EARPA PROJECTS UNVEILED



A SHOWCASE OF CUTTING-EDGE AUTOMOTIVE RESEARCH PROJECTS



4 September 2025

15:00 - 16:00 CET | Webinar







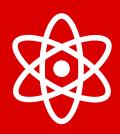






What is EARPA?

The European Automotive Research Partners Association brings together the most prominent independent European R&D providers in the automotive sector



Network
of European
automotive
researchers &
stakeholders



Collaborative platform for road mobility projects



Shapes and influences the European research agenda



EARPA's 60 members provide strong contribution to European research through platforms and partnerships



- 40 Horizon Europe projects 2021-2024 (more than 400 millions EU funding)
- Success rate of HEU CL4&5 proposals 42% (estimated figure)



FORM Forum 2025, 30 September – 1 October 2025







EARPA PROJECTS UNVEILED: SPEAKER

Wissam Dib

Business & Partnership Development Manager
IFP Energies nouvelles







EARPA Projects Unveiled: A Showcase of Cutting-Edge Automotive Research Projects

Wissam DIB
IFP Energies nouvelles







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PROJECT DATA



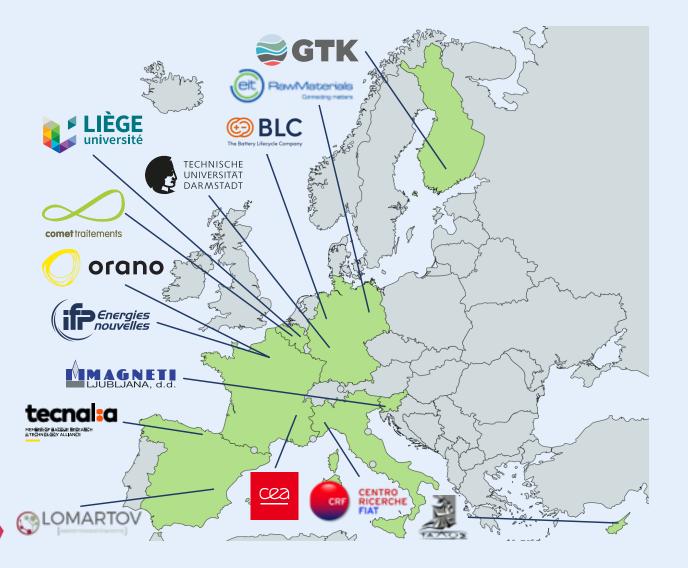
by the end of the project





CONSORTIUM





	Partner	Country
1	ORANO (Coordinator)	France
2	MAGNETI LJUBLJANA	Slovenia
3	CENTRO RICERCHE FIAT SCPA	Italy
4	THE BATTERY LIFECYCLE COMPANY GmbH	Germany
5	COMET TRAITEMENTS	Belgium
6	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES	France
7	IFP ENERGIES NOUVELLES	France
8	UNIVERSITE DE LIEGE	Belgium
9	FUNDACION TECNALIA RESEARCH & INNOVATION	Spain
10	TECHNISCHE UNIVERSITAT DARMSTADT	Germany
11	GEOLOGIAN TUTKIMUSKESKUS	Finland
12	LOMARTOV SL	Spain
13	RTD TALOS LIMITED	Cyprus
14	EIT RAW MATERIALS GmbH	Germany



CHALLENGE



Permanent magnets (PM) containing rare earth elements (REE) play a key role in the green transition. But since they are mainly produced outside Europe, there is a risk to security of supply in Europe

Therefore, a European PM supply chain is needed to support the development of the EV market and thus the energy transition

In 2020, less than 1% of all magnets were recycled

Around 200 tonnes of Neodymium could be recovered in the EU (current estimates)

Expected to reach 400 tonnes in 2030



Equivalent to 1200 tonnes of new PM, enough to manufacture 800,000 electric vehicle traction motors (EVTM)



SOLUTION



Optimising 3 main steps leading to improvements in the 3 pillars of the circular economy business model

USE: Better design of EVTMs

- Facilitate magnet recovery and minimise material loss during reprocessing
- Utilise advanced shaped PMs for improved assembly, avoiding irreversible gluing
- Enhance EVTM performance with better flux distribution and reduced PM mass per kW

MAKE: Better use of REE in the production of magnets

- Increase the sourcing of recycled heavy rare earth elements (HREE) through a short-loop recycling process
 - Enhance the use of secondary REE in new highperformance magnets meeting EVTM requirements
 - Substitute Neodymium with less critical REE (Ce/La) with supplementary use of HREE

RECOVER: Better recovery, reuse and recycling of REE and PM

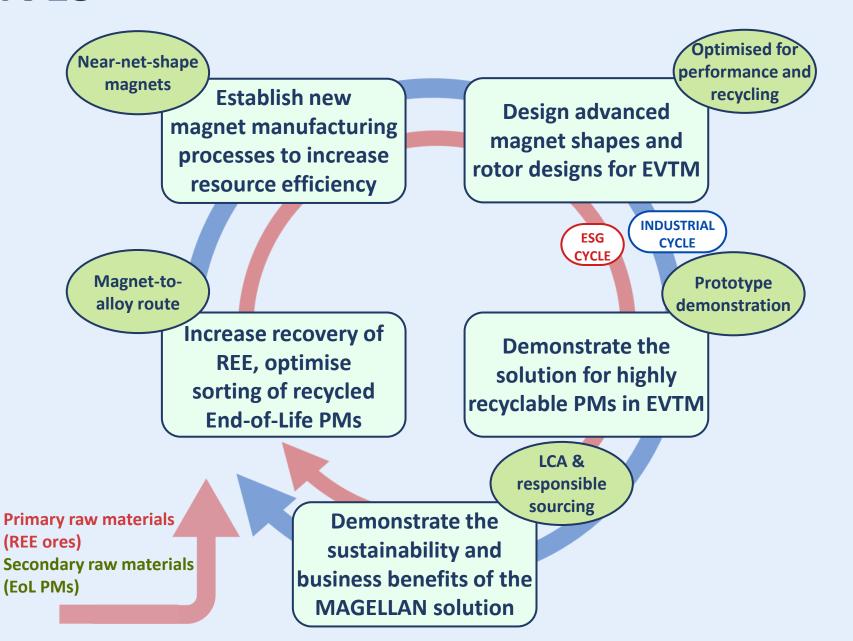
- Upscale the magnet-to-alloy route and employ functional recycling to avoid downcycling
- Establish characterisation protocols for directing EoL
 PMs to their optimal recycling loop
- Promote standardised magnet labelling (composition, size, etc.)





OBJECTIVES







KEY PERFORMANCE INDICATORS



Increase recovery of REE, optimise sorting of recycled End-of-Life PMs

Establish new magnet manufacturing processes to increase resource efficiency

Design advanced magnet shapes and rotor designs for EVTM

Demonstrate the sustainability and business benefits of the MAGELLAN solution

Magnet-to-alloy route

Near-net-shape magnets

Optimised for performance and recycling

Prototype demonstration

responsible sourcing

KPI 1 - Recycle at least 70% of the elements contained in streams of high-performance EoL PMs

KPI 2 - Demonstrate at TRL 7 the restoration of the initial high performances of magnets KPI 1 - Achieve a 40% substitution of Nd by Ce/La

KPI 2 - Achieve a reduction of over 50% in material loss via the PIM process

KPI 1 - Achieve
equivalent
performance with the
reference EVTM using
recycled magnets

KPI 2 - Increase the EVTM's recyclability score from 1.6 to 2

KPI 3 - Reduce PM mass by 20% at the same power as the reference EVTM

KPI 1 - Achieve TRL 7 for all individual developed processes

Demonstrate the

solution for highly

recyclable PMs in

EVTM

KPI 2 - Achieve TRL 7 for the MAGELLAN solution as a whole

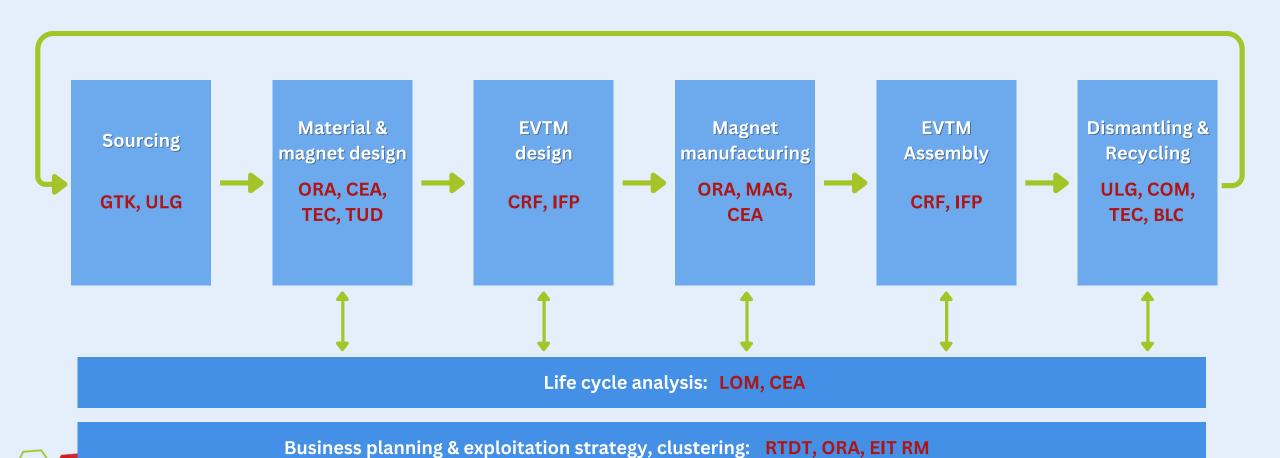
KPI 1 - Reduce by at least 50% the carbon footprint compared to the traditional PM production route

KPI 2 - Reduce by at least 10% the carbon footprint compared to the long-loop recycling by hydrometallurgy

CONSORTIUM



Complementary expertise between academia, research and industry



PROJECT PROGRESS

Maserati GranTurismo Folgore reference for

motor performances and PM characteristics

by CRF and IFPEN



1st 18 months project achievements

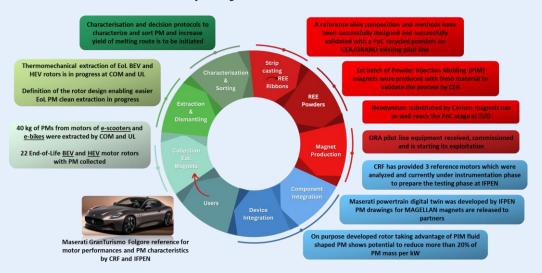
Characterisation and decision protocols to A reference alloy composition and methods have been successfully designed and successfully characterize and sort PM and increase validated with a PoC recycled powders on yield of melting route is to be initiated **CEA/ORANO** existing pilot line Strip Thermomechanical extraction of EoL BEV and 1st batch of Powder Injection Molding (PIM) casting Characterisation **HEV rotors is in progress at COM and UL** magnets were produced with fresh material to REE Ribbons validate the process by CEA Sorting Definition of the rotor design enabling easier REE **EoL PM clean extraction in progress Extraction Powders Neodymium substituted by Cerium magnets has** as well reach the PoC stage at TUD Dismantling 40 kg of PMs from motors of e-scooters and e-bikes were extracted by COM and UL ORA pilot line equipment received, commissioned and is starting its exploitation Magnet 22 End-of-Life BEV and HEV motor rotors Production with PM collected CRF has provided 3 reference motors which were analyzed and currently under instrumentation phase to prepare the testing phase at IFPEN Component Integration Maserati powertrain digital twin was developed by IFPEN Users PM drawings for MAGELLAN magnets are released to Device Integration partners On purpose developed rotor taking advantage of PIM fluid

shaped PM shows potential to reduce more than 20% of

PM mass per kW

PROJECT PROGRESS

1st 18 months project achievements







LOM study shows that value chains of REE from both secondary and primary sources and the volumes available are economically challenging and require regulatory support

MAGELLAN & 8 other EU projects issued a public call to the EC to introduce dedicated waste codes for permanent magnets. This initiative bringing together over 100 entities across Europe, sends a strong signal to EU policymakers: unlocking the circular economy potential of permanent magnets starts with better waste stream visibility and traceability.



EXPECTED RESULTS



The MAGELLAN solution will

Technology - Economy

Demonstrate the **technical and economic viability of recycled PMs**, successfully meeting EVTM requirements

Environment

- ⇒ Enable the **avoidance of primary mining** extraction of millions of tonnes of ore necessary to obtain the equivalent of **535 tonnes of LREE per year**
- Contribute to a reduction of PMs' CO₂ emissions by up to 50%, compared to the standard magnet manufacturing process

Recycling

- ⇒ Increase the reuse of REE content in EoL magnets, achieving a 50% increase in yield
- ⇒ Increase recyclability and material savings, accomplishing significant cost reductions compared to the use of raw materials. Raw materials represent about 20-70% of the price of PMs





Pave the way for a 2000 tonnes/year supply chain, ~10% of the 2040 forecasted European EVTM market

IMPACTS





Scientific

- New magnetic system designs via Powder Injection Moulding (PIM)
- Advanced understanding of the reactions between carbon-based binders and REE powders
- Improved knowledge of magnetic material science



Standards

- Enhanced standards through contributions to ISO/TC 298, focusing on the classification of EoL magnets
- Advanced sustainability standards via a white paper detailing design recommendations for PMs and EVTMs



Economic/ Technological

- Enhanced autonomy and reduced price volatility of REE in EU
- Expanded market and enhanced leadership in the REE PM sector
- New job opportunities across the EU value chain
- Improved cost-effectiveness of PM and EVTM recycling



Societal/Environmental

- Reduced CO₂ emissions from PM manufacturing
- Enhanced adoption of EVs by providing easier access to PMs
- Fostered recycling industries in EU
- Demonstrated contribution to EU 15%-REE recycling goals





Thank you for your attention!

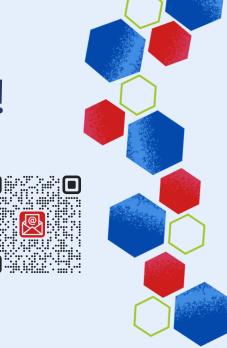
Connect







































Grant Agreement No:101138260



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EARPA PROJECTS UNVEILED: SPEAKER

Sergi Parareda

Researcher at Unit of Metallic and Ceramic Materials Eurecat







Flexcrash

Flexible and hybrid manufacturing of green aluminium to produce tailored adaptive crash-tolerant structures

The new generation of crash-tolerant structures

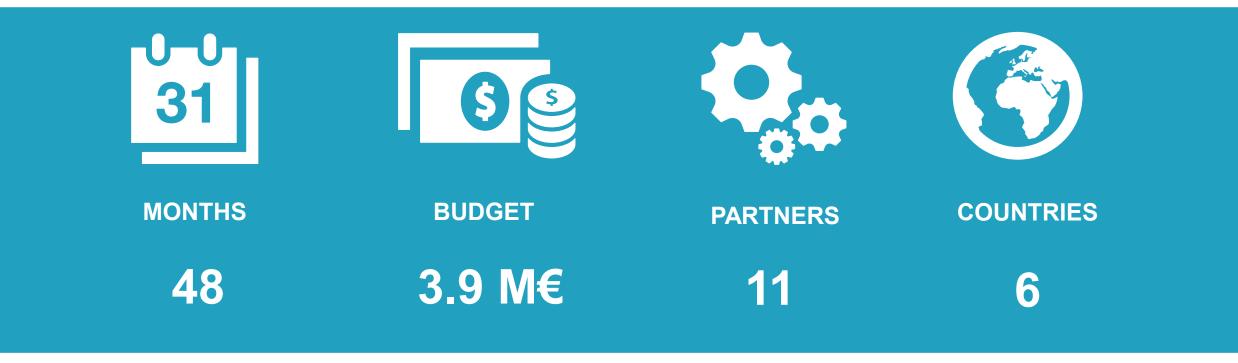
Sergi Parareda – Eurecat sergi.parareda@eurecat.org



Flexcrash project



European project funded under the topic: CL5-2021-D6-01-10 - Testing safe lightweight vehicles and improved safe human-technology interaction in the future traffic system





Consortium



Research centers







Universities





Industries









Industrial research center



Standardization body

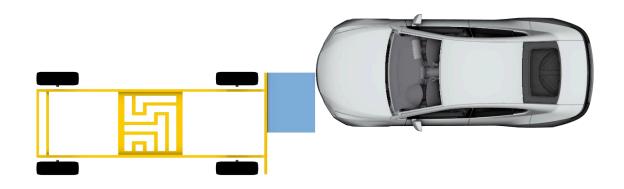




Ambition



Flexcrash ambition is to develop a <u>low weight</u> and circular <u>automotive front</u> <u>structure</u> that supports the EU long-term goals on zero emissions mobility and <u>reduction in injuries and fatalities</u> due to crashes.





Ambition





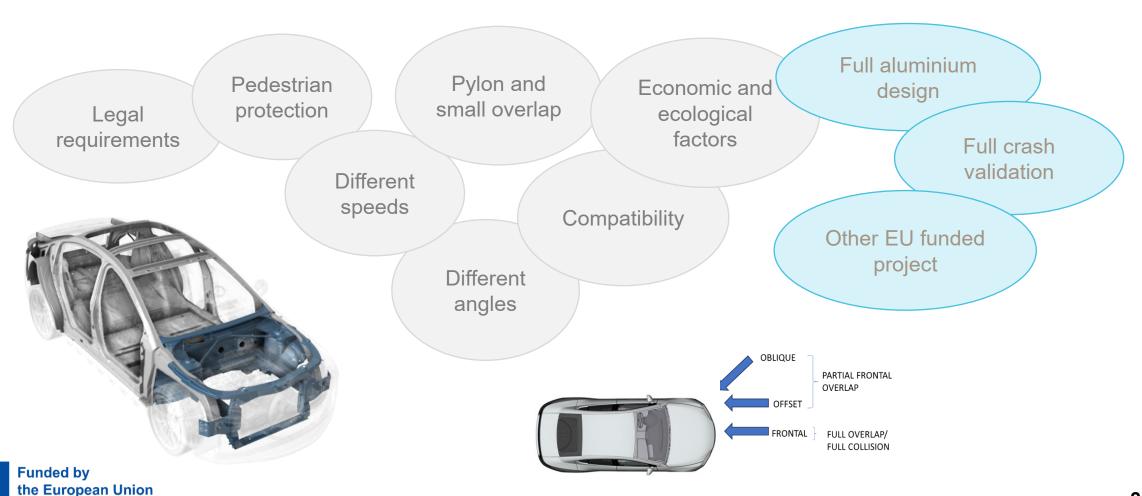






Motivation & Requirements

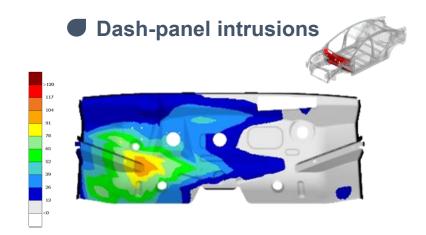
The goal is to design a structure that can absorb the energy of a frontal crash and protect the occupants from injury



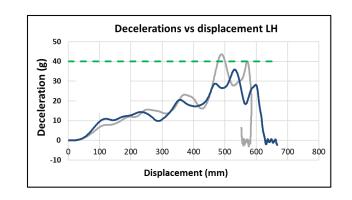


Motivation & Requirements

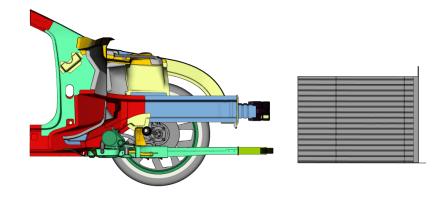
Measurement parameters



Decelerations & OLC

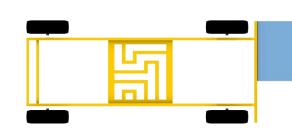


Kinematic & chronology





Barrier 1400 kg, 50km/h Vehicle 50km/h Alignment 0° Overlap 50%







BEV Full-crash virtual model by Gestamp C/D segment

~4,6m length

~ 1800kg weight AHSS



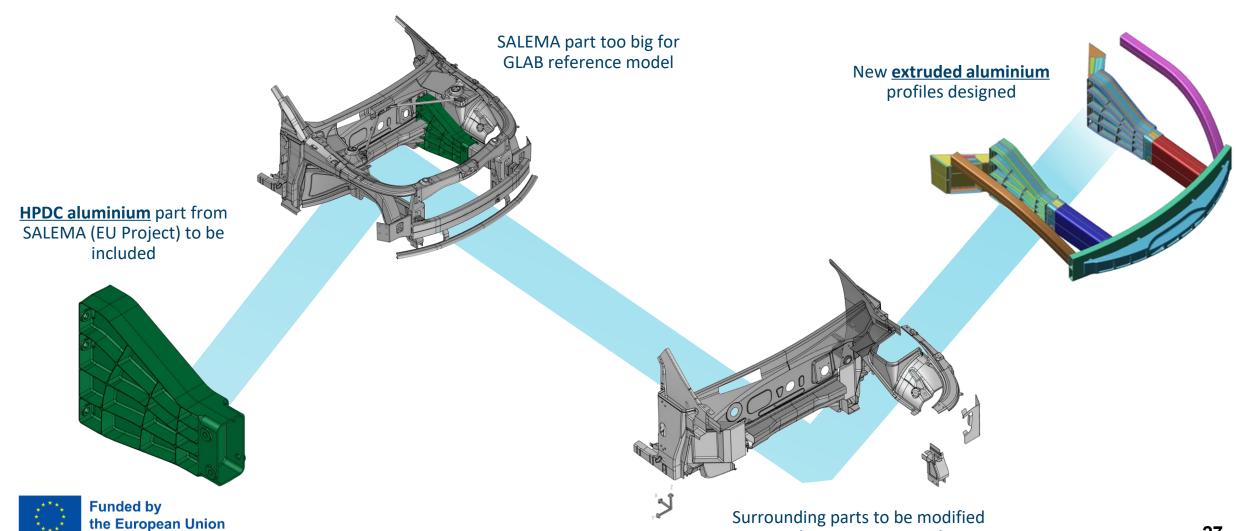


Motivation & Requirements

Measurement parameters

Demonstrator definition

and new ones created



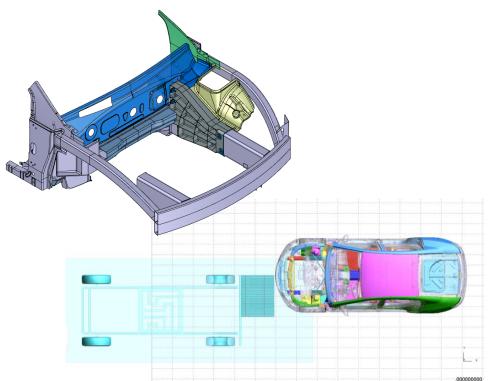


Motivation & Requirements

Measurement parameters

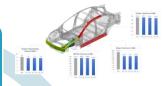
Demonstrator definition

First design including <u>HPDC</u> (AlSi10MnMg) and <u>extruded</u> (6063) parts



Optimization phase to enhance crash performance and weight reduction

Load distribution on BiW



Adjustments on full crash level

AVFF and topological optimization





New testing procedures (fatigue and fracture toughness)



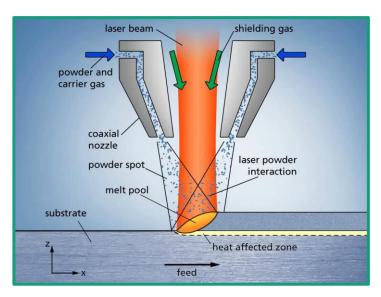
SALEMA part optimization



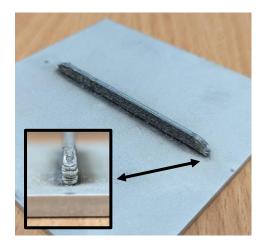


Adding Value Functional Features (AVFF)





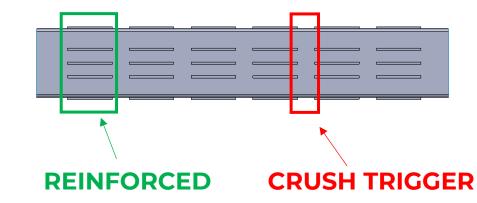
Reinforcements by LMD technology

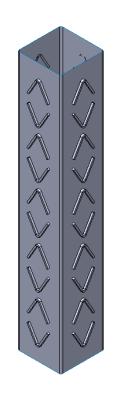




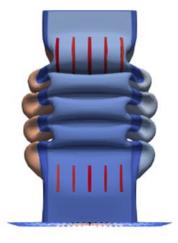
AVFF APPROACH

Deposition of material to create alternance of base material and reinforced one to trigger the folding crash behaviour







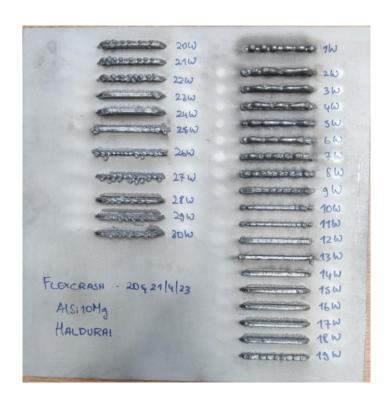


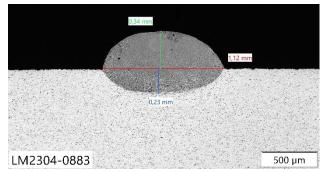
12% weight reduction maintaining the same energy absorption

Adding Value Functional Features (AVFF)

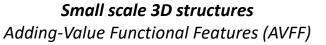


Development of process parameters for high material quality and low thermal input











Laser Metal Deposition (LMD)

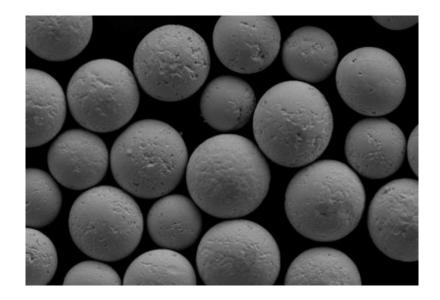


Adding Value Functional Features (AVFF)

Development of aluminium powders with high amount of recycled aluminium and minimized content of CRMs

- ✓ *AlSi10Mg + 1% Zr*
- ✓ *AlSi8Mg + 1% Zr*

Al powder particles from 50 to 100 µm









Centrifugal atomization

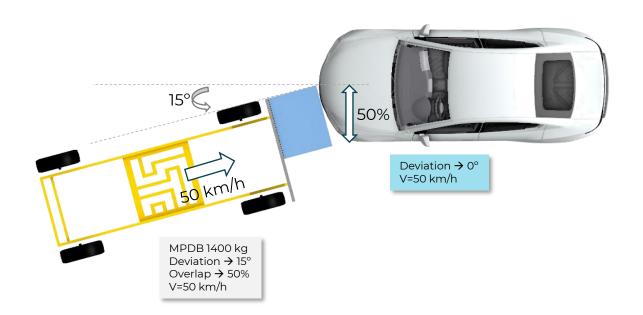


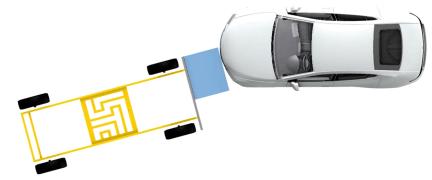
Motivation & Requirements

Measurement parameters

Demonstrator definition

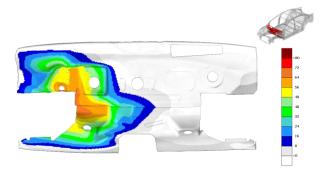
What about **non-standard crash situations**?





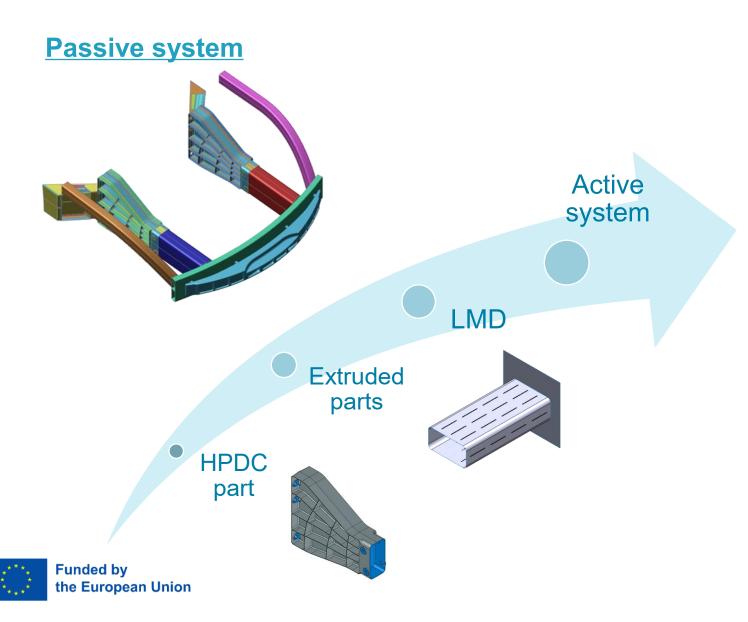


Target is to design a robust front unit that can deal with more challenging future crash scenarios



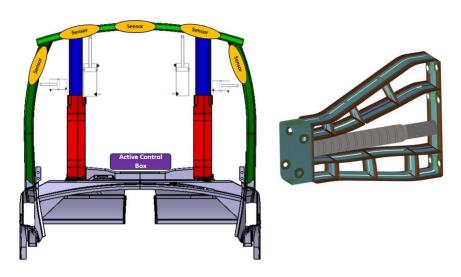






Active system

Adaptive crash-tolerant structure concept



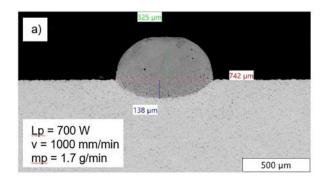
Active system will include:

- Sensors (speed, overlap ratio, angle...)
- Hydraulic actuators
- Auxiliary hydraulic/circuit elements
- Control Unit
- Connecting/assembling components

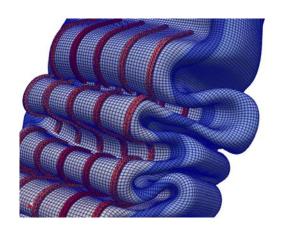
Takeaways



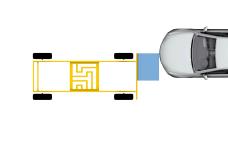
1 Much lighter structures can be obtained by using LMD technology and avoiding the use of multi-materials, which improves the recyclability of components and materials.



Multiple components
conventionally
manufactured by
HPDC and extrusion
can benefit from LMD
technology, which could
be used for other
components or
materials.



Numerical modelling of processes and materials is crucial to assess crash behaviour in multiple scenarios outside of standard testing. This approach could unlock the <u>virtual homologation of vehicles</u> for different conditions.





Coordinated by:

Flexcrash

Flexible and hybrid manufacturing of green aluminium to produce tailored adaptive crash-tolerant structures

Thank you!

https://flexcrash-project.eu/



The Flexcrash project has received funding from the Horizon Europe programme under grant agreement No. 101069674. Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

EARPA PROJECTS UNVEILED: SPEAKER

Simon Edwards
Innovation Director
Ricardo







Measuring the value of the Key Performance Indicators of the 2Zero Partnership

Project Unveiling for EARPA

On-line Simon Edwards, Ricardo 4th September 2025



Summary



- The 2ZERO Partnership is building on the success of earlier, automotive partnerships
 - It has a range of objectives, measures of success and key performance indicators, that project proposers and coordinators must be aware of
- The LeMesurier project provides a method and means to measure these parameters,
 - It has a method that can be used by the Partnership, the projects etc. going forward
- The indications so far are that several of the 2ZERO measures of success have already been achieved, despite being just over half way through the Partnership
 - Many more are progressing well, only a few seem inappropriate or unachievable
- This brief webinar is an introduction to the LeMesurier project
 - A further two webinars, organised in conjunction with 2ZERO, for Autumn this year will give more details
 - The project final meeting will take place in December
- Further information can be found via 2ZERO or the *Le*Mesurier project website: www.LeMesurier-project.eu

Contents



- Introduction
- The 2ZERO Partnership
- The LeMesurier project
- Findings so far
- Next steps
- Further information



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Project Overview



- Measuring the Value of the Key Performance Indicators of the 2ZERO Partnership
- Responding to the call:
 - HORIZON-CL5-2023-D5-01-05 Measuring road transport results towards 2ZERO KPIs
- Coordination and Support Action (CSA)
- Project Start: January 2024
- Project Duration: 24 months
- Consortium of thirteen partners (8 EARPA)
 - Coordinator: E3-Modelling (associated with Ricardo GmbH)
- Project number: 101137477
- Grant Value: ~1m€
- Lump Sum Funding

AVL CERTH E3M, Ricardo FEV Fraunhofer IDIADA IFPEN

Project Summary

The 2ZERO Partnership KPIs 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 multiple and various KPIs (including their sources, methods and reporting formats). It 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. The CSA will support the identification and quantification of the interactions, impacts and effectiveness of the partnership within the road transport challenge. Furthermore, the CSA will provide recommendations for development and analysis of the means of measurement and evaluation of the Partnership within the road transport challenge. Finally, the CSA 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 manufacturers, suppliers, RTOs, operators and infrastructure providers, as well as technology partnerships, joint undertakings and other representative organisations within Europe.

https://lemesurier-project.eu/



This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No. 101137477



The 2ZERO Partnership

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6

A look back at EGVI



EGVI Impact assessment



- Now published on <u>our website!</u>
- A paper copy of the short version is available!



Promotion and dissemination





- Presentation of the findings to the Partnership Board on 6th December
- Public webinar with Strategy Engineers held on 18th January 2024, recording available online
- Distribution of paper copies
- We count on you to share the report!









Main findings

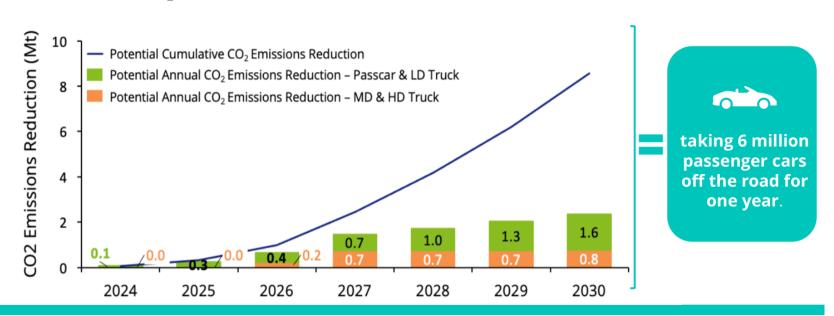


- EGVI contributed to ongoing road transport decarbonisation through the integration of advanced technologies
- EGVI's legacy provides an enduring boost to EU economic growth and employment through improved industry competitiveness
- EGVI supported growth of the EU-wide scientific research community and its strategic alignment

Road transport decarbonisation



EGVI passenger car and truck efficiency improvements could contribute to cumulative CO₂ emissions reductions of up to c.9Mt through to 2030



Why did 2ZERO call for this work?



What do we want to achieve?



Contribute to Europe having the first carbon-neutral road transport system by 2050

Technology leadership supporting economic growth and job safeguard, creation all over Europe Ensure European
competitiveness thanks
to solutions for an
integrated carbon
neutral road transport
ecosystem

Improve the health and quality of life of EU citizens and ensure mobility for people and goods

2Zero 4 pillars

Vehicle technologies and vehicle propulsion solutions for BEV and FCEV

Innovative concepts, solutions and services for the zero emission mobility of people and goods

Integration of the battery electric vehicle into the energy system and related charging infrastructure

LCA and circular economy approaches for sustainable and innovative road mobility solutions

Why did 2ZERO call for this work?

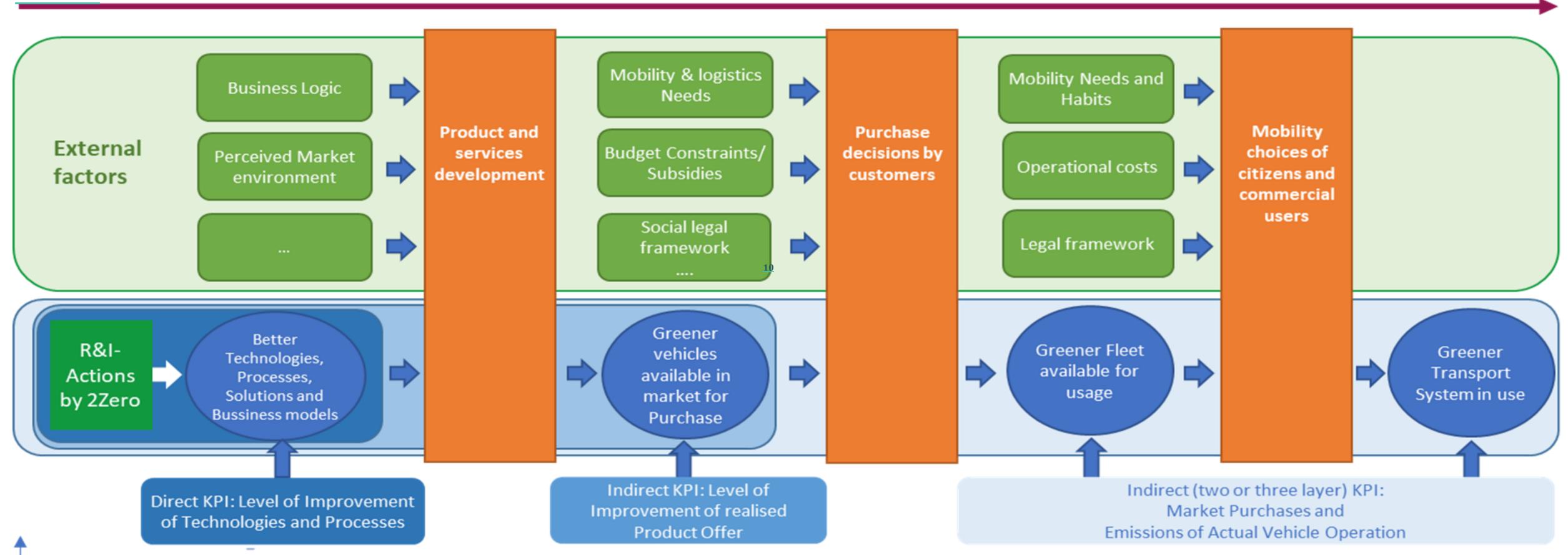


- The 2ZERO Partnership, the successful completion of projects within its work programme, will be an integral part of the strategy for making Europe the first climate-neutral continent by 2050 and of the European Green Deal
- Furthermore, the 2ZERO Partnership will make a contribution to achieving the following UN goals: SDG13 "Climate Action"; SGD7 "Affordable and clean energy"; SDG11 "Sustainable cities and communities"; SDG8 "Decent work and economic growth"; & SDG12 on "Responsible consumption and production".
- However, the route towards these impacts and the time period until they are realised are long, the external factors many
- Therefore, the 2ZERO Partnership has a structured set of General, Specific and Operational Objectives, each with defined targets and key performance indicators, and prescribed reporting
- Through the determination of the method for measuring these KPI and the initial measurement thereof, the LeMesurier project will provide the "how" and a "first assessment of" the potential impact of the 2ZERO Partnership

2ZERO: influence and KPIs over time



time



Influence of 2Zero

The 2ZERO Partnership SRIA





- Contribute to Europe having the first carbonneutral road transport system by 2050 - Ensure technology

- Ensure technology leadership supporting economic growth and job creation all over Europe
- Ensure European competitiveness thanks to solutions for an integrated carbonneutral road transport ecosystem
- Improve the quality of life of EU citizens and ensure mobility for people and goods

CIFIC OBJECTIVES

- Develop zero tailpipe emission, affordable, usercentric solutions (technologies and services) for road-based mobility all across Europe and accelerate their acceptance to improve air quality in urban areas and beyond
- Develop affordable, userfriendly charging infrastructure concepts and technologies that include vehicle and grid interaction
- Support the development of life-cycle analysis tools and skills for the effective design, assessment and deployment of innovative concepts in products/services in a circular economy context
- Develop technologies and solutions to reduce nonpowertrain related emissions and transport related noise
- Demonstrate innovative use cases for the integration of zero tailpipe emission vehicles and infrastructure concepts for the road mobility of people and goods

Development of affordable innovative BEV and FCEV concepts and technologies Development and demonstration of affordable new vehicles solutions,

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- Development and demonstration of affordable new vehicles solutions, charging technologies and services for mass market to enable 1000km long distance trips with no more than 10% additional time compared to conventional solutions, considering economic and environmental assessment
- Broad stakeholder coverage over the different sectors involved
- Number of SMEs in projects funded by the partnership
- Demonstration of zero-emission LDV, passenger cars and commercial use, to reduce TCO compared to conventional vehicles by 20% for the widest usages
- Development and demonstration of solutions for pervasive, user-friendly, low-cost and interoperable low-power and efficient high/ultrahigh-power charging infrastructure
- To support standardisation activities
- To provide scientific input for informed regulation
- Development of affordable innovative BEV and FCEV concepts and technologies
- Development and demonstration of interoperable smart charging and bidirectional energy services and solutions accepted by the users and providing services to the energy grid
- Number of publications
- Number of patent applications
- To ensure a wide dissemination of activities and results

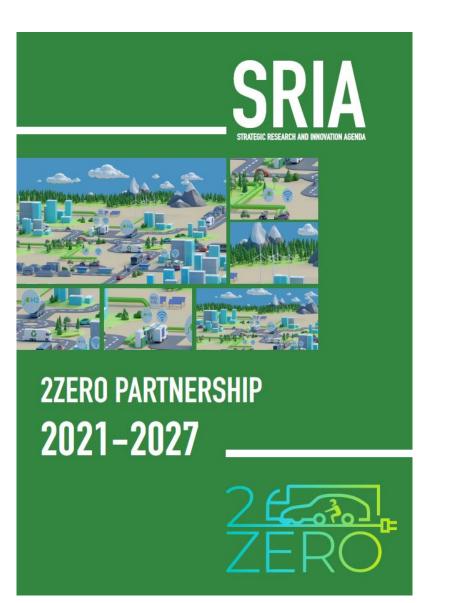
What is a measure of success?

Please use quantitative (Key
Performance) and qualitative
indicators, and link them to a

point in time

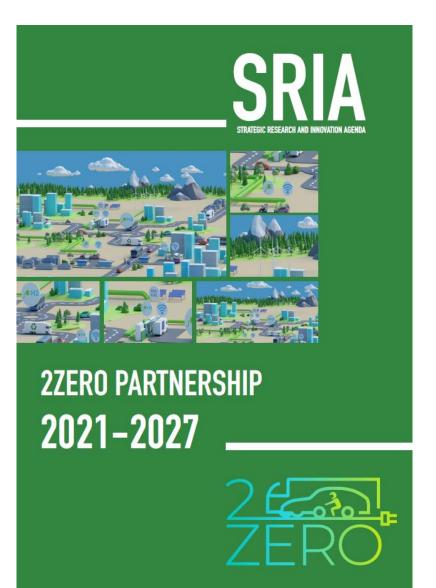
	Eu. opean Partnersh	nip 2Zero	Monitoring and evaluation framework, [March 2021]				
Europe with a innovation, pro	system approach. It will impro	et an ambitious research programm we air quality, the mobility safety o ng the way to a climate neutral road	of people and of goods, i	ience e sure future Eur	opean leadership in		
Objectives		What is a measure of success? Please use quantitative (Key Performance) and qualitative indicators, and link them to a point in time	Which is the data source and up modology used [project data, study,]	Who is responsible for monitoring and providing the data / information When will it be collected?	Baseline and target		
General objectives	Contribute to Europe having the first carbon- neutral road transport system by 2050;	Proportion of climate related spending (climate mainstreaming) in Horizon Europe spending	CORDA Reporting	EC Part of the ex-post evaluation	Baseline 2020		
	Technology leadership supporting economic growth and job creation	FTE jobs supported in entities involved in Horizon projects addressing the European Green Deal per year	Horizon Dashboard	EC Part of the ex-post evaluation	Baseline 2020		
	Ensure European competitiveness thanks to solutions for a made transport ecosystem; Improve the quality of life	Reduction of CO ₂ emission from road transport for all types of vehicles	EEA report	EC / Association Part of the ex-post evaluation	Baseline 1990 Contribution to the overall target of 55% reduction of CO2 emission in 2030 (public target) e.g. number of projects contributing to CO2 reduction		





	European Partnersh	ip 2Zero	Monitoring and evaluation framework, [March 2021]				
Europe with a sy innovation, prod	stem approach. It will impro	et an ambitious research programm we air quality, the mobility safety o ng the way to a climate neutral road	of people and of goods, l	nence ensure future Eur	ropean leadership in		
Objectives	KPI	Please use quanter of success? Please use quanter of success? Performance) as indicators, and point in time Single Source	source and methodology used [project data, study,]	Who is responsible for monitoring and providata / inf When wil collected?			
General objectives	Contribute to Europe having the first carbon-neutral road transport system by 2050;	Proportion of climate related spending (climate mainstreaming) in Horizon Europe spending	CORDA Reporting	Part of the ex-post evaluation	Baseline 2020		
	Technology leadership supporting economic growth and job creation	FTE jobs supported in entities involved in Horizon projects addressing the European Green Deal per year	Horizon Dashboard	EC Part of the ex-post evaluation	Baseline 2020		
	all over Europe; Ensure European competitiveness thanks to solutions for an integrated carbon neutral road transport ecosystem; Improve the quality of life	Reduction of CO ₂ emission from road transport for all types of vehicles	EEA report	EC / Association Part of the ex-post evaluation	Baseline 1990 Contribution to the overall target of 55% reduction of CO ₂ emission in 2030 (public target) e.g. number of projects contributing to CO ₂ reduction		





"Advisory" Footnote

Objectives		What is a measure of success? Please use quantitative (Key Performance) and qualitative indicators, and link them to a point in time	Which is the data source and methodology used [project data, study,]	Who is responsible for monitoring and providing the data / information When will it be collected?	Baseline and target
					vehicles of at least 60% by 2025 and 90% by 2030 ⁴ .
		Number of (publicly available) electric recharging and hydrogen refuelling stations	CEF report Dir 20014/94/EU (AFID) related	EC Part of the ex-post evaluation	Baseline 2020
Add Short Title Here	KPI	available i Multiple Sources	reporting (National Implementation Reports – NIRs) EAFO	Multip	12030 (
Specific objectives	Develop zero tailpipe emission, affordable user- centric solutions (technologies and	Ability of determining realistically and reliably the energy intensity (tank-to-wheel)	Projects results via digital twin ⁵	Associati EC / CINEA / unded projects (biannual)	Baseline 2020 Targets: Reduction of GHG and energy intensity of mobility
	services) for road-based mobility all across Europe and accelerate their acceptance to improve air	Reduce GHG of mobility of people and goods (expressed in tonCO2eq /pkm or tkm and toe ⁶ /pkm and toe/tkm)	Projects results via digital twin	Association / EC / CINEA / funded projects (biannual)	by 30% for personal mobility and 25 % for freight by 2030

⁴ Provided that a drastic cost reduction of batteries occurred.

⁵ provided that a common methodology is agreed among stakeholders

⁶ tonne of oil equivalent



	European Partnersh	nip 2Zero	Monitoring	and evaluation frame	work, [March 2021]						
Europe with a sy innovation, prod	Overall vision: The 2Zero partnership will set an ambitious research programme to accelerate the development of zero tailpipe emission road transport in Europe with a system approach. It will improve air quality, the mobility safety of people and of goods, hence ensure future European leadership in innovation, production and services. By paving the way to a climate neutral road transport system, the partnership will make a key contribution to the success of the European Green Deal.										
Objectives	КРІ	What is a measure of success? Please use quant Performance) at indicators, and point in time Single Source	Which is the data source and methodology used [project data, study,]	Who is responsible for monitoring and providata / inf When will collected?	le Single						
General objectives	Contribute to Europe having the first carbon-neutral road transport system by 2050;	Proportion of climate related spending (climate mainstreaming) in Horizon Europe spending	CORDA Reporting	Part of the ex-post evaluation	Baseline 2020						
	Technology leadership supporting economic growth and job creation	FTE jobs supported in entities involved in Horizon projects addressing the European Green Deal per year	Horizon Dashboard	EC Part of the ex-post evaluation	Baseline 2020						
	all over Europe; Ensure European competitiveness thanks to solutions for an integrated carbon neutral road transport ecosystem; Improve the quality of life	Reduction of CO ₂ emission from road transport for all types of vehicles	EEA report	EC / Association Part of the ex-post evaluation	Baseline 1990 Contribution to the overall target of 55% reduction of CO ₂ emission in 2030 (public target) e.g. number of projects contributing to CO ₂ reduction						

Objectives		What is a measure of success? Please use quantitative (Key Performance) and qualitative indicators, and link them to a point in time	Which is the data source and methodology used [project data, study,]	Who is responsible for monitoring and providing the data / information When will it be collected?	Baseline and target	
	KPI	Number of (publicly available) electric recharging and hydrogen refuelling stations available i Multiple Sources	CEF report Dir 20014/94/EU (AFID) related reporting (National Implementation Reports – NIRs) EAFO	EC Part of the ex-post evaluation Multip	2030 (
Specific objectives	Develop zero tailpipe emission, affordable user- centric solutions (technologies and services) for road-based mobility all across Europe and accelerate their acceptance to improve air	Ability of determining realistically and reliably the energy intensity (tank-to-wheel) Reduce GHG of mobility of people and goods (expressed in tonCO2eq /pkm or tkm and toe ⁶ /pkm and toe/tkm)	Projects results via digital twin ⁵ Projects results via digital twin	Associati EC / CINEA / unded projects (biannual) Association / EC / CINEA / funded projects (biannual)	Baseline 2020 Targets: Reduction of GHG and energy intensity of mobility by 30% for personal mobility and 25 % for freight by 2030	

14

= "Compound KPI"

^{= &}quot;Direct KPI"

⁴ Provided that a drastic cost reduction of batteries occurred.

⁵ provided that a common methodology is agreed among stakeholders

⁶ tonne of oil equivalent





- GO.KPI.1 Proportion of climate related spending (climate mainstreaming) in Horizon Europe spending;
- **GO.KPI.2** FTE jobs supported in entities involved in Horizon projects addressing the European Green Deal per year;
- GO.KPI.3 Reduction of CO₂ emission from road transport for all types of vehicles;
- **GO.KPI.4** Number of new vehicle registration of zero tailpipe emission vehicle in Europe in 2030, both for passenger cars/light duty vehicles (L Cat included) and for commercial vehicles;
- **GO.KPI.5** Increased affordability of the zero tailpipe emission vehicles;
- **GO.KPI.6** Number of (publicly available) electric recharging and hydrogen refuelling stations available in the EU in 2030.

• • • •

• **SO.KPI.11** Feasibility of advanced circular economy strategies in zero emission mobility solutions demonstrated by performed use cases;

•

• **OO.KPI.1** Demonstration of technologies, components, systems and their integration in vehicles enabling affordability, high efficiency and fast charging capability;

• • •

GO. General Objective SO. Specific Objective OO. Operational Objective

Objectives: KPIs, ... Compound





 There are not too many ... but each requires complex analysis to determine:

- GO.KPI.3 Reduction of CO₂ emission from road transport for all types of vehicles;
- •
- **SO.KPI.1** Ability to determine realistically and reliably the energy intensity (tank to wheel);
- **SO.KPI.2** Reduce GHG of mobility of people and goods (expressed in tonCO₂eq/p.km or tonCO₂eq/p.km t.km and toe/pkm or toe/t.km);

- GO. General Objective
- SO. Specific Objective
- OO. Operational Objective

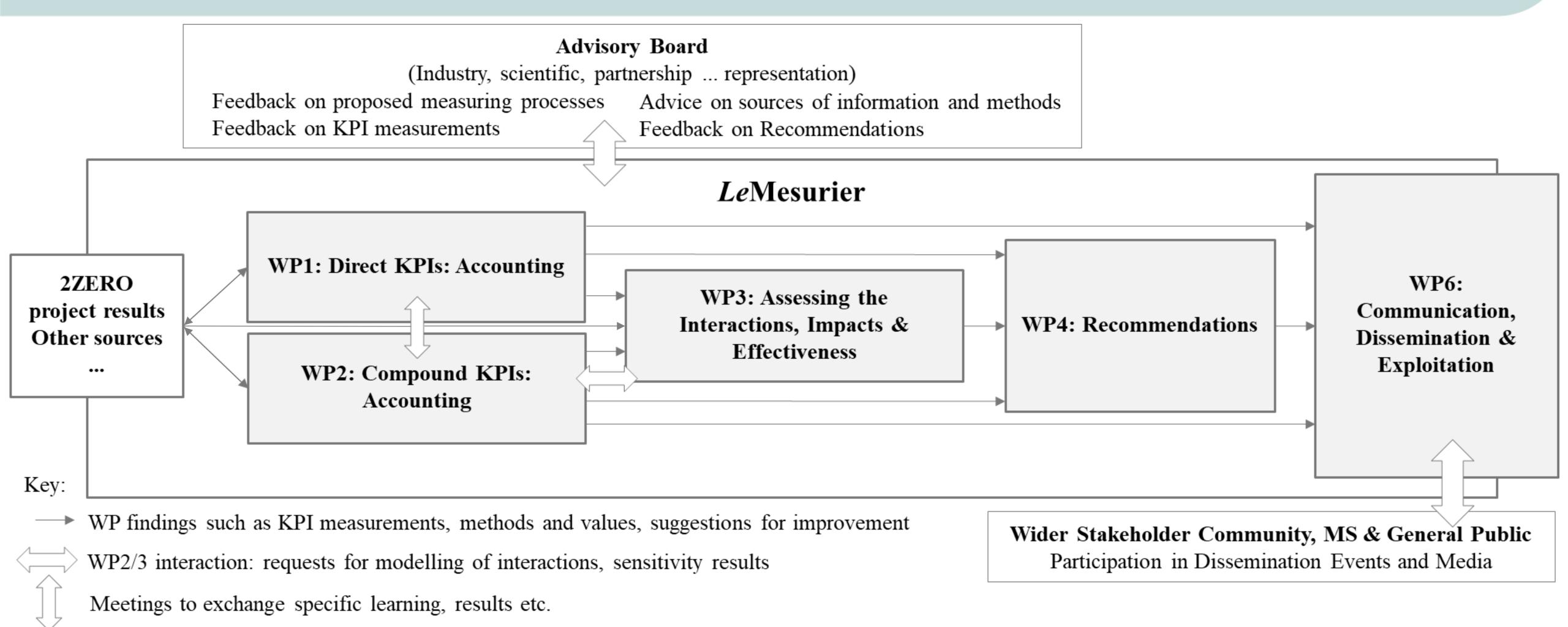


The *Le*Mesurier Project

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

Project Flow





Project Objectives



Objective 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).

Objective 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 gleaned from the 2ZERO Partnership project results.

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

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

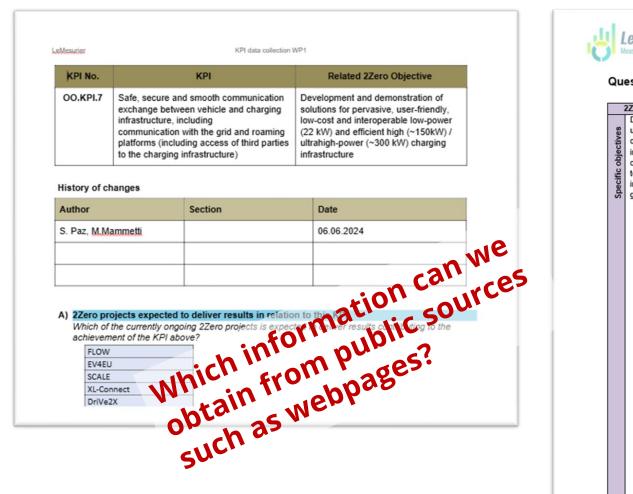


The Findings so far WP1: Direct KPIs WP2: Compound KPIs

Necessary steps towards KPI assessment...



PUBLIC DATA

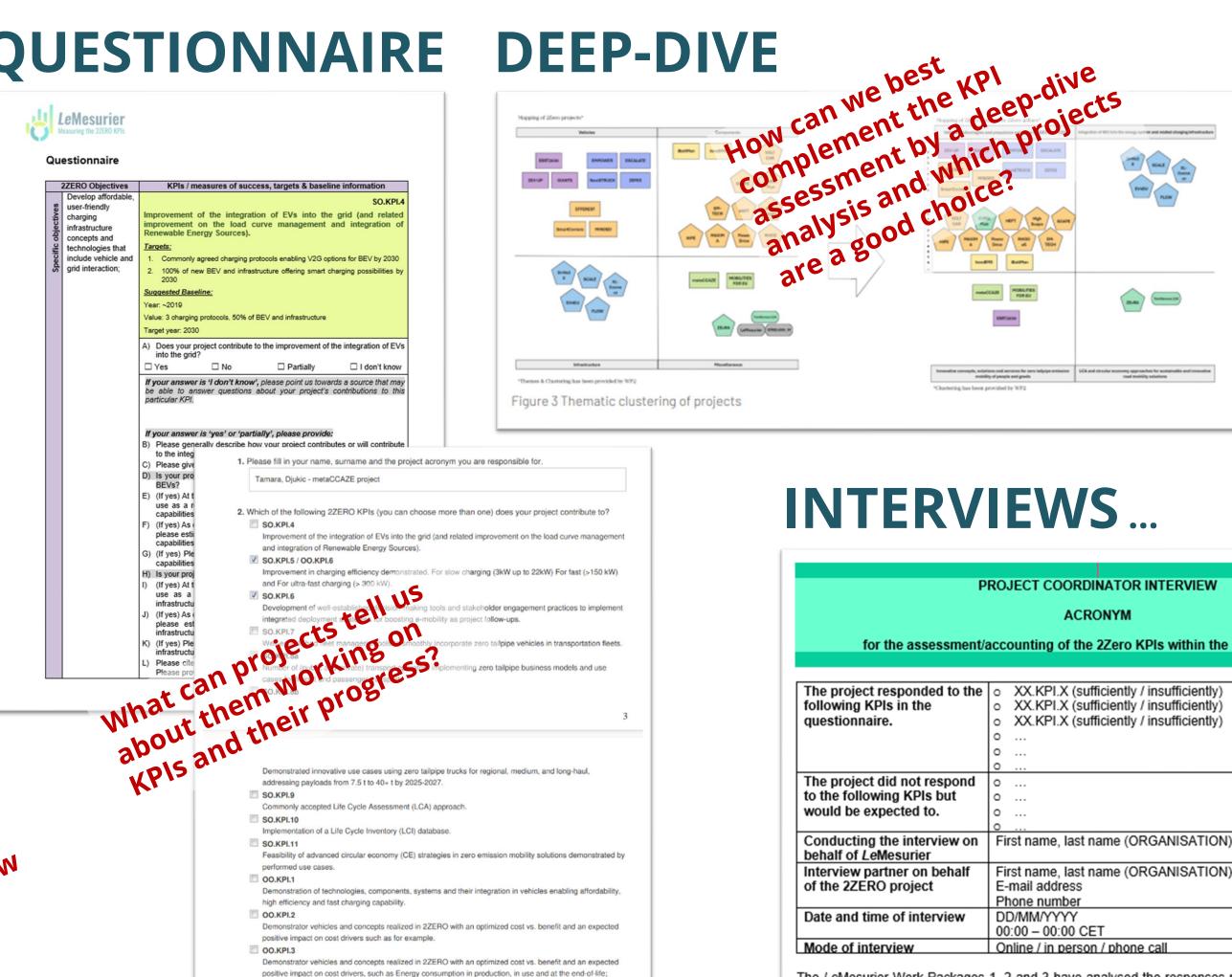


FRAMEWORK



D1.1 - Methods, frameworks & actines to assess the standard seed to know the seed to know t Key Performance Indicators of the

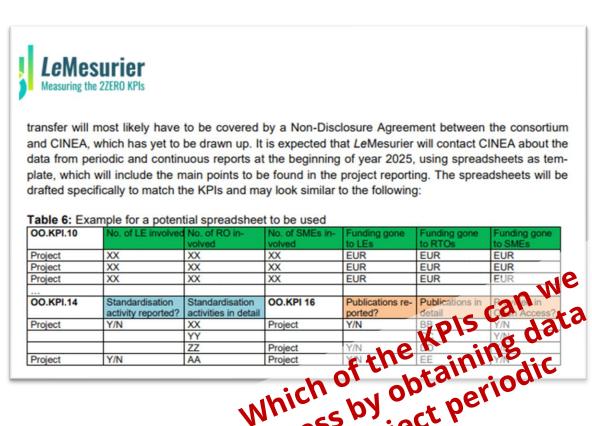
QUESTIONNAIRE DEEP-DIVE



Material used: Production steps and number of parts and; Usage models and productivity.

Demonstration of technologies, components, systems and their integration in vehicles enabling affordability

STATISTICS



INTERVIEWS...

Pl	ROJECT COORDINATOR INTERVIEW	
	ACRONYM	
for the assessment/a	accounting of the 2Zero KPIs within the LeMesurier CS	SA .
The project responded to the following KPIs in the questionnaire.	XX.KPI.X (sufficiently / insufficiently) XX.KPI.X (sufficiently / insufficiently) XX.KPI.X (sufficiently / insufficiently)	thich are the open need to thich are that we need to that we need to the the
The project did not respond to the following KPIs but would be expected to.	0 0 0	thich are that we with a thich are that we with a thick in interviews with a skin interview with a skin inte
Conducting the interview on behalf of LeMesurier	First name, last name (ORGANISATION)	ques in incorspers
Interview partner on behalf of the 2ZERO project	First name, last name (ORGANISATION) E-mail address Phone number	askidinati
Date and time of interview	DD/MM/YYYY 00:00 - 00:00 CET	
Mode of interview	Online / in person / phone call	
	1, 2 and 3 have analysed the responses received to the 024 and need further information to clarify certain points.	

misunderstandings and/or to receive the required level of detail in the responses. To obtain the answers

23.44

Questionnaire: thank you to all who responded



This format allowed for a simplified

This format allowed for a simplified

and questions and representation of KPIs and questions of KPIs and questions and representation of KPIs and questions and representation of KPIs and questions and representation of KPIs and questions.



Coordination and Support Action (CSA)
Project No. 101137477 | HORIZON-CL5-2023-D5-01-05

Background

The 2ZERO Partnership has a set of Key Performance Indicators (KPIs) aligned with its three-layered Objectives, as outlined in its SRIA (Strategic Research and Innovation Agenda[1]). The LeMesurier CSA project is taking the lead in creating a framework to monitor and measure the effectiveness of the 2ZERO Partnership towards its sustainable road transport research and innovation goals.

LeMesurier aims to establish values for and the projected variation of these KPIs over the next decade. This analysis will be based on data gathered from ongoing projects within the 2ZERO Partnership, along with an assessment of their projected impacts. The LeMesurier project's findings will be disseminated to a broad audience, encompassing stakeholders within the road transport sector, policymakers across member states and the general public.

Accounting the 2ZERO KPIs involves accurately collecting data from diverse sources, compiling it and interpreting the KPI development over time. This process should, ultimately, paint a picture of the effectiveness of the 2ZERO Partnership towards achieving its Objectives.

LeMesurier's conclusions will not only be valuable for assessing 2ZERO's current effectiveness but may also contribute to the future 2ZERO calls and resulting projects. The LeMesurier project's findings will serve as a guide for subsequent consortia, on how to direct their efforts towards the 2ZERO Partnership Objectives, suggesting methods for monitoring of project progress.

Here's where your project's results come into play: your project's contribution is key to 2ZERO's success!

We have used public domain sources, such as OpenAIRE, CORDIS and project websites to gain as much information as possible as to how the 2ZERO projects are contributing to the achievement of the 2ZERO targets, as measured via the KPIs. However, there is still information missing, which is where you can contribute: answering this questionnaire will allow us direct access to how your project is contributing to the 2ZERO Objectives.

Your participation in this survey is important.

As a recipient of funding via the 2ZERO Partnership, you are required to support the Partnership monitoring exercise. Responding to this LeMesurier survey will contribute to such support.

Participation in the survey

- Participating projects will be publicly acknowledged in LeMesurier reports and presentations, confirming the project support to taking the Partnership forward.
- The survey data will be used to generate insights and benchmarks for the entire 2ZERO Partnership and identify best practices.
 Quantify project impact on the 2ZERO Partnership's Objectives and KPIs, strengthening your project's success narrative.
- Overview of the questionnaire

The questions in the following table are based on the information of the 2ZERO_SRIA (Strategic Research and Innovation Agenda) and correlate the objectives with their KPIs, their baseline timing and value plus the targets for each KPI. Hence, in the first instance, answers are expected in relation to Europe and its road transport sector.

There are many KPIs, hence an identifier per KPI is used in the format "GO.KPI.X" for KPIs related to the 2ZERO General Objectives, "SO.KPI.X" for KPIs related to Specific Objectives and "OO.KPI.X" for KPIs related to Operational Objectives. This identifier will be used for easier administration in the LeMesurier project. Clearly your project does not relate to all KPIs, hence please only answer questions to those relevant to your project.

The baseline timing refers usually to 2019, with a few exceptions. Please let us know if you have used alternative baseline values to those suggested for your project.

At the end of the questionnaire, there is a broader question related to more generic objective parameters for road transport research. Please just let us know which of these parameters is relevant for your project. We may come back to related these particular answers at a future date.

Structure of the questionnaire

The projects for which we already had collected information previously received a pre-filled Word document along with the link to the online questionnaire

ease fill in your name, surname	and th	e proje	a acronym yo	u are responsible for.		
nich of the following 2ZERO KF	ols (vou	can ch	oose more tha	an one) does your project contribute to?		
SO.KPI.4	.5 () 00					
	of EVs i	into the	grid (and relate	d improvement on the load curve management and integration of Renewable Energy Sources).		
SO.KPI.5 / OO.KPI.6	nau dan	nonetrat	ad Ear slaw ab	arging (3kW up to 22kW) For fast (>150 kW) and For ultra-fast charging (> 300 kW).		
SO.KPI.6	ncy den	IIOIISII al	eu. Foi slow cri	aiging (SKVV up to 22kVV) For last (>100 kVV) and For ultra-last charging (> 300 kVV).		
Development of well-established decision-making tools and stakeholder engagement practices to implement integrated deployment strategies for boosting e-						
mobility as project follow-ups. SO.KPI.7						
	ial tools	to smoo	othly incorporate	e zero tailpipe vehicles in transportation fleets.		
SO.KPI.8a						
SO.KPI.8b	transpor	n operat	ors implementi	ng zero tailpipe business models and use cases for freight and passenger transport.		
	ases usi	ing zero	tailpipe trucks	for regional, medium, and long-haul, addressing payloads from 7.5 t to 40+ t by 2025-2027.		
SO.KPI.9 Commonly accepted Life Cycle	Account	ment (I	CA) annmanh			
SO.KPI.10	M33E33	ment (L	ону арргоаст.			
Implementation of a Life Cycle	Inventor	y (LCI)	database.			
SO.KPI.11 Feasibility of advanced circular	econom	ny (CE)	strategies in ze	ro emission mobility solutions demonstrated by performed use cases.		
00.KPI.1				**************************************		
Demonstration of technologies, OO.KPI.2	compor	nents, s	stems and the	ir integration in vehicles enabling affordability, high efficiency and fast charging capability.		
	cepts re	alized in	2ZERO with a	n optimized cost vs. benefit and an expected positive impact on cost drivers such as for		
example. OO.KPI.3						
	cepts re	alized in	2ZERO with a	n optimized cost vs. benefit and an expected positive impact on cost drivers, such as Energy		
-	se and	at the er	nd-of-life; Mater	ial used; Production steps and number of parts and; Usage models and productivity.		
OO.KPI.4 Demonstration of technologies.	compor	nents, s	vstems and the	ir integration in vehicles enabling affordability, high efficiency and fast charging capability.		
OO.KPI.5						
Optimal balance between batter OO.KPI.7	ry size,	user ne	eds and rechar	ging infrastructure capabilities identified from EU funded projects.		
	unicatio	n excha	nge between v	ehicle and charging infrastructure, including communication with the grid and roaming platforms		
(including access of third partie	s to the	chargin	g infrastructure).		
OO.KPI.8 Definition of dynamic load mana	agemen	t profile:	s for specific sn	nart and bidirectional charging scenarios (office building, private house/garage, public space) by		
EU funded projects, allowing ef	_			hat can lead to increase RES penetration.		
OO.KPI.9 Demonstrated charging operation	ons and	nninaus	the freight and	logistics requirements avoiding logistics losses.		
SO.KPI.1	VII3, 0113	Sweinig	uie ireigiit airu	logistics requirements avoiding rogistics rosses.		
Ability of determining realistical SO KPL2	ly and re	eliably th	e energy inten	sity (tank-to-wheel).		
	ple and	goods (expressed in to	nCO2eq./pkm or tkm and toe /pkm and toe/tkm).		
SO.KPI.3						
Reduction of time and effort nee GO.KPI.3	eded for	the dev	elopment of ze	ro tailpipe emission solutions		
Reduction of CO ₂ emission from	m road t	ransport	for all types of	vehicles		
es your project contribute to th	e follow	ving are	as?			
	YES	NO	PARTIALLY			
Carbon Neutrality	0	0	0			
Air Pollution and Health Effects	0	0	0			
European Competitiveness	0	0	0			

0 0 0

0 0 0

0

0 0

Technology Leadership

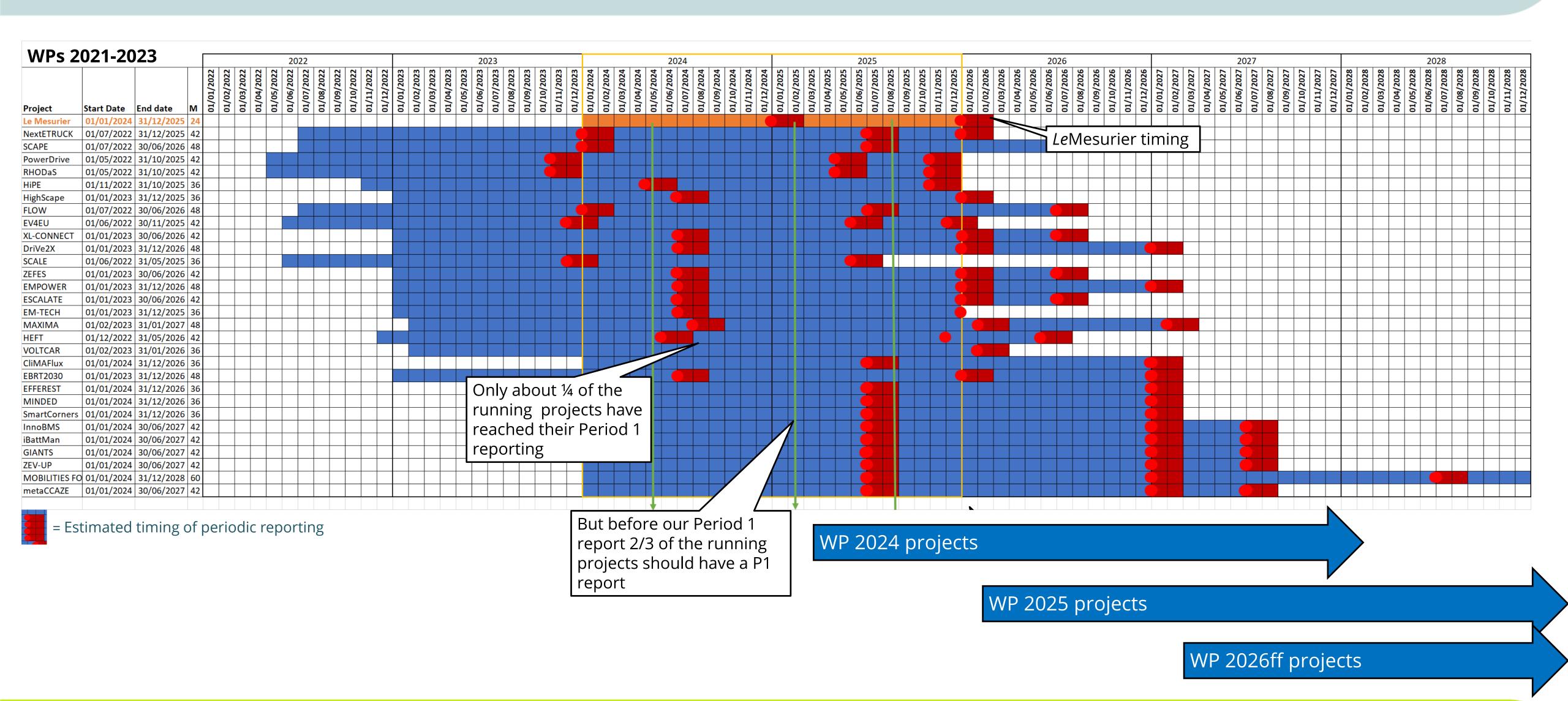
Economic Growth

Circular Economy

SO.KPI.4 Improvement of the integration of EVs into the grid (and related improvement on the load curve management and integration of Renewable Energy Sources) Targets: 1. Commonly agreed charging protocols enabling V2G options for BEV by 2030 2. 100% of new BEV and infrastructure offering smart charging possibilities by 2030 Suggested Baseline: Year: ~2019 Value: 3 charging protocols, 50% of BEV and infrastructure Target year: 2030
Does your project contribute to the improvement of the integration of EVs into the grid? YES NO PARTIALLY I DONT KNOW
Please generally describe how your project contributes or will contribute to the integration of EVs into the grid. Text of 1 to 2000 characters will be accepted O out of 2000 characters used.
Please give an estimate of when relevant project results are expected. Text of 1 to 2000 characters will be accepted O out of 2000 characters used.
Is your project working on charging protocols enabling V2G options for BEVs? YES NO
Is your project working on smart charging possibilities for BEVs? YES NO
Please cite project publications or results that support your statements. Please provide web-links where feasible. Text of 1 to 2000 characters will be accepted 0 out of 2000 characters used.
Have you encountered any specific issues in your work that hindered improving the integration of EVs into the grid? YES NO
Would answering one or more of the questions above cause a potential confidentiality issue? If so, please explain. Text of 1 to 2000 characters will be accepted O out of 2000 characters used.

The projects that have contributed

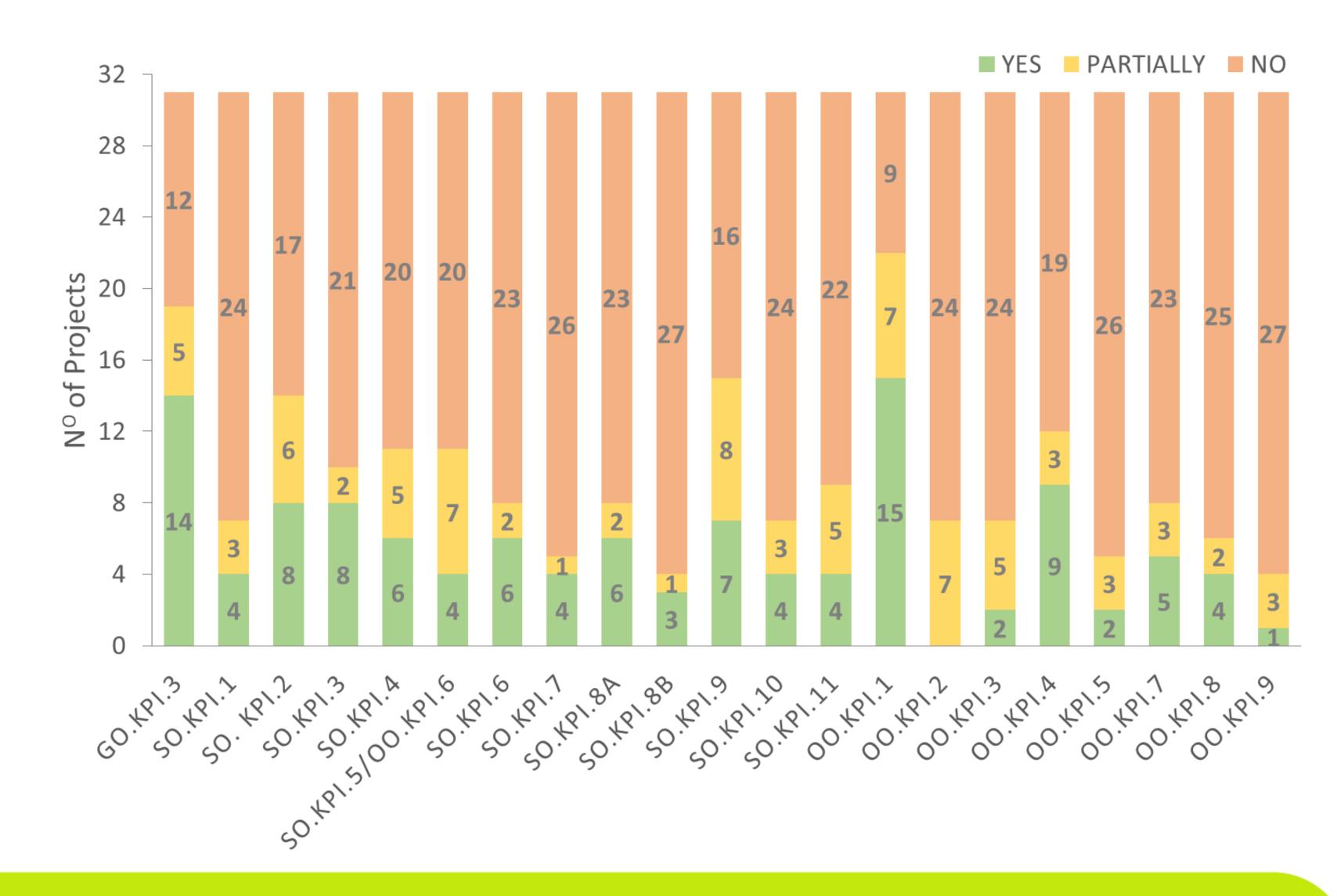




Questionnaire evaluation: Projects' contributions to KPIs



- GO.KPI.3 & OO.KPI.1 show high alignment with projects' ambitions and results
- SO.KPI.2, SO.KPI.3 & OO.KPI.4 show good alignment with projects' ambitions and results
- OO.KPI.3, OO.KPI.5 & OO.KPI.9 show lower alignment with projects' ambitions and results



Overview: Direct KPI assessment

Accomplished	Measured and reached
Progressed	Measured and progression
Static	No progress measured
Inconclusive	Measurement inconclusive



KPI Identifier	KPI description	Status after initial assessment					
		Accomplished	Progressed	Static	Inconclusive		
GO.KPI.1	Proportion of climate related spending (climate mainstream) in Horizon Europe spending						
GO.KPI.2	FTE jobs supported in entities involved in Horizon projects addressing the European Green Deal per year						
GO.KPI.3	Reduction of CO2 emission from road transport for all types of vehicles		Compour	nd KPI			
	Number of new vehicle registration of zero tailpipe emission vehicle in Europe in 2030, both for passenger						
GO.KPI.4	cars/light duty vehicles (L Cat included) and for commercial vehicles						
GO.KPI.5	Increased affordability of the zero tailpipe emission vehicles						
GO.KPI.6	Number of (publicly available) electric recharging and hydrogen refuelling stations available in the EU in 2030						
KPI Identifier	KPI description	Status after in	tial assessme	ent			
		Accomplished	Progressed	Static	Inconclusive		
SO.KPI.1	Ability to determine realistically and reliably the energy intensity (tank-to-wheel)		Compour	nd KPI	•		
SO. KPI.2	Reduce GHG of mobility of people and goods (expressed in tonCO2eq /pkm or tkm and toe /pkm and toe/tkm)		Compour	nd KPI			
SO.KPI.3	Reduction of development time and effort						
	Improvement of the integration of EVs into the grid (and related improvement on the load curve management and						
SO.KPI.4	integration of Renewable Energy Sources)						
	Improvement of charging efficiency demonstrated - For slow charging (3kW up to 22kW) - For fast (>150 kW) and						
SO.KPI.5	ultra-fast charging (> 300 kW)						
	Development of well-established decision-making tools and stakeholder engagement practices to implement						
SO.KPI.6	integrated deployment strategies for boosting e-mobility as project follow-ups						
SO.KPI.7	Well established fleet managerial tools to smoothly incorporate zero tailpipe vehicles in transportation fleets						
	Number of (public and private) transport operators implementing zero tailpipe business models and use cases for						
SO.KPI.8a	freight transport and people mobility						
	Demonstrated innovative use cases using zero tailpipe trucks for regional, medium and long-haul addressing						
SO.KPI.8b	payloads from 7.5 tn to 40+ tn by 2025-2027						
SO.KPI.9	Commonly accepted LCA approach						
SO.KPI.10	Implementation of an LCI database						
	Feasibility of advanced circular economy strategies in zero emission mobility solutions demonstrated by						
SO.KPI.11	performed use cases						

SO.KPI.8a target: 30 companies involved in use cases, 30 passenger and freight transport use cases demonstrated → 130 private for profit companies, 49 use cases, 29 transport operators

Overview: Direct KPI assessment

Accomplished	Measured and reached
Progressed	Measured and progression
Static	No progress measured
Inconclusive	Measurement inconclusive



KPI Identifier	KPI description	Status after initial assessment					
		Accomplished	Progressed	Static	Inconclusive		
	Demonstration of technologies, components, systems and their integration in vehicles enabling affordability,						
OO.KPI.1	high efficiency and fast charging capability						
	Demonstrator vehicles and concepts realized in 2Zero with an optimized cost vs. benefit and an expected positive						
OO.KPI.2	impact on cost drivers						
	Demonstrator vehicles and concepts realized in 2Zero with an optimized cost vs. benefit and an expected positive						
OO.KPI.3	impact on cost drivers						
	Demonstration of technologies, components, systems and their integration in vehicles enabling affordability,						
OO.KPI.4	high efficiency and fast charging capability						
	Optimal balance between battery size, user needs and re-charging infrastructure capabil-ities identified from EU						
OO.KPI.5	funded projects						
	More efficient technologies and solutions developed in EU funded projects for the development of low-power						
OO.KPI.6	charging infrastructure (<22 kW) and high/ultrahigh-power charging (>300 kWh, up to 1MW for long haul trucks)						
	Safe, secure and smooth communication exchange between vehicle and charging infrastructure, including						
	communication with the grid and roaming platforms (including access of third parties to the charging						
OO.KPI.7	infrastructure)						
	Definition of dynamic load management profiles for specific smart and bidirectional charging scenarios (office						
	building, private house/garage, public space) by EU funded projects, allowing effective grid load management						
OO.KPI.8	that can lead to increase RES penetration						
	Demonstrated charging operations answering the freight and logistics requirements avoiding logistics losses						
OO.KPI.9	penetration						

OO.KPI.2 target:
Successful demonstration of zero-emission LDV in representative use cases by 2ZERO projects with an expected outcome of 20% cost reduction in 2030 compared to the 2020 baseline → Use cases with 20% cost reduction not confirmed, but significant reduction of total cost of ownership confirmed.

Overview: Direct KPI assessment

Accomplished	Measured and reached	
Progressed	Measured and progression	
Static	No progress measured	
Inconclusive	Measurement inconclusive	



KPI Identifier	KPI description	Status after ini	Status after initial assessment			
		Accomplished	Progressed	Static	Inconclusive	
OO.KPI.10	Breakdown of EU funding across stakeholder types					
OO.KPI.11	Breakdown of members in the association					
OO.KPI.12	Share of funding going to SMEs					
	Number of organisations reached in the engagement activities of projects: Advisory boards, dissemination					
OO.KPI.13	activities					
OO.KPI.14	Number of projects launching standardisation activities					
OO.KPI.15	Number of standardisation committee working on topics related to the partnership area					
	IPR (Patent / Utility Model / Industrial Design / Copyright / Trade Mark / Confidential Information) generated in					
OO.KPI.16	funded projects					
OO.KPI.17	Number of publications from funded projects					
OO.KPI.18	2Zero contribution to roadmaps preparation					
OO.KPI.19	SRIA updates					
OO.KPI.20	Number of policy recommendations issued by funded projects					
OO.KPI.21	Total number of events organised by funded projects					
OO.KPI.22	Number of events organised by the Association					
OO.KPI.23	Number of events organized by supporting platforms					
OO.KPI.24	Number of professionals trained in funded projects					
OO.KPI.25	Number of training materials provided by funded projects					
OO.KPI.26	Number of members of the public reached by funded projects					

Assessment results have been summarized in D1.2, which is currently under review.

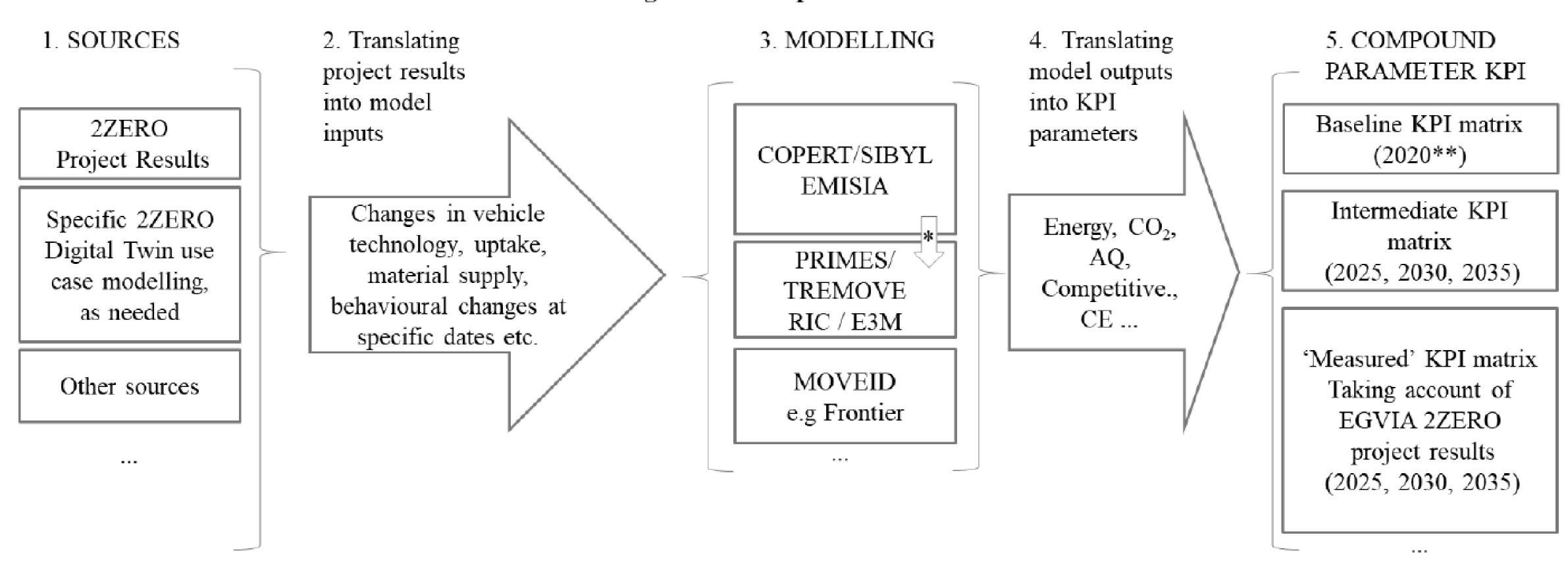
OO.KPI.25 target:

Number of training materials provided by funded projects →
Horizon Europe reporting does not include this information, projects follow-up

Accounting of the Compound KPIs



Accounting for the Compound Parameter KPIs



^{*} PRIMES/TREMOVE uses COPERT from EMISIA as an input

^{**} The Baseline year 2020 was affected by the pandemic, hence whether this year or a pre-pandemic year is appropriate will be determined

Compound KPIs review



The 2ZERO Objectives with Compound KPIs (complex target, multiple sources contribution):

- General Objectives:
 - GO.KPI.3: Reduction of CO₂ emissions from road transport for all types of vehicles
- Specific Objectives:
 - **SO.KPI.1**: Ability to determine, realistically and reliably, the energy intensity (tank-to-wheel)
 - SO. KPI.2: Reduce GHG of mobility of people and goods (expressed in tonCO₂eq./pkm or tkm, and toe/pkm or toe/tkm)
 - **SO. KPI.3**: Reduction of development time and effort

All 2ZERO projects refer to electric propulsion resulting in:

- No direct input for tailpipe emissions (CO_2 , GHG) reduction; but the replacement of the existing powertrains may allow the evaluation to be carried out vs. baseline configuration
- **Direct input** in terms of **energy** efficiency at vehicle level (TtW) or at infrastructure level (WtT) to infer the reduction in view of WP3

Why we use three vehicle parc models



- The Compound KPIs do not exist in any statistical or other database as single, ready-to-use values
- They come out of calculations from **complex models** involving methods that have been developed and are being continuously updated for many years now
- The use of **three different vehicle parc models** within *Le*Mesurier gives a perspective on the likely **KPI variation**
- It gives a **range of projections** and **dispersion of results** to account for the impact of the 2ZERO projects
- It allows for sensitivity analysis and estimation of uncertainties

Overview of the three vehicle parc models





Bottom-up approach on a per country/year basis, EU27 (+ other countries), 1990-2050

- Up-to-date statistical data and relevant legislation, future policies and targets for projections
- Input: stock, activity; Output: energy, air pollutant and GHG emissions
- Granularity: vehicle category, fuel/energy type, segment, Euro standard, age distribution
- Methodology consistent with the <u>EMEP/EEA Emission Inventory Guidebook</u> (CLRTAP and NECD reporting)



PRIMES-TREMOVE is an economic-engineering model for passenger and freight transport, covering all transport modes in the EU27 plus UK, including road, rail, aviation and maritime

- Models a variety of transport measures, including economic, regulatory and infrastructure policies
- Simulates demand and supply dynamics via an optimized mix of technologies and fuels under policy constraints
- Vehicle and fuel choices are endogenous, accounting for purchase and operational costs, technology maturity, market acceptance and infrastructure availability, represented in a dynamic equilibrium system



MOVEID is a linear optimisation model minimising cumulative life-cycle GHG emissions from the EU27+UK road sector including its infrastructure requirements until 2050, subject to constraints

- Considers the infrastructure and raw material requirements of different drivetrains as well as technical ramp-up bottlenecks
- Chooses a mix of powertrains which are allowed to share infrastructure and free it up for reuse when leaving the fleet
- Allows for existing ICE vehicles to switch to e-fuels during their lifetime
- Reports all emissions and energy consumption associated with the road sector

LeMesurier approach



- We collected relevant data from the three vehicle parc models using a common template (stock, activity, energy, CO₂, GHG)
- Each model has a dataset for past years and projections
- This is usually referred to as the model 'baseline' or 'basecase' or 'reference' scenario
- The 2019/2020 values of these datasets formulate the so-called
 - ✓ "LeMesurier Baseline Compound KPI values", i.e. values for the base year 2019/2020
- The values of these datasets for future years formulate the
 - ✓ "Intermediate KPI values"
- The impact of 2ZERO projects produces a different projection formulating the
 - ✓ "Measured KPI values"

Translate project results into model inputs (cont'd)



- Three different cases have been anticipated already since the writing of the *Le*Mesurier proposal
 - 1. The necessary model input data is already available in the projects
 - 2. Data is not available, but the projects possess DTs that can be used to produce the requested results
 - 3. There are no DTs, hence, a 'LeMesurier DT' will be used instead
- Conclusions from the assessment of project responses up to now
 - ✓ Few aggregated values were provided, which need further investigation and contact with the projects
 - ✓ Final results are expected after *Le*Mesurier ends
 - ✓ No answers were given to the project specific questions for detailed information
- Hence, focus has been given to the development of the so-called 'LeMesurier DT'

Translate project results into model inputs (cont'd)



- 'LeMesurier DT' main activity: produce energy consumption values for BEVs and FCEVs operation as a function of speed and other parameters (i.e., temperature, load, vehicle configuration etc.)
- A list of all 2ZERO projects use-cases has been compiled
- Vehicles were classified per category, segment and powertrain
- A physics-based model on multiscale platform has been developed for all vehicle categories: trucks, buses, cars and motorcycles
- For vehicle segments not included in 2ZERO projects, an estimation method is used (i.e., interpolation or extrapolation)
- Work will be presented at the EARPA FORMforum, 2025

Screenshots from Dec. 2024

LeMesurier approach



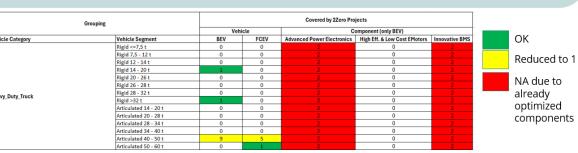
		Filipect Ose-Cases						
Number / Use-Case	Level	Topic	Project	Vehicle Category	Vehicle Segment	Powertrain		
1	Vehicle	ZEV	NextETRUCK	Heavy_Duty_Truck	Rigid 14 - 20 t	BEV		
2	Vehicle	ZEV	ZEFES	Heavy_Duty_Truck	Articulated 50 - 60 t	FCEV		
3	Vehicle	ZEV	ESCALATE	Heavy_Duty_Truck	Articulated 40 - 50 t	FCEV		
4	Vehicle	ZEV	ESCALATE	Heavy_Duty_Truck	Rigid >32 t	BEV		
5	Vehicle	ZEV	ESCALATE	Heavy_Duty_Truck	Articulated 40 - 50 t	BEV		
6	Vehicle	ZEV	EBRT2030	Bus	Urban Buses Articulated >18 t	BEV		
7	Vehicle	ZEV	GIANTS	Motorcycle	Motorcycles 4-stroke 250 - 750 cm3	BEV		
8	Vehicle	ZEV	EFFEREST	Passenger_Car	Medium	BEV		
9	Vehicle	ZEV	MINDED	Bus	Urban Buses Midi <=15 t	BEV		
10	Component	Advanced Power Electronics	SCAPE	Passenger_Car	Medium	BEV		
11	Component	High Eff. & Low Cost EMotors	HEFT	Passenger_Car	All	BEV		
10000	25.00		3000	2000	NAME OF THE PARTY	1000		

- We compiled a list of all 2ZERO projects use-cases
- Vehicles were **classified** per category, segment and powertrain
- Analysis per **project group** (i.e., vehicle/component level for energy calculation etc

2nd General Assembly & Advisory Board Meeting, 9th December 2024

Use-case selection for the simulation model



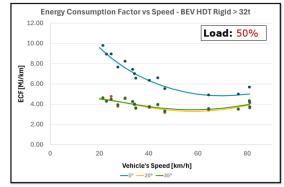


- ✓ **Physics-based** model on multiscale platform
- The set-up and parameterization of the model was based on **public information** (i.e., projects' web sites and deliverables) and assumptions
- For **overlapping** use-cases (i.e., covered by more than one projects) only one was selected
- If vehicle level use-cases already include **optimized components**, component level use-cases are neglected

2nd General Assembly & Advisory Board Meeting, 9th December 2024

Example: BEV truck - energy vs. speed curve





- **Refinements** to model set-up compared to previous GA meeting:
- > Vehicle dynamics, motor map, thermal management and more
- Use of 14 different standardized driving profiles instead of only 1

neral Assembly & Advisory Board Meeting, 9th December 20

'LeMesurier DT': energy consumption of BEVs, FCEVs



Summary of use cases (vehicle categories and segments)

Categories based on COPERT/SIBYL					
Vehicle category	Segment	BEV	FCEV		
	Rigid <=7,5 t		-		
	Rigid 7,5 - 12 t	Estimation	-		
	Rigid 12 - 14 t		-		
	Rigid 14 - 20 t	<i>Le</i> Mesurier DT	-		
	Rigid 20 - 26 t		-		
Heavy duty truck	Rigid 26 - 28 t	Estimation	-		
	Rigid 28 - 32 t		-		
	Rigid >32 t	<i>Le</i> Mesurier DT	-		
	Articulated 14 - 20 t				
	Articulated 20 - 28 t	Estimation	Estimation		
	Articulated 28 - 34 t	Estillation	Estillation		
	Articulated 34 - 40 t				
	Articulated 40 - 50 t	<i>Le</i> Mesurier DT	Le Mesurier DT		
	Articulated 50 - 60 t	Estimation	<i>Le</i> Mesurier DT		
Bus	Urban Buses Midi <=15 t	<i>Le</i> Mesurier DT	-		
	Urban Buses Standard 15 - 18 t	Estimation	-		
	Urban Buses Articulated >18 t	<i>Le</i> Mesurier DT	-		
	Coaches Standard <=18 t	Estimation	-		
Passenger car	Mini	Estimation	-		
	Small	LStillation	-		
	Medium	Le Mesurier DT	-		
	Large-SUV-Executive	Estimation	-		
L-Category	L5e	<i>Le</i> Mesurier DT	_		

Main parameters

Ambient temperature

√5°C

✓ 20 °C

√ 35 °C

Load capacity (relevant for trucks and buses)*

√ 50%

√ 75%

* also, for L5e vehicles used for freight transport

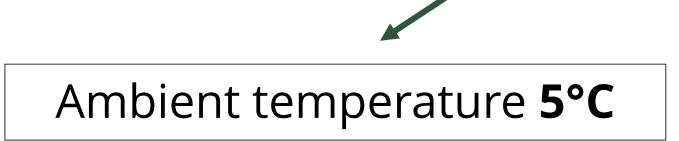
Occupancy rate for passenger cars

√ 1.4 (average number of people)

Results from simulation runs: HDTs Articulated 40-50t BEV

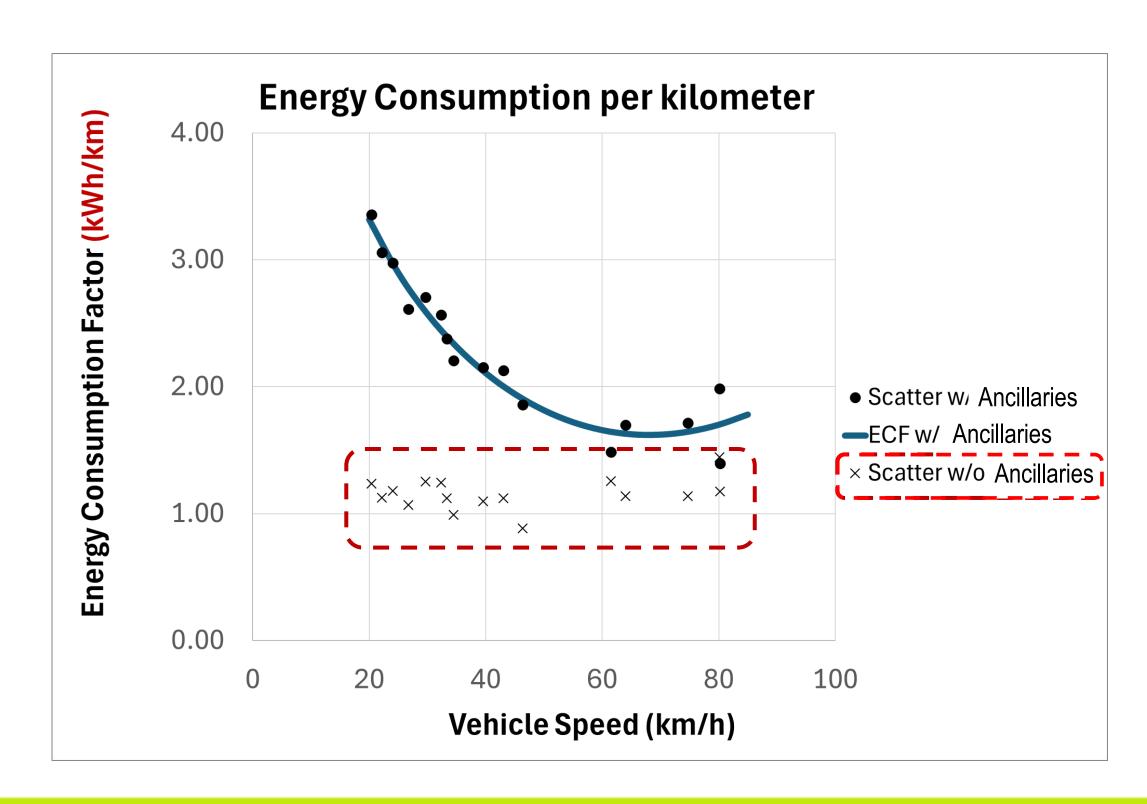


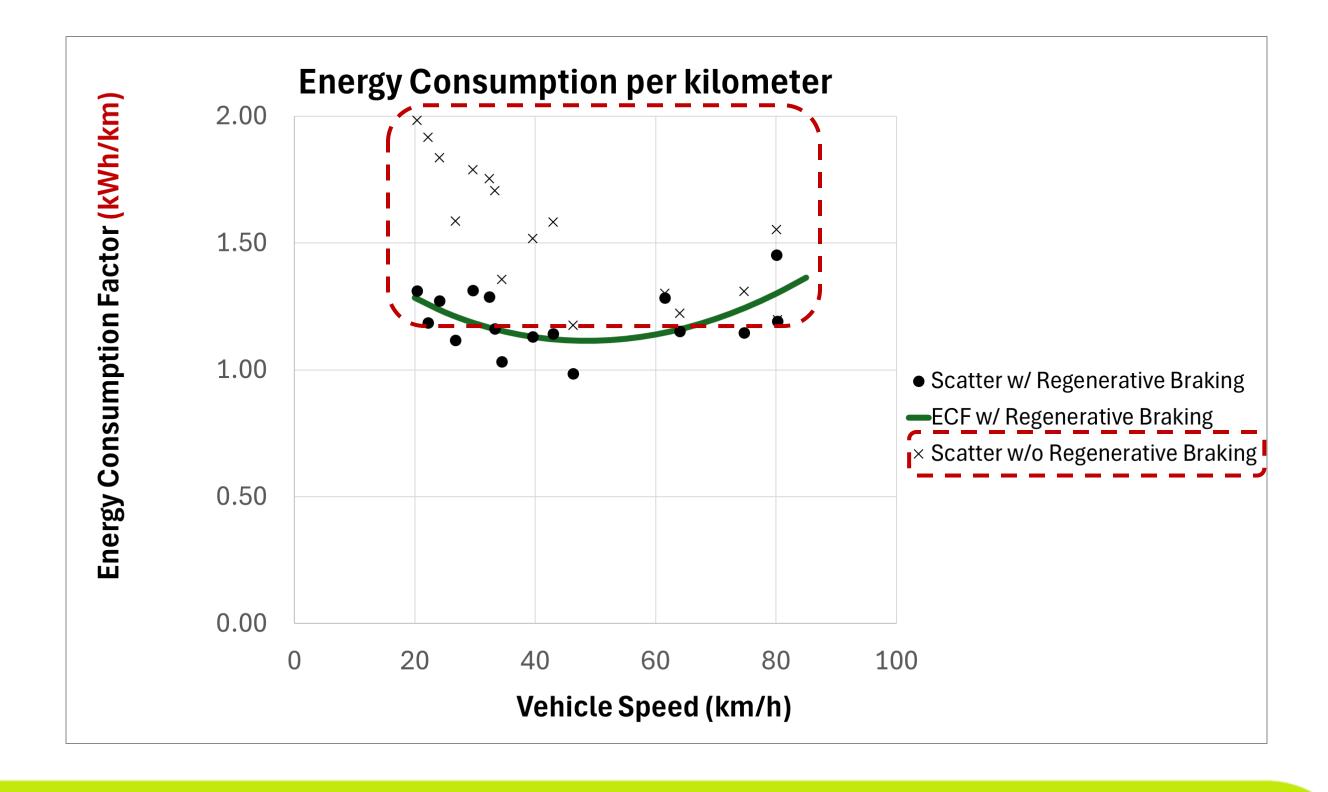
Effects of ancillaries and regenerative braking (load 50%)





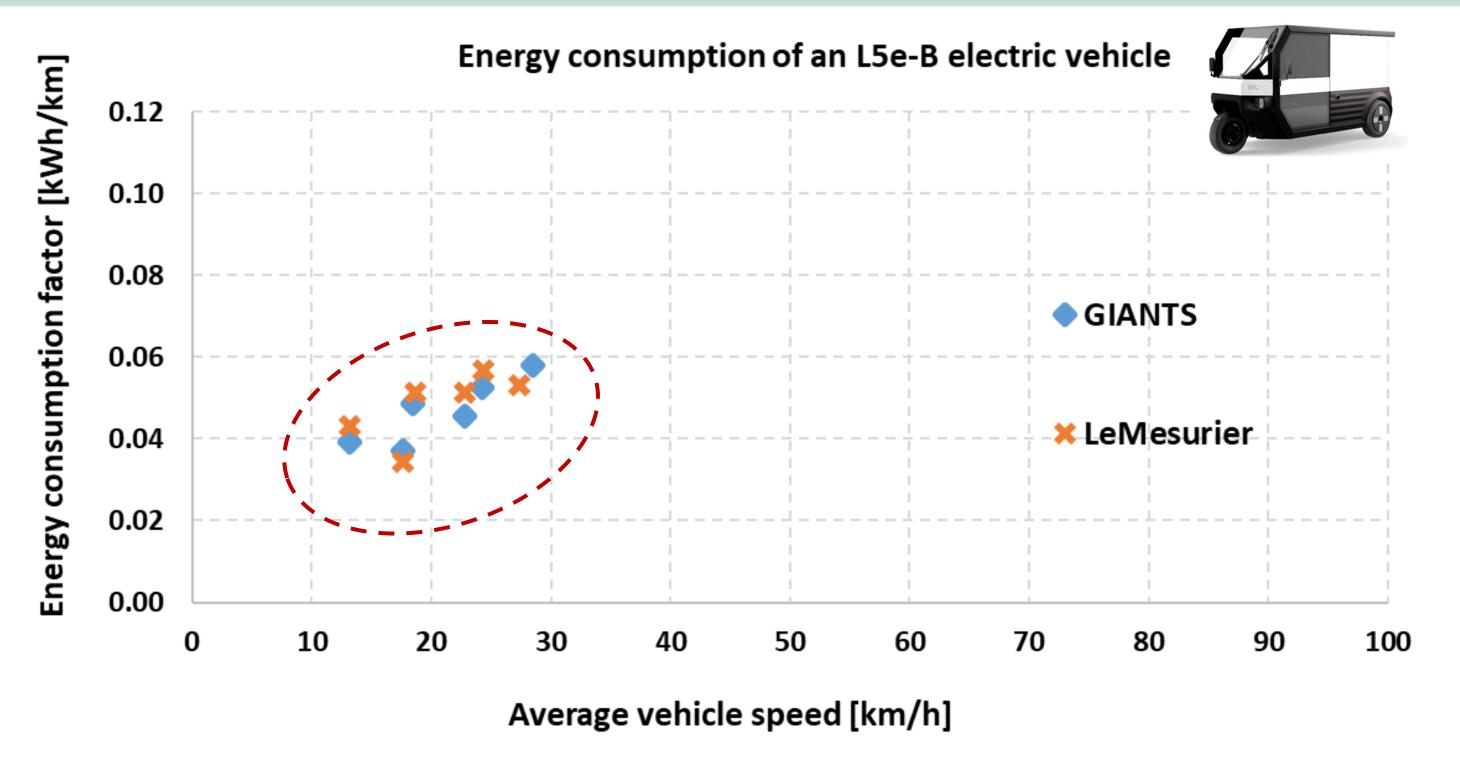
Ambient temperature 20°C





Validation: LeMesurier DT versus GIANTS

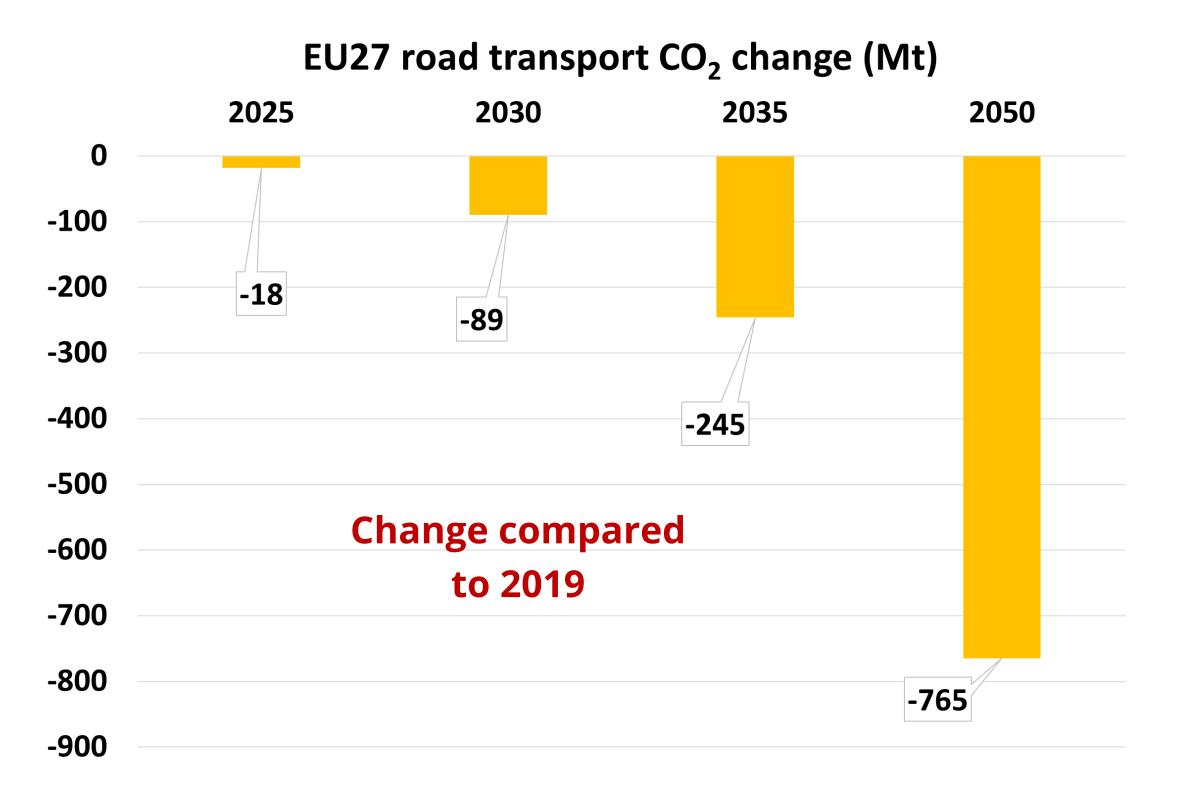




- The results of simulations for the energy consumption of an L5e-B electric vehicle are very close
- Differences are in the range 5-10%, 'acceptable' considering the different models, attributed mainly to the
 different level of parameterisation detail, i.e., different e-motor mapping (efficiency vs. RPM vs. N-m) and
 other components, e.g., battery
- Very **encouraging** results for our work \rightarrow further **exchange** with 2ZERO projects could be beneficial

GO.KPI.3: Reduction of CO₂ from road transport





	Base year	Photo years			
KPI: GO.KPI.3	2019	2025	2030	2035	2050
Total	-	-18 Mt	-89 Mt	-245 Mt	-765 Mt
Change as % of 2019 value	-	-2%	-11%	-29%	-92%

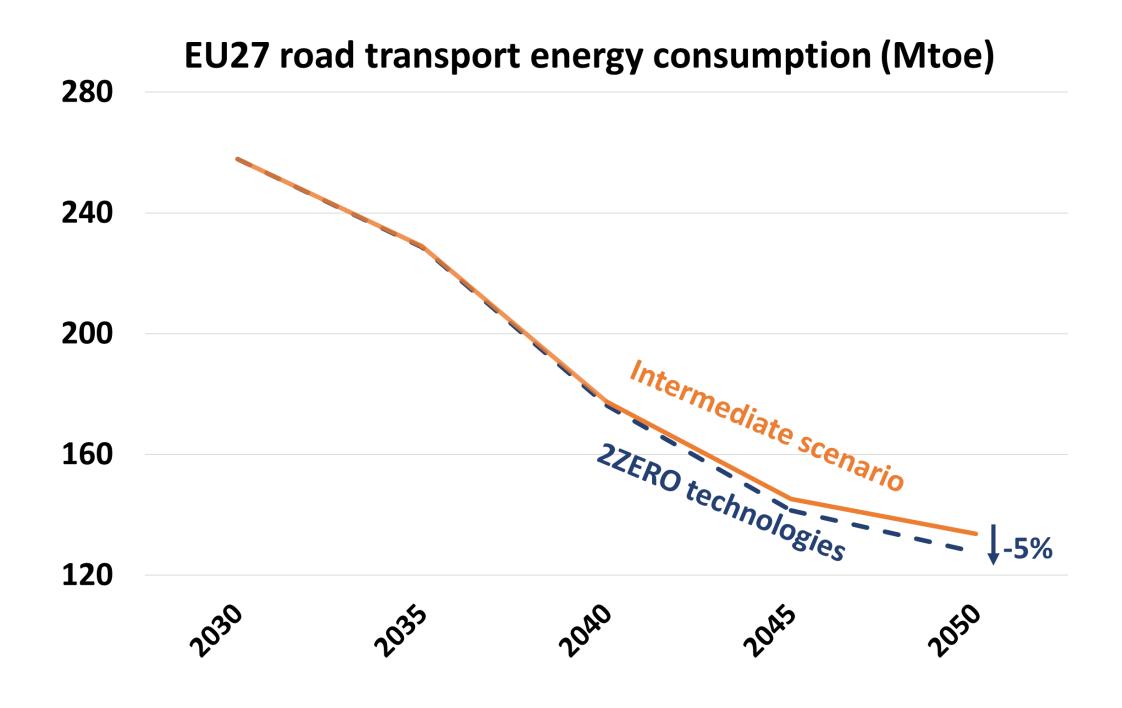
Note: 'Total' means from all types of road vehicles

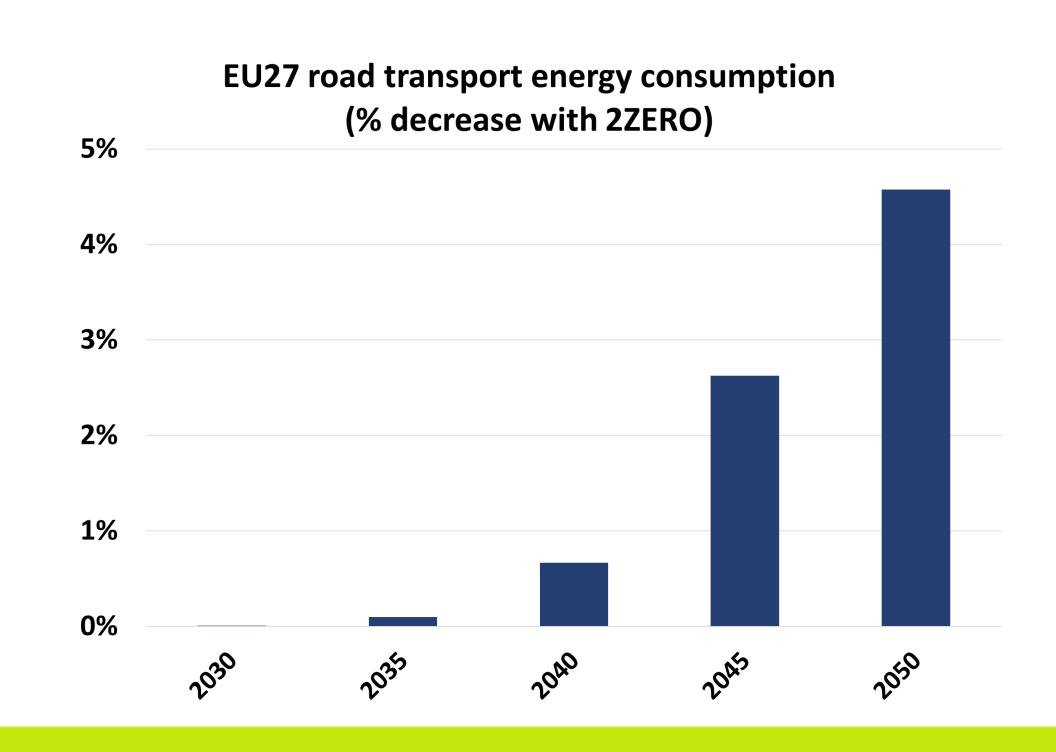
- ✓ Continuous decrease of CO₂ from road transport up to 2050
- \checkmark The change of CO₂ in 2035 is -29% compared to 2019 value and in 2050 is -92%

Impact of 2ZERO projects portfolio



- ✓ The charts below show the **impact of 2ZERO** projects (that were available until the end of 2024) on the COPERT/SIBYL current scenario, i.e., they compare the so-called *Le*Mesurier '**measured**' vs the '**intermediate**' values in total road transport TtW energy consumption
- ✓ <u>Note:</u> The current scenario implicitly **includes** (part of) the impact of the 2ZERO technologies; <u>on top of that</u>, the *Le*Mesurier project has refined/improved the projection of the change due to 2ZERO; hence, the observed difference is <u>specifically</u> <u>attributable</u> to the 2ZERO project contributions, so it is a previously unrecognised projected benefit of the 2ZERO Partnership

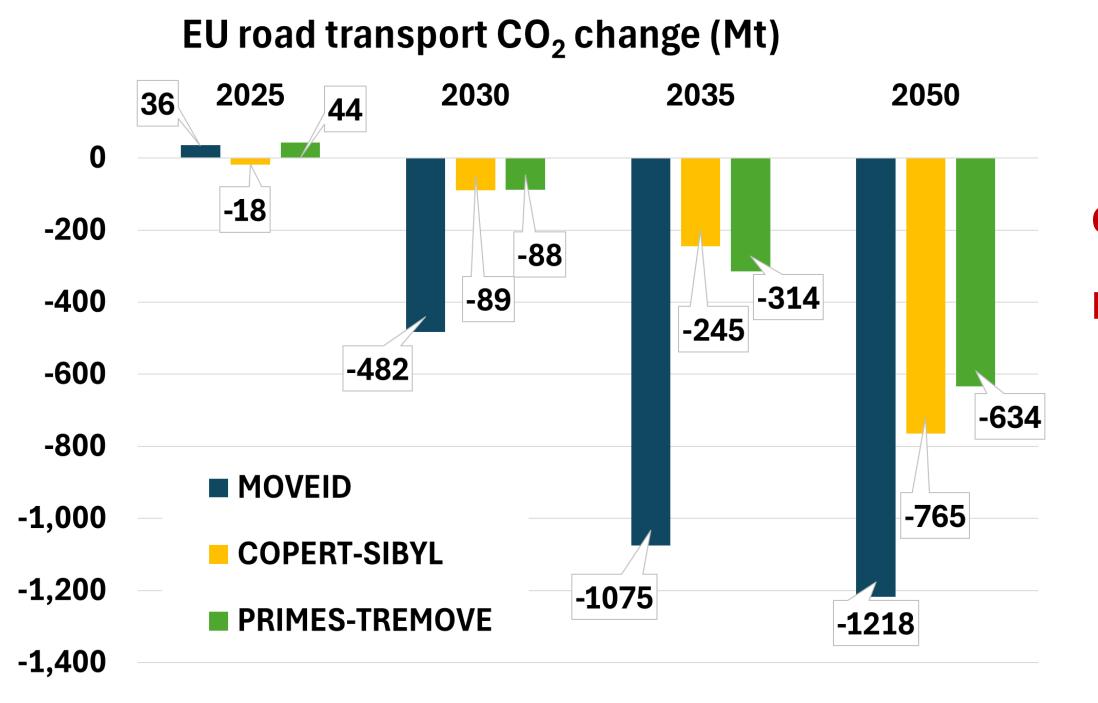




GO.KPI.3: Reduction of CO₂ from road transport



 Indicative combined chart from the 3 vehicle parc models



'Measured' values

COPERT: change compared to **2019**

PRIMES & MOVEID: change compared to 2020

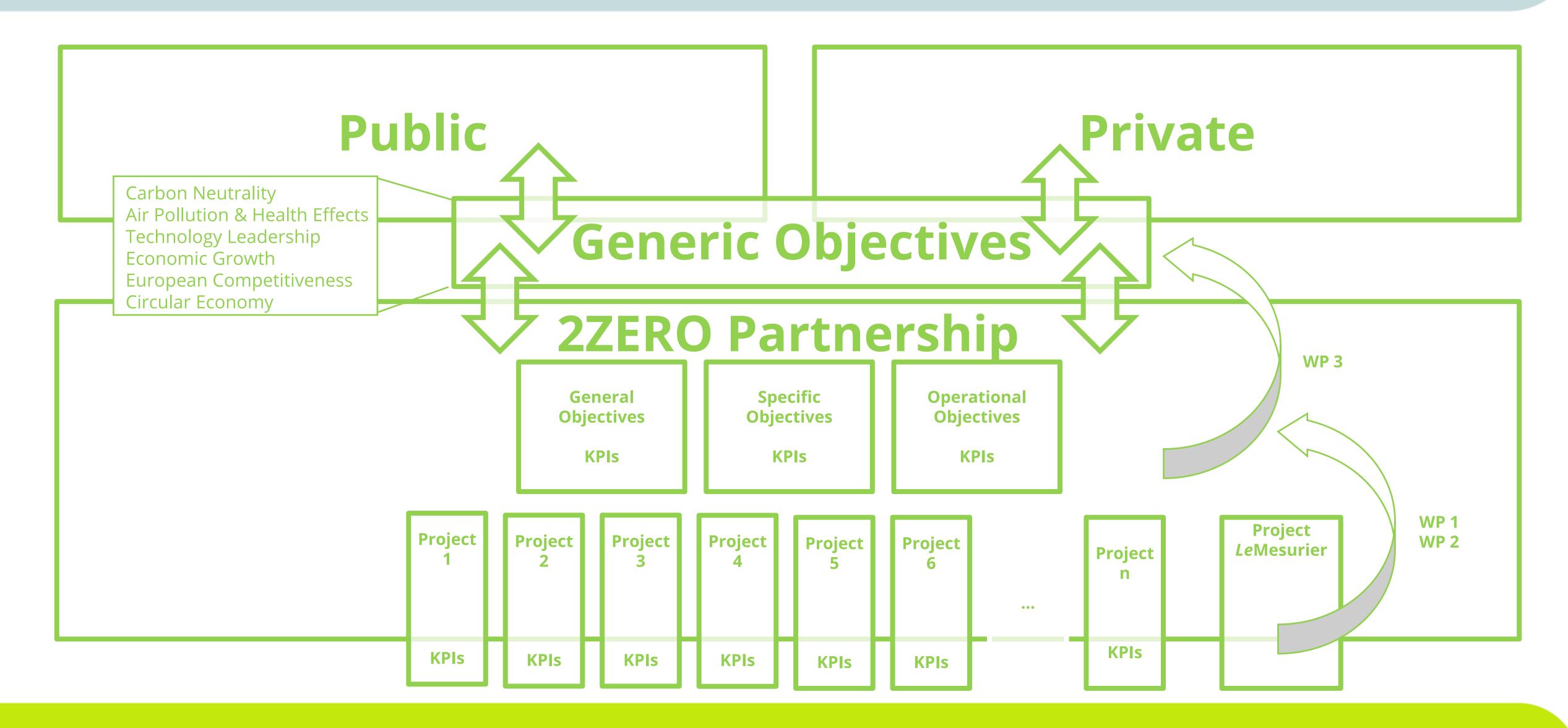
- **COPERT/SIBYL:** TtW, regulation driven, bottom-up approach with detailed fleet/activity projections down to technology/Euro standard level
- **PRIMES/TREMOVE:** WtW, supply/demand equilibrium for transport utility following dynamic economic optimisation, regulation compliance influencing supply/demand model outcomes
- MOVEID: LCA, the goal is to reduce CO₂ as quickly as possible



Next Steps
WP3: Assessing impacts ...
WP6: ... Dissemination

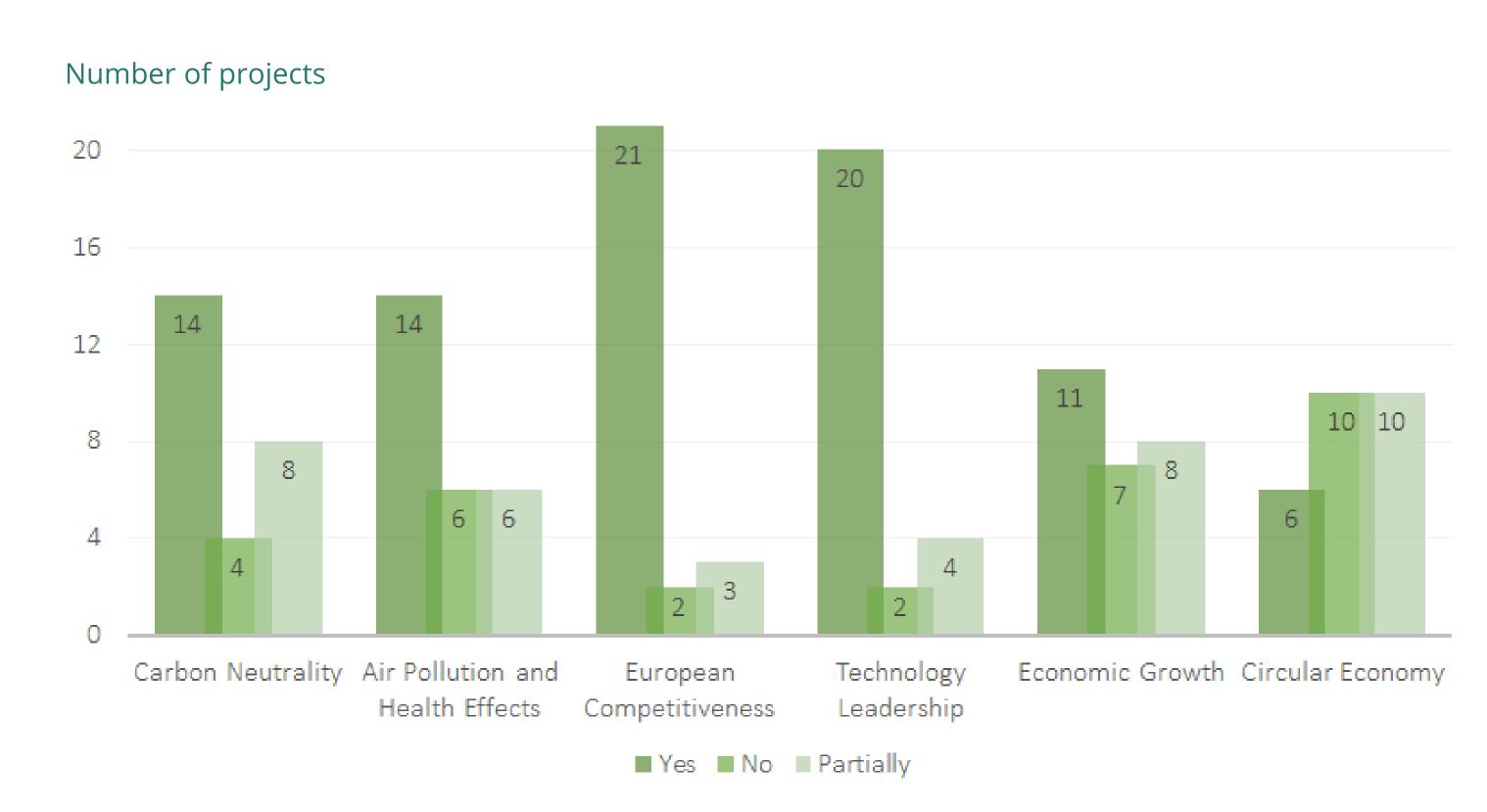
What's the difference between the Generic Objectives and the other 2ZERO Objectives?





Many of the projects are also contributing to the Generic Objectives





- Questionnaire self-assessment of projects and their contribution to the Generic Objectives
- 2ZERO projects anticipate a clear contribution to most Generic Objectives less towards Economic Growth and Circular Economy

Model results

- Alignment established with vehicle parc results
- The assessment approaches for the impact on carbon neutrality as well as air pollution and health effects will be mainly based on the models results
- Use of models for assessment of other Generic Objectives also being explored

KPIs "vs" Generic Objectives

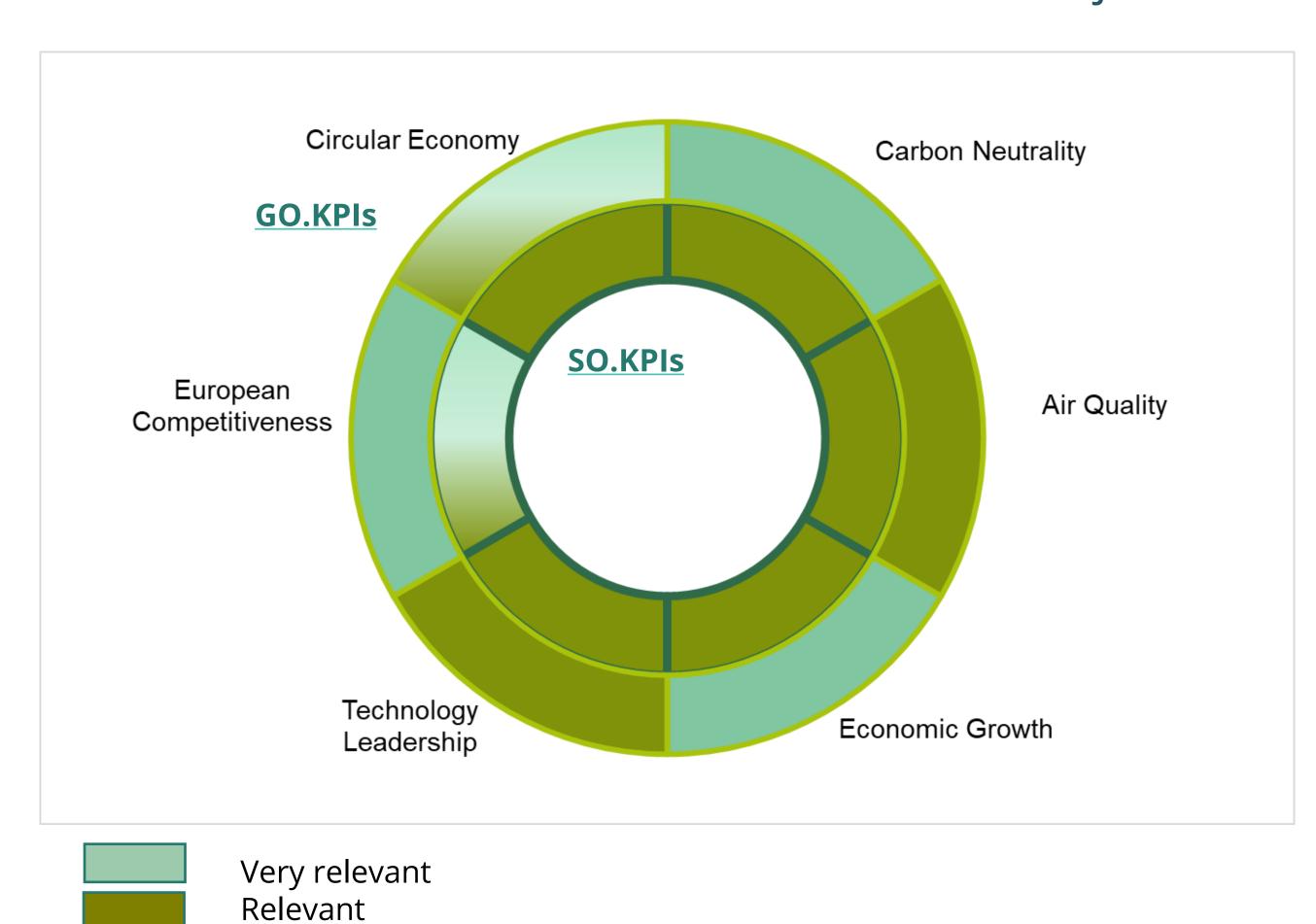


> Qualitative Assessment

GO			
Generic Objective	very relevant	relevant	irrelevant
Carbon Neutrality	4	2	0
Air Quality_	2	3	1
Economic Growth	5	0	1
Technology Leadership	0	4	2
European Competitiveness	4	2	0
Circular Economy	3	3	0

SO.KPIs (12 total)							
Generic Objective	very relevant	relevant	irrelevant				
Carbon Neutrality	1	10	1				
Air Quality	2	9	1				
Economic Growth	4	5	3				
Technology Leadership	3	8	1				
European Competitiveness	5	5	2				
Circular Economy	4	5	3				

How relevant are the 2ZERO KPIs to the Generic Objectives?





Further Information

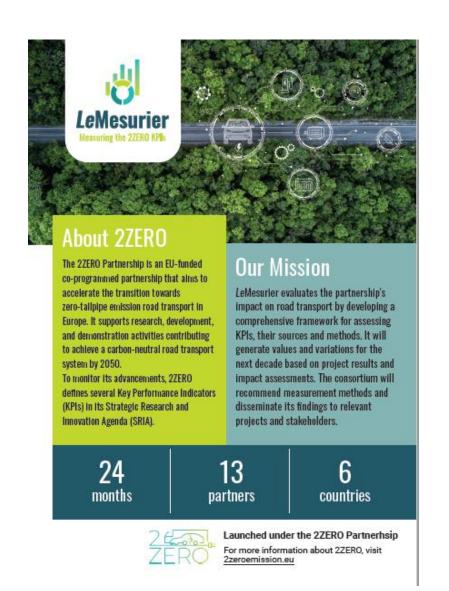
LeMesurier materials (www.LeMesurier-project.eu)



Leaflet summarising the project

LeMesurier roll-up banner Was at RTR2025

Will be at the EARPA FORMforum



Business cards

Available at RTR 2025, EUCAD and other events





Animated presentation (shown at RTR 2025)



LeMesurier
Linktree:
centralises all
project links in one
easy-to-share spot







LeMesurier is developing a framework to monitor and measure the effectiveness of the 2ZERO Partnership in achieving its objectives in the sustainable road transport domain.

Within the project, Key Performance Indicators (KPIs) related to the 2ZERO Objectives, as expressed in the Strategic Research and Innovation Agenda (SRIA), are being evaluated and quantified.

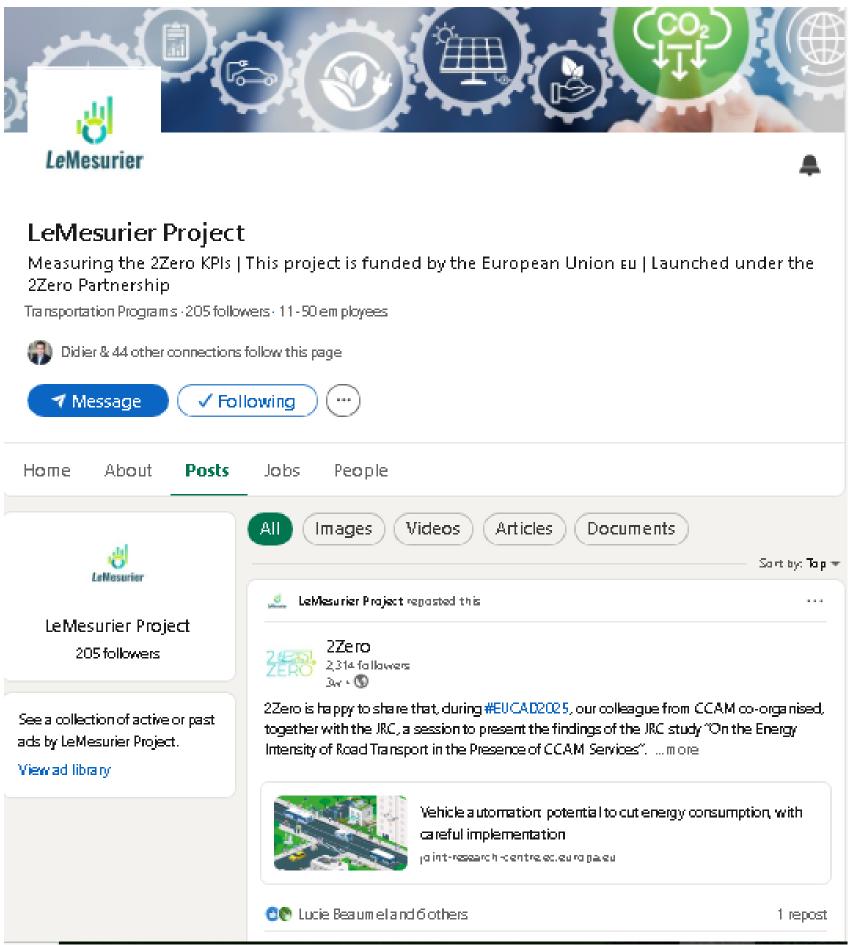






LeMesurier LinkedIn page, conference papers etc.



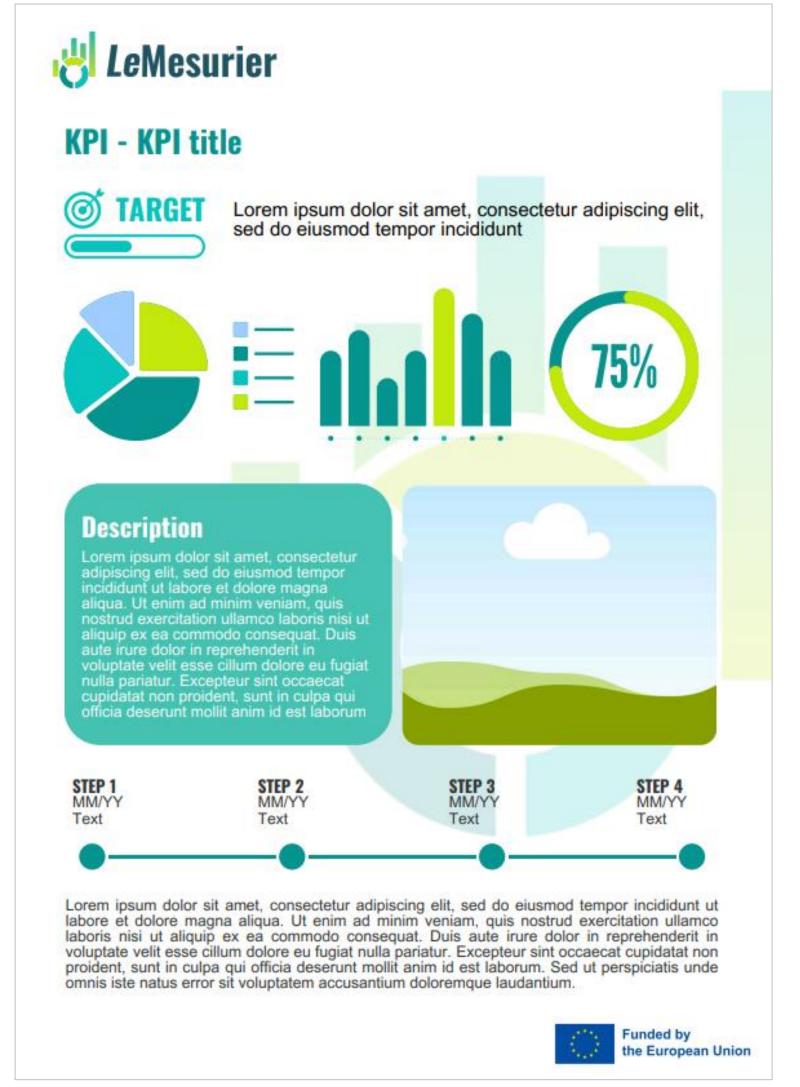












LeMesurier events



Webinars

- LeMesurier webinar 1: "On boarding to LeMesurier methods for new 2ZERO projects"
 - Monday, 27th October 2025, 11:00-13:00
- LeMesurier webinar 2: "Accounting for the KPIs of 2ZERO".
 - Thursday, 13th November 2025, 11:00-13:00

Final Event (General Assembly and Advisory Board Meeting)

Thursday, 4th December 2025, 10:00-16:00



Measuring the value of the Key Performance Indicators of the 2Zero Partnership

THANK YOU FOR YOUR ATTENTION

Simon Edwards, Ricardo



