URBANIZED

MODULAR AND FLEXIBLE SOLUTIONS FOR URBAN-SIZED ZERO-EMISSIONS LAST-MILE DELIVERY & SERVICES VEHICLES

Workshop 2
"Creating the conditions for flexible, zero-emission, 100% electric city logistics"

6th April 2022

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006943.

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

Applus IDIADA

VUB VRIJE UNIVERSITEIT BRUSSEL

BAX & COMPANY VALUE FROM SCIENCE AND TECHNOLOGY

Agenda

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Roadmap for modular electric freight vehicles adoption: The URBANIZED approach		
10:30 am – 10:35 am	Welcome & scope of the workshop	
10:35 am – 10:45 am	- Introduction to URBANIZED: scope, objectives & innovation - URBANIZED vehicle: How technological challenges are being addressed	IDIADA - Project Coordinator VUB
10:45 am – 11:00 am	URBANIZED Roadmap for modular electric freight vehicles adoption	CERTH
11:00 am – 11:55 am	Interactive session I & II	CERTH, BAX&COMPANY
11:55 am – 12:00 pm	Closing	

The aim of this workshop

- **Familiarize with other relevant roadmaps.**
- **Verify the goas & the objectives of the URBANIZED Roadmap… for flexible, zero-emission, 100% electric city logistics"**
- **Relate challenges identified in previous workshop with possible actions for alleviating the barriers and stimulating strong points of adoption.**
- **Getting your input for defining the content of a realistic Roadmap**

HOW we will proceed..

Remember the strong points of the URBANIZED solution

Learn from Gaps identified through roadmaps' review and assessment

Capture your suggestions on measures and actions to be considered for the Road Map in the context of structural interactive session

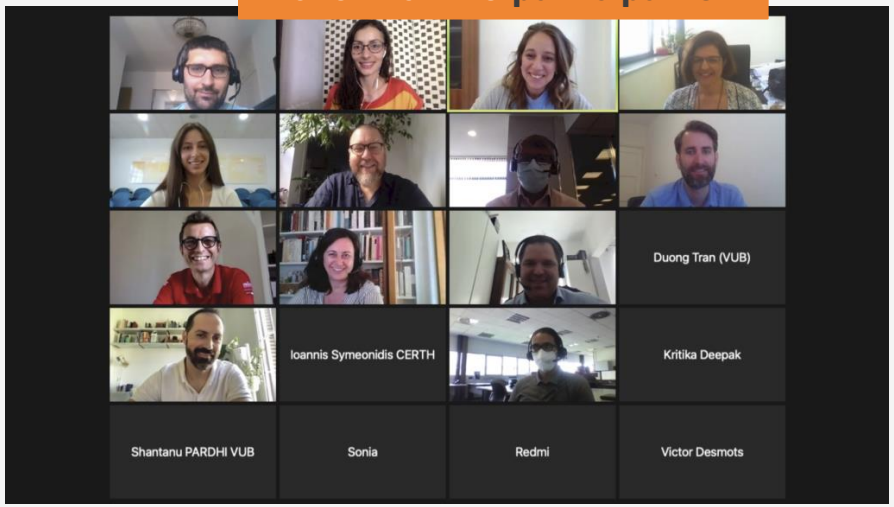
Introduction

Scope of the Workshop

Discover the pathway to reach zero emission city logistics

1st Workshop:

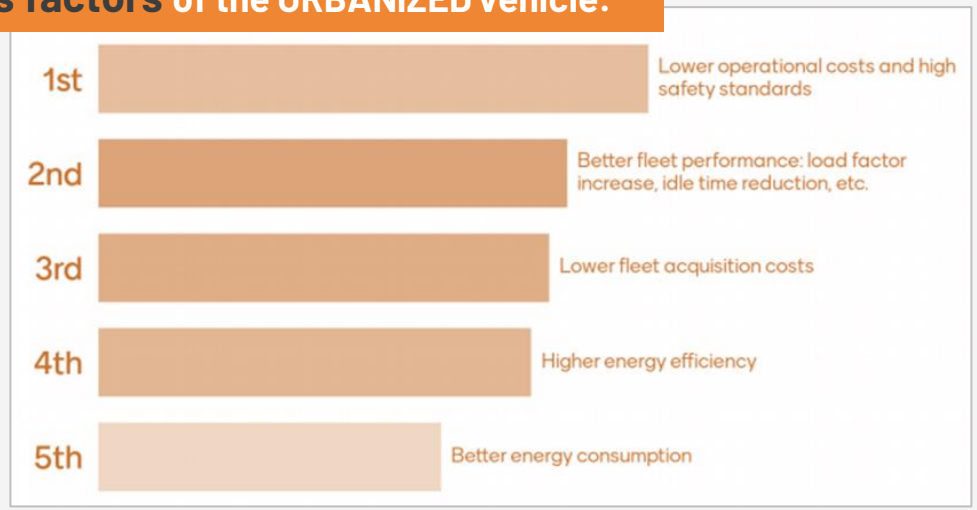
More than 20 participants



Main vehicle characteristics:

- High efficiency with long-lasting battery system
- ICT platform and Energy Management System
- Modular cargo body
- Comfort cabin

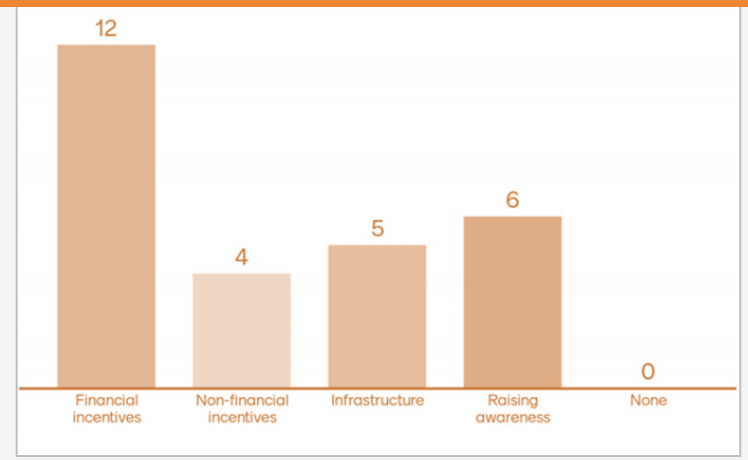
Key success factors of the URBANIZED vehicle:



Concerns expressed among others:

- Existence of competitors
- Inadequacy of charging infrastructure
- Modularity acceptance
- Unfamiliarity with EVs

Financial incentives are the most common practice



Level of satisfaction from already applied measures is quite low

Overview

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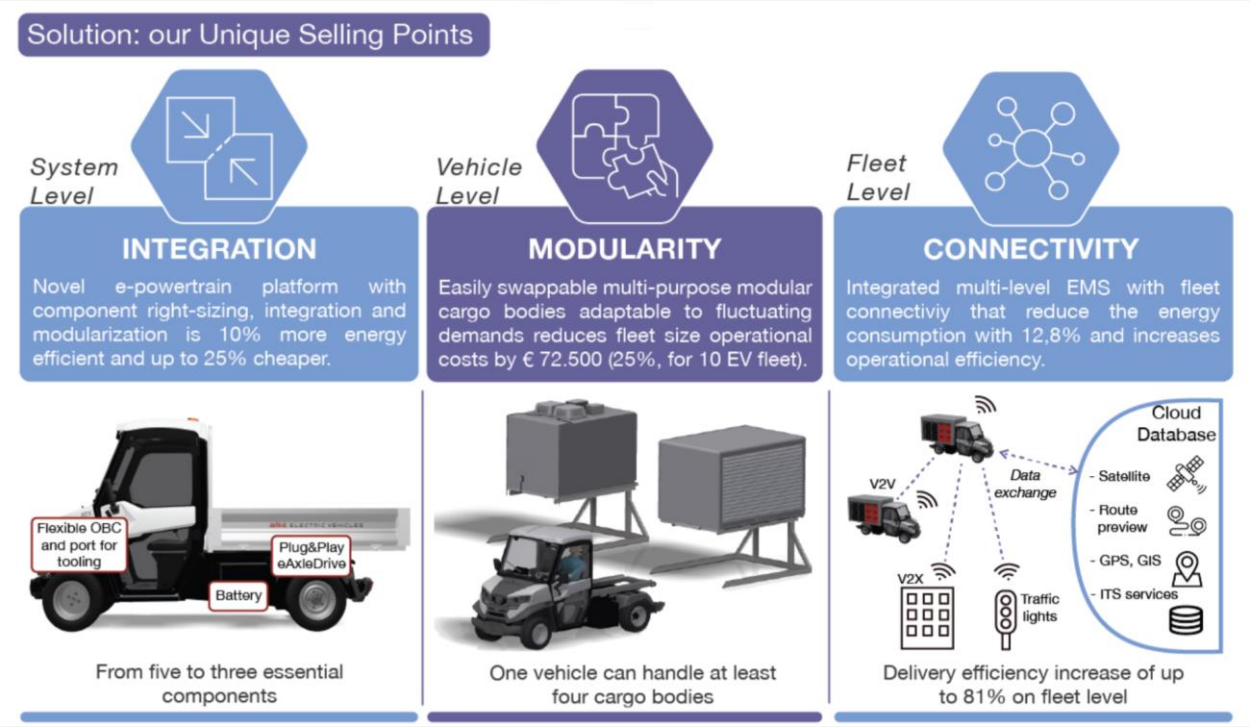
modUlaR and flexible solutions for urBAN-sIzed Zero-Emissions last-mile Delivery and services vehicles

Mission: develop and demonstrate the next generation of **modular vehicle architectures** for urban-sized e-CVs at 3 levels: **vehicle systems** level, **vehicle** level, and **fleet** level




State-of-the-Art: Alkè ATX 3

Key success factors

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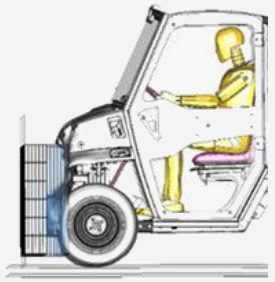
Market acceptance

- **Users**
  - **Improved** chassis/cabin **safety** (EuroNCAP 4★)
  - Enhanced **HMI features** including thermal comfort
  - Integration of **e-hand truck**
- **Fleet Operators & municipalities**
  - 20% increase in **energy efficiency** from current vehicles
    New optimized powertrain components
  - Adoption of **swappable** multi-purpose modular **cargo bodies** for higher flexibility
  - Reduction of operational costs thanks to connectivity and big data algorithms.
    - Eco-driving and eco-comfort functions at vehicle level.
    - Eco-routing and eco-charging functions at fleet level

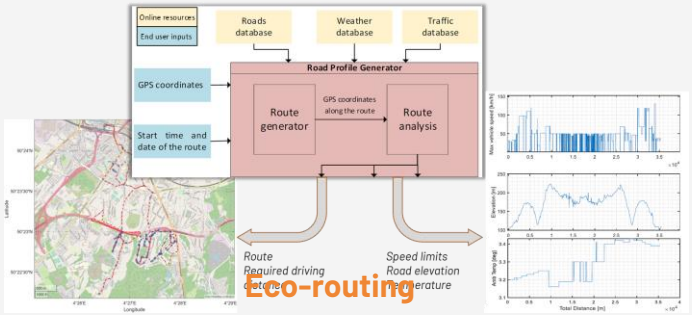
Lateral EuroNCAP



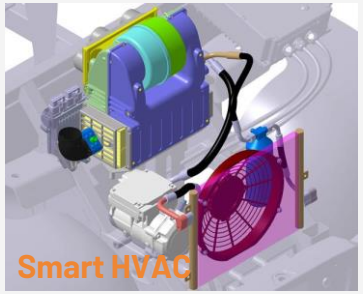
Frontal EuroNCAP

e-hand truck

Swappable cargo bodies



Eco-routing



Smart HVAC

Technical challenges

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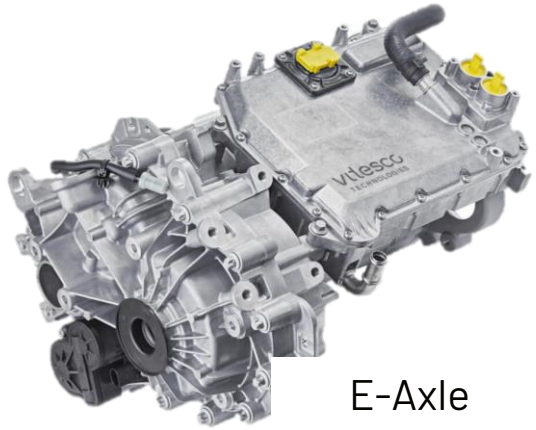
	At EV systems level	At EV vehicle level	At EV fleet level
For OEMs and suppliers	• No mass production, limiting economies of scale • Trade-offs between mass production and customization	• Low demand with low margins for niche markets in the N1 electric segment • Trade-offs battery size, energy density, range, payload and charging strategy • High costs of customisation	• High acquisition costs for purpose-designed vehicles, harder for OEMs to sell in fleets
For end-users, fleet operators and municipalities	• Limited post-sale customisation • Oversized components even for worst case scenario of operation which dramatically increase costs	• Range sensitivity, compared to ICE counterparts • Range anxiety and uncertainty in charging infrastructure availability • Want to use the same vehicle for different purposes • High acquisition costs • Low safety perception • Limited urban space: parking loading/unloading areas…	• High upfront investments with low utilisation rates (oversized fleets with no flexibility) • Unbalanced requirements due to seasonal demand changes • Lower the number of heavy and non-zero-emission vehicles • Limit vehicle access and congestion • Challenging last-mile delivery operations

URBANIZED delivering outputs in 3 dimensions:

1) High-performance e-drivetrain components (Multiphase PMSM, GaN-based inverter, GaN-based Onboard charger)

2) Interchangeable, plug & play cargo modules for different urban freight transport use case scenarios

3) Integrated energy and fleet management strategies using data, connectivity and learning algorithms



E-Axle

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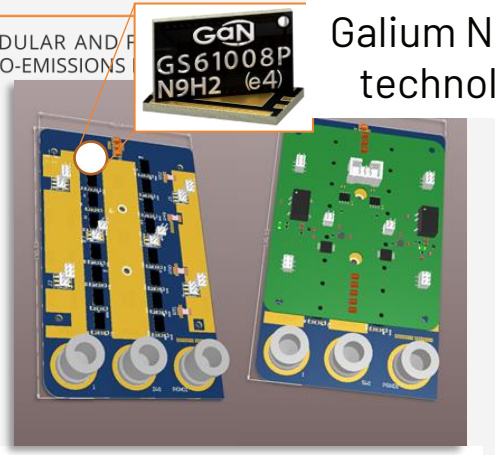
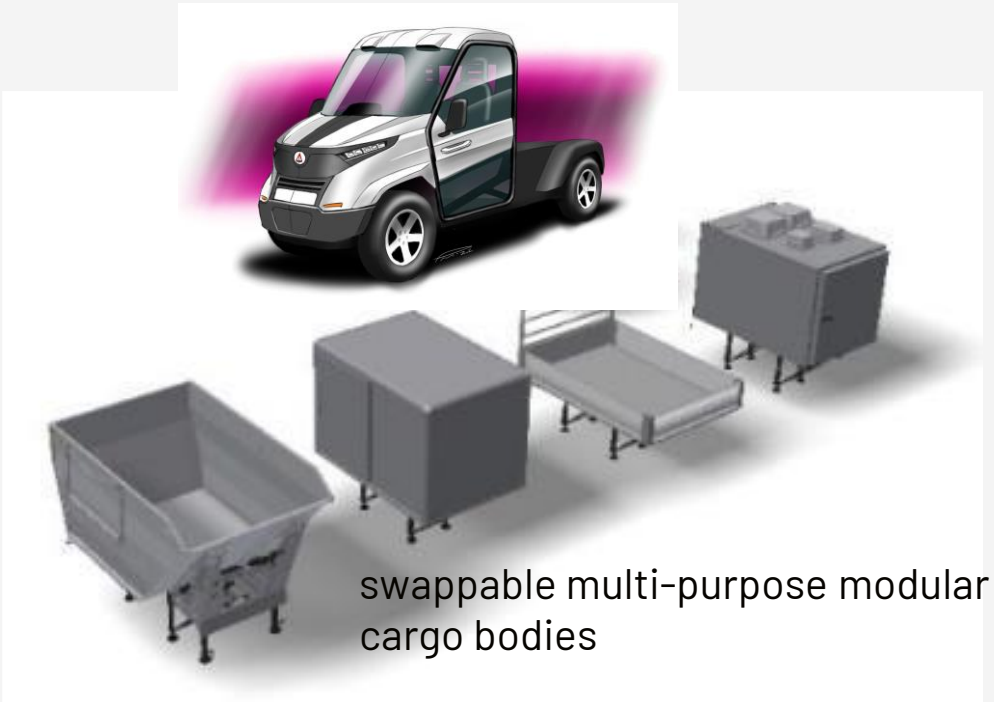
MODULAR AND
ZERO-EMISSIONS

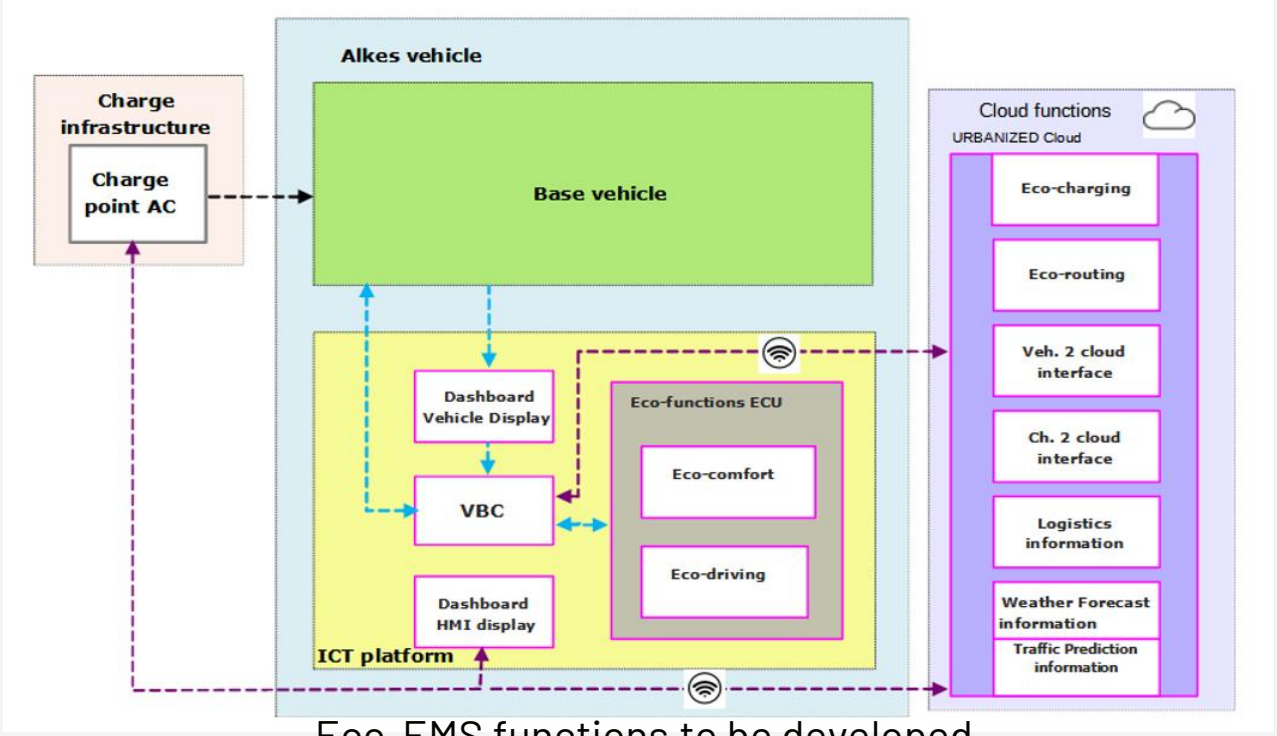


Galium Nitride technology

GaN half-bridge leg



swappable multi-purpose modular cargo bodies



Eco-EMS functions to be developed

Roadmap for modular electric freight vehicles adoption: The URBANIZED approach

Review and assessment of existing roadmaps

Methodological framework

Review and assessment of existing roadmaps towards the transition of city logistics

Step 1

Extensive literature review on existing roadmaps

Step 2

Comparative assessment

Step 3

Conclusions, lessons learned and gaps identified

Criteria for inclusion:

1) Title screening
- Focus on **EU level**
- Publication date **2014-2022**
- title to be relevant to **zero-emission city logistics or sustainable urban mobility**

2) Publication screening (executive summary and contents)

The publication should:
- Refer to **freight** transportation
- **EVs** are mentioned
- Aspect of **policy** is included

3) Full-text assessment for eligibility
- Policies for supporting eLCVs are mentioned
- Specific areas of intervention are proposed

22 **Roadmaps identified**

Methodological framework

Review and assessment of existing roadmaps towards the transition of city logistics

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Criteria for assessment:

- **Author/publisher**
- **Title & year of publication**
- **Territorial coverage:**
  - Local
  - National
  - EU roadmaps
  - Global
- **Risks and challenges identified**
- **Vision and objectives (e.g. zero-emission city logistics by 2030)**
  - Timeline: short-term 2025, medium-term 2030, long-term 2050 roadmaps
  - Goal: zero emission city logistics, 2030's Climate target plan: 55% reduction of GHG emissions by 2030 e.tc.
  - Deviation from Green Deal Goals
- **Methodology used (e.g. back-casing approach, stepwise guidelines, best practices, etc.)**
- **Intervention and Actions proposed (e.g. types of policies, namely financial support or regulatory measures, etc.)**
  - Level of analysis of each intervention: ranking based on their impact, linking the interventions with the different city typologies e.tc.

Roadmaps identified

Global

1. Urban Foresight, IEA, EVI, HEV, TCP (2021). *EV City Casebook*
2. International Energy Agency (2021). Net Zero by 2050
3. TDA, C40, POLIS (2020). How-to Guide: Zero-Emission Zones
4. World Economic Forum (2020). The Future of Last-mile Ecosystems. Transition Roadmaps for Public and Private-sector Players
5. Transport Decarbonization Alliance (2019). Zero Emission Urban Freight
6. World Bank, SUM4All (2019). Global Roadmap of Action Towards Sustainable Mobility
7. International Transport Forum / OECD (2018). Towards Road Freight Decarbonization – Trends, Measures and Policies
8. International Road Transport Union (2017). Commercial Vehicle of the Future. A roadmap towards fully sustainable truck operations
9. International Energy Agency (2017). The Future of Trucking – Implications for energy and the environment

EU level

10. POLIS, ALICE (2021). Guide for advancing towards zero-emission urban logistics by 2030
11. ALICE-ETP (2019). A framework and process for the development of a Roadmap towards Zero-Emissions Logistics 2050
12. ERTRAC, ERRAC, ALICE (2017). Integrated Urban Mobility Roadmap
13. ERTRAC (2017). European Roadmap Electrification of Road Transport roadmap
14. TRT, Ricardo Energy & Environment (2016). Study On European Urban Transport Roadmaps 2030
15. ALICE, ERTRAC (2015). Urban Freight Research & Innovation Roadmap
16. NOVELOG project (2018). NOVELOG D7.4. UFT integration strategies and roadmap
17. ENCLOSE project (2014). Electric Fleets in Urban Logistics
18. TRANSFORuM project (2014). Roadmap on clean urban mobility

National

19. HM Government (UK) (2021). Transitioning to zero emission cars and vans: 2035 delivery plan
20. SPES (2020). Zero Emission zone roadmap for urban logistics for municipalities
21. Top Sector Logistiek (2017). Outlook City Logistics 2017

Local

22. City of Rotterdam (2019). Roadmap ZECL: Moving towards Zero Emission City Logistics in Rotterdam in 2025

EU strategic documents

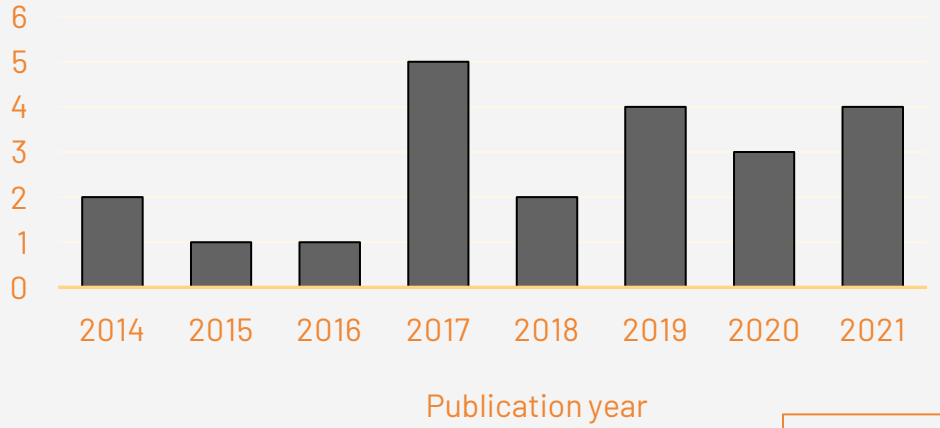
A. European Commission (2011). *Transport White Paper: Roadmap to a Single European Transport Area*

B. European Commission (2014). *A policy framework for climate and energy in the period from 2020 to 2030*

C. European Commission (2019). *the European Green Deal*

Roadmaps' assessment results: Statistics of identified roadmaps

Number of Roadmaps per year



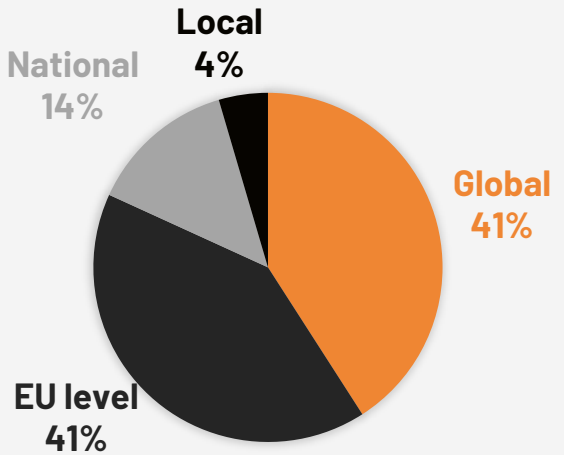
22

identified publications that deal with city logistics

+3 EU strategic documents included as reference documents

50% of the identified roadmaps were published in the **last 3 years**

Territorial coverage



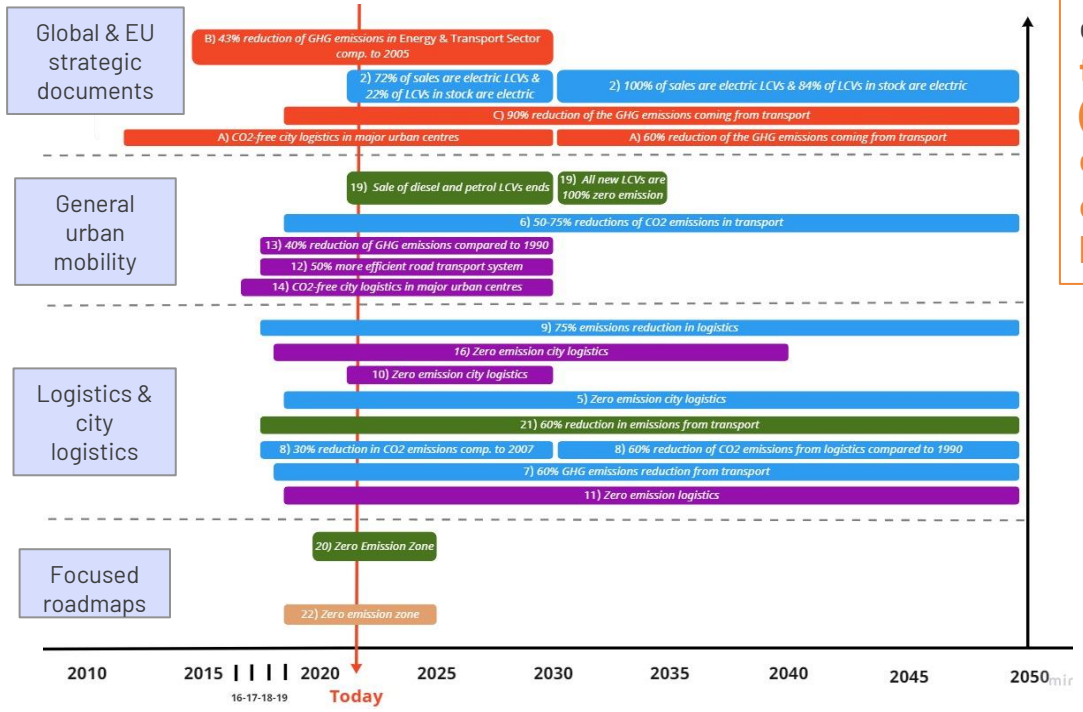
The research **focuses on EU level.**

However, **41%** of the identified publications are **global, which refer to EU** as well.

Roadmaps' assessment results: Mapping the vision & objectives

Roadmaps' goals and objectives identified:

- GHG or CO2 reduction targets
- Phase-out targets of conventionally fueled vehicles
- Share of EVs to reach a specific percentage
- Establishment of Zero-Emission Zones



City logistics emits 6% of total GHG emissions from transport

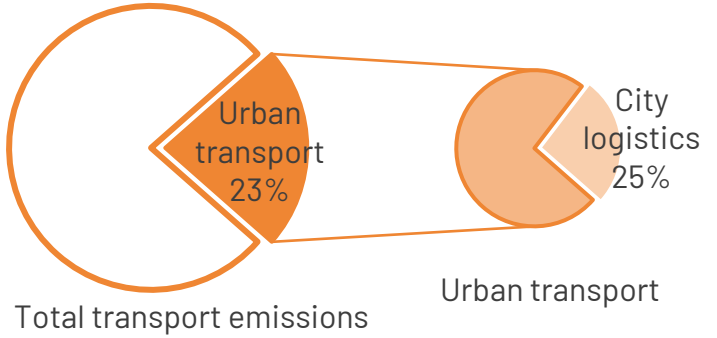
According to projections by the European Environmental Agency, domestic transport emissions are expected to **drop below their 1990 level in 2029 (from 2019-2019 -> 24.26% reduction of GHG emissions of transport→ expected 2.42% annual reduction for both mobility and city logistics)**

The targets for 2030 seem to be quite ambitious.

Assuming that **city logistics** will still represent **6%** of total transportation emissions, **the visions of the roadmaps colored red will not be accomplished.**

ZECL: Zero Emission City Logistics
ZEL: Zero Emission Logistics

GHG emissions from transport



Yearly percentage of CO2-eq. reduction	Vision	Roadmap
1.71%	-60% GHG by 2050 comp. to1990	Transport White Paper (2011)
2.37%	-43% GHG by 2050 comp. to 2005	European Commission (2014)
2.90%	-90% GHG 2019-2050	European Green Deal (2019)
2.42%	-75% GHG by 2050 comp. to1990	Global Roadmap of Action Towards Sustainable Mobility (2019)
2.11%	-60% GHG by 2050 comp. to1990	Towards Road Freight Decarbonization (2018)
3.94%	-39% CO2 2017-2030	European Roadmap Electrification of Road Transport roadmap (2017)
2.04	-60% GHG by 2050 comp. to1990	Outlook City Logistics (2017)
2.04	-60% GHG by 2050 comp. to1990	Commercial Vehicle of the Future (2017)
5.77%	-39% CO2 2017-2030	The Future of Trucks (2017)
3.23%	ZEL 2019-2050	Roadmap towards Zero-Emissions Logistics 2050
3.23%	ZECL 2019-2050	Zero Emission Urban Freight (2019)
11.11%	ZECL 2021-2030	Zero-emission urban logistics by 2030 (2021)
7.14%	ZECL 2016-2050	Study On European Urban Transport Roadmaps 2030
4.55%	ZECL 2018-2050	NOVELOG UFT integration strategies and roadmap (2018)

Roadmaps' assessment results: Approach and content

Type of approach followed in the assessed roadmaps

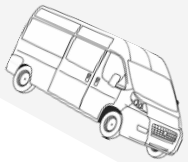
7

Stepwise guidelines

Only 8 out of 22 publications have implemented impact assessment techniques to evaluate the proposed actions.

12

Back-casting approach



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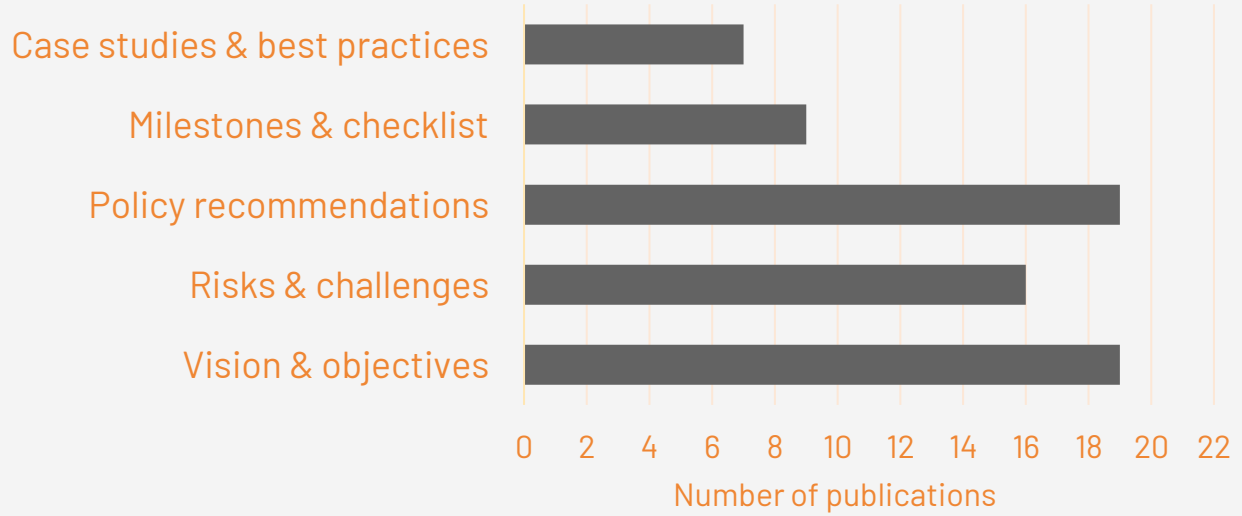
Impact assessment of proposed actions

6

Customized recommendations per type of stakeholder

Only 6 out of 22 publications propose separate actions according to the type of stakeholder.

Content items of the examined publications



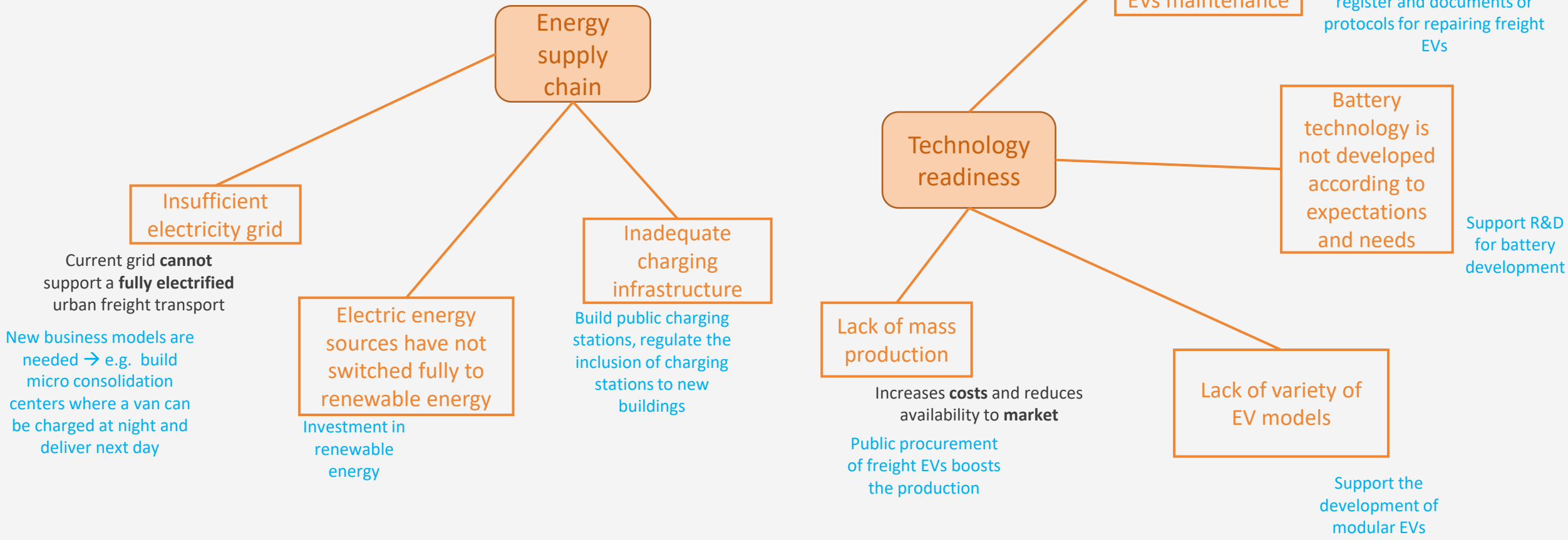
Despite their practical configuration, milestones and checklists **are not proposed by the majority of assessed roadmaps.**

Most of the examined roadmaps, approximately **86%**, include **policy recommendations mostly for public stakeholders**, while a number proposes technologies and innovative solutions towards the decarbonization of city logistics and not policy recommendations.
4 publications → Innovation, technology and research

Challenges identified and policy actions to address them

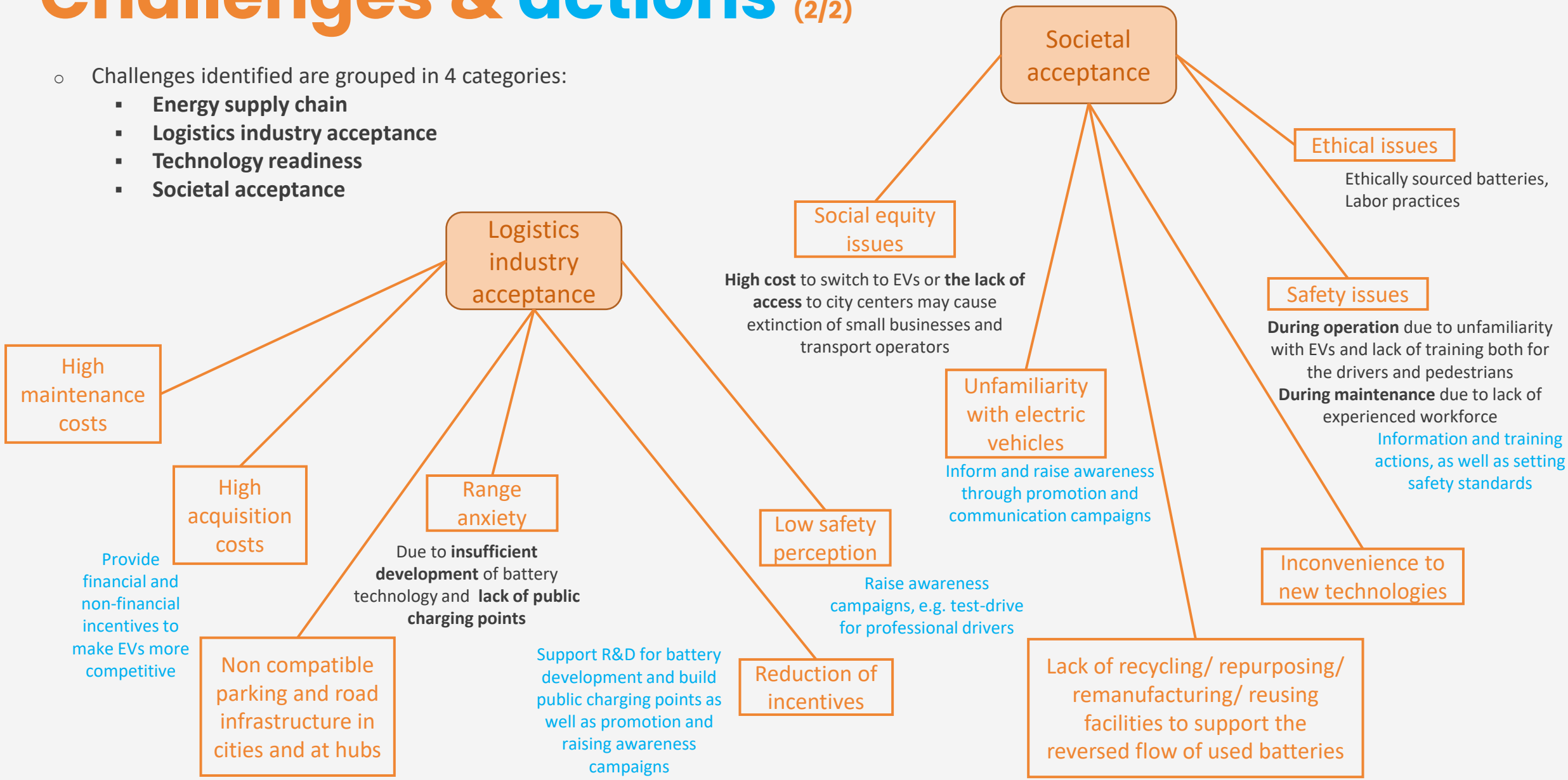
Challenges & actions (1/2)

- Challenges identified are grouped in 4 categories:
  - **Energy supply chain**
  - **Logistics industry acceptance**
  - **Technology readiness**
  - **Societal acceptance**



Challenges & actions (2/2)

- Challenges identified are grouped in 4 categories:
  - **Energy supply chain**
  - **Logistics industry acceptance**
  - **Technology readiness**
  - **Societal acceptance**



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Thank you!

Get in touch via

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