks of the SCALE partners

Project N°: 101056874	**Total budget:** 9 991 611 €	**Coordinator:** Baerte de Brey, ElaadNL, baerte.de.brey@elaad.nl	
Start date: 01.06.2022 **End date:** 01.06.2025	**EU Contribution:** 9 991 611 €		

Partners

OEMs

E-mobility fleet & Software

Research & knowledge institutes

Cities & associations

DSOs & TSOs

Expected Outcome

The project's methodology follows clear and logical steps:

1. Assess EV users and stakeholder needs through indepth interviews, expert sessions, and case pilots
2. Ensure system interoperability, transparency and openness through an Open Architecture (open standards in IT communication)
3. Test and validate the solutions through innovative V2X solutions in 13 real-life use cases structured in 4 Innovation Clusters
4. Scale-up and prepare for mass-deployment in Europe through standardization of smart charging and V2x, joint procurement and building momentum

This is tested in four use cases:

Vehicle to home: two use cases in Greater Munich Area are testing smart home charging to enhance usability for end users, optimise renewable energy usage and reduce the pressure on the grid.

Vehicle to Business: uses cases in Debrecen & Budapest, Toulouse, and Gothenburg are looking at smart V2X charging solutions for office buildings that tap into the advantages of these spaces' centralised charging control, long stationary times and EV penetration in companies' fleets.

Vehicle to Depot: uses cases Oslo, Eindhoven, Utrecht and Rotterdam are implementing charging solutions with local battery storage for heavy-duty batteries, increasing charging speed without costly grid reinforcement and while utilizing renewable energy.

Vehicle to Public: use cases in Oslo, Utrecht and several locations in Hungary are testing smart public charging and V2X ecosystems to help municipalities and car park operators manage energy demand, alleviate local congestion and help reduce peak loads. Utrecht's use case is part of all four clusters: it is set-up to prove the potentials of scaled-up V2X services through a bi-directional ecosystem.

NOTES

XL-CONNECT

Large scale system approach for advanced charging solutions

Project Scope and Objectives

The overall project objective is to optimize the entire charging chain - from energy provision to the end user - to create a clear benefit for all stakeholders. Therefore, a ubiquitous on-demand charging solution based on an optimized charging network considering human, technical and economic factors along the entire charging chain shall be developed.

The investigation of the user behavior as well as the analysis of the energy system and grid will form the basis from a research side, to predict the future behavior of EV owners and fleet operators as well as possible shortcomings in the electric grid and energy system.
The development of advanced charging technologies and control mechanisms as well as advanced charging and sector coupling concepts, will form the basis for the virtual and real evalulations/demonstrations conducted in 4 different European countries (Belgium, Germany, Italy, Portugal). In parallel a smart charging simulation environment (digital twin of the charging chain with a holistic simulation environment with multilevel component models and representative information flow between all agents) will be built up. This digital twin will incorporate the results of the demonstration actions and enable an upscaling to show the impact of these technologies. To ensure the interoperability and the optimization along this charging chain, the consortium comprises all relevant partners/stakeholders (energy providers, grid operators, charge point operator, EV equipment providers as well as vehicle manufacturer).

Project N°: 101056756	**Total budget:** 8 387 622.25 €	**Coordinator:** Alois Steiner Virtual Vehicle Research alois.steiner@v2c2.at	
Start date: 01.01.2023 **End date:** 30.06.2026	**EU Contribution:** 8 387 620 €		

Partners

virtual vehicle · Università degli Studi Firenze · IFP Energies nouvelles · ABEE · Applus IDIADA · RICARDO · UNIRESEARCH · FEV · FEV test systems · eurecat · RWTH Aachen University · AIT Austrian Institute of Technology · mycroftmind member of TTC group · Regionetz · STAWAG · EWV · ABB · University of West Bohemia · E-REDES · dccs · NEUMAN ALUMINIUM · circontrol · BMW · estra

Expected Outcome

The project will study how people use electric vehicles and analyze the energy system and power grid to understand how they will behave in the future. This research will help predict the actions of electric vehicle owners and companies that use electric vehicle fleets. It will also identify any problems or weaknesses in the electric grid and energy system.

The expected outcomes and results are:

Innovative technologies and control mechanisms for smart and bidirectional charging:

- Optimizing the needs of EV-users, buildings and the grid

Optimal smart charging and sector coupling concepts with:

- Optimal user satisfaction
- Scalability from small to large number of vehicles
- Efficient use of local and grid resources, providing more than 50% reduction of energy exchange with the grid
- Maximized benefits for all stakeholders

New services with:

- Improved user experience for EV owners and fleet operators (localization, booking, payment and billing)
- Open architecture for smart and bidirectional charging solutions

Operational and economical models with:

- Optimal user satisfaction for all stakeholders
- All economic elements included; energy prices (local and grid), use of infrastructure, degradation & depreciation of local storage (battery)
- Integral planning processes, cross sectoral benefits

Demonstrate, evaluate and lower barriers for implementation

- Demonstration action in 4 European countries (Belgium, Germany, Italy, Portugal)
- LCA, social and social-economic impact
- Assessment of data collection/exchange and management for smart and bidirectional charging

Upscaling Use of Digital Twin

- Quantitative parametric and probabilistic models for assessing the impact and progressive, massive EV penetration on the electricity system as well as on vehicles (battery degradation etc.)
- Framework for use of personal data

NOTES

DriVe2X

Delivering Renewal and Innovation to mass Vehicle Electrification enabled by V2X technologies

DRIVE2X

Project Scope and Objectives

Electric vehicle (EV) owners will be able to power their homes and use their car as a backup power source. This will all be possible thanks to vehicle-to-everything (V2X) technology. It allows for the bidirectional transfer of energy between EVs, the grid, homes or buildings. In this context, the EU-funded DriVe2X project will advance the deployment of V2X solutions. Specifically, it will focus on developing new knowledge, models and technologies to support the deployment of EVs. It will also implement AI techniques for smart charging and trading of V2X flexibility. The project will develop next-generation slow, lower-cost bidirectional charger units. The overall goal is for DriVe2X to accelerate the uptake of V2X by advancing knowledge, technology and policy tools.
DriVe2X's overall objective is to contribute to accelerate the uptake of V2X by

i) deepening the state-of-the-art knowledge on this nascent field,
ii) developing new V2X technologies and solutions suitable to mass EV deployment and
iii) producing policy tools and insights in support of relevant decision makers.

DriVe2X will advance state-of-the-art in V2X flexibility markets by establishing novel retailed marketplace, V2X charger technology by making them smarter, more efficient, cheaper and compact, the social side of V2X by providing empirical patterns and V2X upside studies by developing mass-deployment scenarios and roll-out strategies.

Project N°: 101056934	Total budget: 9 204 544.93 €	Coordinator: Goncalo Mendes Lappeenrannan-Lahden Teknillinen Yliopisto Lut goncalo.mendes@lut.fi	
Start date: 01.01.2023 End date: 31.12.2026	EU Contribution: 9 204 541 €		

Partners

LUT University
edp NEW
ENGINEERING
TNO
DLR
technische universität dortmund
tecnalia
PRE
TU Delft
ICONS
eMOTION Srl
ASM TERNI S.p.A.
Gemeente Amsterdam
ANA Aeroportos de Portugal
Future Isle of Wight
NTU Nottingham Trent University

Expected Outcome

This multidisciplinary four year project aims to establish a solid scientific base and stakeholder awareness for mass deployment V2X solutions. DriVe2X will develop new knowledge, tools, models, and technologies to cope with a V2X-based mass EV deployment in future. It will study and consolidate the understanding on the behavioural uncertainties linked to V2X and develop policy tools to support increasingly complex decisions on V2X roll-out in European smart cities. DriVe2X will implement advanced artificial intelligence techniques that efficiently capture the flexible energy potential from smart charging in building parking lots, homes, and charging stations, and match it with the distribution networks's localized needs in order to research dynamic marketplaces for exchanging and trading V2X flexibility locally. DriVe2X will develop next-generation slow, lower-cost bidirectional charger units (from TRL3 to TRL7), that will be tested under different use cases in five demonstrators. DriVe2X embrace the EV user's perceptions and expectations as critical success factors in V2X uptake and upscaling to a mass deployment future. Thus, DriVe2X innovates by inquiring and eliciting the social determinants of V2X, explicitly including it in the development of novel V2X technologies, tools and solutions.

NOTES

TransSensus LCA

Towards a European-wide harmonised transport-specific LCA

Project Scope and Objectives

For the transformation of our transport system towards climate-neutrality, the reliable and comparable assessment of the environmental footprint of different solutions and technologies becomes essential. Although all stakeholders already recognise the importance of life cycle assessment, the transport sector is still struggling to adopt LCA approaches. Among others, standardised and comparable results are still lacking due to limitations in accessing and managing real-life data or applying non-harmonised, non-coherent methods, tools and system boundaries, to name some. Within this context, considering upcoming technologies leveraging emission reduction strategies, circular economy targets as well as social aspects poses significant challenges for making the best choice in terms of sustainability as an integral part of product development and mobility solutions.

Consequently, the CSA TranSensus LCA aims to pave the way towards a commonly accepted and applied single LCA approach for zero-emission road transport. The conceptual framework for such a transport-specific LCA will be developed within the project by uptaking and refining the known SotA based on a Needs & Gaps analysis, by building on relevant past and ongoing activities (projects, working groups of associations or networks, standardisation efforts, …). These insights will be merged into one consistent approach considering environmental, economic and social aspects. Where open gaps are identified, recommendations and processes will be derived to remove them. Furthermore, key elements for implementing a single LCA approach and framework at the European level will be described and tested. As such, TranSensus LCA will provide the needed framework to implement and conduct a consistent and comparable assessment of the environmental footprint over the lifetime.

Project N°: 101056715	**Total budget:** 3 675 176,25 €	**Coordinators:** Thilo Bein & Felipe Cerdas	
Start date: 01.01.2023 **End date:** 30.06.2025	**EU Contribution:** 3 675 176,25 €	Fraunhofer LBF & IST info@lca4transport.eu	

Partners

Fraunhofer, BMW, brgm, cea, EDF, Ghent University, Universiteit Leiden, northvolt, Groupe Renault, Ricardo, RWTH Aachen University, Scania, sphera, ivl Swedish Environmental Research Institute, Technische Universität Braunschweig, université de Bordeaux, Volkswagen Aktiengesellschaft, umicore, Valeo, ST life.augmented

Expected Outcome

The results of TranSensus LCA will include: (i) consensus across all key stakeholders for a harmonised, robust, transparent, single life-cycle approach for ZEV and batteries; (ii) recommended guidelines for the appropriate application of the approach; (iii) applicability of the approach for use in other markets; and (iv) a roadmap for implementation of the recommended guidelines in standardisation bodies.
In detail

- a baseline for a European-wide, harmonised, commonly accepted and applied single LCA approach for a zero-emission road transport system (Consensus amongst relevant stakeholders from research and industry)
- roadmap for implementation of the harmonised life-cycle approach
- guidelines for applying the harmonised life-cycle approach
- recommendations on elements that should be harmonised also with LCC (life-cycle cost)/TCO (total cost of ownership) assessments
- recommendations for alignment / extension to non-ZE road transport and other relevant transport modes will be provided.

The results of TranSensus LCA will contribute to transforming road transport to zero-emission mobility. Among others, a consensus on an evidence-based, transparent single European-wide approach for assessing environmental impacts enables an efficient information of a product sustainability (better consumer information and outline of benefits) lowering the threshold for consumers to choose zero-emission mobility solutions and offering an objective comparison of potential choices. Furthermore, consensus on a transparent, comparable and evidence-based single LCA approach embracing environmental, economic and social aspects encourage industry to implement the assessment in early stages of product development. Thus, industry becomes better able to provide more sustainable and mobility scenario optimised products with lower TCO. A lower TCO leads also to a increased user acceptance and accelerated uptake of zero-emission solutions.

NOTES

ZEFES

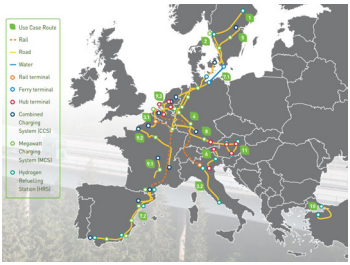
Zero Emissions flexible vehicle platforms with modular powertrains serving the long-haul Freight Eco System

Project Scope and Objectives

The use of zero tailpipe emission vehicles for long-distance heavy-duty freight transport is an important pathway towards achieving the targets set out by the EU to be climate-neutral by 2050. In this project, such vehicles are Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FCEVs). The share of BEVs and FCEVs in the HD transport will increase rapidly, giving a share of roughly 25% in 2030. However, the current vehicles have challenges regarding range, available payload, charging/refuelling possibilities, and energy/fuel costs. On those fronts, the current BEV and FCEV are not compatible with the traditional ICE vehicles.

In the ZEFES project, OEMs, suppliers, logistic companies, and research partners will work together towards the overall goal of ZEVs for long distance heavy-duty freight transport, by focussing on efficiency improvements, mass production capabilities and demonstrating the use of the technology in daily operations. There will be 15 different Use Cases along the TEN-T corridor, where 9 vehicle configurations (BEV and FCEV) will transport different types of freight throughout Europe. The main objectives are to:

- Improve modular Heavy Duty (HD) Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FCEVs)
- Demonstrate an interoperable Megawatt Charging System (MCS) and the location deployment strategy for hydrogen refuelling stations (HRS)
- Provide digital and fleet management tools specifically for HD ZEVs, fleet integration with remote operational optimisation of vehicle performance
- Demonstrate missions on national and cross-border, TEN-T corridors, fulfilling the requirements for range and payload, and comparing the deployability of BEVs and FCEVs for different mission profiles
- Define pathways for a significant price reduction and volume increase
- Analyse the impact on business, society and energy efficiency



Project N°: 101095856

Start date: 01.01.2023
End date: 30.06.2026

Total budget: 35 479 157.50 €

EU Contribution: 23 195 078 €

Coordinator:
Prof. dr. Omar Hegazy
Vrije Universiteit Brussel
omar.hegazy@vub.be

Partners

VUB Vrije Universiteit Brussel · Ford Otosan · Kässbohrer · Renault Trucks · Scania · Volvo · Eck · ABB · AVL · Carburos Metalicos Grupo Air Products · Air Products · Michelin · Plastic Omnium · Ricardo · Uniresearch · ZF · alice Alliance for Logistics Innovation through Collaboration in Europe · dpd · Colruyt Group · Gruber Logistics · Gebrüder Weiss · P&G · PrimaFrio · PTV Group · Fraunhofer IVI · HAN University of Applied Sciences · Applus IDIADA · TNO · UIC International Union of Railways · CFL multimodal · Sesé Group · Hitachi Energy · IRU

Expected Outcome

Demonstration of high efficiency, long-haul Heavy-Duty Vehicle (HDV) powertrains for truck-trailer combinations, capable of 750 km range (without recharging nor refuelling) whilst operating at a minimum of 40 tons GVW under operational conditions comparable to the VECTO long haul mission profile. ZEFES will demonstrate the improvements in energy and thermal management systems, including HVAC, of HD BEV and FCEV. It will also show improvements in inverter and DC/DC convertor technologies, in-axle motor concepts, as well as a variety of distributed powertrains. This will all result in a higher efficiency thus a lower energy use per ton-kilometre cargo.

Demonstrators will cover long haul missions of at least 6 months, covering daily routes between 500 and 1300 km, with an overall average of 800 km per day. For each demonstration there is a logistic party involved, transporting varying cargo. The ZE vehicles replace vehicles that currently use fossil fuels. The demonstrations enable an extensive data collection over a period of 15 months and over more than 1 million kilometres. The mapping of charging/refuelling stations will be investigated together with the **AEVETO cluster**.

The project demonstrates 9 vehicle combinations on various multi-modal corridors, using rail and ferry, charging and filling wherever it is strategically necessary in line with drive and resting time regulation, EC561/2006. ZEFES is, on purpose, showing a broad coverage of different logistics sectors and routes though Europe.
Demonstrations have specifically been designed for their potential impacts on the

1. Effect on costs (diesel costs, energy costs, cost/tkm cargo)
2. Effects on on-time delivery
3. Charging at terminals and trailers on trains and vehicles on ferries.

Developing a digital twin (DT) platform will include DT of the trucks and infrastructure, with digital tools becoming available in all phases: during development, testing and operation. The tools can improve the vehicle's design and optimize their usage. The models also show the recharge/refuel infrastructure, so that charging/refuelling can be planned as optimally as possible. The tools help for the maintenance and integration in fleets of ZEV. In addition, tools will optimize assignments, intelligent routing and road access optimization. ZEFES delivers the following specific tools for ZEVs: co-design tool for the rightsizing of modular vehicles and their components, tools based on DTs to (remotely) optimize the performance of the vehicles, to optimize the routing and charging and to perform predictive maintenance.

Pathways are created in ZEFES that show the steps for the cost / price reduction of components and the total vehicle towards the production of 10,000 units per year, which can be achieved due to the help of the modularity and standardisation of components in the project. This provides insight into in which year the total cost of operation of ZEV will be equal to 2020 engine-based solutions.

NOTES

EMPOWER

Eco-operated, Modular, highly efficient, and flexible multi-POWERtrain for long-haul heavy-duty vehicles

Project Scope and Objectives

EMPOWER addresses in full the expected outcome and scope of the HORIZON-CL5-2022-D5-01-08 topic by delivering two flexible, modular, and scalable zero-emission heavy-duty vehicles (ZE HDV) belonging to the VECTO vehicle group 9 (6×2 rigid trucks), with a gross vehicle weight equal or above 40 tons. One vehicle is powered by a Fuel Cell (FC) system and has a driving range of 750 km, while the other is powered by a battery-electric powertrain, and has a driving range of 400 km. Both vehicles will be delivered at TRL 8 by the end of the project (end of 2026) and are expected to approach the market by 2029. Within its technical activities, EMPOWER will:

- design, implement and deliver technology bricks: a modular vehicle system architecture, a modular low-voltage E/E architecture, a FC system with high reliability and extended operational lifetime with a modular energy storage, a highly efficient e-axle, an optimised thermal- and energy management, an optimised HVAC system featuring CO_2 as refrigerant and infrared heating panels, an electrified distributed braking system, digital twin models of the demonstrators, an innovative Human Vehicle Interface for optimised control of the vehicle systems, featuring Vehicle-to-Grid communication and eco-routing, a fleet management system for the integration of ZE HDV into the fleet, an overall LCA and TCO assessment, and the operation of a green hydrogen infrastructure for ZE HDV.
- demonstrate the driving range and real-world operation performance of the two ZE HDV in five different long-haul and regional distribution use-cases, including cross-border corridors between different European member states.

Project N°: 101096028	**Total budget:** 26 940 811,09 €	**Coordinator:** Dragan Simic AIT Austrian Institute of Technology dragan.simic@ait.ac.at	
Start date: 01.01.2023 **End date:** 31.12.2026	**EU Contribution:** 18 052 313 €		

Partners

AIT Austrian Institute of Technology – Tomorrow Today
IVECO GROUP
ifp Energies nouvelles
Politecnico di Torino – Department of Energy "G.Ferraris"
LEAD TECH – Integrated Logistic Support
Villinger research & development
cidetec energy storage
ctengineering
GRUBER LOGISTICS
brembo
H2 South Tyrol
Air Liquide
FPT Powertrain Technologies

Expected Outcome

AREA I - Component Design and Modularity
EMPOWER addresses multiple areas, including modular vehicle and low voltage E/E architectures, reliable FC systems with modular energy storage, efficient e-axles, optimized thermal and energy management, advanced HVAC systems, electrified braking, and digital twin models. The modular approach allows for scalability across different vehicle platforms.

AREA II - Integration and Infrastructure
EMPOWER encompasses an innovative Human Vehicle Interface with Vehicle-to-Grid communication and ecorouting capabilities, a fleet management system for seamless integration of ZE HDVs, an overall LCA and TCO assessment, and the operation of a green hydrogen infrastructure for the cross-border demonstration of long-haul ZE HDVs in Europe.

AREA III - Demonstration
EMPOWER Demonstration consists of two stages. Stage 1 demonstrates the maximum driving ranges of the FCEV (750 km) and BEV (400 km) on the Balocco Proving Ground in Italy. In Stage 2, a six-month conclusive demonstration takes place, involving real-world use cases, such as long-haul operations for customers like Barilla and Electrolux, as well as transportation between IVECO's manufacturing sites and logistic hubs.

NOTES

ESCALATE

Powering European Union Net Zero Future by Escalating Zero Emission HDVs and Logistic Intelligence

Project Scope and Objectives

Heavy-duty vehicles account for about 25% of EU road transport CO_2 emissions and about 6% of total EU emissions. Following the European 2050 goals, ESCALATE aims to demonstrate high efficiency z(0)HDV(1) powertrains for long-haul applications that will provide a range of +750 km without refueling/recharging and cover at least 500 km average daily operation (6+ months) in real conditions. Its main objectives are:

- Development and demonstration of ground-breaking high-efficiency long-haul b-HDV(2), f-HDV(3) and r-HDV(4) at a minimum GVW of 40t with +750km unrefueled/uncharged range under real-world operational conditions.
- Development and demonstration of cost-effective standardized modular electric multi-powertrains in real-world conditions for a minimum 500 km daily operation under full load for 6 months.
- Development and demonstration of connected grid-friendly (multi) energy fast charging concepts and solutions
- Seamless integration and fluid operation of Zero-emission HDV fleets both en-route (TEN-T and highway hubs) and in the storage depots/logistics hubs.
- Development of 4 Trustworthy Modular Digital Twins of demonstrator vehicles for early identification and assessment of "Innovations True Value" (impact assessment+ valuation) in the context of 2Zero targets, continuous optimization and LCA.
- Global Leadership for European Automotive, Logistics, and Infrastructure & Powering EU Absolute Zero Future through.

HDV(1) : Heavy Duty Vehicles b : Battery (2), f : Fuel cell (3) r : range extender (4)
z (0) for all battery and Fuel cell

Project N°: 101096598

Start date: 01.01.2023
End date: 30.06.2026

Total budget:
22 401 515 €

EU Contribution:
16 594 389 €

Coordinators:
Servais Ouenou Gamo – FEV
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Scientist and Technical Coordinator: Ahu Ece Hartavi Karcia – Surrey University
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Partners

HORIZON-CL5-2022-D5-01-08

Expected Outcome

ESCALATE technologies are implemented on 5 pilots and expected outcomes are:

Demonstration and validation of zHDVs in a range of +750km for the high operational flexible VECTO 5, 9,10,12 for 5 cross border pilots including battery-HDVs and fuel cell-HDVs, and range extender HDVs covering the different challenges of fleet operations. This will also show:

- Modularity and standardization of multi-powertrain technologies for b-HDVs with novel thermal management, standardized modular battery packs, e-powertrain interfaces, with advanced cooling and packaging and advanced control and on-board energy management techniques.
- Improved road-legal next-generation fuel-cell modules with modular mechanical and electrical interfaces and advanced TMS for 4 different VECTO groups for improving the longer range and cleaner cruise of f-HDVs.
- A holistic modelling of the powertrain solution stack based on CAE calculations and Digital Twin based simulations to increase the energy density and overall efficiency and reduce cabin noise.

The 5 zHDVs pilots developed trucks of ESCALATE project will be demonstrated over a period of at least 6 months covering the different weather and terrain conditions, urban-highway crossings and addressing the requirements of mix-fleet operations covering at least 500 km average daily operation. This will be use-cases of specific component dimensioning (FC, Battery, EDU, Transmission, ...) reaching the goal on high-power Megawatt charging and Hydrogen high speed refueling infrastructures that will improve the long-haul fleets in terms of operational efficiency and time.

Provide fleet managers with tools as:

- Smart fleet management on demand prediction and energy optimization with AI integrated.
- Fleet Manager, strengthened with secure connectivity of zHDVs with infrastructures, for mission profiling for efficient and cost-optimized usage of different vehicle types for supporting the seamless integration of zero tailpipe emissions vehicles.
- Predictive maintenance tools using AI algorithms.

Contribute to the price reduction steps by

- Proposing a system design optimization for resource efficiency and enhanced life cycle through LCA studies to achieve climate neutrality as mentioned in 2Zero targets.
- Computations to valorise the effect of innovations in 5 pilots through the assessment of "Innovation True Value" in terms of time, cost efficiency, effectiveness, eco-friendliness, long-term sustainability, and optimisation in line with LCA, LCCA, and S-LCA.

NOTES

EM-TECH

Innovative e-motor technologies covering e-axles and e-corners vehicle architectures for high-efficient and sustainable e-mobility

EM-TECH

Project Scope and Objectives

As electric machine technology emerges, new technologies can provide innovative solutions for the electric car sector. The EU-funded EM-TECH project will develop innovative electric machine technology solutions for automotive traction. The project will focus on passenger car and van applications to provide competitive costs and significant reduction of motor energy loss during vehicle operation, and to decrease the rare earth content, including implementing magnet recycling solutions. The solutions will include innovative direct and active cooling designs, virtual sensing functionalities, enhanced machine control, electric gearing and digital twin-based optimisation. They will feature embedded systematic consideration of life cycle analysis and life cycle costing aspects right from the early design stages.

Project N°: 101096083	**Total budget:** 3 834 550 €	**Coordinators:** AVL List Martin Weinzerl martin.weinzerl@avl.com Jasmin Kniewallner jasmin.kniewallner@avl.com	
Start date: 01.01.2023 **End date:** 31.12.2025	**EU Contribution:** 3 834 550 €		

Partners

AVL

ARMENGAUD INNOVATE

elaphe Propulsion Technologies

IAAPS ADVANCING PROPULSION

i&m Ideas&Motion

Politecnico di Torino

TECHNISCHE UNIVERSITÄT ILMENAU

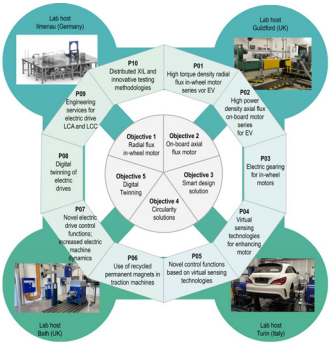
UNIVERSITY OF BATH

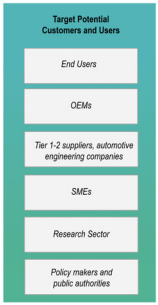
UNIVERSITY OF SURREY

UrbanGold recycling for a green future

VAIONIC

Expected Outcome





EM-TECH brings together 10 participants from industry and academia to develop novel solutions to push the boundaries of electric machine technology for automotive traction, through: (i) innovative direct and active cooling designs; (ii) virtual sensing functionalities for the high-fidelity real-time estimation of the operating condition of the machine; iii) enhanced machine control, bringing reduced design and operating conservativeness enabled by (ii); (iv) electric gearing to provide enhanced operational flexibility and energy efficiency; (v) digital twin based optimisation, embedding systematic consideration of Life Cycle Analysis and Life Cycle Costing aspects since the early design stages; and (vi) adoption of recycled permanent magnets and circularity solutions.

The proposed innovations will be implemented in new series of radial flux direct drive in-wheel motors characterized by so far unexplored levels of torque density (>150 Nm/litre, >50 Nm/kg), and on-board single stator double rotor type ironless axial flux machines providing power density and specific power levels in excess of 30 kW/litre and 10 kW/kg. The solutions will address both passenger car and van applications (continuous power levels of 50 kW - 120 kW), providing competitive costs (<6 Euro/kW for a production of 100000 units/year), and leading to significant reduction of motor energy loss during real vehicle operation (>25%), and to >60% decrease of the rare earth content, including implementation of magnet recycling solutions.
EM-TECH obtained the support of several car makers (AUDI AG and Changan UK R&D Centre Ltd) as well as a Tier 1 supplier (PUNCH Turino S.p.A.), which will strengthen the exploitation strategy.

NOTES

MAXIMA

Modular AXIal flux Motor for Automotive

Project Scope and Objectives

The MAXIMA project aims to create a comprehensive methodology for designing and producing electrical machines tailored for the automotive core market. This methodology addresses diverse challenges, including efficiency, cost reduction, high power/torque density, and recyclability of critical raw materials. By focusing on the innovative Axial Flux Synchronous Machine (AFSM) topology, MAXIMA strives to unlock new opportunities and improve existing options in terms of topologies and materials.

Currently, Axial Flux Synchronous Machines are known for their efficiency, but they remain limited to niche markets due to high manufacturing costs. The MAXIMA project will optimize the design and manufacturing/recycling processes to enhance the performance and cost-effectiveness of AFSM. This ambitious endeavor will pave the way for higher-performing and more affordable electrical machines while minimizing their environmental impact.

MAXIMA's Goals:

- Prototype Design: Developing two prototypes within the power range of 60 kW - 120 kW, designed to be adaptable to various markets and founded on a modular conceptual framework.
- Power & torque densities: Triving for peak performance metrics of over 23 kW/litre, 7 kW/kg, 50 Nm/litre, and 20 Nm/kg to enhance power and torque densities.
- Reduced losses*: Aiming for a 20% reduction in energy consumption during vehicle operation to enhance overall energy efficiency.
- Resource Optimization*: Striving for a 60% reduction in the use of scarce resources to minimize our environmental footprint.
- Cost-effective mass production: Striving for a unit cost below €6/kW for a production scale of 100,000 units per year, aiming to facilitate widespread Electric Vehicle adoption.
- High recyclability: Pursuing a goal of achieving over 60% recyclability for Critical Raw Materials, surpassing the automotive state of the art in 2020, to promote resource conservation.
- Ecodesign framework: Articulating best practices for evaluating and mitigating environmental impacts, fostering a commitment to sustainability.

**Percentages are relative to the automotive state of the art in 2020.*

Project N°: 101096097	**Total budget:** 5 824 495 €	**Coordinator:** Stéphane Clénet Arts et Métiers-Institute of Technology stephane.clenet@ensam.eu	
Start date: 01.02.2023 **End date:** 31.01.2027	**EU Contribution:** 5 484 542.25 €		

Partners

Arts et Métiers Sciences et Technologies · Technical University of Cluj-Napoca Romania · CTTC Centre Tecnològic de Transferència de Calor Universitat Politècnica de Catalunya · CITCEA · EMOTORS · feuga fundación empresa universidad gallega · Höganäs · mimplus · ocas ArcelorMittal · MULTI PHYSICS · STELLANTIS · Université de Lille · VUB · EVERGI RESEARCH GROUP

Expected Outcome

At the conclusion of the MAXIMA project, significant advancements will be realized. TRL5 prototypes will be developed, showcasing the capabilities of AFSM technology. Moreover, the project will provide a validated methodology that accelerates electrical machines design, reducing time to market and fostering faster electric vehicles adoption. Additionally, cutting-edge technologies like digital twins will empower optimal operation, to optimize performance and efficiency.

Axial Flux Synchronous Machine. The goal of MAXIMA is to create an affordable and adaptable axial flux electric machine for the automotive industry that offers enhanced performance, incorporates strategies to reduce the use of critical rare earth metals, and has minimal environmental impact.

Multiphysics and digital twin. To enhance performance, an innovative multiphysics design process will be employed, incorporating novel thermal management concepts. Furthermore, a Digital Twin will be constructed, to facilitate the development of an optimal control strategy for operating the electrical machine at its maximum potential. To minimize costs, the electrical machine and its manufacturing process flow will be jointly designed.

Life Cycle Assessment. The end-of-life considerations for the electrical machine, including the recycling of rare earth metals used in permanent magnets, will be thoroughly examined. The Life Cycle Assessment will be conducted to analyze the environmental impact of each solution throughout its entire life cycle. Recommendations for mitigating impacts across various environmental impact categories will be provided, with a primary focus on reducing impacts related to climate change and mineral resource scarcity.

Prototype Manufacturing. Upon completion of the MAXIMA project, prototypes will be produced to conduct testing, assessment, and validation of the novel concepts explored in the project, including the modular design of the electrical machine, the optimal control based on Digital Twin, and the manufacturing/recycling process flow.

NOTES

HEFT

Novel concept of a low cost, high power density and highly efficient recyclable motor for next generation mass produced electric vehicles

Project Scope and Objectives

HEFT considers that an energy efficient rare-earth synchronous motor is the best option for next generation high-power primary axle traction EVs and proposes a set of innovation challenges on electric synchronous motor configuration based on SiC inverters (direct cooling of rotor and stator, advance insulation for high voltage, multibarrier rotor topology, wave windings) and advanced materials (advanced GBD magnets, epoxy for magnet fixation, composite for motor housing, insulation resin). These innovations will result in a high-efficient and low-cost solution that will be validated on 2 motor topologies, which compared to two main reference automotive IPM commercial motors in Europe (VW ID.3 and FIAT500) will lead to next impacts: >800V, 20% reduction losses, >7 KW/kg and 42kW/l power density, 28% cheaper, 50-66% material savings, including 60% reduction of REE content and >80% REE recyclability rate. As this solution is still dependent on REE from China, HEFT will be aligned with the ERMA action plan towards a circular economy market of rare earth permanent magnets and suggests: one alternative magnet route (CE based) and two REE recycled routes together with policies promotion towards the foundation of a European rare earths industry, capable of delivering 20% of EU demand by 2030. HEFT plans 8 WPs to implement these concepts, where 5 research partners will be essential for developing innovative ideas around the design-to-x approach, while strong companies (GKN, MAGNETI, SUMIBE) will ensure that HEFT results have a clear market orientation and fulfil the industry needs. HEFT plans to organize OEM workshops to ensure wide adoption of HEFT solutions, but also with policymakers to promote regulations towards the EU circular market that would help maintaining the leadership of EU companies, while increasing their competitiveness and job opportunities linked to the new circular business models.

The general objective of HEFT is to develop and test two variants of lower cost, higher efficiency and power density permanent magnet eMotors for mass produced cars and vans.

Project N°: 101096306 **Start date:** 01.12.2022 **End date:** 31.05.2026	**Total budget:** 3 476 515 € **EU Contribution:** 3 476 515 €	**Coordinator :** Javier Poza MONDRAGON GOI ESKOLA POLITEKNIKOA JOSE MARIA ARIZMENDIARRIETA S COOP jpoza@mondragon.edu	

Partners

Mondragon Unibertsitatea Faculty of Engineering

GKN AUTOMOTIVE

MAGNETI LJUBLJANA, d.d.

SUMITOMO BAKELITE EUROPE (GHENT) NV

ikerlan MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

KU LEUVEN

The University of Nottingham

Expected Outcome

In HEFT project, high saving rates of primary rare earth CRM will be applied by a development of very compact IPM eMotors. The efficiency and power density of IPM eMotors for mass produced cars and vans will be improved through the development of new research actions related to advanced configurations and materials. Regarding the Advanced new configurations, SiC inverters will be implemented, allowing increasing rotor speeds while maintaining high number of poles of the motors. This will lead to lower losses and a more compact motor. Advanced direct cooling systems of the stator windings and rotor will be developed, to obtain a lower volume in copper conductors and magnets. Then, a higher system voltage with a motor with advanced insulation will be used to increase the motor peak power and reduce the recharging time. HEFT project also develops an innovative IPM multibarrier rotor topology. This approach allows using magnets with less coercivity since protects the magnets face to demagnetization currents. At the same time, it allows maximizing the output torque (optimal reluctance torque) and finally, special hairpin configurations (wave windings) will be developed to obtain a higher copper fill factor and less end-windings copper at lower manufacturing costs. Following with HEFT Advanced materials innovation, high performance magnets with less Dy content will be obtained by using advanced Grain Boundary Diffusion (GBD) magnets. The development of advanced compound materials for high resistance magnets fixation inside the rotor will allow increasing rotor speeds, reduction or removal of magnetic bridges and an easy dismantling of magnets at the motor EoL. Then, progress will be made in new composite materials for structural motor housing, that will contribute to the reduction of weight and cost and, at the same time, improve the direct cooling of the stator windings. Finally, advanced insulation resin for the slots moulding will be elaborated to improve the stator/coil interface and the insulation endurance face to high dV/dt. Considering this innovation activities,

HEFT concept will be built around a series of technological challenges detailed in the sub-sections below.

- New magnets with less REE content (NdCeFeB magnets or Dy free…)
- Recycled NdFeB magnets
- Improved rotor cooling system
- Multibarrier rotor topology with alternative magnets
- High strength magnet fixation compound
- Composite structural motor housing
- Advanced stator cooling system
- Jet cooling on motor end-windings
- High voltage with an advance insulation system
- Wave winding technology
- eMotor improvements due to an optimized use of SiC inverters
- Advanced Digital twin platform
- New business models for eMotors in a circular economy and new opportunities in the eMotors value chain

NOTES

VOLTCAR

Design, manufacturing, and validation of ecocycle electric traction motor

Project Scope and Objectives

In response to the need to reduce transportation-related emissions and energy consumption, major passenger car manufacturers and other light-duty vehicle producers are actively expanding their electric vehicle portfolios. However, the current reliance on rare materials in electrical traction motors poses several challenges. Specifically, the use of rare earth permanent magnet materials, such as Neodymium-Iron-Boron magnets, presents issues due to their importation costs and potential supply shortages in the future.

To enhance European competitiveness, VOLTCAR project, titled 'Design, Manufacturing, and Validation of Ecocycle Electric Traction Motors,' proposes an innovative, high-speed, permanent magnet-assisted synchronous reluctance technology, which significantly reduces the dependence on rare materials. By adopting this approach, VOLTCAR aims to address the limitations posed by scarce resources while advancing sustainable electric mobility.

Project N°: 1101096557	**Total budget:** 5 997 135.75 €	**Coordinator:** Jenni Pippuri-Mäkeläinen VTT Technical Research Centre of Finland jenni.pippuri-makelainen@vtt.fi	
Start date: 01.02.2023 **End date:** 30.01.2026	**EU Contribution:** 5 997 135.75 €		

Partners

VTT, BOSCH, Danfoss, Hidria, KU LEUVEN, LUT University, SIEMENS, RTD Talos, UNIVERZA V LJUBLJANI University of Ljubljana, BORGWARNER, KOLEKTOR

Expected Outcome

VOLTCAR motor prototype is perfected to meet the strictest performance requirements (power density, efficiency), sustainability criteria (recyclability, circularity and low use of rare resources and copper) and the expectations of the automotive sector (cost, reliability, integrability). This major goal is supported by introducing digital methodologies that are capable of assessing the life cycle costs, energy consumption, and carbon footprint, guiding the outcomes towards maximised sustainability with reduced use of rare materials and efficient recycling and repurposing patterns. The validity of the VOLTCAR motor prototypes, 50 kW and 120 kW motor, and related technologies is proved according to the automotive standards, presenting an X-in-the-loop (XiL) experimentation environments. With this development, VOLTCAR will simultaneously lead to more green jobs in local SMEs throughout Europe to reduce unemployment rate.

The VOLTCAR consortium comprises world-leading automotive Tier 1 and Tier 2 companies and research partners with complementary knowledge and expertise for the successful execution of the proposed work.

NOTES

CliMAFlux

Circular design and manufacturing techniques for next-generation highly-efficient integrated axial flux motor drives for electric vehicles

Project Scope and Objectives

Electric traction machines are at the heart of the transition towards a zero tailpipe emission road mobility landscape, with their performance and cost directly impacting the attainable market penetration of electric vehicles. To accelerate the transition, next-generation electric motors need to push the existing boundaries in terms of efficiency, power density, manufacturability, cost, and environmental sustainability. A reduced and more circular use of rare earth resources is critical to reinforce Europe's strategic autonomy and establish a more economically sustainable value chain. Recently developed axial flux motor technology based on a yokeless and segmented armature topology yields promising prospects in all these areas, significantly reducing the required amount of rare earth magnet material by design, and combining this with unmatched power density compared to state-of-the-art radial flux machines.

In summary, CliMAFlux will establish new knowledge and industrial leadership in key digital, enabling and emerging technologies, and, therefore, directly contribute to Europe's Key Strategic Orientations C and A as well as actively support the transformation towards zero tailpipe emission road mobility (2Zero).

Project N°: 101096062

Start date: 01.01.2024
End date: 30.12.2026

Total budget:
4 411 934,80 €

EU Contribution:
4 411 934,55 €

Coordinator:
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Gent University
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Partners

UNIVERSITEIT GENT

TRAXIAL
AXIAL FLUX - BE CONFIDENT

TENNECO

Politecnico di Torino

TECHNISCHE UNIVERSITÄT ILMENAU

BLUWAYS

STOHL GROUP

UNIVERSITÀ DEGLI STUDI FIRENZE

Expected Outcome

CliMAFlux will develop novel concepts (e.g. in terms of excitation and cooling) for more performant (e.g. >35% energy loss decrease in driving cycles) axial flux motors, thus reducing the need for rare earth materials by 60%, leveraging high-fidelity multiphysics models (e.g. electromagnetic, thermal, mechanical, and at the system level) and digital twins. Innovative designs and manufacturing processes will be proposed to:

(i) increase the power density to >23 kW/l, through novel materials and improved thermal behaviour;

(ii) enhance circularity over the lifetime (including >70% recyclability at the end of life); and

(iii) ensure cost competitiveness (50% cost reduction) at mass production level (reaching ~€5/kW).

The CliMAFlux on-board motors are integrated with the power electronics and mechanical transmission systems. The resulting electric drives will be managed by robust predictive controllers based on the CliMAFlux digital twins, including artificial intelligence (AI) prediction models, which will also facilitate novel functionalities in vehicle (sub)systems, hereby exploiting the full capability of the complete electrified drivetrain. The individual motor (with focus on approx. 90 kW continuous power) and integrated drive system will be benchmarked over a wider range of vehicles, in terms of both performance and environmental impact, on virtual (X-in-the-Loop with digital twin) and hardware test platforms up to TRL7, i.e. on a research electric vehicle already available at the consortium participants.

NOTES

eBRT2030

European Bus Rapid Transit of 2030: electrified, automated, connected

Project Scope and Objectives

The project has the objective of creating and demonstrating a new generation of advanced full electric, urban and peri-urban European Bus Rapid Transit (BRT) enhanced with novel automation and connectivity functionalities. Public transportation is at the core of efforts for achieving sustainable mobility and improving the environmental footprint of urban transport. BRT (Bus Rapid Transit) is one of the biggest innovations the bus domain has ever seen because of the positive transformative effects on cities in terms of reduction of congestion and air pollution. The eBRT2030 project aims at supporting the next generation of innovative and effective public transport systems thus accelerating the transition towards zero emission road mobility across Europe and improving the life of European citizens. The eBRT2030 project will demonstrate these innovative solutions in six European cities and one international city (Barcelona, Amsterdam, Eindhoven, Athens, Rimini, Prague, and Bogota). The project has also the ambition to carry out feasibility studies and small-scale demonstrations in South America and East Africa. The project will involve 49 different partners across Europe and beyond with a strong involvement of the industry. The Consortium includes Bus manufacturers, e-mobility systems service suppliers, engineering, and technology providers. The industry partners will collaborate with research centres, European bus operators and leading international associations in the sector. The Consortium has the capacity to spread the innovations across the entire European public transport sector.

Project N°: 101095882	**Total budget:** 30 491 980.11 €	**Coordinators:** UITP Flavio Grazian flavio.grazian@uitp.org Umberto Guida umberto.guida@uitp.org	
Start date: 01.01.2023 **End date:** 31.12.2026	**EU Contribution:** 22 776 213.57 €		

PARTNERS

UITP, VUB, AVL, tecnalia, Applus IDIADA, cenex nederland, IRU, VTT, VOLVO, IVECO BUS, TMB Transports Metropolitans de Barcelona, Irizar e-mobility, FACTUAL, CRM Centre de Recerca Matemàtica, Universitat Politècnica de Catalunya BarcelonaTech, arriva, connexxion, EBUSCO, heliox, Dopravní podnik hlavního města Prahy, ŠKODA, Elektroline, Univerzita Pardubice, START ROMAGNA, enel x, Transport for Athens OASA S.A., LA ROLITA, TEMSA, etra I+D, SCANIA, POLIS, ERTICO ITS EUROPE, RINA, CERTH, RUPPRECHT CONSULT, UEMI, SWARCO, Fraunhofer IVI, SYSTRA, semitan, Trivector, asstra, ALSTOM, ne—mi, trolley:motion

HORIZON-CL5-2022-D5-01-10

Expected Outcome

The eBRT2030 project will create a New Generation of advanced full electric, urban and peri-urban European Bus Rapid Transit (BRT) enhanced with novel automation and connectivity functionalities, to support sustainable urban transport by reducing cost/km/passenger, TCO, GHG and pollutant emissions and traffic congestion. The eBRT2030 project is developed through three main lines: 1) The development of technology-focused key innovative solutions for BRT, both at system and subsystem level, at level of vehicle, infrastructure, operation, and IoT connectivity 2) 7 demos of BRT system innovative solutions in real-operation, both city-&operator-led and BRT system-focused, or focused on specific technology innovation at subsystem level that are ready for BRT operations, in Europe and outside Europe (Latin America) and fully integrated in the whole urban mobility scenario 3) the definition a new European concept of Bus Rapid Transit for year 2030, benefitting of evaluation, multiplication and replication of the real-operation test of innovations, that improve the performance of the whole European urban bus system. All cities in eBRT2030 are strongly committed to innovate with electrification, automation, connectivity technology tailored to the characteristics of European bus operations.

eBRT2030 will work closely together with end-users to understand how the developed eBRT services can be improved to support the needs of citizens. Following this, the project will heavily focus on advancing passenger experience and enhancing mobility access of underserved areas, or regions with increased transportation needs. Expected outcomes:

- Flexible, economically viable, integrated, and synchronised eBRT solutions
- Advanced and predictive vehicle operation systems end-user comfort, safety and security
- Innovative, integrated and reliable charging solutions combined with automation and connectivity enablers
- Smart interoperable IoT monitoring platform for connectivity, fleet planning and charging management
- Validation and demonstration of innovative eBRT concepts in real-life public transport services
- Pathways for future replication including economically viable business models
- Definition a new European concept of BRT for year 2030

Results:

In the first year the project started the preparatory phase, that is now followed by the the technological development, testing, and validation. The first important result is the publication of BRT report describing the high-level BRT system architecture, the definition of the key areas of characterisation and its functional element, the BRT system concepts for the project, its benchmark and the characterisation process applied to the different functional elements. The report examines the European context for the implementation of BRT systems and analyses the impact of electrification on BRTs. It also provides a technology state-of-the-art and an overview of governance and planning for implementation of these systems. Additionally, the simulation tool developed for the EU-project ASSURED is currently being updated for the visual representation of an EBRT system and its individual components. This digital twin software will enable the optimization of the design of the EBRT system and components and will allow the users to optimize around cost and environmental parameters.

NOTES

SmartCorners

User-centred Optimal Design of Electric Vehicle with Smart E-Corners

Project Scope and Objectives

In-wheel motors (IWMs) have become a mature technology that is well-suited for new user-centric electric vehicles (EVs). IWMs can be integrated in multi-functional and controllable modules consisting of the electric powertrain, friction brake and suspension/steering actuation. By combining several vehicle functionalities in a compact solution, the modules offer substantial opportunities to enhance the design and the operation of EVs. This is the starting point of the SmartCorners project. Using machine learning and AI, an adaptive multilayer control strategy will be implemented with historical and current data from the vehicle, its environment, and users, including relevant EV fleets. This approach will pave the way toward software-defined vehicles, enabling rightsizing, holistic optimisation, innovative fault mitigation and actuator allocation strategies as well as more efficient, adaptive, predictive, and personalised system operation. SmartCorners will bring a so far un-explored authority level over: i) vehicle design, through skateboard-like chassis configurations; ii) energy management aspects, covering pre-conditioning and predictive thermal management during EV operation; iii) comfort and functional aspects, in terms of user-centric cabin thermal management, and pre-emptive vehicle body control; and iv) dismantling process and recycling of the vehicle. The development and industrialization of the project outcomes will be accelerated by comprehensive and integrated simulation, design and validation methodologies to decrease development time and cost, and support the uptake of AI-based solutions. In conclusion, SmartCorners will provide a significant competitive advantage of the European industry and contribute to achieve key strategic orientations C and A of the EU Strategic Plan.

Project N°: 101138110	**Total budget:** 6 317 719,99 €	**Coordinator:** Walter Lukesch AVL DiTEST walter.lukesch@avl.com	
Start date: 01.01.2024 **End date:** 31.12.2026	**EU Contribution:** 4 575 719,99 €		

Partners

AVL DITEST
AVL
ARMENGAUD INNOVATE
elaphe Propulsion Technologies
UEMI www.uemi.net
BLUWAYS
TECHNISCHE UNIVERSITÄT ILMENAU
MARELLI
HERON
POLITECNICO DI TORINO

Expected Outcome

1. Accelerated uptake of affordable and more energy efficient electric vehicles (EVs) through the development of innovative and holistic user-centric solutions, optimized system concepts and components sizing.
2. Increase comfort and safety (e.g. de-misting) functions' effectiveness and leading to a real-world range increase of 20% (compared to the State-of-the Art donor vehicle or demonstrator) at external temperature of 0 degrees Celsius.
3. Component sizing and performance matched to vehicle reliability and performance requirements to reduce costs by at least 5% at vehicle level.
4. Reduced development time at vehicle systems and components by 30% using AI for advanced design support and control algorithms in EV holistic thermal management and powertrain systems.

NOTES

MINDED

Thermal and energy Management for INcreased Driving range of an Electric minibus including improved user-centric Design and thermal comfort

Project Scope and Objectives

MINDED addresses in full the "expected outcome" and "scope" of the HORIZON-CL5-2023-D5-01-01 topic by delivering a battery electric IVECO eDaily minibus with 20 % improved range at 0 °C against the 2023 baseline. This is achieved by introducing a highly efficient heating system based on infrared (IR) panels, controlled by a novel user-centric HMI, embedding an optimised thermal and energy management strategy (TEMS) for improved comfort and reduced energy consumption. These activities are complemented with the demonstration of a new HVAC unit based on a heat pump, capable of reducing the vehicle's cooling energy requirements by 15 % against the baseline, while leveraging the efforts made on the HMI and TEMS. To do so, MINDED encompasses 10 Technology Bricks, organised in three areas:

- Heating and Cooling System, including IR heating panels, thermal cabin insulation, a thermal mannequin for evaluating passenger comfort, the optimised HVAC unit featuring an e-compressor with gas bearings, the required ECUs, and the user-centric HMI.
- Digital Twin and Control Strategy, including a new digital twin model, an AI-based algorithm for predicting driving behaviour, the TEMS, and a comfort control strategy for determining optimal settings.
- Demonstration and Performance Evaluation, demonstrating the IVECO eDaily minibus on the dynamometer at TRL 7 and the HVAC unit on the ThermoLab testbed at TRL 6.

Project N°: 101138202	**Total budget:** 6 735 413.75 €	**Coordinator:** Dragan Simic AIT Austrian Institute of Technology dragan.simic@ait.ac.at	
Start date: 01.01.2024 **End date:** 31.12.2026	**EU Contribution:** 4 999 301.25 €		

Partners

AIT Austrian Institute of Technology – Tomorrow Today
Applus IDIADA
FSB University of Zagreb Faculty of Mechanical Engineering and Naval Architecture
Garrett Advancing Motion
IVECO
LEAD TECH Integrated Logistic Support
RIMAC Technology
Villinger research & development
Technische Universität Darmstadt
TU Wien
Automotive Test Center GmbH

Expected Outcome

To reach the objectives and ambition, MINDED will draw from a portfolio of Technology Bricks in three AREAs:

AREA I
Heating and Cooling System dealing with the development, design and implementation of infrared heating panels, thermal cabin insulation, thermal mannequin for measuring and evaluating the passenger comfort, optimised HVAC system layout in heat pump operation mode based on oil-free e-compressor with gas bearing technology, necessary electronic control units (ECU), and user centric designed driver and passenger HMIs for adjusting the thermal comfort.

AREA II
Digital Twin and Control Strategy dealing with the development of entire vehicle digital twin model of the minibus, AI-based algorithm for predicting the driving behaviour to be fed into the overall control strategy of the vehicle, overall predictive thermal and energy management (control) strategy, and comfort control strategy for determining the best settings for optimum comfort.

The combination and interaction of all developments and simulations from AREA I and AREA II pave the way to AREA III, for the successful integration and demonstration.

AREA III
Demonstration and Performance Evaluation deals with the integration of the developed Technology Bricks into the vehicle demonstrator and the overall testing of the vehicle on the climatised dynamometer (TRL 7) and of the air conditioning components on an advanced ThermoLab testbed (TRL 6), including a digital twin demonstrator of an overall vehicle.

NOTES

EFFEREST

EFFicient user-centric EneRgy managEment SysTems for optimized EVs

Project Scope and Objectives

EFFEREST targets a decisive leap forward in the novel use of data to achieve energy efficient electric vehicle (EV) designs, matching enhanced user acceptance with efficient vehicle operation. Significant improvements will be gained by leveraging knowledge from real fleet behaviour. Users will benefit from personalised data and the always-available option to select the vehicle performance type; in this way, users will perceive that individualised eco-functionality sufficiently fulfils normal daily-use requirements and will be motivated to save energy even over longer periods of regular usage. To achieve its ambition, EFFEREST brings together 11 partners from industrial and research backgrounds covering the entire EV value chain

Project N°: 101138266	**Total budget:** 6 416 748,74 €	**Coordinator:** Alexander Kospach Virtual Vehicle Research alexander.kospach@v2c2.at	
Start date: 01.01.2024 **End date:** 30.12.2026	**EU Contribution:** 4 999 814,25 €		

Partners

Expected Outcome

A co-design framework will be implemented with a holistic user-centric energy management system control architecture based on adaptive digital twins, model-based optimization for component rightsizing, predictive model-based control and AI, benefitting from V2X, fleet-generated information and historical data. Most importantly, novel indicators will be identified that provide deeper insight into the effect that technical improvements have on user experience: this will help to derive more realistic development targets with a direct impact on user attractiveness, which in turn will impact the controllers that will be tailored adaptively to the current condition of the specific EV and its usage pattern, thus providing personalized and robust behaviour. Innovations in powertrains, battery systems, heating, ventilation and air conditioning systems will then be demonstrated through extensive evaluations in test facilities and a demonstrator vehicle, the aim being to make EVs more energy-efficient, comfortable, safe and affordable. As such, EFFEREST will increase the competitiveness of Europe, strengthening industrial leadership in key digital, enabling and emerging technologies to make EVs more attractive for the worldwide mass market.

NOTES

InnoBMS

Situationally aware innovative battery management system for next generation vehicles

Project Scope and Objectives

The core objective of InnoBMS is to develop and demonstrate (TRL6) a future-ready best-in-class BMS hard- and software solution that maximizes battery utilization and performance for the user without negatively affecting battery life, even in extreme conditions, whilst continuously maintaining safety.
The core objective will be achieved through five technical objectives.
1) advanced hybrid physical and data-driven models and algorithms to enable a flexible and modular BMS suitable for a wide range of batteries.
2) Software for a fully connected and fully wireless BMS that acts as a communication server inside the vehicle E/E-architecture, the center of connection, on-board diagnostics and decision-taking for all battery-related information.
3) A scalable, fully wireless and self-tested BMS hardware that enables using different battery sizes at different operating voltage levels, and smart sensor integration.
4) Better battery utilization and exploitation using cloud-informed strategies and procedure.
5) A heterogeneous simulation toolchain and automated test methods.

Project N°: 101137975

Start date: 01.01.2024
End date: 30.06.2027

Total budget:
5 672 894,38 €

EU Contribution:
4 013 441,88 €

Coordinator:
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Partners

VUB, TOFAŞ TÜRK OTOMOBİL FABRİKASI A.S., BOSCH, AVL, Applus IDIADA, cidetec, UNIVERZA V LJUBLJANI, Typhoon HIL, UNIRESEARCH, FPT POWERTRAIN TECHNOLOGIES, POTENZA

Expected Outcome

Concretely, the InnoBMS proposal will deliver a 12% higher effective battery pack volumetric density, a 33% longer battery lifetime and a demonstrated lifetime of 15 years. The results will be demonstrated using novel testing methods that give a 36% reduction in the testing time of a BMS. The results will be demonstrated in two use cases, one light commercial vehicle (Fiat Doblo Electric) and one medium-duty van (IVECO eDaily). The key outcomes will enable a cost reduction of 12% and 9.7% for passenger cars and light-duty vehicles, respectively.

NOTES

iBattMan

Smart, Connected and Secure Battery Management System Enhanced by Next Generation Edge and Cloud Computing, Sensors and Interoperable Architecture

iBattMan

Project Scope and Objectives

The iBattMan project will revolutionize battery management for Li-ion technologies, crucial for replacing ICE vehicles by 2050. iBattMan – through an innovative, modular, and scalable Battery Management System (BMS) – will improve performance, safety, and cost-effectiveness of Li-ion technologies, contributing its full market penetration. iBattMan will incorporate novel sensors and methodologies for monitoring the State-of-Health (SOH) of the cells during operation and in charging, together with cutting-edge technologies and tools for V2X and second-life applications, and use advanced physics- and data-based models implemented on-board and on-cloud for performance evaluation, diagnosis, health management and safety evaluation tools, to trigger actions to address safety and cyber-security concerns.

iBattMan approaches will contribute significantly to the achievement of the following objectives:

1. Provide a safe, optimal, reliable, and secure operation through an innovative BMS platform that incorporates advanced State-of-X (SoX) models continuously adapted during the 1st and 2nd life operation and reliable Firmware Over-The-Air (FOTA) updates through certificated communication to optimize the performance, circularity, and sustainability and extend the operational lifetime of Li-ion batteries.
2. Increase end-user acceptance to support the growth of a solid, competitive, and integrated Pan-European supply chain within the automotive and renewables industries in the EU through economies of scale by merging electric mobility and vehicle-to-grid and 2nd life applications to support the electric infrastructure for a higher integration of renewables for prosumers.
3. Establish standardized methods and protocols to extract valuable data from the system components to create databases and libraries for the Scientific Community and Industry.
4. Foster the collaboration between academia, industrial partners, and high-tech SMEs to create rich ecosystems for the rapid development of new BMS applications, facilitated by the new actors in the value chain to supply breakthrough technologies and services to the automotive and renewables industries.
5. Generate new IP and patents in the field of BMS technologies sensors, electronics, communications, and information and communication technologies (ICTs) and generate new products and services for the EU Battery Industry related to system monitoring, state estimation, and health management, as well as the use of data as a service (DaaS) for design and operation optimisation purposes.

Project N°: 101138856

Start date: 01.01.2024
End date: 30.06.2027

Total budget: 6 360 168.75 €

EU Contribution: 4 999 641.25 €

Coordinator:
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Partners

AARHUS UNIVERSITY · Technische Hochschule Ingolstadt · FICOSA · virtual vehicle · IREC Shaping Energy for a Sustainable Future · nvision · eurecat · AVL · INOVA+ · FORD OTOSAN · Manifattura Automobili Torino

HORIZON-CL5-2023-D5-01-02

Expected Outcome

iBattMan will develop an innovative BMS platforms, which is chemistry and EV pack architecture agnostic, to incorporate advanced sensors and cell modelling implemented in on-board and on-cloud and to also enable connectivity with smart chargers, ECUs and second life applications. The members of the iBattMan consortium, through interdisciplinary collaboration across different fields and industry sectors, place a strong emphasis on turning the outcomes and technological developments of the project into value-creating products and services, and will make substantial mid- and long-term impacts in the EU battery sector.

iBattMan will target the following outcomes:

- A simplified, efficient and connected BMS including reduction of parts and cost including data necessary for 2nd life and V2X applications - iBattMan will develop next-generation BMS technology for a range of e-mobility and stationary applications towards reduction of parts and cost;
- Improved and optimized monitoring and predictive diagnostics for a more accurate and efficient battery management maintenance - iBattMan will develop enhanced monitoring and prediction methods for more precise and effective maintenance;
- Development of relevant interfaces to allow access to the BMS and its database - iBattMan will develop significant relevant interfaces for accessing all BMS data towards preconditioning and optimized operation;
- Generally improved exploitation of battery performance - iBattMan will develop improved cell level SoH, cell aging prediction and battery state estimation algorithms for improved exploitation of battery performance towards safety and prolongation of battery lifetime;
- Improved control of battery operating conditions and determination of key state estimators SoX - iBattMan will develop enhanced operation control and SoX estimators with increased accuracy and early warning indicators towards improved performance, reliability, safety, and lifetime;
- New simulation tools and test methods for faster development, validation, and integration - iBattMan will develop advanced tools and test methods for faster development, validation, and integration towards a massive reduction of testing time;
- Enhanced communication between battery BMS and ECUs - iBattMan will develop relevant interfaces for reinforced communication towards more efficient battery operation.

iBattMan will contribute with an outstanding step forward in the EU battery development roadmap and enable accelerated market adoption of smart batteries to bring to market world-leading class Li-ion technologies to improve the cost-effectiveness, circularity, and sustainability of the EU battery industry by 2030-2035.

It will support the integration of more renewables on the grid based on new concepts such as Smart Cities and Net Zero Buildings to benefit EV car manufacturers and complementary markets like urban mobility, 2nd life application for stationary storage, batteries, and battery recycling.

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GIANTS

Green Intelligent Affordable New Transport Solutions

Project Scope and Objectives

The goal of the GIANTS project is to provide affordable, accessible and sustainable urban mobility solutions to emerging and advanced markets. A modular and scalable vehicle platform solution for light electric vehicles is developed to provide mission tailored solutions for the urban passenger challenge. The platform will include a lightweight, blind mating and portable 48V battery, a scalable e-drivetrain, a standardized vehicle control system, and roof solar panels. Further digital twins will be developed to optimize maintenance intervals, energy management and end-of-life prediction according to vehicle usage. The usability of the GIANTS platform will be showcased at five demo sites in Bruges (Belgium), Stockholm (Sweden), Manila (Philippines), Delhi (India) and Kisumu (Kenia). The project has the potential of 1.5 million vehicles sold annually from 2028 onwards that will use the developed platform and technologies. This leads to 5 main objectives for the project:

O1: Identification of common technology bricks for frugal, L-category vehicle development and production addressing advanced and emerging markets based on user (drivers, passengers, road users) and market needs as well as components, system specifications and infrastructure requirements/trends.

O2: Flexible modular platform serving 2 different markets (emerging/advanced) with at least 2 different application fields (people mover/ cargo).

O3: Viable exploitation pathways and business models for efficient market uptake, involving early adopters in cities and municipalities and logistic companies with the potential of up to 1,5 Mill. vehicles annually from 2028 onwards.

O4: Digitalization of components, systems and platform for flexible design and efficient operation of frugal vehicle solutions.

O5: Evaluation of TRL8 demo vehicles in emerging and advanced environments.

Project N°: 101138220

Start date: 01.01.2024
End date: 30.06.2027

Total budget:
15 103 522,5 €

EU Contribution:
11 959 732,51 €

Coordinator:
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Partners

virtual vehicle, Renault Group, TOYOTA, Valeo, CLEAN MOTION, SQUAD, TUX, cleantron, IESTA, POLIS, CLEPA, VUB, KU LEUVEN, CTU, Wuppertal Institut, FIR, i2m, WeTu, HiWi tronics, SOLBIAN, TOJO MOTORS, CLEAN AIR ASIA

Expected Outcome

The GIANTS project is expected to yield outcomes centered around the development and demonstration of a modular platform for light electric vehicles. This platform, characterized by standardized components and interfaces, along with clearly defined requirements, will be validated through practical demonstrations in both emerging and advanced markets. It is envisaged that the platform's performance and capabilities will be confirmed through this process. Key features of the platform, such as its scalable powertrain and Vehicle Control Unit (VCU), swappable 48V batteries, integration of a solar roof, and versatility for both passenger and cargo transportation, are projected to be thoroughly validated.

It is anticipated that collaboration with leading and smaller OEMs will lead to the construction of 12 vehicles based on the GIANTS platform. The usability of these vehicles is expected to be extensively tested in various real-world urban scenarios, affirming the effectiveness of the GIANTS platform-based vehicles. Furthermore, it is expected that OEMs will embrace the GIANTS platform, intending to market platform-based vehicles extensively in emerging and advanced markets.

Moreover, it is expected that smaller OEMs will follow suit, developing additional vehicles based on the GIANTS platform tailored to specific missions and local requirements. This diversification is projected to further promote the uptake of GIANTS technology across various sectors.

The adoption of GIANTS-platform based vehicles is anticipated to bring significant benefits to car sharing providers as well as to logistics operators, who are expected to capitalize on the platform's modularity, interoperability, and cost-effectiveness. This is anticipated to translate to reduced Total Cost of Ownership (TCO) for vehicles and enhanced economic efficiency. Additionally, it is envisaged that the general public will benefit from an improved quality of life in urban areas, thanks to the deployment of environmentally friendly and efficient transportation solutions.

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ZEV-UP

Frugal Zero-Emission Vehicles for the Urban Passenger challenge

Project Scope and Objectives

ZEV-UP aims to develop a user-centric, modular, and fully zero-emission battery electric vehicle (BEV). The vehicle will target passenger transportation but will also address goods transport needs. The ZEV-UP vehicle is designed to feature a swappable battery system, providing convenience, flexibility, and lower operational costs. This adaptable and frugal electric vehicle seeks to redefine electromobility, paving the way for a more sustainable and user-friendly transportation landscape.

The ZEV-UP frugal vehicle concept will be implemented across three variants tailored to diverse user requirements. These ultracompact variants are designed to meet the daily mobility needs of customers who make regular, short-distance urban trips, while also saving parking space. The modular microcar will share common components to ensure durability, safety, and minimal operational and maintenance costs. The primary variant is a compact two-seater tailored for urban use, while a longer wheelbase four-seater variant caters to family transportation needs. Additionally, this longer wheelbase variant can be converted into a two-seater commercial vehicle with a dedicated cargo area to transport goods. Demonstrations of the vehicles will be conducted with real users in various conditions and environments in Budapest and Istanbul to validate user acceptance and evaluate the design and technological innovations of the vehicles. The project aims to accelerate the adoption of ZEV-UP for both established and emerging markets, including market studies in Asia and Africa.

Project N°: 101138721	**Total budget:** 12 580 906.25 €	**Coordinator:** Emin Aliyev	
Start date: 01.01.2024 **End date:** 30.06.2027	**EU Contribution:** 9 619 202.63 €	ERTICO e.aliyev@mail.ertico.com	

Partners

ERTICO, Ford Otosan, Akkodis, Aspilsan, Coşkunöz Holding, elaphe Propulsion Technologies, Otokoç Otomotiv, rhoe, FEV, CERTH Centre for Research & Technology Hellas, ICOOR, UNIMORE Università degli Studi di Modena e Reggio Emilia, Institut VEDECOM, University of Cape Town, LUMS A Not-for-Profit University, AVERE The European Association for Electromobility, University of Leeds

Expected Outcome

The project will conduct a comprehensive examination of user needs, perform market analysis, and define system and powertrain requirements. Following this, the ZEV-UP Vehicle architecture and design, as well as the Digital Twin Requirements and vehicle prototype, will be developed and implemented. Plans for demonstration and simulation will facilitate the Budapest and Istanbul pilots, including homologation and certification for the three variants of the ZEV-UP vehicle. The project will also deliver short-term and long-term impact assessments, scale-up strategies, proliferation modelling, and evaluations of market uptake. A Final Exploitation Plan, business model, and communication and dissemination strategies will be delivered to maximise the project's impact.
Overall, the project will foster synergies with pertinent projects, initiatives, and networks to advance towards a more sustainable urban mobility and transportation environment. The ZEV-UP vehicle will serve as a pivotal component in the electric vehicle industry, reinforcing European competitiveness in this field.

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ZEvRA

Zero Emission electric Vehicles enabled by haRmonised circulArity

Project Scope and Objectives

ZEvRA's main objective is to improve the circularity of light-duty EVs throughout their entire value chain, from materials supply and manufacturing to end-of-life (EoL) processes, which aligns with the European Union's goal of achieving zero CO_2 emissions by 2035, particularly in the EV value chain. To do so, ZEvRA will develop a Design for Circularity (DfC) methodology and a holistic circularity assessment aimed at improving the production of electric vehicles (EVs) based on the 9Rs. This methodology will be validated by developing zero emission solutions for the most important automotive materials, covering > 84 % material mix: steel, three versions of aluminium (wrought, casting, and foam), thermoplastics composites (long and continuous fibre-reinforced), unfiled/short fibre plastics, glass, tyres and Rare Earth Elements (REE). These solutions will be supported by a set of digital tools to support the manufacturing of the use cases, the assessment of circularity, traceability, and the virtual integration of components into a full replicable vehicle. To maximise the outreach of the methodology and zero emission solutions, ZEvRA will develop a dedicated training & upskilling programme for the automotive workforce and academia, together with activities aimed at increasing awareness & acceptability of the proposed zero emission solutions. Lastly, circular business models targeting EoL and logistics aimed at improving the economic feasibility of circularity in EVs are advanced. ZEvRA's innovations aim to improve zero emission approaches in the life cycle and value chain of at least 59 % of European EVs by 2035 through the 5 OEMs and Tier 1's that are part of the consortium, which includes industry and academia covering the entire automotive value chain.

Project N°: 101138034

Start date: 01.01.2024
End date: 31.12.2026

Total budget:
11 382 948.50 €

EU Contribution:
11 382 948.50 €

Coordinator:
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Partners

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Expected Outcome

The general outcome will be a **harmonized methodology and circularity assessment, increasing the circularity of components made by the 8 most important automotive group of materials** by introducing 9R strategies for advancing manufacturing and EoL technologies. The components will be designed and integrated adhering to the requirements of the 5 OEMs as well as the Skoda Enyaq baseline, aiming at brand independency and replicability.

A **harmonized design inception report**, including roles mapping, methodological framework and workshop's dynamics will be drawn up in WP1 (Circular economy methodology). A preliminary definition of the circularity assessment and a **repository of DfC strategies** will be developed. An **evaluation for Skoda Enyaq** will be realized. Thereafter conclusive LCA, LCC and SLCA analysis of the developed technologies will be executed and the developed technologies will be assessed. ZEvRA will build a **DfC methodology (MRL4)** that allows designers to conceptualize their own strategy. For this, the methodology will consist of four easy-to-follow steps that adhere to the DfC principles as an iteration process.

Among others it is expected to develop an **AI tool for steel use cases** in WP2 (Digital tools). The results of preliminiary simulation processes of plastic and composite use cases will be applied to virtual twins and a digital database tool for designbased, identification of CE value chains. A **manual** will be provided for others **who wish to populate the database with other strategies, materials, or component designs**. A **DPP** (Digital Product Passport) will be developed and validated, guarnteeing an enhanced traceability of automotive components in the circular value chain. Finally, results of regression analytical model between microstructure, heat treatment conditions and mechanical properties for both casting and wrought alloys will be presented. Last but not least virtual twins of the casting and extrusion processes integrated with the developed regression analytical models and virutal twins of the aluminium will be generated. The intended outcome is a **comprehensive report that highlights the capabilities of the virtual twin of the component**.

WP3 (Circular car prototype) aims at the end to develop **physical and virtual demonstration of the circular car concept with all use-case demonstrators integrated**, after having worked out a vehicle concept, which is ready for 9R method and with joining methods for CE. Moreover, a **digital twin model and a simulation environment** has to be developed and FEM and SHM simulation of the vehicle has been carried out. The performance of the car has to be evaluated as dynamic and FE.

The following **use case prototypes** will be developed in WP4: steel, wrought aluminium, casting aluminium, aluminium foam, TP, plastic, glass and tyres. There will be established an **educational platform design and development**. The full training packages include training resources for researchers, students and workers to develop skills for the digital and green economy. These include long and short term training as well as short courses and learning nuggets. Potential topics include LCA and CE, material developments, Industry 4.0, digital twin and eco-design, as well as training on developed use cases.

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LeMesurier
Measuring the 2ZERO KPIs

LeMesurier

Project Scope and Objectives

The 2ZERO Partnership Key Performance Indicators are multiple and various, relating to the three-layer approach for the Objectives of 2ZERO, as expressed in its SRIA. This CSA will determine a common framework for monitoring these KPIs (including their sources, methods and reporting formats). Specifically, the project's objectives are:

1: To account for the contribution of the 2ZERO partnership and the results of its projects, towards the partnership's main objectives, their targets (as measured against the whole set of the identified KPIs).

2: To support the identification and quantification of all interactions, impacts and effectiveness of the partnership within the road transport challenge, mainly as a result of the information gathered from the 2ZERO partnership project results.

3: To provide additional recommendations for further development and analysis of means of measurement and evaluation of the partnership within the road transport challenge.

4: To disseminate and exploit the methods to and the measurements of the 2ZERO KPIs to relevant projects (within and beyond 2ZERO) and stakeholders.

Project N°: 101137477 **Start date:** 01.01.2024 **End date:** 31.12.2025	**Total budget:** 1 064 295 € **EU Contribution:** 1 064 295 €	**Coordinators:** Giannis Giannelos (Project Coordinator) giannelos@e3modelling.com Simon Edwards (Technical Coordinator) simon.edwards@ricardo.com	

Partners

E3Modelling · RICARDO · e:misia · AVL · VDI|VDE|IT · BOSCH · ERTICO ITS EUROPE · FEV · Fraunhofer Gesellschaft · Applus IDIADA · IFP Energies nouvelles · POLIS Cities and Regions for Transport Innovation · UEMI www.uemi.net

Expected Outcome

*Le*Mesurier will generate values for the KPIs and their expected variation for the coming decade, based upon the results of the projects being conducted within the partnership and the assessment of the impact of these projects' results. This Coordination and Support Action (CSA) will support the identification and quantification of the interactions, impacts and effectiveness of the partnership within the road transport challenge. Furthermore, it will provide recommendations for development and analysis of the means of measurement and evaluation of the partnership within the road transport challenge. Finally, *Le*Mesurier will disseminate and communicate its results to a wide range of stakeholders, throughout the road transport sector, but also across Member States and to the public in general, via a range of media and events.

The consortium undertaking *Le*Mesurier represents many sectors of the road transport community from multiple European countries: it will be guided by a strong Advisory Board representing a broad range of vehicle manufactures, suppliers, RTOs, operators and infrastructure providers, as well as technology partnerships, joint undertakings and other representative organisations within Europe.

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MOBILITIES FOR EU

New MOBility solutions for cIlmate neutraLity in EU cITIES

MOBILITIES FOR EU

Project Scope and Objectives

MOBILITIES FOR EU aims at demonstrating that innovative passenger mobility and freight transport concepts designed and implemented following participative and user-center principles are cost-effective and feasible solutions to contribute significantly to the cities' transformation towards climate-neutrality, allowing to speed up the process even to reach SCOPE 2 emissions reduction in 2030.

Madrid (Spain) and Dresden (Germany) will implement 11 pilots comprising 27 very innovative solutions for mobility of people and freight, exploiting the combined potential of electrification, automation and connectivity, from the design to the implementation and evaluation stages acting as Lead Cities (LC). Both cities also ambition to act as pioneers of this process, taking advantage of multiple already existing initiates of social engagement and empowerment that will be integrated in the idea of Urban Transport Labs (UT-Labs), conceived as Innovation Hubs with the aim of fostering faster upscaling and replicability at EU level, making 5 Replication Cities (Ioaninna–Greece, Trencin–Slovakia, Espoo-Finland, Gdansk-Poland and Sarajevo-Bosnia&Herzegovina) through their own UT-Labs direct participants of the processes and later on main protagonists of their own designs.

Project N°: 101139666 Start date: 01.01.2024 End date: 31.12.2028	Total budget: 28 945 012,89 € EU Contribution: 24 743 622,50 €	Coordinator: Julia Vicente Gómez CARTIF julvic@cartif.es	

Partners

CENTRO TECNOLÓGICO CARTIF · MADRID · mercamadrid · EMT MADRID · orange · ferrovial construcción · ferrovial · T-Systems · Plexigrid · POLITÉCNICA UNIVERSIDAD POLITÉCNICA DE MADRID · prezero · alsa · Dresden · VOLKSWAGEN AKTIENGESELLSCHAFT · Fraunhofer SCAI · SAP · TECHNISCHE UNIVERSITÄT DRESDEN · CIT UPC · saena Sächsische Energieagentur GmbH · ESPOO ESBO · TRENČÍN · STU · BOSNA I HERCEGOVINA FEDERACIJA BOSNE I HERCEGOVINE KANTON SARAJEVO VLADA · www.gdansk.pl · ΔΗΜΟΣ ΙΩΑΝΝΙΤΩΝ · Steinbeis · AEDIVE · WE RIGHT CLICK · International Road Federation Fédération Routière Internationale Federación Internacional de Carreteras

Expected Outcome

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metaCCAZE

Flexibly adapted MetaInnovations, use cases, collaborative business and governance models to accelerate deployment of smart and shared Zero Emission mobility for passengers and freight

Project Scope and Objectives

metaCCAZE accelerates the user-centred deployment of smart systems and services that combine electric automated and connected mobility and related infrastructure across European cities. metaCCAZE organizes a series of MetaDesign activities with multisector-stakeholders and different population groups to develop metadesigned shared zero-emission mobility use cases, collaborative business and governance models. A toolkit called MetaInnovations, is developed consisting of six main smart technologies (1. Align: grid supply-fleet-demand; 2. Harmonise: AI-Datawarehouse; 3. Charge: inductive automated charging; 4. Automate: i. remote control center, ii. Advanced Driver Assistance System; iii. 5. Connect: V2X protocols; 6. Manage & Operate: i. electric vehicle scheduling and demand; 6. Digital twin optimisation). MetaInnovations are pioneered in passenger and freight services (public transport, on-demand mini buses, bike sharing, deliveries) and related infrastructure (mobility and logistics hubs, traffic management centres, charging infrastructure) and widely demonstrated in 4 trailblazer cities (Amsterdam, Munich, Limassol, Tampere). Successful use cases, MetaInnovations and MetaServices are transferred, implemented and demonstrated in 6 follower cities (Athens, Krakow, Gonzo, Milan, Miskolc, Paris region). Demonstrations are monitored to ensure that their impact aligns with the MISSION and SUMP/SULP targets, and that the society embrace them. The MetaSkills Hub is developed and utilizes the lessons learned to deliver a series of cross-sectorial interactive training courses. The MetaPolicy Package is developed to contribute to updates of urban and transport policies and feed the strategic research and innovation agendas (SRIA) of CCAM, 2ZERO and other initiatives. metaCCAZE is a project, and an initiative to transition cities to the green metamobility era that the Green Deal, 2ZERO, CCAM, Mission and other EU partnerships envisage by 2030 and beyond.

Project N°: 101139678

Start date: 01.01.2024
End date: 31.12.2027

Total budget:
28 450 737,50 €

EU Contribution:
24 724 551,13 €

Coordinator:
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Partners

ERTICO, MaaS Lab, BABLE, FACTUAL, Steinbeis, TRT, Gemeente Amsterdam, AMS Amsterdam Institute for Advanced Metropolitan Solutions, TU Delft, ZOEV CITY, townmaking, ARGALEO, Technolution, Landeshauptstadt München, Technical University of Munich, stadtraum, nextbike, SMART CITY SYSTEM, DB SCHENKER, ΔΗΜΟΣ ΛΕΜΕΣΟΥ, EMEA, oxygen. for Democracy, TAMPERE, REMOTED, Tampere University, ΑΝΑΠΛΑΣΗ ΑΘΗΝΑΣ Α.Ε., Kraków, GOVERNMENT OF MALTA MINISTRY FOR TRANSPORT, INFRASTRUCTURE AND CAPITAL PROJECTS, MALTA PUBLIC TRANSPORT, L-Università ta' Malta, AGENZIA MOBILITÀ AMBIENTE TERRITORIO, NEXT S.R.L., Università degli Studi di Napoli Federico II, MVK Zrt., HC Linear, Yvelines Le Département, INSTITUT VEDECOM, Floware, ATPL, MOBILYSIS

Expected Outcome

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