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**Towards a European-wide harmonised transport-specific LCA Approach**

# TranSensus LCA

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## Deliverable 3.2

## Summary and results of the evaluation, clustering and prioritisation of feedback from the advisory boards

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**EXECUTIVE SUMMARY**

Three voting rounds were conducted to gather feedback from advisory boards composed of industry and scientific experts. The first voting round (December 14, 2023 - January 25, 2024) engaged 12 participants, revealing a general consensus on foundational elements but highlighting areas needing further discussion. The second round (March 28 - April 26, 2024) involved 12 votes, introducing a "no preference" option to clarify responses. The third round (September 10 - October 4, 2024) included 17 votes and refined the calculation method for consensus.

**Key Findings**

**First Voting Results:**

- The first round contained a total of 49 questions with 22 not achieving a qualified majority in both advisory boards. Notable areas where adjustments were suggested included definitions of zero-emission vehicles and Social Life Cycle Assessment (S-LCA) methodologies.
- Comments indicated a lack of clarity on certain topics and the need for further discussions to align perspectives.

**Second Voting Results:**

- In the second round, 58 questions were posed, with 33 not achieving a qualified majority. The introduction of a "no preference" option allowed for clearer interpretation of votes.
- Key issues revolved around technology coverage, functional units, and electricity modeling approaches. Feedback emphasized the need for definitions and alignment with existing standards.

**EXECUTIVE SUMMARY**

- Third Voting Results:
- The final round included 95 questions, with 14 not securing a qualified majority. Changes in voting methodology excluded "no answer" and "no preference" from percentage calculations to enhance clarity.
- Persistent concerns related to functional unit definitions, vehicle lifetime estimates, and social risk indicators were highlighted, pointing to a need for robust data and transparency in methodologies.

**Prioritization and Discussion**

Following each voting round, feedback sessions were held to clarify comments and address divergent opinions. Key themes included:

- Calls for clearer guidelines and definitions across various LCA components.
- Emphasis on the importance of aligning methodologies with EU standards and ensuring comprehensive coverage of zero-emission technologies.
- Recognition of the ambitious scope of the LCA framework and the need for practical guidance in reporting and documentation.

This structured feedback process has been crucial for refining the LCA guidelines and ensuring that they meet the diverse needs of stakeholders across the transport sector.

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# I. Introduction

The TranSensus LCA project, funded by the EU's Horizon Europe program, aims to develop a harmonized, European-wide life cycle assessment (LCA) approach for zero-emission road vehicles. This initiative brings together more than 40 key stakeholders from industry and research, covering the full value chain of zero-emission vehicles. The project's goal is to create a standardized, real-data-based LCA methodology that embraces environmental, economic, and social aspects. This approach will be adaptable, comprehensive, and cover a wide range of zero-emission technologies while allowing for confidentiality and auditability.

The TranSensus LCA project is structured across six work packages designed to develop a comprehensive life cycle assessment methodology for zero-emission road vehicles. WP1 reviews existing standards, guidelines, and literature to identify gaps in current LCA practices. WP2 then uses these insights to conceptualize a standardized LCA methodology by developing a unified LCI database and LCA methodology for road transport, integrating environmental and social aspects, particularly for electromobility. In parallel, WP3 facilitates the review-feedback process, managing communication between Advisory Boards and WP2 through documentation compilation, questionnaire development, workshops, and systematic feedback evaluation.

The three rounds took place:

- First voting round from 14/12/2023 to 25/01/2024
- Second voting round from 28/03/2024 to 26/04/2024
- Third voting round from 10/09/2024 to 04/10/2024

This report is the second deliverable of work package (WP) 3 and aims to present the results of the three voting, the process of voting result evaluation as well as the feedback loops with both the industry and the scientific advisory boards. The three voting rounds were accompanied by feedback rounds with leading experts in sustainable transportation, life cycle assessment, and environmental engineering from across European research institutions and industry partners.

# II. Process of evaluation of voting results, prioritisation and clustering of feedback

The Advisory Boards were established during the projects initial phase and combine partners from both the industry as well as the scientific world. There are 15 organisations in the Industry Advisory Board (IAB) and 11 in the Scientific Advisory Board (SAB) as shown in Table 1.

**Table 1.** Overview Advisory Boards

| Industry Advisory Board | | Scientific Advisory Board | |
|---|---|---|---|
| **Associate** | **External** | **Associate** | **External** |
| Smart Freight Centre | Michelin | IFPEN | VIF (EARPA) |
| Forvia (CLEPA) | E. Aluminium Assoc. | ECTRI | KTH Stockholm |
| Vitesco (CLEPA) | World Auto Steel | | Joanneum |
| Recharge | EPoSS | | NTNU |
| ERTICO | Volvo Cars | | Uni. of Alcala |
| EURIC | Honda | | Uni. of Thessaloniki |
| Stellantis | EUCAR | | EMPA |
| | Polestar | | JRC |
| | | | ICCT |

The process shown in Figure 1 describes the way the three voting rounds were carried out both among the beneficiaries, who are directly or indirectly involved within the working groups and among the Advisory Boards (industry and scientific). The voting on the side of the beneficiaries was carried out after intensive working phases during which building blocks which combined are the full Transensus LCA guideline were developed. The building blocks are described in deliverable D2.3. The votings by the advisory boards were evaluated and prioritized. Criteria for this were the following:

- Questions that showed a different consensus/no consensus compared to the beneficiaries voting
- Questions that received a lot of comments
- Questions with comments that pointed out possible further improvements / aspects to be included

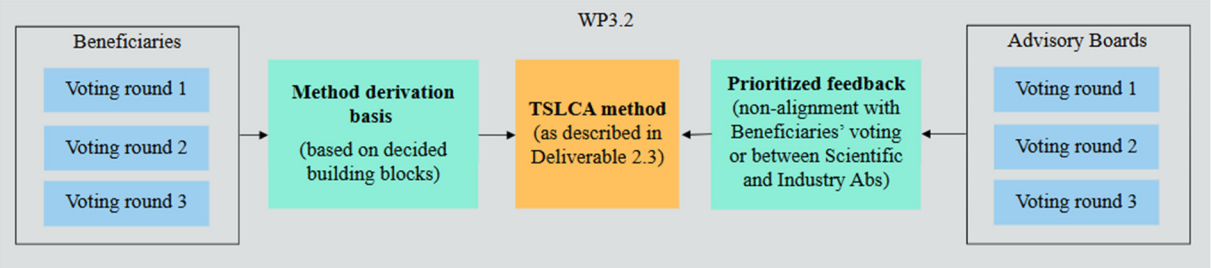


**Figure 1.** Process of voting and Advisory Board feedback

Within the EU survey, questions were either "validation check questions" or "consultation questions". The process of developing these questions and evaluating the results can be seen in Figure 2. The initial internal voting in Work Package 2 (WP2) focused on various options, with the following decision-making process:

A qualified majority is defined as a 2/3 majority. Options reaching this threshold are submitted for advisory board voting as "Validation Check Questions", options failing to reach this threshold require further discussion and consultation and are submitted as "Consultation Questions".

"Validation Check Questions" were used to confirm agreement with both advisory boards. If a qualified majority among the boards was achieved, no further action was needed. Those building blocks can be incorporated in the guideline (Deliverable 2.3). However, if the majority was not reached, these questions were discussed in the advisory board workshop.

"Consultation Questions", which did not reach a majority in the internal WP2 voting, were also addressed in advisory board workshops. Here the feedback from both Industry and scientific experts was even more essential to get valuable insight. These results and comments were also addressed in the next advisory board workshop and the findings were referred back to WP2 for more in-depth consideration.

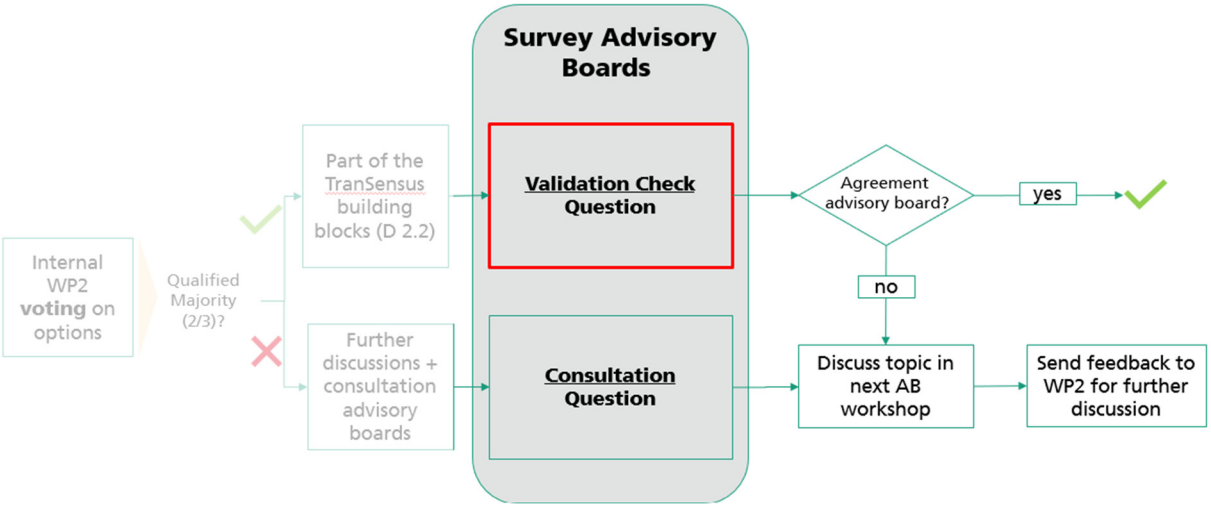


**Figure 2.** The two different types of questions

This process ensures thorough consideration and validation of all options, incorporating both internal expertise and external advisory input before finalizing the Transensus building blocks as part of the final guideline.

## II.1 Results and feedback process of first voting

The first voting round from 14/12/2023 to 14/01/2024 was started with an advisory board meeting on the 14th of December. The time was extended until the 25th of January. During this meeting the first building blocks, suggested by WP2 were presented to the advisory boards and the overall voting process was shown. The voting on the EU survey platform was opened right after the meeting until the 25th of January 2024. Two weeks later at the General Assembly in Darmstadt, first results were already presented with the final evaluation still. On the 8th of February 2024 the final results were presented to the advisory boards and comments that were made but required further assessment were discussed. One day later on 9th of February those results including the comments made in the advisory board meeting the day before were shown to WP2 task leaders.

### II.1.1 Voting Results #1

On January 14, 2024, the voting process concluded. The survey consisted of a total of 49 questions, 51 with all subquestions included. The final results were evaluated and showed overall agreement with the building blocks established in Work Package 2. The answers in details can be viewed in the excel file “240114_First Voting Exploitation_TSLCA”.

Total Participation: 12 votes were cast.

Representation:

- Industry Advisory Board: 5 votes
- Scientific Advisory Board: 7 votes

The results indicated overall alignment between the industry and scientific perspectives on the project's foundational elements. This consensus reflects the collaborative approach that integrates both practical industry insights and scientific expertise. Details on the voting breakdown by the two boards are presented in Table 2.

The voting results revealed that certain questions failed to achieve a qualified majority, defined as a two-thirds (2/3) consensus. Some questions failed to attain this qualified majority within the industry or scientific advisory board and in some instances, both the industry and advisory board groups fell short of the required 2/3 majority on particular questions. Lack of clear consensus on these issues indicated areas where further discussion or clarification may be necessary

to move forward. It also highlights the complexity of the topics at hand and the diverse perspectives held by different stakeholder groups. Responses that selected "no answer" were included in the total percentage calculation.

Those questions as well as comments provided by the boards in response will be presented in the next chapter.

**Table 2.** First voting: Overview agreement of Advisory Boards

| # Question | Topic | Subtopic | Consortium | Industry Advisory | Scientific Advisory |
|---|---|---|---|---|---|
| | | | Agreement in % | | |
| 1 | S-LCA | UNEP guidelines and reference scale approach | 100 % | 40 % | 86 % |
| 2 | Ontology | ORIONT as basis for TLCAO | 100 % | 80 % | 86 % |
| 3 | Decomposition tree | GREET and JRC as basis | 100 % | 40 % | 86 % |
| 4 | LCA typology | LCA typology | 100 % | 100 % | 86 % |
| 5 | Technology coverage | ZEV definition | 100 % | 60 % | 71 % |
| 6 | Technology coverage | H2 ICE inclusion? | 100 % | 80 % | 71 % |
| 7a | Technology coverage | Vehicle types | 100 % | 80 % | 71 % |
| 7b | Technology coverage | Light means of transport inclusion? | Not Available<br>*Trend: include* | 60 %<br>*On option 2* | 43 %<br>*On option 2* |
| 8 | System boundary | Cradle-to-grave | 100 % | 100 % | 71 % |
| 9 | System boundary | Second use | Not Available<br>*Trend: no 2nd use* | 60 %<br>*On option 2* | 71 %<br>*On option 2* |
| 10 | System boundary<br>*21 sub-decisions* | Cut-off hierarchical process,<br>List of never cut-off,<br>Default process in-/exclusions | 100 % | 100 % | 95 % |
| 11 | Functional unit | Wording | 100 % | 80 % | 100 % |

| | | | | | |
|---|---|---|---|---|---|
| 12 | Functional unit | Use of default values? | 100 % | 80 % | 57 % |
| 13 | S-LCA<br>*4 sub-decisions* | Application of S-LCA<br>Activity variable<br>Standard/guideline<br>Geographical scope | 100 % | 100 % | 75 % |
| 14 | Data Collection | Primary and secondary data | Not Available<br>*Trend: agree* | 100 % | 86 % |
| 15 | Data Collection | Primary data share index | 100 % | 60 % | 100 % |
| 16 | Data Collection | Supply chain & manufacturing | Not Available<br>*No agreement* | 60 %<br>*On option 3* | 57 %<br>*On option 3* |
| 17 | Data Collection | Use - energy consumption standard scenario for LDV | Not Available<br>*No agreement* | 80 %<br>*On option 1* | 43 %<br>*On option 1* |
| 18 | Data Collection | Use - non-exhaust emissions | Not Available<br>*Trend: include tyre & break wear, etc.* | 100 %<br>*On option 3* | 86 %<br>*On option 3* |
| 19 | Data Collection | Use - energy efficiency BEV, FCEV | Not Available<br>*Trend: include degradation factor* | 80 %<br>*On option 3* | 57 %<br>*On option 2* |
| 20 | Data Collection | Use - energy consumption standard scenario for HDV? | 100 % | 80 % | 71 % |
| 21 | Data Collection | Maintenance | Not Available<br>*Trend: list of components is given* | 60 %<br>*On option 2* | 71 %<br>*On option 2* |
| 22 | Data Collection | EoL | Not Available<br>*Trend: secondary data for EoL processes* | 100 %<br>*On option 1* | 57 %<br>*On option 2* |
| 23 | Multifunctionality | Top-down - consistency across life cycle? | 100 % | 80 % | 71 % |
| 24 | Multifunctionality | Top-down - general approach | Not Available<br>*Trend: option 1* | 40 %<br>*On option 1* | 43 %<br>*On option 3* |
| 25 | Multifunctionality | Top-down - consistency across 3P sustainability | Not Available<br>*Trend: option 1* | 40 %<br>*On option 1* | 57 %<br>*On option 1* |

| | | | | | |
|---|---|---|---|---|---|
| 26-30 | Multifunctionality | Bottom-up - co-products, metals and alloys | Not Available *Trend: cut-off approach* | 40 % *On option 2* | 71 % *On option 2* |
| 31 | S-LCA | Data collection diagram for reference scale | 100 % | 40 % | 86 % |
| 32 | S-LCA | Multifunctionality | 100 % | 40 % | 86 % |
| 33 | S-LCA | Data for activity sources hierarchy | 100 % | 40 % | 71 % |
| 34 | S-LCA | Pedigree Matrix | 100 % | 40 % | 71 % |
| 35 | Non-restrictive set | EF method inclusion | 100 % | 80 % | 86 % |
| 36 | Non-restrictive set | CED-total inclusion | 100 % | 100 % | 86 % |
| 37 | Non-restrictive set | CED-non-renewable inclusion | 100 % | 100 % | 86 % |
| 38 | Non-restrictive set | Criticality inclusion | 100 % | 80 % | 86 % |
| 39 | Non-restrictive set | Resource dissipation inclusion | 100 % | 100 % | 71 % |
| 40 | Non-restrictive set | Exclude biodiversity impact | 100 % | 60 % | 71 % |
| 41 | Non-restrictive set | Exclude circularity indicators and aspects | 100 % | 100 % | 71 % |
| 43 | Normalization & Weighting | Factors recommendation | Not Available | 80 % | 100 % |
| 44 | S-LCA | Impact sub-categories and stakeholder's categories | 100 % | 40 % | 71 % |
| 45 | S-LCA | Reference scale approach | 100 % | 40 % | 86 % |
| 46 | Uncertainty, sensitivity and scenario analysis | Definitions | 100 % | 80 % | 100 % |
| 47 | Uncertainty, sensitivity and scenario analysis | Sensitivity analysis – OAT<br>Sensitivity analysis – OAT + GSA | 100 % | 100 % | 86 % |

| | | | | | |
|---|---|---|---|---|---|
| 48a | Uncertainty, sensitivity and scenario analysis | Uncertainty analysis - level of constraint | Not Available *Trend: Uncertaint should be recommended* | 60 % *On option 2* | 57 % *On option 2* |
| 48b | Uncertainty, sensitivity and scenario analysis | Uncertainty analysis - approach | Not Available *Trend: agree* | 80 % | 100 % |
| 49 | Uncertainty, sensitivity and scenario analysis | Scenario analysis - level of constraint | Not Available *Trend: dedicated scenario analysis optional* | 60 % *On option 2* | 57 % *On option 2* |

### II.1.2 Clustering and evaluation of feedback from advisory boards

There are 22 questions that did not reach qualified majority in at least one advisory board (s. Table 3). Reasons can sometimes be found in the comment section which is shown in Table 4 and clustered in the following chapter.

**Table 3.** First voting: Questions with no qualified majority in one or two boards

| # Question | Topic | Subtopic | Qualified Majority in Industry Advisory Board (IAB) | Qualified Majority in Scientific Advisory Board (SAB) |
|---|---|---|---|---|
| 1 | S-LCA | UNEP guidelines and reference scale approach | X | √ |
| 3 | Decomposition tree | GREET and JRC as basis | X | √ |
| 5 | Technology coverage | ZEV definition | X | √ |
| 7b | Technology coverage | Light means of transport inclusion? | X | X |
| 9 | System boundary | Second use | X | √ |
| 12 | Functional unit | Use of default values? | √ | X |
| 15 | Data Collection | Primary data share index | X | √ |
| 16 | Data Collection | Supply chain & manufacturing | X | X |

| | | | | |
|---|---|---|---|---|
| 17 | Data Collection | Use - energy consumption standard scenario for LDV | √ | X |
| 19 | Data Collection | Use - energy efficiency BEV, FCEV | √ | X |
| 21 | Data Collection | Maintenance | X | √ |
| 22 | Data Collection | EoL | √ | X |
| 24 | Multifunctionality | Top-down – general approach | X | X |
| 25 | Multifunctionality | Top-down - consistency across 3P sustainability | X | X |
| 26-30 | Multifunctionality | Bottom-up - co-products, metals and alloys | X | √ |
| 31 | S-LCA | Data collection diagram for reference scale | X | √ |
| 32 | S-LCA | Multifunctionality | X | √ |
| 33 | S-LCA | Data for activity sources hierarchy | X | √ |
| 34 | S-LCA | Pedigree Matrix | X | √ |
| 40 | Non-restrictive set | Exclude biodiversity impact | X | √ |
| 44 | S-LCA | Impact sub-categories and stakeholder's categories | X | √ |
| 45 | S-LCA | Reference scale approach | X | √ |
| 48a | Uncertainty, sensitivity and scenario analysis | Uncertainty analysis - level of constraint | X | X |

*S-LCA (Q1, Q31, Q32, Q33, Q34, Q44, Q45)*

Most comments justifying a disagreement or not answer to this question refer to limited knowledge about the topic of Social Life Cycle Assessment. One comment pointed out that alignment with eLCA is important, for example when it comes to choosing the right allocation approach (Q32; prefers to use economic allocation over physical). Considering the source of data, one voter wished for adjustment of the suggested sources (Q33) and added that it depends on the goal and scope. Q34 refers to the recommendation of using the pedigree matrix for data quality assessment and one voter noted that the difference between “similar sectors” and

"slightly different sectors" is unclear. Comments to Q44 and Q45 were again mostly about the low level of expertise in the field of S-LCA but one voter was missing positive impacts. It was mentioned that as of now an assessment would give the best score for a value chain established in high-income countries, not accounting for benefits in countries with poorer governance e.g. added value to local communities.

*Decomposition Tree (Q3)*

One comment mentions that the use of abbreviations in this question and the corresponding documents is confusing while another one states that contributions of the hydrogen storage system as well as interior components like seats need to be identified.

*Technology Coverage (Q5, Q7b)*

Q5. Comments disagreeing with defining zero emission vehicles (ZEVs) as vehicles without tail pipe emissions pointed out that the definition should align with the EU standard to prevent ambiguity, particularly if internal combustion engines (ICE) are included. Recommendations specify zero carbon tailpipe emissions (focusing on GHGs as defined by the Kyoto Protocol) and electric motor propulsion, which inherently excludes hydrogen ICE vehicles. Clarifications are needed to address hydrogen slip from fuel cells, direct H2 losses from storage systems, and to confirm that water vapor from H2 combustion is not classified as an emission. This ensures alignment with regulatory frameworks while maintaining technical precision.

Q7b. Incorporating light means of transport (LMT) into the Transensus guideline is seen as beneficial for several reasons in the comments. It is said that it requires only minimal additional effort but offers a more comprehensive picture of transportation systems. Additionally, light means of transport are relatively easy to model and could align with anticipated regulatory changes. For option 1, the efficient use of space is identified as a critical factor when considering light means of transport. Voters that chose to exclude it argue that light means of transport differ significantly in purpose, functional units, manufacturing principles and supply chains compared to vehicles, making their integration challenging. A focused approach on vehicles is preferred, with the possibility of extending the study to include e-bikes and e-scooters in the future. Additionally, while LMTs are relevant, their inclusion could complicate feasibility and increase risks for the study.

*System Boundary (Q9)*

The inclusion of second use in the guideline is viewed as an opportunity to provide a more comprehensive picture, even though it should not be the primary focus. While there is no immediate need for its integration, advancements in technology, e.g. in batteries, could make second use more relevant in the future. Clear rules would then be necessary to ensure proper accounting and prevent misuse. For now, second use is considered a low priority but could be revisited in future revisions. It is suggested that second use might not be mandatory but could

be explored as part of sensitivity analyses to assess its impact. Other comments suggest to only include ideas how to address this in the future but not consider this right now since its also not part of existing methods, since it would also bring additional complexity and uncertainty.

*Functional Unit (Q12)*

Critics of the proposed segments for defining a car's lifetime express several concerns. They question the clarity and applicability of using vehicle size to determine lifetime mileage, as this approach is based on statistics from fossil-fueled vehicles, which may not apply to zero-emission vehicles. The assumption that larger vehicles are more durable is challenged, with cost or value suggested as better differentiators. The rapid development of battery technologies could also alter longevity expectations. Additionally, the "mission profiles" concept is criticized for its lack of clarity and limited relevance to passenger vehicles. One voter advocates for a fixed lifetime mileage across all vehicle sizes, with sensitivity analyses to explore variations. The comments also emphasize the need to consider the time dimension, including how vehicle usage changes over time and the impact of calendar aging on batteries. Geographical variability and using actual lifetime values from manufacturers are also highlighted as important factors.

*Data Collection (Q15, Q16, Q17, Q19. Q21, Q22)*

Q15. Not including a Primary Data Share Index: Participants voting against this suggestion emphasize the importance of increasing the use of primary data and suggest that transparency about the amount of primary data used could encourage better data collection. However, they argue that there is no need for an index to measure this. Instead, the source and type of data (primary or secondary) should be clearly documented for each variable, allowing external parties to calculate such metrics if desired.

Q16. Guidance given for Primary Data: Some comments state that Option 3 (give list of components/ processes etc.) is favoured as it reduces the risk of excessive arbitrariness compared to Options 1 and 2. Voters suggest providing guidance for each vehicle class, potentially at the material level (e.g., aluminium used in a car's Body in White), similar to existing practices for batteries. It is also recommended considering periodic updates, even if this complicates back-comparisons. Option 1 should be paired with a high degree of transparency about the data quality and details according to one comment.

Q17. Standard scenario for energy consumption: It was stated by one voter that taking only WLTP brings a distortion on use-phase vs. manufacturing & recycling phases, another voter mentioned that it depends on the goal and scope of the LCA.

Q19. Energy efficiency (BEV / FCEV): Option 2 (degradation factor) was considered most suitable, either directly or as a sensitivity analysis (Option 3) and seen as a compromise by voters.

Q21. Maintenance: Comments for Option 2 (give list of components and processes) state that the approach is seen as more comprehensive and suitable. However, concerns are raised about the focus on battery durability, as batteries might outlast vehicles. There is currently no evidence on EV durability, and electronics failure could potentially become a more significant end-of-life trigger than battery wear.

Q22. Recommended Data for EoL: Participants voting for developing a list of processes to include and use secondary data for recycling, energy recovery and disposal processes included comments saying managing end-of-life vehicles (ELVs) is challenging due to limited control over their lifecycle. However, automotive companies actively retrieving ELVs or implementing traceability tools like digital product passports could improve oversight. Addressing uncertainty in future vehicle and technology data availability is essential, with alignment to frameworks like GRB-CFB recommended to evaluate the share of batteries using primary data. While actualization of data may complicate comparisons, it remains an important consideration for improving transparency and circularity in the automotive sector.

*Multifunctionality (Q24, Q25, Q26-30)*

Q24. General approach: One comment stated that while physical allocation is always possible, its meaningfulness is the key issue. It suggests defining criteria, such as price differences, or using economic allocation with clear price rules to prevent manipulation.

Q25. Consistency across LCE, S-LCA and LCC: One comment asked for an example to be able to evaluate this question. Not many comments and a few “non-votes” show a bit of uncertainty with this question.

Q26-30. Specific rules for multifunctional processes: Comments that voted against specific rules stated that the proposed hierarchy should follow ISO 14044, requiring justifications for using lower-level options. According to those voters, Transensus LCA should comply with the standard's multifunctional recycling section, covering EoL, metals, second-life applications, and V2X. Clear allocation criteria, as per ISO 14044, eliminate the need for additional justifications, ensuring streamlined compliance without specific examples.

*Non-restrictive Set – not including biodiversity (Q40)*

Biodiversity was considered crucial by most participants but the comments differ a bit. Some advocate including a biodiversity indicator or endpoint-level ecosystem impact analysis. However, some argue that LCA cannot adequately address biodiversity, as this requires direct focus on agriculture and forestry practices.

*Uncertainty, sensitivity and scenario analysis (Q48a)*

No real comments were made to explain the different voting. One comment pointed out the importance of transparency (voted for making uncertainty analysis optional/recommended).

Another one of a participant voting for making this mandatory stated that it's important for decision making.

The following table 4 shows all comments in a shortened version given to the single questions. For extended comments, please refer to the file *"240209_First voting results AB –with comments.pptx"* for extended comments.

**Table 4.** First voting: All significant comments

| # Question | Topic | Subtopic | Total Comments | Significant Comments |
|---|---|---|---|---|
| 1 | S-LCA | UNEP guidelines and reference scale approach | 3 | 1. I am not an S-LCA expert ... but argumentation in report sounds reasonable<br>2. Beyond our area of expertise<br>3. Limited maturity within the company |
| 2 | Ontology | ORIONT as basis for TLCAO | 2 | 1. You are building upon (another) EU project - bringing some consistency and some kind of continuity into these kinds of activities.<br>2. Beyond our area of expertise |
| 3 | Decomposition tree | GREET and JRC as basis | 6 | 1. Seems a reasonable choice to me as well - especially the latter is linked to the European regulation development<br>2. We fully agree. We have some experience with GREET and we think it is the best basis to advance further.<br>3. *Forvia*: Surprised not to see the hydrogen storage tanks and some interior components mentioned in the composition. These have a large impact and should be included explicitly |
| 4 | LCA typology | LCA typology | 4 | 1. Sounds reasonable to me ... wondering if we don't need an additional layer on a sub-car level (e.g. for parts / components of a single car)?<br>2. It would be useful to specify what is the purpose to make such a distinction.<br>3. I do not see the distinction between macro and micro fleet LCA, at least from a methodological point of view. Whatever be the fleet, the approach will be the same, I understand. It may also be the fleet of a rental company, or of a municipality |

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| 5 | Technology coverage | ZEV definition | 8 | 1. ZEV definition needs to be alligned with EU definition to avoid confusion<br>2. *Johanneum*: zero emission vehicle we should, if possible, avoid this word. This is mis leading if the LCA expert phrase it as “zero-emission vehicles”.<br>3. *Comment Fraunhofer LBF*: we have to use what [politics gives us/ work with the commonly used term and define it] |
| 6 | Technology coverage | H2 ICE inclusion? | 3 | 1. Only if the definition recognizes that ICE is not zero emission. But including ICE is surely necessary<br>2. H2 ICE should not be included as it is a distraction and very unlikely powertrain to be used. This can be 'added' in much later once the H2 supply chain LCA is done... |
| 7a | Technology coverage | Vehicle types | 4 | 1. Use EU legal terminology for defined vehicle types, see EU directive 2007/46/EC.<br>2. As various types of trucks exist, each one may be having a different bill of materials depending on utility. So, a further specification of vehicles could be examined within this category, if relevant.<br>3. Clear definition based on standards needed. Mopeds seem to overlap with light means of transport<br>4. All public buses e.g. suburban, countryside |
| 7b | Technology coverage | Light means of transport inclusion? | 11 | 1. Few additional efforts to get a much more comprehensive picture …<br>2. *NTNU*: Inclusion of LMT is important but the main competence of the partners in this consortium is not on these type of vehicles so recommend to not include this. |
| 8 | System boundary | Cradle-to-grave | 3 | 1. For the battery at least a second life scenario should be considered<br>2. Cradle to cradle gets relevance in context of circularity |

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| 9 | System boundary | Second use | 7 | 1. Gives a more comprehensive picture<br>2. It would be interesting to use this project as an opportunity to see the feasibility of adding the second use even if second use as such should not be the focus. |
| 10a | System boundary<br>*21 sub-decisions* | Cut-off hierarchical process,<br>List of never cut-off,<br>Default process in-/exclusions | 4 | 1. Is it 3% for each individual flow or for the totality of flows that are excluded? In the PCR for tires, the cut-off is set at 1% for individual flow and at 5% for the totality of the flows that are excluded. In the methodology developed by PFA, the totality of the flows that can be excluded shall not exceed 1%.<br>2. Consider GRB-CFB approach to add the missing mass to the most impactful material of the corresponding system component (ensure that overall mass balance fits despite cutting off) |
| 10b | System boundary<br>*21 sub-decisions* | Cut-off hierarchical process,<br>List of never cut-off,<br>Default process in-/exclusions | 2 | 1. It's important to recognize that certain elements may function as alloying elements. These elements could exist in trace amounts and prove challenging to incorporate. Consequently, we advise implementing a cut-off when these elements are present as alloying components below a certain percentage (at European Aluminium we propose to cut off alloying elements below 1‰ (below 0,001 in weight).<br>2. Make list of REEs |
| 10c | System boundary<br>*21 sub-decisions* | Cut-off hierarchical process,<br>List of never cut-off,<br>Default process in-/exclusions | 2 | 1. We recommend specifying whether the validity applies exclusively to an element present in the final product or extends to the manufacturing process.<br>2. This is a data issue! |

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| 10d | System boundary<br>*21 sub-decisions* | Cut-off hierarchical process,<br>List of never cut-off,<br>Default process in-/exclusions<br>Development, administration, marketing expenses —› Exclude | 2 | 1. Depending on goal and scope |
| 10d | System boundary<br>*21 sub-decisions* | Cut-off hierarchical process,<br>List of never cut-off,<br>Default process in-/exclusions<br>-Infrastructure for electricity and hydrogen generation —› Include<br>-Maintenance:<br>consumables —› Include<br>- Maintenance: wear parts —› Include<br>- Non-exhaust emissions from tires and brakes —› Include<br>- Charging cable —› Include | 3 | 1. If you start including infrastructure (last line) then, the remaining should be included as well …<br>2. The way tires will be taken into account as wear parts will have to be specified/explained as I don't know what is specified in maintenance books and how it reflects reality.<br>3. Charging cable may be questioned, but tend to agree |
| 10d | System boundary<br>*21 sub-decisions* | Cut-off hierarchical process,<br>List of never cut-off,<br>Default process in-/exclusions<br>Charging station —› Exclude | 2 | 1. Not sure if charging station should be excluded<br>2. Charging station is part of energy provision infrastructure and should be considered part of the vehicle system (an EV doesn't function without it.) |

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| 10d | System boundary<br>*21 sub-decisions* | Cut-off hierarchical process,<br>List of never cut-off,<br>Default process in-/exclusions<br>Auxiliary materials for production —› Include | 1 | 1. Cut-off definition necessary for auxiliary materials for production. |
| 11 | Functional unit | Wording | 4 | 1. Looks reasonable & modulable by taking into account occupancy rates in a separate step<br>2. Probably using vehicle-km for passenger cars as functional unit would help avoiding confusion coming from occupancy rate assumptions. Besides vehicle-km is the standard functional unit used in pass cars for emissions calculations.<br>3. Note "tonne" is the correct spelling. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Tonne-kilometre_(tkm)<br>4. And for 2-Wheelers? |
| 12 | Functional unit | Use of default values? | 12 | 1. We recommend a mandatory sensitivity analysis on the lifetime of the vehicle<br>2. Although within one segment type lifetime may vary tremendously based on the thermal management<br>3. Not to forget geographical variability (Europe vs. rest of the world)<br>4. *Volvo*: It does not state anything on terms of lifetime in years. Is this being considered at all? I would suggest that that should be part of it. E.g. if lifetime is 12 years, we should include this in the use phase with regard to future energy grid mixes |
| 13 | S-LCA<br>*4 sub-decisions* | Application of S-LCA<br>Activity variable | 3 | 1. Not a specialist for this topic, but documentation sounds reasonable<br>2. Beyond of our area of expertise |

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| | | Standard/guideline<br>Geographical scope<br>General | | 3. Limited maturity on S-LCA within our company |
| 13 | S-LCA<br>*4 sub-decisions* | Application of S-LCA<br>Activity variable<br>Standard/guideline<br>Geographical scope<br>Worker Hours | 3 | 1. Worker hours can be obtained easily; but...difference between one worker hour in Central Europe and in China<br>2. Worker hours might be difficult to obtain for secondary sectors, added value and a standard key linking this to worker hours (as done in Psilca) makes assessments easier. Recommmend worker hours though |
| 14 | Data Collection | Primary and secondary data | 4 | 1. We suggest a slight rewording: Primary data is data pertaining to a specific product and can be collected over its entire life cycle. It may take the form of measured activity data (e.g. kWh needed to produce a unit of X), emissions and/or emission factors.<br>2. Is the use of primary upstream data foreseen (I assume yes, but not totally clear from the table)? |
| 15 | Data Collection | Primary data share index | 2 | 1. Increasing the use of primary data shall be a common objective and transparency on the amount of primary data used could be a push to improve primary data collection and use.<br>2. No need for an index. but the source and type of data (primary or secondary) should be clearly documented for each variable. An external party 'could' calculate it if they wanted. |
| 16 | Data Collection | Supply chain & manufacturing | 4 | 1. Actualization should be considered, even if it will be more difficult to do back-comparisons |

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| | | | | 2. Not just EV battery but 'new' powertrain components. FC, storage, motor, etc. particularly related to innovative trends and/or manufacturer's competitive advantage. |
| 17 | Data Collection | Use - energy consumption standard scenario for LDV | 7 | 1. Taking only WLTP brings a distorsion on use-phase vs. manufacturing & recycling phases<br>2. *Forvia*: it is good to go for WLTP as reference but we need to include some real world coefficients that should be integrated. There are some of these available, also by the European Commission. |
| 18 | Data Collection | Use - non-exhaust emissions | 3 | 1. Be as complete as possible<br>2. Maybe start with option 2 but have option 3 as final target.<br>3. *Johanneum*: this is a good example of being more explicit about the goal and scope. If it is only about greenhouse gasses, you can leave out all non-GHG related particles. |
| 19 | Data Collection | Use - energy consumption standard scenario for LDV | 6 | 1. Beyond our area of expertise<br>2. *Honda*: similar problem with RW for use phase that could become a difficult topic. |
| 20 | Data Collection | Use - energy consumption standard scenario for HDV? | 2 | 1. Beyond our area of expertise.<br>2. Depending on goal and scope |

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| 21 | Data Collection | Maintenance | 8 | 1. Not sure about the focus on battery durability. Batteries might well outlive the vehicle, but we do not have any evidence on EV durability. What about electronics? Maybe electronics failure becomes a more relevant EoL trigger than battery wear? (Option 2)<br>2. *Johanneum*: yes maintaince should be in but how to assess the spare parts to be in is difficult, how do you define this? The data for spare parts is different for different vehicles. I would be very useful for TranSensus to make some recommendations on what to include. |
| 22 | Data Collection | EoL | 7 | 1. It is hard to have control of the ELV. However, an exception may arise if the automotive company actively retrieves ELVs (a growing trend) or if traceability tools, such as digital product passports, are effectively implemented. (Option 1)<br>2. *VW*: Wording is difficult also with what we mean with primary vs secondary definition. |
| 23 | Multifunctionality | Top-down - consistency across life cycle? | 1 | 1. Consistency is a highly valuable elements within LCA - thus we should strive for it … |
| 24 | Multifunctionality | Top-down - general approach | 7 | 1. A good hierarchical approach ... as you can judge everything the same (Option 1)<br>2. *Forvia*: “agreed, I found multi-functionality difficult to understand.” |
| 25 | Multifunctionality | Top-down - consistency across 3P sustainability | 2 | 1. The more consistency the better the result<br>2. It would be good to give an example on which cases would be an option to not have consistency across LCA, s-LCA and LCC to better evaluate. |

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| 26-30 | Multifunctionality | Bottom-up - co-products, metals and alloys | 4 | 1. EoL, metals, 2nd life, V2X<br>2. We do not have any specific examples to provide |
| 31 | S-LCA | Data collection diagram for reference scale | 2 | 1. Limited maturity on S-LCA in our company<br>2. I am missing the sectors (the link from the BoM to the sector activity). Also, activity data (worker hours) and impacts (child labor) are mixed in the flow-sheet |
| 32 | S-LCA | Multifunctionality | 3 | 1. Beyond our area of expertise.<br>2. Since s-LCA is related with worker hours or added value, economic allocation might make more sense than physical. Alignment with e-LCA should be aimed at. See also previous comment on allocation |
| 33 | S-LCA | Data for activity sources hierarchy | 4 | 1. Beyond our area of expertise.<br>2. It is preferable to use an S-LCA dedicated database (SHDB or PSILCA).<br>3. Limited maturity on S-LCA in our company<br>4. It depends on goal and scope |
| 34 | S-LCA | Pedigree Matrix | 5 | 1. Limited maturity on S-LCA in our company<br>2. Distinction between 2 and 3 not very clear for technical (what is the difference between similar sectors and slightly different sectors; why would I select slightly different instead of similar?) Also, completeness index not clear (does it refer to the matching of activity data to industry sectors?) |
| 35 | Non-restrictive set | EF method inclusion | 1 | 1. Makes sense ... |
| 36 | Non-restrictive set | CED-total inclusion | 1 | 1. Could be I clouded as optional, but I see little added value. Also, CED-nr is pretty redundant with GWP |

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| 37 | Non-restrictive set | CED-non-renewable inclusion | 1 | 1. Could be I clouded as optional, but I see little added value. Also, CED-nr is pretty redundant with GWP |
| 38 | Non-restrictive set | Criticality inclusion | 1 | 1. I am not an S-LCA expert ... but argumentation in report sounds reasonable |
| 39 | Non-restrictive set | Resource dissipation inclusion | 6 | 1. The Consortium recommends to explore to shift from the concept of depletion to the concept of dissipation; for possible recommendation in the TranSensus LCA method based on further work to be performed in 2024.<br>2. Needs to be considered for the recommendation of datasets. These need to support dissipative resource accounting |
| 40 | Non-restrictive set | Exclude biodiversity impact | 4 | 1. Biodiversity should be included in the study. We advise including one indicator for biodiversity or consider analyzing biodiversity at end point level – effect on ecosystem.<br>2. Biodiversity remains an important topic. However, we cannot propose a better indicator. |
| 41 | Non-restrictive set | Exclude circularity indicators and aspects | 3 | 1. See Q40<br>2. We advise to add circularity indicators and aspects in the analysis.<br>3. Circularity is getting high relevance |
| 43 | Normalization & Weighting | Factors recommendation | 2 | 1. All good<br>2. At least for EF impact categories, the full set of normalisation and weighting factors is available. We would suggest that both sets of factors (for normalisation and weighting) are recommended. We agree to keep optional the normalisation and weighting steps |

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| 44 | S-LCA | Impact sub-categories and stakeholder's categories | 4 | 1. Beyond our area of expertise.<br>2. Low level of maturity on S-LCA in the company |
| 45 | S-LCA | Reference scale approach | None | None |
| 46 | Uncertainty, sensitivity and scenario analysis | Definitions | 1 | 1. The definition of a scenario is very brief and somewhat vague, and is not further explained in the background material. An example would help in order to better understand. This also makes it difficult to give an opinion on Q49. |
| 47a | Uncertainty, sensitivity and scenario analysis | Sensitivity analysis – OAT<br>Sensitivity analysis – OAT + GSA | 1 | 1. What do you expect from this? |
| 47b | Uncertainty, sensitivity and scenario analysis | Sensitivity analysis – OAT<br>Sensitivity analysis – OAT + GSA | 1 | 1. See Q47a |
| 48a | Uncertainty, sensitivity and scenario analysis | Uncertainty analysis - level of constraint | 6 | 1. Important if LCA is used for decision making (Option 1)<br>2. *Comment RECHARGE*: sensitivity is more of a demonstration of the variability of your results. more of an exploration of uncertainty. Uncertainty would be more robust |
| 48b | Uncertainty, sensitivity and scenario analysis | Uncertainty analysis - approach | None | None |

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| 49 | Uncertainty, sensitivity and scenario analysis | Scenario analysis - level of constraint | 3 | 1. Gives more robustness into the results (Option 2)<br>2. The definition of a scenario is very brief and somewhat vague, and is not further explained in the background material. An example would help in order to better understand. This also makes it difficult to give an opinion on the question. (no answer)<br>3. Need of readibility and simplification of the approach (Option 1) |

### II.1.3 Prioritization and discussion of feedback

The results of the first voting were shown to the Advisory Boards on the 8th of February 2024. Single questions were highlighted to gather further insight, clarify comments and point out questions that showed a different consensus/no consensus compared to the beneficiaries voting. The whole presentation (s. *240209_First voting results AB -with comments*) including all questions and results was sent to the boards after the meeting.

For the first voting two general comments were received highlighting concerns about the ambitious scope of the LCA framework, urging explicit clarity on its purpose (e.g., for OEMs). It it said that reporting and documentation require more guidance, including specifics on necessary details to ensure transparency. Providing templates or examples of expected reports could streamline compliance and improve understanding of requirements.

Questions with missing qualified majority were already addressed in chapter II.1.2, therefore only questions with added comments in the Advisory board meeting are mentioned in this chapter in table 5. Questions with many "no votes" were also shown in the Advisory board meeting and can be found in the presentation in *240209_First voting results AB -with comments*.

**Table 5.** First voting: Focus questions with comments from Advisory Board workshop

| # Question | Topic | Subtopic | Comments during Advisory Board Workshop |
|---|---|---|---|
| 3 | Decomposition tree | GREET and JRC as basis | - Surprised not to see the hydrogen storage tanks and some interior components mentioned in the composition. These have a large impact and should be included explicitly |
| 5 | Technology coverage | ZEV definition | - zero emission vehicle we should, if possible, avoid this word. This is mis leading if the LCA expert phrase it as "zero-emission vehicles".<br>- zero emission vehicle we should, if possible, avoid this word. This is mis leading if the LCA expert phrase it as "zero-emission vehicles".<br>- zero emission vehicle we should, if possible, avoid this word. This is mis leading if the LCA expert phrase it as "zero-emission vehicles".<br>- zero emission vehicle we should, if possible, avoid this word. This is mis leading if the LCA expert phrase it as "zero-emission vehicles". |
| 7b | Technology coverage | Light means of transport inclusion? | - Inclusion of LMT is important but the main competence of the partners in this consortium is not on these type of vehicles so recommend to not include this. |

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| | | | - for us it is a pragmatic approach, to focus on vehicles for the time being and maybe look into LMT as a next step.<br>- focus maybe on type approved vehicles<br>- No OEM that focus on these types of vehicles in the project |
| 12 | Functional unit | Use of default values? | - It does not state anything on terms of lifetime in years. Is this being considered at all? I would suggest that that should be part of it. E.g. if lifetime is 12 years, we should include this in the use phase with regard to future energy grid mixes; Missing profiles will also override the WLTP. That should be considered.<br>- This question is about can we have a scenario for future electricity mixes because parts of the life cycle is in the future. This should be solved in the goal and scope. From the battery industry the conclusion is clear: All scenarios about the future are uncertainty (e.g. future change in electricity mixes or recycling processes). The point of view from EC: you use the worst case. My suggestion is to would have different "types of LCA", e.g. one for prospective LCA; we disagree that there should be different life time mileages for different vehicles. If we do go for this, large vehicles drive longer then small vehicles. This gives an incentive for people to buy large cars.<br>- It does not state anything on terms of lifetime in years. Is this being considered at all? I would suggest that that should be part of it. E.g. if lifetime is 12 years, we should include this in the use phase with regard to future energy grid mixes |
| 17 | Data Collection | Use - energy consumption standard scenario for LDV | - it is good to go for WLTP as reference but we need to include some real world coefficients that should be integrated. There are some of these available, also by the European Commission.<br>- the WTLP is not good enough for PHEV, there you can get wrong misleading results<br>- Not so much worried about this discussion on "real world" factor. The WLTP already was improved to reflect real world. To find a homogenous factor is a never-ending debate and we should leave that to the regulators<br>- There are multiple revisions etc. on how realistic this is. There are issues with communication, we can only communicate official approved regulatory protocols, which is WLTP. |
| 18 | Data Collection | Use - non-exhaust emissions | - this is a good example of being more explicit about the goal and scope. If it is only about greenhouse |

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| | | | gasses, you can leave out all non-GHG related particles. |
| 19 | Data Collection | Use - energy efficiency BEV, FCEV | - similar problem with RW for use phase that could become a difficult topic<br>- we also try to get as close to "real" for the results to communicate performance. This can especially be important for BEV and FCEV where efficiency degrades over time so that is the rational to include this |
| 21 | Data Collection | Maintenance | - would the battery not be included in the functional unit description?<br>- The durability requirements are minimum standards.<br>- yes maintaince should be in but how to assess the spare parts to be in is difficult, how do you define this? The data for spare parts is different for different vehicles. I would be very useful for TranSensus to make some recommendations on what to include.<br>- is that possible in terms of type approval?<br>- the discussion on this started in 2015 which was triggred by Tesla. But still no proposal or agreement not there. It would be good to have it mentioned at this stage |
| 22 | Data Collection | EoL | - OEMs do not have control over this, we will not have primary data for this so difficult to include it.<br>- Wording is difficult also with what we mean with primary vs secondary definition.<br>- we discussed that in the battery, it is about what is feasible. Many declarants will not have primary data, using average secondary European data could be used. This can be replaced with primary data that needs to be as complete as the secondary data to "overwrite": this can also be a network of different recyclers ("a mix"). |
| 24 | Multifunctionality | Top-down - general approach | - there was from our side also some confusion with these different options<br>- agreed, I found multi-functionality difficult to understand. |
| 48a | Uncertainty, sensitivity and scenario analysis | Uncertainty analysis - level of constraint | - How the LCA will be used, it will be used for comparison. People will use the lower values. So the only way to avoid the cherry picking approach is to have a transparency in the uncertainty. So attached to the declaration should be uncertainty of what you declare. When you have the option between primary or secondary data you have different uncertainty. So it is a strong tool to "enforce" primary data. |

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| | | | - Also inclined to sensitivity analysis? sensitivity is more of a demonstration of the variability of your results. more of an exploration of uncertainty. Uncertainty would be more robust |

## II.2 Results and feedback process of second voting

The second voting round commenced on 28/03/2024 and continued until 26/04/2024, again spanning a period of approximately one month. This round was accompanied with an optional Q&A session for the Advisory Board on April 11th, 2024, providing an opportunity for clarifications and discussions on the proposed building blocks. Following the closure of the voting period, a comprehensive feedback meeting was held on May 24th, 2024. This meeting brought together both the WP2 team and the advisory boards, combining what had previously been separate sessions. This joint meeting allowed for direct interaction and immediate discussion of the voting results and any concerns raised. Shortly after, on May 29th, 2024, a dedicated voting results meeting was conducted with the WP2 team. During this session, the final outcomes of the second voting round were presented in detail, including an analysis of the feedback received by the boards and its implications for the project's progress.

### II.2.1 Voting Results #2

The second voting process ended on April 26th, 2024, after participants responded to 58 questions. A comprehensive breakdown of the responses is available in the excel file *240425_Second Voting Exploitation_TSLCA*, which can be accessed for further review.

Total Participation: 12 votes were cast.

Representation:

- Industry Advisory Board: 7 votes
- Scientific Advisory Board: 5 votes

The voting process remained the same as in the first round, with one key difference: the option "no preference" was introduced. This addition aimed to make the interpretation of votes clearer. In the initial voting, when no vote was cast, only comments could provide insight into the reason—whether it was due to a lack of understanding of the question or simply having no preference, perhaps because of insufficient expertise in that specific area. Responses that selected "no answer" or “no preference” were included in the total percentage calculation. Another change was adding a mandatory comment box that had to be filled out as soon as a participant chose “disagree”.

Questions that did not reach a qualified majority as well as comments provided by the boards in response will again be presented in the next chapter.

**Table 6.** Second voting: Overview agreement of Advisory Boards

| # Question | Topic | Subtopic | Consortium | Industry Advisory | Scientific Advisory |
|---|---|---|---|---|---|
| | | | Agreement in % | | |
| 1 | Technology coverage | Light means of transport | 58 %<br>*Trend: exclude* | 71 %<br>*exclude* | 60 %<br>*exclude* |
| 2 | System boundary | Second use | 100 % | 86 % | 80 % |
| 3 | Functional unit | Default values for lifetime activity for passenger cars and LCV (general hierachry) | 100 % | 86 % | 60 % |
| 4 | Functional Unit | Default values for lifetime activity for passenger cars and LCV (PRIMES-TREMOVE) | 100 %<br>*Trend: aggregated* | 100 %<br>*aggregated* | 20 %<br>*aggregated* |
| 5 | Functional unit | Default values for lifetime activity for HDV | 100 % | 57 % | 60 % |
| 6 | Functional unit | Default values for lifetime activity Two-wheelers | 100 % | 14 % | 60 % |
| 7 | Electricity Modelling | Production phase | 58 %<br>*Trend: location based* | 57 %<br>*Location based* | 60 %<br>*Location based* |
| 8 | Electricity modelling | Use phase | 100 % | 86 % | 80 % |
| 9 | Electricity modelling | EoL Phase | 100 % | 80 % | 71 % |
| 10 | Electricity modelling | On-site electricity production | 100 % | 86 % | 80 % |
| 11 | Electricity Modelling | Market-based electricity modelling - hierarchy | 100 % | 100 % | 40 % |
| 12 | Electricity modelling | Market-based electricity modelling – Safeguards (additionality) | 100 % | 71 % | 60 % |

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| 13 | Electricity modelling | Market-based electricity modelling – Safeguards (Physical link) | 100 % | 100 % | 60 % |
| 14 | Electricity modelling | Market-based electricity modelling – Safeguards (time synchronization) | 100 % | 71 % | 20 % |
| 15 | Electricity modelling | Market-based electricity modelling – Safeguards (negative impacts) | 100 % | 86 % | 20 % |
| 16 | Electricity modelling | Market-based electricity modelling – Safeguards (others?) | 100 % | 14 % | 0 % |
| 17 | Electricity Modelling | Bonus Question | 63 %<br>*Trend: sensitivity* | 43 %<br>*On sensitivity* | 20 %<br>*On sensitivity* |
| 18 | Multifunctionality | Consistency between LCA, S-LCA, and LCC | 100 % | 100 % | 80 % |
| 19 | Multifunctionality | General Hierarchy of MF | 100 % | 100 % | 80 % |
| 20 | Multifunctionality | Exceptions from Hierarchy | 100 % | 71 % | 60 % |
| 21 | Multifunctionality | Dealing with multifunctionality in the EoL phase | 100 %<br>*Trend: cut-off* | 57 %<br>*On cut-off* | 40 %<br>*On cut-off* |
| 22 | Data | Company specific and secondary data | 100 % | 100 % | 100 % |
| 23 | Data | Minimum data requirements for Level 3 LCA | 100 % | 86 % | 60 % |
| 24 | Data | Which energy consumption to use as standard scenario for LDV? | 100 % | 86 % | 80 % |
| 25 | Data | Non-exhaust emissions during the use phase? | 100 %<br>*Trend: Option 2* | 43 %<br>*On option 2* | 100 %<br>*On option 2* |
| 26 | Data | Maintenance | 100 % | 100 % | 100 % |
| 27 | Data | Type of data for EoL | 100 % | 86 % | 100 % |
| 28 | Normalization | Normalized Result as optional | 100 % | 86 % | 60 % |

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| 29 | Normalization | Normalization Factor | 100 % | 43 % | 40 % |
| 30 | Prospective and Fleet Level LCIA | Differences to Product LCA/Retrospective LCA | 100 % | 100 % | 100 % |
| 31 | Comparison of Soft-wares | Differences in LCIA Cal-culation | 100 % | 100 % | 20 % |
| 32 | Mandatory set of LCA-Impact Category | Climate Change | 100 % | 100 % | 100 % |
| 33 | Mandatory set of LCA-Impact Category | Depletion of abiotic re-sources | 63 % | 71 % | 60 % |
| 34 | Mandatory set of LCA-Impact Category | Land use | 100 % | 80 % | 100 % |
| 35 | Mandatory set of LCA-Impact Category | Photochemical ozone for-mation | 100 % | 86 % | 80 % |
| 36 | Mandatory set of LCA-Impact Category | Human toxicity & Ecotox-icity | 100 % | 86 % | 80 % |
| 37 | Mandatory set of LCA-Impact Category | Water scarcity | 100 % | 71 % | 80 % |
| 38 | Mandatory set of LCA-Impact Category | Acidification | 100 % | 86 % | 80 % |
| 39 | Mandatory set of LCA-Impact Category | Freshwater & Marine eu-trophication | 100 % | 71 % | 80 % |
| 40 | Mandatory set of LCA-Impact Category | Particulate matter | 100 % | 86 % | 100 % |
| 41 | Mandatory set of LCA-Impact Category | Ozone depletion | 100 % | 86 % | 80 % |
| 42 | Mandatory analysis of parameters | Usage: consumption | 100 % | 100 % | 100 % |
| 43 | Mandatory analysis of parameters | Quantity value | 100 % | 100 % | 100 % |
| 44 | Mandatory analysis of parameters | Usage: lifetime | 100 % | 71 % | 100 % |

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| 45 | Mandatory analysis of parameters | Usage: geographical variation of energy mix for consumption | 100 % | 86 % | 100 % |
| 46 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | 65 % | 71 % | 100 % |
| 47 | Recommend analysis of parameters | Choice of secondary data | 100 % | 100 % | 60 % |
| 48 | Recommended analysis of parameters | Location of the value chain: electricity mix | 100 % | 86 % | 40 % |
| 49 | Recommended analysis of parameters | Supply chain improvements: recycled vs. primary materials | 100 % | 86 % | 60 % |
| 50 | Recommended analysis of parameters | Usage: maintenance & wearing | 100 % | 57 % | 100 % |
| 51 | Recommended analysis of parameters | Usage: payload/number of passengers | 100 % | 57 % | 40 % |
| 52 | Recommended analysis of parameters | Usage: temperature | 100 % | 57 % | 60 % |
| 53 | Recommended analysis of parameters | Future mix: EoL electricity/fuel mix | 100 % | 57 % | 80 % |
| 54 | Recommended analysis of parameters | Second use | 100 % | 57 % | 20 % |
| 55 | Optional analysis of parameters | Optional analysis of parameters | 100 % | 57 % | 60 % |
| 56 | Optional analysis of parameters | Location of the value chain: fuel mix, transport distance & means | 100 % | 71 % | 80 % |
| 57 | Optional analysis of parameters | Process improvements (e.g., waste management, upstream recycling processes, ...) | 100 % | 71 % | 80 % |
| 58 | Optional analysis of parameters | Process improvements: energy consumption | 100 % | 71 % | 60 % |

### II.2.2 Clustering and evaluation of feedback from advisory boards

33 questions failed to achieve qualified majority approval in one or both advisory boards (refer to Table 7). Potential explanations for these outcomes may be identified in the corresponding comment section, detailed in Table 8 and grouped thematically in the following chapter.

**Table 7.** Second voting: Questions with no qualified majority in one or two boards

| # Question | Topic | Subtopic | Qualified Majority in Industry Advisory Board (IAB) | Qualified Majority in Scientific Advisory Board (SAB) |
|---|---|---|---|---|
| 1 | Technology coverage | Light means of transport | X | √ |
| 3 | Functional unit | Default values for lifetime activity for passenger cars and LCV (general hierarchy) | √ | X |
| 4 | Functional Unit | Default values for lifetime activity for passenger cars and LCV (PRIMES-TREMOVE) | √ | X |
| 5 | Functional unit | Default values for lifetime activity for HDV | X | X |
| 6 | Functional unit | Default values for lifetime activity Two-wheelers | X | X |
| 7 | Electricity Modelling | Production phase | X | X |
| 11 | Electricity Modelling | Market-based electricity modelling - hierarchy | √ | X |
| 12 | Electricity modelling | Market-based electricity modelling – Safeguards (additionality) | √ | X |
| 13 | Electricity modelling | Market-based electricity modelling – Safeguards (Physical link) | √ | X |
| 14 | Electricity modelling | Market-based electricity modelling – Safeguards (time synchronization) | √ | X |
| 15 | Electricity modelling | Market-based electricity modelling – Safeguards (negative impacts) | √ | X |

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| 16 | Electricity modelling | Market-based electricity modelling – Safeguards (others?) | X | X |
| 17 | Electricity Modelling | Bonus Question | X | X |
| 20 | Multifunctionality | Exceptions from Hierarchy | √ | X |
| 21 | Multifunctionality | Dealing with multifunctionality in the EoL phase | X | X |
| 23 | Data | Minimum data requirements for Level 3 LCA | √ | X |
| 25 | Data | Non-exhaust emissions during the use phase? | X | √ |
| 28 | Normalization | Normalized Result as optional | | X |
| 29 | Normalization | Normalization Factor | X | X |
| 31 | Comparison of Softwares | Differences in LCIA Calculation | √ | X |
| 33 | Mandatory set of LCA-Impact Category | Depletion of abiotic resources | √ | X |
| 47 | Recommend analysis of parameters | Choice of secondary data | √ | X |
| 48 | Recommended analysis of parameters | Location of the value chain: electricity mix | √ | X |
| 49 | Recommended analysis of parameters | Supply chain improvements: recycled vs. primary materials | √ | X |
| 50 | Recommended analysis of parameters | Usage: maintenance & wearing | X | √ |
| 51 | Recommended analysis of parameters | Usage: payload/number of passengers | X | X |
| 52 | Recommended analysis of parameters | Usage: temperature | X | X |
| 53 | Recommended analysis of parameters | Future mix: EoL electricity/fuel mix | X | √ |
| 54 | Recommended analysis of parameters | Second use | X | X |

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| 55 | Optional analysis of parameters | Optional analysis of parameters | X | X |
| 58 | Optional analysis of parameters | Process improvements: energy consumption | √ | X |

*Technology Coverage (Q1)*

Two voters from the industry board voted for including light means of transport with limited guidance and one "no preference" vote to leave it up to the internal Transensus consortium to come up with a solution.

*Functional Unit (Q3-Q6)*

Q3. Comments state that alignment requires clarification on whether warranty periods form the basis of assumptions. Disagreement arises if warranty is used, while other approaches may be open to discussion. A fixed default value (not vehicle-specific) should be established unless a standardized, verifiable ageing model is mandated within the T-LCA framework to ensure comparability. This model's lifetime outputs must be publicly transparent to prevent misuse. Additionally it is said, that the choice of approach depends on the LCA's goal and scope, making a universal hierarchy inappropriate.

Q4. Participants who voted for differentiated values stated when detailed data is available, it should be leveraged to enhance accuracy, ensuring fairness across all powertrains. Current BEV values diverge from internal findings and carry uncertainty due to limited end-of-life data, favoring aggregated estimates. Addressing varied mileages per powertrain appears complex. Prioritize clear, rounded values (e.g., to 10,000) to minimize artificial distinctions, balancing simplicity and comparability over excessive precision. Technology's rapid evolution further supports adaptable, readable frameworks. While approaches depend on LCA goals, tools like SIBYL/COPERT (aligned with PRIMES/TREMOVE) should be integrated for granular insights. Comments for aggregated values though stated that to ensure fairness across powertrains, aggregated values for BEVs are preferred due to discrepancies with internal data and uncertainties from limited end-of-life examples. Addressing varying mileages per powertrain appears overly complex. Prioritize clear, adaptable frameworks that account for evolving technologies and improve readability.

Q5. For HDV there were 4 "no preference" votes and no comments which explains the low percentage.

Q6. For two-wheelers there were 6 votes stating "no preference" and one comment belonging to a disagree vote saying that the segmentation approach is acceptable, but motorcycle mileage estimates seem too low. A UK study suggests ranges of 28,000–140,000 km, which is higher

than proposed. The methodology mixes mobility model data for cars with regulatory standards for motorcycles, causing inconsistency. The IEA MoMo study could provide more neutral data for two-wheelers.

*Electricity Modelling (Q7, Q11-Q17)*

Q7. There were 7 votes for location based, 3 for market based and 2 no vote/no preference. The comment pro market based were saying that the market-based approach in LCA better reflects real energy supply but requires strict rules: reliable residual mix disclosure, physical connection within the same bidding area, and alignment with EU regulations. The GHG Protocol recommends this approach only if these conditions are met; otherwise, location-based is preferred due to data reliability issues. This also applies to process heat sourced via certificates without physical connections. The participants voting for location-based approach stated that the location-based approach is preferred in LCA due to its practicality and credibility. It avoids the complexities and greenwashing risks of market-based methods, which require strict conditions. Location-based encourages local green electricity investment and allows for choosing local suppliers, making it a more robust choice compared to market-based methods that may not drive new renewable investments and face verification challenges.

Q11. Comments for developing another hierarchy were: Avoid rushing decisions and clarify definitions, especially for "regional" areas. When residual mix data is scarce, use country-average mixes as a fallback. Prioritize sub-national data over national averages if available. Without supplier-specific data, rely on certificates or residual mixes to prevent double-counting, as these are more practical and credible options. Those that agreed with the suggested hierarchy: When country-specific residual mix data is lacking, use the country-average mix. Clarify "regional" definitions and prioritize sub-national data over national averages if available. Without supplier-specific data, rely on certificates or residual mixes to avoid double-counting, as supplier-specific residual mixes are impractical.

Q12. There were 3 no vote/ no preference votes which explains the missing qualified majority. The one vote that disagreed stated that the issue is valid but beyond this project's scope; EAC-managing authorities must resolve it.

Q13. There were1 no vote and 1 no preference among the 5 scientific votes, which explains the missing majority. The rest agreed.

Q14. Concerning the safeguards for EACs related to production/ consumption time synchronozation there were 2 no votes and 2 no preference. Among the 2 disagree comments it was stated that while the problem is acknowledged, resolving it within this project is unfeasible; authorities managing EACs should address it. Additionally, certification cancellation is not inherently tied to time synchronization.

Q15. 3 no votes, 2 no preference.

Q16. Only 1 agree and 1 disagree vote, rest were no preference/ no vote.

Q17. Participants voting for no need for additional guidelines to handle inconsistencies in electricity approaches stated that Options 1 and 2 are technically similar, with the choice depending on the relevance of the electricity mix in the LCA system. If critical, the steps in both options naturally apply, making additional guidelines unnecessary. However, differing modelling approaches may arise, requiring clear justification for energy model selection. For sensitivity: Electricity modelling rules should be consistent across all life cycle stages to ensure aligned reporting with the defined goal and scope. This maintains methodological rigor and transparency.

*Multifunctionality (Q20, Q21)*

Q20. Disagreeing with the suggestion for no exceptions from the hierarchy in Q19 except for EoL: Consistent electricity modelling rules must apply to all life cycle stages, including End-of-Life (EoL). Using different allocation approaches across stages creates inconsistency. The application of the hierarchy (e.g., residual mix, certificates) in EoL must be explicitly reported to maintain transparency and alignment with the LCA's goal and scope.

Q21. Comments for using CCF (from PEF): The Cut-off approach is recommended for its transparency and alignment with existing standards, but it lacks incentives for future recycling. The Circular Footprint Formula (CFF) aligns with EU goals and encourages recycling, yet it's complex and relies on future assumptions. While CFF has potential, its implementation challenges, such as time mismatches and double-counting risks, need addressing. The choice between these methods depends on the LCA's focus: Cut-off for accuracy or CFF for circularity incentives.

Comments for using cut-off approach: The Circular Footprint Formula (CFF) faces criticism for its complexity and reliance on uncertain future recycling processes, particularly for long-lived products like batteries. Key issues include the impracticality of predicting recycling methods decades in advance and mismatched timelines. Additionally, CFF's burden-free treatment of recycled content may overly incentivize its use without accounting for upstream impacts, risking skewed environmental assessments.

*Data (Q23, Q25)*

Q23. Voters who disagreed with the recommended minimum requirements to reach Level 3 were stating that the proposed 20% threshold for foreground data in automotive LCAs is seen as arbitrary and non-scientific. Instead, all components with a significant impact should be modeled using detailed data. It's recommended to follow the UNECE A-LCA discussions for standardized guidelines. These rules should apply universally to all vehicles to ensure consistency and fairness.

Q25. Votes were 2/3 leaning towards including tyre and brake wear as well as others with no additional comments.

*Normalization (Q28, Q29)*

Q28. Only 1 disagree vote stating that it depends on the goal and scope. Rest was 2 no preference, rest agreed.

Q29. Considering following the Global Planetary Boundary based normalization factors three participants voted against this giving the following reasons: Normalization is not preferred in LCA due to its lack of established methodology, though PEF-recommended normalization factors (NF) could be considered. Assessments based on planetary boundaries are impractical, as their definitions and limits remain scientifically unclear and lack consensus.

*Comparison of Softwares (Q31)*

Limiting LCA software comparisons to GaBi and SimaPro introduces bias, especially for prospective LCAs. **OpenLCA** (free, open-source) and **GREET** should also be considered, as they offer similar capabilities for modeling and impact assessment. However, discrepancies between databases (e.g., ecoinvent vs. EF) often outweigh differences in software functionality. Including a broader range of tools provides a more balanced perspective, particularly for future-oriented assessments.

*Mandatory Set of LCA-Impact Category (Q33)*

Depletion of abiotic ressources: Batteries in vehicles rely on scarce metals (e.g., cobalt, nickel, lithium), making **resource depletion** a critical impact category to retain in LCAs. There is no preference for using "dissipation" over "depletion," as both concepts address resource scarcity but differ in scope (dissipation focuses on material dispersion, depletion on finite reserves). Retaining depletion metrics ensures alignment with circular economy goals and highlights risks tied to critical raw materials.

*Recommended analysis of parameters (Q47-Q54)*

Q47. No qualified majority only due to 1 no vote and 1 no preference among the scientific votes. Rest agreed.

Q48. Only 1 disagree vote, 1 no vote, 2 no preference.

Q49. Only 1 disagree vote, 2 no preference.

Q50. Only 2 disagree vote, 1 no preference.

Q51. Disagreeing with recommendation to do an analysis on the payload/ number of passengers during usage: The proposal to soften the functional unit (FU) definition or classify it as "optional analysis" is met with scepticism. Allowing flexibility risks enabling manipulation of results (e.g., cherry-picking parameters to skew outcomes) and introduces uncertainty, as OEMs

may lack reliable data to define the FU accurately. A standardized FU is critical to ensure comparability and prevent gaming of LCA outcomes.

Q52. Disagreeing with recommendation to do an analysis on ambient temperature during usage : The phrase "on the ambient temperature" should be rephrased for flexibility (e.g., "under specific operating conditions") to avoid rigidity in LCA modelling. While optional analysis could be acceptable, it relies on vague assumptions (e.g., temperature ranges, usage patterns), reducing reliability. However, ambient temperature is not a critical hotspot in typical battery LCAs, so prioritizing other impactful parameters (e.g., energy mix, material sourcing) is advised.

Q53. Disagreeing with recommendation to do an analysis on the EoL electricity/ fuel mix modelled with a future mix: The EoL electricity/fuel mix should align with the methodology chosen for the use phase (Q46) to avoid inconsistencies (e.g., assuming a future energy mix for the use phase but today's mix for EoL). Modeling them together under a unified "future scenario" framework ensures temporal coherence. Since EoL is typically based on secondary data, standalone adjustments add minimal value. Combining these analyses streamlines assumptions and reduces redundancy.

Q54. Disagreeing with the recommendation to do an analysis on the second use: "Second use" of vehicle components (e.g., batteries) is a complex issue that requires clearer methodological guidelines before being classified as optional or mandatory in LCAs. While the functional unit (FU) aligns with the vehicle's useful life, components designed for second life (e.g., with dedicated business models) should be integrated into the **core LCA**—not relegated to sensitivity analyses—to reflect their environmental impacts. However, second-use scenarios remain **out of scope** for vehicle LCAs if they are not a hotspot (e.g., if reuse is speculative or lacks data). Clarity on system boundaries and allocation rules is critical to avoid inconsistent interpretations.

*Optional analysis of parameters (Q55, Q58)*

Q55. Disagreeing with the recommendation to do an optional analysis on the supplier choice with respect to supply chain improvements: The current formulation is too vague, allowing excessive interpretation. Supplier names should remain confidential to downstream companies **unless** explicitly required for hotspot analysis (e.g., critical materials, energy sources). Transparency should be limited to scenarios where supplier-specific data directly impacts environmental hotspots, ensuring relevance without unnecessary disclosure.

Q58. 1 no preference, 1 no vote and 2 disagree votes stating that the issue is redundant, as it is already addressed in Question 42. Adding further complexity risks creating unnecessary overlap or confusion.

The following table shows all comments given in the second voting in a shortened version. For extended comments, please refer to the file *"240430_Second voting results AB -with comments.pptx"* for extended comments.

**Table 8.** Second voting: All significant comments

| # Question | Topic | Subtopic | Total Comments | Significant Comments |
|---|---|---|---|---|
| 1 | Technology coverage | Light means of transport | 9 | 1. Could be added in a second phase of the project<br>2. Inconsistency throughout guideline with level of guidance provided<br>3. Starting point to provide further guidance in the future. |
| 2 | System boundary | Second use | 8 | 1. There might be products which are designed with "second use" in mind (incl. a matching business plan). It should be possible to reflect such case in the LCA. This could be the case for LMT with swappable batteries.<br>2. All issues of circularity are relevant to reuse resp. longer lifetime of components<br>3. Second use impact or benefit can be significant and should be considered. |
| 3 | Functional unit | Default values for lifetime activity for passenger cars and LCV | 9 | 1. A default value should be fixed and not vehicle dependent. Unless a commonly agreed and verifiable ageing model is specified and its use made mandatory for reporting under the T-LCA framework, no comparability is given. The lifetime values obtained in this model must be public and transparent also to the end-user (to avoid cheating).<br>2. Agree, as different situations (question) may ask for different approaches - and this is possible in that way<br>3. Induce bias for larger vehicles enabling more lifetime kilometers |

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| 4 | Functional Unit | Default values for lifetime activity for passenger cars and LCV | 21 | 1. I suggest that SIBYL/COPERT should also be considered as option, since it provides more detailed data. It is noted that PRIMES/TREMOVE is largely based on SIBYL/COPERT categorization and activity data.<br>2. Simplicity and clarity should prevail rather than aiming at too high accuracy, as too many categories may be perceived as a way to escape comparability.<br>3. Not the same use phase. ST has own calculation: 294.836 km for LCV (12 years at 8%) as use time is more important than driven kms |
| 5 | Functional unit | Default values for lifetime activity for HDV | 3 | 1. Discussion and explanation needed to answer this question<br>2. Depend on goal & scope<br>3. Similarly, I suggest that SIBYL/COPERT should also be considered as option, since it provides detailed data in particular as regards activity largely compatible with VECTO. |
| 6 | Functional unit | Default values for lifetime activity Two-wheelers | 7 | 1. Similarly, I suggest that SIBYL/COPERT should also be considered as option, largely compatible with the above regulation<br>2. *Honda*: Question needs more attention; the digits for mileage for motorcycles recommended (EURO5) are way to low (by factor 10); for Two wheelers from emission regulation (Euro 5 / 6) – different lifetime – different FU; IEA study: involved – can check how we used data for motorcycle – FU: 5000/50000 km is very low number |
| 7 | Electricity Modelling | Production phase | 16 | 1. Due to the difficulty to obtain reliable electricity attributes for many regions, recommend location-based. Market can only be acceptable if a Residual mix is disclosed reliably and used for all assessments in this region, otherwise double-counting. Physical connection (same bidding area) would also be needed. Apart from that, alignment with EU legislation such as green hydrogen act would be useful |

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| | | | | 2. Location based approach is easier for LCA assessment but market-based reflects better the real energy supply. But to be applied it is needed to define clear rules and traceability<br>3. Modelling without possibilities of greenwashing and non-representative models |
| 8 | Electricity modelling | Use phase | 4 | 1. The question of market-based vs location-based should be taken up here as well!<br>2. Electricity grid evolution should be taken into account<br>3. Depend strongly on goal & scope |
| 9 | Electricity modelling | EoL Phase | 5 | 1. Recycling sites have to be built in a specific location and construction commences well before the first volumes are recycled so it's possible to model the expected electricity product that will be used and hence apply the specific emission factor related to it. If the EF cannot be defined based on facts the dynamic modelling approach can be used.<br>2. Agree partially. If energy certificates are allowed for manufacturing (market-based approach), then the same must apply to EoL. This would mean the use of residual mixes, not average mixes |
| 10 | Electricity modelling | On-site electricity production | 5 | 1. Guidance on how to avoid double accounting, selling of certificates, and handling ox exceed energy is needed.<br>2. No need of a whole separate guidance<br>3. Effect on overall results is negligible. |
| 11 | Electricity Modelling | Market-based electricity modelling - hierarchy | 14 | 1. How to handle the case when there is neither supplier specific data or residual mix data? To our understanding, it's difficult to find information about residual mix outside of EU.<br>2. No supplier-specific mix. Either you buy certificates, then you know exactly the mix you buy, or you do not, then you use the residual. Otherwise, |

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| | | | | probably double-counting (supplier sells certificates to some clients, and the rest get the mix. This would the at least have to be the supplier-specific residual mix.-> not practical |
| 12 | Electricity modelling | Market-based electricity modelling – Safeguards (additionality) | 9 | 1. While we agree with the problem description, we find it unfeasible for this project to come up with a solution to it, this needs to be approached by authorities/organizations managing the respective EACs.<br>2. Outside of LCA-practitioners/ LCA guidelines scope. These are issues that should be dealt with within the electricity market itself.<br>3. Too hard in practice. Financial additionality is the foundation for EACs which is sufficient. |
| 13 | Electricity modelling | Market-based electricity modelling – Safeguards (Physical link) | 6 | 1. Physical link is important to show that it is not just a credit. But the definition of physical link is also key.<br>2. Do not reduce the possibilities for automotive sector in current situations<br>3. Outside of LCA-practitioners/ LCA guidelines scope. Issues to be dealt with within the electricity market itself |
| 14 | Electricity modelling | Market-based electricity modelling – Safeguards (time synchronization) | 9 | 1. While we agree with the problem description, we find it unfeasible for this project to come up with a solution to it, this needs to be approached by authorities/organizations managing the respective EACs.<br>2. Not possible in practice. Temporal match secured on calendar year basis within EACs, -> sufficient. Yearly annulment mechanism of not used EACs must be assured. Only EACs with this mechanism to be approved.<br>3. Afraid additional effort needed to go into time synchronization. |
| 15 | Electricity modelling | Market-based electricity modelling – Safeguards (negative impacts) | 4 | 1. Nevertheless, the question of availability of energy storage systems used to time shift the green electricity available should be accounted for<br>2. Do not understand the question: is this about multi-functionality and/or use phase electricity usage? |

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| 16 | Electricity modelling | Market-based electricity modelling – Safeguards (others?) | 7 | 1. Quite hypothetical question that is difficult to take a clear stance to. We don't see any additional needs. (Or should we have answered disagree then?)<br>2. The safeguards mentioned above should be sufficient |
| 17 | Electricity Modelling | Bonus Question | 13 | 1. Option 1 and 2 are not really different (technically you do the same thing in both cases). From a LCA scientist perspective, it obviously depends on the relevance of the electricity mix within your system ... and if relevant, you will automatically do what Option 1+2 describe. Hence, we don't need further guidelines ...<br>2. Only if the MB is voted for with satisfying safeguards.<br>3. Consistent with TSLCA approach to address inconsistencies, further aspects... |
| 18 | Multifunctionality | Consistency between LCA, S-LCA, and LCC | 2 | 1. Sounds reasonable and pragmatic in the same time<br>2. Some relevant examples would be helpful to further discuss/decide |
| 19 | Multifunctionality | General Hierarchy of MF | 4 | 1. System expansion does not seem to be very helpful for vehicle LCA, MF problems will occur along the value chain and the impact of the main material is needed, where does expansion fit there?<br>There is always a physical relationship (there is always a mass balance), so the final last option 'economic allocation' is obsolete<br>2. General agreement but the allocation section could be discussed in more details<br>3. Prefer 1. subdivision, 2. allocation, 3. system expansion, 4. substitution |
| 20 | Multifunctionality | Exceptions from Hierarchy | 4 | 1. No exception also for the EoL stage. No reason for different allocation approaches in different life cycle stages, would be inconsistent<br>2. Another exception should be added for the co-production of energy/electricity. For this subject there should be no substitution and as physical |

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| | | | | allocation is not possible then the recommendation should be economic allocation. |
| 21 | Multifunctionality | Dealing with multifunctionality in the EoL phase | 20 | 1. Cut-Off is the approach recommended by EN 15804 (EPD, construction area); however, as we are here in the context of the European Commission, following the CFF seems more appropriate ...<br>2. CFF too complicated and requires to have knowledge about future recycling processes. Also, the time mismatch creates problems, especially for long living products. How can an OEM know and ensure that today's batteries are recycled by a specific recycling process?<br>3. Depend on goal and scope, very relevant to assess on circularity issues |
| 22 | Data | Company specific and secondary data | 1 | 1. Don't re-invent the wheel here (again) |
| 23 | Data | Minimum data requirements for Level 3 LCA | 5 | 1. Why only 20% ... ? Sounds very arbitrary - and from an LCA scientist perspective this is wrong - simply ALL parts that have a relevant contribution (--> can then discuss, what "relevant contribution" exactly mean ...) should be modelled with foreground data.<br>2. We recommend to follow and wait for UNECE A-LCA discussion.<br>3. Wouldn't it be better to give a percentage of the non-battery impacts of the vehicle instead A fixed percentage of the total vehicle? |
| 24 | Data | Which energy consumption to use as standard scenario for LDV? | 2 | 1. Important to keep the RW correction factor (cf. D-CLIMA report) . Important to be aligned with the UNECE A-LCA.<br>2. Depend on goal & scope<br>sensitivity analysis is mandatory on energy consumption |
| 25 | Data | Non-exhaust emissions during the use phase? | 8 | 1. Completeness seem to me relevant for such an issue like LCA |

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| | | | | 2. Should follow availability of data and methodology (euro7 GTR24 and UNR117)<br>3. Make sure all hotspots are considered. |
| 26 | Data | Maintenance | 1 | 1. Agree but need to better understand how the frequency of maintenance will be determined for each part (based on real tests, on data from parts suppliers, etc.) |
| 27 | Data | Type of data for EoL | 5 | 1. To be discussed as it could be needed to allow primary data if some innovative processes are developed by some actors<br>2. Need to keep EoL actors under control now and in the future<br>3. Statement not clear enough -> propose hierarchy with larger emphasis on using company-specific data and only if not feasible OEMs may also use secondary data. |
| 28 | Normalization | Normalized Result as optional | 1 | 1. Depend on goal & scope<br>all emissions should be reported explicitly from LCI |
| 29 | Normalization | Normalization Factor | 4 | 1. Not really established. Would tend to use PEF recommend NF<br>2. Nobody knows the planetary boundaries, so no assessment possible<br>3. Normalization should be free from value judgment (≠ PB). |
| 30 | Prospective and Fleet Level LCIA | Differences to Product LCA/Retrospective LCA | None | None |
| 31 | Comparison of Softwares | Differences in LCIA Calculation | 7 | 1. There are - especially from the point of view "prospective LCA" - other tools on the market that have a wide spread and are in use ... hence a comparison only of GaBi & SimaPro lead to a bias in the perception (even if you don't give any recommendation) ... |

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| | | | | 2. Will there be a recommendation made in TranSensus concerning the data-base to be used?<br>3. Not enough time in the project |
| 32 | Mandatory set of LCA-Impact Category | Climate Change | 1 | 1. Question is however not only if we include a LCIA category, but which model is used to calculate the respective impact. And there, I would strongly argue for - again to avoid re-inventing the wheel - the use of the EF method (midpoint level) ... |
| 33 | Mandatory set of LCA-Impact Category | Depletion of abiotic resources | 9 | 1. Batteries in a car are using metals such as cobalt, nickel, or lithium ... and those substances are not abundant on the planet earth ...<br>2. Agree only if the new indicator "dissipation of abiotic resources" is in-cluded in the future.<br>3. Stick with existing indicator 'abiotic depletion of elements' as defined in EF |
| 34 | Mandatory set of LCA-Impact Category | Land use | 6 | 1. From where do you know that "land use" is not a relevant category when dealing with mobility ... mobility is using (for streets etc.) quite some land resources.<br>2. For biofuels and renewable energy relevant, but type of land must be given<br>3. Multicriteria nature of LCA should remain a mandatory aspect of the TLCA method à Provide the score with the results, while maintaining the results of this impact category as mandatory. The lack of robustness à in-terpretation section. |
| 35 | Mandatory set of LCA-Impact Category | Photochemical ozone formation | 3 | 1. This initial methodology should focus on GHG<br>2. Is a regional/local impact depending on weather<br>3. See also question 32 |

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| 36 | Mandatory set of LCA-Impact Category | Human toxicity & Ecotoxicity | 3 | 1. One of the few impact categories where the LCA community agreed on a common approach (i.e. USEtox) / (ii) similar as "resource depletion" this seems to me relevant impact categories in relation to the entire metal chains ...<br>2. Hotspots for ecotoxicity (e.g. mining). Multicriteria nature of LCA is mandatory aspect of TLCA method.<br>3. To provide the score with the results as mandatory. Lack of robustness to be within interpretation section. |
| 37 | Mandatory set of LCA-Impact Category | Water scarcity | 4 | 1. Guess that especially the extraction of the various metals could also have quite some impact in this category ... hence it is of relevance, and thus needs to be included<br>2. Robustness has to be considered for evaluation. |
| 38 | Mandatory set of LCA-Impact Category | Acidification | 4 | 1. This initial methodology should focus on GHG<br>2. Not sufficient regionalized data in databanks available |
| 39 | Mandatory set of LCA-Impact Category | Freshwater & Marine eutrophication | 8 | 1. This initial methodology should focus on GHG<br>2. Marine Eutrophication not an issue for ZEV?<br>3. Not sufficient regionalized data in databanks available. |
| 40 | Mandatory set of LCA-Impact Category | Particulate matter | 3 | 1. This initial methodology should focus on GHG<br>2. Not sufficient regionalized data in databanks available (cities versus countryside e.g.) |
| 41 | Mandatory set of LCA-Impact Category | Ozone depletion | 6 | 1. Lack of robustness: see evaluation.<br>2. Ozone depletion recommended as mandatory<br>3. All impact categories in EF method should be evaluated. |

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| 42 | Mandatory analysis of parameters | Usage: consumption | 2 | 1. Agreement on mandatory analysis. Reporting obligations to be defined later Not mandatory à recommended |
| 43 | Mandatory analysis of parameters | Quantity value | 3 | 1. Agreement on mandatory analysis. Reporting obligations to be defined later<br>2. IMDS (precise) the base for an OEM BOM. No sense to make an analyze of quantity value<br>3. Not mandatory: better recommended (only energy flows). Add complexity & workload without clear added value. |
| 44 | Mandatory analysis of parameters | Usage: lifetime | 3 | 1. The product lifetime is determined by the product design and engineering. The standard FU is close to the actual specifications of the product. Depending on the usage intensity at the respective owner/user of the product, the product is usually passed to the 2nd, 3rd, 4th, n-th owner, until the product lifetime is exhausted.<br>2. We don't see it as relevant<br>3. Not mandatory à recommended. The standard scenario provides sufficient information for the general audience/customers. |
| 45 | Mandatory analysis of parameters | Usage: geographical variation of energy mix for consumption | 3 | 1. Project should make suggestions on the selection of sensitivity candidates (region, country). Without guidance, regional energy mix analysis can easily be used to "create" desired results.<br>2. Not mandatory: better recommended.<br>3. Not relevant. Which geographic variation ? what is the goal ? Comparing country grid mix is done outside of LCA. Use EU dynamic grid mix during use phase: compare ZEV, not countries |
| 46 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | 10 | 1. Or a product LCA, the assumption for the future change in electricity is based on models, so it should only be optional. |

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| | | | | 2. Ideally fixing sensitivity analysis to: "static mix as of SoP" vs "dynamic model“<br>3. Not relevant. Electricity is handled in another WG |
| 47 | Recommend analysis of parameters | Choice of secondary data | 2 | 1. Yes, if the factor (i.e. secondary data) shows a relevant influence ... otherwise, no<br>2. Not relevant |
| 48 | Recommended analysis of parameters | Location of the value chain: electricity mix | 6 | 1. Yes, if the factor (i.e. applied electricity model) shows a relevant influence ... otherwise, no<br>2. Not relevant. Too complex to handle. Up to 7 tiers with 5000 parts |
| 49 | Recommended analysis of parameters | Supply chain improvements: recycled vs. primary materials | 7 | 1. Yes, if the factor (i.e. primary materials) shows a relevant influence ... otherwise, no<br>2. Should already be known if material comes from primary or secondary sourcing. A "parallel" model with recycled materials as independent "what if" study ecodesign.<br>3. The scenario analysis is more fitted for the use of LCA as an ecodesign tool. |
| 50 | Recommended analysis of parameters | Usage: maintenance & wearing | 4 | 1. Low impact on result, but high effort and vague boundary conditions. Also depends on choice of aftermarket components, which are not under control of OEM.<br>2. Considering the relatively small impact maintenance has on the overall result, is a recommendation of this analysis really motivated? |
| 51 | Recommended analysis of parameters | Usage: payload/number of passengers | 9 | 1. Softening project choice of FU. "Optional analysis" could be OK.<br>2. I would be very skeptical about the viability. How does an OEM know this parameter? It opens possibilities for gaming of results |

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| | | | | 3. Gives no further insight, this is standard knowledge and the same results for every vehicle/every OEM. |
| 52 | Recommended analysis of parameters | Usage: temperature | 9 | 1. Why "on the ambient temperature" ... shouldn't we formulate this more flexible?<br>2. It's an interesting parameter, though the possible future use of RW factors and the whole mission profile discussion also touches it. Additionally, should this be combined with some kind of guidance regarding indoor temperature/HVAC usage?<br>3. No proven data syst. available to be used to change parameters (some type approval cycles e.g. for Korea available, but not for EU vehicles, not for all vehicles) |
| 53 | Recommended analysis of parameters | Future mix: EoL electricity/fuel mix | 7 | 1. Should not be an independent factor. EoL electricity/fuel mix needs to be in line with choices at Q46<br>2. Wasn't EoL to be modeled based on secondary data? Then this does not add much<br>3. Not relevant, added value? As an ex. of optional parameters or too much recommended analysis. |
| 54 | Recommended analysis of parameters | Second use | 10 | 1. "Second use" is a very large issue (and here weakly to not at all defined ...) - hence, this will lead to a very divers interpretation ... Need first a more clear approach for dealing with second use, before we can make this optional/mandatory ...<br>2. FU is in line with useful life of the product. However, some components of the product might be engineered with second life in mind (incl. Related business model), which should be reflected in the LCA itself (and not as sensitivity)<br>3. As the second life is expected to be excluded from the LCA baseline, this analysis is the only assessment of the potential impact of the second life. |

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| 55 | Optional analysis of parameters | Optional analysis of parameters | 10 | 1. To weak (in the sense of too large room for interpretation ...) as formulated for the moment ...<br>2. Under respect of confidentiality agreements<br>3. Not relevant; Too complex, too many parts, tiers |
| 56 | Optional analysis of parameters | Location of the value chain: fuel mix, transport distance & means | 8 | 1. As the impact of the logistic is generally negligible for the energy intensive products, the analysis as little value.<br>2. ... yes, if these factors show a relevant influence ... otherwise, no<br>3. This information to be known or based on informed assumptions. |
| 57 | Optional analysis of parameters | Process improvements (e.g., waste management, upstream recycling processes, ...) | 7 | 1. No concern on any additional analysis if it is optional<br>2. The value chain should be known before conducting the assessment. A "parallel" model with improved processes as independent "what if" study.<br>3. The scenario analysis is more fitted for the use of LCA as an ecodesign tool. |
| 58 | Optional analysis of parameters | Process improvements: energy consumption | 10 | 1. Too complex<br>2. The value chain should be known before conducting the assessment. A "parallel" model with improved processes as independent "what if" study.<br>3. No need for an additional requirement focussing on energy consumption |

### II.2.3 Prioritization and discussion of feedback

The voting results for the second round were presented to the Advisory Boards on 30th of April 2024, with specific questions highlighted to clarify comments, address divergent consensus levels (vs. beneficiaries' voting), and gather deeper insights. The full presentation (see Annex *240430_Second voting results AB -with comments*), including all questions and outcomes, was shared with the boards post-meeting.

Again, questions lacking a qualified majority were resolved in Chapter II.2.2; this chapter (Table 9) focuses solely on those with additional comments from the Advisory Board meeting. Questions with significant "no votes" or "no preference" were also highlighted during the meeting and are detailed in the presentation (*240430_Second voting results AB -with comments*).

**Table 9.** Second voting: Focus questions with comments from Advisory Board workshop

| # Question | Topic | Subtopic | Comments during Advisory Board Workshop |
|---|---|---|---|
| 4 | Functional Unit | Default values for lifetime activity for passenger cars and LCV (PRIMES-TREMOVE) | - 1. Remark on corporate data – in favour of differentiated values – if regulations supported with data, data is not sufficient of course; 2. Remark Tremove-data – general inventory well established on EU level, transport, etc.; Please take into account this data, for policy context important<br>- differentiation – more difficult, results will be skewed and result in no decision for policy making context, vehicle from the past is different from now, no good data, all assumption data, will result in artificial result<br>- [mentionned the OBMFC (On Board Fuel Consumption Monitoring)]; milage data will be recorded and improved and for the usage of the model level. |
| 6 | Functional unit | Default values for lifetime activity Two-wheelers | - Question needs more attention; the digits for mileage for motorcycles recommended (EURO5) are way to low (by factor 10); for Two wheelers from emission regulation (Euro 5 / 6) – different lifetime – different FU; IEA study: involved – can check how we used data for motorcycle – FU: 5000/50000 km is very low number<br>- motorcycles were not in focus for a long time; therefor no good quality of data; question indeed needs to be revised;<br>- get data from Energy Agency (Uni Thessaloniki is in contact) - use data for TransensusLCA, |

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| | | | Honda could provide input in the respective WP2 meeting if discussed again |
| 7 | Electricity Modelling | Production phase | - PPA – uncertainty item – it will affect energy modelling (option 1 and 2) PPA allocated to the company would not show in the market-based approach; if PPA is part of MB approach then vote would change; |
| 46 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | - Question from task lead: would you have voted „yes“if mandatory meant „mandatory reporting“?<br>- Answer: some yes |
| 51 | Recommended analysis of parameters | Usage: payload/number of passengers | - how does this work with Functional unit: passenger car usually milage related<br>- FU for passenger car: defined person kilometer (linked to passenger travelling) - vehicle kilometer assumption 1 passenger kilometer |
| 52 | Recommended analysis of parameters | Usage: temperature | - package of factors for discussion/ definition: number of km, number vehicle, payload etc. policy based, more statistics required; depends on condition of the car, temperature etc. |

## II.3 Results and feedback process of third voting

The final and third voting round began on 10/09/2024 and lasted until 04/10/2024, extending slightly beyond the originally planned end date of 27/09/2024 due to some late responses. This round, like its predecessors, spanned approximately one month, allowing ample time for thorough consideration and feedback from the advisory boards. Following the conclusion of the voting period, a combined meeting was held on October 17th, 2024. This meeting brought together both the advisory boards and the WP2 team, streamlining the feedback process by eliminating the need for a separate WP2 meeting. During this session, the voting results were presented in detail to all participants. The joint nature of the meeting facilitated immediate and direct discussions between the advisory boards and the WP2 team regarding the outcomes of the voting round. This integrated approach allowed for a more efficient exchange of ideas and concerns, enabling the WP2 team to gain immediate insights into the advisory boards' perspectives. The meeting served as a platform to analyse the feedback received and discuss issues still pending.

### II.3.1 Voting Results #3

The third voting process concluded on **October 4, 2024**, with participants responding to 95 questions. A detailed analysis of the responses is provided in an Excel file, available for further examination

Total Participation: 17 votes were cast.

Representation:

- Industry Advisory Board: 10 votes
- Scientific Advisory Board: 7 votes

For this last voting there was again a change. This time in the way the results and percentage of agreement was calculated. While in the first 2 votings the “no answer” and “no preference” votes were included in the percentage calculation, this time they were left out. The reason was that the former calculation resulted in many questions not reaching a qualified majority but not because participants were voting against a suggestion or were split in their opinion when there were different options but because some people didn’t want to vote if the topic was not within their level of expertise. Those questions are now still addressed in the advisory board meeting but not included in the percentage calculation.

Questions that did not reach a qualified majority as well as comments provided by the boards in response will again be presented in the next chapter

**Table 10.** Third voting: Overview agreement of Advisory Boards

| # Question | Topic | Subtopic | Consortium | Industry Advisory | Scientific Advisory |
|---|---|---|---|---|---|
| | | | Agreement in % | | |
| 1 | Functional unit | Default values for lifetime activity Two-wheelers | 100 % | 100 % | 100 % |
| 2 | Functional unit | Default values for lifetime activity HDV | 100 % | 100 % | 71 % |
| 3 | Functional unit | Default values for lifetime activity in years | 94 % | 80 % | 57 % |
| 4 | OEM fleet LCA | Recommended approach for passenger cars | 100 % | 78 % | 67% |
| 5 | OEM fleet LCA | Recommended approach for HDV | 100 % | 86 % | 67 % |
| 6 | OEM fleet LCA | Recommended approach for two-wheelers | 100 % | 100 % | 67 % |
| 7 | Prospective LCA | Recommended approach | 100 % | 90% | 100% |
| 8 | Macro fleet LCA | Recommended approach | 100 % | 80 % | 86 % |
| 9 | Electricity modelling | Time period matching for electricity consumption processes | 95 % | 89 % | 100 % |
| 10 | Electricity modelling | Electricity consumption modelling approach (production phase) | 89 % | 100 % | 86 % |
| 11 | Electricity Modelling | Safeguards for the use of Energy Attribute Certificate (EAC) related to additionality for the product LCA production phase | 76 % | 88 % | 67 % |
| 12 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 79 % | 89 % | 100 % |
| 13 | Electricity modelling | Production phase electricity consumption modelling | 100 % | 100 % | 80 % |

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| | | - Additional specifications for the market-based electricity modelling approach | | | |
| 14 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 100 % | 100 % | 80 % |
| 15 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 100 % | 100 % | 100 % |
| 16 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 100 % | 80 % | 80 % |
| 17 | Electricity Modelling | Use phase electricity consumption modelling | 100 % | 90 % | 100 % |
| 18 | Electricity Modelling | On-site electricity production modelling for Product LCA | 83 % | 90 % | 100 % |
| 19 | Electricity Modelling | On-site electricity production modelling for Product LCA | 83 % | 100 % | 83 % |
| 20 | Electricity Modelling | Fleet level LCA | 94 % | 100 % | 100 % |
| 21 | Electricity Modelling | Fleet level LCA | 88 % | 80 % | 100 % |
| 22 | Electricity Modelling | Prospective vehicle LCA | 100 % | 100 % | 83 % |
| 23 | Electricity Modelling | Prospective vehicle LCA | 82 % | 100 % | 100 % |
| 24 | Multifunctionality | Enhanced hierarchy | 100 % | 100 % | 100 % |
| 25 | Multifunctionality | EoL | 94 % | 75 % | 100 % |
| 26 | Multifunctionality | Prospective LCA recommendations | 94 % | 83 % | 100 % |
| 27 | Multifunctionality | Fleet Level LCA recommendations | 94 % | 83 % | 100 % |

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| 28 | Data collection and type | (Energy consumption) subquestion 1: Realword emission factor | 100 % | 100 % | 83 % |
| 29 | Data collection and type | (Energy consumption) subquestion 2: Fuel cell degradation | 93 % | 80 % | 100 % |
| 30 | Data collection and type | Non-exhaust emissions (hydrogen leakage) | 100 % | 100 % | 100 % |
| 31 | Data collection and type | Hydrogen supply model-ling in the use phase | 100 % | 100 % | 100 % |
| 32 | Data collection and type | Maintenance, wear and consumables | 100 % | 90 % | 100 % |
| 33 | Data collection and type | Data Quality Rating (DQR) | 94 % | 100 % | 100 % |
| 34 | Impact Category | CED | 83 % | 89 % | 75 % |
| 35 | Impact Category | LCIA Method | 100 % | 100 % | 100 % |
| 36 | Impact Category | Depletion and Dissipation | 89 % | 70 % | 100 % |
| 37 | Impact Category | Cumulative H2 Emissions | 88 % | 70 % | 100 % |
| 38 | Impact Category | S-LCA Indicators | 100 % | 100 % | 100 % |
| 39 | Impact Category | S-LCA Indicators | 100 % | 100 % | 75 % |
| 40 | Impact Category | S-LCA Indicators | 100 % | 100 % | 75 % |
| 41 | Impact Category | S-LCA Indicators | 100 % | 100 % | 75 % |
| 42 | Impact Category | Subject : S-LCA Indicators | 92 % | 100 % | 75 % |
| 43 | Impact Category | Subject : S-LCA Indicators | 100 % | 100 % | 100 % |
| 44 | Impact Category | Subject : S-LCA Indicators | 100 % | 100 % | 80 % |
| 45 | Impact Category | Subject : S-LCA Indicators | 100 % | 100 % | 60 % |
| 46 | Recommended S-LCIA Indicators | Weekly hours of work per employee | 100 % | 100 % | 75 % |
| 47 | Recommended S-LCIA Indicators | Social security expendi-tures | 100 % | 100 % | 75 % |

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| 48 | Recommended S-LCIA Indicators | Overall country sector risk forced labour | 100 % | 100 % | 60 % |
| 49 | Recommended S-LCIA Indicators | Forced labour risk | 100 % | 100 % | 75 % |
| 50 | Recommended S-LCIA Indicators | Presence of indigenous population | 93 % | 100 % | 60 % |
| 51 | Recommended S-LCIA Indicators | Corruption Perception Index (CPI) | 100 % | 100 % | 75 % |
| 52 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | 81 % | 88 % | 100 % |
| 53 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | 87 % | 89 % | 100 % |
| 54 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | 100 % | 100 % | 100 % |
| 55 | Mandatory analysis of parameters | Usage: consumption | 94 % | 75 % | 100 % |
| 56 | Mandatory analysis of parameters | Usage: consumption | 94 % | 75 % | 100 % |
| 57 | Mandatory analysis of parameters | Usage: vehicle lifetime | 88 % | 86 % | 83 % |
| 58 | Mandatory analysis of parameters | Usage: vehicle lifetime | 93 % | 71 % | 100 % |
| 59 | Mandatory analysis of parameters | Usage: Variation of energy mix consumption | 88 % | 100 % | 86 % |
| 60 | Mandatory analysis of parameters | Usage: Variation of energy mix consumption | 88 % | 100 % | 83 % |
| 61 | Mandatory analysis of parameters | Quantity value (for hotspots) | 89 % | 75 % | 75 % |
| 62 | Mandatory analysis of parameters | Quantity value (for hotspots) | 88 % | 75 % | 75 % |
| 63 | Recommended analysis of parameters | Choice of secondary data | 94 % | 63 % | 100 % |
| 64 | Recommended analysis of parameters | Choice of secondary data | 100 % | 63 % | 100 % |

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| 65 | Recommended analysis of parameters | Location of the value chain: electricity mix | 88 % | 75 % | 100 % |
| 66 | Recommended analysis of parameters | Location of the value chain: electricity mix | 93 % | 75 % | 100 % |
| 67 | Recommended analysis of parameters | Supply chain improvements: recycled vs. primary materials | 88 % | 75 % | 100 % |
| 68 | Recommended analysis of parameters | Supply chain improvements: recycled vs. primary materials | 93 % | 100 % | 100 % |
| 69 | Recommended analysis of parameters | Usage: maintenance & wearing | 82 % | 100 % | 100 % |
| 70 | Recommended analysis of parameters | Usage: maintenance & wearing | 81 % | 100 % | 100 % |
| 71 | Recommended analysis of parameters | Usage: payload/number of passengers | 100 % | 75 % | 71 % |
| 72 | Recommended analysis of parameters | Usage: payload/number of passengers | 100 % | 75 % | 71 % |
| 73 | Recommended analysis of parameters | Usage: temperature | 80 % | 57 % | 83 % |
| 74 | Recommended analysis of parameters | Usage: temperature | 86 % | 50 % | 80 % |
| 75 | Recommended analysis of parameters | Future mix: EoL electricity/fuel mix | 76 % | 100 % | 100 % |
| 76 | Recommended analysis of parameters | Future mix: EoL electricity/fuel mix | 81 % | 100 % | 100 % |
| 77 | Recommended analysis of parameters | Second use (split between vehicle and battery?) | 100 % | 67 % | 83 % |
| 78 | Recommended analysis of parameters | Second use (split between vehicle and battery?) | 100 % | 67 % | 83 % |
| 79 | Recommended S-LCA interpretation parameters | Quantity value (for hotspots) | 100 % | 100 % | 100 % |
| 80 | Recommended S-LCA interpretation parameters | Geographical variation of the value chain | 100 % | 50 % | 100 % |

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| 81 | Recommended S-LCA interpretation parameters | choice of the activity variable | 100 % | 100 % | 100 % |
| 82 | Recommended S-LCA interpretation parameters | assumptions on data | 100 % | 100 % | 100 % |
| 83 | Recommended S-LCA interpretation parameters | price related to process or materials | 100 % | 0 % | 100 % |
| 84 | Recommended S-LCA interpretation parameters | geographical variation of the energy consumed | 100 % | 100 % | 100 % |
| 85 | Recommended S-LCA interpretation parameters | quantity of energy consumed during the use phase | 100 % | 0 % | 100 % |
| 86 | Integration in product development process | / | 100 % | 100 % | 100 % |
| 87 | Reporting | TSLCA adherence levels for product LCA | 94 % | 0 % | 100 % |
| 88 | Reporting | TSLCA partial adherence for product LCA | 94 % | 89 % | 67 % |
| 89 | Reporting | 3rd party verification if level 3 Product LCA (TSLCA will provide a check-list in D5.2) | 94 % | 88 % | 100 % |
| 90 | Reporting | Public reporting content for Produc LCA: Minimum info (Goal and scope) | 83 % | 83 % | 80 % |
| 91 | Reporting | Public reporting content for Produc LCA: Minimum info (LCI) | 89 % | 100 % | 100 % |
| 92 | Reporting | Public reporting content for Produc LCA: Minimum info (LCIA) | 100 % | 100 % | 100 % |
| 93 | Reporting | Public reporting content for Produc LCA: Minimum info (Interpretation) | 89 % | 100 % | 100 % |

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| 94 | Reporting | TSLCA adherence for other type of LCAs | 100 % | 83 % | 100 % |
| 95 | Reporting | S-LCA | 100 % | 100 % | 100 % |

### II.3.2 Clustering and evaluation of feedback from advisory boards

Fourteen questions did not secure qualified majority approval in one or both Advisory Boards (see Table 11). Potential reasons for these outcomes are outlined in the corresponding comment section (see Table 12), with thematic groupings explored in the following chapter.

**Table 11.** Third voting: Questions with no qualified majority in one or two boards

| # Question | Topic | Subtopic | Qualified Majority in Industry Advisory Board (IAB) | Qualified Majority in Scientific Advisory Board (SAB) |
|---|---|---|---|---|
| 3 | Functional unit | Default values for lifetime activity in years | √ | X |
| 45 | Impact Category | Subject : S-LCA Indicators | √ | X |
| 48 | Recommended S-LCIA Indicators | Overall country sector risk forced labour | √ | X |
| 50 | Recommended S-LCIA Indicators | Presence of indigenous population | √ | X |
| 63 | Recommended analysis of parameters | Choice of secondary data | X | √ |
| 64 | Recommended analysis of parameters | Choice of secondary data | X | √ |
| 73 | Recommended analysis of parameters | Usage: temperature | X | √ |
| 74 | Recommended analysis of parameters | Usage: temperature | X | √ |
| 80 | Recommended S-LCA interpretation parameters | Geographical variation | X | √ |
| 83 | Recommended S-LCA interpretation parameters | price related to process or materials | X | √ |

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| 85 | Recommended S-LCA interpretation parameters | quantity of energy consumed during the use phase | X | √ |

*Functional Unit (Q3)*

There are 4 voters disagreeing with the proposed default values for vehicle lifetimes in the EU. These are criticized for being too low and misaligned with real-world data. For passenger cars, ICCT research indicates an average lifetime of 18+ years based on end-of-life vehicle ages (17–20 years in Germany, France, Portugal, and others), while the SIBYL model suggests 25 years. However, ACEA reports an average fleet age of 12.3 years for cars, 12.5 years for LCVs/buses, and 14 years for trucks—figures that reflect current usage in specific countries, not total lifetimes. National licensing data further distort estimates, as they ignore vehicles exported and reused in other EU/non-EU markets, particularly in major exporting countries.

For HDVs (trucks/buses), ICCT recommends 20–21 years, contrasting with ACEA's fleet age of 14 years. The discrepancy highlights the need to distinguish between fleet age (average time in a country) and total lifetime (including post-export use). Transparency issues compound the problem, as sources for the proposed defaults are unclear.

It's recommended to adopt ICCT/SIBYL lifetime estimates (18–25 years for cars, 20+ years for HDVs) to reflect actual use cycles. Calculations should be adjusted to account for cross-border vehicle reuse, especially in export-heavy markets. Additionally, disclosing data sources and assumptions would improve credibility. Current defaults risk underestimating operational spans, skewing lifecycle assessments and policy outcomes. Longer lifetimes better align with evidence, particularly for exported vehicles.

*Impact Category (Q45)*

It is to mention that this questions received 6 "no preference" votes. Among the 2 disagree votes comments questioned the inclusion of "high living cost" as a standalone social risk indicator in S-LCA. Without contextualizing it against minimum wage or income levels, the metric lacks meaning, as affordability depends on the ratio between living expenses and earnings. For example, a high cost of living in a region with proportionally high wages may not indicate worker hardship. This indicator should be revised to reflect living cost relative to income (e.g., % of minimum wage required for basic needs) to assess actual social risks. The current approach risks misrepresenting regional socioeconomic conditions.

*Recommended S-LCA Indicators (Q48, Q50)*

Q48. The choice between site-specific and sector-specific approaches in Social Life Cycle Assessment (S-LCA) is questioned. If S-LCA is done site-specific, certain indicators like "presence of indigenous people" make sense, but if it's sector-specific, these indicators lose

relevance. The concern is whether the methodology should focus on specific locations or broader industry sectors. This distinction is crucial because sector-specific data from typical background databases can't capture localized issues, while site-specific data is more resource-intensive and may not be practical for large-scale analyses.

Q50. Same comment as for Q48.

*Recommended analysis of parameters (Q63, Q64, Q73, Q74)*

Q63. (only 1 disagree vote) The sensisitivity analysis for the selection of secondary datasets introduce the idea that a choice is possible. On the contrary, the guidance should clarify that the datatsets the more representative has to be selected.

Q64. Same comment as for Q63.

Q73. (only 1 disagree vote) Comment states that data availability can be a challenge here.

Q74. (only 1 disagree vote) Voter wondered whether its not better to model based on the actual market shares.

*Recommended S-LCA interpretation parameters (Q80, Q83, Q85)*

Q80. Geographical variation was not considered a hot spot or too complex.

Q83. (only 1 disagree, 1 agree vote, rest no preference). Including the price related to process or materials in the recommended list of TranSensus LCA social interpretation parameters is seen rather sceptical because the results may never be published for confidentiality reasons.

Q85. Including the quantity of energy consumed during the use phase was considered redundant - energy consumption is already captured in environmental LCA. A different metric is needed if trying to account for energy cost to the user.

The following table shows all comments given in the third voting in a shortened version. For extended comments, please refer to the file "241017_Voting3_results_ABs incl. comments" for extended comments.

**Table 12.** Third voting: All significant comments

| # Question | Topic | Subtopic | Total Comments | Significant Comments |
|---|---|---|---|---|
| 1 | Functional unit | Default values for lifetime activity Two-wheelers | 2 | 1. Similar values for motorcycles are found by the Swiss Federal Office of Statistics in Mobilität in der Schweiz, Ergebnisse des Mikrozensus Mobilität und Verkehr 2010.<br>2. Limited activity in this market segment |
| 2 | Functional unit | Default values for lifetime activity HDV | 4 | 1. The factors of 15 and 18 are too low for representative bus vehicle lifetimes in the EU. ICCT research suggest representative vehicle lifetimes of buses in the EU to be 20-21 years, see appendix in Mulholland et al. (2022), The CO2 standards required for trucks and buses for Europe to meet its climate targets. ICCT, https://theicct.org/publication/hdv-co2standards-recs-mar22/<br>2. Similarly as for buses and coaches, is it reasonable that trucks only have one figure? Is there a big difference between long haul vs short haul that should be included? |
| 3 | Functional unit | Default values for lifetime activity in years | 22 | 1. For passenger cars, ICCT research suggests an average lifetime of at least 18 years. This is based on the average age of end-of-life vehicles in several countries: Germany<br>2. we do not think one value for trucks/busses is relevant, rather have different distances for different types of applications. unclear if the value should be average of a population or max. Also consider if different technologies have different lifetime (fuel cell, batteries etc)<br>3. lifetime of coaches and urban buses not coherent with previous question (x15 & x18) |

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| 4 | OEM fleet LCA | Recommended approach for passenger cars | 18 | 1. Cover all GHG emission species, not only CO2: For the life-cycle climate impact of vehicles it is particularly important to also cover the GWP of methane emissions. It is recommended to widen the scope to include all GHG species considered in the IPCC's most recent AR's, currently AR5.<br>2. WLTP consumption should be multiply by a coefficient 1.2 to reflect real life consumtion (EU com data). à OK with the rest of the approach<br>3. If the LCA relates to a secondary function in future market, it is necessary to have an apples to apple relationship between the products being compared. |
| 5 | OEM fleet LCA | Recommended approach for HDV | 7 | 1. Disagreement to the process described for passenger cars.<br>2. Market based approach is needed for energy carrier emission factors, losses in charging and refueling should as well be included, standby losses should as well be included<br>3. Same remark as Q4 for the mention of all LCIA impacts. |
| 6 | OEM fleet LCA | Recommended approach for two-wheelers | 5 | 1. Disagreement to the process described for passenger cars.<br>2. A similar rationale applies as with passenger cars.<br>3. Same remark as Q4 for the mention of all LCIA impacts. |
| 7 | Prospective LCA | Recommended approach | 4 | 1. For prospective LCA, the wording about second life declaration should be more clear<br>2. Is the MF of multiple functions really defined in the inventory? We could not find it… |
| 8 | Macro fleet LCA | Recommended approach | 8 | 1. Not a strong disagreement, but I do not see why it should be different from fleet LCA. Maybe just some clarification needed<br>2. SIBYL by Emisia, which appears to be the only software currently available that can perform fleet-based LCAs, already adopts the functional unit of "fleet operation over a year in a specific region.“ |

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| | | | | 3. The functional unit should be already defined in the recommended approach |
| 9 | Electricity modelling | Time period matching for electricity consumption processes | 4 | 1. Ok for production of vehicle but challenges to find data for a long period of time for use. Introduces too much uncertainties<br>2. Practitioners have no influence on reference year of secondary data |
| 10 | Electricity modelling | Electricity consumption modelling approach (production phase) | 8 | 1. Disagree with mixed method approach. Either you use the database, or you model the process based on primary data. But mixed methods is cherry picking. If you know that your provider is using PPA you should also be able to get some informationa bout the process.<br>2. If there is knowledge that suppliers are not using certificates then residuals should be used even in the mix methods approach<br>3. documented for 3rd party verification only! details are defined in T2.5 reporting |
| 11 | Electricity Modelling | Safeguards for the use of Energy Attribute Certificate (EAC) related to additionality for the product LCA production phase | 2 | 1. Maybe the scenario "Recent installations < 15 years" is somewhat ambitious. (no preference)<br>2. 15 is much too long for additionality. After 15y the investment is probably fully discounted already, that does not make sense. It's should be much less, say, 2 years unless a contractual agreement was signed before the start of operations (no preference) |

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| 12 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 7 | 1. 500km might be realistic for Europe, but it is likely that 500km is too low for China or North America<br>2. We prefer the first option. 500 km seems arbitrary and too short; for example in Sweden, a lot of the power generation (both old and new installations) is concentrated to northern parts but transferred and used in the southern parts,well beyond 500 km.<br>3. Option 1 because Option 2 may need further tracking/ monitoring requirements thus complicating modelling. Plus 500km distance appears arbitrary. |
| 13 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 6 | 1. Only those EAC with an hourly production/consumption time synchronization should be eligible to be considered.<br>2. Agree with the hierarchy, the hourly time step should be the ultimate goal to prevent greenwashing and have representative modelling.<br>3. In principle, location-based is always a yearly average. It is difficult to say when EACs will be able to be more granular than that |
| 14 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 1 | 1. Shall also comply with the Red III Directive i.e., mandatory disclosure of the Residual mix. No EAC should be allowed if they come from a region where the Residual mix is not tracked and disclosed. Otherwise, double accounting would occur. |
| 15 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 1 | 1. This seems like a very hypothetical scenario. |

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| 16 | Electricity modelling | Production phase electricity consumption modelling - Additional specifications for the market-based electricity modelling approach | 4 | 1. See previous comment, the hierarchy leads to potential double accounting and violates physical accounting principles. Only REC can be used that come from a region where a unique entity exists that tracks all certificates and calculates and dicloses the corresponding Residual mix. If no Residual is available, no REC shall be allowed from this region, and only the average mix can be used.<br>2. The entity which disclose, if non-European, shall follow equivalent rules than AIB |
| 17 | Electricity Modelling | Use phase electricity consumption modelling | 6 | 1. It is unavoidable that publically availible LCAs will be compared. This method introducuses so many sources of variation that the results will be much less robust. Our suggestion would be to have the static model as base, and the detailed model as scenario assessment.<br>2. Scenarios available in the LCA databases are taken as it is needed to have complete modelling available. Most official ones are STEPS scenarios.<br>3. We are concerned about a strict hierarchy regarding "prioritising data sources/the basis for the default conservative future electricity mix projection". For instance it should be possible to select option c. as long as it is transparent. |
| 18 | Electricity Modelling | On-site electricity production modelling for Product LCA | 5 | 1. Considering current, global manufacturing facilities, hourly allocation seems impossible. Yearly should be OK.<br>2. We do not model every machine in the production line specifically. This overhead is scope 3 emissions reporting and very difficult/inaccurate to establish assumptions on amortization on a vehicle basis. This is not necessary and has a minimal impact on product LCA level.<br>3. For the amount of electricity that is consumed during the production phase only the hourly timestep should be applied. |
| 19 | Electricity Modelling | On-site electricity production modelling for Product LCA | 7 | 1. If this can be considered for production - it needs to be considered also for the further life cycle stages<br>2. Inconsistent with proposal for production phase. |

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| | | | | 3. This sentence: "For such systems, part of the produced electricity can be consumed to charge the vehicle and part of it can be fed into the grid (excess of electricity production)“ |
| 20 | Electricity Modelling | Fleet level LCA | 2 | 1. Specific electricity for EOL<br>2. See comment for Q18: production assets are not regularly part of a vehicle product LCA. If we started with some wind turbines with minimal impact on overall results, we would have to include every robot on the production lines as well (not possible though). This is Scope 3 reporting territory. |
| 21 | Electricity Modelling | Fleet level LCA | 6 | 1. Considering current, global manufacturing facilities, hourly allocation seems impossible. Yearly should be OK.<br>2. Yes, but be sure that residual mix is applied for the fleet not considered as 'on-site electricity' production for use. With only hourly based conditions (yearly seems to be too wide).<br>3. This question should be split into two questions based on the interpretation of "fleet." The rule works for OEM fleets or specific fleets like rental car companies or car-sharing businesses. However, for country-level fleet studies, it would be better to default to the same rule as product LCA, excluding on-site electricity generation in the use phase. |
| 22 | Electricity Modelling | Prospective vehicle LCA | 4 | 1. Too uncertain. For prospective, use average grid mixes. Anyone can claim any future utopic PPA, it is totally open<br>2. Static electricity mix for the use phase should only be used if no scenario for the dynamic electric mix modelling is available. The argument of legal concerns should not apply for prospective LCAs |
| 23 | Electricity Modelling | Prospective vehicle LCA | 4 | 1. but with only hourly based conditions (yearly seems to be too wide). |

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| | | | | 2. On-site electricity must only apply to production phase, not the use phase. If need to apply to use-phase, explicit mention of the scope of its application (only vehicles under the influence of OEMs) during use phase must be made. |
| 24 | Multifunctionality | Enhanced hierarchy | 1 | 1. We still might prefer 1. subdivision, 2. allocation, 3. system expansion, 4. substitution |
| 25 | Multifunctionality | EoL | 5 | 1. The proposal is not comparable to the EU PEF method who will be mandatory for all products in the near future<br>2. The CFF calculation which is part of the PEF method should be applied, in anticipation that the traceability requirements attached to the new Due Diligence regulations makes this method more accurate for the calculation of the circular economy environmental benefits.<br>3. PEF CFF should be used as it is the European regulatory default methodology, and TS LCA is also EU-specific. |
| 26 | Multifunctionality | Prospective LCA recommendations | 3 | 1. Same as above<br>2. We agree with the proposed approach, please note that the first safeguard regarding substitution doesn't apply for prospective LCA…<br>3. PEF CFF should be used as the European regulatory default methodology, with TS LCA also being EU-specific. Any uncertainties with PEF CFF, such as A&B factors, may need updating with new data and guidance. It's also important to consider future scenarios for recycling and end-of-life stages to provide a balanced societal perspective. |
| 27 | Multifunctionality | Fleet Level LCA recommendations | 3 | 1. Same as above<br>2. Which calculation rule to apply for V2G substitution?<br>3. PEF CFF should be used as the European regulatory default methodology, with TS LCA also being EU-specific. Any uncertainties with PEF CFF, such as A&B factors, may need updating with new data and guidance. It's also |

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| | | | | important to consider future scenarios for recycling and end-of-life stages to provide a balanced societal perspective. |
| 28 | Data collection and type | (Energy consumption) subquestion 1: Realword emission factor | 5 | 1. No fundamental diagree, but it is unclear where the Option 1 values should come from. For sure not from the OEM themselves, since we know about their tendency to manipulate these values to their advantage. A neutral source is needed<br>2. If ICEVs or PHEVs running on e-fuels are considered to be covered, the list of WLTP-RW factors can be expended, see ICCT and European Commission reports mentioned in the comments to previous questions of this survey.<br>3. To be updated when new data will become available |
| 29 | Data collection and type | (Energy consumption) subquestion 2: Fuel cell degradation | 4 | 1. 52% efficiency seems low for FCEV for HD, we have approximately 58% in our calculations<br>2. Low TRL of FC technology may require to revise this approach<br>3. internal discussion needed on proposed values; furthermore under 1. "values need to be validated"- why? not prescribed/needed for BEV |
| 30 | Data collection and type | Non-exhaust emissions (hydrogen leakage) | 5 | 1. 0,5% for use in H2 ICE and FC; maybe we need to make a distinction between both technologies.<br>2. More recent data from literature (Sand et al., Warwick et al. 2023...) seem to specify ~12kgCO2eq/kgH2.<br>3. The recommendation should go further. The indirect impacts on Climate change from H2 should start to be reported when the IPCC releases a CF. |
| 31 | Data collection and type | Hydrogen supply modelling in the use phase | 2 | 1. We agree to the modelling principle, but we suggest that in coming work group discussions consider to add the possibility to use assumptions where hydrogen is produced with other techniques than electrolysis e.g. from biogas or steam reforming of natural gas with CCS ("blue" & "purple" H2). Bloomberg reports with forecast for blue & electrolysis produced hydrogen exist. |

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| | | | | 2. Thank you for the clear definitions |
| 32 | Data collection and type | Maintenance, wear and consumables | 2 | 1. Not sure it is relevant for some items like tires to base the number of replacements on maintenance manual. To be further discussed.<br>2. We agree with the proposed way for maintenance. Please note that cycle life AND calendar life should be taken into account for the traction battery. Please note, also, that hydrogen tanks should be added in the list in addition to FCEV stacks… |
| 33 | Data collection and type | Data Quality Rating (DQR) | 1 | 1. Agree to make it mandatory, however recommend adopting PEFs data quality rating. This is the method that will be required for batteries, adopting this would make it consistent across the board |
| 34 | Impact Category | CED | 7 | 1. No impact, Meaningless. Rather of interest for the OEM, so should be optional. If you want to account for efficiency, better account for land use, this is the main constraint in a renewable world, and also related with efficiency<br>2. Distinguish between low carbon energies and the others, as defined by the European Taxonomy (low carbon energies: < 100 g eq CO2 / kWh)<br>3. CED_renewable: weak or no link to an environmental problem. the environmental impact of extracting energy from the sun or wind, but acknowledges that renewable energy production has environmental burdens that are already covered by other impact categories |
| 35 | Impact Category | LCIA Method | 5 | 1. Indicators based on local impacts (e.g. acidification) are not as well developed and are thus less meaningful.<br>2. ok, but at the moment we apply CML method<br>3. Be careful of Biogenic Carbon : in EF3.0 & EF3.1 GWP is with biogenic carbon JRC recommends 0/0 or we might prefer like in CML method GWP biogenic Carbon is (-1/+1) |

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| 36 | Impact Category | Depletion and Dissipation | 5 | 1. All optional would be preferable.<br>2. More work is needed on deplection metrics and methodology before recommending including them. They are highly uncertain impact indicators.<br>3. We believe that ADP should be coupled with criticality which is currently optional. The two should be on the same level. |
| 37 | Impact Category | Cumulative H2 Emissions | 5 | 1. Not agreeing with giving a recommendation, even though we know, we should wait for the IPCC<br>2. Not yet taken into account in IPCC<br>3. Waiting for officially aligned impact assessment method and inclusion in secondary dataset |
| 38 | Impact Category | S-LCA Indicators | 4 | 1. Including SLCA metrics will increase workload and it is unclear if it will provide significant insights or improve decision making<br>2. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.).<br>3. S-LCA is difficult to apply to a Product level LCA. It makes more sense from a fleet-LCA perspective. How do you allocate the rate of accidents from a site to a specific product? Typically, the rate of accidents is related to hours of work, which are then much easier to relate to a specific product. |
| 39 | Impact Category | S-LCA Indicators | 4 | 1. No relyable data available<br>2. Should come with Recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.).<br>3. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional |

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| | | | | (large) effort might hamper a complete, consistent and comparable assessment over all sectors. |
| 40 | Impact Category | S-LCA Indicators | 3 | 1. Data availability vs additional value<br>2. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.).<br>3. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. |
| 41 | Impact Category | S-LCA Indicators | 4 | 1. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.). (agree)<br>2. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. (agree)<br>3. How would you aggregate the different risk levels along the value chain? If one step is associated with high risk but the next is low risk, what would be your overall risk? This question is relevant to all the Social-LCA indicators. (no preference) |
| 42 | Impact Category | Subject : S-LCA Indicators | 5 | 1. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.). |

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| | | | | 2. We agree, that it is a relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors.<br>3. Please be more clear regarding the origin of indicator/rating: from which organisation? |
| 43 | Impact Category | Subject : S-LCA Indicators | 2 | 1. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.).<br>2. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. |
| 44 | Impact Category | Subject : S-LCA Indicators | 3 | 1. Value added?<br>2. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.).<br>3. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. |
| 45 | Impact Category | Subject : S-LCA Indicators | 5 | 1. I ticked no preference in most due to lack of experience in slca, but this one sound weird. Why should a high living cost be a high risk? It should at least be put in relation with the minimum wage, otherwise it seems not meaningful |

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| | | | | 2. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.).<br>3. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. |
| 46 | Recommended S-LCIA Indicators | Weekly hours of work per employee | 3 | 1. Value added<br>2. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.). (agree)<br>3. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus, it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. (agree) |
| 47 | Recommended S-LCIA Indicators | Social security expenditures | 3 | 1. Value added<br>2. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.). (agree)<br>3. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. (agree) |

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| 48 | Recommended S-LCIA Indicators | Overall country sector risk forced labour | 5 | 1. Again, just wondering whether the sLCA should be done site-specific (then this does not seem to make sense) or sector specific, as provided in the typical background databases (but then, other indicators such as the presence of indigenous people does not make sense)<br>2. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.).<br>3. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. |
| 49 | Recommended S-LCIA Indicators | Forced labour risk | 3 | 1. Relevance? sLCA not method of choice<br>2. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.). (agree)<br>3. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors. (agree) |
| 50 | Recommended S-LCIA Indicators | Presence of indigenous population | 5 | 1. See previous comment. If on sector and country level, does not make sense. Just the fact that indigenous people exist in a country seems a weak evidence. But again, I am not an expert practitioner in slca<br>2. Relevance sLCA maybe not right methode<br>3. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.). |

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| 51 | Recommended S-LCIA Indicators | Corruption Perception Index (CPI) | 5 | 1. Should come with recommendations on the use of available databases/methodologies and/or how to collect LCI information (data collection, weighting factors, etc.).<br>2. Relevant assessment of social impacts. However, we expect that data on these impacts are not readily available (yet) for all processes in the supply chain. Thus it might command additional efforts in data gathering. This additional (large) effort might hamper a complete, consistent and comparable assessment over all sectors.<br>3. S-LCA general comments: Why no indicator on diversity and inclusion, the development of knowledge and skills of employees and local communities or on local development, which are important axes in social/societal matters? |
| 52 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | 7 | 1. It should be recommended but not mandatory<br>2. Should it be possible to choose which one the practitioner/user prefers?<br>3. Answer considers a mandatory sensitivity analysis on the future mix. |
| 53 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | 9 | 1. It should be recommended but not mandatory<br>2. With sufficient documentation on the future electricity/H2 mix scenario used for the use phase.<br>3. Answer considers a mandatory sensitivity analysis on the future mix |
| 54 | Mandatory analysis of parameters | Future mix: use phase electricity/H2 mix | 5 | 1. With sufficient documentation on the future electricity/H2 mix scenario used for the use phase.<br>2. Okay for recommended analysis; note: free dataset of IEA does not contain detailed information for each energy source on country level (only most important on regional level). Data need to be purchased for full details.<br>3. This should be recommended only. Method ok but not mandatory. |

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| 55 | Mandatory analysis of parameters | Usage: consumption | 5 | 1. Not a hot spot or too complex Could be good to clarify which should be the default<br>2. With sufficient documentation and justification. |
| 56 | Mandatory analysis of parameters | Usage: consumption | 6 | 1. With sufficient documentation and justification<br>2. Ambient temp can also be part of this guideline<br>3. Requires harmonisation with question 17 (Use phase electricity consumption modelling) |
| 57 | Mandatory analysis of parameters | Usage: vehicle lifetime | 6 | 1. Theoretically agree, but in sum this seems too much mandatory additional analyses to me, makes the approach difficult to apply and unappealing<br>2. With sufficient documentation and justification<br>3. Should not be mandatory |
| 58 | Mandatory analysis of parameters | Usage: vehicle lifetime | 6 | 1. The life length is not a fix number but a function of how the HDV is being used and this must be accounted for. A longer life cannot have the same consumption throughout the life, for example. There is a need for smart combinations and guidance to this for HDV<br>2. With sufficient documentation and justification.<br>3. Shouldn't be mandatory |
| 59 | Mandatory analysis of parameters | Usage: Variation of energy mix consumption | 5 | 1. Theoretically agree, but in sum this seems too much mandatory additional analyses to me, makes the approach difficult to apply and unappealing<br>2. With sufficient documentation and justification<br>3. The scope of the study specifies the region. Scenarios can be recommended but not mandatory |
| 60 | Mandatory analysis of parameters | Usage: Variation of energy mix consumption | 8 | 1. Theoretically agree, but in sum this seems too much mandatory additional analyses to me, makes the approach difficult to apply and unappealing |

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| | | | | 2. Would it make sense to combine this with the scenario analysis of future electricity supply?<br>3. The scope of the study specifies the region. Scenarios can be recommended but not mandatory |
| 61 | Mandatory analysis of parameters | Quantity value (for hotspots) | 7 | 1. Too complex to be put in place<br>2. This question is not super clear. I had to reread it multiple times to see that it was different to Q63.<br>3. Already very high accuracy in LCI due to vehicle specific BOM and foreground data makes sensitivity irrelevant. Sensitivity for background datasets is too time consuming. |
| 62 | Mandatory analysis of parameters | Quantity value (for hotspots) | 8 | 1. Not a hot spot or too complex<br>2. General comments on Mandatory parameters analysis: A lot of analysis to be performed by OEMs!<br>3. OEMs know the quantities based on the BOM. Maintenance is already included. |
| 63 | Recommended analysis of parameters | Choice of secondary data | 8 | 1. The sensisitivity analysis for the selection of secondary datasets introduce the idea that a choice is possible. On the contrary, the guidance should clarify that the datatsets the more representative has to be selected.<br>2. Not a hot spot or too complex<br>3. Sensitivity for background datasets is too time consuming. |
| 64 | Recommended analysis of parameters | Choice of secondary data | 4 | 1. The sensisitivity analysis for the selection of secondary datasets introduce the idea that a choice is possible. On the contrary, the guidance should clarify that the datatsets the more representative has to be selected.<br>2. with sufficient documentation and justification. |

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| 65 | Recommended analysis of parameters | Location of the value chain: electricity mix | 7 | 1. Not a hot spot or too complex<br>2. Scenario analysis for location of supply chain is not relevant since we always try to represent the actual supply chain set up and geography. Improvements will always be done but is not linked to a single LCA. A vehicle LCA of a vehicle produced at another production unit in another region (ex China) is a completely other LCA and not a scenario/sensitivity.<br>3. There are many scenarios already to be done mandatory. Not wise in our opinion to have too many mandatory and recommended scenarios. |
| 66 | Recommended analysis of parameters | Location of the value chain: electricity mix | 6 | 1. Not a hot spot or too complex<br>2. With sufficient documentation and justification.<br>3. Why only have the electricity grid mix reflect the geographical variance? It would be better to give guidance on how to choose alternative datasets that represent production in another region as well, changing the electricity mix used can be a backup. If you have Europe as the baseline, you can often just pick the "same" dataset but for another region such as Asia or Global. Then there will be more relevant parameters that has changed rather than only electricity grid mix. It is also possible even with black box datasets and feasible in both ecoinvent and GaBi (with very few exceptions). |
| 67 | Recommended analysis of parameters | Supply chain improvements: recycled vs. primary materials | 6 | 1. Is it really about how the use of primary or secondary materials can improve the process? I'm not sure this is part of TSLCA rules. If it's about improving the impact, please mention this clearly in the question.<br>2. Don't see any added value. This is part of a company's analysis of potential decarbonisation actions and not linked to a single LCA.<br>3. I agree with the concept to test secondary material shared but not with the wording. Process improvements of recycling or production? Or both? Is really always a process improvement necessary to allow more secondary material? |

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| 68 | Recommended analysis of parameters | Supply chain improvements: recycled vs. primary materials | 7 | 1. The practitioner should take into account the feasibility of higher recycling content when defining the scenario (e.g. recycled content availability and material properties)--for example a 100% recycled aluminum scenario could be calculated, but not actually feasible in practice<br>2. It is also important that they follow the MF guidelines when considering recycled material<br>3. 0% is not always a reasonable lower value - e.g. for batteries there will be mandatory secondary material shares soon for some materials. Lower value should be based on regulatory targets; Can we integrate somehow in the concept that it is important to evaluate that the material is additionally recycled (not taken from another sector) and that realistic supply is considered? |
| 69 | Recommended analysis of parameters | Usage: maintenance & wearing | 7 | 1. Not a hot spot or too complex<br>2. Very more complex for HD, we suggest to focus on important components such as batteries, tires, electric and fuel cell drivelines components<br>3. Maintenance already mandatorily included |
| 70 | Recommended analysis of parameters | Usage: maintenance & wearing | 8 | 1. Not a hot spot or too complex<br>2. Very more complex for HD, we suggest to focus on important components such as batteries, tires, electric and fuel cell drivelines components<br>3. The impact should be small while the number of maintenance parts are large with sufficient documentation and justification. |
| 71 | Recommended analysis of parameters | Usage: payload/number of passengers | 6 | 1. Not a hot spot or too complex (x2)<br>2. This does not improve the information quality: It's only adding an (arbitrary) denominator.<br>3. Usage of vehicle not relevant for technology of vehicle |

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| 72 | Recommended analysis of parameters | Usage: payload/number of passengers | 8 | 1. Not a hot spot or too complex (x2)<br>2. FU should be independant of usage behaviour |
| 73 | Recommended analysis of parameters | Usage: temperature | 9 | 1. Not a hot spot or too complex (x2)<br>2. Mandatory “Disagree” comment] Too complex to build a "temperature weighted" driving profile; the corresponding vehicle efficiency at different temperatures are not readily accessible<br>3. This can be challenging due to data availability. |
| 74 | Recommended analysis of parameters | Usage: temperature | 9 | 1. Too complex to implement and not a hotspot<br>2. Temperature is not the only parameter that impacts the energy consumption. Enough with one sensitivity analysis for energy consumption<br>3. Not a hot spot or too complex |
| 75 | Recommended analysis of parameters | Future mix: EoL electricity/fuel mix | 5 | 1. Very limited impact |
| 76 | Recommended analysis of parameters | Future mix: EoL electricity/fuel mix | 5 | None |
| 77 | Recommended analysis of parameters | Second use (split between vehicle and battery?) | 6 | 1. Not a hot spot or too complex<br>2. What is second use of a car? On which components do you want to have this be done? On the battery, the engine, the gearbox, the wheels? All these may have a a second use. Yes, there is some hype around this for batteries, but it should be consistent. So maybe better keep it out altogether<br>3. This should be optional and not a recommendation. Making this a recommendation assumes the viability of second use applications. Including battery |

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| | | | | second use in vehicle LCA will introduce unintended issues and complexities. For example, functional unit has to be revised (EV lifetime + 2nd use), extended system boundary or allocation needed, any impact credits of secondary battery will conflict with the cut-off approach, and so on. |
| 78 | Recommended analysis of parameters | Second use (split between vehicle and battery?) | 8 | 1. Not a hot spot or too complex<br>2. Including battery second use in vehicle LCA will introduce unintended issues and complexities. For example, functional unit has to be revised (EV lifetime + 2nd use), extended system boundary or allocation needed, any impact credits of secondary battery will conflict with the cut-off approach, and so on.<br>3. See previous (What is second use of a car? On which components do you want to have this be done? On the battery, the engine, the gearbox, the wheels? All these may have a asecond use. Yes, there is some hype around this for batteries, but it should be consistent. So maybe better keep it out altogether). What about second use of other components? Also, what is the underlying threshold to be used for the SoH? |
| 79 | Recommended S-LCA interpretation parameters | Quantity value (for hotspots) | None | None |
| 80 | Recommended S-LCA interpretation parameters | Geographical variation of the value chain | 2 | 1. Not a hot spot or too complex |
| 81 | Recommended S-LCA interpretation parameters | choice of the activity variable | None | None |

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| 82 | Recommended S-LCA interpretation parameters | assumptions on data | 1 | 1. Not clear what "data assumptions" means in this context. |
| 83 | Recommended S-LCA interpretation parameters | price related to process or materials | 2 | 1. This analysis may never be published for confidentiality reasons<br>2. The cost data will be very difficult to compile and likely will be propriety |
| 84 | Recommended S-LCA interpretation parameters | geographical variation of the energy consumed | None | 1. None |
| 85 | Recommended S-LCA interpretation parameters | quantity of energy consumed during the use phase | 2 | 1. This is redundant--energy consumption is already captured in environmental LCA. A different metric is need if trying to account for energy cost to the user.<br>2. -Just as eLCA (no preference) |
| 86 | Integration in product development process | / | 1 | 1. While we don't disagree with this, we don't see why it needs to be included in an LCA methodology. In the end, companies will use the outcomes of prospective and retrospective LCAs in whatever way they see fit. (no preference) |
| 87 | Reporting | TSLCA adherence levels for product LCA | 3 | 1. We agree with the two levels of adherence. It should be specified in the final version of the methodology how to calculate the %.<br>2. Agree with the proposal but have an issue with the specific wording of this sentence: "Requirements with choices -> choice needs to be transparent and justified and documented when asked". Why "when asked"? It shall always be at least documented in the full LCA report so that the reviewer can understand the choices.<br>3. A verification process is missing, without reporting there is no record or proof of the correct or full use of the TSLCA methodology |

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|---|---|---|---|---|
| 88 | Reporting | TSLCA partial adherence for product LCA | 6 | 1. There is a large risk that the differences will to large and then no comparable results.<br>2. I do not see a reasonable / feasible way of seeing the thresholds.<br>3. T% is not really useful here. It's more like "performing at least one IC according to TSLCA, without additional sens. analysis", e.g. |
| 89 | Reporting | 3rd party verification if level 3 Product LCA (TSLCA will provide a check-list in D5.2) | 5 | 1. This goes beyond LCA method as such.<br>2. The car is a collection of more than 1000 components, and if it is intended to be open to public assuming inter-product comparisons, it should be recognized that Lv3 hotspot components have the following challenges: When calculating hot spot components with primary data, it is difficult to compare them truly with third party certification if there is no PCR on the components<br>3. A publication of an LCA requires 3rd party verification (if ISO14040/44 is to be followed), regardless of UNECE level. |
| 90 | Reporting | Public reporting content for Produc LCA: Minimum info (Goal and scope) | 9 | 1. For "Material Breakdown in % according to VDA material classes", isn't it more appropriate to have it in the Life Cycle Inventory?<br>2. Not all these points/issues are needed in order to have a transparent study<br>3. The car is a collection of more than 1000 components, and if it is intended to be open to public assuming inter-product comparisons, it should be recognized that Lv3 hotspot components have the following challenges: When calculating hot spot components with primary data, it is difficult to compare them truly with third party certification if there is no PCR on the components |
| 91 | Reporting | Public reporting content for Produc LCA: Minimum info (LCI) | 11 | 1. Include as well what type of sensitivity analysis? Clarify<br>2. List should be revisited based on voting results (mandatory aspects).<br>3. TSLCA deviations |

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|---|---|---|---|---|
| 92 | Reporting | Public reporting content for Produc LCA: Minimum info (LCIA) | 3 | 1. The car is a collection of more than 1000 components, and if it is intended to be open to public assuming inter-product comparisons, it should be recognized that Lv3 hotspot components have the following challenges: When calculating hot spot components with primary data, it is difficult to compare them truly with third party certification if there is no PCR on the components |
| 93 | Reporting | Public reporting content for Produc LCA: Minimum info (Interpretation) | 6 | 1. Some examples to facilitate going from guide to an actual report.<br>2. What does this MC-table refer to? Also mandatory requirements?<br>3. Should we have comparisons with other studies as optional? |
| 94 | Reporting | TSLCA adherence for other type of LCAs | 1 | 1. Generally agree, could this also be used for specific products LCA's outside of Europe? |
| 95 | Reporting | S-LCA | None | None |

### II.3.3 Prioritization and discussion of feedback

The third round voting results were presented to the Advisory Boards on 17 October 2024, with key questions highlighted to clarify feedback, address consensus gaps (compared to beneficiaries' votes), and gather insights. The full presentation (Annex *241017_Voting3_results_ABs incl. comments*), including all questions and outcomes, was shared post-meeting. As in previous rounds, questions without qualified majority approval were resolved in Chapter II.3.2; this chapter (s. Table 13) focuses exclusively on those with additional Advisory Board comments. Questions with notable "no votes" or "no preference" responses were also emphasized during discussions and are documented in the presentation (*241017_Voting3_results_ABs incl. comments)*.

**Table 13.** Third voting: Focus questions with comments from Advisory Board workshop

| # Question | Topic | Subtopic | Comments during Advisory Board Workshop |
|---|---|---|---|
| 3 | Functional unit | Default values for lifetime activity in years | - value for motorbikes is 25yrs but LDVs is much lower, motorbikes are based on statistical data; suggestion to form an extra small working group to do another sensitivity analysis<br>- full lifetime also includes other regions (also outside of Europe); statistical evidence needed; important for dynamic modelling of use phase; important to showcase the advantage of BEVs over other powertrains<br>- data needs to be reliable and keep in mind it needs to be practical<br>- there is plenty available and reliable data<br>- lifespan in years of secondary importance, lifetime km are more important |
| Additional Q1 | General remarks | Reason for not answering some questions | - S-LCA is not mature enough yet, Commission might be thinking that this should be adapted<br>- should be made clear that maturity is low<br>- you do not have to perform an sLCA alongside an eLCA, wait for road testing results<br>- include in the guideline that there were many no preference votes to make people understand that it is not mature<br>- we need to start with a pragmatic approach<br>- more research is necessary, makes this clear<br>- make sure that the industry side is being heard and that this might not be industry pragmatic |

# Appendix

**Voting 1:**

- 240114_First Voting Exploitation_TSLCA (Excel File)
- 231214_TranSensus LCA_AB_Meeting_Introduction voting process (PDF)
- 240130_TranSensus LCA_WP3_GA_Darmstadt (PDF)
- 240208_First voting results AB meeting (PDF)
- 240209_First voting results AB -with comments (PDF)

**Voting 2:**

- 240425_Second Voting Exploitation_TSLCA (Excel)
- 240524_Second voting results AB meeting (PDF)
- 240430_Second voting results AB -with comments (PDF)

**Voting 3:**

- 240425_Third Voting Exploitation_TSLCA (Excel)
- 241017_Voting3_results_Abs (PDF)
- 241017_Voting3_results_ABs incl. comments (PDF)