

UNECE IWG A-LCA

Developing an harmonized methodology for automotive's future

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Agenda

- **General context**
- **Timeline**
- **Structure**
- **Use phase – SG4 status update**

General Context

General Context

Background

Life cycle assessment (LCA) is a method to estimate the material and energy flows of a product (e.g. transportation service) to analyse environmental effects over the entire lifetime of the product ‘from cradle to grave’.

“LCA has been used in the automotive industry for more than 20 years, mainly as a means of identifying environmental hotspots and as an aid to prioritise areas of innovation” (Warsen and Krinke, 2013).

ISO 14040 series has been in effect since 2006, but the scope of the investigation is not standardized.



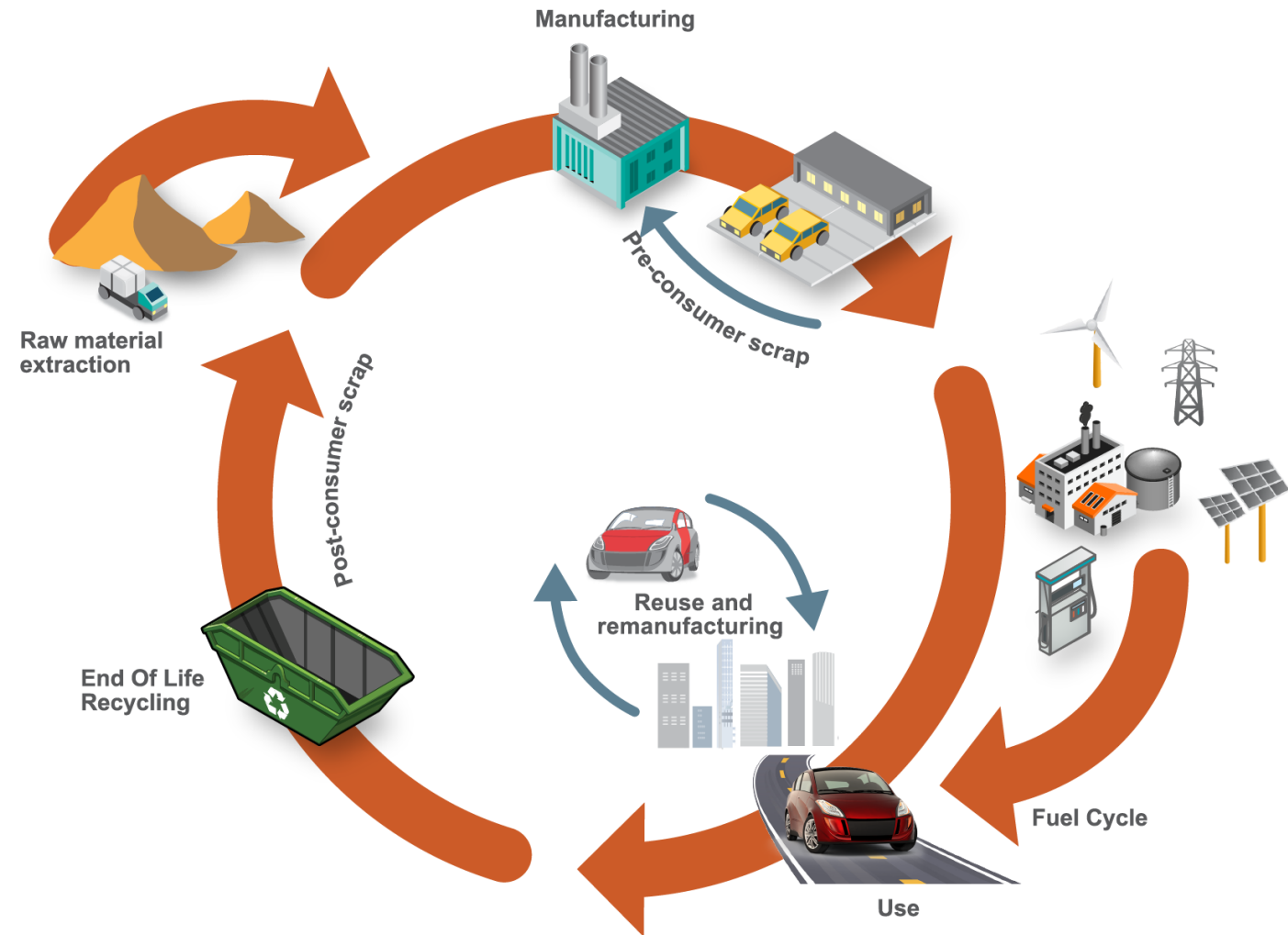
General Context

Introduction

Japan and Korea proposed to GRPE to work on the clarification of methodologies for the assessment of life-cycle GHG emissions of automotive.

GRPE created a new Informal working group **A-LCA** under GRPE (ECE/TRANS/WP.29/GRPE/86/Rev.1)

The IWG is an **open structure** enabling the exchange of information and expertise among numerous members.

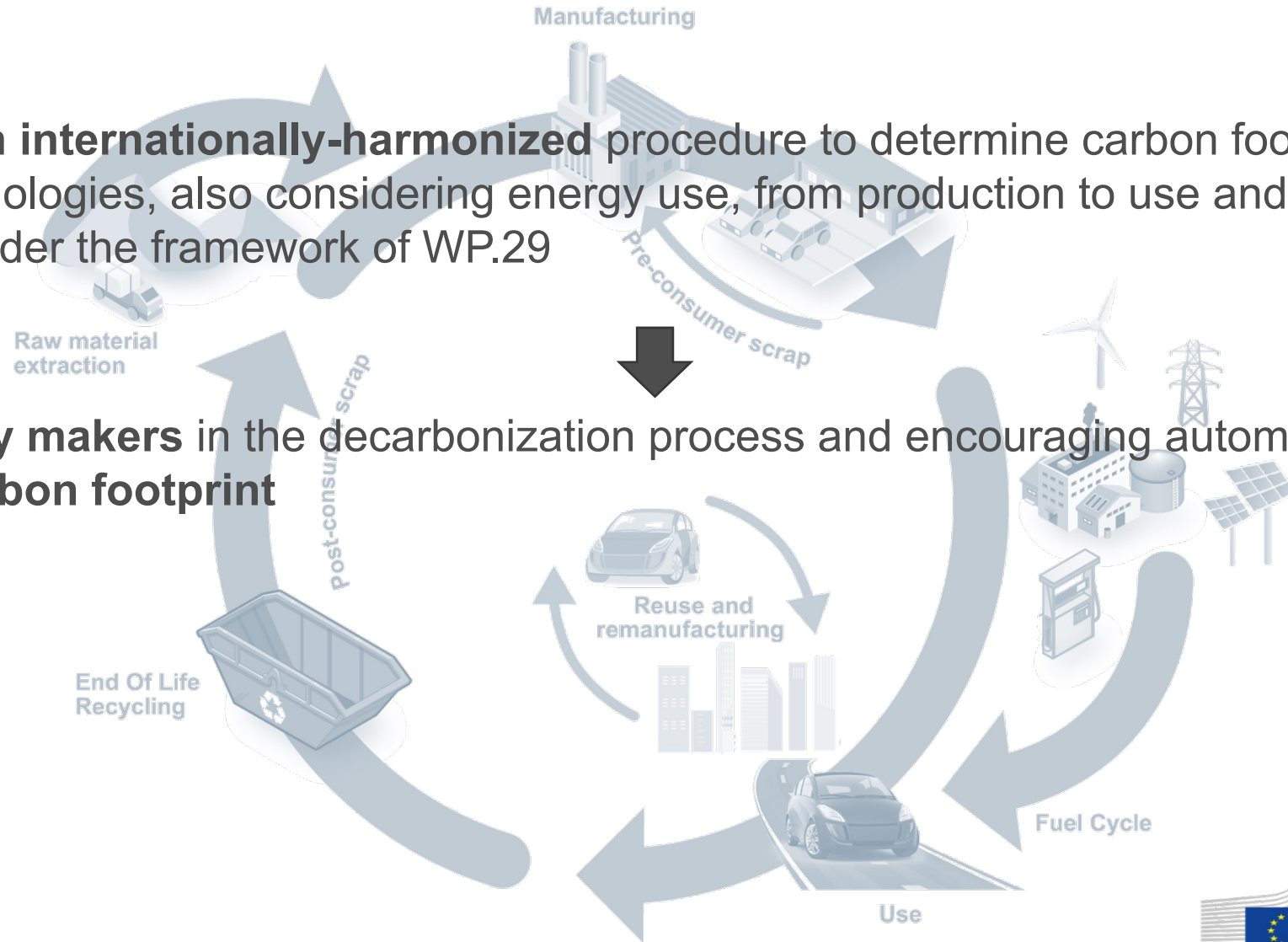


General Context

Scope

Developing an **internationally-harmonized** procedure to determine carbon footprint of different technologies, also considering energy use, from production to use and disposal as a **resolution** under the framework of WP.29

Helping **policy makers** in the decarbonization process and encouraging automotive industries to **reduce carbon footprint**



General Context

International activities in the context of A-LCA

French Décret/Arrêté modifying the conditions of eligibility of “Bonus Écologique” for new electrical vehicles in France

- Introduction of an environmental scoring (upstream carbon footprint for a vehicle) based on a proposed formula - Vehicle concerned : M1 vehicle only

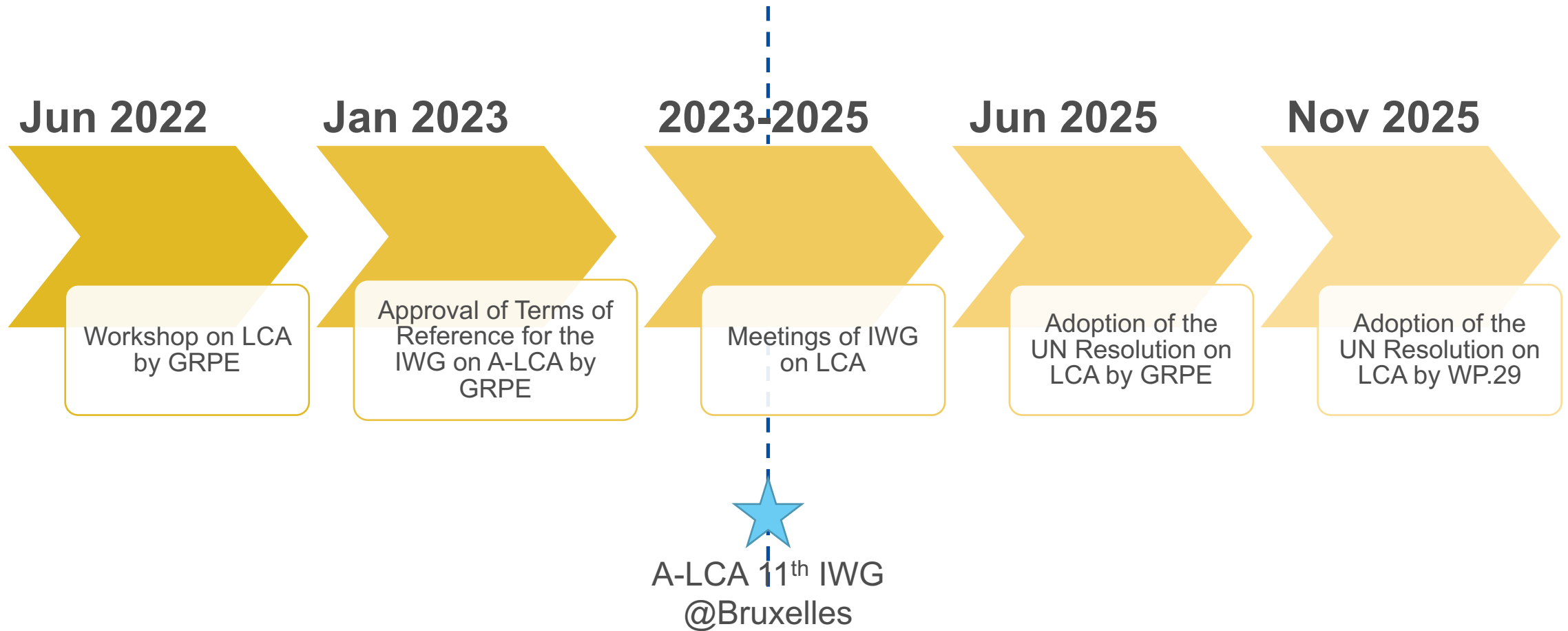
China Low Carbon Action Plan (CALCP) - LCA vehicle methodology under review is a non governmental research program initiated and organized by CATARC.

- EC Provision: common EU methodology, to be developed by the Commission by 2025, for assessing the full life cycle of CO2 emissions of cars and vans placed on the EU market, as well as for the fuels and energy consumed by these vehicles.



Timeline

Timeline



IWG Structure

IWG Structure

work areas		work elements	common	specific each area	common
Life stages	Material production	Material & Material recycling ②	① Overarching aspects	activity item and data	⑥ Fuel & Energy Cycle
	Parts production	Parts & Vehicle production ③		activity item and data	
	Inhouse parts production				
	Vehicle assembly				
	Use Phase	Use Phase ④		activity item and data	
	End of Life	End of Life ⑤		activity item and data	
Verification methodology transparency and consistency, data qualification and plausibility					
Drafting ⑦				Drafting	

Sub-Groups (SGs):

1. Overarching aspects & verification
2. Material & material recycling
3. Parts & vehicle production
4. **Use phase**
5. End of life
6. Fuel & energy cycle
7. Drafting



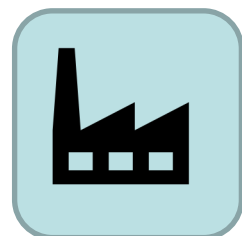
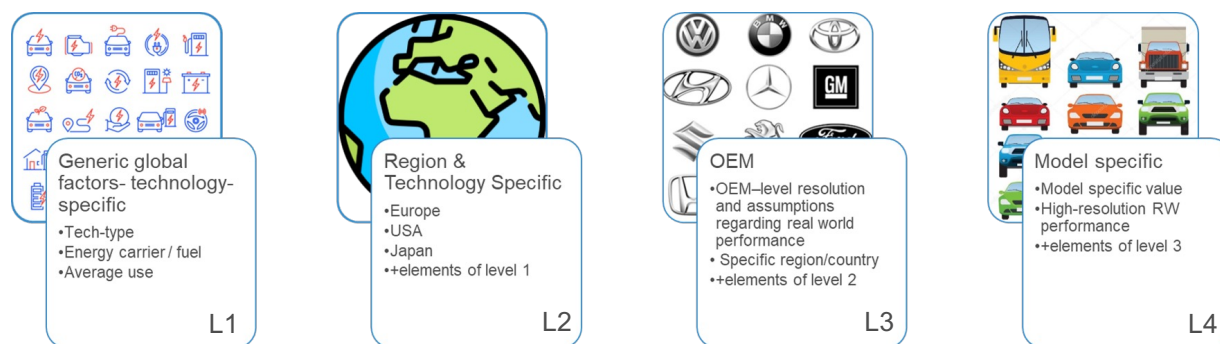
Use phase – SG4 status update

Discussion items for SG4

- ❑ Scope definition
- ❑ Boundaries definition
- ❑ Level Concepts for SG4
 - ❑ Boundaries include in-use phase, regular consumptions and maintenance
 - ❑ Discussion on elements to be considered (charging/refueling/driving/maintenance/cabin-conditioning/other)
 - ❑ Possible datasets – Primary Data concept

SG4 Scope

- Provide a comprehensive methodology for calculating **realistic** GhG emissions and energy consumption over vehicle use-phase at various levels of detail and considering the availability of different information and datasets



In-use energy consumption & GhG emissions



Regular consumptions



Maintenance



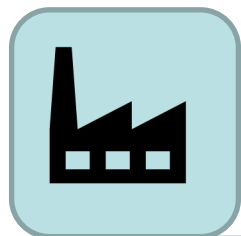
In – Use GhG emissions and energy consumption



SG4 Boundaries

- Agree on vehicle types type/powertrains to be included
- Define service life (OEM or Default)
- Agree on databases – acceptable data sources - standards
- Define maintenance frequency

Proposed boundaries



In-use energy consumption
& GhG emissions



Regular consumptions



Maintenance



Covering activity from circulation to end-of-life

Draft CO₂eq Calculation (JRC)**

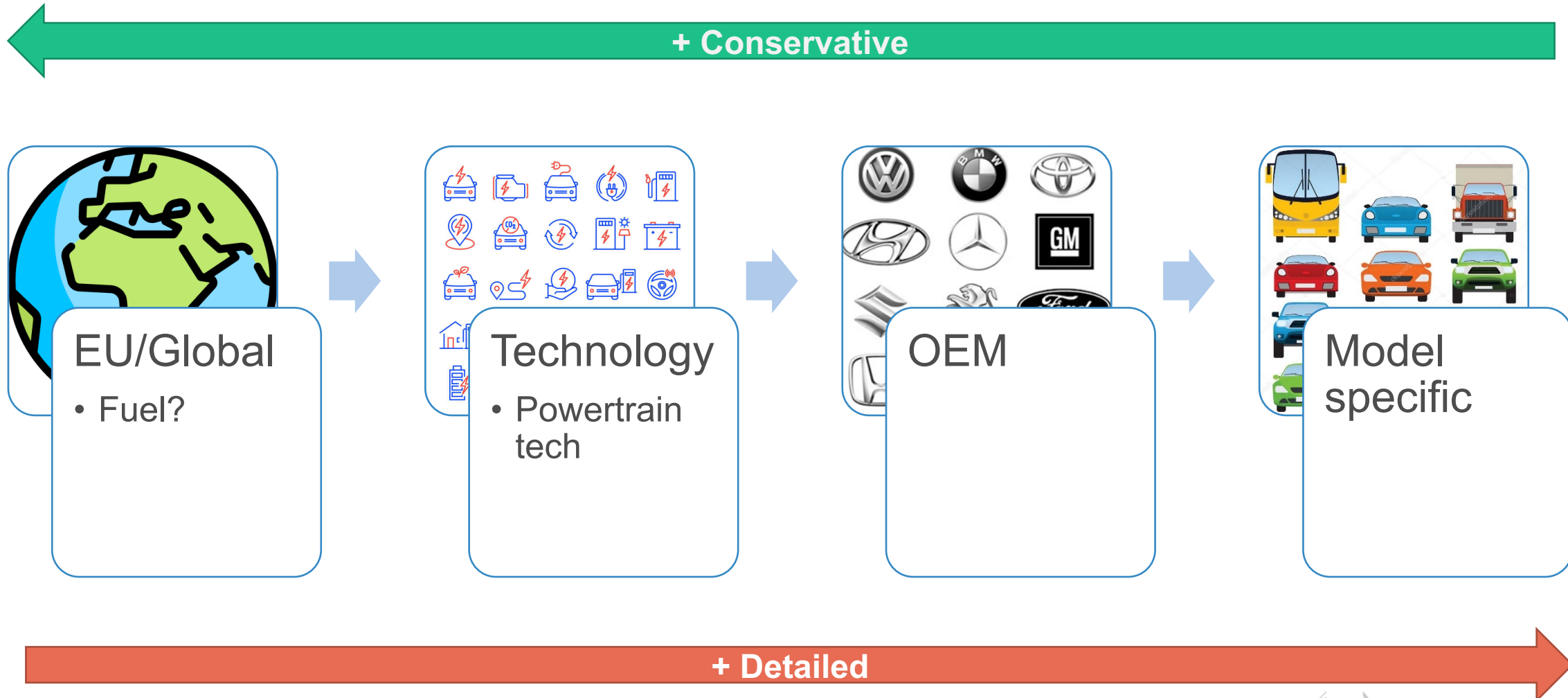
Lifetime GhG_{use} [CO₂eq] = GhG [CO₂eq/km] * total average distance [km] + Maintenance * occurrences + waste (total)

GhG [CO₂eq/km] = Energy consumption (MJ/km) * Conversion Factor SG6 + Fuel Energy Consumption (g/km) * Conversion Factor SG6 + fugitive emissions + other emissions (TBD from the guidebook)

Energy consumption OR Fuel energy consumption = TA Value (or equivalent) * RW correction factor [lvl1, lvl2, lvl3, lvl4] * degradation factor [lvl1, lvl2, lvl3, lvl4] * other factors (?)

** Important to define levelling concept [lvl1, lvl2, lvl3, lvl4] and the data sources

Levels concept of Use Phase



Level Concept for SG4 - JRC

*USE PHASE	Reference Vehicle	Representativeness	Energy consumption		Maintenance	Service Life
			In-use	Charging		
Level 1	General concept per powertrain tech /energy carrier	Global average	Average homologation value normalized to WLTP corrected for RW (global)	Generic charging eff(?)	Generic	Generic/Global
Level 2	General concept per powertrain tech/energy carrier	Regional (EU/US/JP/KR /CN...)	Regional typical of vehicle type representative or Real World (RW)	Regional typical charging eff value (at vehicle level)	Generic/regional	Regional typical service life for each vehicle type
Level 3	Representative vehicle for each OEM/powertrain/energy carrier (need to define criteria)	OEM/National	OEM-resolution and assumptions for RW performance	OEM average efficiency (standardised?)	OEM Specific	Regional with option to declared higher life
Level 4	Specific OEM's vehicle model	OEM's specific vehicle model	Homologation value corrected based on RW characteristic value (based on OBFCEM or similar data provided by operators)	Vehicle specific charging eff (at vehicle level)	Model-region specific	OEM/Model specific average data

Feedback from members

Time of application	USE PHASE	Reference Vehicle	Representativeness	Energy consumption		Maintenance	Service Life	Other
				In-use	Charging			

Pre vehicle sale	Level 1	General concept per powertrain tech /energy carrier	Global average	Average homologation value normalized to WLTP corrected for RW (global)
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Pre vehicle sale	Level 2	Same as Lv 1	Regional (EU/US/JP/KR/CN...)	Regional RW correction
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Time of application	USE PHASE	Reference Vehicle	Representativeness	Energy consumption
				In-use
Pre vehicle sale	Level 1 (Generic)	General concept per powertrain tech /energy carrier	Global average	Average regio homologation value (<i>ideally</i> normalized to WLTP) corrected for RW (e.g. basic SBTI value of ...)
Pre vehicle sale	Level 2	Same as Lv 1	Regional (EU/US/JP/KR/CN...)	+Regional RW correction (ca =Lv1 if require specific CF)
Post vehicle sale	Level 3 (OEM)	Representative vehicle model variant for each OEM /powertrain /energy carrier (need to define criteria)	OEM's specific vehicle model	OEM model variant regional RW correction optional OEM specific alternative assumptions for performance

Level 4 (OEM+)	None: OEM specific vehicle model and variant /configuration (i.e. engine, battery size, other options, etc)	OEM's specific vehicle model and variant	Specific model/variant EC, plus High-resolution RW value (based on OBFCM or similar data)	As for Level 3, but also by specific model variant (if different)	As for Level 3, but also by specific model variant (if different)	As for Level 3	OEM model-specific fugitive emissions + degradation factors
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Japan Positions on Level Concept
 JPN sees that no levelling concept is necessary for SG4
 → set only "Level 4" to take care of all potential items (expect SG4 member to update them in excel file), then SG4 makes a decision of the applicable items under the current ToR time scale (~2025).

Level Concept for SG4

USE PHASE	Reference Vehicle	Representativeness	Energy consumption		Maintenance	Service Life
			In-use	Charging		
Level 1	General concept per powertrain tech /energy carrier	Global average	Average homologation value normalized to WLTP corrected for RW (global)	Generic charging efficiency (?)	Generic	Generic/Global
Level 2	Same as Lv 1	Regional (EU/US/JP/KR/CN...)	Regional RW correction	Regional charging efficiency value (standardised)	Generic/regional	Regional / Unique service life
Level 3	Representative vehicle for each OEM/powertrain/energy carrier (need to define criteria)	OEM/National	OEM-resolution and assumptions for RW performance	OEM average efficiency (standardised?)	OEM Specific	Regional with option to declared higher life
Level 4	Specific OEM's vehicle model	OEM's specific vehicle model	High-resolution RW value (based on OBFCM or similar data)	Vehicle specific charging efficiency (standardised?)	Model specific	OEM/Model specific average data

<example>
 PEV : X yrs/x km
 HEV : Y yrs/y km
 FCHV : Z yrs/z km
 Others : XY yrs/xy km

Level 4 : JPN pursues under the SG4 activities (some of items are still under the discussion)

SG4 Meeting Schedule Plan

September	October	November	December	January	February
-	10 th – SG4 4 th meeting	5 th – SG4 4 th meeting	4 th – A LCA 12 th IWG	8/9 th – A LCA 13 th IWG @Geneva	
7 th – A LCA 10 th IWG	17/18 th – A LCA 11 th IWG @BRU		12 th – SG4 6 th meeting	16 th – SG4 7 th meeting	TBD

Thank you

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European Commission Joint Research Centre

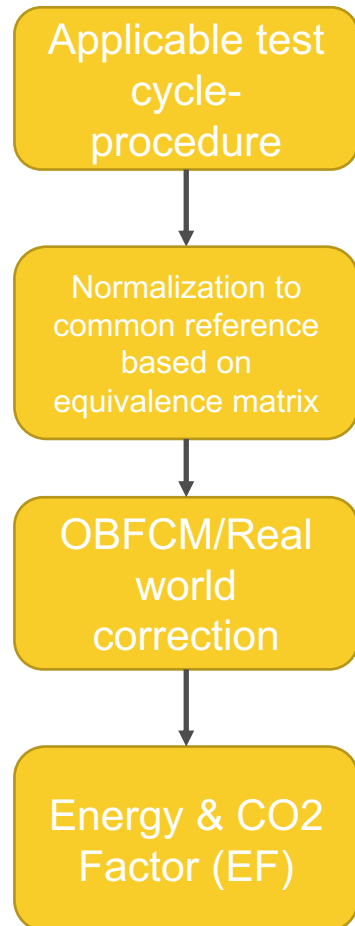
Energy, Transport and Climate

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Fuel Consumption/Efficiency



Equivalence matrix (for positive energy demand & mean efficiency)

ratio	WLTP	NEDC	US06	FTP	JC08	other
WLTP							
NEDC							
US06							
FTP							
JC08							
.....							
other							