D2.1 Stakeholder Needs & Acceptance

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Authors

Name	Organisation	Name	Organisation
Mark Meyer	POLIS	Tomi Nord	I2M
Mark Sheridan	POLIS	Simone Regondi	Solbian
Pedro Gomes	POLIS	Peter Moertl	ViF
Michael Wiesner	I2M	Mateo Jukic	ViF

Reviewers

Name	Organisation	Date
Stefan Werland	WI	2024-07-24
Pius Sonnberger	ViF	2024-07-24

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Effects on follow-up activities and other WPs/tasks	No impact is foreseen.
Mitigation measures	The leader is reaching out individually to inactive partners and also initiating bilateral calls to have a more interactive process to engage with the partners.

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1. Executive Summary

Deliverable 2.1 (D2.1) is linked to the work in Task 2.1 and Task 2.2 and provides the *results* of an analysis of stakeholders needs and acceptance of frugal EV platforms & infrastructure, including quantified criteria and KPIs. The objectives were to explore the legal, regulatory and market frameworks through an information gathering survey which looks at stakeholder and user needs. This survey explores user behaviour, vehicles presently used, and how these are used for various journeys, including multimodal trips. Environmental factors are asked as well as personal preferences. The KANO survey methodology was used within the survey where it was practical to better understand feature preferences. Overall, the gathering of this information feeds into the goals and next steps of the project, which has the aim to integrate frugal EVs from the GIANTS project and pilots into various mobility systems. The process, criteria included in the survey, and initial results can be found in this deliverable.

The survey presents a foundation of information on user and stakeholder's mobility patterns and preferences in relation to LEVs to support understanding within the project on user needs to optimise the inclusion of vehicle features and the design of frugal LEVs.

Task 2.1 also indicates that 'needs and infrastructure trends are identified and policy requirements for grid independent solar charging/battery swapping stations are elaborated'. On this topic, the deliverable includes research on current research and state of the art vehicle integrated Photovoltaic Solutions (VIPV) and Swappable Batteries. This covers current charging infrastructure as well as the outlook for the future of battery swapping solar charging.

The work that went into the related tasks and this deliverable will then feed into the next tasks and D2.2, which will provide a *synthesis* of the data.

Keywords: Stakeholder survey, user needs, Frugal LEVs, user-centred design.

2. Objectives

The GIANTS project aims to provide affordable and accessible mobility solutions to both emerging and advanced markets. This will be built on a set of technological solutions that allow the production of L5,L6,L7 class Light Electric Vehicles (LEVs) suited to provide urban traffic solutions. The goal of this approach is to create frugal (economical, without excessive features) vehicles, based on user demand, which optimise societal benefits and reduce environmental impacts.

In order to achieve that, the starting points in Work Package 2 (WP2) are:

- Task 2.1 (T2.1): 'Legal, regulatory and market framework with quantitative assessment, information gathering & survey on user, stakeholder, and infrastructure needs'
- Task 2.1 (T2.1): 'Further, the needs and infrastructure trends are identified and policy requirements for grid independent solar charging/battery swapping stations are elaborated'
- Task 2.2 (T2.2): 'Analysis of stakeholders' concerns and acceptance of frugal electric vehicles for the development of vehicle mission profiles'

This is also linked to the overall GIANTS and WP objectives though creating a foundation to assess user needs and preferences in determining vehicle options and specifications for the project and use cases.

The objectives of T2.1 were met through the successful creation and dissemination of a survey on user, stakeholder, and infrastructure needs. Elements of T2.2 were also met as the lead partner for analysis of stakeholder concerns and acceptance, I2M, was brought into the process of developing the survey to ensure the results were of a format, structure and provided relevant details to benefit the project. T2.2 is ongoing and leads into the next task to develop mission profiles and the next deliverable in WP2, D2.2 [M12] which will provide a 'synthesis of the data' collected in T2.1 and processed in T2.2.

The work that went into the survey and resulting data provides progress towards the following objectives highlighted in the grant agreement:

- "WP2 Objectives: Define the level playing field for a vehicle concept that could be integrated in various mobility systems and that can bridge the conflicting expectations of vehicle users, territories and citizens living or moving in functional urban areas, while exploiting future opportunities and considering the regulatory, social, and environmental aspects."
- "Explore gaps in the legal, market and regulatory framework including organisational, technical and interoperability aspects and define business models for mobility systems based on the GIANTS platform."

This also provide progress towards one of the overall project objectives outlined as KPIs in the Grant Agreement:

- Objective 1: Identified common technology bricks for frugal, L-category vehicle development and production addressing advanced and emerging markets based on user (drivers, passengers, road users) and market needs as well as components, system specifications and infrastructure requirements/trends.

3. Description of Work

The following chapter describes the overall efforts to create and implement the survey. Chapter four describes the needs and infrastructure trends identified in relation to independent solar charging/battery swapping stations.

3.1 Organisation of the project partners and the tasks

The Kick-Off Meeting (KoM) for the GIANTS project was held at the very end of January, so it was critical to quickly begin planning and conversations with partners to arrange regular meetings and allocate the various tasks within the work package, especially Task 2.1. In order to do this, an Excel was set up to define the various tasks, designate the colleagues that should contribute, set deadlines, and indicate the level of progress / completion. In parallel, meetings were arranged with relevant colleagues. First this was monthly WP2 meetings, then meetings with WP3 were added to ensure alignment, then these shifted to bimonthly WP2 meetings. Additional 'focus group' meetings with more engaged and relevant partners to the individual tasks occurred more frequently, as well as spontaneous bilateral meetings. Throughout this process, various documents were created which formed the foundation for the creation of the survey, background research which led to identifying the key stakeholders, sample use cases, and also identifying stakeholders to share the survey with once complete.

Some of the initial background work for the survey done in parallel was submitted by project colleagues from the perspective of industry/production/OEMs (Original Equipment Manufacturers). This included the GIANTS stakeholder map and CONOPS (Concepts of Operations). **(See Appendix A for visuals.)** These were beneficial in identifying potential stakeholders and use cases in order to frame survey questions.

3.2 User centred assessment of use context and tasks

The main proposition of the GIANTS project, per the EU grant agreement, is that key user requirements for mission suitability can be fulfilled by L-class vehicles used in urban environments at costs considerably below those currently required for M- or N1-vehicles. Thereby, GIANTS should allow to produce and efficiently operate light vehicles (L5, L6 and L7) in emerging markets such as in Asia or Africa, as well as in advanced markets, and address at least two different application fields (people mover / cargo). During the project Kick-Off Meeting, it was indicated the primary focus should be on passenger use, so this was kept in mind throughout the various tasks completed. User acceptability is an important goal and for this purpose, the partners in the GIANTS project will perform a "Systematic and thorough analysis of user centric needs due to future evolution of urban areas representative for emerging and established markets including infrastructure." This work is performed in WP2 "Assessment of user needs in first phase of project." Here, user demand for emerging and advanced markets is assessed at the outset of the project to tailor demonstrations to user requirements while interoperability and modularity will ensure synergies in product development. To accomplish this, the work of OEMs that focuses on the engineering and sales aspects, necessitates the need of social science / humanities methods.

There are some inherent limitations of L class vehicles compared to class M and N-class vehicles, especially in terms of size and power for transport, as well as safety. Therefore, the uptake and acceptance of L-class vehicles will highly depend on shaping them such that users find them practical, usable, and accessible. Potential customers may ask "Why use a small vehicle if I have to do many trips with it?" The questions in the project consist of identifying methods to overcome and compensate such potential disadvantages with certain 'targeted features' to overcome such obstacles. Such targeted features may look quite different

between emerging and advanced markets and key to GIANTS success may be formulating use cases with such knowledge.

To address these challenges, the GIANTS project partners adopted a human-centred design approach derived from ISO 92411-210[1] and adapted it for the purposes of GIANTS. Whereas ISO 92411-210 is focused on user interactions with digital systems, the design of vehicles requires - in addition to user-vehicle interactions - also appropriate vehicle functionality that goes beyond the design of interactions such as in classic computer interaction design. In the figure below, user-centred design process is depicted. The main principles consist of the following:

1. **The design is based upon an explicit understanding of users, tasks, and environments.**
2. Users are involved throughout design and development
3. The design is driven and refined by user-centred evaluation
4. The process is iterative
5. The design addresses the whole user experience
6. The design team includes multidisciplinary skills and perspectives.

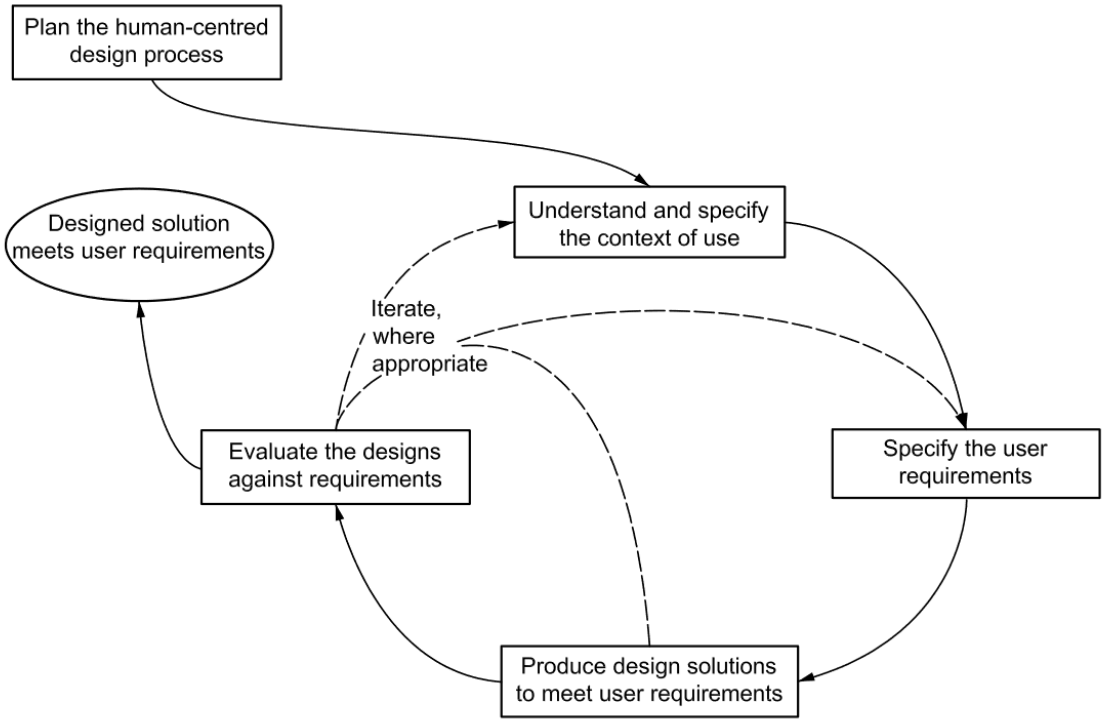

Figure 3-1: User-Centred Design Process in ISO 92141-210, numbers added by GIANTS

In this chapter we focus on task 1 (printed bold in the list above) to inform the design of the GIANTS solutions upon an explicit understanding of users, tasks, and environments. For this purpose, we identified three main methods for the context of use assessment (see Figure 3-1). First, a screening of existing literature on the use and needs for L-class vehicles was performed. Based on that, a simple task analysis was performed to identify the main tasks of L-class vehicle users. This information should then inform the collection of direct user data using focus groups, interviews, and surveys. This follows an iterative approach. Focus groups consist of an open-ended exploration of the main topic area: what are the most critical

features and considerations concerning the design of LEVs? Such exploration is intended to frame the following, more detailed investigations and prepares for conducting interviews where experts provide more details, explore the topic in more depth, and identify various viewpoints. Finally, surveys are used to quantify outcomes with detailed questions (see next chapter).

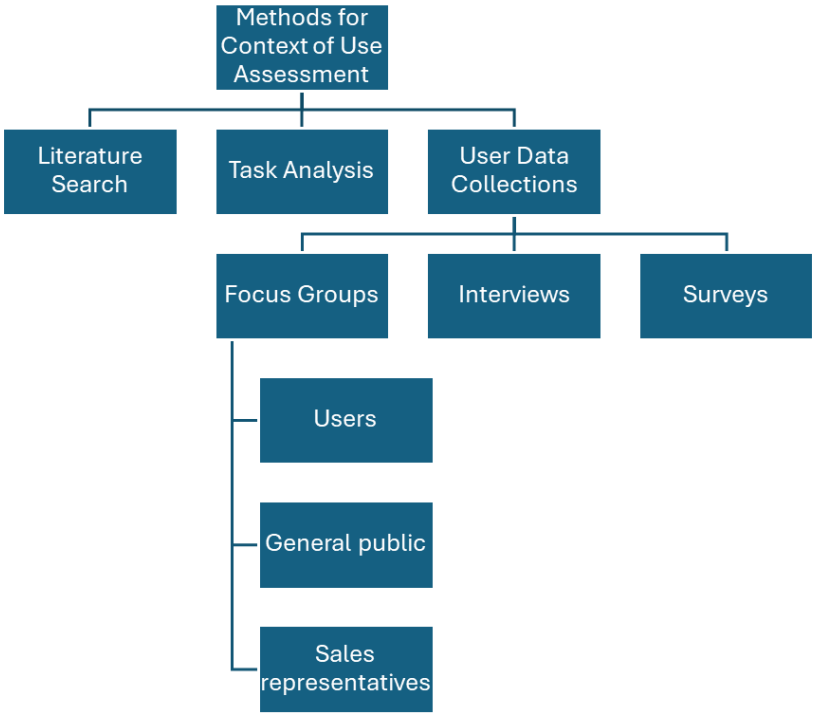

Figure 3-2: GIANTS Context of Use Assessment Methods

Reviewed Literature

An investigation of driving patterns of more than 100 vehicles of craftsmen and services in Norway[2] indicated that 42% of these could be replaced with battery powered L-class vehicles with a range of 170 km. If such battery powered L-class vehicles could reach a range of 200 km over the whole year, almost all vehicles could be replaced. They also reported that purchase incentives would need to be in place to unlock that potential.

In an exploratory survey with more than 4000 participants, the perceived advantages of LEVs was investigated.[3] Among the respondents, 26 % were LEV users and 37% were interested in them but did not yet use them. The remaining 37 % were not interested in LEVs. The results indicated that LEVs were appreciated for their travel comfort, accessibility, and environmental friendliness but lower on their safety. LEV users perceived them more positively than non-users, leading to the conclusion that especially familiarity with LEVs could lead to positive attitudes about them.

User involvement in the innovation process was found to be beneficial to accelerate the uptake of novel solutions and to foster the change of mobility patterns for shared electric mobility.[4] In their study they performed interviews with more than 50 employees at two workplaces with LEV users as well as non-users. They also tracked vehicle usage and administered surveys. Based on this data, four user types could be differentiated: Vigilant users, passive collaborators, active decision makers, and ambassadors -and

proposed to include users and non-users in the decision-making process to create a positive sharing climate.

A recent study on car commuter requirements for LEV usage[5] employed an online survey and user workshop to explore commuter preferences and requirements for Light Electric Vehicles (LEVs), involving 51 participants who provided insights into their commuting needs and barriers to LEV adoption. The findings indicated a preference for L5e-class vehicles due to their (theoretically) higher permitted speed and passenger capacity, alongside significant concerns regarding the durability of LEV components, particularly batteries. Participants expressed a willingness to switch to LEVs if conditions such as accessible charging infrastructure and competitive pricing were met. These results imply that while there is openness to adopting LEVs, addressing user concerns, enhancing infrastructure, and communicating the benefits of LEVs will be essential for effectively integrating LEVs into daily commuting practices.

Identification of vehicles

In order to accurately convey the context in regard to the vehicles being referred to, in interviews, the survey, and the project as a whole to the general public, various ways of representing the L-class vehicles were written out. For the online survey (See later sections and Appendix) these descriptions were structured in a simplified, user-friendly format to provide context.

Below is a more details description of the L-class vehicles within the project, both for context for this deliverable, as well as use within the project and technical discussions:[6]

- L5: A vehicle with three wheels symmetrically arranged in relation to the longitudinal median plane with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm3 or whatever the means of propulsion a maximum design speed exceeding 50 km/h.

- L6: A vehicle with four wheels whose unladen mass is not more than 350 kg, not including the mass of the batteries in case of electric vehicles, whose maximum design speed is not more than 45 km/h, and whose engine cylinder capacity does not exceed 50 cm3 for spark (positive) ignition engines, or whose maximum net power output does not exceed 4 kW in the case of other internal combustion engines, or whose maximum continuous rated power does not exceed 4 kW in the case of electric engines.

- L7: A vehicle with four wheels, other than that classified for the category L6, whose unladen mass is not more than 400 kg (550 kg for vehicles intended for carrying goods), not including the mass of batteries in the case of electric vehicles and whose maximum continuous rated power does not exceed 15 kW.

Task analysis

Based on the reviewed literature, an initial task analysis was performed to collect the various tasks that users perform when interacting with LEVs (See Figure). The direct operation of the vehicle includes driving, loading, and unloading, and refuelling the vehicle. Occasional operations include maintenance and repair. A general factor represents access to the vehicle, whether the LEV is owned, shared, a rental, or part of an organisations fleet. The boxes in the figure below basically indicate the information needs that were

identified: What information do we need from users to be able to develop a user-centred LEV? For example, what kind of driving experience is expected from drivers in terms of safety, range, comfort, and speed?

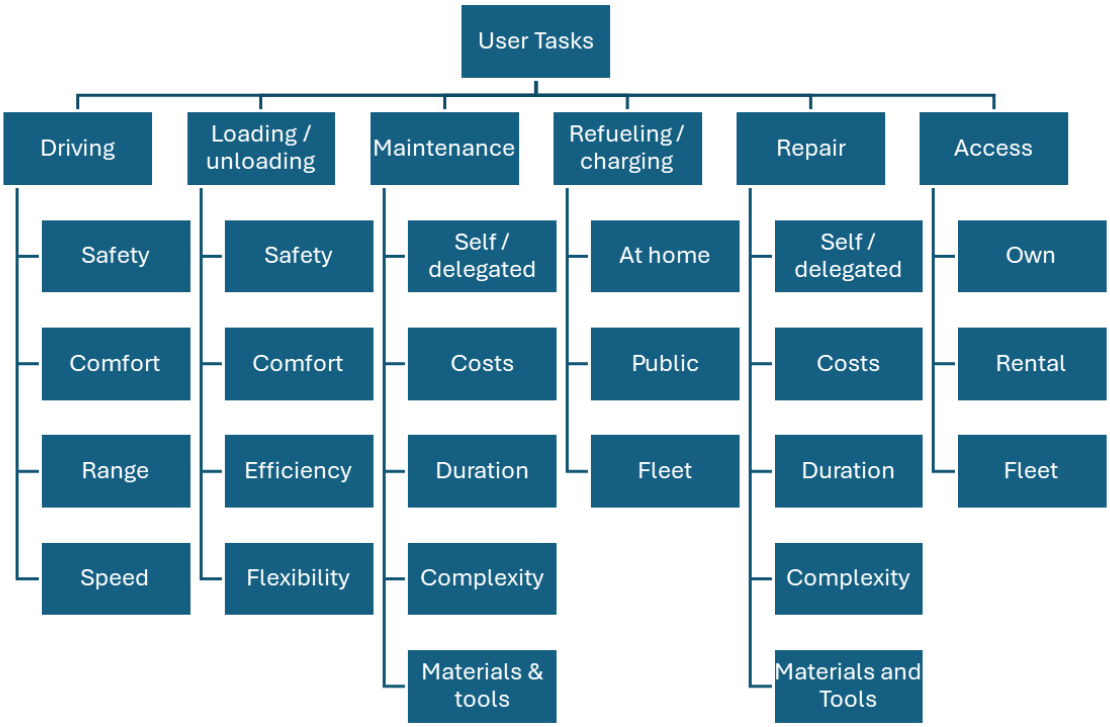

Figure 3-3: User Task Related Information needs for the User-centred LEV Design

From information needs to focus group and interview questions

Building on the user task related information needs indicated in the figure above, additional factors are needed to understand the context in which the tasks occur. This context can be described by the AUTOS framework[7] that views the context as consisting of the artifact, the user, usage situation, and organisational factors within which the tasks occur (See Figure).

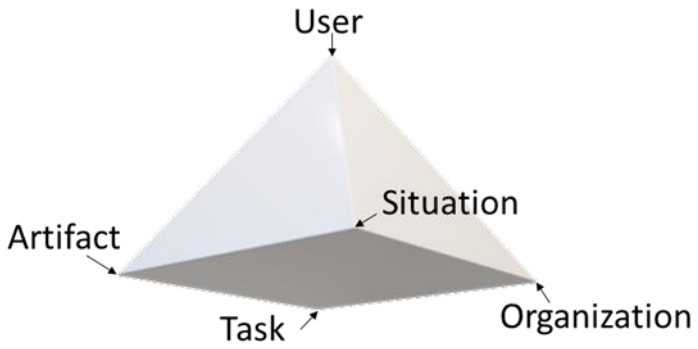

Figure 3-4: The AUTOS Framework for User-Centered Design[7]

By applying the AUTOS factors, along with the user task information needs previously introduced, interview questions were assembled that are documented in the Appendix **(See Appendix B.)**

Interview results

At the time of deliverable submission, we have interviewed 4 participants, three from Austria, and one from the Philippines. All used the vehicle for work, not for personal use. The mission profiles varied from continuous shuttle/bus mode (one user) to single trips for purposes of service and vending (three users). With one of the users, we were able to conduct a focused session, where in addition to the interview questions we could assess larger considerations: This LEV user had his own business and had selected the LEV for his needs. The two other users from Austria also had their own businesses and could share their experiences with the vehicle as well as the decisions to buy one. The three users of the LEV in Austria emphasized the 'coolness' appeal factor of LEVs, specifically for the purpose of service and vending competition that differentiated them from other competitors. The usual trip length was relatively small, going back and forth to different parts of town where they set up their service and vending activities with no additional travel to other places. The vehicles they used were all considered relatively cheaply made, not exhibiting expected quality standards.

The main consideration for the (one) shuttle user relates to the swapping of batteries for charging, that, due to the size of the vehicle and battery, requires additional personnel.

Initial Conclusions and Identified Design Principles

Based on the limited number of interviews, we cannot yet make conclusive recommendations concerning the design of LEVs to meet user needs. However, based on the already apparent diversity of use conditions and use environments, we surmise the following user-centred principles could be most relevant for designing LEVs:

1. The LEV should allow to be adaptable to varying sets of trip distances, not just one maximal one. Usage types can range between short single trips to continuous trips on a continuous route. Most likely different battery sizes and types are necessary to support such different trip types, and the user should be able to select the appropriate one for his or her transport needs. It may be possible to categorize range needs into 3 range types: < 50 km, 50 – 150km, and larger. (To be confirmed.)
2. A promising market of LEVs seems to be, based on our initial interviews, a niche-market to adapt a small vehicle to very specific business needs such as baking Pizza, selling espresso, or selling warm food. Here a differentiating appeal through the size and type of vehicle can attract customer's attention that is good for business and cannot be achieved by traditional vehicles. We observed that this may also be contributed to by prevalent social attitudes of the 'coolness' of such small vehicles, especially for 'retro-looking' vehicles that resemble small vehicles from the 60's or 70's. This was a factor that was not apparent to us prior to the interviews but resulted from them.

- Accordingly, to facilitate a variety of service and vending activities, the LEV should have a high level of adaptability. For example, one user mentioned that if the vehicle loading capacity were able to accommodate standard European pallet sizes (EN 13698-1) in the size of 1200 x 800 mm, this would represent a significant advantage. But maybe even more important than standard size would be the easy customisability of the loading platform for the specific use purposes and ideas. Such customisation could be performed by the vehicle owner or be delegated to specific customisation support companies.

- If the LEV is used for business purposes, a major decision criterion is the durability and replaceability of certain vehicle parts, for example, the battery. The interviewees mentioned that if the battery life is too short and/or the replacement is too expensive, this can have an impact on their purchase decision, as their business must be profitable.

3. External incentives may be necessary to overcome limitations of LEVs for user acceptance. Such incentives can include tax advantages, funding support, or access rights that are not achievable otherwise. This was the case for three of the four interviewed users.
4. The acceptable price range for the LEV for the purposes of service and vending was indicated to be between 10 – 20K Euro. This did not include the customisation which would cost another 20-25K Euro.

The interviews are still ongoing at the time of deliverable submission. The following sections describe the design and conduct of the survey for a more complete and wider understanding of use context and tasks as well, as the framing conditions for the GIANTS innovations.

3.3 The GIANTS survey

In order to determine the needs and concerns of various stakeholders as regards the adoption of L5, L6, and L7 LEVs a survey was created. This survey targeted three distinct groups of stakeholders: (potential) end users; fleet operators, fleet owners, or fleet managers; and local, regional, or national public authorities / governments. The survey was split into different sections by topic and the choice of one of the above three categories brought survey participants to relevant questions tailored to their group.

Based upon information from the Grant Agreement and extensive discussions with project partners the following steps were taken to create and publish the survey:

1./ POLIS Established an initial draft of the survey.
2./ Colleagues within the project, having expertise in various areas, refined these questions and provided further content to the survey to ensure the necessary information was gathered for future tasks within the project. Colleagues from SQUAD, I2M, Renault, and Clean Air Asia were especially involved closely in these tasks, while the survey as a whole received input and feedback from the range of WP2 colleagues.
3./ After the critical thematic areas were established, these questions were formulated to the KANO (further information in the following section) survey format where relevant, and otherwise as rankings, multiple-choice, or open-ended questions, as relevant.
4./ Duplications and unnecessary questions were removed.
5./ Questions were arranged in a logical order for respondents and the various sections were arranged by theme and to target only relevant questions towards the key survey target audiences.
6./ The survey was then tested to ensure the questions were properly framed, and further refinements were made along the way. Testing was completed within the focus group, WP2, and then the consortium.
7./ The survey was shared with stakeholder and the general public.

Further details are outlined in the below sub-sections.

3.3.1 How the questions are structured and how the KANO approach was implemented

To facilitate the collection and analysis of data, as well as comparability and measurability of results, besides the qualitative questions about the socio-economical background of respondents, GIANTS adopted the KANO approach for the design of specific sections of the survey. The KANO approach was used both due it being cited in the Grant Agreement, and because it serves as a tool to assess user desires for various product features versus actual needs, which is addressed in the other approaches to framing questions within the survey.

For the survey to fit the KANO model, all of the main features were assigned 2 questions. One asked in a positive way (functional question), one in a negative way (dysfunctional question).

Since the KANO model should reflect what the customers want, the questions were all asked with a common scheme. “How would you feel if,” is the beginning of every question, in order to trigger a more emotional response from the survey-taker.

The survey-taker always has 5 choices on every question:

- I like it
- I expect it
- I am neutral
- I can tolerate it
- I dislike it

There are also questions where the survey-taker should rank the different features by importance. These questions will further pin down which features should be prioritised. Further details on categorising and analysing the results can be found later in this chapter.

3.3.2 Key criteria and KPIs to assess

It is key to the frugal vehicle design, that features which are not necessary are not implemented. While some features of standard cars are clearly out of scope of a frugal vehicle, many features fall into a grey area. For example, advanced infotainment systems with touchscreens and voice controls are clearly out of scope for a frugal electric vehicle, while safety features such as anti-lock braking systems fall into a grey area, as they are important for safety but add to the overall cost. The KANO approach allows for the most vital features to be discerned.

The features focus mainly on usability for the customer. Therefore, fields like cargo, charging, energy consumption and safety received the most attention. After long discussions between project partners, the following features were identified to be assessed in the survey:

- Additional Heating
- Air Conditioning
- Cargo Capacity - smaller vehicle (2-person)
- Cargo Capacity – larger vehicle (4-person)
- Tailorable (vehicle modifications made by the user) changes in seating and cargo space
- Anti-Lock Braking Systems (ABS)

- Backing Up Alarm
- Headrest and Mirrors
- Crash Safety Features
- Passenger Capacity
- Doors
- Anti-theft
- Comfort Features
- Comfort Features - Space
- Comfort Features – Acoustic (shield from noise)
- Compact Size
- Vehicle Aesthetics and Design
- Swappable Batteries – for Charging
- Swappable Batteries – Ability to self-swap
- Power Capacity
- Rapid Charging
- Charging Infrastructure
- Battery enclosure
- Solar Panels

3.3.3 Survey Structure

Once the survey questions were established, it was organised to tailor sections to the key stakeholders.

The key stakeholders identified to focus on for the survey were:

1./End users
2./Fleet operators
3./Public authorities

While fleet operators and public authorities could technically choose to answer and end users – this categorisation was set up to capture replies from the primary stakeholders identified and to have context for the role in which they are completing the survey (their choice of category.)

The choice of one these categories within the survey also diverted respondents to the most relevant sections of the survey. The longest survey was for ‘End users’ with 80 questions.

The survey was structured into four key sections (plus gathering general information) as outlined in the Grant Agreement using the KANO method where this was practical:

- Design and Affordability
- Road Safety and Infrastructure Requirements
- Integration into Mobility Ecosystem
- Fleet Management

The survey begins with a general information section, which asks basic questions about the age and gender of respondents, before questions about the respondent's country and city of residence or area of operations. This allows for an analysis to be conducted of different key markets, both advanced and emerging, which is one of the objectives of WP2. After self-identifying the stakeholder group they belong to, respondents are directed to the appropriate survey questions.

End users are directed to answer questions on the demographic background of their household, allowing for an analysis of the needs of city residents of various demographic backgrounds, as outlined in T2.1. Questions about terrain and current mobility habits help identify infrastructure needs and trends, another requirement of T2.1 and T2.2. This includes various questions structured as multiple-choice, as well as offering space for 'other' answers.

The next section of the survey addresses vehicle design and affordability, primarily using the KANO method. 24 questions, each with a functional and dysfunctional sub-question, provide thorough insights into what (potential) end users value most, ensuring that the LEVs can be designed in the most frugal way possible without sacrificing essential components. Additionally, in other questions, respondents are asked to rank various key features in order of importance, offering further insights into user priorities.

The next section addresses road safety and infrastructure requirements, identified in T2.1 and T2.2 as key components to analyse. This section is open to end users and public authorities alike, reflecting the importance of the topic both from a regulatory as well as an individual perspective.

The next section addresses integration into mobility ecosystems, as outlined in T2.2., and is to be answered by public authorities. The majority of questions are phrased in an open format, allowing for in-depth replies from those with a deeper understanding of the nuances of the topic, and accounting for the lower value of quantitative analysis on the topic.

The last section is open for fleet managers and addresses key issues regarding fleet management. This section also addresses modularity and the circular economy, as specified in T2.2. These questions also allow for open answers, taking advantage of the expertise that respondents can offer.

Finally, all survey respondents are given a final open question asking, 'Do you have any other comments?', to provide an opportunity to comment on anything potentially overlooked and to gather further input and feedback. **(See Appendix C for the full survey.)**

3.3.4 GIANTS survey - Online platform

Google Forms was selected as the online platform for the survey due to its comprehensive features, ease of use, and wide accessibility. This platform allows for the creation of customised surveys with various question types, facilitating the collection of both quantitative and qualitative data. It also allows for easy implementation of questions in the KANO format. Google Forms integrates seamlessly with Google Sheets, enabling real-time data analysis and efficient data management. In addition to this, results are displayed directly in Google Forms using easily readable visuals. Its user-friendly interface ensures that respondents can easily navigate the survey, thus increasing response rates. Furthermore, Google Forms offers robust security measures to protect respondent data. No personally identifying information is intentionally requested or collected though the questions asked within the survey, aligning with GDPR compliance requirements.

3.3.5 Dissemination of the survey

The survey was shared with a list of stakeholder groups established in the Grant Agreement, and systematically covering the range of stakeholder groups by approaching project partner' networks. This approach takes advantage of the global nature of the consortium to reach (potential) EV users, public authorities, as well as fleet operators in a range of geographic areas. Organisations which could be reached were shared internally to ensure a broad range of survey coverage, however contact names and details were not shared in order to respect GDPR. The outreach was done internally by the partners who suggested the organisations to reach out to with the survey. A letter was provided which could be used directly, extracted from, or translated for reaching out to potential survey respondents and for sharing the survey on social media. **(See Appendix D for further details.)**

Figure 3-5: GIANTS Survey banner

3.3.6 Initial results

As of the date of the submission of the deliverable, there are presently 162 responses to the survey and the survey will be left open for continued outreach and dissemination to ensure continuous input (until project partners agree to close the survey.) and to support the analysis for D2.2 and the future goals of the project.

Overall, the information received is comprehensive in details. While most of the questions were not mandatory, most respondents that submitted surveys completed most or all of the questions. Information is provided through the platform both in the format of graphs as in Google Forms (which can be exported to Microsoft Excel) so that the data can be arranged and analysed in more detail.

Some results below may include repeated categories or duplication. This is generally due to minor refinements in the very first days or write in responses, as these graphs are auto generated and cannot be manipulated. The results will be more closely analysed through the data exported into Google Forms / Microsoft Excel. D2.1 present the *results, which are generally still raw data, so* the information is not yet sorted or analysed in detail. The *synthesis* and interpretation of the results will take place later in D.2.2. However, the following figures can provide some initial ideas of the type of results received so far:

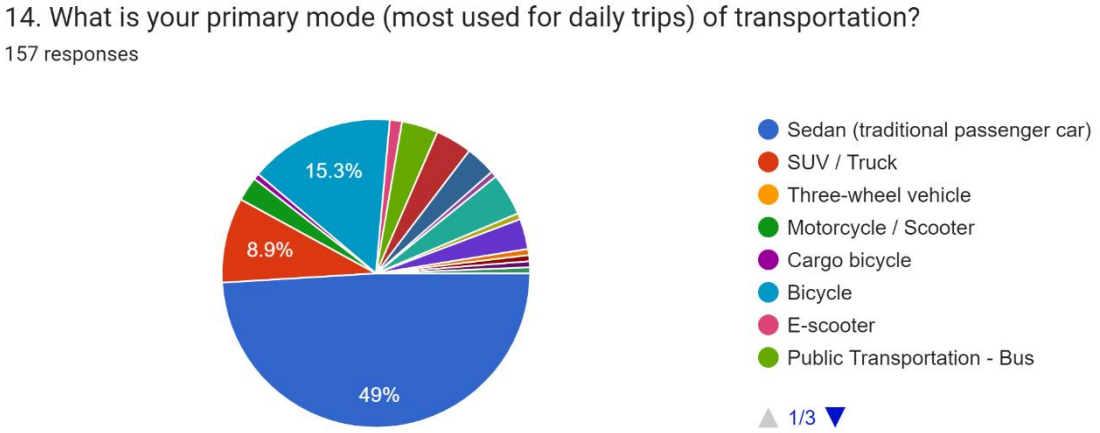

Figure 3-6: Survey Results: Primary mode of transportation

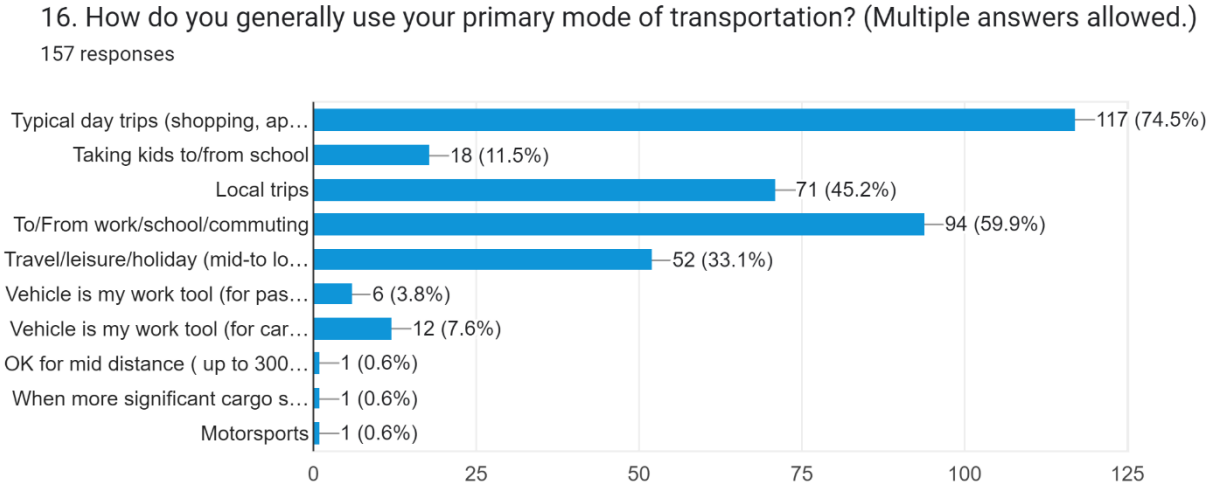

Figure 3-7: Survey Results: Usage of primary mode of transportation

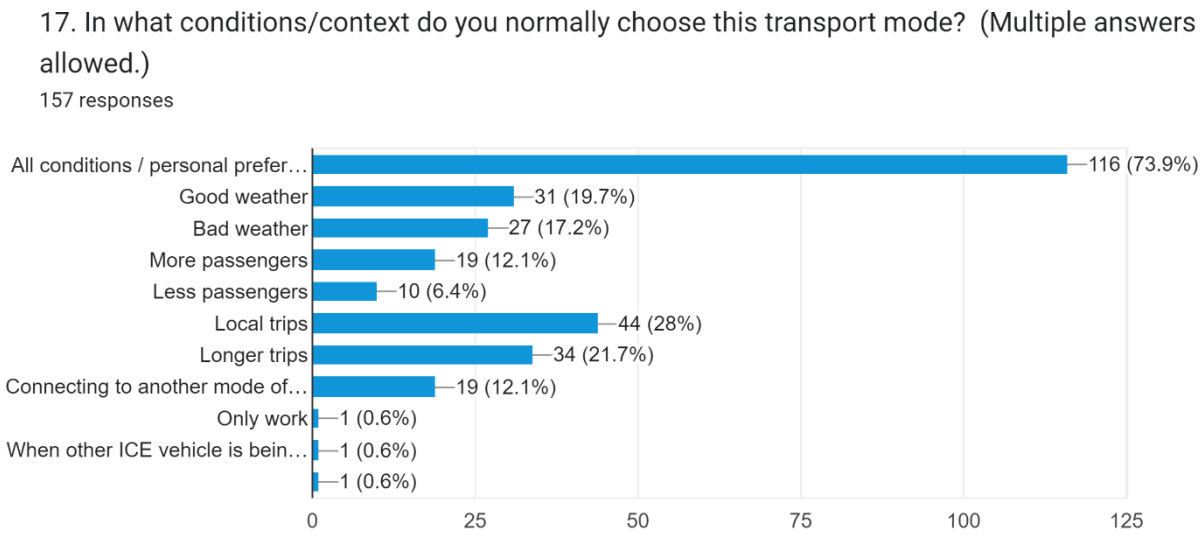

Figure 3-8: Survey Results: Conditions for choosing primary mode of transportation

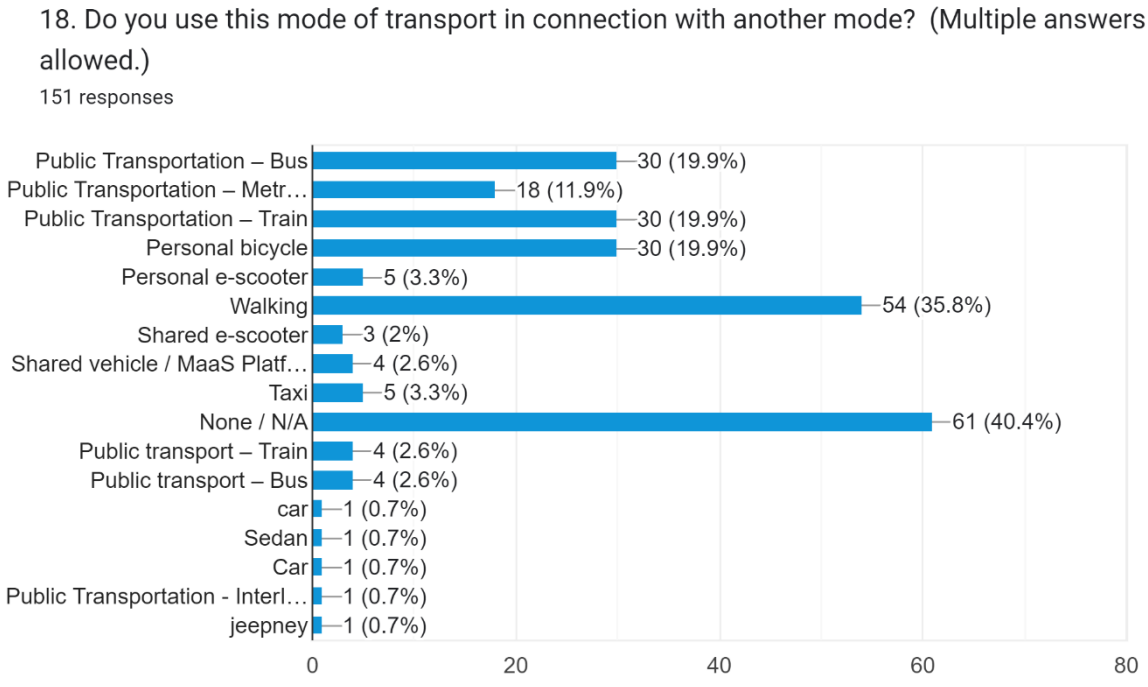

Figure 3-9: Survey Results: Primary mode of transport -Connections with other modes of transport

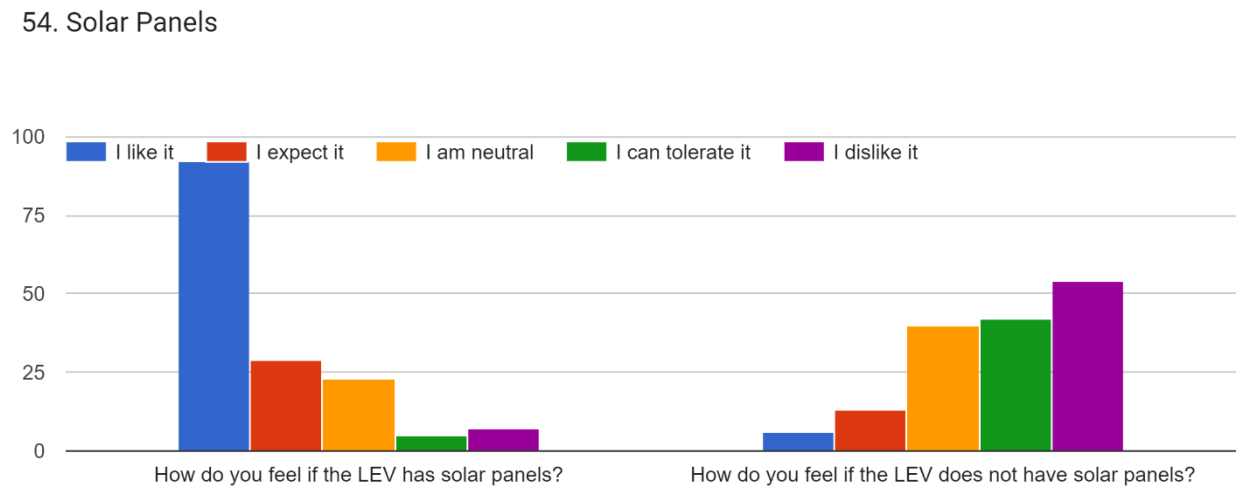

Figure 3-10: Survey Results: KANO question: Solar Panels

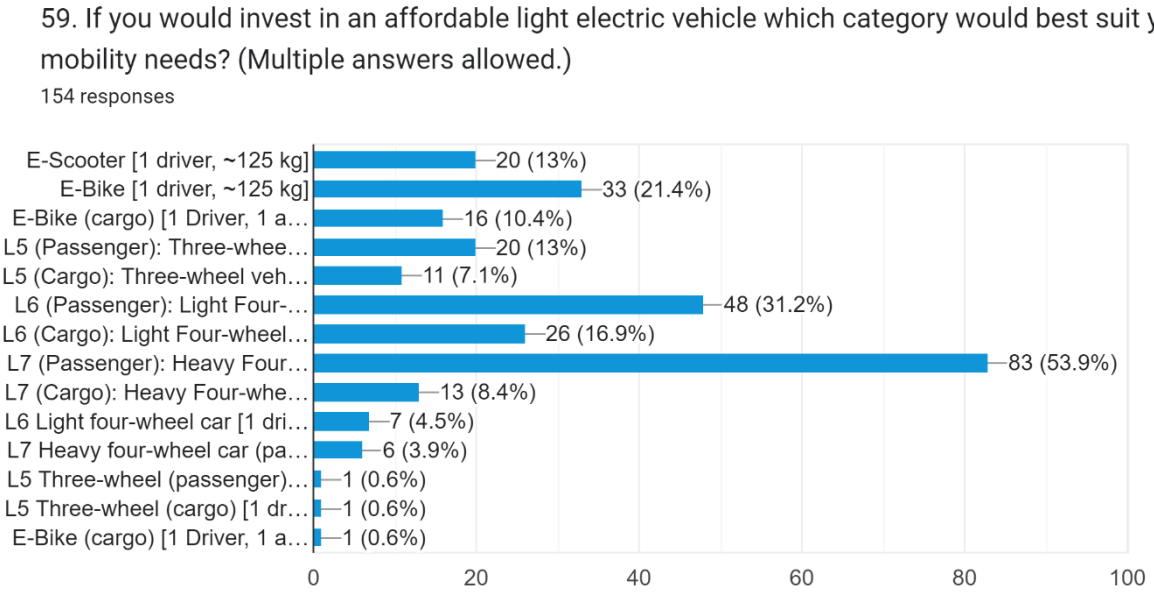

Figure 3-11: Survey Results: What category of LEV best suits your mobility needs?

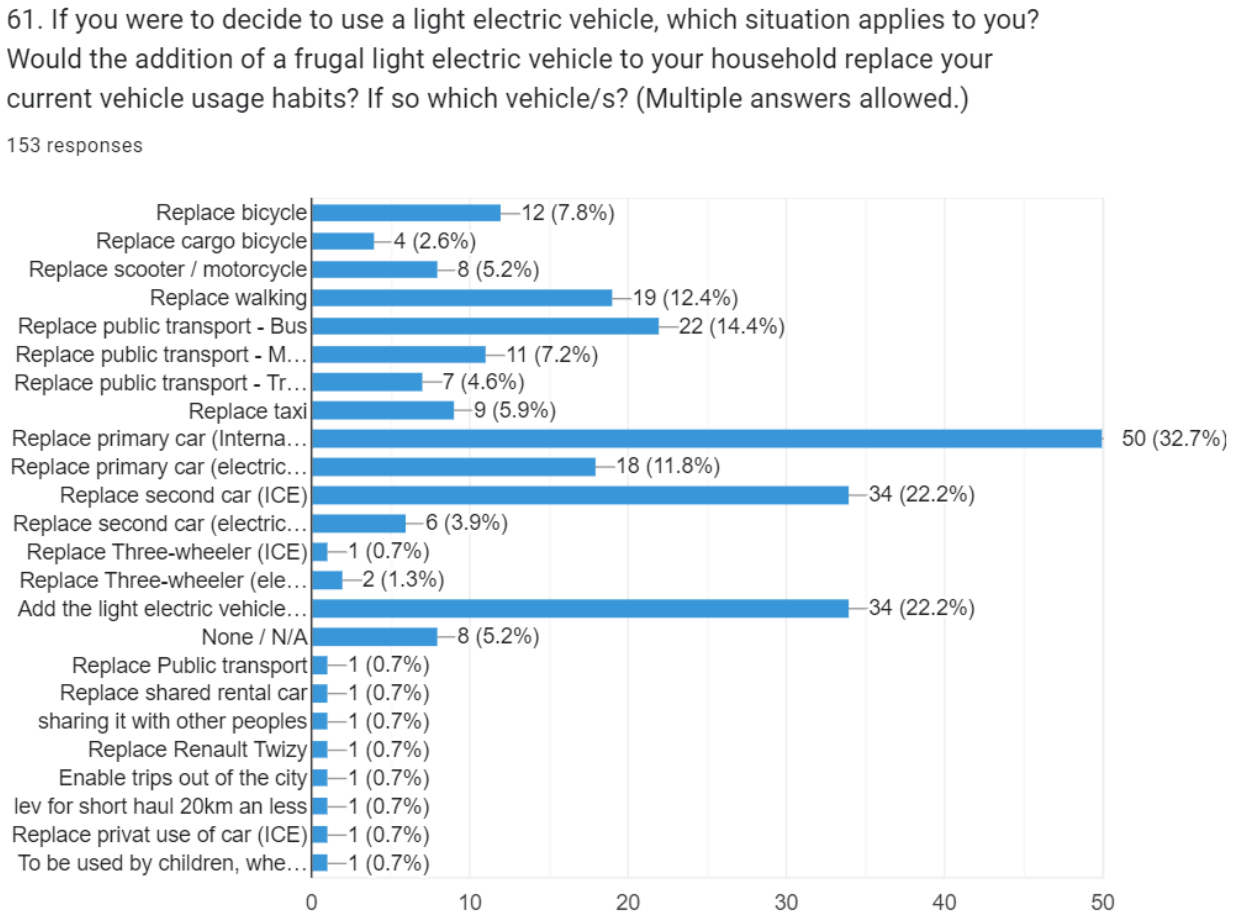

Figure 3-12: Survey Results: Would the addition of an LEV to your household replace usage of an existing vehicle?

63. If we develop an L5/L6/L7 LEV vehicle that fulfils all your needs/purposes described above OR replace your current vehicle(s), what price range do you estimate as reasonable/affordable within your market in Euros (€/EUR)? (Link to EU currency converter)

152 responses

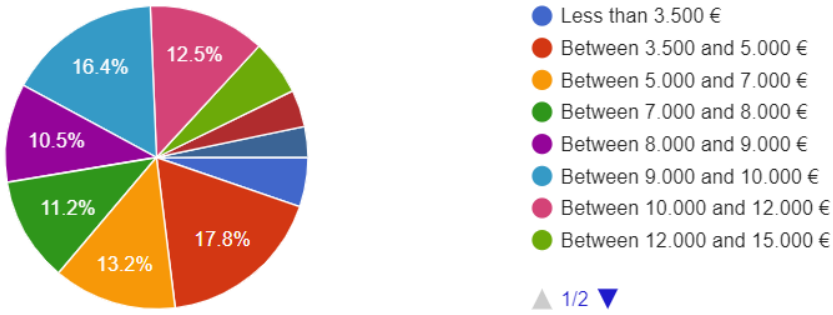

Figure 3-13: Survey Results: What price range do you estimate as reasonable/affordable in your market for an L5/L6/L7 LEV?

1	Timestamp	1. Gender	2. Age	3. Country	4. City (*If you are completing this survey as a fleet operator, public authority, etc. the primary city of your operations / city you represent)	5. What is the population where you live? (*If you are completing this survey as a fleet operator, public authority, etc. the population of the primary city of your operations / city you represent)	6. You are completing this survey as: (*You will be directed to focused survey questions.)
132	7/22/2024 11:31:46	Male	45-59	Czechia	Prague	Between 500.000 and 2.000.000	A private individual / User
133	7/22/2024 12:05:10	Male	30-44	Czechia	Prague	Between 500.000 and 2.000.000	A private individual / User
134	7/22/2024 12:28:45	Male	45-59	South Africa	CAPE TOWN	> 2.000.000	A private individual / User
135	7/22/2024 14:03:31	Male	60-78	United Kingdom	Crymych	< 2.000	A private individual / User
136	7/22/2024 16:03:20	Male	60-78	Germany	Zittau	Between 10.000 and 25.000	A private individual / User
137	7/23/2024 8:46:14	Male	18-29	Germany	München	Between 500.000 and 2.000.000	A private individual / User
138	7/24/2024 8:59:56	Male	30-44	Nepal	kathmandu	> 2.000.000	A private individual / User
139	7/25/2024 3:46:12	Male	45-59	Philippines	Sto. Tomas Batangas	Between 150.000 and 500.000	A private individual / User
140	7/25/2024 10:52:37	Male	18-29	Malta	Qormi	Between 10.000 and 25.000	A private individual / User
141	7/25/2024 11:16:43	Male	18-29	Malta	Birkirkara	Between 10.000 and 25.000	A private individual / User
142	7/25/2024 11:27:56	Male	45-59	Philippines	Carmona City	Between 50.000 and 150.000	A private individual / User
143	7/25/2024 16:01:29	Male	30-44	Czechia	Prague	Between 500.000 and 2.000.000	A private individual / User
144	7/26/2024 5:45:40	Female	30-44	Austria	Vienna	Between 500.000 and 2.000.000	A private individual / User
145	7/26/2024 9:24:48	Male	45-59	Sweden	Ängelholm	Between 25.000 and 50.000	OEM

Figure 3-14: Survey results 9: Sample Google Sheets / Microsoft Excel output

3.3.7 KANO approach – Categorising the results

With the KANO question answers, there is a very straightforward approach to determine the categories of the features afterwards. Depending on the answer of the functional and the dysfunctional question, each feature can be assigned to a specific category, outlined in the figures below:

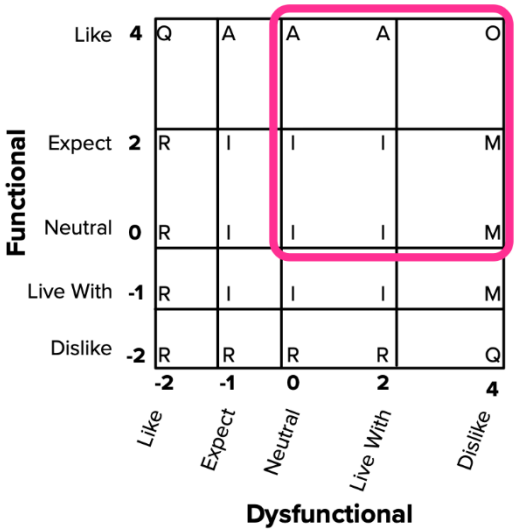

Figure 3-15: Reading the KANO results 1
(Source: Folding Burritos[8])

The Kano-Model is a good way to separate different features of a product into distinct categories:

- **Attractive (A)**: Also sometimes called 'delighters'. Features that satisfy the customer when it's there, but don't usually bother the customer if it's not there
- **Indifferent (I)**: Features that don't influence the satisfaction of the customer
- **Must-have (M):** Requirements that the customer expects and takes for granted. Basic demand. This is a feature that gets overlooked when it functions, but when it doesn't function the customer gets very dissatisfied
- **One-dimensional (O**): Also sometimes called Performance (P). Priority features/areas where satisfaction increases with improved functionality
- **Reverse (R)**: Feature that when implemented will lead to dissatisfaction of the customer
- **Questionable (Q)**: Questionable answers

Figure 3-16: Reading the KANO results 2
(Source: KANOSURVEYS, KANO.PLUS[9] [10])

With all the features allocated, and the priorities of the features, the most important features will crystallise. The model helps prioritise features that maximise overall satisfaction while balancing the needs of different user groups. Features that are "Must-Be" for all users are prioritized first, followed by "One-Dimensional" features that provide the best trade-off between cost and satisfaction. By systematically categorising and prioritising features, the KANO model ensures that the design of the vehicle can meet the

essential needs of most users while carefully managing and balancing the varied and sometimes conflicting wishes of different user profiles.

To really stand out against competitors it can be helpful to implement one or two *Attractive* features. This for example could be for the GIANTS vehicles, the solar panel.

Indifferent features should be implemented if it is important for the functionality or safety, but otherwise can be left out.

Reverse features should not be implemented, with an exception if safety is concerned.

Questionable features contain a contradiction in the stakeholder's opinion. If a feature receives a majority of users answers classified this way, this could indicate an issue with how the question was asked.

3.3.8 Future assessment

The full analysis and synthesis of the data will be presented in the next Deliverable, D2.2 (linked to ongoing work in T2.2, T2.3, and T2.4). Nonetheless, from making the survey in T2.1 it is possible to derive first insights on how to handle the data in the next steps of the project. As already stated, the survey can be split into the KANO part, that focuses stakeholder desires and the non-KANO part, that focuses on the stakeholder needs. Therefore, these two parts can also be split in the analysis. This approach will allow to identify the extent to which the customers' desires align with their actual needs.

In order to establish real technical parameter ranges that are not overengineered, it will be crucial to focus on the non-KANO part of the survey. The KANO part will be useful to determine which features can be omitted, or reduced to their minimum, while still maintaining satisfaction with the LEV.
Furthermore, it will be useful to split the takers of the survey into groups of similarity. This method can clarify if, for example, only one specific group of people has a problem with excluding a certain feature.

The results of this initial analysis should enable us to determine a “mission suitability index” that will be a measure of best fitting frugal parameters, rather than maximum parameters, as part of T2.3.

4. Current Research and State of the Art Vehicle Integrated Photovoltaic Solutions (VIPV) and Swappable Batteries

In the following paragraph the needs and infrastructure trends are investigated with a focus on grid independent solar charging and battery swapping solutions. This is part of Task 2.1 which indicates that 'needs and infrastructure trends are identified and policy requirements for grid independent solar charging/battery swapping stations are elaborated'.

4.1 Current charging infrastructure

In September 2023, the EU published Regulation (EU) 2023/1804[11], commonly known as the Alternative Fuel Infrastructure Regulation (AFIR). It sets for the first time legally binding national and EU-wide targets for the deployment of alternative fuels infrastructure including EV recharging stations. This regulation applies from 13 April 2024 and requires that Member States must ensure among others:

- Fleet-based targets, with a total power output of at least 1.3 kW for each battery electric car or van and 0.8 kW for each plug-in hybrid registered in their territory to be through publicly accessible recharging stations
- Distance-based targets, with the installation of a fast-charging pool in each direction of travel along the core and comprehensive TEN-T networks for LDVs and HDVs
- Location based targets for urban nodes and safe and secure parking for HDVs

In the last years, we have witnessed an increase of the number of EV charging points in Europe, which, according to the European Alternative Fuels Observatory (EAFO) is currently around 624.000, of which 87% are AC and 13% DC.[12] Out of 27 Member States, 25 are currently above target (the exception is Ireland and Malta), but it is a dynamic indicator, which can change each year. However, the geographical distribution of this charging infrastructure is uneven throughout Europe, with Germany, France and the Netherlands comprising more than 50% of the charging points.

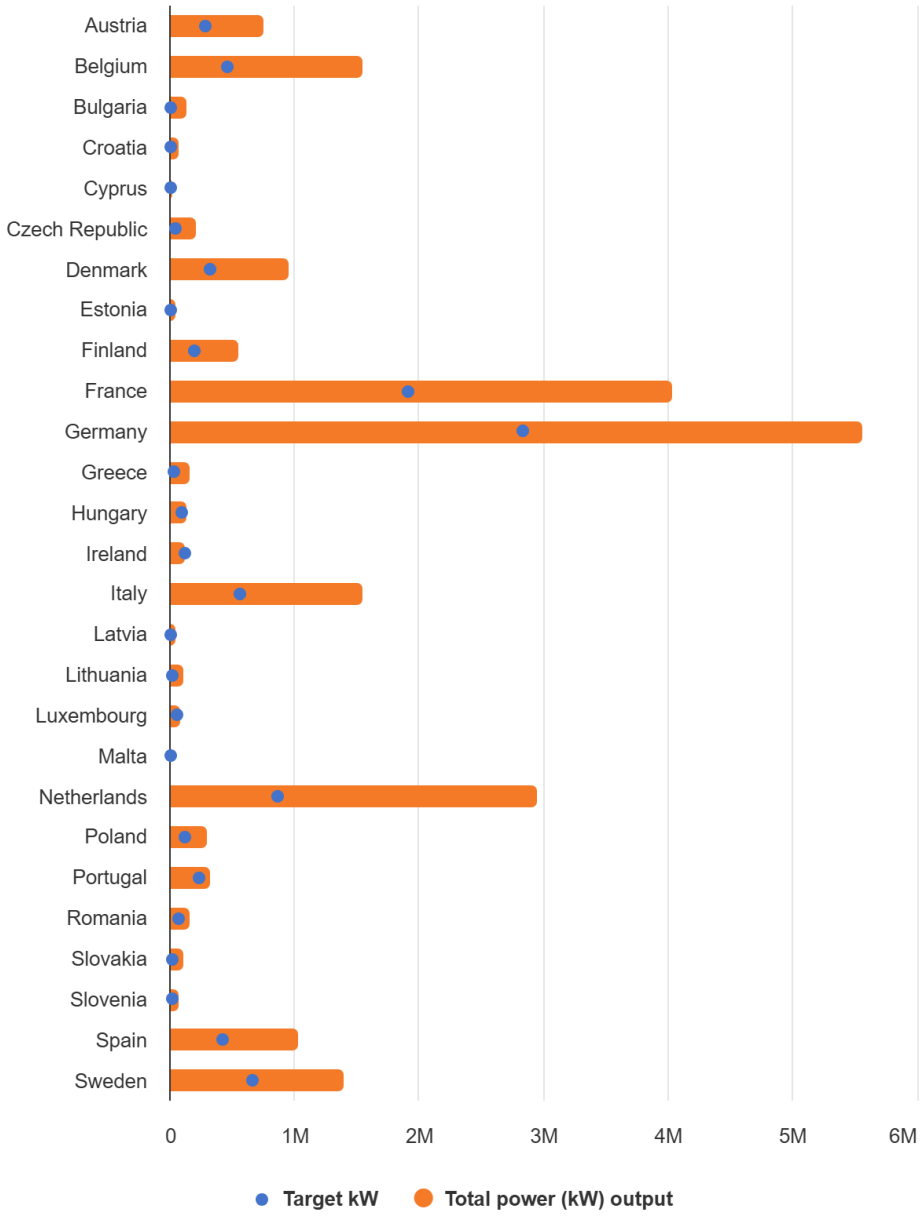

Figure 4-1: Total power output per AFIR fleet-based target
(Source: EAFO[13])

However, according to the European Green Deal, it is expected that by 2030, around 30 million BEVs (Battery Electric Vehicles) will be circulating on EU roads, and without an ambitious investment from Member-States, the AFIR targets will not be met that year.[14]

Other developed markets, such as UK and Germany, are also enhancing public charging support while reducing vehicle incentives, for example the "United Kingdom has ended subsidies for private cars but maintained incentives[15] for private and public charging installations."[16]

This is not solely a European issue - Based on the report from EY-Parthenon, the European charging infrastructure "must scale significantly to meet the quickly growing demand from EV drivers."[17] Two indicators of the pressure on the infrastructure are (i) the ratio between Electric Vehicles and the amount of available Public Charging Points and (ii) the quality of charging, i.e. the charging speed or the kW installed. Therefore, it may be more relevant to consider the total charging capacity per EV, given that fast chargers can serve more EVs per day than slow chargers (See figure below.)

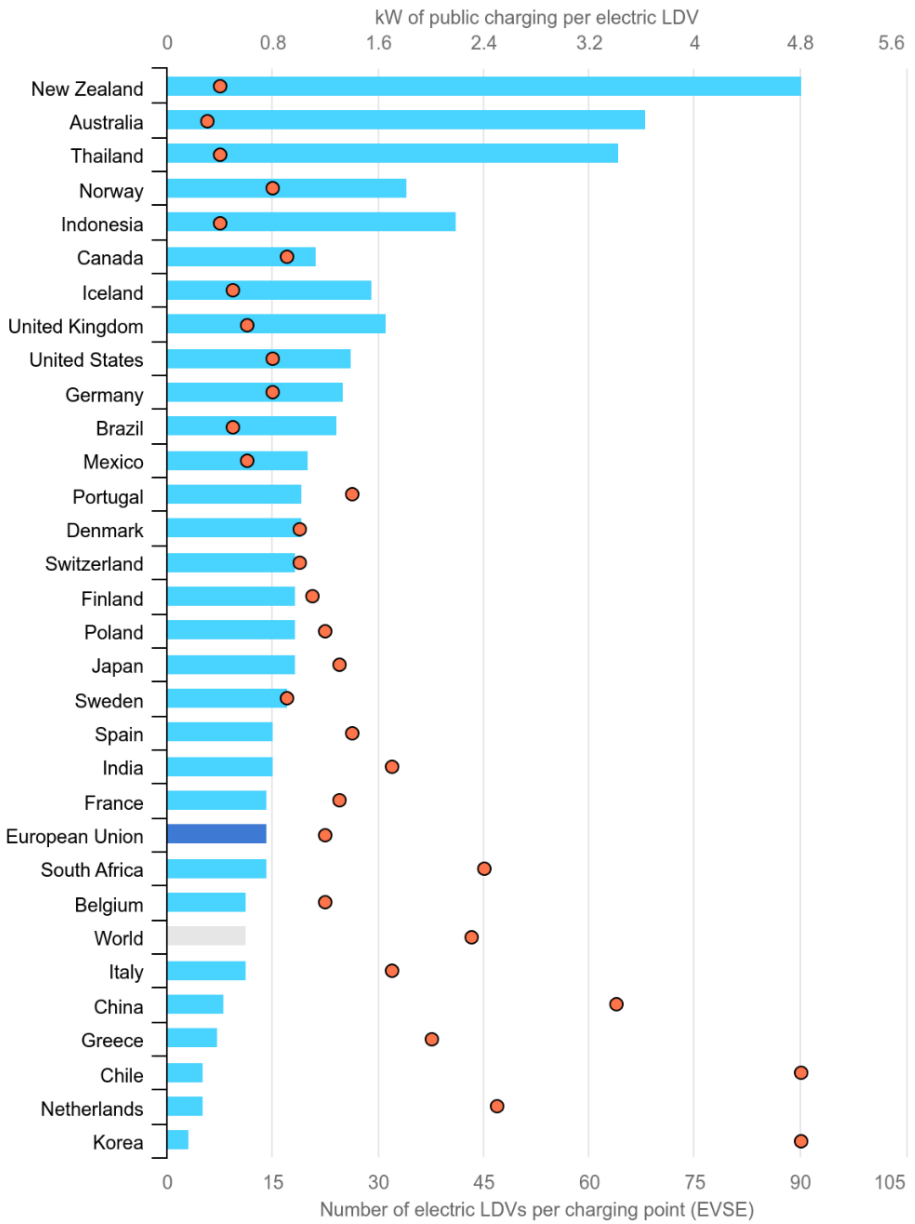

Figure 4-2: In blue the ratio between ELDV (Electric Light-Duty Vehicles) and the public charging points. In orange the ratio between the installed power in kW and the amount of ELDV

(Source: IEA[18])

"High ratios of publicly available charging capacity to EVs in use are crucial in regions where home charging is less accessible and can help improve the consumer experience more widely. Sufficient coverage reduces concerns about range, and can allow for vehicles with lower[19] battery capacity, thereby reducing costs and critical material demand."[20]

Charging ratios also illustrate the differing approaches of governments: "Although New Zealand has the most vehicles per charger, it is ahead of countries such as Australia and Thailand when considering charging capacity per EV. This can be attributed to New Zealand prioritizing fast public chargers over slow, resulting in the highest proportion of fast chargers to slow chargers globally, standing at 75%. Similarly, the next highest proportions globally are observed in South Africa, China, and Norway, with 53%, 44% and 41%, respectively. At the other end of this spectrum lie countries such as Brazil, the Netherlands and Korea, which have installed more slow public chargers, with the share of fast public chargers representing 0.1%, 4% and 10%, respectively."[21]

Public charging and its infrastructure is the enabler for EVs adoption, therefore globally the "public charging stock increased by more than 40% in 2023, and the growth of fast chargers – which reached 55% – outpaced that of slow chargers."[22]

4.2 Outlook for the future

Policies focused on charging infrastructure play an important role in increasing the number of charging points per EV. "The capacity requirements can be relaxed once 15% battery electric stock share has been reached. In the APS, the average charging capacity per EV is close to 1 kW, despite over 80% of electric LDVs being battery electric, given that battery electric LDVs reach a 30% stock share. The AFIR regulation also requires that from 2025 onward, DC fast charging (at least 150 kW) be installed every 60 km along the EU Trans-European Transport Network (TEN-T). As such, the share of fast chargers is set to increase from the 2023 share of approximately 15%."[23]

4.2.1 Battery swapping

Among the alternative solutions for charging, it is relevant to spend few words on battery swapping.

"Battery swapping can be completed in as little as five minutes[24], can help to extend battery life through more controlled charging, and can spread power demand over a longer period, thus reducing pressure on the electricity grid. Battery swapping is currently most developed in China, where it has been encouraged by national and local governments since 2020[25]. As many as half[26] of electric heavy-duty trucks sold in 2023 were enabled with battery-swapping technology. In late 2022, SAIC launched[27] a joint venture to set up around 40 battery swapping stations in cities such as Beijing, Guangzhou, Shanghai and Shenzhen, with the aim of installing 3 000 stations by 2025. In 2023, CATL, the world's largest producer of EV batteries, launched[28] QIJI Energy, an all-in-one heavy-duty truck chassis battery-swapping solution, which aims to reduce costs by building upon existing battery technology."[29]

4.2.2 Solar charging (VIPV)

Vehicle-integrated photovoltaic (VIPV) refers to the integration of solar panels directly into the surfaces of a vehicle (roof, hood, doors, or trunk), which allows vehicles to harness the solar energy and charge the battery.

General benefits:

- Reduce charging moments
- Reduce grid capacity need
- Reduce grid congestion moments
- Extend range with smaller battery
- Auxiliary loads & maintaining state of charge while satisfying no-idle requirements
- Fleet operators are concerned about the ability of the grid to supply sufficient power at a depot or warehouse to charge an electrified fleet, so VIPV could help offset some of that need.

Solar decentralised linked to a battery swapped stations:

- The PV charging stations will be popular for private EV users. It is cheap electricity for the EV, with less surplus PV electricity from the own PV installation. This helps the PV electricity production for EVs and the EV market penetration.
- Decentralised grid connected PV installation and an EV are still a success and offers most of the customer benefits of «real» VIPVs.
- Public parking places will be mandatory equipped with PV in many countries. This helps the PV electricity production for EVs and the EV market penetration once more.

Below is a list of VIPV solutions:

SolarMoves[30]

Since early 2023, a European consortium, including TNO, Fraunhofer ISE, and three solar technology suppliers, has been investigating the impact of vehicle-integrated solar on the electricity needs of electric vehicles. The *SolarMoves* project, led by the European Commission's DG MOVE, aims to quantify solar electricity generation on vehicle bodies and its effect on future charging infrastructure.

Twenty vehicles across Europe have been equipped with irradiance sensors to gather real-world data for validating energy yield models. The three-year project combines solar power production and consumption simulations with real-time measurements from vans and trucks with integrated photovoltaics.

The project's findings will provide insights into the efficiency improvements of electric vehicles using integrated solar panels and help predict future charging infrastructure needs. These results will inform policy recommendations for the European Commission.

“From 2019 to 2023, Fraunhofer ISE investigated the solar potential of German traffic routes in the "PV2GO" project. Initial experience was gained in this project with irradiation sensors, which were developed further in the *SolarMoves* project. In PV2Go, these sensors were installed on 57 cars and 5 trucks as part of a citizen science campaign. The scientists collected and evaluated more than 46 million data points over 460,000 kilometres in the course of a year. Their data analyses showed that the solar energy losses due to shading in a vehicle with roof- and hood-integrated solar and average driving behavior is around 35 percent.”[30]

Future Policy Making[31]

Below a summary of the future policy making as described by the (Alliance of Solar Mobility) ASOM's chairwoman Bonna Newman.

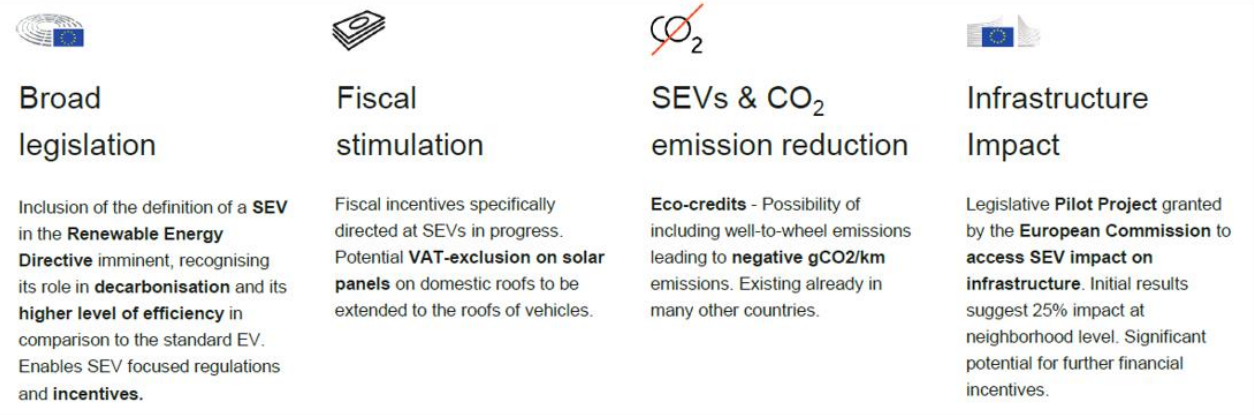

Figure 4-3: ASOM's Future Policy Making
(Source: Newman, B.)

PhotoVoltaic Automotive Body[32]

The PVAB (PhotoVoltaic Automotive Body) project aims at the design, development and demonstration of a new architecture of photovoltaic modules for the automotive and its production process, as well as the opportunities that this evolution brings to the development of solutions that promote the integration and performance improvement of the panels.[32]

Figure 4-4: PVAB project from Portugal
(Source: PhotoVoltaic Automotive Body)

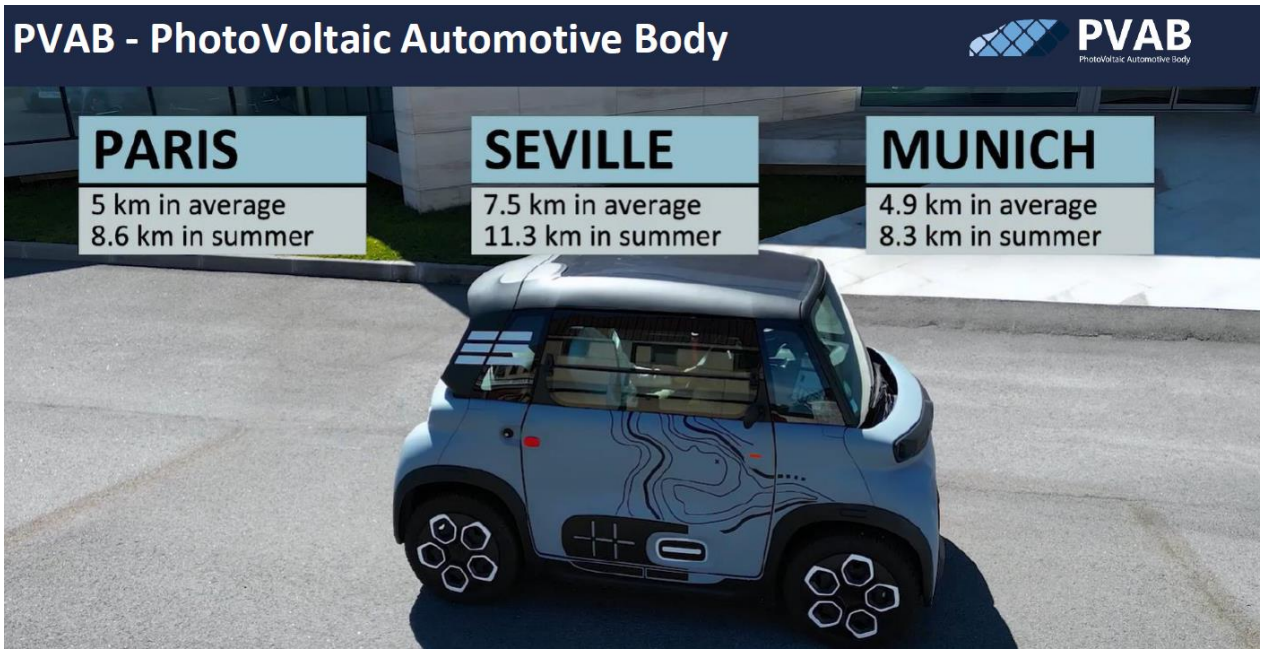

Figure 4-5: PVAB project with Citroen AMI VIPV solar roof
(Source: PhotoVoltaic Automotive Body)

AGC value proposition[33]

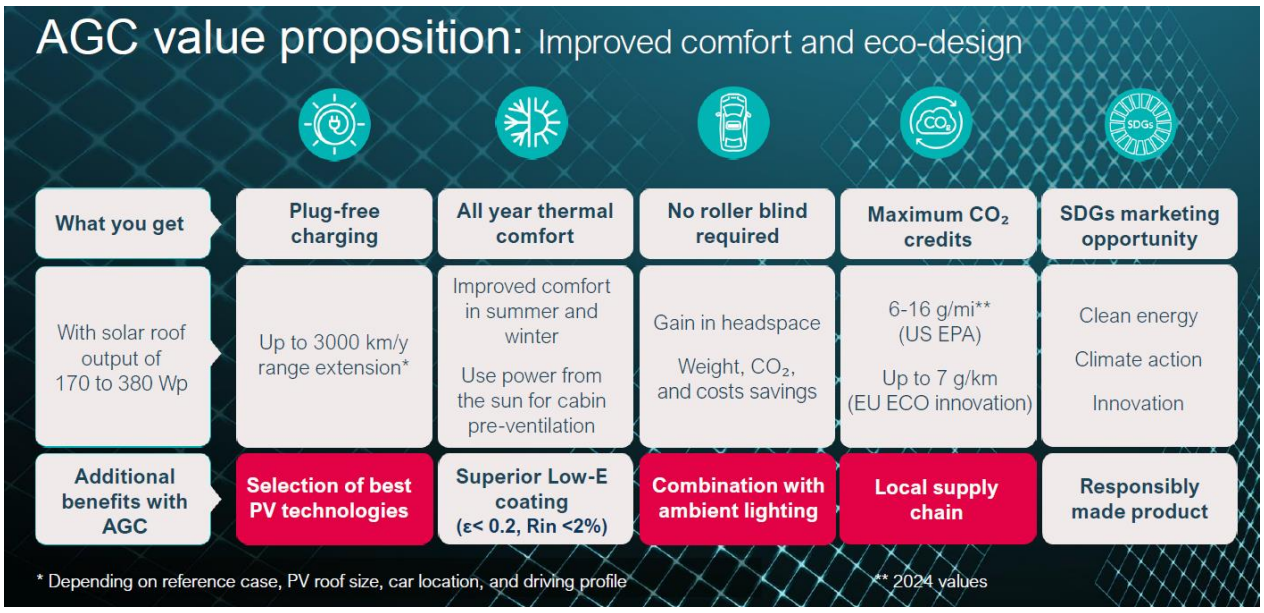

Figure 4-6: AGC value proposition
(Source: AGC)

5. Conclusion

This deliverable described the goals, process, and details of the work that created the various components and efforts that went into the completion of the initial steps for GIANTS Work Package 2. The key result is the creation of the user survey.

Overall, the gathering of this information feeds into the goals and next steps of the project, which has the aim to integrate frugal EVs from the GIANTS project into various mobility systems. The process, criteria included in the survey, and initial results were presented, and the comprehensive results will be available to project colleagues for future tasks.

The survey presents a foundation of information on user and stakeholder mobility patterns and preferences in relation to present vehicles usage and LEVs.

The deliverable also included research on the state-of-the-art vehicle integrated Photovoltaic Solutions (VIPV) and Swappable Batteries. This covers current charging infrastructure as well as the outlook for the future of battery swapping solar charging.

Policies on charging infrastructure are crucial for the widespread adoption of EVs. However, alternative solutions like battery swapping and vehicle-integrated solar panels can also help reduce the burden on the grid.

The work that went into the related tasks and this deliverable and the results will feed into the next tasks and D2.2, which will provide a *synthesis* of the collected survey and data collected in T2.1 and processed in T2.2.

As of the date of the submission of the deliverable, there are presently 162 responses to the survey and the survey will be left open (until project partners agree there are sufficient results) for continued outreach and dissemination to support the analysis for D2.2 and the future goals of the project.

6. Abbreviations

Abbreviation/Acronym	Definition
ASOM	Alliance of Solar Mobility
BEV	Battery Electric Vehicles
DEM	Demonstrator, Pilot, Prototype
ELDV	Electric Light-Duty Vehicle
EV	Electric Vehicles
GIANTS	Green Intelligent Affordable New Transport Solutions
LEV	Light Electric Vehicle
OEM	Original Equipment Manufacturer
PCP	Public Charging Points
PU	Public
PV	Photovoltaic
R	Document, Report
VIPV	Vehicle Integrated Photovoltaic
WP	Work Package

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A. Annex – Survey Process

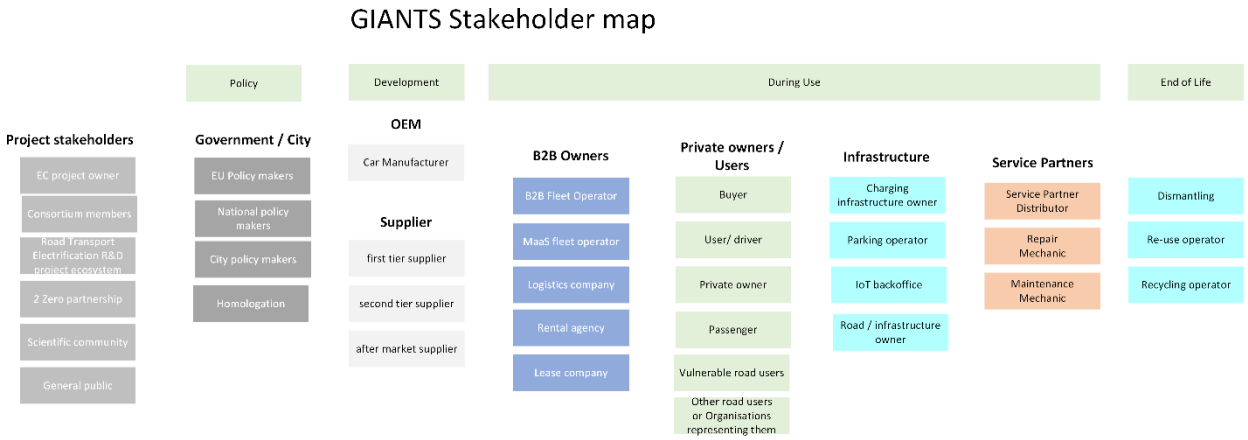

Figure 7-1: GIANTS Stakeholder map

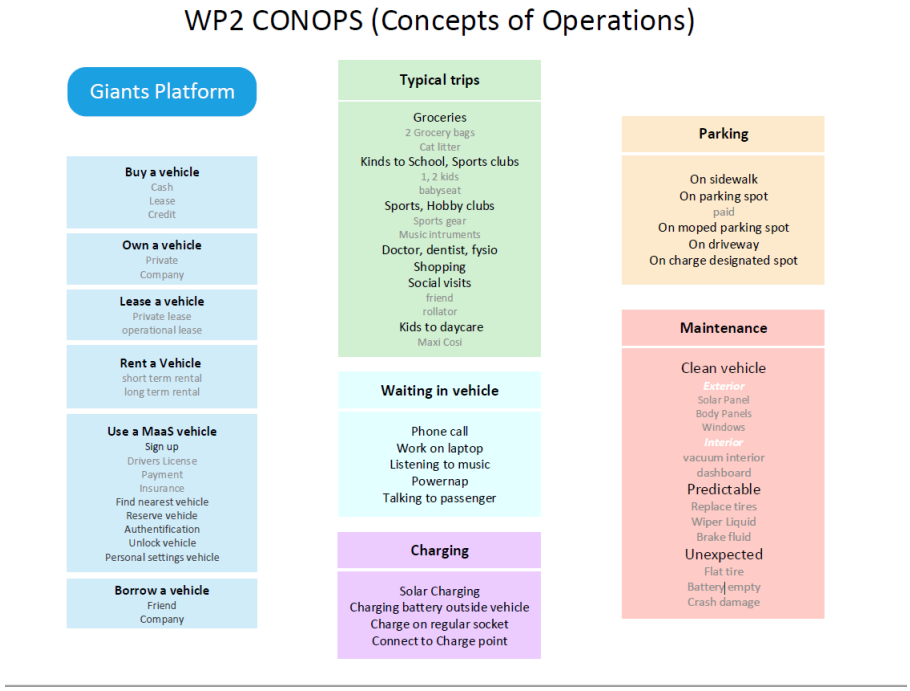

Figure 7-2: WP2 CONOPS (Concepts of Operations)

B. Annex – Interview Questions

The first questions related the **user characteristics**:

1. **Age range:** 15 – 20, 20 – 30, 30 – 60, 60>
2. **Gender:** Male / Female / Other
3. **Country where you live: ___**
4. **Have you previously used** a light vehicle (with less than 550 kg maximum load, either electric or with combustion motor). If yes, please explain what type? Why did you decide to use such vehicle?
5. If user has already used a light vehicle (see previous question): In your experience, what are potential shortcomings of your current vehicle that could be improved?
6. Imagine that in our current EU project, we will develop **"new light electric vehicle"** just for you and to address your needs. Can you briefly describe some main requirements for such vehicle? In what environment would you use such new light electric vehicle? (Big urban city, Small urban city, Around city, Town, Village, Rural)?

Questions about the Environment

1. In what of the following situations/environment would you predominantly use the new light electric vehicle and why? Interviewer prompts the following:
    1. In busy public road environments
    2. On roads that are not accessible by other vehicles (e.g. too narrow)
    3. In crowded areas
    4. In areas where the vehicle could be easily stolen?
    5. Others
2. Could you briefly describe, based on your experience, a typical trip for which you could use the new light electric vehicle?
3. What approx. distance would you travel without in-between stops longer than 5 minutes. >1km, >5km, >10km, >20km, >50km, other
4. How would you charge the new light electric vehicle (e.g. existing or future public charging stations, charging at home, fleet charging etc.) Please explain why and any important constraints.
5. Could you please describe some risks of using such a new light electric vehicle in your environment (e.g. theft, crashes,...)

Questions about the Mobility Tasks

1. Would the new electric light vehicle be your work tool? If so, would you transport goods, people, or both? Please describe a typical load situation.
    1. approx. how many driving / using hours on a busy day?
2. Would you use the new light electric vehicle (also / only) for private use (such as for daily shopping or bringing your children to school)?
    1. approx. how many driving hours on a busy day?
3. What specific tasks are also important to accomplish (such as loading / unloading, selling, other)? Please briefly describe.
4. For following tasks would you foresee either delegating them to others (such as garages) or do yourself? Please briefly describe…

Tasks	Self	Delegated
1. Repairment,		

2. maintenance,		
3. software updates,		
4. standard vehicle configuration modifications,		
5. perform non-standard vehicle configuration modifications.		
6. others		

Questions about the Organization

1. If you are not planning on buying a new light electric vehicle for yourself, could you please describe how to access a new electric vehicle for use? (e.g. rent, as part of a fleet).
2. Would you use the rented vehicle for a specific trip or continuously for several days
3. Would you need a vehicle configuration for specific trip purpose such as (e.g. “Cargo for snakes”)

Questions about the new electric vehicle

1. What is for you an acceptable minimum range for the new light electric vehicle to meet the described purposes above? Could you please explain your estimate?
>50 km, >100 km, >150 km, >200 km
2. If you plan to use the new light electric vehicle to transport people, how many passengers should it be able to transport? Could you please explain?
1 driver, +1 passenger, +2 passengers, +3 passengers
3. If you plan to use the new light electric vehicle to transport goods, what would be the required minimum payload? Could you please explain?
100kg, 200 kg, 300 kg, 400 kg
4. How do you ensure your current vehicle is not being manipulated or stolen during parking?)
5. What do you see as a primary barrier to replace your current vehicle with a new light electric vehicle?
6. Please rank the five most important aspects of our new electric vehicle:

Type of Answer	**Quantify Priority [1-5]**
Durability / reliability	
Modular repair (available, easy to assemble spare parts)	
Accessible charging infrastructure / battery solutions	
Safety	
Buying Price	
Configurability of the number of seats	
Bad weather protection	
Comfort (air conditioner, cooler, heater)	
Other, please specify (box)	

7. (If applicable): What is for you an acceptable price range for purchasing a new light electric vehicle for the described purposes? (0-1K, 1K – 5K, 5K – 10K, 10K – 15K)

C. Annex – GIANTS Survey

GIANTS HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON EUROPE RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO. 101138220.
Views and opinions expressed are however those of the consortium 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.

Your views on Light Electric Vehicles:
GIANTS project: User and stakeholder needs survey

Project/Context: GIANTS is a Horizon Europe project that aims to provide affordable and accessible mobility solutions to both emerging and advanced markets. GIANTS has the goal of developing frugal (economical, without excessive features) vehicle / mobility solutions based on user demand. This will be built on a set of technological solutions that allow the production of L5,L6,L7 class Light Electric Vehicles (LEVs) suited to provide urban traffic solutions. The approach offers modularity, scalability, interoperability, and features innovative charging and energy optimisation solutions.

Project Website www.giants-project.eu

Overview: Our aim within this project is to create a vehicle platform that meets the needs of users, without excessive functions and features. The goal of this approach is to create an affordable and modular design, optimising societal benefits and reducing environmental impacts.

As you answer the survey questions, please remember this goal. Understanding your essential requirements will enable us to design an affordable and flexible platform suited to your needs, without additional economic or environmental costs.

Information gathered in this survey is anonymous (no personally identifying information intentionally requested or collected) and the results will be used within the consortium to support and enhance the goals of the project. Many questions are 'optional' unless marked "*" for mandatory. The survey will take approximately 15-20 minutes to complete.

Your responses will not be received until manually clicking to submit at the end of the survey. Even if the survey is not completed in full, we appreciate if you submit as much as possible.

Many thanks for your participation!

Acronyms / Symbols
ICE: Internal Combustion Engine (traditional petrol vehicle)
LEV: Light Electric Vehicle
<: Less than
≤: Less than or equal to
>: Greater than
≥: Greater than or equal to

Visuals of L-Class vehicles by GIANTS project partners:
*L5 (Passenger): Three-wheel vehicle; capacity: (people+cargo) ≤1000kg, 5 seats (*depends upon local regulations); max speed: N/A.*
L5 (Cargo): Three-wheel vehicle; capacity: (people+cargo) ≤1000kg, 2 seats; max speed: N/A.
L6 (Passenger): Light Four-wheel vehicle; capacity (people+cargo) ≤250kg, 2 seats; max speed: 45km/h.
L6 (Cargo): Light Four-wheel vehicle; capacity (people+cargo) ≤300kg, 2 seats; max speed: 45km/h.
L7 (Passenger): Heavy Four-wheel vehicle; capacity (people+cargo) ≤450kg, 4 seats; max speed: 90 km/h.
L7 (Cargo): Heavy Four-wheel vehicle; capacity (people+cargo) ≤1000kg, 2 seats; max speed: 90 km/h.

Please keep in mind that in the context of this survey, general usage of the terminology LEVs refers to L5/L6/L7 class LEVs.

General Information

(*All survey respondents)

1. Gender:* Male | Female | Prefer not to answer |Non-binary

2. Age:
   ☐ <18
   ☐ 18-29
   ☐ 30-44
   ☐ 45-59
   ☐ 60-78
   ☐ >78

3. Country:*

4. City (*If you are completing this survey as a fleet operator, public authority, etc. the primary city of your operations / city you represent):*

5. What is the population where you live? (*If you are completing this survey as a fleet operator, public authority, etc. the population of the primary city of your operations / city you represent):*
   ☐ > 2.000.000
   ☐ Between 500.000 and 2.000.000
   ☐ Between 150.000 and 500.000
   ☐ Between 50.000 and 150.000
   ☐ Between 25.000 and 50.000
   ☐ Between 10.000 and 25.000
   ☐ Between 2.000 and 10.000
   ☐ < 2.000

6. You are completing this survey as:* (*You will be directed to focused survey questions.)
   ☐ A private individual / User
   ☐ A fleet operator, fleet owner, or fleet manager
   ☐ A local, regional, or national public authority / Government
   ☐ Other (please specify)

   (*Key stakeholders:
   1./end users
   2./fleet operators
   3./public authorities)

General Information (Continued)

(*A private individual / User only)

7. What is the nearest equivalent to your highest obtained educational degree?
   ☐ None
   ☐ Elementary school
   ☐ high school
   ☐ bachelor
   ☐ master
   ☐ PhD

8. How many people / family members live in your household? (for safety related questions)

People	Number
Adults (18 and older)	0,1,2,3,4,5+
Kids (6-17)	0,1,2,3,4,5+
Toddlers (1-5)	0,1,2,3,4,5+
Infants (younger than 1)	0,1,2,3,4,5+

9. Estimated annual household (family) income in 2023 in Euros (€/EUR)? (Link to EU Currency Converter -at bottom of the linked page)
   ☐ 0-2,500
   ☐ 2500-5000
   ☐ 5,000-10,000

☐ 10,000-25,000
☐ 25,000-40,000
☐ 40,000-75,000
☐ 75,000-125,000
☐ >125,000

10. Please indicate the typical elevation profile of the areas where you drive most frequently. Choose the option that best describes the terrain:
    ☐ Mostly flat or gently rolling terrain
    ☐ Moderate hills and inclines
    ☐ Steep hills and significant elevation changes

11. Road quality: What type of terrain do you primarily drive on? Please select the option that best describes the surface conditions of the roads you typically use:
    ☐ Paved roads (asphalt or concrete) – High quality
    ☐ Paved roads (asphalt or concrete) – Medium quality
    ☐ Paved roads (asphalt or concrete) – Low quality
    ☐ Gravel roads
    ☐ Dirt roads
    ☐ Off-road terrain (e.g., trails, rough terrain)
    ☐ Mixed terrain (combination of paved and unpaved roads)

12. What type and how many vehicles does your household currently **own**?
    ☐ Sedan (traditional passenger car) 0,1,2,3+
    ☐ SUV / Truck 0,1,2,3+
    ☐ Three-wheel vehicle 0,1,2,3+
    ☐ Motorcycle / Scooter 0,1,2,3+
    ☐ Cargo bicycle 0,1,2,3+
    ☐ Bicycle 0,1,2,3+
    ☐ E-scooter 0,1,2,3+
    ☐ L5 LEV / Three-wheel vehicle 0,1,2,3+
    ☐ L6/L7 LEV / Four-wheel vehicle 0,1,2,3+
13. Other (Please specify type and number) ___

14. What is your primary mode (most used for daily trips) of transportation?
    ☐ Sedan (traditional passenger car)
    ☐ SUV / Truck
    ☐ Three-wheel vehicle
    ☐ Motorcycle / Scooter
    ☐ Cargo bicycle
    ☐ Bicycle
    ☐ E-scooter
    ☐ Public Transportation - Bus
    ☐ Public Transportation - Metro/Subway
    ☐ Public Transportation - Train
    ☐ Taxi
    ☐ Walking

☐ L5 LEV / Three-wheel vehicle
☐ L6/L7 LEV / Four-wheel vehicle
☐ Other (please specify): _____

15. How is this vehicle powered?
☐ Traditional fuel (petrol/gasoline/diesel)
☐ Hybrid
☐ Electric
☐ N/A
☐ Other (please specify)

16. How do you generally use your primary mode of transportation? (Multiple answers allowed.)
☐ Typical day trips (shopping, appointments, etc.)
☐ Taking kids to/from school
☐ Local trips
☐ To/From work/school/commuting
☐ Travel/leisure/holiday (mid-to long distance)
☐ Vehicle is my work tool (for passenger transport)
☐ Vehicle is my work tool (for cargo/delivery)
☐ Other____

17. In what conditions/context do you normally choose this transport mode? (Multiple answers allowed.)
☐ All conditions / personal preference
☐ Good weather
☐ Bad weather
☐ More passengers
☐ Less passengers
☐ Local trips
☐ Longer trips
☐ Connecting to another mode of transport (multimodal trip)
☐ Other____

18. Do you use this mode of transport in connection with another mode? (Multiple answers allowed.)
☐ Public Transportation - Bus
☐ Public Transportation - Metro/Subway
☐ Public Transportation - Train
☐ Personal bicycle
☐ Personal e-scooter
☐ Walking
☐ Shared e-scooter
☐ Shared vehicle / MaaS Platform
☐ Taxi
☐ None / N/A
☐ Other (please specify): _____

19. What is your secondary/alternate mode of transportation?
☐ Sedan (traditional passenger car)

☐ SUV / Truck
☐ Three-wheel vehicle
☐ Motorcycle / Scooter
☐ Cargo bicycle
☐ Bicycle
☐ E-scooter
☐ Public Transportation - Bus
☐ Public Transportation - Metro/Subway
☐ Public Transportation - Train
☐ Taxi
☐ Walking
☐ L5 LEV / Three-wheel vehicle
☐ L6/L7 LEV / Four-wheel vehicle
☐ Other (please specify): _____

20. How is this vehicle powered?
☐ Traditional fuel (petrol/gasoline/diesel)
☐ Hybrid
☐ Electric
☐ N/A
☐ Other (please specify)

21. How do you generally use your secondary mode of transportation? (Multiple answers allowed.)
☐ Typical day trips (shopping, appointments, etc.)
☐ Taking kids to/from school
☐ Local trips
☐ To/From work/school/commuting
☐ Travel/leisure/holiday (mid-to long distance)
☐ Vehicle is my work tool (for passenger transport)
☐ Vehicle is my work tool (for cargo/delivery)
☐ Other____

22. In what conditions/context do you normally choose this transport mode? (Multiple answers allowed.)
☐ All conditions / personal preference
☐ Good weather
☐ Bad weather
☐ More passengers
☐ Less passengers
☐ Local trips
☐ Longer trips
☐ Connecting to another mode of transport (multimodal trip)
☐ Other____

23. Do you use this mode of transport in connection with another mode? (Multiple answers allowed.)
☐ Public Transportation – Bus
☐ Public Transportation - Metro/Subway
☐ Public Transportation – Train

☐ Personal bicycle
☐ Personal e-scooter
☐ Walking
☐ Shared e-scooter
☐ Shared vehicle / MaaS Platform
☐ Taxi
☐ None / N/A
☐ Other (Please Specify): _____

24. Type of housing do you live in? (relevant for charging infrastructure):
☐ House (rent)
☐ House (own)
☐ Duplex/shared building (1/4-1/2 of the building) (rent)
☐ Duplex/shared building (1/4-1/2 of the building) (own)
☐ Apartment building (rent)
☐ Apartment building (own)
☐ Other___

25. How many 'car' parking spaces do you have available for yourself at your residence (even if used for other type of vehicles, bicycles, etc.)?
☐ 0
☐ 1
☐ 2
☐ 3+
☐ N/A

26. Would you/your building be able to install charging infrastructure at your home?
☐ Yes
☐ No
☐ I do not know
☐ N/A

27. How many hours do you generally spend per week on the following in your own vehicles / on public transport? (Road types are only an example. Please choose what best aligns with the infrastructure/speed limit.)

Bicycle infrastructure (<25 km/h)	1,2,3,4,5,6,7,8+
Local (sub)urban roads (restricted speeds / residential areas) (20 – 30 km/h)	1,2,3,4,5,6,7,8+
Local (built environment / unrestricted speeds) (30 – 50 km/h)	1,2,3,4,5,6,7,8+
Local public transport - bus	1,2,3,4,5,6,7,8+
Regional / long-distance public transport - bus	1,2,3,4,5,6,7,8+
Local rail - train	1,2,3,4,5,6,7,8+
Regional / long-distance rail - train	1,2,3,4,5,6,7,8+
Rural roads / motorways (45 – 70 km/h)	1,2,3,4,5,6,7,8+
Rural roads / motorways (70 – 90 km/h)	1,2,3,4,5,6,7,8+
Highway (>90 km/h)	1,2,3,4,5,6,7,8+

28. If you rent vehicles from an agency, what type and for what purpose?

29. If you use shared vehicles, what type and for what purpose?

Acronyms / Symbols
ICE: Internal Combustion Engine (traditional petrol vehicle)
LEV: Light Electric Vehicle
<: Less than
≤: Less than or equal to
>: Greater than
≥: Greater than or equal to

Visuals of L-Class vehicles by GIANTS project partners:
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L6 (Passenger): Light Four-wheel vehicle; capacity (people+cargo) ≤250kg, 2 seats; max speed: 45km/h.
L6 (Cargo): Light Four-wheel vehicle; capacity (people+cargo) ≤300kg, 2 seats; max speed: 45km/h.
L7 (Passenger): Heavy Four-wheel vehicle; capacity (people+cargo) ≤450kg, 4 seats; max speed: 90 km/h.
L7 (Cargo): Heavy Four-wheel vehicle; capacity (people+cargo) ≤1000kg, 2 seats; max speed: 90 km/h.

*Please keep in mind that in the context of this survey, general usage of the terminology LEVs refers to L5/L6/L7 class LEVs.

Survey

Part A: Design & Affordability

(*A private individual / User only)

30. What model would best represent your preferred usage of a frugal L5/L6/L7 light electric vehicle?
☐ Total Ownership (Purchased)
☐ Leased
☐ Car Sharing (Shared Usage with Others)

☐ Rental (Short-Term Usage)
☐ Subscription Service (Monthly Payment for Usage)
☐ None / N/A
☐ Other (Please Specify): _____

*When answering the following questions, please keep in mind that all questions are in relation to L5/L6/L7 LEVs and additional features may impact / increase overall costs

*Kano options for all questions:
I like it
I expect it
I am neutral
I can tolerate it
I dislike it

Feature	Question
31. Additional Heating	Functional: How do you feel if the LEV has an additional heating system (beyond the defogging/de-icing required by law which provides some heating)? Dysfunctional: How do you feel if the LEV does not have an additional heating system?
32. Air Conditioning	Functional: How do you feel if the LEV has air conditioning? Dysfunctional: How do you feel if the LEV does not have air conditioning?
33. Cargo Capacity - smaller vehicle (2-person)	Functional: How do you feel if the LEV has a higher cargo / weight capacity (including driver, passengers, cargo >200kg total)? Dysfunctional: How do you feel if the LEV has limited cargo / weight capacity (<200kg total)?
34. Cargo Capacity – larger vehicle (4-person)	Functional: How do you feel if the LEV has a higher cargo / weight capacity (including, driver, passengers, cargo >450kg total)? Dysfunctional: How do you feel if the LEV has limited cargo capacity (<450kg total)?
35. Tailorable (vehicle modifications made by the user) changes in seating and cargo space	Functional: How do you feel if the LEV allows for modular changes to shift seating for cargo space? Dysfunctional: How do you feel if the LEV does not allow for modular changes to shift seating for cargo space?
36. Anti-Lock Braking Systems (ABS)	Functional: How do you feel if the LEV includes Anti-Lock Braking Systems (ABS)? Dysfunctional: How do you feel if the LEV does not include ABS?
37. Backing Up Alarm	Functional: How do you feel if the LEV includes a vehicle motion alarm (driving in reverse / backing up alarm)?

Feature	Question
	Dysfunctional: How do you feel if the LEV does not include a backing up alarm?
38. Headrests and Mirrors	Functional: How do you feel if the LEV includes headrests and side/rear-view mirrors? Dysfunctional: How do you feel if the LEV does not include headrests and side/rear-view mirrors?
39. Crash Safety Features	Functional: How do you feel if the LEV includes safety features in relation to crash safety such as airbags, crumple zones (structural features- to absorb impact in a collision), a collapsable steering column (mechanical feature designed to prevent the steering column from penetrating the interior of the car or the driver in the case of a collision)? Dysfunctional: How do you feel if the LEV does not include safety features in relation to crash safety such as airbags, crumple zones, a collapsable steering column?
40. Passenger Capacity	Functional: How do you feel if the LEV can carry more than 2 passengers? Dysfunctional: How do you feel if the LEV can not carry more than 2 passengers?
41. Doors	Functional: How do you feel if the LEV is enclosed and with doors? Dysfunctional: How do you feel if the LEV is open and without doors?
42. Anti-theft	Functional: How do you feel if the LEVs were capable of (if software was developed) advanced anti-theft features, such as GPS tracking systems, an alarm? Dysfunctional: How do you feel if the LEVs were not capable of advanced anti-theft features?
43. Comfort Features	Functional: How do you feel if the LEV has additional comfort features, such as cupholders, speakers, vanity mirrors? Dysfunctional: How do you feel if the LEV does not have additional comfort features?
44. Comfort Features - Space	Functional: How do you feel if the LEV has extra legroom / headspace in the vehicle? Dysfunctional: How do you feel if the LEV does not have extra legroom / headspace in the vehicle?
45. Comfort Features – Acoustic (shield from noise)	Functional: How do you feel if the LEV has extra acoustic dampening qualities (shield from external/road noise)? Dysfunctional: How do you feel if the LEV does not have extra acoustic dampening qualities (shield from external/road noise)?
46. Compact Size	Functional: How do you feel if the LEV has a compact size (<2 meters length) and is able to park crosswise? Dysfunctional: How do you feel if the LEV is not this compact?

Feature	Question
47. Vehicle Aesthetics and Design	Functional: How do you feel if you find the vehicle aesthetics and design appealing when purchasing a vehicle? Dysfunctional: How do you feel if you do not find the vehicle aesthetics and design appealing when purchasing a vehicle?

Charging Feature	Question
48. Swappable Batteries for Charging	Functional: How do you feel if the LEV has swappable batteries for charging? Dysfunctional: How do you feel if the LEV does not have swappable batteries for charging?
49. Swappable Batteries – Ability to self-swap	Functional: How would you feel if the swappable batteries were of a weight and placement in the vehicle which allowed the user to change these on their own? Dysfunctional: How would you feel if the swappable batteries were not of a weight and placement in the vehicle which allowed the user to change these on their own?
50. Power capacity	Functional: How would you feel if the vehicle was capable of having backup (extra) batteries? Dysfunction: How would you feel if the vehicle was not capable of having backup (extra) batteries?
51. Rapid Charging	Functional: How do you feel if the LEV supports rapid charging -~45 minutes (normal charging time 3.5 hours)? Dysfunctional: How do you feel if the LEV does not support rapid charging?
52. Charging Infrastructure	Functional: How do you feel if the LEV is compatible with standard public charging stations? Dysfunctional: How do you feel if the LEV is not compatible with standard public charging stations? (requires specialised charging infrastructure and can mostly only be charged at home.)
53. Battery enclosure	Functional: How would you feel if the battery was in a secured enclosure/casing to protect it from floods/water? Dysfunction: How would you feel if the battery was not in a secured enclosure/casing to protect it from floods/water?
54. Solar Panels	Functional: How do you feel if the LEV has solar panels? Dysfunctional: How do you feel if the LEV does not have solar panels?

55. How important do you rank the following features (1 = Not Important, 9 = Extremely Important)

Additional Heating	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Air Conditioning	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Cargo / Passenger capacity	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Price	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

Tailorable (vehicle modifications made by the user) changes in seating and cargo space	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Doors	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Charging Infrastructure	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Safety Features (in general)	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Vehicle Aesthetics and Design	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

56. How important do you rank the following features (1 = Not Important, 9 = Extremely Important)

Price	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Safety features (in general)	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Anti-theft features	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Range (cover longer distances without charging)	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Rapid charging	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Swappable batteries for charging (lighter, ability to self-swap)	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Comfort features - space (legroom and headspace)	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Comfort Features – Acoustic (shield from noise)	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Solar panels	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

57. How important do you rank the following safety features (1 = Not Important, 9 = Extremely Important)

Anti-Lock Braking Systems (ABS)	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Driving in reverse / Backing up alarm	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Headrests	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Side/rear-view mirrors	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Airbags	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Crumple zones	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯
Collapsable steering column	1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

58. How much payload/passenger capacity meets your minimum needs?

	Necessary (✓)	Good but not necessary (✓)
☐ 100 kg capacity (people + cargo)		
☐ Between 100 and 250 kg capacity (people + cargo)		
☐ Between 250 and 450 kg capacity (people + cargo)		
☐ Between 450 and 650 kg capacity (people + cargo)		

☐ Between 600 and 1000 kg capacity (people + cargo)
☐ > 1000 kg capacity (people + cargo)

59. If you would invest in an affordable light electric vehicle which category would best suit your mobility needs? (Multiple answers allowed.)

☐ E-Scooter [1 driver, ~125 kg]
☐ E-Bike [1 driver, ~125 kg]
☐ E-Bike (cargo) [1 Driver, 1 adult or 2 child passengers, ~250 kg]
☐ L5 (Passenger): Three-wheel vehicle; capacity: (people+cargo) ≤1000kg, 5 seats (*depends upon local regulations); max speed: N/A.
☐ L5 (Cargo): Three-wheel vehicle; capacity: (people+cargo) ≤1000kg, 2 seats; max speed: N/A.
☐ L6 (Passenger): Light Four-wheel vehicle; capacity (people+cargo) ≤250kg, 2 seats; max speed: 45km/h.
☐ L6 (Cargo): Light Four-wheel vehicle; capacity (people+cargo) ≤300kg, 2 seats; max speed: 45km/h.
☐ L7 (Passenger): Heavy Four-wheel vehicle; capacity (people+cargo) ≤450kg, 4 seats; max speed: 90 km/h.
☐ L7 (Cargo): Heavy Four-wheel vehicle; capacity (people+cargo) ≤1000kg, 2 seats; max speed: 90 km/h.

60. Do you have any comments regarding the previous question?

61. If you were to decide to use a light electric vehicle, which situation applies to you? Would the addition of a frugal light electric vehicle to your household replace your current vehicle usage habits? If so which vehicle/s? (Multiple answers allowed.)

	Selection (✓)
☐ Replace bicycle	
☐ Replace cargo bicycle	
☐ Replace scooter / motorcycle	
☐ Replace walking	
☐ Replace public transportation - Bus	
☐ Replace public transportation - Metro/Subway	
☐ Replace public transportation - Train	
☐ Replace taxi	
☐ Replace primary car (Internal combustion engine (ICE))	
☐ Replace primary car (electric, other)	
☐ Replace second car (ICE)	
☐ Replace second car (electric, other)	
☐ Replace Three-wheeler (ICE)	
☐ Replace Three-wheeler (electric)	
☐ Add the light electric vehicle to your vehicles without replacing existing vehicles	
☐ None / N/A	
☐ Other…	

62. If you do not already own an L5/L6/L7 LEV, why you would consider investing in one?

63. If we develop an L5/L6/L7 LEV vehicle that fulfils all your needs/purposes described above OR replace your current vehicle(s), what price range do you estimate as reasonable/affordable within your market in Euros (€/EUR)? (Link to EU Currency Converter -at bottom of the linked page)

Selection (✓)

- ☐ Less than 3.500 €
- ☐ Between 3.500 and 5.000 €
- ☐ Between 5.000 and 7.000 €
- ☐ Between 7.000 and 8.000 €
- ☐ Between 8.000 and 9.000 €
- ☐ Between 9.000 and 10.000 €
- ☐ Between 10.000 and 12.000 €
- ☐ Between 12.000 and 15.000 €
- ☐ Between 15.000 and 18.000 €

64. What incentives or benefits would motivate you to switch from conventional vehicles to frugal light electric vehicles?
    - ☐ Lower Operating Costs
    - ☐ Environmental Benefits
    - ☐ Easy parking
    - ☐ Benefits in obtaining parking permit
    - ☐ Access to car-free/Low emissions zone areas
    - ☐ Tax Incentives
    - ☐ None / N/A
    - ☐ Other (Please Specify): _____

65. How often do you use the HVAC system (Heating, Ventilation, and Air Conditioning) in your car, and for what purposes? Please select the option that best describes your usage.
    - ☐ I rarely or never use the HVAC system.
    - ☐ I use the HVAC system primarily for heating during cold weather.
    - ☐ I use the HVAC system primarily for cooling during hot weather.
    - ☐ I use the HVAC system for both heating and cooling throughout the year.
    - ☐ Other (please specify): _____

66. Does your city of operations have sufficient public charging space for vehicles?

67. What do you see as barriers to using an L5/L6/L7 LEV vehicle as a primary form of transport/work vehicle?

Part B: Road Safety and Infrastructure Requirements

(*A private individual / User + A local, regional, or national public authority / Government)

68. How easy is it to find parking in your daily travels? (1 = Not easy, 9 = Extremely easy)

1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

69. How fair do you think it is to pay a parking fee relative to the size of the vehicle? (1 = Not Fair, 9 = Extremely Fair)

1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

70. What safety precautions would you feel most necessary/important for yourself and/or transporting children? (Choose 1-3 answers.)
    - ☐ Improved infrastructure
    - ☐ Low speed limit zones established by municipalities (≤30 km/h)
    - ☐ Low speed limit zones established by municipalities (≤50 km/h)
    - ☐ In-vehicle safety guidelines and features (Roll bars, airbags, etc.)
    - ☐ Crash safety rating/requirements for vehicles
    - ☐ Increased safety regulations and enforcement in cities
    - ☐ Increased liability for larger vehicles in traffic incidents
    - ☐ None / N/A
    - ☐ Other ___

71. What age do you think is appropriate for operating an L5/L6/L7 LEV vehicle?

72. Do you identify any age restrictions/courses/licensing which are in place / should be in place on who can drive a frugal L5/L6/L7 LEV, or in any specific use case?
    - ☐ Anyone above certain age can/should be able to drive a frugal LEV, no licence required
    - ☐ Anyone above certain age can/should be able to drive a frugal LEV, no licence required, with a training course
    - ☐ Anyone above a certain age can/should be able to drive a frugal LEV, but they require a licence
    - ☐ Anyone above a certain age can/should be able to drive a frugal LEV, but they require a training course and a licence
    - ☐ Further comments? ___

73. Are there any transport spaces you feel L5/L6/L7 class LEV vehicles should not be permitted to operate for safety reasons? (Multiple answers allowed.)
    - ☐ Not on dedicated active transport infrastructure / bicycle lanes
    - ☐ Not on faster roads (>50 km/h)
    - ☐ Not on faster roads (>70 km/h)
    - ☐ No restrictions
    - ☐ Other (Please Specify): _____

74. Are there any transport spaces in your area which you feel L5/L6/L7 class LEV vehicles should be permitted to operate where traditional larger vehicles can not? (Multiple answers allowed.)
    - ☐ Dedicated active transport infrastructure / bicycle lanes
    - ☐ Low Emission Zones (LEZs) / Restricted access areas in city centres
    - ☐ None / N/A

☐ Other (Please Specify): _____

75. Do you have any additional views or feedback on operational and safety aspects of frugal L5/L6/L7 LEVs (what is best; what to avoid; issues encountered in your city/region/country)?

76. Any comments on the effectiveness of enforcement (parking, charging areas, areas of operation) in regard to anything that should be changed?

77. How important is it to you to have ample charging stations conveniently located throughout your area? (1 = Not Important, 9 = Extremely Important)

1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

78. How important is it to you to have locally available replacement parts? (1 = Not Important, 9 = Extremely Important)

1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

79. How important is it to you to have local after-sales support services (maintenance, repair)? (1 = Not Important, 9 = Extremely Important)

1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯

Part C: Integration into Mobility Ecosystem

(*A local, regional, or national public authority / Government only)

80. What benefits do you foresee with other road users sharing the space with this class of vehicle?

81. What concerns do you have or foresee with other road users sharing the space with this class of vehicle: safety, negative perceptions, allocation of space, potential conflicts, etc.?

82. Do you see any need for subsidies or incentives offered to users (e.g. low-income, pensioners, etc.)?

83. Do you support/want increased use of these smaller, more frugal L-class vehicles?

84. What would you see as potential incentives to increase uptake?

85. What would be the ideal type and characteristics of an L5/L6/L7 class LEV vehicle to perform municipal services, and for what purpose would you consider these vehicles?

86. How well do you think local regulations support the adoption and effective use of electric vehicles? Consider incentives, infrastructure support, and other policies.
    ☐ Very supportive
    ☐ Moderately supportive
    ☐ Neutral
    ☐ Slightly unsupportive
    ☐ Not supportive at all

87. What changes in local regulations would most benefit the adoption and effective use of these vehicles?

88. Do you have any infrastructure or incentives in place to support differentiated parking fees (by size of vehicle)?

89. Do you have / plan to have charging facilities at mobility hubs?

90. Do you have / plan to have public charging facilities?

91. Are there existing policies that you feel need re-thinking, changed, or improved upon in relation to accelerating the implementation of charging infrastructure / increasing usage of LEVs in fleets / improving road safety? etc.

92. What requirements would you need met to provide municipal services with L5/L6/L7 class EV fleets? (For example, for work in city parks and playground services, maintaining active transport infrastructure, garbage removal, de-icing streets, vehicles for office staff, shared municipal vehicles, etc.)

93. What are the most significant barriers to the adoption of electric vehicles in your area?
    - ☐ High taxes and fees
    - ☐ Lack of infrastructure
    - ☐ Strict vehicle standards
    - ☐ Insufficient incentives
    - ☐ None / N/A
    - ☐ Other (Please Specify): _____

94. Are there any current or planned government-led programs for financing or funding procurement of LEVs? If yes, which market segment are these targeted for (e.g. logistics company, private users or individuals, transport service providers, manufacturers, etc)?

Part D: Fleet Management

(*A fleet operator, fleet owner, or fleet manager only)

95. How many passenger/cargo vehicles are in your fleet?

96. During typical daily fleet operations, what payload capacity would be sufficient for L5/L6/L7 class LEVs to meet your needs?

97. What charging system would be most preferable to ensure smooth fleet operations?
    - ☐ Plug fast-charging
    - ☐ Swappable batteries
    - ☐ Solar
    - ☐ A combination of the above
    - ☐ None / N/A
    - ☐ Other (Please Specify): _____

98. Over the course of typical daily operations, what would be the necessary minimum maximum speed required of an L5/L6/L7 LEV?

99. What is the average daily km covered by a vehicle in your fleet?

100. What is the typical total length of time that a vehicle in your fleet stands idle over the course of 24 hours? (Please include time parked at locations where charging facilities might conceivably be provided)

101. Durability: What qualities do you require? Do you have any suggestions to strengthen the overall durability of fleet vehicles?

102. From your experience, what aspects/parts of LEVs could be optimised towards a circular economy?

103. What security features do you need / expect?

104. What would you need to ensure the vehicles / fleets could be adapted with external software for such tasks as real-time vehicle tracking, unlocking, maintenance management, analytics on energy consumption?

105. Do banks have favourable interest rates or financing schemes that help different kinds of users in purchasing LEVs? What are the usual terms for bank/loan programs?

106. Have you/your organization/company been a recipient of an electric vehicle project pilot/program/initiative in the past or currently? If yes, could you provide some further details such as project names, the procurement arrangement (donated, partially paid, fully paid), types of LEVs and how many vehicles were involved?

Part E: General observations

(*All survey respondents)

END OF INTERVIEW SURVEY

Please click the submit button below to send your answers.

Thank you for participating in the GIANTS survey!

107. Any other comments?

D. Annex – Survey Dissemination

For sharing / email:

LINK: https://docs.google.com/forms/d/e/1FAIpQLScthDrvR80lSqr-lFtbk4OPGkeqokEDJC6a_e5ydHcIFA_TqQ/viewform?usp=sf_link

Dear colleagues,

Kindly support our research in developing frugal L5, L6, L7 class LEVs in the GIANTS project by completing our survey. The survey will take approximately 15-20 minutes to complete. Clicking the image or title text will lead directly to the survey, as well as clicking here.

Many thanks for your participation!

GIANTS project: User and stakeholder needs survey

Project/Context: GIANTS is a Horizon Europe project that aims to provide affordable and accessible mobility solutions to both emerging and advanced markets. GIANTS has the goal of developing frugal (economical, without excessive features) vehicles / mobility solutions based on user demand. This will be built on a set of technological solutions that allow the production of L5, L6, L7 class Light Electric Vehicles (LEVs) suited to provide urban traffic solutions. The approach offers modularity, scalability, interoperability, and features innovative charging and energy optimisation solutions.

Project Website www.giants-project.eu

Overview: Our aim within this project is to create a vehicle platform that meets the needs of users, without excessive functions and features. The goal of this approach is to create an affordable and modular design, optimising societal benefits and reducing environmental impacts.