GRPE A-LCA IWG
Status of SG5 (EoL) activities

December 4th , 2023

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

Agenda

1. Material/Parts recycling modeling
2. Secondary data set

SG5 Controversial topics list

Topic	Option 1	Option 2	Option 3
Secondary data	Global harmonised	Region by region	Country by Country
Logistics	Include	Exclude	-
Recycle process	Current process	Future process	-
Second life parts	Include	Exclude	-
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
Material/Parts recycling modeling	Recycled content method (Cutoff)	Closed Loop Approximation Method (CLAM)	Circular Footprint Formula (CFF)
Boundary conditions	SG 5	SG 2	

More important controversial topics

Recycling modeling Benchmarking

		Recycled Content Method (Cut Off)	Closed Loop approximation Method (CLAM)	Circular Footprint Formula (CFF)
Carbon Neutral Promotion	Promotes Low CO2 material selection at SOP	++	-	+
	Promotes CO2 reduction at EoL	-	++	+
	Enhance various recycling technology development collaborating with other industries	+	+	++
Circular Economy promotion	Promotes use of recycled material at SOP	++	-	+
	Promotes material/parts recycling at EoL	–	++	+
	Enhance various recycling technology development collaborating with other industries	+	+	++
LCA Operation	Database (2ndary data) maturity	+	-	-
	Industry acceptance	+	-	-
	In control of OEM	++	-	+
	Accessibility to primary data	++	-	+
	Practicability	++	-	+

GRPE A-LCA Objectives from ToR

1) To develop an internationally-harmonised procedure to determine the carbon footprint* of different technologies	+	+	++
2) This resolution can be used to help make policy and can encourage automotive industries to reduce carbon footprint	+	+	++
3)Shall be developed respecting the principles of transparency and consistency、also strike a balance between the accuracy and the workload considering the complex supply chain	++	-	+

Benchmarking rating detail

Japan Automobile Standards Internationalization Center

- CFF can evaluate "more different recycling technologies CFP" than Cut off, so better CFF rating on Objective 1 & 2 of ToR

CN countermeasure example in Automotive industry		Recycled content method (Cut off)	Circular Footprint Formula (CFF)
Material production /Recycling	**-Low CO2 material use** (e.g. Green steel/AL, Bio plastic,,,)	++	++
	-Recycled material use (e.g. EAF, Recycled Al/Plastic,,,)	++	+
	-Recyclable material use (e.g. Metal,,,)	-	++
	-High quality closed loop recycling with high quality scrap generation from ELV (e.g. Easy dismantle design, Single material parts design,,,)	+ (Only Automotive use)	++ (Both Automotive and other industry use)
	-ASR thermal recovery reduction with plastic material recycling promotion (e.g. Easy dismantle & single material plastic parts design, ASR sorting,,,)	+ (Only Automotive use)	++ (Both Automotive and other industry use)
Parts Recycling	**-Parts reuse** (e.g. Engine, T/M,,,)	++	++
	-Parts Repurpose (e.g. EV battery repurpose to other industries)	-	++

++ ; Well evaluate + ; evaluate - ; Not evaluate

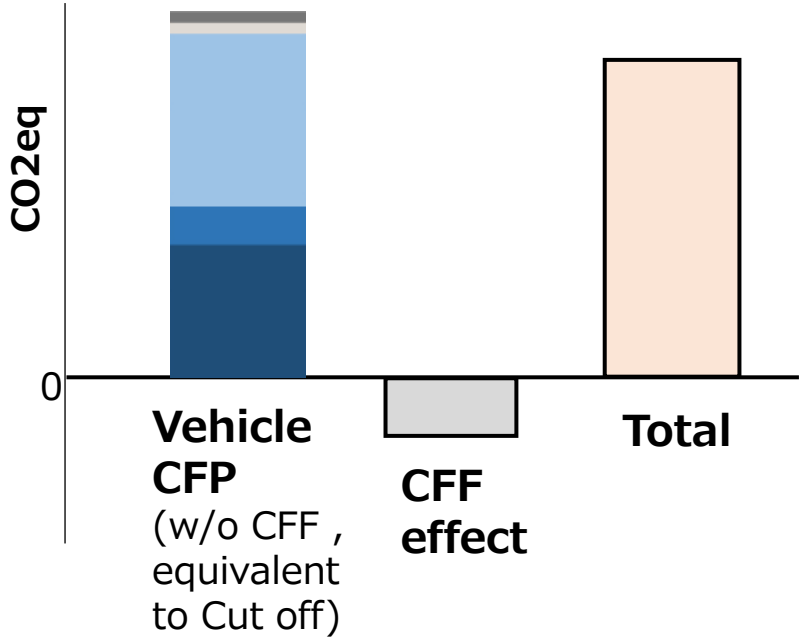
CFF risk mitigation for Objectives 3 of ToR

A-LCA Objectives from ToR	Cut Off	CLAM	CFF
1) To develop an internationally-harmonised procedure to determine the carbon footprint* of different technologies	+	+	++
2) This resolution can be used to help make policy and can encourage automotive industries to reduce carbon footprint	+	+	++
3)Shall be developed respecting the principles of transparency and consistency、also strike a balance between the accuracy and the workload considering the complex supply chain	**++**	**-**	**+ ⇒ ++**

1) STEP by STEP CFF application approach to balance between the accuracy and the workload.

		STEP1 (2025)	STEP2 (2025-)
ELV	Material recycle	**-Steel, Al, Cu** (Main vehicle material)	**-All recycled material**
	Parts Reuse/ Repurpose	**-Traction battery** (Recycled parts with traceability)	**-All recycled parts**
Process Scrap	Material recycle	N/A	**-All process scrap**

2) Manage CFF effect individually for the transparency and the consistency with Cut off



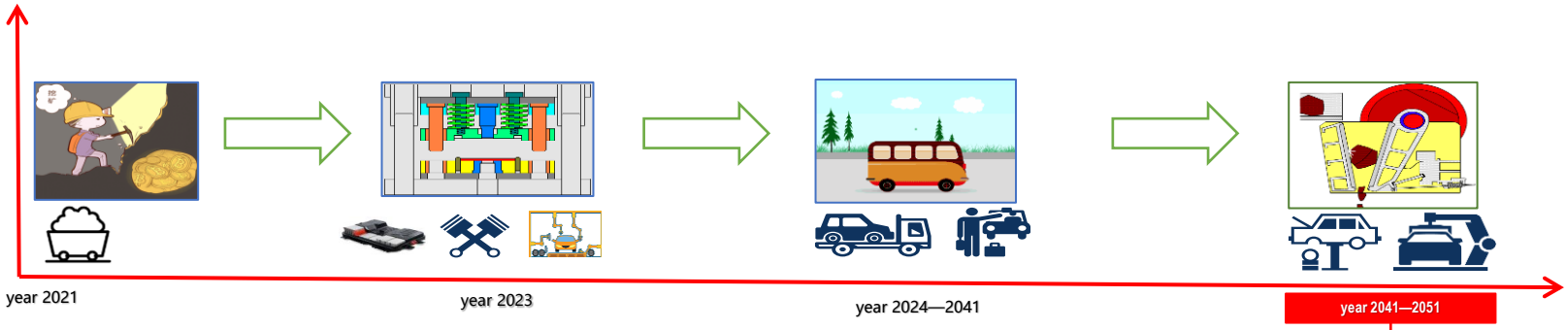
CFF method and CUT-OFF method

in LCA methodology

<CATARC Recommendation>

Both methods should be in the standard

- **First is CFF method** for the purpose of comparing different technical route
- **Second is CUT-OFF method** for the purpose of comparing different individual products



1、CFF method

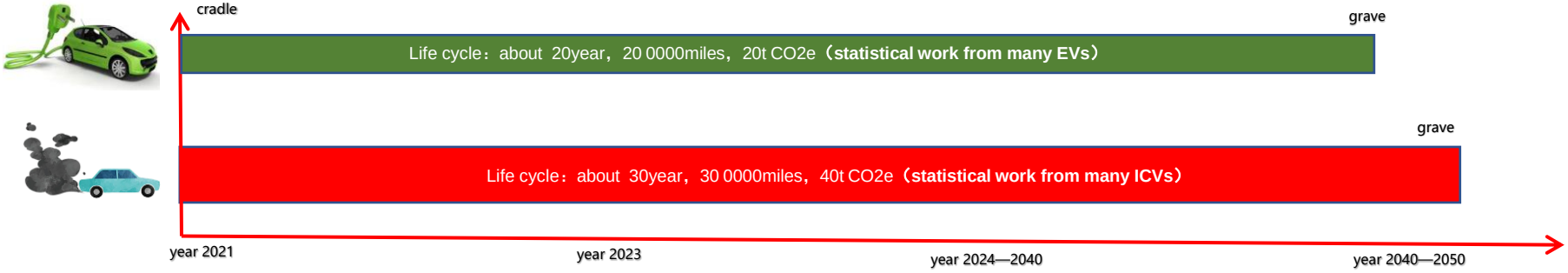
At the year 2051, we can make life cycle assessment by using CFF method, for the purpose of camparing different technical route:

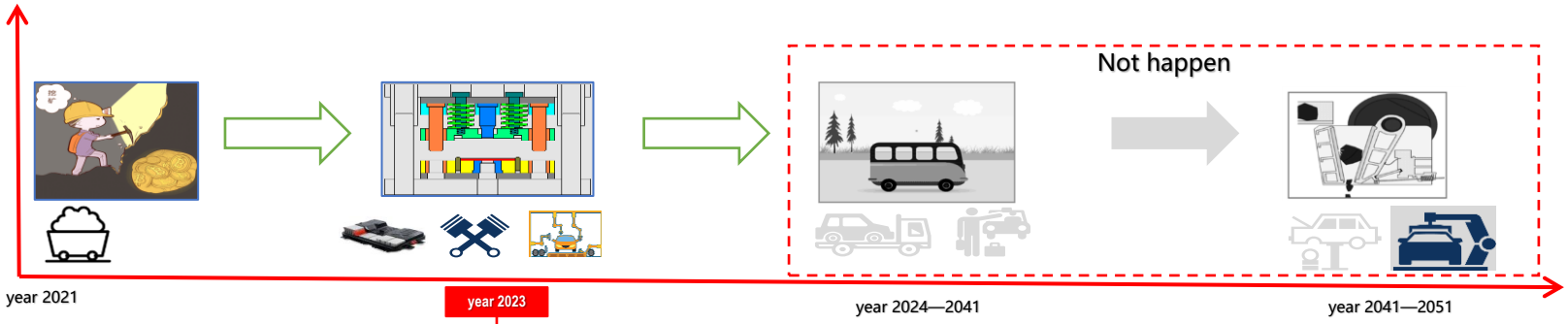
1、Finish the life cycle GHG inventory compiling of **a lot of vehicles** from cradle to grave ;

2、Finish the calculating of the total carbon footprint of **many Vehicles**;

3、Give the **default data** of carbon footprint of materials，components，transportation，Vehicles and so on;

4、Compare the carbon footprint level of **different types of vehicles**（using **default data** of whole Vehicles）。





2、CUT-OFF method

At the year 2023, we can make partial life cycle assessment by using cut-off method, for the purpose of camparing individual Vehicle:

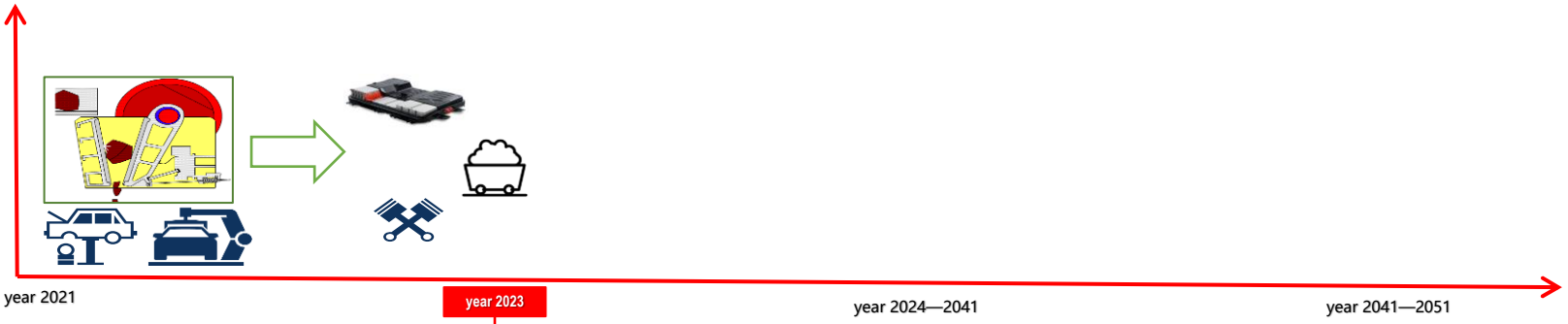
1、Finish the life cycle GHG inventory compiling of **individual vehicle** **from** **cradle to gate** ;

2、Finish the calculating of the total carbon footprint of **individual** Vehicle;

3、Give the **primary data** of carbon footprint of materials, components, transportation, Vehicles and so on;

4、Compare carbon footprint level of different **individual vehicles**（using **primary data and punitive secondary data of** Vehicles）

5、Recycled material usage can be considered at the material stage, EOL stage will be cut-off.



3、For the purpose of promoting recycling

At the year 2023, many Vehicles are disassembled and recycled, these Vehicles are manufactured many years ago, now, we can:

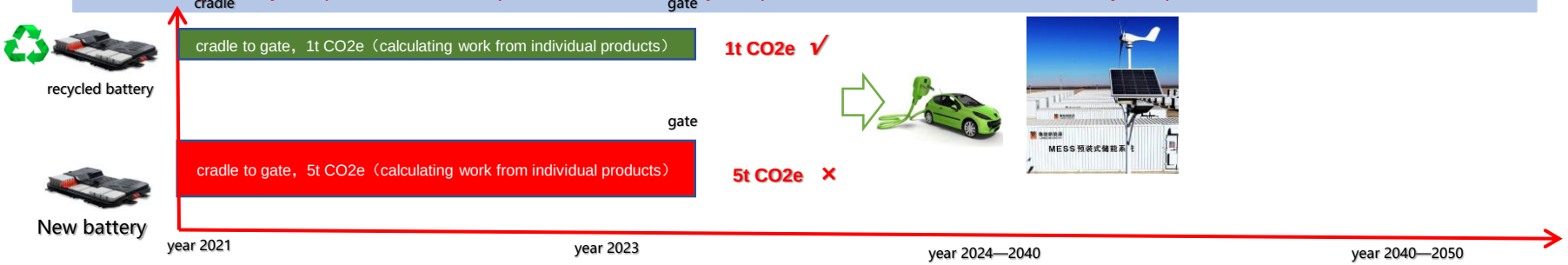
1、Finish the life cycle GHG inventory compiling of **individual End-of-life vehicle** **from cradle（ELV） to gate（recycled products）**：

2、Finish the calculating of the total carbon footprint of **individual** recycled products（reused parts，remanufactured parts，repurposed part，materials）；

3、Give the **primary data** of carbon footprint of recycled materials，recycled components，and so on；

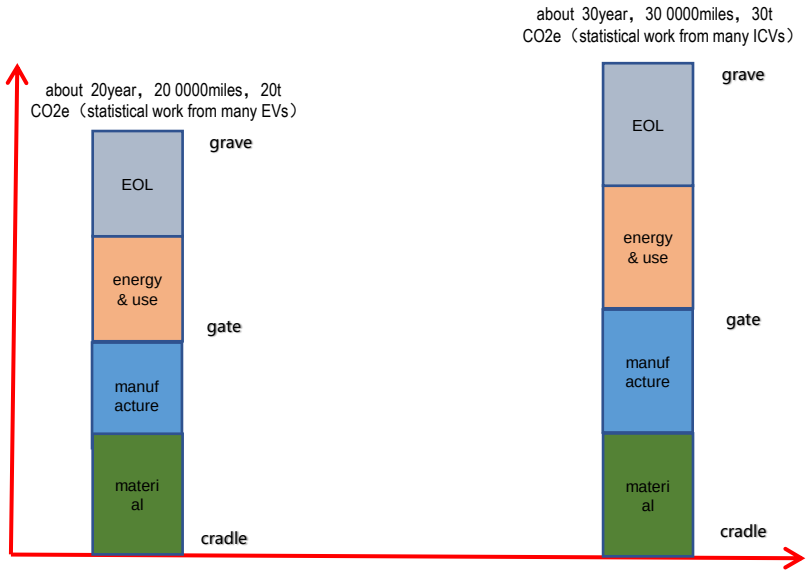
4、Compare carbon footprint level of different **individual recycled products**（using **primary data and punitive secondary data of** recycling process）

5、Focusing on recycled products，we can promote the use of recycled products，because low carbon of recycled products



1、For the purpose of comparing different technical routes（EVs & ICVs）

CFF method



EVs

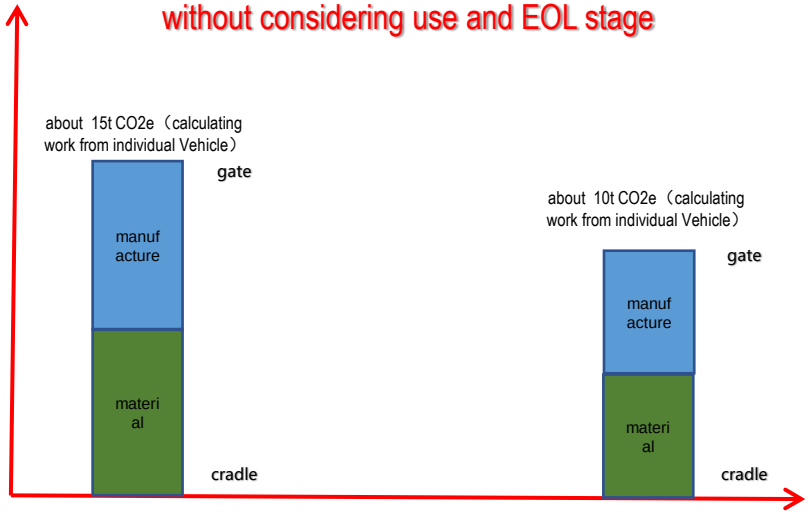
VS

ICVs

2、For the purpose of comparing different individual Vehicles（EV a & EV b）

cut-off method

without considering use and EOL stage



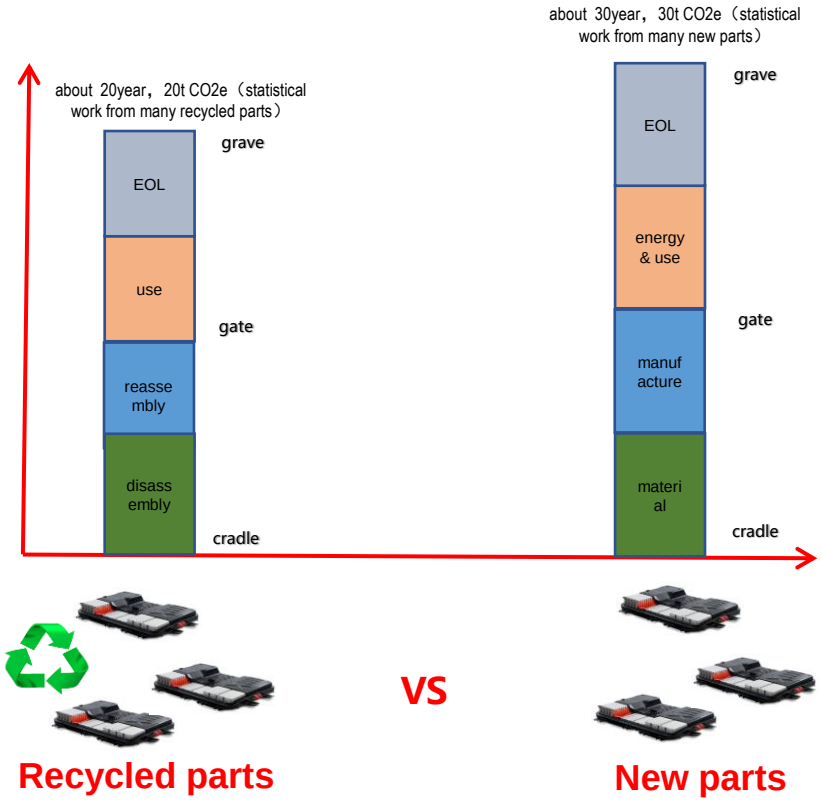
EV a

VS

EV b

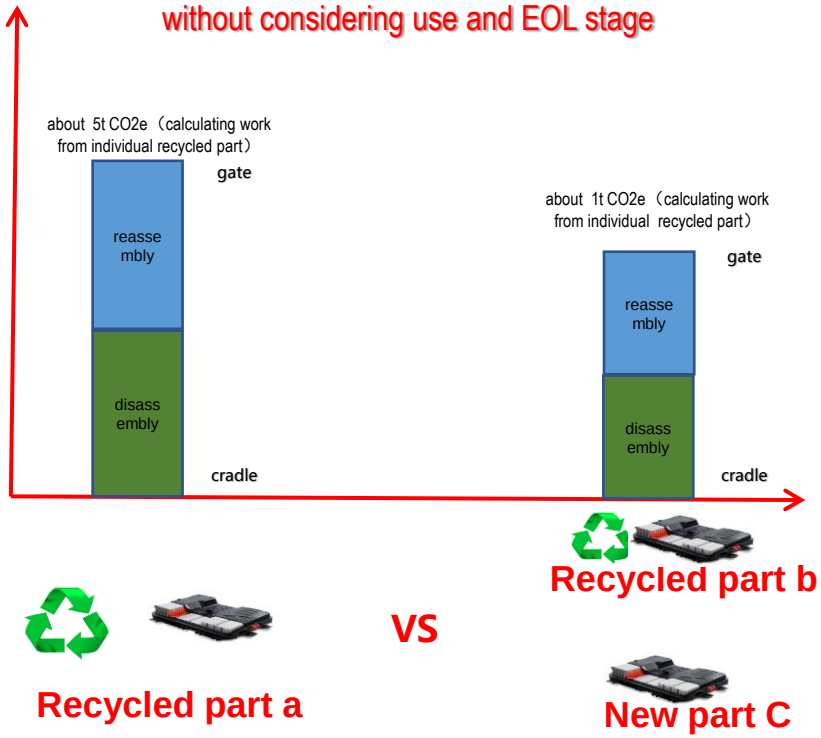
3、For the purpose of comparing different technical routes（Recycled parts & New parts）

CFF method



4、For the purpose of comparing different individual products（Recycled parts & New parts）

cut-off method



PFA | FILIÈRE AUTOMOBILE & MOBILITÉS

PLATEFORME FRANCAISE DE L'AUTOMOBILE - FRENCH AUTOMOTIVE PLATFORM

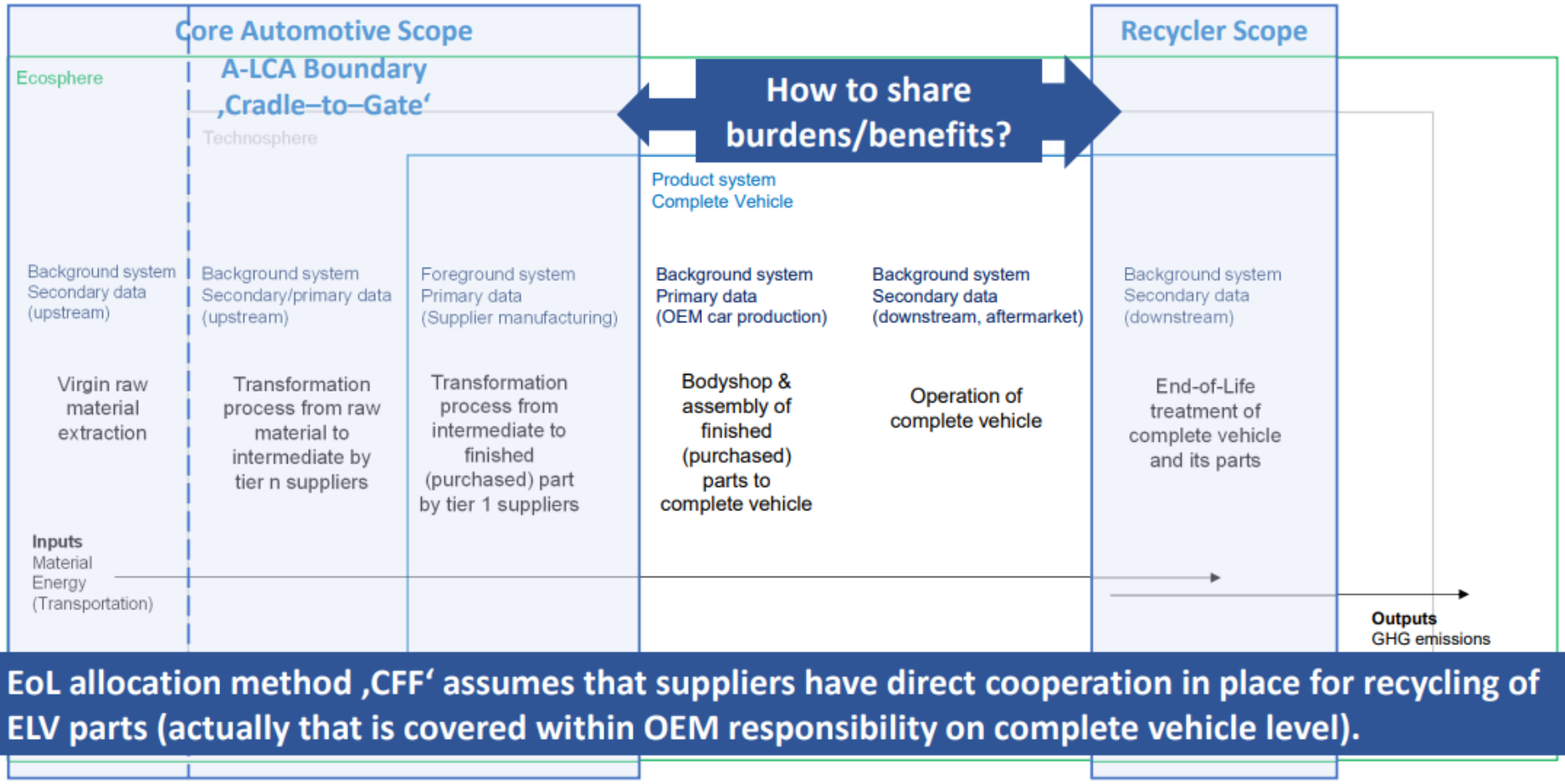
End of Life assessment in Vehicle LCA : CFF vs Cut-off

Yves BABIAN – Renault Group

- Introduce the study for LCA applied to vehicle or vehicle equipment, and the method recommended for vehicle is the cut-off method.
- The main weakness of CFF is 1) it brings many benefits from tomorrow, and low benefits from today's usage of recycled materials. 2) recycled metals used today are mainly from other markets, but only one parameter A in the CFF formula.
- There are specific regulations to force the end-of-life vehicle treatments, therefore Automotive PCR should focus on the upstream circularity by adopting cut-off.
- Two examples from Renault with CFF are given, 1) Flat steel; 2) Tires. In both cases, there're lots of difficulties in the parameters chosen.
- Emphasize again on the support of Zhang's proposal, that to use CFF for technology comparison, and Cut-off for individual vehicle comparison.

CLEPA
European Association of Automotive Suppliers

FOREGROUND & BACKGROUND SYSTEM SUPPLIER



EoL allocation method ‚CFF‘ assumes that suppliers have direct cooperation in place for recycling of ELV parts (actually that is covered within OEM responsibility on complete vehicle level).

Courtesy to Magna LCA team

European Aluminium

END OF LIFE MODELLING

SG5 Meeting - Brussels

19th October 2023

- For aluminium industry, the End-of-life recycling approach is often applied. The CFF modelling approach for metal is very close to the End-of-life approach
- What the industry tries to incentivize is the collection of metal after end-of-life.

Minutes of GRPE A-LCA IWG SG5 meeting #4

Date and time	: Thursday, October 19, 2023, 9:00-12:00 (CET)
Location	: Hybrid meeting (Renault Brussels office, 40 avenue des Arts, 1040 Brussels (4th floor) and online Teams)

Discussion

- CFF and Cut-off approaches were compared under the objectives of ToR. **CFF can evaluate "more different recycling technology", therefore, better than Cut-off for Objective 1&2.**
- To fulfill the transparency target in Objective 3, Japan proposed 1) a step by step approach, in step 1 (2025) only steel, Al, Cu and traction battery will be considered, and extended to other recycled materials in step 2 after 2025. 2) manage CFF effect separately from Vehicle CFP (calculated via Cut-off approach).
- To create secondary datasets for steel, Al and Cu.
- Nuglisch (CLEPA): **Re-emphasize that CFF is good for technology comparison, while Cut-off is good for quantitative evaluation.**
- Yamatomo (JASIC): Cut-off approach might result in using materials that are totally non-recyclable.
- Goy (OCIA): Using Cut-off approach does not obey recyclability, since the ultimate target is to reuse as much as possible.
- Yamatomo (JASIC): Agree, but how to reach the ultimate goal is the responsibility of each OEM.
- Nucci (EU Aluminium): **Life cycle assessment of Vehicle is in the boundary of the OEM, thus OEM also needs to look at the stages covered by other actors.** Meanwhile, there is competition between reuse and recycled content, thus can only incentivize only one. Have seen similar studies before like the CFF effect.
- Nuglisch (CLEPA): To reach concrete CO2 reduction target, **a verifiable method needs to be applied**.
- Yamatomo (JASIC): **SG4 will also need to evaluate future effect**, as they need to take consideration the fuel consumption in 20 years, and they're not possible to verify as well.
- There have been massive discussions on the A-LCA target, and technology evolution, no consistent agreement has been reached.
- Goy (OCIA): **The proposal from China can solve the problematic issue we faced, CFF method be applied at the end-of-life,** when all the data are known and ready. **Cut-off be applied at the beginning of vehicle life**, and you don't need to take any necessary credits that cannot be verified.
- Everyone agrees that the **decision shall be made depending on the A-LCA purpose whether it is for OEM's accountability for the society or for the society/government as the baseline.**
- Yamatomo (JASIC): **CFF and Cut-off can both be applied in A-LCA for different purposes**, just as proposed by China.
- Yamatomo (JASIC): **The group tentatively consider the CATARC proposal as the most appropriate.**
- Actions needed: **Each group take CATARC proposal back for a more widely internal discussion, and discuss again in the next meeting.**
- Martineau (CLEPA): Re-initiate the discussion on thinking of a new method under Cut-off approach, but take the recyclability into consideration.

As of 13th Nov.2023

Material/Parts recycling modeling Internal discussion summary

		Result	Remarks
Leading Team	China (CATARC)	・No update from original proposal	・Detailed boundary and principle of these two methods need to be discussed further
	Japan (JASIC)	・Support CATARC proposal	・Specific use case description on Cutoff or CFF to be discussed respecting ToR of A-LCA
Main Participants	France	・Under study until end next week	・No strong position
	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. ・Secondly, To request of a clear definition/condition when to use which method	
	CLEPA	・Re-assess the position on EoL allocation method	・Cut off preferable until CLEPA concern resolved e.g. EoL CFP responsibility share between OEM and Parts Supplier,,,
	European Aluminum	・Only CFF, need to study Scenario	
Observers	JRC	・Under study until next SG5 meeting	

Discussion to be continued for SG5 one voice

Agenda

1. Material/Parts recycling modeling
2. Secondary data set

2. EoL secondary data set –image-

Topic	Option 1	Option 2	Option 3
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]	*	**	**	**	**	**	***	***	***	***	***	***	***

SG5 to discuss the best option and CFF parameter data set to be added

appendix

1. Organization -Organization Chart-

[1] 20th Nov. '23