GRPE A-LCA IWG
SG5(EoL) Meeting 003

4th Sept. 2023

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

Agenda

1. SG5 002 minutes & 003 agenda confirmation
2. EoL LCA discussion
   1) EoL system boundaries and processes with activity data & Intensity data
      -STEP1. Regional information sharing
      ・Japan ・China
   2) Material/Parts recycling modeling
      - JAMA CFF methodology introduction
3. Next action
   - Next meeting ; 19th October @ Brussels ?

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Minutes of GRPE A-LCA IWG SG5 meeting #2

Date and time : Wednesday, July 12, 2023, 16:00–17:25 (JST)
Location : Online (Teams)
Attendees : See attendee list

Agenda:

1. CFF introduction by JRC
2. 10th July GRPE A-LCA IWG cascade
3. EoL LCA discussion
   1) EoL "CONTROVERSIAL" TOPICS list #2
   2) EoL level concept #2
4. Next action

Notes:

1. CFF introduction by JRC

- At the request of the leading team, the JRC (Mr. Fulvio Ardente) gave a presentation on the CFF methodology pioneered by the JRC, as shown in Appendix 2. There was a lively exchange of questions and answers as below:
  - Zhao (CATARC): I think that there might be some mistakes in the formula.

    Ardente (JRC): The formula should be correct because it has been extensively tested. If there are some questions after you go over the main report on CFF methodology, please get in touch with me without constraint.

- Goy (OICA): You said that the CFF still needs to be adjusted to each sector. Do you plan to adjust it to the automotive sector?

  Ardente (JRC): So far, the development of the PEFCR has followed a bottom-up approach. That is, the industry basically decided to launch the process of developing the methodology through the official or unofficial process. We cannot comprehend all processes in all sectors. It is an automobile manufacturer to consider whether creating PEFCR for vehicles indeed makes sense.

Post meeting note: the JRC provided additional information as below:

- Environmental Footprint methods
  https://eplca.jrc.ec.europa.eu/EnvironmentalFootprint.html
- Work specific on batteries
  https://eplca.jrc.ec.europa.eu/EU_BatteryRegulation_Art7.html

2. 10th July GRPE A-LCA IWG cascade

- Regarding the definition of the product category based on S.R.1 (1998 agreement), the leading team proposed that SG5 opened its eyes to all categories at the early stage of the EoL LCA study. The proposal was adopted.
- It was confirmed again that the product system to be studied is automobiles in the ToR, not specific components such as batteries. However, specific components are obviously assessed in the LCA of automobiles, and the level concept by Korean refers to the PCR of particular components in level three. Therefore, SG5 will continue to discuss how to deal with batteries.

3. EoL LCA discussion

1) EoL “CONTROVERSIAL” TOPICS list #2

- The leading team proposed that the list of controversial topics of OICA was adopted as one of SG5 because there was no negative feedback for OICA’s list from attendees. The proposal was adopted.

2) EoL level concept #2

- The leading team proposed a revised EoL level concept reflecting feedback from attendees. The achievement target in SG5 is level three. The proposal was adopted.

4. Next action

- The leading team proposed 12 months schedule. The proposal was adopted.
- The next meeting in September will be held online. The secretary will schedule the date and time with a meeting scheduling tool.
- At the next meeting, the leading team plans to explain the system boundaries and processes of EoL, which Japan and China are considering, the CFF methodology of JAMA, and the boundary condition between SG2 and SG5.

Appendix 1: Attendee list

Appendix 2: JRC's presentation

2023.07.12 - Meeting A-LCA IV

SG5 003 Agenda confirmation

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JAMA LCA guideline Draft version

End-of-Life stage

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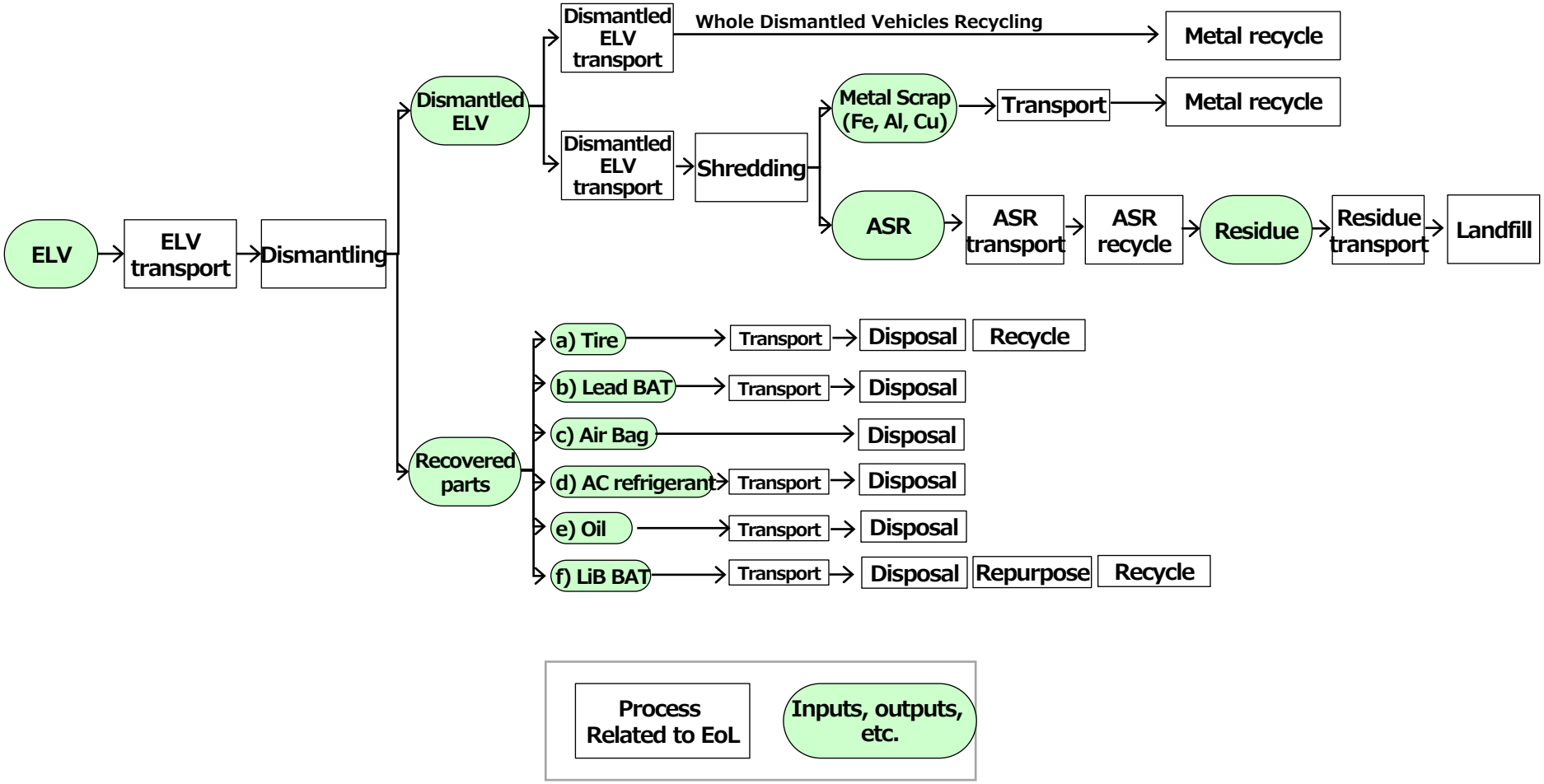
EoL processes in Japan



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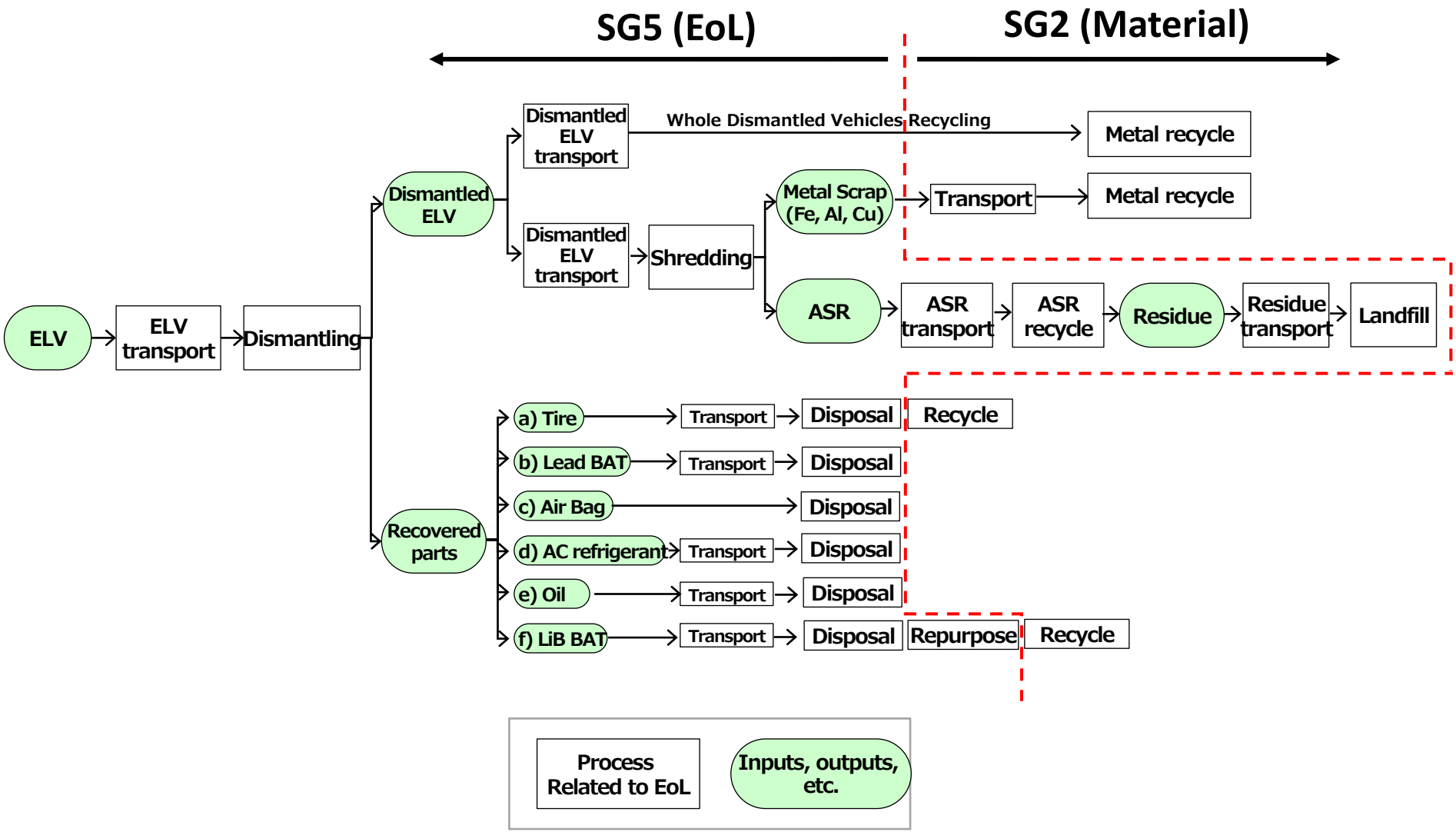
EoL system boundary
-Between SG5(EoL) and SG2(Materials)-



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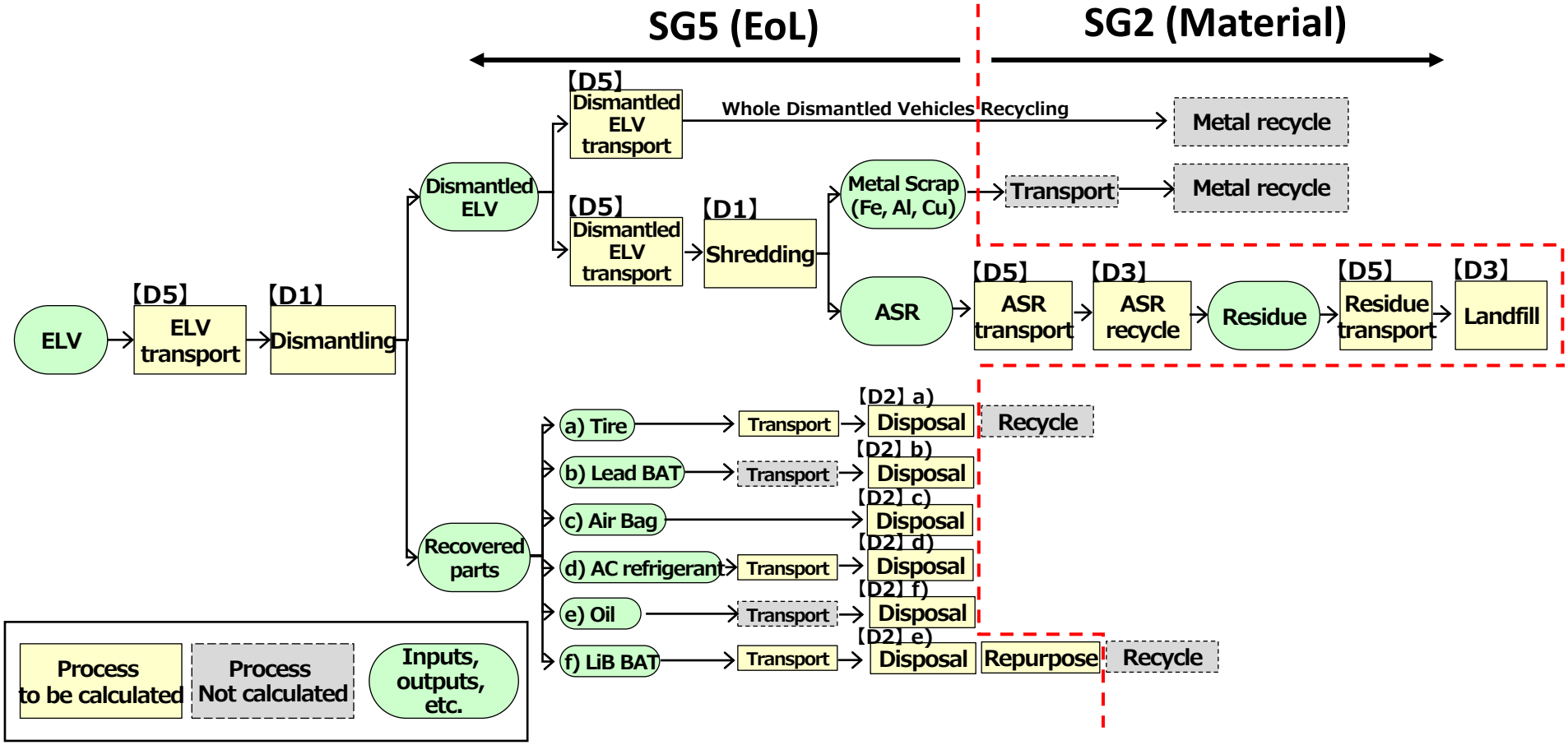
EoL system boundary
- Vehicle EoL CO2 emission-



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

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

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Vehicle EoL CO2 emission with Activity data & Intensity data

EoL processes		Treatment	Activity data (Primary data)	Intensity data [kgCO2/kg] (Secondary data)	Intensity data [kgCO2/kg] CFF effect	Data resource
【D1】 ELV treatment		Dismantling / Shredding	ELV weight [kg]	***		JAMA LCA data set based on JFAR/Mizuho Research&Technologies/(NTT data) report "CO2 emissions visualizationin in overall automobile recycling" (2022)
【D2】 Recovered parts treatment	a) Tire	Disposal (Thermal recovery/Transport/ Recycle/Retread)	Parts weight [kg]	***	***	JAMA LCA data set based on JATMA "Tyre LCCO2 calculation guidelines Ver.3.0.1" (2021)
	b) Lead BATT	Disposal (Plastic parts incineration/Lead scrap treatment/Neutralization treatment)	Parts weight [kg]	***		IDEA ver3.2
	c) Air Bag	Disposal (Air Bag removing)	Parts weight [kg]	***		IDEA ver2.3
	d) AC refrigeran	Disposal (Fluorocarbons Destruction/Transport)	Parts weight [kg]	***		JAMA LCA data set based on MOE/MRI report "Automobile Recycling study for Achieving Carbon Neutrality in 2050" (2021)
	e) Oil	Disposal (Thermal recovery)	Parts weight [kg]	***	***	"List of Calculation Methods and Emission Factors 2020" from Ministry of Economy, Trade and Industry HP
	f) LiB BATT	Disposal	Parts weight [kg]	***		METI·Mizuho Research&Technologies repport "Carbon Footprint Calculating Method of Batteries for Automotive (Draft) ver.1.0" (2022)
		Repurpose	Refer to JAMA CFF			JAMA LCA data set
【D3】 ASR treatment		Disposal (Thermal recovery) / Residue landfill	ASR weight [kg]	***	***	JAMA LCA data set based on MOE/MRI report "Automobile Recycling study for Achieving Carbon Neutrality in 2050" (2021)
【D4】 Material recycle		(Recycle)	Refer to JAMA CFF			JAMA LCA data set
【D5】 Transport		Land transportation for ELV, Dismantled ELV, ASR and Residue	ELV weight [kg]	***		JAMA LCA data set, IDEA ver2.3

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【D1】End of Life Vehicle (ELV) treatment -Dismantling / Shredding-

1) Activity data

- ELV Weight [kg] *Applicable from Motorcycle to Bus/Truck

2) Intensity data

- ELV treatment intensity ; *** [kgCO2eq/kg]

3) Scenario

- Investigated CO2 emission of each Dismantling and Shredding processes in JPN Automotive recyclers with their electricity and diesel fuel consumption.

*Resource ; Interview based on JFAR/Mizuho Research Technologies /(NTT data) report “CO2 emissions visualization in overall automobile recycling" (2022)

【CO2 emission unit data detail】

・Per vehicle						**・Per ELV weight**		**・Total**
ELV treatment processes	**Recycler Average** [kgCO2eq /vehicle]	Recycler				[kgCO2eq/ kg]		[kgCO2eq/kg]
		A	B	C				
Dismantling	***	***	–	***				
Shredding	***	***	***	–				
Total	***				⇨	***	* % ⇨	***
Whole Dismantled Vehicles Recycling	***	–	–	***	⇨	***	* %	

・Average ELV weght; 1100kg

【D2】Recovered Parts　a) Tire

1) Activity data

- Tire Weight [kg] × (1-Wearing rate (%))　*Wearing rate : PC　***　、TB　***

2) Intensity data

	Disposal intensity (with CFF) [kg-CO_2eq/kg]	Details					
		incineration [kg-CO_2eq/kg]	Thermal recovery/Material recycle /Retread Credit (CFF effect) [kg-CO_2eq/kg]				Trans port[kg-CO_2eq/kg]
Passenger car･Motorbike Tire	***	***	***	Thermal recovery	***	***	***
				Material Recycle	0	(-)	
				Retread	0	(-)	
Track･Bus Tire	***	***	***	Thermal recovery	***	***	***
				Material Recycle	***	***	
				Retread	***	***	

*() : Recycling ratio

3) Scenario

- Refer to “JATMA Tire LCCO2 calculation Guidelines Ver.3.0.1”, Tire Disposal GHG emission evaluated with not only Incineration /Transport but also Thermal recovery/Material recycle/Retread by Circular Footprint Formula (CFF)

【D2】Recovered Parts　b) Lead Battery

1) Activity data

- Lead battery weight[kg]

2) Intensity data

	Disposal intensity [kg-CO_2eq/kg]	Details		
		Plastic parts incineration [kg-CO_2eq/kg]	Lead scrap treatment [kg-CO_2eq/kg]	Neutralization treatment [kg-CO_2eq/kg]
Lead battery	***	***	*** *1	*** *2

*1 Calculated with IDEA v2.3 Lead scrap
*2 Calculated with IDEA v2.3 sodium hydroxide

3) Scenario

-Refer to “Ministry of the Environment FY2021 report on research and study work toward the realization of carbon neutrality in automobile recycling in 2050”, Lead Battery Disposal GHG emission evaluated with Plastic parts incineration/Lead scrap treatment/Neutralization treatment
-Lead Battery material recycle not evaluated by CFF due to not enough recycling information

【D2】Recovered Parts　c) Air Bag

1) Activity data

- Air Bag Assy weight [kg]

2) Intensity data

- Air Bag Assy Disposal intensity ;　＊＊＊　[kg-CO_2eq/kg]

＊ Calculated with IDEA v3.2 Air Back removing

3) Scenario

-Air Bag Assy Disposal GHG emission evaluated only with Air Bag removing from ELV.
-Air Bag Material, e.g. Metal, Plastic,, GHG emission included in 【D3】 ASR treatment or【D4】Material Recycle as part of Dismantled ELV

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【D2】Recovered Parts d) AC refrigerant (Fluorocarbons)

1) Activity data

-AC refrigerant (Fluorocarbons) weight [kg], filled in air conditioner at vehicle production

2) Intensity data

	Disposal intensity [kg-CO_2eq/kg]	Details		
		Fluorocarbon Destruction [kg-CO_2eq/kg]	Transport [kg-CO_2eq/kg]	CO2 from Destruction [kg-CO_2eq/kg]
AC refrigerant (Fluorocarbons)	***	*** *1	*** *2	*** *3

*1 Calculated with IDEA v2 Service about destruction of Fluorocarbons
*2 “Car recycle data book 2020” from car recycle promotion center
*3 MRI report

3) Scenario

-Refer to “Ministry of the Environment FY2021 report on research and study work toward the realization of carbon neutrality in automobile recycling in 2050”, AC refrigerant (Fluorocarbons) Disposal GHG emission evaluated with Fluorocarbons Destruction/Transport/CO2 from Destruction

-Cut off CFC Disposal GHG emission due to 2% of total Fluorocarbons in 2021 and no production since 1995

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【D2】Recovered Parts　e) Oil

1) Activity data

- Oil weight [kg]

2) Intensity data

	Disposal Intensity (with CFF) [kg-CO_2eq/kg]	Details	
		Incineration [kg-CO_2eq/kg]	Thermal recovery Credit(CFF effect) [kg-CO_2eq/kg]
Oil	***	*** *1	***

*1 “List of Calculation Methods and Emission Factors 2020” from Ministry of Economy, Trade and Industry HP

3) Scenario

-Refer to “Ministry of the Environment FY2021 report on research and study work toward the realization of carbon neutrality in automobile recycling in 2050”, Oil Disposal GHG emission evaluated with Incineration and Thermal recovery credit by CFF

【D2】Recovered Parts　f) LiB　-Disposal-

1) Activity data

- Used battery pack weight [kg], Combustibles weight in used battery packs [kg]

2) Intensity data

- Refer to METI・Mizuho Research＆Technologies report "Carbon Footprint Calculating Method of Batteries for Automotive (Draft) ver.1.0" (2022)
- Used battery pack disposal unit [kg-CO2eq/kg], CO2 emissions intensity from combustion [kg-CO2eq/kg]

Note: The above intensity will be provided by the secretariat to each calculation entity individually as necessary.

3) Scenario

- Disposal ; Used battery pack weight [kg] × Used battery pack disposal unit [kg-CO2eq/kg]
- Combustion ; Combustibles weight [kg] in used battery pack × CO2 emissions intensity from combustion [kg-CO2eq/kg]

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【D2】Recovered Parts　f) LiB　-Repurpose-

-ELV EV BATT repurpose to other industry-

1) Activity data, 2) Intensity data

- Set R2, Qsout/Qp, E*v and ErecEoL value based on current technology or future technology

	A	R1	R2	Qsin /Qp	Qsout /Qp	Ev [kgCO2 /kg]	E*v [kgCO 2/kg]	Erec [kgCO 2/kg]	ErecEoL [kgCO2/kg]
LiB (30kw)	0.5	0	0.3	-	0.6	3000	←	-	300
	・Default		Tentative value ・BATT recovery ratio		Tentative value ・SOH	Tentative value 100kgCO2/kwh *30kwh			Tentative value ・1/10 Ev

3) Scenario

Virgin BATT prod. impact

Repurpose BATT prod. impact [kg-CO2eq/kg]

$$Ev + R2 \times (1-A) \times (ErecEoL - E^*v \times Qsout/Qp)$$

Credit due to repurposed BATT supply

CFF effect [kgCO2eq/kg]

Trial calculation	CFF effect [kgCO2/kg]
LiB (30kwh)	-225

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【D3】ASR treatment

1) Activity data

- ASR Thermal Recovery Material* Weight [kg]
- Wood Material Weight [kg] (only Truck/Bus)

*PP/PE/PVC/ABS/PA/ PC/PET/PBT/PU/PA/ Rubber (Draft)

2) Intensity data

	Disposal unit (with CFF) [kg-CO_2eq/kg]	Details			
		Incineration [kg-CO_2eq/kg]	Thermal recovery Credit (CFF effect) [kg-CO_2eq/kg]	Electricity recovery Credit (CFF effect) [kg-CO_2eq/kg]	Residue Landfill [kg-CO_2eq/kg]
ASR Thermal Recovery Material	***	***	Under study	Under study	***
Wood Material	***	***	***	***	-

3) Scenario

-ASR Disposal GHG emission evaluated with not only Incineration / Residue Landfill, but also Thermal / Electricity recovery by CFF, under study now.

-Wood material Disposal GHG emission evaluated with Incineration and Thermal / Electricity recovery, not with CO2 absorption effect

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【D4】Material Recycle

1) Activity data

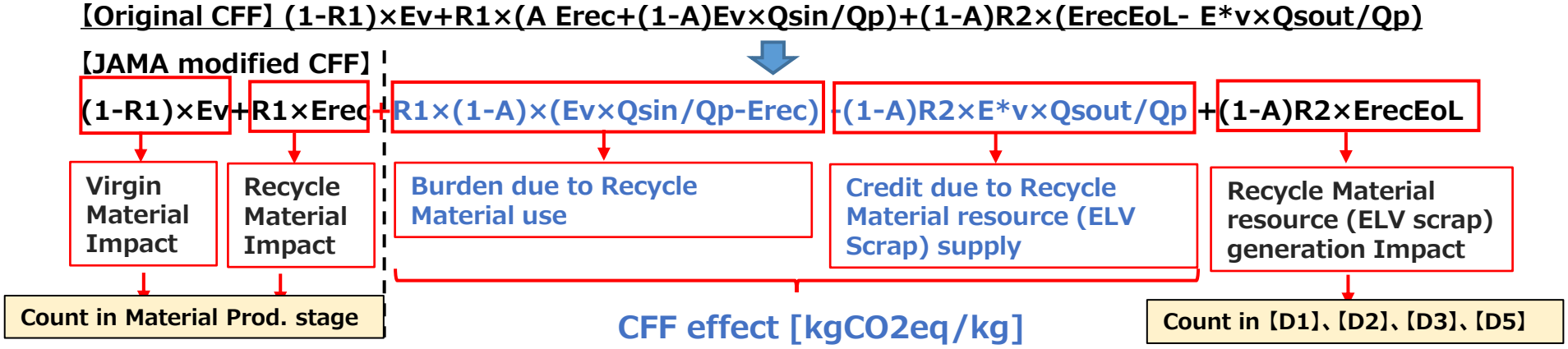
- Material weight [kg] ; Steel, Aluminum, Copper

2) Intensity data

- CFF effect [kgCO2eq/kg] ; Calculate CFF effect referring to CFF parameter of each material in Material CFF parameter data set

3) Scenario

- Evaluate CO2 emission on Material Recycle by Circular Footprint Formular (CFF), especially with “CFF effect” below.



- Total material CFF effect ;
  Σ (Material weight [kg] × CFF effect of each material [kgCO2eq/kg])

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【D4】Material Recycle

4) Materials CFF parameter data set (Draft)

* CFF parameters is now being determined and managed as secondary data @ JAMA LCA Guideline in 2023

■Materials CFF parameter

Material type			CFF parameter								
			Ev	Ev*	Erecycle	A	R1	R2	Qsin /Qp	Qsout /Qp	Erecycle EoL
Steel	1	Cast iron	***	***	***	***	***	***	***	***	-
	2	Cold rolled steel sheet	***	***	***	***	***	***	***	***	-
	3	***	***	***	***	***	***	***	***	***	-
	10	Long steel	***	***	***	***	***	***	***	***	-
	14	***	***	***	***	***	***	***	***	***	-
AL	15-1	***	***	***	***	***	***	***	***	***	-
	15-2	Cat AL for AL R/W	***	***	***	***	***	***	***	***	-
	16	Cast AL	***	***	***	***	***	***	***	***	-
	17	AL sheet	***	***	***	***	***	***	***	***	-
	18	***	***	***	***	***	***	***	***	***	-
Cu	19	***	***	***	***	***	***	***	***	***	-
	22	***	***	***	***	***	***	***	***	***	-

【D5】Transport

1) Activity data

- ELV weight [kg]

2) Intensity data

- Whole ELV processes transport intensity; ***　[kgCO2eq/kg]

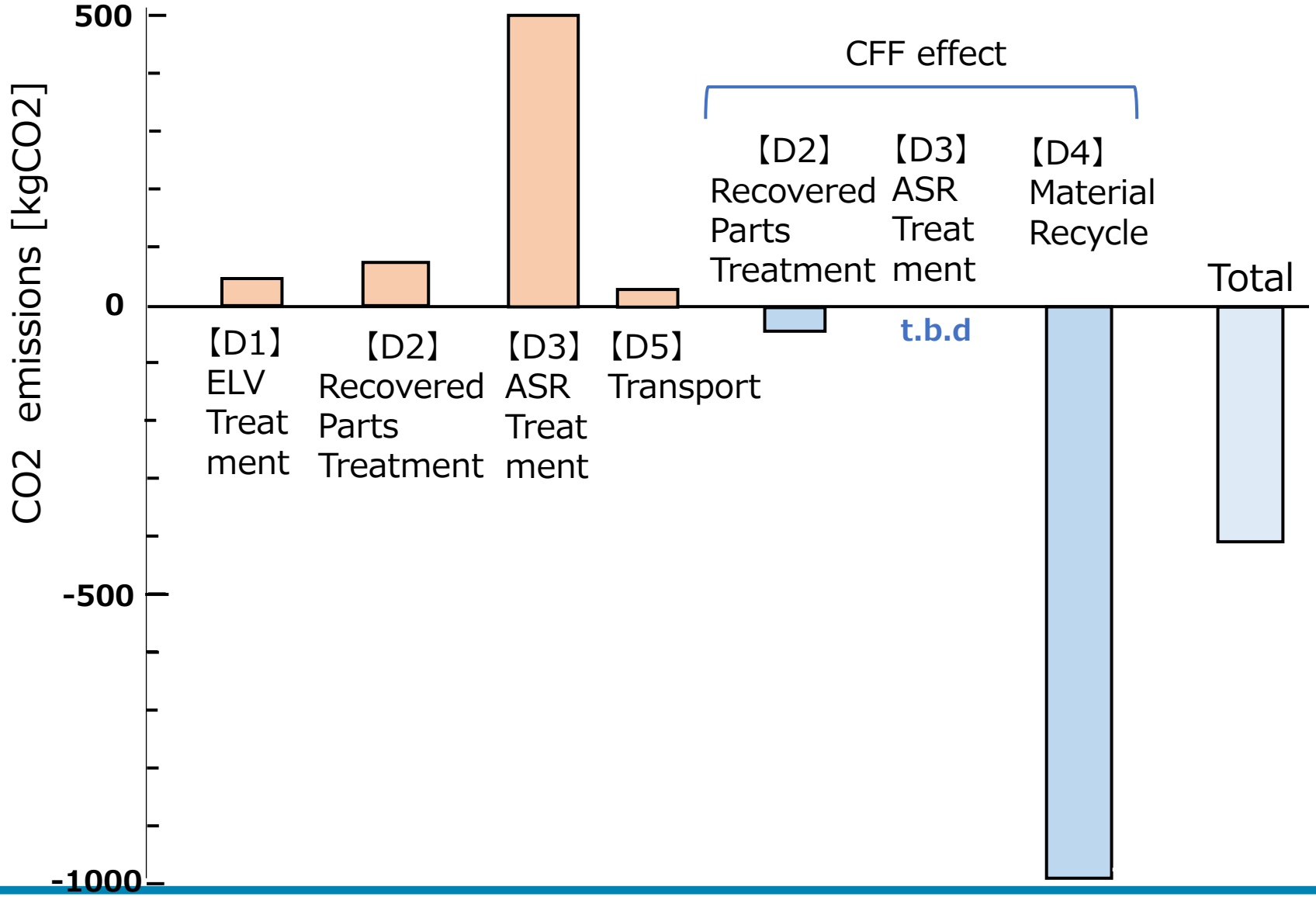
3) Scenario

- Calculated whole ELV processes transport intensity with 5 transport processes intensity by Transport weight factor, Transport Distance and Transfer ton-km intensity.

Functional unit data detail

Transport processes [Tranport]			Transport weight factor	Transport Distance [km] Round Trip	Transport ton-km intensity [kgCO2eq /t/km]	Each Transport Intensity [kgCO2eq/ kg]	Whole Transport Intensity [kgCO2eq/ kg]
			2011 JAMA LCA guideline	MRI report method	2011 JAMA LCA guideline		
A	Dealer→Dismantler	[ELV]	***	***	***	***	***
B	Dismantler→Shredder	[Dismantled ELV]	***	***	***	***	***
C	Dismantler→Metal Recycler	[Dismantled ELV]	***	***	***	***	***
D	Shredder→ASR Recycler	[ASR]	***	***	***	***	***
E	ASR Recycler→Landfill	[Residue]	***	***	***	***	***
						Total	***

EoL CO2 emissions trial calculation on B-segment passenger vehicle



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邦普循环
BRUNP RECYCLING

EoL Vehicles Recycling Industry Introduction in China

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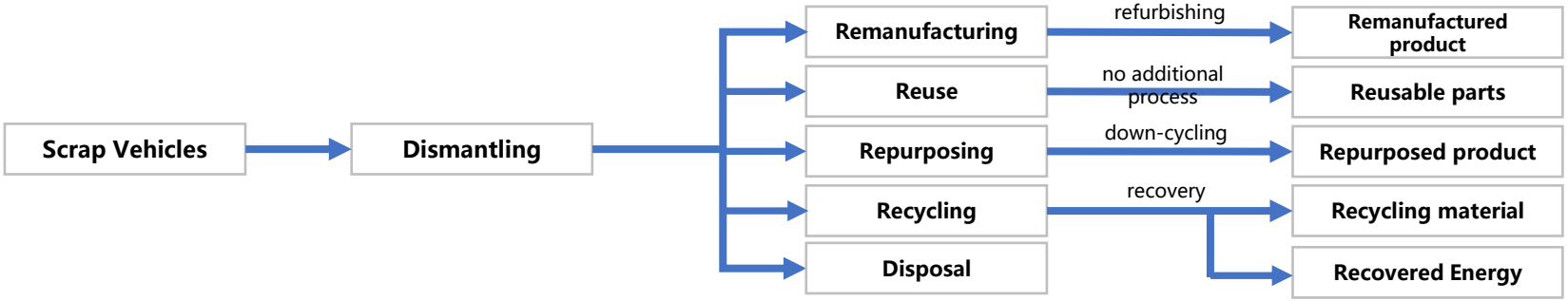
1 Recycling industry scale

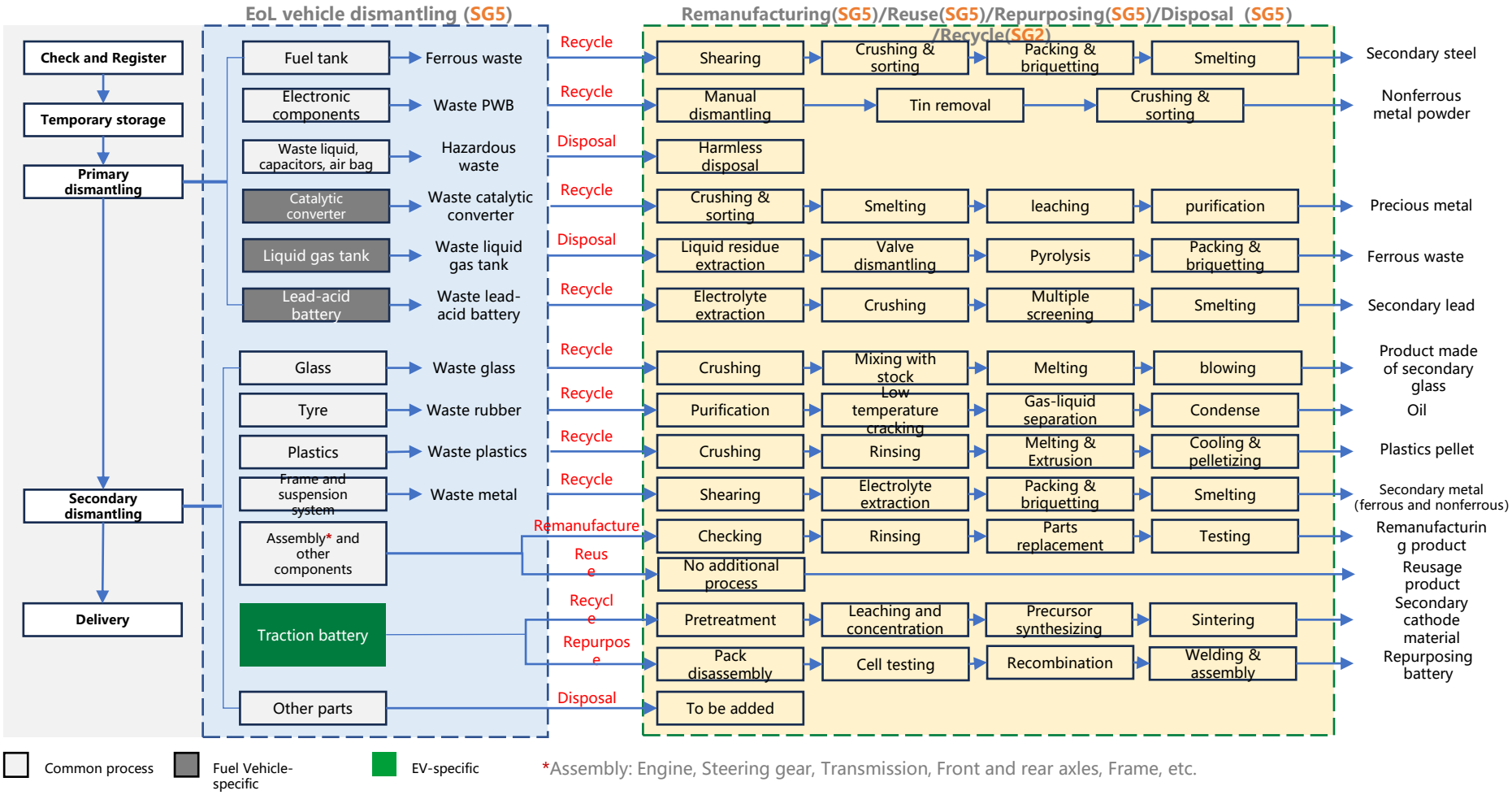
Based on the large number of EoL vehicles, Chinese vehicle recycle has attracted many financial and technological investment so that a complete industrial chain and mature market have established.



Enterprise Type	Number of qualified enterprise	Processing capacity/market value
EoL vehicle dismantling enterprise	1300+	3.5 million vehicles per year
Vehicle and components remanufacturing enterprise	1000+	50 billion CNY (9.98 trillion JPY)
Vehicle and components reuse enterprise	250+	15 billion CNY (300 billion JPY)
Waste glass recycling enterprise	300+	10 million tons per year
Waste metal recycling enterprise	1600+	30 million tons per year
Waste plastics recycling enterprise	1000+	19 million tons per year
Tyre (rubber) recycling enterprise	1500+	6.75 million tons per year
Lead-acid battery recycling enterprise	572	6.65 million tons per year
Traction battery recycling enterprise	88	100.2 thousand tons per year

Data：Chines white list of traction battery recycling enterprises, Industry research reports, Tianyan check.

2 Dismantling parts processing of EoL vehicle



Annex | Remanufacturing pilot enterprises

Since 2008, in order to promote the development of a circular economy, the National Development and Reform Commission of China has initiated a pilot programme for the remanufacturing of automotive parts and components. The following is the partial list of remanufacturing pilots that have passed acceptance.

Remanufacturing of automotive parts
Volvo Construction Equipment (China) Co., Ltd.
ZF SERVICES(China) Co., Ltd.
Shanghai Xinfumei Gear Boxes Technology Service Co., Ltd.
Zhangjiagang Furui Special Equipment Co., Ltd.
Yuchai Remanufacturing Services (Suzhou) Co., Ltd.
Quanxing Machining Group Co., Ltd.
Zhejiang Hand In Hand Recovery Auto Parts Co., Ltd.
Hunan Oil Pump Co., Ltd.
JIANG XI JIANG Ling MOTOR Company Group Industry Co., Ltd.
Guangzhou Kuayue Automobile Parts Industry & Trade Co., Ltd.
Shaanxi North DYNAMIC Co., Ltd.
Wabco China Co., Ltd.
Sankaku (Xiamen) Auto Parts Co., Ltd.

Remanufacturing technical services
Beijing Aoxue Ksin Surface Engineering Technology Co., Ltd.
Hebei Ruizhao Laser Remanufacturing Technology Stock Co., Ltd.
Shandong Energy Heavy Equipment Group Dazu Remanufacturing Co., Ltd.
Remanufacturing reverse logistics recycling system
Hebei Logistics Industrial Group Co., Ltd.
Chuzhou Hongwu Scrap Car Recycling Co., Ltd.
Remanufacturing professional equipment production
Wuhan Farley Laserlab Cutting Welding System Engineering Co., Ltd.

*Remanufactured products include: engines, transmissions, starters, generators, etc.

Overview of China's Remanufacturing Related Policies

The remanufacturing industry is of great significance, as it not only relates to the development of the circular economy but also to expanding domestic demand and environmental protection. China's remanufacturing industry started relatively late and has a lengthy industrial chain, involving policies, regulations, standards, technology, and organization. It is a rather complex systemic project

Compared to manufacturing new products, remanufactured products **Cost 50%** ↓ Atmospheric pollutant emissions **80%** ↓ Energy saving **60%** Material conservation **70%**

1994

The concept of remanufacturing automotive components has gradually entered China. The former Ministry of Machinery Industry, the former Ministry of Foreign Trade and Economic Cooperation, and the General Administration of Customs jointly approved the establishment of China's first automotive engine remanufacturing company, marking the beginning of the exploration journey for remanufacturing automotive parts in our country

2005

The National Development and Reform Commission (NDRC) has included the remanufacturing of automotive components in the pilot catalog for the circular economy. The State Council issued Documents No. 21 and No. 22, clearly indicating that the country will support the remanufacturing of discarded mechanical and electrical products and list 'green remanufacturing technology' as one of the projects receiving increased financial support from the government.

2008

The 'People's Republic of China Circular Economy Promotion Law' has officially come into effect. This law stipulates that the state supports enterprises in engaging in the remanufacturing of automotive components, construction machinery, machine tools, and other products. Remanufacturing has been formally included within the legal framework

2009

The National Development and Reform Commission (NDRC) has successively identified two batches of 42 automotive component remanufacturing enterprises to carry out pilot projects. The scale and scope of China's automotive component remanufacturing industry are gradually expanding, and it is beginning to have an influence

2019

"The State Council has introduced a series of policies to support and outline opinions on the standardized development of the remanufacturing industry. In April 2021, the National Development and Reform Commission, in conjunction with eight other ministries, issued the 'Interim Measures for the Normative Management of Remanufacturing of Automotive Components'

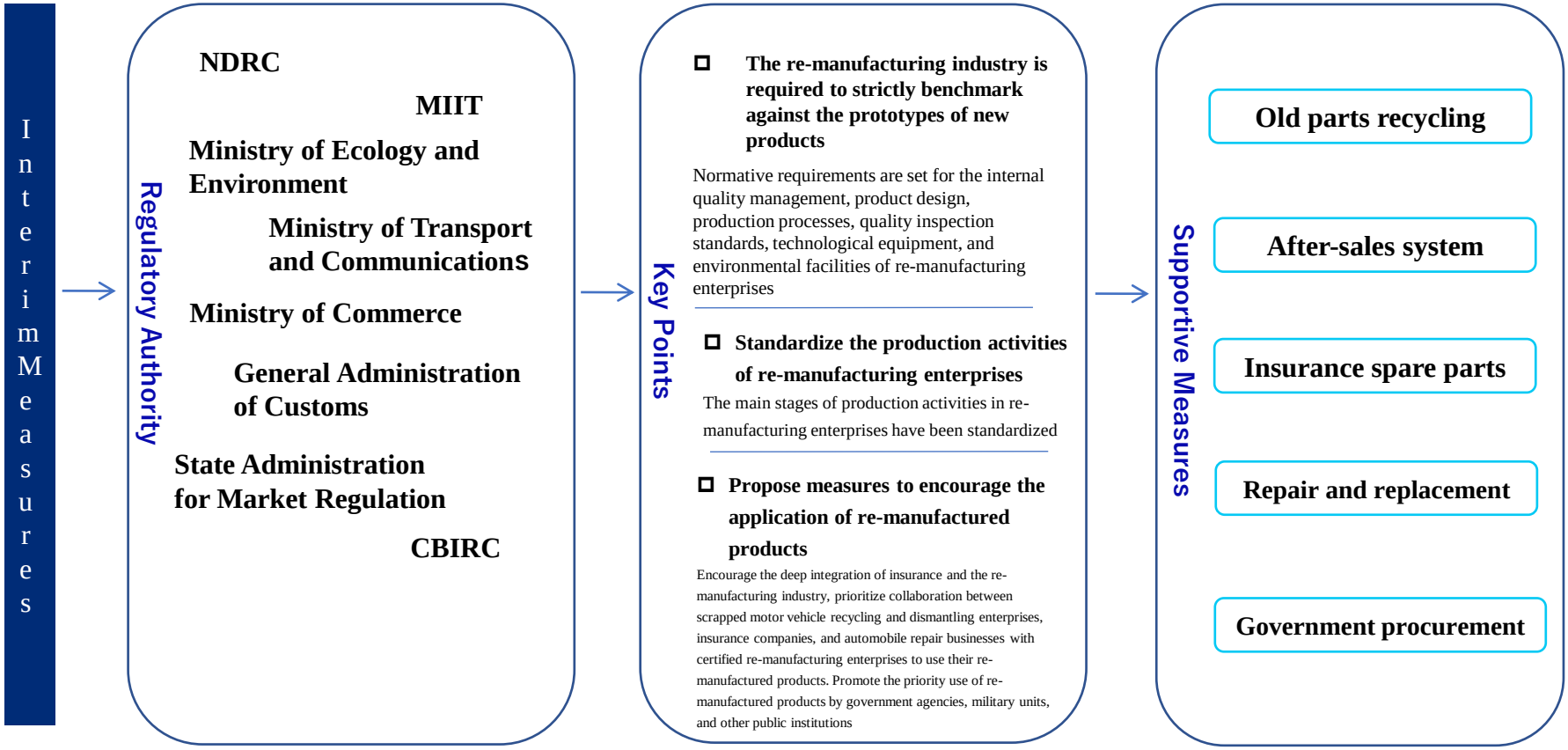
2020

"On September 1st, 2020, the 'Measures for the Management of Scrapped Motor Vehicle Recycling' were officially implemented. It explicitly stated support for the development of automotive component remanufacturing, providing a legal basis for the growth of the automotive component remanufacturing industry.

2021

<Interim Measures for the Standard Management of Automotive Component Remanufacturin>

In April 2021, the National Development and Reform Commission (NDRC) of China issued the 'Interim Measures for the Standard Management of Automotive Component Remanufacturing.' This is the first comprehensive regulatory document in China's automotive component remanufacturing sector, marking a significant milestone in the development of China's remanufacturing industry. It signifies that China's automotive component remanufacturing industry has transitioned from the pilot phase to a stage of comprehensive and standardized development



<Interim Measures for the Standard Management of Automotive Component Remanufacturin>

Further regulate the development of the automotive component remanufacturing industry, stabilize the market order of the automotive component remanufacturing industry, extend the automotive component industry chain, and promote the upgrading of the automotive after-sales market system

Re-manufacturing enterprises (primary entities responsible for the quality of re-manufactured products) → **Re-manufactured products** → **Re-manufactured product sales enterprises Automobile repair enterprises**

What:

1. Possess technical equipment and capabilities in disassembly, cleaning, manufacturing, assembly, and product quality testing.

2. Possess technical means and capabilities to test and assess the performance indicators of used components.

3. Have appropriate pollution prevention facilities and capabilities, and comply with relevant environmental protection requirements for waste management and disposal.

4. Establish and implement relevant technical quality standards and production specifications for product re-manufacturing.

5. Make public commitments to society, including product quality performance, after-sales warranties, and proper labeling usage.

How：

1. Adopt international cash quality management standards to enhance management levels.
2. Recycle old components for re-manufacturing from qualified scrapped motor vehicle recycling and dismantling enterprises, as well as other legal and compliant channels.
3. Establish standards for old parts recycling to ensure the conditions for re-manufacturing are met.
4. List the inventory of identifiable old components and the inventory of re-manufacturable parts possessed by the enterprise.
5. For purchased scrapped automobiles, the "five major assemblies" that are not used for re-manufacturing within the company will be sold as scrap to smelting or crushing enterprises.
6. Clearly stipulate that the performance and quality of re-manufactured products shall not be inferior to those of prototype new products, and that the standards for factory inspection, mandatory certification, and warranty shall be the same as those for new products.
7. Provide quality assurance and after-sales service for re-manufactured products produced and sold, which shall be no less than those for prototype new products.
8. Utilize the "Unified Coding and Marking of Automotive Components" to establish a full lifecycle traceability system for re-manufactured products.

1. The quality should meet the quality standards of prototype new products, safety standards should not be lower than the national requirements for prototype new motor vehicle components, and environmental performance should meet relevant national standards.
2. Re-manufacturing enterprise logos and "Re-manufactured Product" markings should be prominently displayed in a way that is permanent. Packaging and product manuals should include information such as the re-manufacturer's name, address, production date, product standards, and traceability codes for major assemblies.
3. Entry into the production stages of complete automobile enterprises is prohibited

When selling and using re-manufactured products, provide consumers with information indicating that the product is a re-manufactured product. Also, offer a certificate of product quality compliance for re-manufactured products, information about quality guarantees, and an after-sales quality warranty manual

Automobile repair enterprises:
Include information about the use of re-manufactured products in the maintenance cost settlement list provided to consumers, and upload this information to the Ministry of Transport's electronic health record system for automobile repairs

The definition of automotive component remanufacturing has been clarified

It refers to the process of professionally repairing or upgrading old automotive components that are no longer used due to functional damage or technological obsolescence, ensuring their quality characteristics and safety and environmental performance are not inferior to prototype new products

……

<Implementation Plan for the Pilot Extension of Automotive Product Producer Responsibility>

Background: In recent years, China has attached great importance to and vigorously promoted the Extended Producer Responsibility (EPR) system, carrying out top-level design and issuing a series of policy documents related to the EPR system. The management of automotive product EPR has been gradually incorporated into the legal framework, emphasizing the primary responsibility of production enterprises for the recycling of scrapped automobiles and the comprehensive utilization of resources

Policy guidance

Initiation

2016 **Implementation Plan for Extended Producer Responsibility System**

Concept Introduction

Development

2019 - 2022

- Law on the Prevention and Control of Solid Waste Pollution to the Environmen
- Measures for the Management of Scrapped Motor Vehicle Recycling
- 14th Five-Year Plan for the Development of Circular Economy
- 14th Five-Year Plan for Green Industrial Development
- The 14th Five-Year Plan and the Outline of Long-Term Goals for 2035
- Accelerating the Implementation Plan for Industrial Resource Comprehensive Utilization

Comprehensive Deployment

Focus

2021 **Implementation Plan for the Pilot Extension of Automotive Product Producer Responsibility**

Pilot Exploration

Trend

Extended Producer Responsibility Regulations for Automotive Product Producers

Policy Constraints

<Implementation Plan for the Pilot Extension of Automotive Product Producer Responsibility>

Policy Basic Information

Implementation Plan for the Pilot Extension of Automotive Product Producer Responsibility

Basic Approach

- ✓ Subject: Production Enterprises
- ✓ Focus: Recycling and Reuse
- ✓ Foundation: Market Mechanism
- ✓ Driving Force: Technological Innovation

Pilot Objectives

till 2023

- ✓ Significant improvement in the standardized recycling level of scrapped automobiles.
- ✓ Steady improvement in the utilization of regenerated resources from scrapped automobiles.
- ✓ Resource comprehensive utilization rate reaching 75%.
- ✓ Recyclable utilization rate reaching 95%.
- ✓ The proportion of regenerated materials for key components exceeding 5%

Pilot Content

- ✓ Establishing a recycling system.
- ✓ Promoting comprehensive resource utilization.
- ✓ Implementing green supply chain management.
- ✓ Enhancing information transparency

Implementation and Management

Product Scope:

- ✓ Automotive products sold and used within China's territory.

Declaration Conditions:

- ✓ Declaration should be primarily conducted by automotive enterprises. Encouragement is given for joint declarations involving other related enterprises, scrapped motor vehicle recycling and dismantling enterprises, and comprehensive resource utilization enterprises.

企业类型&具体要求

Auto Makers

Entities must be registered within China's territory and possess independent legal personality, and they must have obtained the "Announcement of Road Motor Vehicle Manufacturing Enterprises and Products" for domestic automotive production enterprises. Additionally, automobile import enterprises that import vehicles from overseas and sell them domestically, and have obtained mandatory product certification, are also eligible

Scrapped Motor Vehicle Recycling and Dismantling Enterprises

Enterprises that have obtained qualifications for scrapped motor vehicle recycling and dismantling, and are engaged in scrapped motor vehicle recycling and dismantling operations.

They must have sound management systems, leading industry capabilities, and a high level of energy conservation and environmental protection.

Their production and operations must comply with national and local laws, regulations, and standards, and they should have had no significant safety or environmental incidents in the past three years

Comprehensive Resource Utilization Enterprises

Engaged in production and operational activities related to comprehensive resource utilization. These enterprises possess the capability to carry out comprehensive resource utilization, including re-manufacturing, and meet relevant requirements

Note: Deadline for application: August 31, 2021. Pilot period: 2 years. The application period for the first batch of pilots has concluded, and the next batch has not yet begun

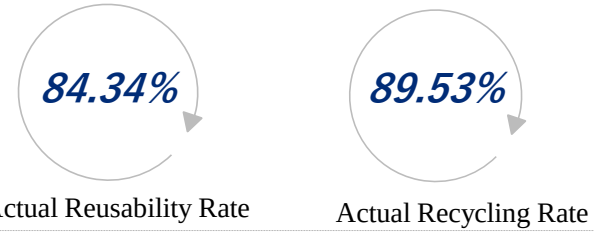
<Implementation Plan for the Pilot Extension of Automotive Product Producer Responsibility>

EPR Platform's Practical Dual Rates Calculation and Regenerated Materials Management Module:
Scrapped motor vehicle recycling and dismantling enterprises calculate the actual reuse rate and actual recycling rate by recording data from the disassembly of scrapped vehicles in real recycling and utilization scenarios. Simultaneously, the proportion of regenerated materials used is calculated, advancing the implementation of the EPR dual rates requirements

Actual Dual Rates Calculation Module

Input	**Gross Vehicle Weight (GVW)**	**Preprocessing**	**Dismantling**	**Metal Recycling**	**Reusability**	**Energy Recovery**
Output	**Actual Reusability Rate**			**Actual Recycling Rate**		

Actual Dual Rates Situation (Baseline Data)



Actual Reusability Rate Actual Recycling Rate

Regenerated Materials Management Interface

Part	Applicable Vehicle Models	Regenerated Materia
Part Weight	Regenerated Material Weight	Regenerated Material Usage Ratio
Regeneration Technology		

Future Trends in EPR Supplier Management

Green SC

Risk Model
Supplier Risk Rating Assessment Indicators: Economic, Social, BenefitsEnvironmental

Supplier's Raw Data Recording

Risk Assessment: Supplier's Five-Point Rating Evaluation

Dual Rates Calculation

Policy Status: Currently, policies only impose constraints on the first batch of pilot host factories, and there are no direct requirements yet for tier-one suppliers.

Next Steps Plan: We plan to officially submit the "Norms for Calculating Reuse Rate and Recycling Rate of Scrapped Vehicles" for approval later this year

<Management Methods for Recycling of Scrap Motor Vehicles>

- On April 22, 2019, the State Council promulgated the "Management Methods for Recycling of Scrap Motor Vehicles" (hereinafter referred to as the "Methods"), which came into effect on June 1, 2019.
- The purpose of the "Methods" is to standardize the recycling of scrap motor vehicles, protect the environment, promote the development of circular economy, and ensure road traffic safety.

Revision Background

This "Method" is a revision based on the "Management Methods for Recycling of Scrap Motor Vehicles" issued by the State Council in 2001.

■ Three reasons for the revision:

1. Remanufacturing challenges: With the national emphasis on developing a circular economy, remanufacturing of automotive components is one of the key areas. However, the regulations in the "Management Methods for Recycling of Scrap Motor Vehicles" that require the "five major assemblies" to be sold to steel companies limit the access of remanufacturing enterprises to old parts.

2. Environmental protection: Higher environmental requirements call for effective measures to address environmental pollution issues such as solid waste and waste oil during the process of scrapped car recycling.

3. Market intervention and regulatory alignment: The scrapped car recycling industry needs to reduce market intervention and optimize administrative permits; at the same time, the new regulations must be aligned with the latest laws and regulations to ensure consistency.

Main Content

1.The "five major assemblies" of a car can be recycled and reused

The "Methods" allow the remanufacturing of scrapped car "five major assemblies", improving the reuse rate of old parts and reducing environmental pollution.

2.More companies will participate in the recycling process

The "Methods" encourage automotive manufacturing companies to establish recycling enterprises, introduce reward and subsidy policies, and promote more companies and vehicle owners to actively participate in recycling.

3.Unauthorized disposal of scrapped vehicles may face heavy penalties

Unauthorized individuals engaging in scrapped vehicle recycling without certification may face confiscation of illegal proceeds and heavy fines, in order to maintain order in the recycling process**.**

4.The automotive industry develops in a more standardized and transparent manner

Policies encourage remanufacturing, guide qualified enterprises to participate in recycling, clarify punishment measures, strengthen supervision and inspection systems, provide convenience measures, and promote standardized and transparent development of the automotive industry.

<Management Methods for Recycling of Scrap Motor Vehicles>

- The "Detailed Rules" is a policy document jointly released by the Ministry of Commerce and other departments on July 18, 2020.
- The release of these rules aims to standardize the recycling and dismantling activities of scrapped motor vehicles, strengthen the management of the scrapped motor vehicle recycling and dismantling industry, and promote the development of the motor vehicle environmental protection and resource recycling industries.

Main Content

01

Clarify Responsibilities： Clarify the definition and related responsibilities of scrapped motor vehicle recycling and dismantling activities, and stipulate that the Ministry of Commerce is responsible for implementing supervision and management, while development and reform, industrial and information technology, public security, ecological environment, transportation, market supervision and other departments are responsible for relevant supervision and management within their respective responsibilities.

02

Detail Recycling Process： The recycling process of scrapped motor vehicles has been detailed, including the qualification certification of recycling and dismantling enterprises, specific operational specifications for recycling and dismantling activities, and environmental protection requirements during the recycling and dismantling process.

03

Regulate Price Standards

The price standards for recycling and dismantling of scrapped motor vehicles are defined to prevent unreasonable low-price recycling and malicious price competition.

04

Encourage Remanufacturing and Resource Recycling

Provisions have been made for the remanufacturing and resource recycling of scrapped motor vehicle parts, encouraging the development of resource recycling and environmental protection industries.

05

Establish Supervision and Inspection System

A supervision and inspection system has been established for the recycling and dismantling activities of scrapped motor vehicles. Each department conducts supervision and inspection within its respective responsibilities, and specifies punishment measures for illegal behaviors.

Agenda

1. SG5 002 minutes & 003 agenda confirmation
2. EoL LCA discussion
   1) EoL system boundaries and processes with activity data & Intensity data
      -STEP1. Regional information sharing
      ・Japan ・China
   2) Material/Parts recycling modeling
      - JAMA CFF methodology introduction
3. Next action
   - Next meeting ; 19th October @ Brussels

JAMA CFF introduction

Challenge to introduce CFF methodology on Material recycling, Recovered parts recycling, Parts reuse and ASR recycling to enhance not only CN but also CE

【Circular Footprint Formular (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

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

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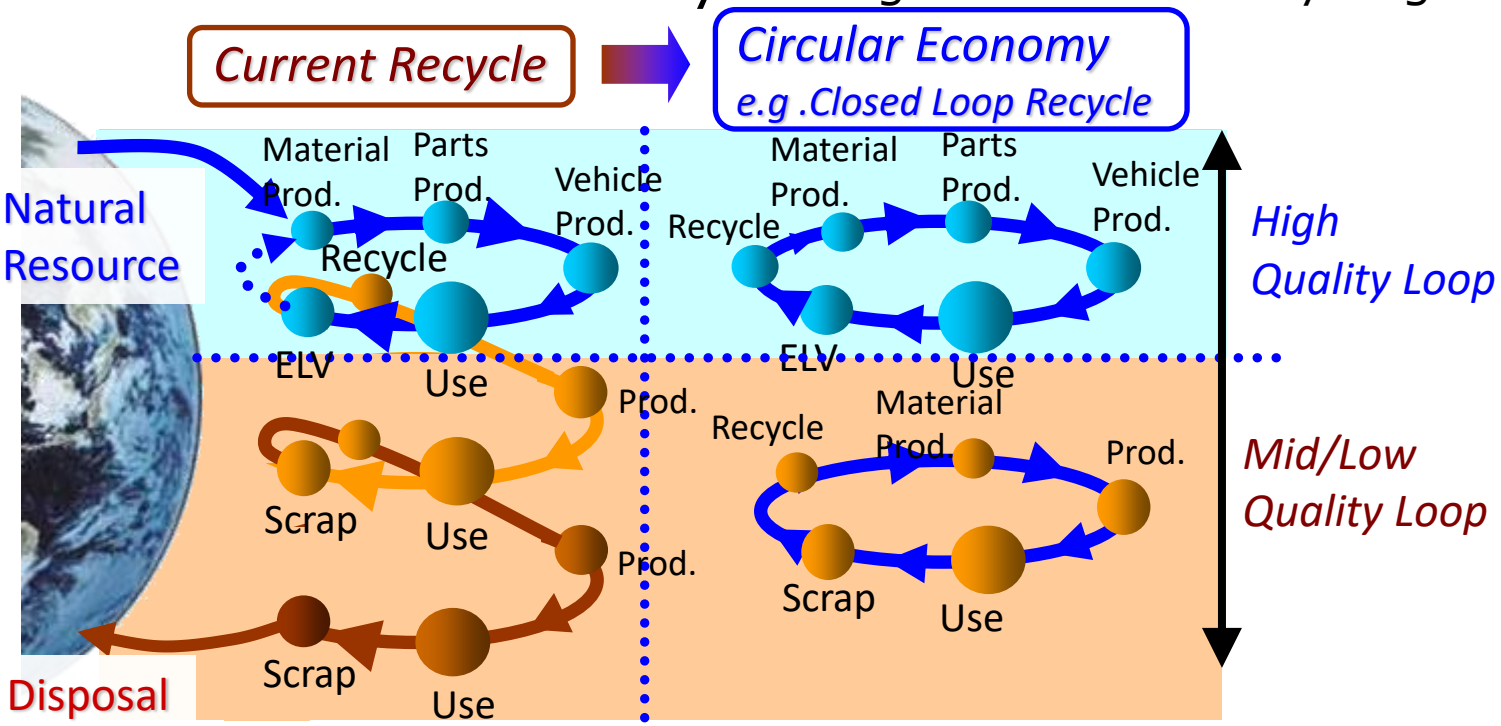
Why CFF ? -Challenge of Automotive-

1) Promote Carbon Neutral - JAMA announcement -

JAMA member companies, together with their global stakeholders, will make maximum efforts towards carbon neutrality by 2050 by developing technologies to further reduce automotive CO_2 emissions so that they can provide optimal choices for consumers in countries/regions worldwide.

2) Promote Circular Economy - Image of Material Recycling -



LCA modeling Benchmarking on A-Material recycling

	Attributional LCA	Consequential LCA	
	Recycled content method (Cut off)	**Closed loop approximation method（CLAM）**	**Circular Footprint Formula (CFF)**
Carbon Neutral promotion	++ ・By low CO2, e.g. recycled material, selection(+) ・No evaluation on recycling at EoL(−)	++ ・By good recycling material at EoL selection (+) ・No evaluation on recycled material use (-)	+++ ・By both low CO2 material and good recycling material at EoL selection (+)
Circular Economy promotion	+ ・By recycled material use (+) ・No evaluation on material/Parts recycling at EoL (-)	+ ・By evaluation on material recycling at EoL (+) ・Not evaluate Parts recycling (-)	+++ ・By balanced evaluation on recycled material use and material/Parts Recycling at EoL (+)
LCA Operation	+++ ・Data base exist (+) ・Familiar with many industries (+)	+ ・Not good data base (-) ・Not included in Corp. LCA (-)	+ ・No date base (-) ・Not included into Corp.LCA (-)

JAMA CFF methodology

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1) Follow CFF concept

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

2) STEP by STEP CFF application approach with JAMA specific CFF parameter determination

		STEP 1	STEP2
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

3) Manage “CFF effect” individually in vehicle CFP

Material CFF parameters determination

- Respect CFF parameter definition and guideline
- Determine CFF parameter value considering Automotive use and CE promotion

	A	R1	R2	Qsin/ Qp	Qsout/Qp	Ev [kgCO2/ kg]	E*v [kgCO2/ kg]	Erec [kgCO2/ kg]	Erec EoL [kgCO2/ kg]
Steel	Follow CFF guide line e.g. Metal ;0.2 Plastic ;0.5	・From IDEA data base linked to Ev/Ev*/ Erec or JOGMEC Material flow data	**・From Japan End-of-Life Vehicle Recycling and Treatment Flow report e.g. Metal; 0.99**	**・Determine by Physical aspects ・Tramp element content in ELV steel scrap**		**・Utilize new IDEA data base which will be established in 2023 according to JAMA request**			・Impact of ELV treatment process linked to Scrap generation
AL				**・Determine by Economic aspects ・ELV scrap price /High-Quality scrap price in the market**					
Cu									

The Quality ratio, Qsin/Qp, Qsout/Qp

- Follow below CFF guideline
- Determine the quality ratio of Steel by Physical aspects, AL and Cu by Economic aspects

【CFF guideline】

Q_P ; Quality of the primary material, i.e. Quality of the virgin material.
Q_{Sin} ; Quality of the ingoing secondary material, i.e. the quality of the recycled material at the point of substitution.
Q_{Sout} ; Quality of the outgoing secondary material, i.e. the quality of the recyclable material at the point of substitution.

- ***The Quality ratio, Q_{Sin}/Q_P , Q_{Sout}/Q_P,***

The quality ratios shall be determined at the point of substitution and per application or material.

The quantification of the quality ratios shall be based on:

- Economic aspects: i.e. price ratio of secondary compared to primary materials at the point of substitution. In case the price of secondary materials is higher than that of the primary ones, the quality ratios shall be set equal to 1.
- When economic aspects are less relevant than physical aspects, the latter may be used.

The Quality ratio of AL and Cu

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- Clear correlation between AL or Cu scrap price in the market and AL or Cu content　JPN scrap trade company data @ FY23 Aug.
- Determine Qsout/Qp by Economic aspect, ELV scrap price/High-Quality scrap price in the market

・AL Qsout/Qp ; 0.4

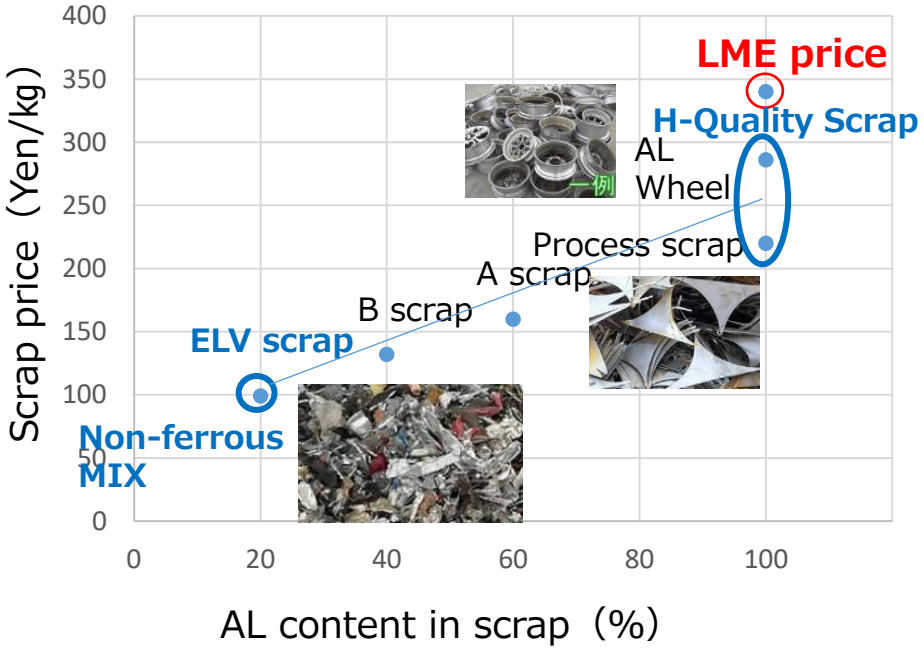

Fig.1 AL scrap economic value on variable scrap in JPN market

・Cu Qsout/Qp ; 0.4

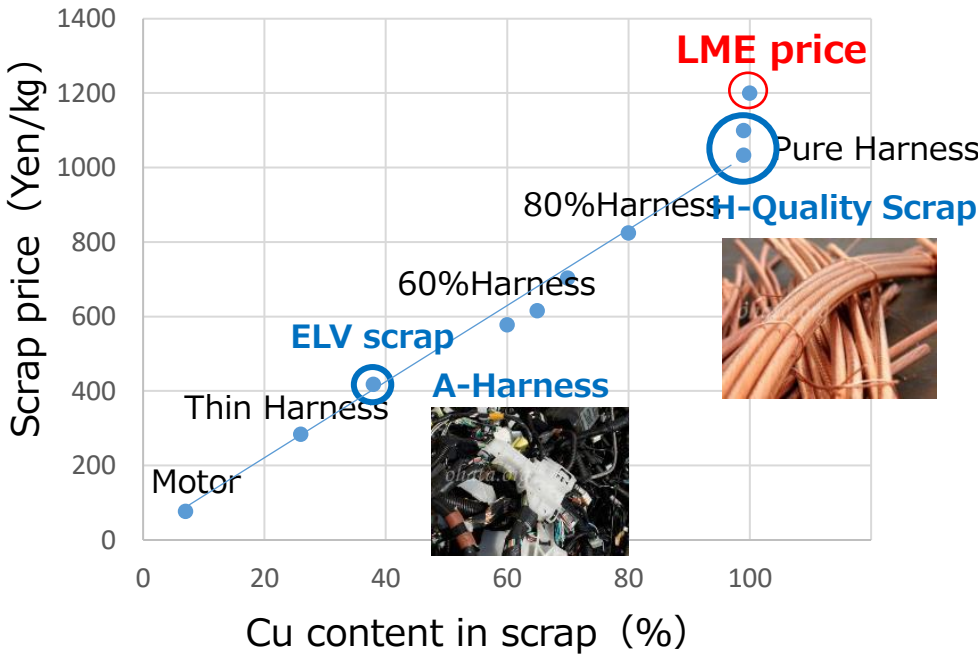

Fig.2 Cu scrap economic value on variable scrap in JPN market

The Quality ratio of Steel

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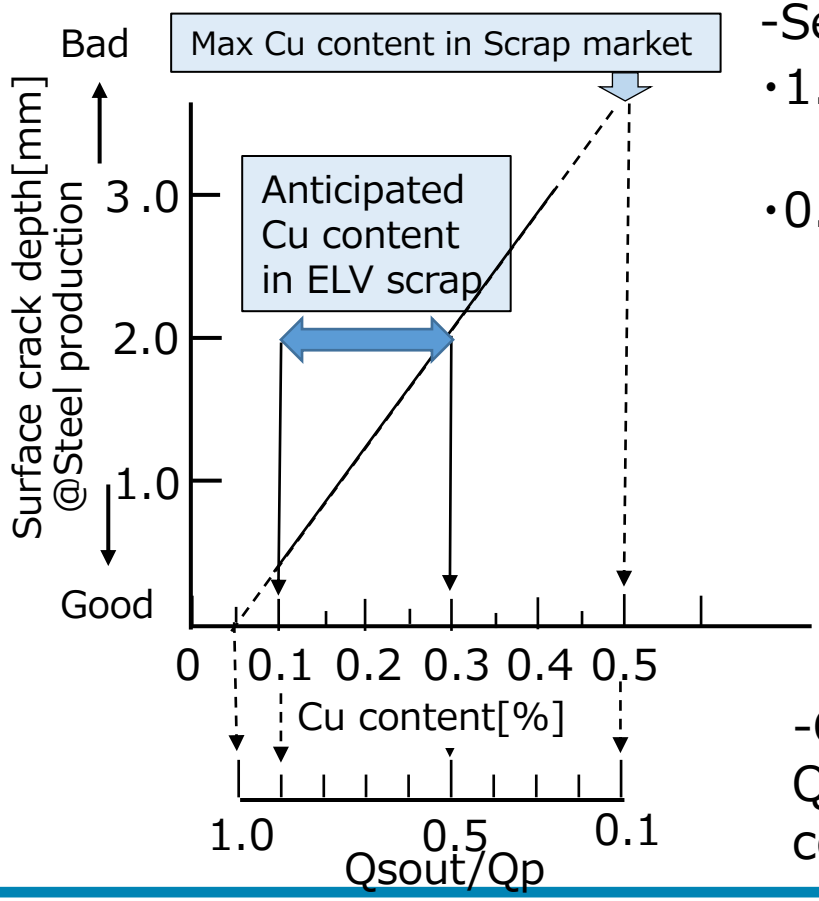
- Not clear correlation between Steel scrap price and scrap quality related to purity

JPN scrap new paper data @ FY19-22

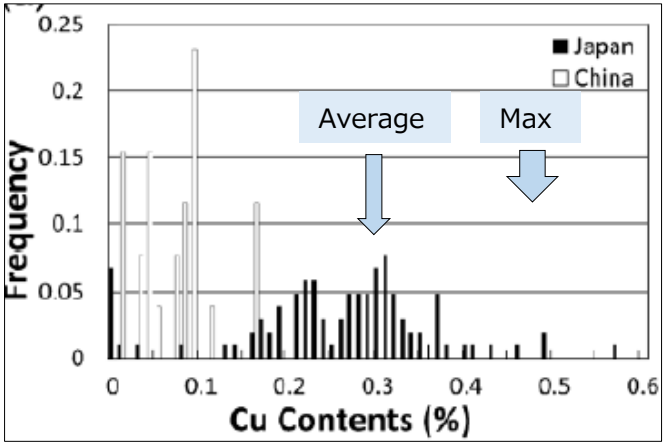
- Determine Qsout/Qp by Physical aspects, tramp elements content
- Focus on Cu content, the most severe tramp element for Flat steel production through EAF with steel scrap



-Set Qsout/Qp value ;

・1.0; Cu content 0.05, upper limit for Flat steel production

・0.1; Cu content 0.5, Max content in Scrap market



-Confirm Cu content in ELV scrap in FY23 Q3. It is anticipated from 0.1 to 0.3%, corresponded to 0.5-0.9 Qsout/Qp value.

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Material CFF parameters management

- Material CFF parameters is now being determined and managed as secondary data set in JAMA LCA Guideline / IDEA in 2023

-JAMA CFF parameter data set image-

■Materials CFF parameter			CFF parameter								
Material type			Ev	Ev*	Erecycle	A	R1	R2	Qsin /Qp	Qsout /Qp	Erecycle EoL
Steel	1	Cast iron	***	***	***	***	***	***	***	***	-
	2	Cold rolled steel sheet	***	***	***	***	***	***	***	***	-
	3	***	***	***	***	***	***	***	***	***	-
	10	Long steel	***	***	***	***	***	***	***	***	-
	14	***	***	***	***	***	***	***	***	***	-
AL	15-1	***	***	***	***	***	***	***	***	***	-
	15-2	Cat AL for AL R/W	***	***	***	***	***	***	***	***	-
	16	Cast AL	***	***	***	***	***	***	***	***	-
	17	AL sheet	***	***	***	***	***	***	***	***	-
	18	***	***	***	***	***	***	***	***	***	-
Cu	19	***	***	***	***	***	***	***	***	***	-
	22	***	***	***	***	***	***	***	***	***	-

CFF application to EV BATT Repurpose

・Case study ; ELV EV BATT repurpose to other industry

Virgin BATT prod. impact

Repurpose BATT prod. impact [kg-CO2e/kg]

$$Ev+R2\times(1-A)\times(ErecEoL - E^{*}v\times Qsout/Qp)$$

Credit due to repurposed BATT supply

CFF effect [kgCO2e/kg]

Case study	CFF effect
LiB (30kwh)	-225

・Set R2, Qsout/Qp, E*v and ErecEoL value as primary data

	A	R1	R2	Qsin/Qp	Qsout/Qp	Ev [kgCO2/kg]	E*v [kgCO2/kg]	Erec [kgCO2/kg]	Erec EoL [kgCO2/kg]
	0.5	0	0.3	-	0.6	3000	←	-	300
LiB (30kw)	・Default		Tentative value ・BATT recovery ratio		Tentative value ・SOH	Tentative value 100kgCO2/kwh *30kwh			Tentative value ・1/10 Ev

CFF effect management

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- Need to have the transparency and the consistency with current methodology, “Cut off”.
- Manage “CFF effect” individually with modified formula below

【Original CFF】 (1-R1)×Ev+R1×(A Erec+(1-A)Ev×Qsin/Qp)+(1-A)R2×(ErecEoL- E*v×Qsout/Qp)

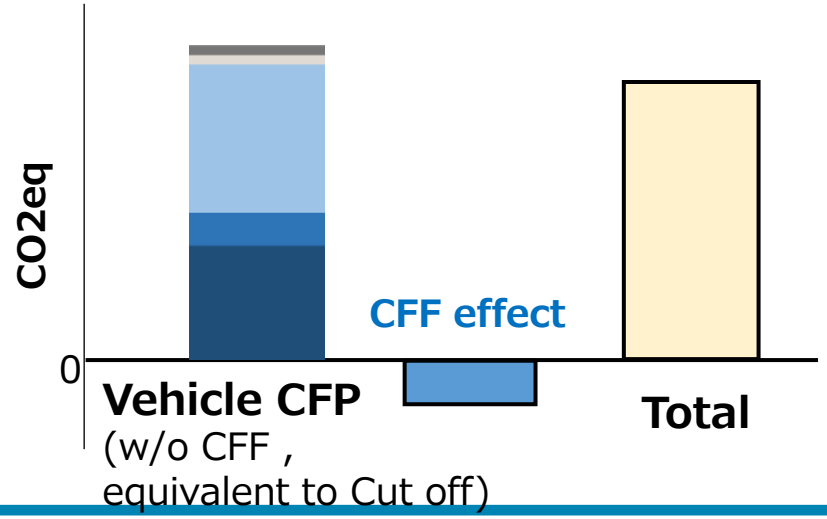
【JAMA modified CFF】

(1-R1)×Ev + R1×Erec + R1×(1-A)×(Ev×Qsin/Qp-Erec) -(1-A)R2×E*v×Qsout/Qp +(1-A)R2×ErecEoL

- (1-R1)×Ev: Virgin Material Impact → Count in Material Prod. stage
- R1×Erec: Recycle Material Impact → Count in Material Prod. stage
- R1×(1-A)×(Ev×Qsin/Qp-Erec): Burden due to Recycle Material use
- -(1-A)R2×E*v×Qsout/Qp: Credit due to Recycle Material resource (ELV Scrap) supply
- +(1-A)R2×ErecEoL: Recycle Material resource (ELV scrap) generation Impact → Count in EoL stage (【D1】、【D2】、【D3】、【D5】)

CFF effect [kgCO2eq/kg]

- Vehicle CFP Management <Image>



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   1) EoL system boundaries and processes with activity data & Intensity data
      -STEP1. Regional information sharing
      ・Japan　・China
   2) Material/Parts recycling modeling
      - JAMA CFF methodology introduction
3. Next action
   - Next meeting ; 19th October @ Brussels ?

3. Next action

- Next SG5 meeting

<Option 1 >
1. Date & time ; 19th Oct. just after GRPE A-LCA IWG, 9:00-15:00?
2. Venue; T.B.C. @ Brussels, Hybrid
3. Attendee; all SG5 member
4. Agenda ; EoL LCA intensive discussion pull forwarding some agenda in 12 months schedule
   e.g. System boundary, Material/Parts recycling modeling *with SG2?*

<Issue>
- *SG5 MAIN PARTICIPANTS availability*
- *Logistics, especially for Venue*

<Option 2>
1. Date ; 2hours, late Oct.
2. Venue; Online
3. Attendee; all SG5 member
4. Agenda; EoL LCA discussion according to 12 months schedule

Remarks;
- F2F with hybrid meeting to be studied

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			☆					☆
SG5 leading team Meeting (LTM)			☆11 ☆26	☆	☆ ☆	☆ ☆	☆ ☆	☆ ☆	☆ ☆	☆ ☆	☆ ☆	☆ ☆	☆ ☆	☆ ☆
SG5 Meeting			☆12		☆	☆	☆	(☆)	☆	☆	☆	☆	☆	☆
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	☆ US	☆ IND	Harmonization ☆ #1	(Regional Study)		☆ #2		☆ Final
	3. Contro versial topics	1) Material/Parts recycling modeling	☆JRC intro.		☆ JAMA intro.	Common Pros/Cons Discussion ☆ #1	☆ #2	CFF Application Study ☆ #1	☆ #2	CFF Road Map ☆ #1	☆ #2	☆ Final		
		2) Other			Boundary Conditions ☆				Rec. Process	☆	☆	☆ Logistics	2nd life Parts	
	4. Summary for drafting													☆

3. Next action

- Request to SG5 member

1) Prepare and Present “-STEP1. EU Regional information sharing”
in Oct. SG5

2) Support to arrange “Venue of next SG5 meeting in Brussels” e.g. ACEA office?

- SG5 Leading Team action

1) Request to support “-STEP1. US Regional information sharing” in Nov. SG5 to IWG on 7th Sept.

Appendix