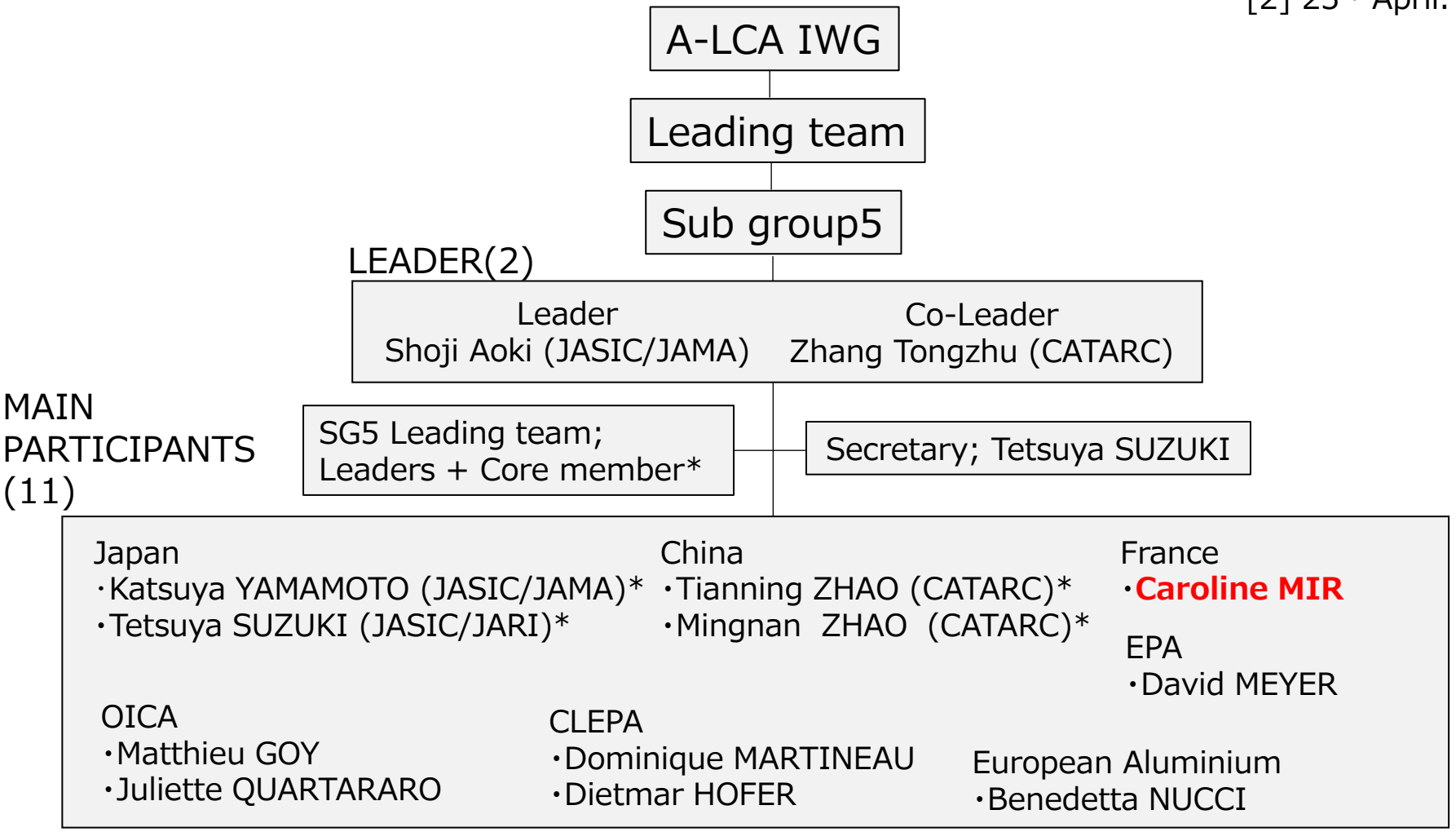
# GRPE A-LCA IWG
# SG5(EoL) Meeting 010

23rd April 2024

GRPE A-LCA IWG SG5
Leader ; Shoji Aoki (JASIC/JAMA),
Co leader; Zhang Tongzhu (CATARC)

# 1. Organization -Organization Chart-

[2] 23rd April. '24




**Caroline MIR**
Ingénieure Environnemental
Service Transports et Mobilités
www.ademe.fr

# Agenda

1. SG5 009 minutes & 010 agenda confirmation
2. GRPE A-LCA IWG 15th session flash report
3. EoL LCA discussion
   1) Other controversial topics discussion
      - EoL secondary data availability investigation in EU
      - ELV management out of sale region
   2) Material/Parts recycling modeling discussion
      - Each CPs and NGOs position
      - Module D study interim report
      - CFF or RCM application condition
4. Next action

# Minutes of GRPE A-LCA IWG SG5 meeting #9

Date and time : Tuesday, March 26, 2024, 12:00–19:40 (CET)
Location : Online (Teams)
Attendees : See attendee list

Agenda:

1. SG5 008 minutes & 009 agenda confirmation
2. EoL LCA discussion
   1) Material/Parts recycling modeling discussion
      - Each CPs and NGOs position
      - OICA CFF/RCM Pros/Cons study
      - CFF or RCM application condition
   2) Other controversial topics discussion including EoL process modeling harmonization
3. Next action

Notes:

**1. SG5 008 minutes & 009 agenda confirmation**

- The minutes and agenda were approved unanimously.

**2. EoL LCA discussion**

**1) Material/Parts recycling modeling discussion**

- Each CPs and NGOs position
- OICA CFF/RCM Pros/Cons study

- OICA, the only participant that had not reached a conclusion, was again unable to provide a conclusion. The main questions and answers, and comments were as follows:
  - Goy (OICA): OICA does not require a majority vote, but rather unanimity. Since some are in favor of the cutoff and others are in favor of the CFF, no consensus can be reached. Therefore, it is not possible to take a unified position. The only thing we can do is to present a table of pros and cons.

- Aoki (JP/JASIC): This table would be helpful to all participants. I understand that it is difficult for OICA to reach a unified opinion. Can you finalize your position at next month's meeting?
- Goy (OICA): Since ACEA has declared its favor of the cut-off, it will not be possible unless JAMA supports it. Since JAMA and ACEA are clearly divided in their positions, we believe that the modular method of EPD is an excellent compromise.
- Aoki (JP/JASIC): I will have a small meeting next Friday with members familiar with the EPD modular method. I will be able to present the discussion results at the next SG5 meeting.

**- CFF or RCM application condition**

- Mr. Aoki presented two drafts of Option 1 (flowchart) and Option 2 (bulleted text) on how to present the conditions for the application of the recycling models. Overall, Option 2 was preferred. The texts will be refined for further discussion. The main questions and answers, and comments were as follows:
  - Martineau (CLEPA): We should at least clarify here what a functional unit is. Is it the whole vehicle? Or the material? Without defining the functional unit, I don't think we can give a schematic like the modular method of the EPD. If the modules can be separated, then the RCM can be applied until the vehicle is disposed of, and then the specific module can be applied when the vehicle is disposed of.
  - Nucci (European Alminium): Option 2 is better. Because I think it is clearer and covers a variety of cases where companies can decide whether to apply RCM or CFF based on the purpose of the study and the availability of data. This does not mean that European Aluminum favors both methods, only that CFF is still better.
  - Hofer (CLEPA): In the first bullet point, please delete "parts"; CFF and RCM should only apply to the evaluation of materials, not parts.
  - Aoki (JP/JASIC): However, some are very interested in applying CFF to traction batteries.
  - Hofer (CLEPA): The European Battery Regulation does not necessarily cover the whole battery. Only certain cathode active substances and battery materials are addressed, and they are well specified.

- Nucci (European Alminium): CFF is a modeling method for products. Therefore, it can be applied to any type of product. Calculations will give different values for different materials. However, this does not mean that it cannot be applied to products.
- Hofer (CLEPA): We can only apply CFF to specified materials. We are talking about 10,000 materials in a single car. And if we tried to apply CFF in a precise LCA equivalent to level 4, it would take thousands of years of modeling. This is because CFF ultimately has to be calculated on a material-by-material basis.
- Nucci (European Alminium): I did not invent CFF. I just stated what the EF Recommendation says: CFF can be applied at the product level. And when you calculate it, you have to choose specific parameters for specific materials. There are ways to simplify complex products. For example, for a very complex component, you could apply CFF at the component level and define the A parameters and R1 and R2 at that component level.
- Goy (OICA): CFF is complex. Such complexity has not been applied to a long-life product like a car. So, it is not a perfect solution. It makes a lot of assumptions for a complex formula, which means it is far from reality.
- Meyer (US/EPA): In LCA, it is important to allow some flexibility and allow the practitioner to make the best decisions, considering the study's goals and objectives. Our problem now is that there are several different ways to analyze a vehicle or fleet of vehicles. They are all different questions and can give different results. So, we are trying to figure out how to make sure that we don't lose the flexibility of covering a wide range of questions when doing an LCA on vehicles.
- Martineau (CLEPA): Bullet points are better than a flowchart. However, we need to take into account what we discussed about EPD.

**2) Other controversial topics discussion including EoL process modeling harmonization**

**[Three items to be concluded]**

<1 Boundary conditions>

- OICA, JRC, EPA, and CLEPA finally agreed to Option 1 (Agree). This means that all participants in SG5 agreed to Option 1.

<3. Second life parts>

- JRC agreed to Option 1 (Include). Thus, all participants who had expressed their position so far chose Option 1, except the EU Aluminium, which was neutral. The position of France, which was absent today, was not yet known.

<4. Logistics>

- Since France, the only country without expressing its position, was absent, this topic was omitted.

**[Three items to be discussed]**

< 2. Secondary data>

- Dr. Zhang explained the tables of secondary data of EoL and CFF parameters in China that CATARC had studied.
- Mr. Aoki asked the other participants to fill in the data in the designated Excel format, just as CATARC had done.

<5. ELV management out of sale region

- Japan supported Option 1, while the other participants generally supported Option 3. The positions of each participant were as follows:
  - Patrone (EU/JRC): I favored Option 3. Because the EU has a traceability system for ELV.
  - Nucci (European Aluminum): In principle, I agree with JRC that we should model the process as it happens in reality. However, I believe that it is currently impossible to know in which country the exported vehicle has been processed, even in Europe. Even if an identification number existed, it would be lost when it left Europe. So, I think Option 1 or Option 2 would be better, but I don't know which is better.
  - Hofer (CLEPA): It depends on who is responsible for recycling. It also depends on the local regulations. So, CLEPA is neutral.

- Goy (OICA): Option 3 clearly reflects the most reality. However, it is less feasible than Options 2 and 1. I will discuss this within OICA.
- Meyer (US/EPA): Based on statistics on disposal in each country, a global average can be calculated for Option 2. But Option 3 is better, if anything. We want to estimate the real world as much as possible.
- Zhang (CATARC): I favored Option 3.

<6. Recycle process>

- European Aluminium, JRC, and OICA favored Option 1 (Current).

**4. Next action**

- The next SG5 meeting will be held online on Tuesday, April 23, from 12:00 to 14:00 CET.

Appendix 1: Attendee list

# Agenda

1. SG5 009 minutes & 010 agenda confirmation
2. GRPE A-LCA IWG 15th session flash report
3. EoL LCA discussion
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# GRPE A-LCA IWG
# SG5(EoL) status report

Shoji Aoki (Japan)
Zhang Tongzhu (China)

15th A-LCA IWG meeting
18th,19th April 2024

# Agenda

1. LCA Timing Discussion for SG4, SG5, and SG6
2. EoL controversial topics
    - Recycling modeling
    - System boundary
    - Secondary data set
3. Schedule

# A-LCA IWG Meeting
# LCA Timing Discussion for SG4, SG5, and SG6

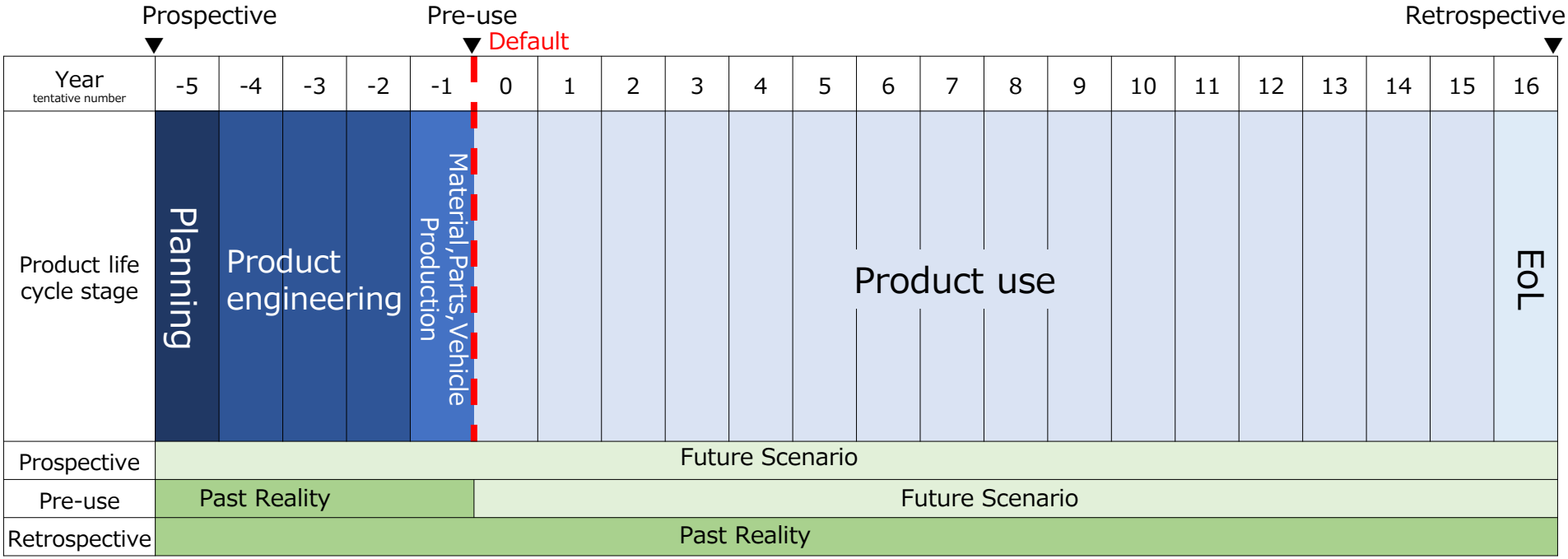
Shoji Aoki (Japan)
Katsuya Yamamoto(Japan)

Thu 7th Mar. 2024

# Discussion on timing of LCA implementation in A-LCA

■ Considerations for LCA Implementation Timing

- For automobiles with long product life, there is little need for Retrospective LCA.
- The LCA results in the pre-use stage are equivalent to the environmental performance evaluation at the time of purchase ,which is expected to be utilized for consumer purchasing decisions and environmental policies.
- Primary objective of A-LCA ToR is a harmonization of methodology to promote carbon neutrality ,so that A-LCA policy does not define specific use cases.
- Based on this policy,both Prospective and Retrospective LCA cannot be excluded.




Draft of proposal

- In principle, all three timings are within the scope of A-LCA IWG.
- However, pre-use is given default, considering the most representative use cases, until 2025 of A-LCA IWG goal period.

# Meeting minutes

■ Date: Thursday, 7th March 2024

■ Participants

SG4: TRIPATHY Samarendra (OICA), DI PIERRO Giuseppe (JRC)
SG5: AOKI, SHOJI (Japan), YAMAMOTO, KATSUYA (Japan), Tongzhu ZHANG (China)
SG6: Romain Denayer (EVB/AVERE), N. Kawaharada (Japan)

■ Agenda

1. Recap of 14th A-LCA IWG
2. Discussion on timing of LCA implementation in A-LCA

■ Conclusion

It was agreed to make the following statement with one voice

- In principle, all three timings are within the scope of A-LCA IWG.
- However, pre-use is given default, considering the most representative use cases, until 2025, which is the goal period of A-LCA IWG.

■ Remarks from participants

- It was proposed to set pre-use timing as the default option. After our proposal, we need to check for feedback from other SGs (AOKI, SHOJI).
- It is considered the best scenario when considering the IWG (DI PIERRO Giuseppe).
- When we say primary data, it does not necessarily mean primary data. We are planning to use certification. I fully agree with this proposal (TRIPATHY Samarendra).
- I have no feedback today. Maybe I will create a visualization and present it at next SG5 meeting, as I have some thoughts (Tongzhu ZHANG).
- I made a presentation about this timing in the SG6 meeting and assume SG6 would accept this default timing with no major issues (N. Kawaharada).
- In subgroup 6, we are still waiting to see how other subgroups are approaching this, as we understand that some other subgroups are further behind in these discussions. We value the input from the other subgroups (Romain Denayer).

# SG5 Controversial topics list

Reporting item

Summary of the latest status

| Topic | Option | | | Status |
|---|---|---|---|---|
| 0.Material/Parts recycling modeling | Recycled content method (Cutoff) | Closed Loop Approximation Method (CLAM) | Circular Footprint Formula (CFF) | Under discussion |
| 1.Boundary conditions | | | | Agreed to common boundary |
| 2.Secondary data | Global harmonised | Region by region | Country by Country | Under study data availability |
| 3.Second life parts | Include | Exclude | - | Agreed to include with a condition of traceability |
| 4.Logistics | Include | Exclude | - | Under discussion |
| 5.ELV management out of sale region | Take into account process of country of sale | Take into account global average | Take into account process of country of EoL | Under discussion |
| 6.Recycle process | Current process | Future process | - | Agreed to apply current process |

# Material/Parts recycling modeling
# Internal discussion summary of Cutoff and CFF

- US(EPA) position updated, “Both Cutoff and CFF method are preferable”.
- SG5 leading team are expecting OICA to bring their position in coming SG5 meeting and can support OICA if necessary.

| | | Result | Remarks |
|---|---|---|---|
| Leading Team | China (CATARC) | ・Both Cutoff and CFF methods should be included in the standard | ① CFF method： for the purpose of comparing different technical route without considering responsibilities ;<br>② CUT-OFF method：for the purpose of comparing different individual products with same technical route。<br>・Detailed boundary and principle of these two methods presemted in SG5 006 |
| | Japan (JASIC) | ・Support CATARC proposal | ・Specific use case description on Cutoff or CFF to be discussed respecting ToR of A-LCA |
| Main Participants | France | ・Both Cutoff and CFF methods could be acceptable, CFF is favorable | ・No strong position. A final official position will be taken at the next SG5 meeting. |
| | US(EPA) | ・Both Cutoff and CFF methods are preferable | |
| | OICA | ・OICA sees the potential of the CATARC proposal. However, it is needed to wait for CLEPA to present their proposal too, and to get more detailed information on the CATARC proposal.<br>・Secondly, To request of a clear definition/condition when to use which method | |
| | CLEPA | ・Cradle-to-Gate, step 1 (level 3&4 ‚reporting‘): Support Cutoff<br>・Cradle-to-Grave, step 2 (level 1&2 ‚technology comparison‘): Support CFF for selected parts and associated Materials | |
| | European Aluminum | ・Only CFF, need to study Scenario, but having both methodologies in A-LCA could be acceptable | |
| Observers | JRC | ・CFF approach is favorable. Considering both methodologies in the discussion according to the scope could be acceptable | European Commission Recommendation (EU) 2021/2279 on the use of the environmental footprint methods to measure and communicate the life cycle environmental performance of products and organisations, in which Annex 1 e 2 refer to PEF (Product Environmental Footprint) while Annex 3 e 4 to OEF (Organisation Environmental Footprint). |

# Material/Parts recycling modeling

## CFF or RCM(Cutoff) application guideline (Draft)

1. Circular Footprint Formula (CFF) or Recycled Content Method (RCM) should be applied to the evaluation of material/parts recycling.
2. In cases where it is difficult to obtain appropriate data to set CFF parameters, Recycled Content Method (RCM) should be applied with the effort to develop CFF parameter
3. LCA owner should decide CFF or RCM application based on Use case taking Pros/Cons of each methodology into account.

Main remarks

CLEPA
- Clarify the definition of a functional unit

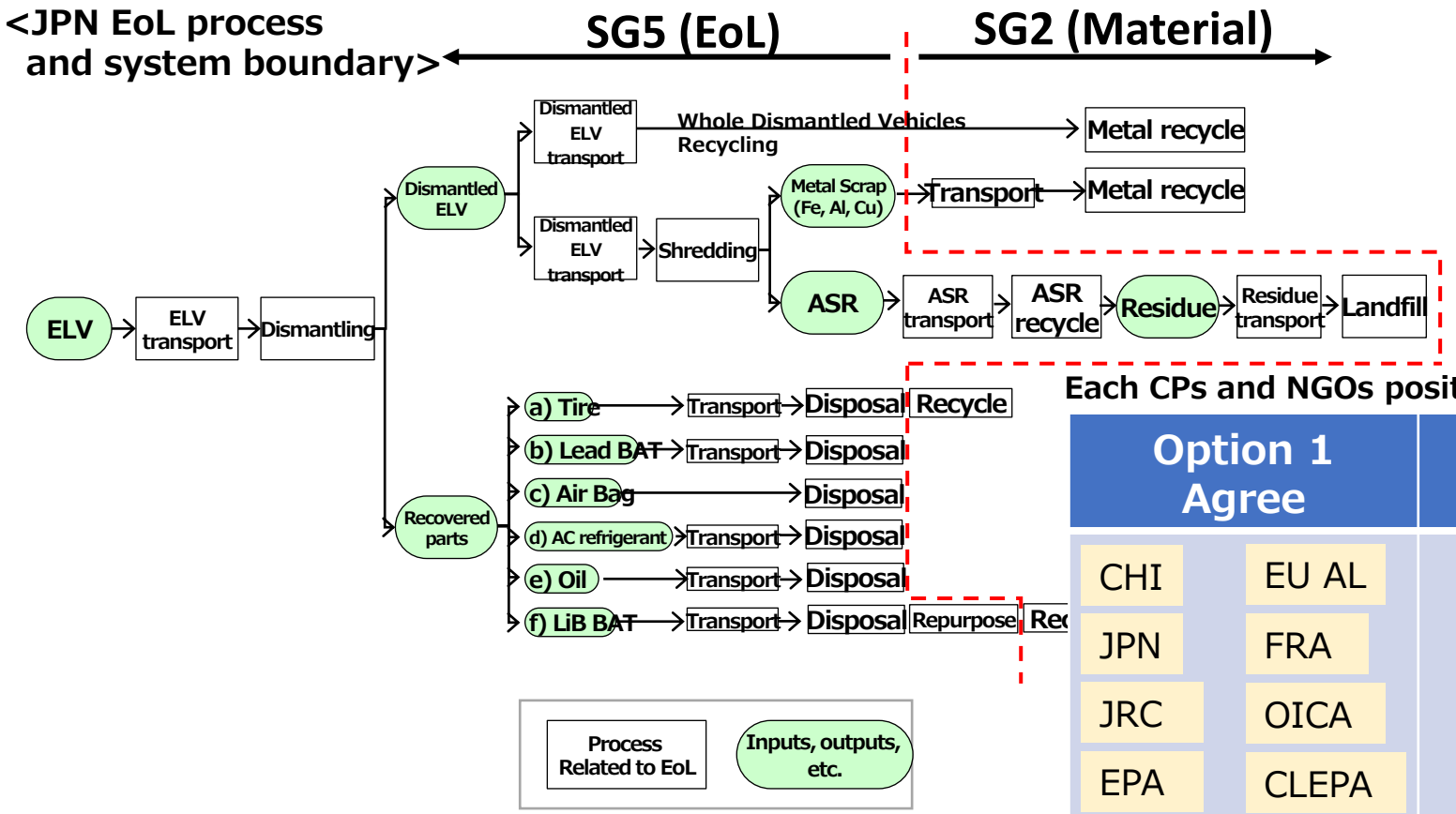
European Aluminium
- Supports draft, allowing companies to choose RCM or CFF based on study purpose and data availability.

CLEPA
- we need to take into account what we discussed about EPD.
- We can only apply CFF to specified materials.

US
- Flexibility in LCA is crucial for making informed decisions.

# Boundary conditions

1) From ELV transport to Disposal (e.g. Incineration or Landfill)
2) Material recycling
   -SG5(EoL) ; to Scrap generation
   -SG2(Material) ; From Material recycling
3) Parts reuse/repurpose
   -SG5(EoL) ; to reuse/repurpose parts generation




Each CPs and NGOs position

| Option 1 Agree | | Option 2 Not Agree |
|---|---|---|
| CHI | EU AL | |
| JPN | FRA | |
| JRC | OICA | |
| EPA | CLEPA | |

# Secondary data

- Study data availability in each country or region (by the end of April)
- The latest Status: Japan-available, China-partly available, US-not available

| Topic | Option 1<Level2> | Option 2 <Level3> | Option 3 <Level3> |
|---|---|---|---|
| Secondary data | Global harmonised | Region by region | Country by Country |

| EoL process | | | Activity data (Primary data) | Functional unit | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Level 2 | Level 3 | | | | | Level 4 | | | | | | |
| | | | | Secondary | Secondary | | | | | Primary | | | | | | |
| | | | | Global | NA | PRC | EU | IND | JPN | US | PRC | FRA | GR | KR | IND | JPN |
| ELV treatment | ELV transport | | ELV weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | Dismantling | | ELV weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | Dismantled ELV transport | | Dismantled ELV weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | Shredding | | Dismantled ELV weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| Recovered parts treatment | 1. Tire | Disposal/Recycle | Parts weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** |
| | 2. Lead BAT | Disposal | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** |
| | 3. Air Bag | Disposal | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** |
| | 4. Lubricant | Disposal | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** |
| | 5. AC refrigerant | Disposal | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** |
| | 6. LiB BAT | Repurpose/Recycle/Disposal | Parts weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** |
| | 7. Other Parts | Disposal/Recycle | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** |
| ASR trearment | ASR transport | | ASR weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | ASR Recycle | | ASR weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | Residue transport | | Residue weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |
| | Landfill | | Residue weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** |

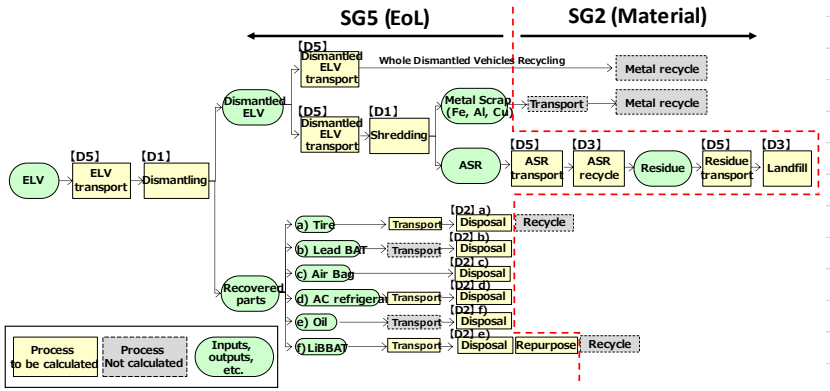
# Secondary data availability –EoL process-

**Region or Country;**

***For detai EoL process confirmation, please refer to Sept SG5 material in Wiki***

| EoL process | | | Activity data (Primary data) | Intensity data | | |
|---|---|---|---|---|---|---|
| | | | | Secondary data availability | Secondary data set information | Remarks |
| 【D1】ELV treatment | Dismantling | | ELV weight [kg] | | | |
| | Shredding | | Dismantled ELV weight [kg] | | | |
| 【D2】 Recovered parts treatment | a)Tire | Disposal | Parts weight [kg] | | | |
| | b)Lead BAT | Disposal | Parts weight [kg] | | | |
| | c)Air Bag | Disposal | Parts weight [kg] | | | |
| | d)AC refrigerant | Disposal | Parts weight [kg] | | | |
| | e)Oil | Disposal | Parts weight [kg] | | | |
| | f) LiB BAT | Parts Remanufactuaring | Parts weight [kg] | | | |
| | | Parts Reuse | Parts weight [kg] | | | |
| | | Parts Repurpose | Parts weight [kg] | | | |
| | | Disposal | Parts weight [kg] | | | |
| | Other Parts | Disposal/Recycle | Parts weight [kg] | | | |
| 【D3】ASR trearment | ASR Recycle (Thermal recovery) | | ASR weight [kg] | | | |
| | ASR Residue landfill | | Residue weight [kg] | | | |

## EoL system boundary
### - Vehicle EoL CO2 emission-




Vehicle EoL CO2 emission=Σ( Process to be calculated CO2 emission)

Process to be calculated CO2 emission=Activity data×Intensity data



**<legend symbol>**

**✓ ; Available**

**－ ; Not available**

**＊ ; Other. e.g. Primary data is available or possible to make secondary data**

# Secondary data availability –CFF parameter-

**Region or Country;**

| CFF parameter | | Data set availability | Data set information | Remarks | Reference; JPN case: Data set availability | Data set information | Remarks |
|---|---|---|---|---|---|---|---|
| Material/Parts recycling | A | | | | ✓ | PEFCR | |
| | R1 | | | | ✓ | JAMA LCA guideline data set | Steel, Al, Cu only |
| | R2 | | | | ✓ | JAMA LCA guideline data set | Steel, Al, Cu only |
| | Qsin/Qp | | | | ✓ | JAMA LCA guideline data set | Steel, Al, Cu only |
| | Qsout/Qp | | | | ✓ | JAMA LCA guideline data set | Steel, Al, Cu only |
| | Ev | | | | ✓ | JAMA LCA guideline data set | Steel, Al, Cu only, IDEA basis |
| | E*v | | | | ✓ | JAMA LCA guideline data set | Steel, Al, Cu only, IDEA basis |
| | Erecycled | | | | ✓ | JAMA LCA guideline data set | Steel, Al, Cu only, IDEA basis |
| | ErecyclingEoL | | | | ✓ | JAMA LCA guideline data set | Steel, Al, Cu only, IDEA basis |
| Energy (ASR thermal recovery etc) | EER | | | | ✓ | JAMA LCA guideline data set | |
| | LHV | | | | ✓ | General JPN industrial database | |
| | XER,heat | | | | ✓ | General JPN industrial database | |
| | ESE, heat | | | | ✓ | General JPN industrial database | |
| | XER,elec | | | | ✓ | General JPN industrial database | |
| | ESE, elec | | | | ✓ | General JPN General database | |

***For detail CFF and CFF parameter confirmation, please refer to the European Commission Recommendation (EU) 2021/2279 through below link***

https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021H2279&from=EN

material $(1-R_1)E_V + R_1 \times \left(AE_{recycled} + (1-A)E_V \times \frac{Q_{Sin}}{Q_P}\right) + (1-A)R_2 \times \left(E_{recyclingEoL} - E^*_V \times \frac{Q_{Sout}}{Q_P}\right)$

energy $(1-B)R_3 \times \left(E_{ER} - LHV \times X_{ER,heat} \times E_{SE,heat} - LHV \times X_{ER,elec} \times E_{SE,elec}\right)$

disposal $(1-R_2-R_3) \times E_D$

**<legend symbol>**
**✓ ; Available**
**- ; Not available**
*** ; Other. e.g. possible to take CFF parametr**

# SG5 12 months Schedule

| | | | 2023 | | | | | | 2024 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 |
| **Main activities** | | | **Develop Methodologies** | | | | | | | | | | | |
| **GRPE A-LCA IWG** | | | ☆10 | | ☆7 | ☆ 17-18 | | ☆4 | ☆ 7-8 | ☆ 20 | | ☆ 18-19 | | |
| **SG5 leading team Meeting (LTM)** | | | ☆11 ☆26 | ☆ 23 | ☆6 ☆20 | ☆12 ☆25 | ☆9 ☆22 | ☆5 ☆21 | ☆18 ☆31 | ☆21 | ☆ ☆ | ☆ ☆ | ☆ ☆ | ☆ ☆ |
| **SG5 Meeting** | | ☆26 | ☆12 | | ☆4 | ☆19 | ☆13 | ☆12 | ☆23 | ☆ 22 | ☆ 26 | ☆ **23** | ☆ | ☆ |
| **Objectives** | **1. Level concept Definition & Initial target** | | ☆12 | | | | | | | | | | | |
| | **2. System boundary with activity data & Intensity data based on each regional EoL process** | | | | Reginal info. sharing | | | | | | **Harmonization** | | | |
| | | | | | ☆ JPN, CHI | ☆ EU#1 | ☆ EU#2 | | | ☆ US | ☆ **#1** | | ☆ **#2** | ☆ **Final** |
| | | | | | | | | | | | **Regional 2ndary data Study** | | | |
| | **3. Contro versial topics** | **1) Material/Parts recycling modeling** | ☆JRC CFF intro. | | ☆ JAMA CFF intro. | ☆ #1 | Common Pros/Cons Discussion ☆ #2 | ☆ #3 | ☆ #4 | ☆ #5 | **CFF or RCM Application condition Study** ☆ #1 | ☆ #2 | ☆ #3 | ☆ **Final** |
| | | **2) Other** | | Boundary Conditions | ☆ | | 1.Boundary #2 3. 2nd life Parts 4. Logistics | ☆ | ☆ | ☆ | ☆ | ☆ | **2.Secondary data 5. ELV management out of sale region 6. Recycle process** | |
| | **4. Summary for drafting** | | | | | | | | | | | | | ☆ |

# Draft agenda for the 15th Session of the Informal Working Group on Automotive Life Cycle Assessment (IWG on A-LCA)

| Meeting info | |
|---|---|
| Date | April 18th and 19th, 2024 |
| Time | 9:30 ~ 17:30 on 18th<br>9:30 ~ 16:45 on 19th |
| Venue | The K HOTEL SEOUL (3F, Geomungo Hall Section C)<br>(03183) 70, Baumoe-ro 12-gil, Seocho-gu, Seoul, South |
| Link | please click here |

## Day_1 (18th April, 2024)

| Time | | Agenda Item | Lead | Meeting Documents | Purpose or Target |
|---|---|---|---|---|---|
| 9:30 ~ | 1 | Welcome and introduction | Chairs | NA | Information sharing |
| ~ 9:35 | 2 | Adoption of the agenda | Chairs | A-LCA-15-01* | Agreement |
| ~9:40 | 3 | Adoption of the last meeting minutes | Secretariat | A-LCA-14-05** | Agreement |
| ~ 10:30 | 4 | Overarching aspects<br>CPs' and NGOs' opinions are welcomed+ | Chairs | Overarching Aspects_after 13th meeting.xlsx*** | Decision & status update |
| ~ 10:50 | Coffee Break | | | | |
| ~ 12:00 | 5 | Status of each SG activities | SG leaders | A-LCA-15-02, 04, 05, 07 and 08* | status update |
| ~ 13:30 | Lunch Break | | | | |
| ~ 15:30 | 5 | Status of each SG activities | SG leaders | * | status update |
| ~ 16:00 | Coffee Break | | | | |
| ~ 17:20 | 5 | Status of each SG activities | SG leaders | * | status update |
| ~17:30 | 6 | Closing | Chairs | NA | Closing |

## Day_2 (19th April, 2024)

| Time | | Agenda Item | Lead | Meeting Documents | Purpose or Target |
|---|---|---|---|---|---|
| 9:30 ~ | 7 | Welcome and introduction | Chairs | NA | Information sharing |
| ~ 9:40 | 8 | Recap of discussions on Day_1 | Chairs | NA | Agreement |
| ~11:00 | 9 | Interaction between SGs, including coffee break | SG leaders | | status update |
| ~ 12:00 | 4 | Overarching aspects<br>CPs' and NGOs' opinions are welcomed+ | Chairs | Overarching Aspects_after 13th meeting.xlsx*** | Decision & status update |
| ~ 13:30 | Lunch Break | | | | |
| ~14:30 | 9 | Outcome of interaction session between SGs | SG leaders | | status update including agreement |
| ~16:00 | 10 | Issues on drafting, including coffee break | Chairs& SG leaders | | |
| ~16:30 | 11 | Any other business<br>● Green NCAP in Korea | All | A-LCA-15-09e | Notification Information sharing |
| ~16:40 | 12 | Next steps[1] | Chairs | | |
| ~16:45 | 13 | Closing | Chairs | NA | Closing |

# Result of interaction

| Interaction with | Result | Next action |
|---|---|---|
| SG1 | • An overarching scenario for logistics<br>• Determining the cut-off criteria for whether the logistic impact of EoL is eliminated | SG1 to capture in overarching aspect |
| SG2 | • Environmental burden for recycle material | SG5 to share recycle modeling |
| SG3 | • EoL allocation | SG3 and SG5 to conduct separate meeting |
| SG4 | • How to treat maintenance parts | SG4 and SG5 to conduct separate meeting |
| SG6 | • For emission factor of electricity and fuel, which future scenario values or current values are used in the EoL calculation? | SG5 to send request to SG6 |

# Agenda

1. SG5 009 minutes & 010 agenda confirmation
2. GRPE A-LCA IWG 15th session flash report
3. EoL LCA discussion
   1) Other controversial topics discussion
      - EoL secondary data availability investigation in EU
      - ELV management out of sale region
   2) Material/Parts recycling modeling discussion
      - Each CPs and NGOs position
      - Module D study interim report
      - CFF or RCM application condition
4. Next action

# SG5 Controversial topics -Progress and actions-

| Topic | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| 0.Material/Parts recycling modeling | Recycled content method (Cutoff) | Closed Loop Approximation Method (CLAM) | Circular Footprint Formula (CFF) |
| 1.Boundary conditions | Agree with LTM proposal | **-SG5 common position confirmed** | |
| 2.Secondary data | **Secondary data availability of each EoL process and CFF parameter in Japan. China and US confirmed. Follow up EU region.** | | |
| 3.Second life parts | Include | **-Almost SG5 common position confirmed<br>-JRC; Neutral, FR; t.b.c** | |
| 4.Logistics | Include | **-Proposed as one of overarching aspects in IWG.<br>-Wait for SG1 direction** | |
| 5.ELV management out of sale region | Take into account process of country of sale | Take into account global average | Take into account process of country of EoL |
| | | **・Need to study a compromise** | |
| 6.Recycle process | Current process | **-SG5 common position confirmed** | |

# 2. Secondary data

| Topic | Option 1 <Level2> | Option 2 <Level3> | Option 3 <Level3> |
|---|---|---|---|
| Secondary data | Global harmonised | Region by region | Country by Country |

- Need to confirm Secondary data of each process and CFF parameter in each country or region
- JPN, CHI, US confirmed, Confirm EU today

| | | | l unit | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Level 4 | | | | | | | | |
| | | | | | | | | | Primary | | | | | | | | |
| | | | | | | | | | US | PRC | FRA | GR | KR | IND | JPN | | |
| | | | | | | | | | *** | *** | *** | *** | *** | *** | *** | | |
| treatment | Dismantling | | ELV weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | Dismantled ELV transport | | Dismantled ELV weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | Shredding | | Dismantled ELV weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| Recovered parts treatment | 1. Tire | Disposal/Recycle | Parts weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** | |
| | 2. Lead BAT | Disposal | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** | |
| | 3. Air Bag | Disposal | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** | |
| | 4. Lubricant | Disposal | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** | |
| | 5. AC refrigerant | Disposal | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** | |
| | 6. LiB BAT | Repurpose/Recycle/Disposal | Parts weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** | |
| | 7. Other Parts | Disposal/Recycle | Parts weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | | transport | Parts weight [kg] | | | | | | | *** | *** | *** | *** | *** | *** | *** | |
| ASR trearment | ASR transport | | ASR weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | ASR Recycle | | ASR weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | Residue transport | | Residue weight [kg] | | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |
| | Landfill | | Residue weight [kg] | * | ** | ** | ** | ** | ** | *** | *** | *** | *** | *** | *** | *** | |

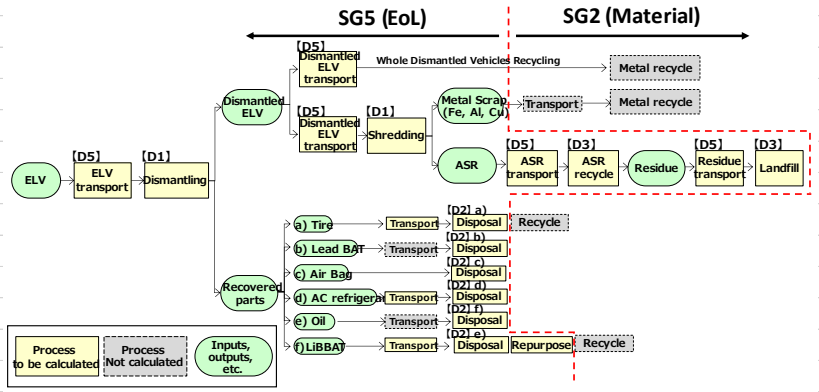
# 2. Secondary data availability –EU EoL process-

**Region ; EU**

*For detai EoL process confirmation, please refer to Sept SG5 material in Wiki*

| EoL process | | | Activity data (Primary data) | EU | | |
|---|---|---|---|---|---|---|
| | | | | Intensity data | | |
| | | | | Secondary data availability | Secondary data set information | Remarks |
| 【D1】ELV treatment | Dismantling | | ELV weight [kg] | ✓ | | EU ELV regulation |
| | Shredding | | Dismantled ELV weight [kg] | ✓ | | EU ELV regulation |
| 【D2】 Recovered parts treatment | a)Tire | Disposal | Parts weight [kg] | ✓ | | EU ELV regulation |
| | b)Lead BAT | Disposal | Parts weight [kg] | ✓ | | EU ELV regulation |
| | c)Air Bag | Disposal | Parts weight [kg] | ✓ | | EU ELV regulation |
| | d)AC refrigerant | Disposal | Parts weight [kg] | ✓ | | EU ELV regulation |
| | e)Oil | Disposal | Parts weight [kg] | ✓ | | EU ELV regulation |
| | f) LiB BAT | Parts Remanufactuaring | Parts weight [kg] | ✓ | | EU ELV regulation |
| | | Parts Reuse | Parts weight [kg] | ✓ | | EU ELV regulation |
| | | Parts Repurpose | Parts weight [kg] | ✓ | | EU ELV regulation |
| | | Disposal | Parts weight [kg] | ✓ | | EU ELV regulation |
| | Other Parts | Disposal/Recycle | Parts weight [kg] | ✓ | | EU ELV regulation |
| 【D3】ASR trearment | ASR Recycle (Thermal recovery) | | ASR weight [kg] | ✓ | | EU ELV regulation |
| | ASR Residue landfill | | Residue weight [kg] | ✓ | | EU ELV regulation |

## EoL system boundary
### - Vehicle EoL CO2 emission-




Vehicle EoL CO2 emission = Σ( Process to be calculated CO2 emission)

Process to be calculated CO2 emission = Activity data × Intensity data

**<legend symbol>**

**✓ ; Available**

**- ; Not available**

*** ; Other. e.g. Primary data is available or possible to make secondary data**

# 2. Secondary data availability -EU CFF parameter-

| Region ; EU | | EU | | |
|---|---|---|---|---|
| **CFF parameter** | | **Data set availability** | **Data set information** | **Remarks** |
| Material/Parts recycling | A | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | R1 | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | R2 | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | Qsin/Qp | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | Qsout/Qp | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | Ev | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | E*v | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | Erecycled | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | ErecyclingEoL | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| Energy (ASR thermal recovery etc) | $E_{ER}$ | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | LHV | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | $X_{ER,heat}$ | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | $E_{SE,heat}$ | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | $X_{ER,elec}$ | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |
| | $E_{SE,elec}$ | ✓ | | Part C of Annex II of EC Recommendation 2021/2279 |

***For detail CFF and CFF parameter confirmation, please refer to the European Commission Recommendation (EU) 2021/2279 t***

https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021H2279&from=EN

material $(1-R_1)E_V + R_1 \times \left( AE_{recycled} + (1-A)E_V \times \frac{Q_{Sin}}{Q_P} \right) + (1-A)R_2 \times \left( E_{recyclingEoL} - E^*_V \times \frac{Q_{Sout}}{Q_P} \right)$

energy $(1-B)R_3 \times \left( E_{ER} - LHV \times X_{ER,heat} \times E_{SE,heat} - LHV \times X_{ER,elec} \times E_{SE,elec} \right)$

disposal $(1-R_2-R_3) \times E_D$

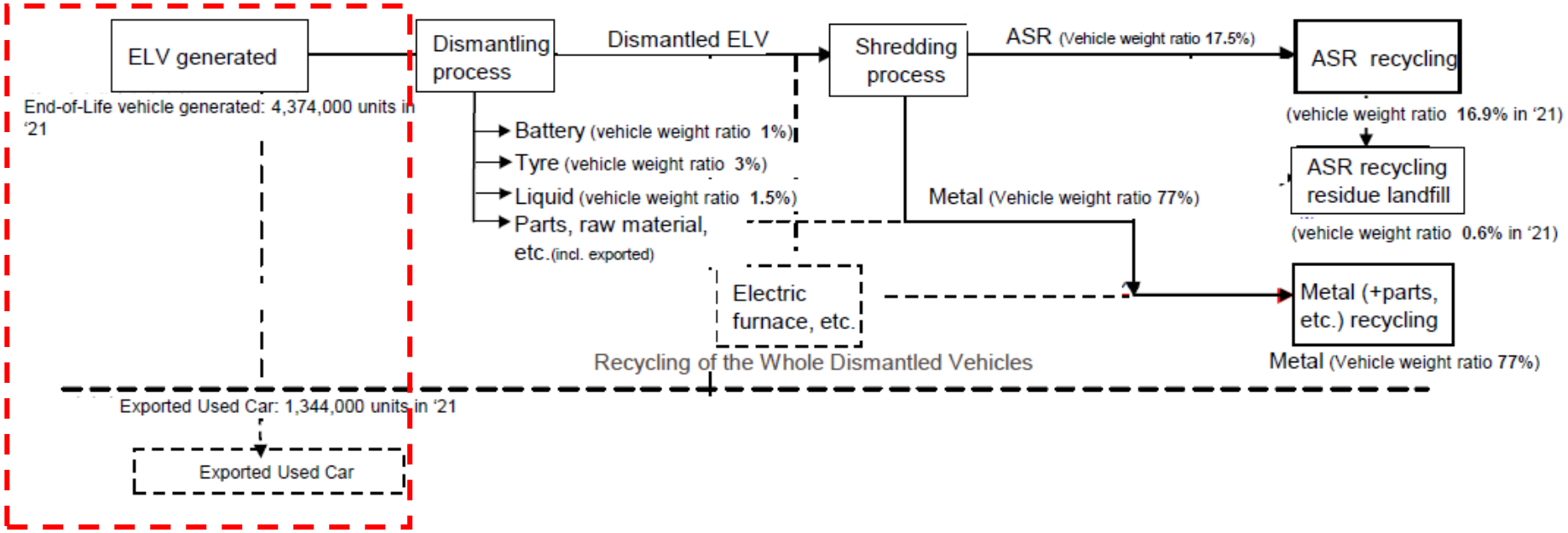
**<legend symbol>**
**✓ ; Available**
**- ; Not available**
*** ; Other. e.g. possible to take CFF parametr**

# 5. ELV management out of sale region

FRA OICA

| Topic | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| ELV management out of sale region<br>Neutral<br>CLEPA | Take into account process of country of sale<br>JPN<br>Or,EU AL | Take into account global average<br>Or,EU AL | Take into account process of country of EoL<br>JRC CHI<br>EPA |

**Japan End-of-Life Vehicle Recycling and Treatment Flow**

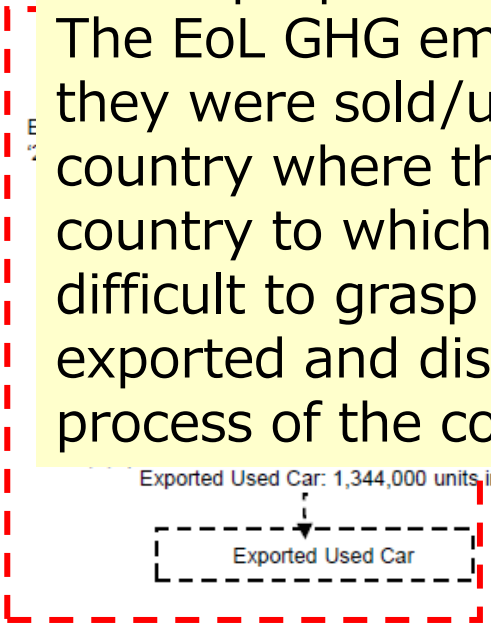


# 5. ELV management out of sale region

FRA OICA

| Topic | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| ELV management out of sale region<br>Neutral<br>CLEPA | Take into account process of country of sale<br>JPN<br>Or,EU AL | Take into account global average<br>Or,EU AL | Take into account process of country of EoL<br>JRC CHI<br>EPA |

<New proposal draft>
The EoL GHG emission of vehicles exported from the country where they were sold/used should be evaluated by the EoL process of the country where they were exported and disposed/recycled, but if the country to which they were exported cannot be tracked or it is difficult to grasp the EoL process of the country where they were exported and disposed/recycled, they may be evaluated by the EoL process of the country where they were sold/used originally.



# Agenda

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      - CFF or RCM application condition
4. Next action

# Material/Parts recycling modeling
# Internal discussion summary of Cutoff and CFF

As of 26th Mar

| | | Result | Remarks |
|---|---|---|---|
| Leading Team | **China (CATARC)** | **・Both Cutoff and CFF methods should be included in the standard** | ① CFF method： for the purpose of comparing different technical route without considering responsibilities ;<br>② CUT-OFF method：for the purpose of comparing different individual products with same technical route。<br>・Detailed boundary and principle of these two methods presemted in SG5 006 |
| | **Japan (JASIC)** | **・Support CATARC proposal** | ・Specific use case description on Cutoff or CFF to be discussed respecting ToR of A-LCA |
| Main Participants | **France** | **・Both Cutoff and CFF methods could be acceptable, CFF is favorable** | ・No strong position. A final official position will be taken at the next SG5 meeting. |
| | **US(EPA)** | **・Both Cutoff and CFF methods are preferable** | |
| | OICA | ・OICA sees the potential of the CATARC proposal. However, it is needed to wait for CLEPA to present their proposal too, and to get more detailed information on the CATARC proposal.<br>・Secondly, To request of a clear definition/condition when to use which method | |
| | **CLEPA** | **・Cradle-to-Gate, step 1 (level 3&4 ‚reporting'): Support Cutoff**<br>**・Cradle-to-Grave, step 2 (level 1&2 ‚technology comparison'): Support CFF for selected parts and associated Materials** | |
| | **European Aluminum** | **・Only CFF, need to study Scenario, but having both methodologies in A-LCA could be acceptable** | |
| Observers | **JRC** | **・CFF approach is favorable. Considering both methodologies in the discussion according to the scope could be acceptable** | European Commission Recommendation (EU) 2021/2279 on the use of the environmental footprint methods to measure and communicate the life cycle environmental performance of products and organisations, in which Annex 1 e 2 refer to PEF (Product Environmental Footprint) while Annex 3 e 4 to OEF (Organisation Environmental Footprint). |

# Module D study interim report

**<1st Meeting memo>**

1. Meeting date; 7th March 2024
2. Attendee; Aoki-san, Zhang-san, Dominique-san, Goy-san, Nucci-san, Patrone-san, Elena-san, Yamamoto, SG5 leading team member
3. Discussion & Conclusion;
   -EU Aluminum and JPN presented What is Module D in Construction industry.
   -Each party agreed to study about Module D treatment in A-LCA internally

**<2nd Meeting memo>**

1. Meeting date; 9th April. 2024
2. Attendee; Aoki-san, Zhang-san, Dominique-san, Hofer-san, Goy-san, Nucci-san, Patrone-san, Elena-san, Yamamoto, SG5 leading team member
3. Discussion & Conclusion;
   -CLEPA presented their study about new recycling modeling based on Module D concept.
   -JRC didn't support CLEPA proposal because Module D didn't have A parameter and proposed a compromise, which was;

- Keep Module D separate structure.
- Replace Module D formular to relevant CFF modular to include A parameter.
- Include separated relevant CFF modular to total vehicle CFP following CFF philosophy.

   -JRC compromise was confirmed as attached.
   -Each party agreed to have further study based on JRC compromise and to have another SG5 small meeting 3 weeks later.
   -In order to support further study, JRC are going to e-mail CFF parameter in EF compliant dataset by IWG @ Korea.
   -This result will be shared in 23rd April SG5 meeting as an interim report.

# Module D in the building sector

Benedetta Nucci

European Aluminium

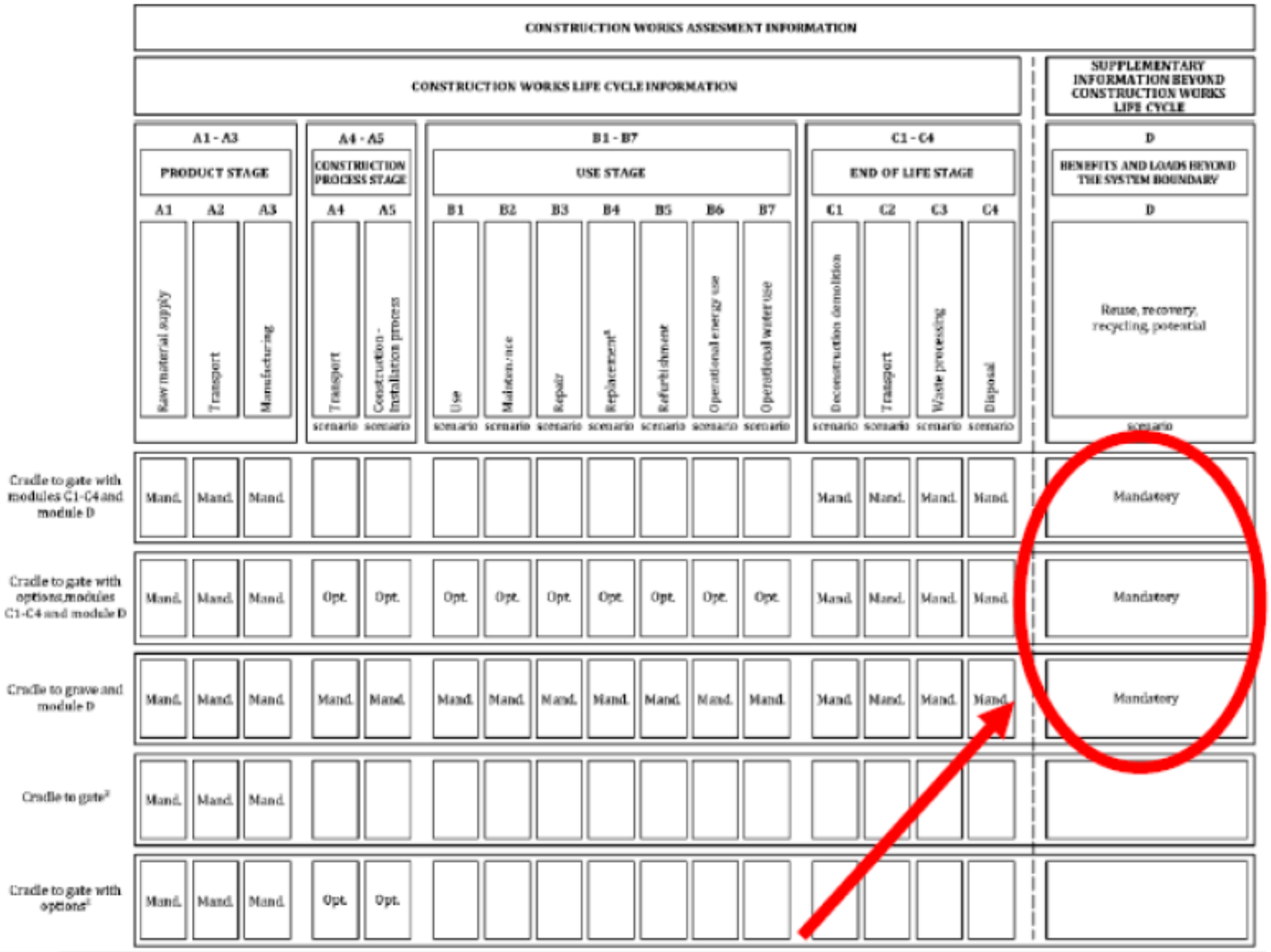
# References – building sector

- **ISO 21930** - Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
- **EN 15804/A2:2019** Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

- When it comes to EN 15804, the two following publications from the metal industry explains how Module D should be calculated :

- https://iopscience.iop.org/article/10.1088/1755-1315/323/1/012049
- https://www.metalsforbuildings.eu/assets/Uploads/e718754f3f/2021-08-02-MFB-position-Module-D-and-circularity-v2.pdf

# EN 15804/A2:2019



# Example – coil coated alu sheet


*Figure 1 Main production processes and components of coil coated sheets*

## 4 LCA – RESULTS COIL COATED ELVAL ENF 1 mm; 1,5 mm; 2 mm

### 4.1 Result of the LCA – Environmental impact Coil coated ELVAL ENF 1 mm, 1 $m^2$

The tables below report the results of the LCA study for 1 $m^2$ coil coated aluminium sheet ELVAL ENF 1 mm.

#### 4.1.1 Core environmental impact indicators

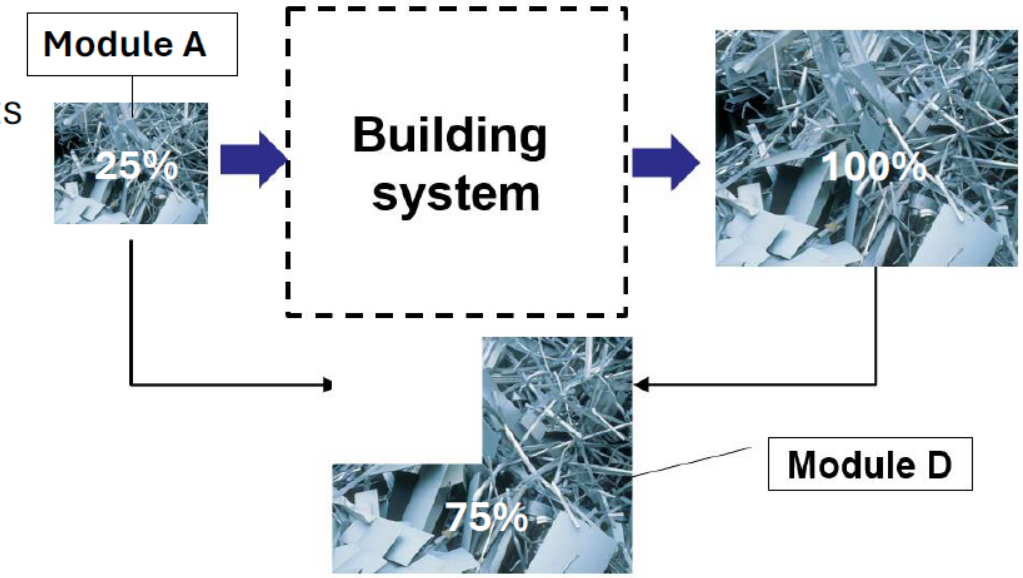
*Table 6 Core environmental impact indicators for 1 $m^2$ coil coated aluminium sheet ELVAL ENF 1 mm*

| Impact category | Unit | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| **GWP - total** | kg $CO_2$ eq. | 1,81E+01 | 1,32E-04 | 4,38E-01 | 2,62E-02 | 8,58E-02 | 7,91E-04 | -1,20E+01 |
| **GWP – fossil** | kg $CO_2$ eq. | 1,81E+01 | 1,31E-04 | 4,34E-01 | 2,60E-02 | 8,50E-02 | 8,12E-04 | -1,20E+01 |
| **GWP – biogenic** | kg $CO_2$ eq. | 2,28E-02 | 6,58E-08 | 3,45E-03 | 1,31E-05 | 5,28E-04 | -2,36E-05 | -2,54E-02 |
| **GWP - luluc** | kg $CO_2$ eq. | 5,46E-03 | 8,50E-07 | 6,37E-04 | 1,69E-04 | 2,07E-04 | 2,39E-06 | -1,58E-03 |

# The principle of EN 15804's Module D: Basics

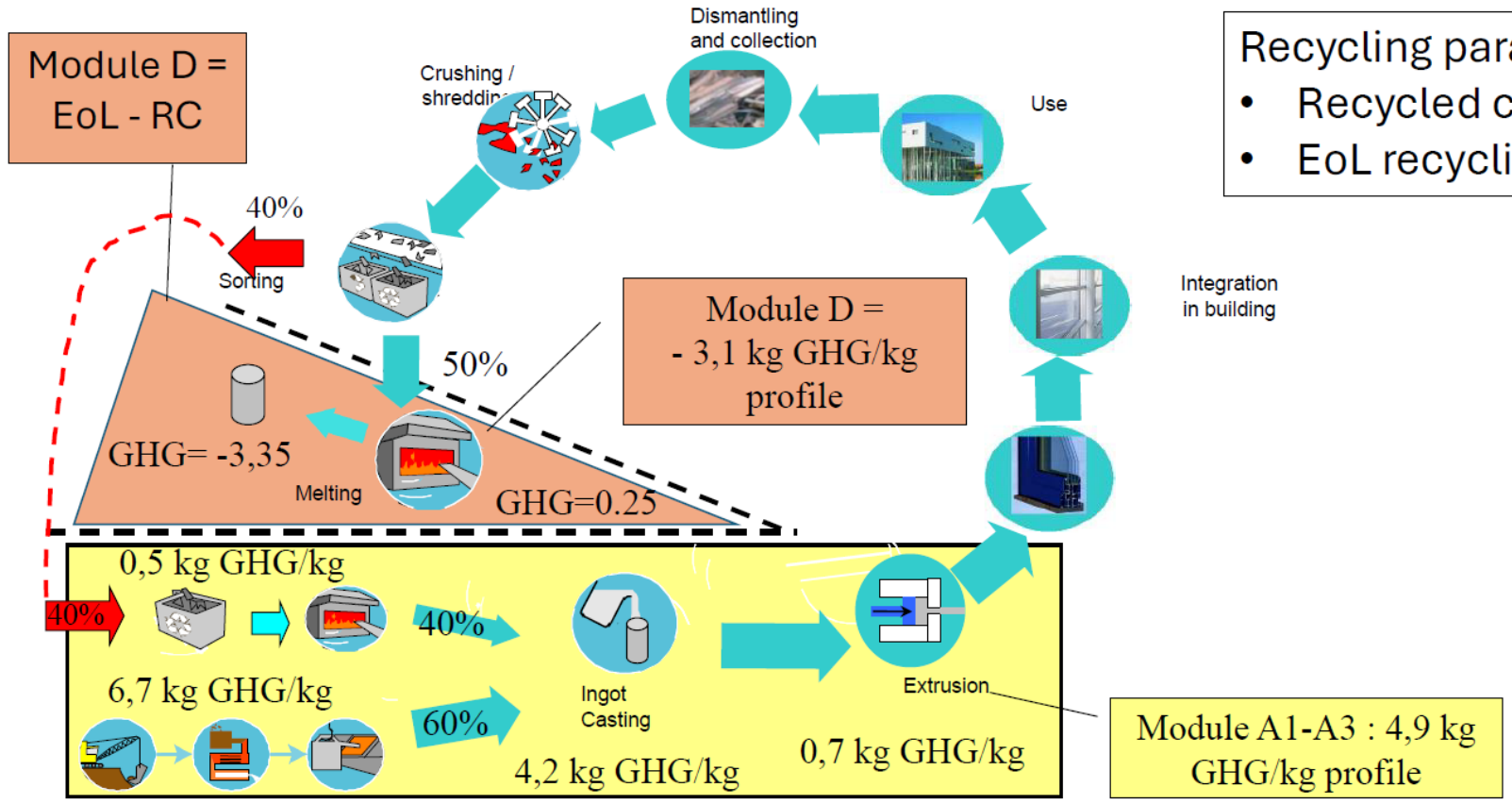
Assuming 25% recycled content, and an end-of-life recyclability of 100%

Environmental benefits of 25% recycled content reflected in Module A




Additional net environmental benefits from end-of-life stage, i.e. 75%, reflected in Module D

# The principle of EN 15804's Module D: Example




Recycling parameters:

- Recycled content = 40%
- EoL recycling rate = 90%

# Details Mod. A & D – EN15804

$$e_{module\ A} = e_{PE} + M_{VM\ in} \cdot E_{VM\ in} + M_{MR\ in} \cdot E_{MR\ after\ EoW\ in} + M_{ER\ in} \cdot E_{ER\ after\ EoW\ in}$$

→ Same as cut-off

$e_{module\ D1}$ being the loads and benefits related to the export of secondary materials:

$$e_{module\ D1} = \sum_i \left( M_{MR\ out}\big|_i - M_{MR\ in}\big|_i \right) \cdot \left( E_{MR\ after\ EoW\ out}\big|_i - E_{VMSub\ out}\big|_i \cdot \frac{Q_{R\ out}}{Q_{Sub}}\Big|_i \right)$$

Net flow!

| | |
|---|---|
| $e_{module\ D}$ | specific loads and benefits per unit of output for module D |
| → $e_{module\ D1}$ | specific loads and benefits per unit of analysis for module D related to the export of secondary materials |
| $e_{module\ D2}$ | specific loads and benefits per unit of analysis for module D related to the export of secondary fuels |
| $e_{module\ D3}$ | specific loads and benefits per unit of output for module D related to the export of energy as a result of waste incineration (for $R_1 < 60\ \%$ and $R_1 > 60\ \%$) |
| $e_{module\ D4}$ | specific loads and benefits per unit of output for module D related to the export of energy as a result of landfilling |

# CFF

**Material**

$$(1-R_1)E_V + R_1 \times \left(AE_{recycled} + (1-A)E_V \times \frac{Q_{Sin}}{Q_p}\right) + (1-A)R_2 \times \left(E_{recyclingEoL} - E_V^* \times \frac{Q_{Sout}}{Q_P}\right)$$

**Energy** $(1-B)R_3 \times (E_{ER} - LHV \times X_{ER,heat} \times E_{SE,heat} - LHV \times X_{ER,elec} \times E_{SE,elec})$

**Disposal** $(1-R_2-R_3) \times E_D$

Cut-off when A=1

For a detailed comparison of Module D with PEF:

End-of-life modelling of buildings to support more informed decisions towards achieving circular economy targets
Sahar Mirzaiea, Mihaela Thuringb, Karen Allackerc

Available online

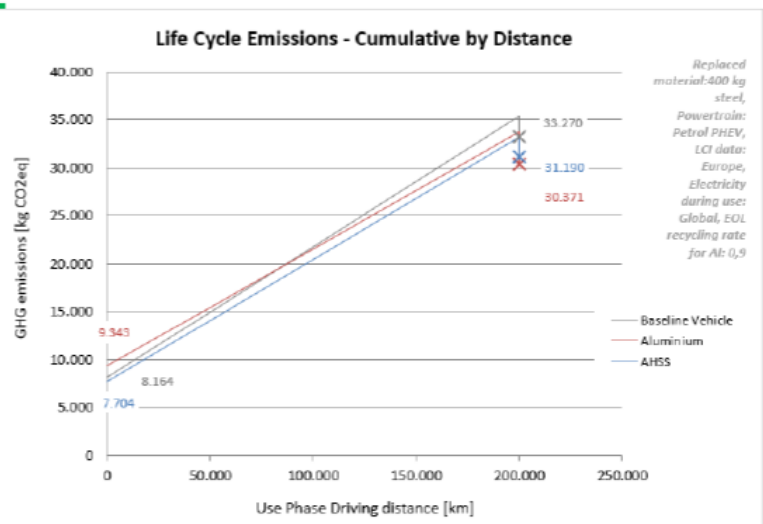
# Example for automotive - Excel file: here

## FINAL RESULTS: SUMMARY

THE ALUMINIUM STORY

*LCA Chart 1* *Cumulative Emissions by Distance/Stage*

| Stage | Baseline Vehicle | Aluminium | AHSS | Mileage |
|---|---|---|---|---|
| Production | 8.164 | 9.343 | 7.704 | 0 |
| Use Phase | 35.422 | 33.772 | 33.194 | 200.000 |
| EOL Recycling Credit | 33.270 | 30.371 | 31.190 | 200.000 |
| Total | 33.270 | 30.371 | 31.190 | 200.000 |




*LCA Chart 2:* *Emissions by Individual Stage*

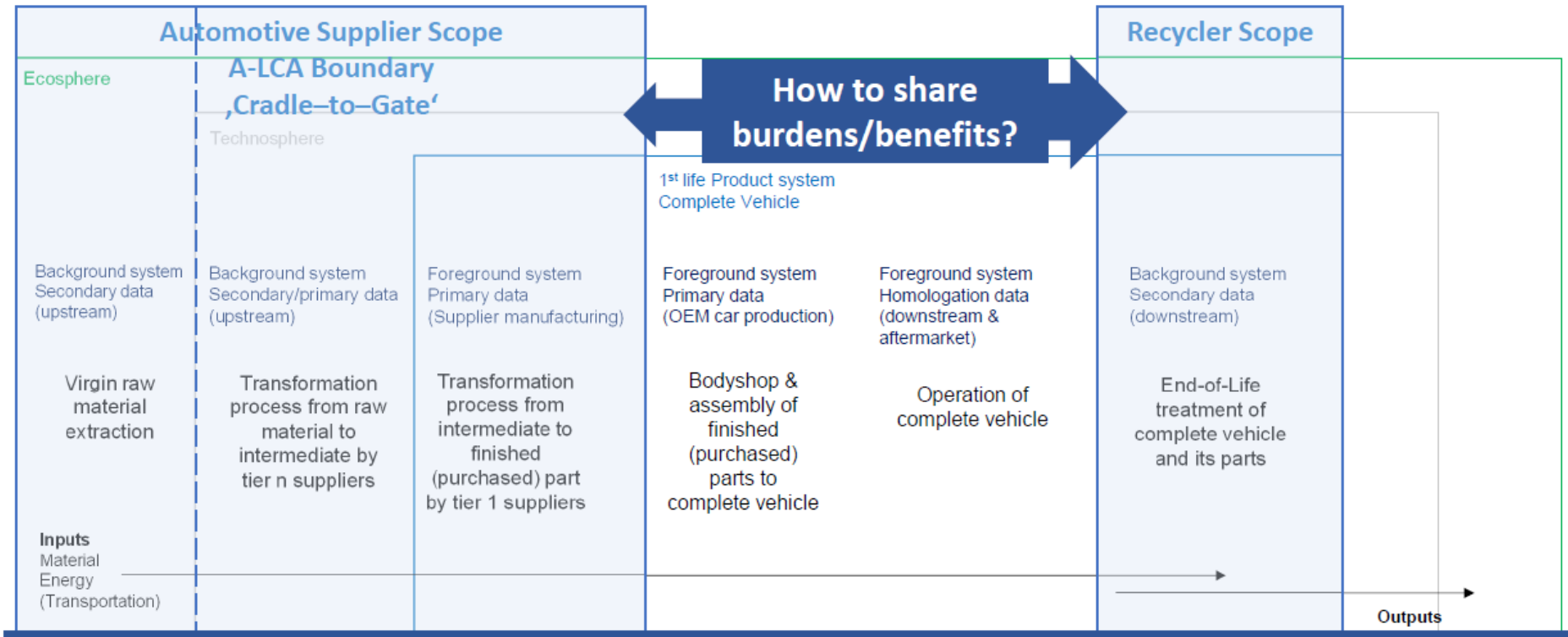
| Stage | Baseline Vehicle | Aluminium | AHSS | Mileage |
|---|---|---|---|---|
| Production | 8.164 | 9.343 | 7.704 | 0 |
| Use Phase | 27.258 | 24.429 | 25.490 | 200.000 |

CLEPA
European Association of Automotive Suppliers

# Scope and End of Life allocation method UN IWG A-LCA level concept

CLEPA
European Association of Automotive Suppliers

# SCOPE AUTOMOTIVE SUPPLIER




**Different EoL allocation methods assume suppliers have direct cooperation in place for recycling of ELV parts (actually that is covered within in OEM responsibility or handled different according regional market demands & mechanisms).**

Courtesy to Magna LCA team

CLEPA
European Association of Automotive Suppliers

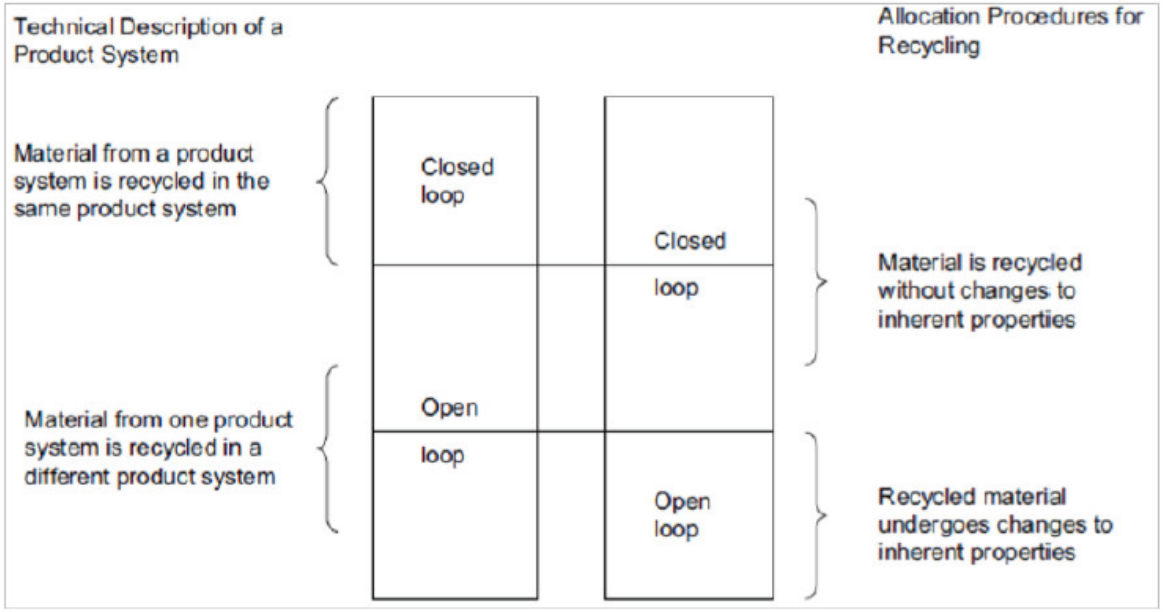
# OPEN LOOP / CLOSED LOOP RECYCLING

In ISO14040, the hierarchical allocation order provided for solving multifunctionality is relevant for modelling recycling emissions based on company-specific data.

ISO14044, defines three different EoL allocation procedures applicable for recycling

1. Closed-loop allocation
2. Open-loop allocation
3. Open-loop case with closed-loop procedure → an allocation problem emerges concerning the recycling benefit of export or imports to other product pools

1) dividing the process into sub-processes and "cutting off" the sub-processes providing the secondary function
2) "system expansion" where all functions of the product system are integrated into the system boundary through avoidance of impacts
3) if allocation cannot be avoided, an allocation approach based on inherent properties shall be applied



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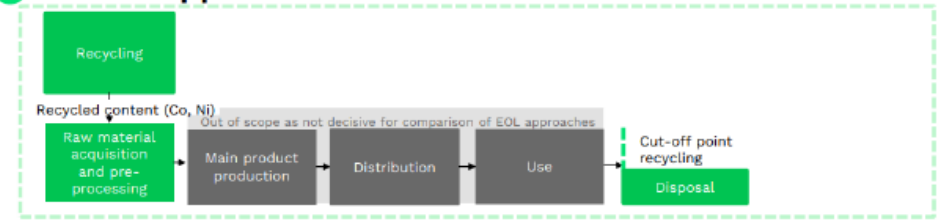
# DIFFERENT EOL ALLOCATION METHODS

## Swedish Life Cycle Center (overview):

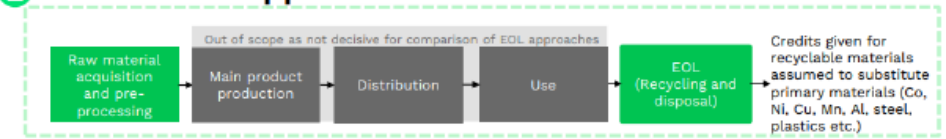
| Method | Alternative names | Recommended by |
|---|---|---|
| Simple cut-off | Recycled content approach<br>100/0 method | International EPD system<br>PAS 2050<br>Greenhouse Gas Protocol |
| Cut-off with economic allocation | - | Dutch Handbook on LCA |
| Clepa proposal as alternative to CFF<br>Cut-off plus credit | Module D | ISO 21930:2017<br>EN 15804:2012+A2 + CEN/TR 16970:2016<br>EN16485:2014 |
| Allocation to material losses | Closed-loop approximation<br>0/100 method<br>End-of-life approach<br>Recyclability substitution<br>Value of scrap approach | ISO 14044:2006 + ISO TR 14049:2012<br>ISO 14067:2018<br>ISO 20915:2018<br>PAS 2050:2011<br>Greenhouse Gas Protocol<br>WorldSteel Association<br>International Stainless-Steel Forum |
| Allocation to virgin material use | 100/0 method | - |
| 50/50 methods | - | Nordic Guidelines on LCA<br>Ekvall (2000) |
| Quality-adjusted 50/50 methods | UBA approach | German requirements on LCA of beverage packaging<br>Allacker et al. (2017) |
| Circular Footprint Formula | PEF approach | Product Environmental Footprint Guide |
| Market price-based allocation | Open-loop procedure | ISO 14067:2018 |
| Market price-based substitution | - | Schrijvers et al. (2016a) |
| Price-elasticity approaches | Market-based modeling | Ekvall (2000) |
| Allocation at the point of substitution | APOS | Ecoinvent |

## European Product Passport initiatives discuss a selection from the Swedish overview:

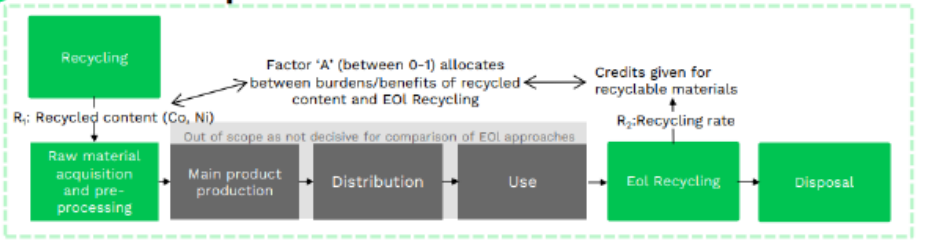
### 1 Cut-off approach




### 2 Substitution approach




### 3 Circular Footprint Formula




* CFF developed and proposed by JRC for PEF in Europe

Courtesy to IVL Swedish Environmental Research Institute & Battery Pass Consortium

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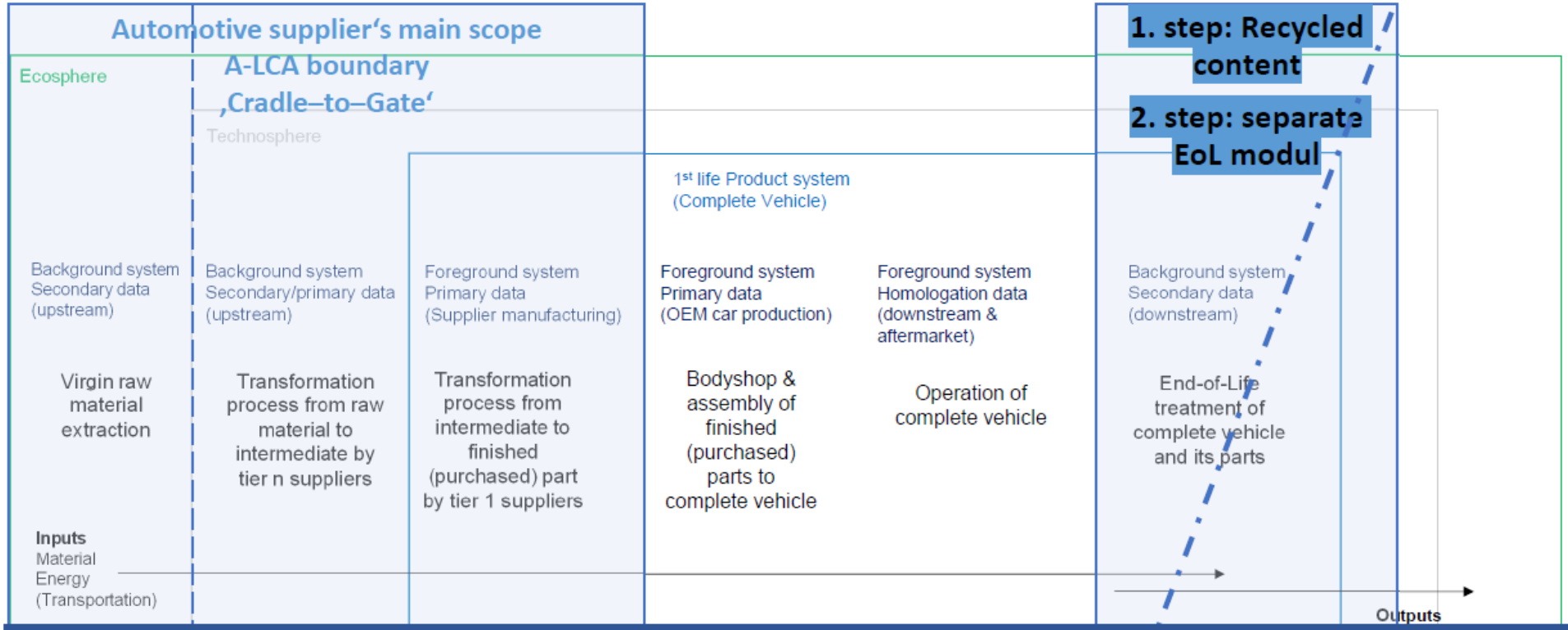
# CLEPA PRIORITIES FOR EOL IN A-LCA




**Prio 1: ‚Recycled content' for EoL-phase of automotive parts**

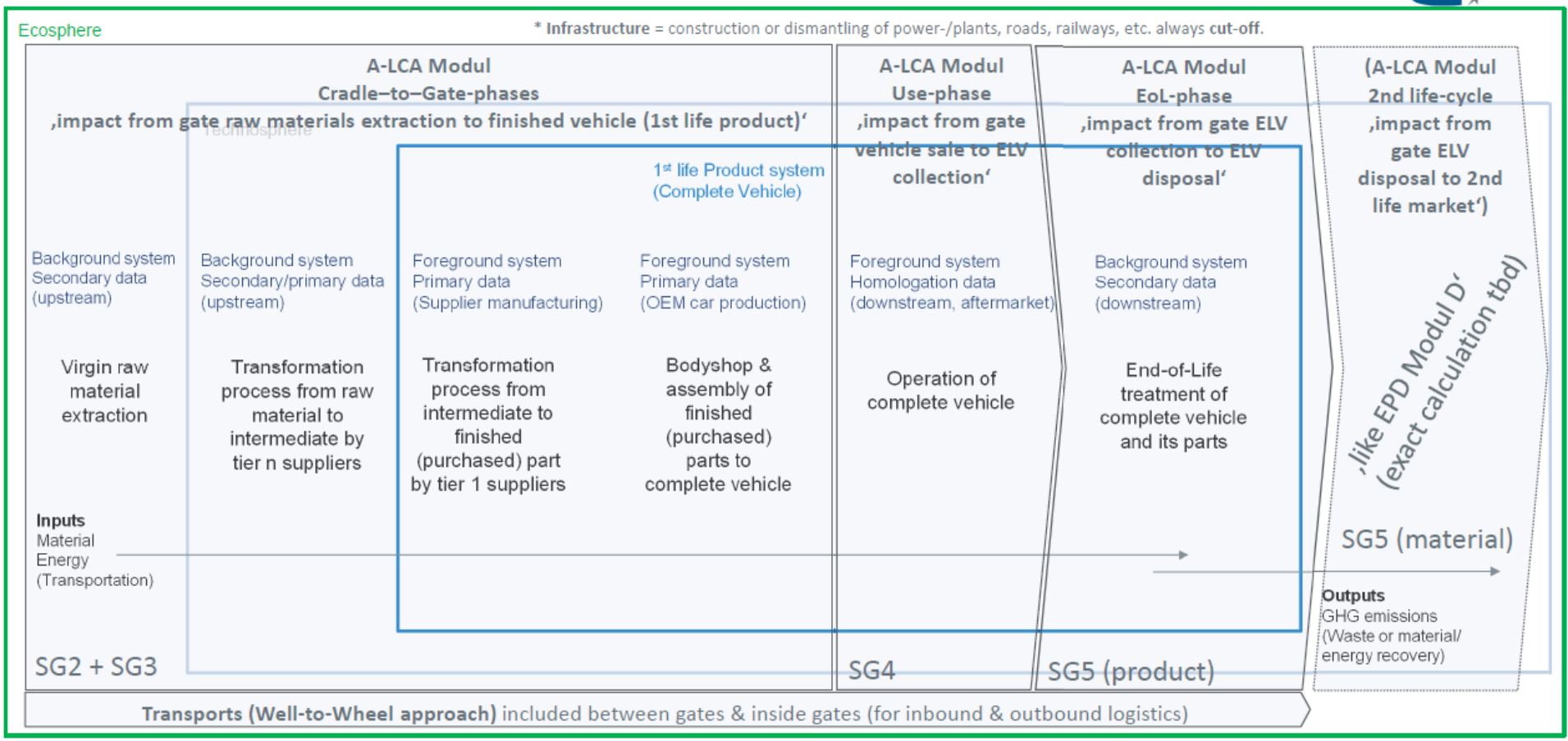
→ Cut-off EoL allocation for regional PCF reporting (level 3 hotspot parts and level 4)

**Prio 2: ‚Separate EoL modul', EPD KPI (separate CF calc/report) for EoL phase**

*(option for technology comparison: CFF for mandatory EoL materials → relevant materials & CFF parameters tbd)*

Courtesy to Magna LCA team

# A-LCA SCOPE & EOL OPTION ‘SEPARATE EOL MODUL’




Courtesy to Magna LCA team

# JRC compromise proposa

-Keep Module D separate structure.
-Replace Module D formular to relevant CFF modular to include A parameter.
-Include separated relevant CFF modular to total vehicle CFP following CFF philosophy.

## Module D

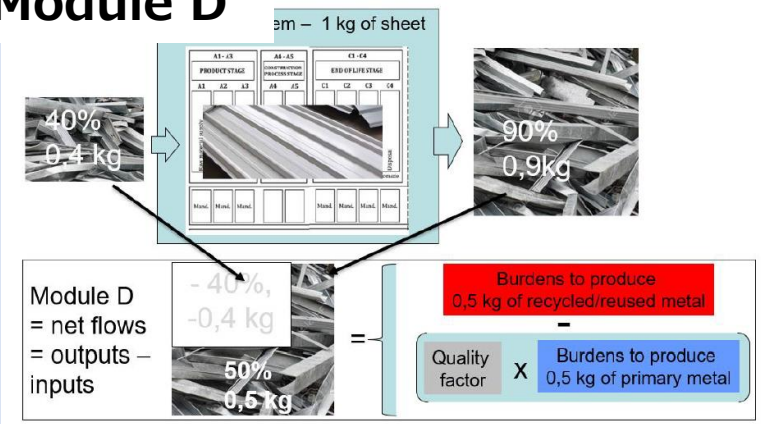



Fig.2. Module D illustration as per EN15804

$$(1-R1)\times Ev+R1\times Erec$$
$$+$$
$$(R2-R1)\times(Erec-Q\times Ev)$$

RCM equivalent

Module D formular

## CFF

Production burdens

$$(1-R_1)E_V+R_1\times E_{recycled}$$

RCM equivalent in CFF modular

Burdens and benefits related to secondary materials input

$$-(1-A)R_1\times\left(E_{recycled}-E_V\times\frac{Q_{Sin}}{Q_P}\right)$$

Burdens and benefits related to secondary materials output

$$(1-A)R_2\times\left(E_{recyclingEoL}-E_V^*\times\frac{Q_{Sout}}{Q_P}\right)$$

Module D formular ⇒Relevant CFF modular

In case that

-A=0 -Ev=E*v

-Erec=ErecEoL -Qsin/Qp=Qsout/Qp

$$(1-R1)\times Ev+R1\times Erec$$
$$+$$
$$(R2-R1)\times(Erec-Q\times Ev)$$

# <2nd draft >

## CFF or RCM(Cutoff) application guideline

- Circular Footprint Formula (CFF) or Recycled Content Method (RCM) should be applied to the evaluation of material/parts recycling.
- In cases where obtaining appropriate data for CFF parameter setting is difficult, Recycled Content Method (RCM) should be applied with the effort to develop CFF parameter
- LCA owner should decide CFF or RCM application based on Use case taking Pros/Cons of each methodology into account.

Main remarks in Mar. SG5

Dominique MARTINEAU (CLEPA/Vitesco Technologies):
•Highlights the need to clarify the functional unit of the study.
•Suggests separating the discussion of parts recycling and material recycling.
Benedetta NUCCI (European Aluminium):
•Supports the second draft of the application guideline.
•Discusses the possibility of applying the CFF to complex components with simplifications.
Dietmar HOFER (CLEPA/Magna):
•Advocates for the strict application of the CFF to specific materials rather than complex products like vehicles.
•Raises concerns about the practicality and complexity of applying the CFF to a large number of materials.
David MEYER (EPA):
•Reminds participants of the flexibility and purpose of LCA studies.

- 3rd draft to be updated

## CFF or RCM(Cutoff) application guideline

- Circular Footprint Formula (CFF) or Recy[illegible]ent Method (RCM) should be applied to the evaluation of material[illegible]ing.
- In cases where obtaining [illegible]data for CFF parameter setting is difficult, Recycled Content Meth[illegible]should be applied with the effort to develop CFF parameter
- LCA owner should decide CFF or RCM application based on Use case taking Pros/Cons of each methodology into account.

To be updated

To be updated after SG5 small meeting #3 for May SG5

# Agenda

1. SG5 009 minutes & 010 agenda confirmation
2. GRPE A-LCA IWG 15th session flash report
3. EoL LCA discussion
   1) Other controversial topics discussion
      -EoL secondary data availability investigation in EU
      - ELV management out of sale region
   2) Material/Parts recycling modeling discussion
      - Each CPs and NGOs position
      - Module D study interim report
      - CFF or RCM application condition
4. Next action

# 3. SG5 12 months Schedule

Next

| | | | 2023 | | | | | | 2024 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 |
| Main activities | | | Develop Methodologies | | | | | | | | | | | |
| GRPE A-LCA IWG | | | ☆10 | | ☆7 | ☆ 17-18 | | ☆4 | ☆ 7-8 | ☆ 20 | | ☆ 18-19 | | |
| SG5 leading team Meeting (LTM) | | | ☆11 ☆26 | ☆ 23 | ☆6 ☆20 | ☆12 ☆25 | ☆9 ☆22 | ☆5 ☆21 | ☆18 ☆31 | ☆21 | ☆ ☆ | ☆ ☆ | ☆ ☆ | ☆ ☆ |
| SG5 Meeting | | ☆26 | ☆12 | | ☆4 | ☆19 | ☆13 | ☆12 | ☆23 | ☆ 22 | ☆ 26 | ☆ **23** | ☆ | ☆ |
| Objectives | 1. Level concept Definition & Initial target | | ☆12 | | | | | | | | | | | |
| | 2. System boundary with activity data & Intensity data based on each regional EoL process | | | | Reginal info. sharing ☆ JPN, CHI | ☆ EU#1 | ☆ EU#2 | | | ☆ US | **Harmonization** ☆ **#1** | ☆ **#2** | ☆ **Final** | |
| | 3. Contro versial topics | 1) Material/Parts recycling modeling | ☆JRC CFF intro. | | ☆ JAMA CFF intro. | ☆ #1 | Common Pros/Cons Discussion ☆ #2 | ☆ #3 | ☆ #4 | ☆ #5 | **CFF or RCM Application condition Study** ☆ #1 | ☆ #2 | ☆ #3 | ☆ **Final** |
| | | 2) Other | | Boundary Conditions | ☆ | | 1.Boundary #2 3. 2nd life Parts 4. Logistics | ☆ | ☆ | ☆ | ☆ | ☆ | **2.Secondary data 5. ELV management out of sale region 6. Recycle process** | |
| | 4. Summary for drafting | | | | | | | | | | | | | ☆ |

# - Next SG5 meeting

1. Date ; 2hours, late May.
2. Venue; Online
3. Attendee; all SG5 member
4. Agenda; according to SG5 12 months schedule
   - Material/Parts recycling modeling

     Focus on Module D study#3 and CFF or Cutoff application guideline 3rd draft
   - Other controversial topics discussion

     EoL process modeling harmonization
   - Drafting plan
   - Next action

<Proposal>
-May SG5 ; 23rd May from 12:00 to 14:00 @CET