IWG A-LCA SG4 Use Phase

Giuseppe Di Pierro - Giuseppe.DI-PIERRO@ec.europa.eu

Georgios Fontaras - Georgios.FONTARAS@ec.europa.eu

4th A-LCA SG4 meeting – 10/10/2023

Key Points

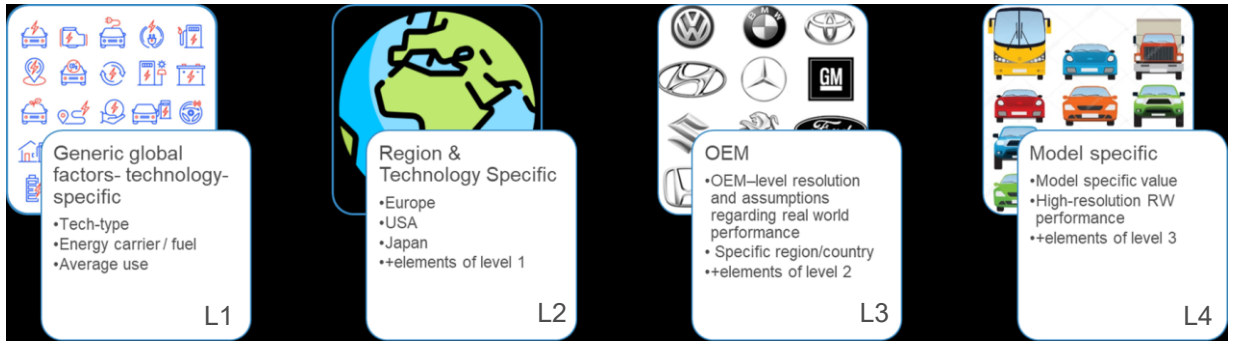
- Agreement reached 
  - SG4 Scope, Boundaries (only GhG), maintance + regular consumption
- Still TBD 
  - Life duration/milage, Leveling concept
  - OBFCM data vs TA only – need for some reality correction factors ?
- Others
  - Create a dedicated team for maintenace and consumables topics (volunteers?)

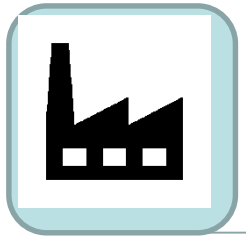
Discussion items for SG4

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

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





& GhG emissions

Regular consumptions

Maintenance

In – Use GhG emissions and energy consumption

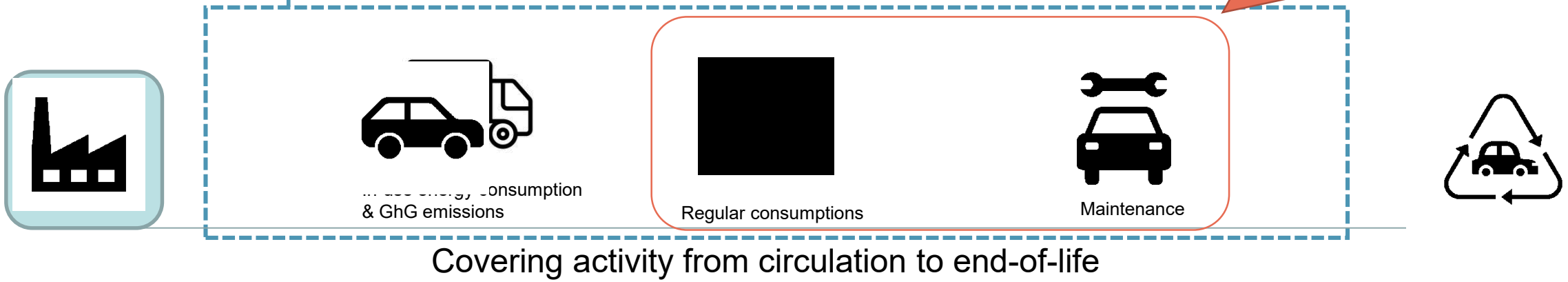
European Commission

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

Dedicated leader/responsible?

Proposed boundaries



Draft CO_2eq Calculation (JRC)**

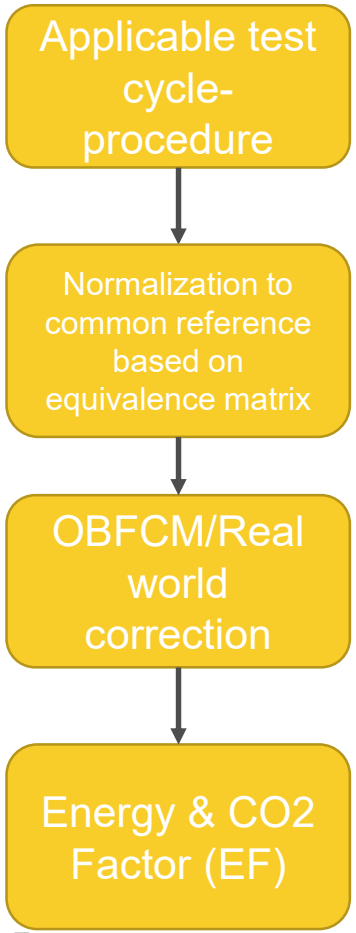
Lifetime GhG_{use} [CO2eq] = GhG [CO2eq/km] * total average distance [km] + Maintainance * occurrences + waste (total)

GhG [CO2eq/km] = Energy consumption (MJ/km) * Factor SG6 + Fuel Energy Consumption (g/km) * 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, lvl 3,lvl 4] * other factors (?)

** Important to define levelling concept [lvl1, lvl2, lvl 3,lvl 4] and the data sources

Fuel Consumption/Efficiency



Equivalence matrix (for positive energy demand & mean efficiency)

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

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 (standardised?)	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 OBFCM or similar data provided by operators)	Vehicle specific charging eff (standardised?)	Model-region specific	OEM/Model specific average data

Level Concept for SG4 - OICA

Not clear what representativeness is. OICA position after clarification

SG6 topic (out of vehicle)
AC charging: efficiency is not required due to on-board charger

Need further discussion in OICA

USE PHASE	Reference Vehicle	Representativeness	Energy consumption		Maintenance	Service Life	Other
			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	

Readily available

Readily available reflecting regional use

Readily available from OEM

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

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

(JPN) Request to other SGs and Request from other SGs

items	to which SG	from which SG	notes
1. OEM showroom	NA	SG3	Accept the request
2. Provide the consumed energy for maintenance parts (please refer SG4-03-JPN02 for detail)	SG3/SG5	NA	unit should be J, not GHG
3. Provide GHG factors for each fuel (please refer SG4-03-JPN02 for detail)	SG6	NA	unit should be GHG/L or kg
4. Provide GHG factors for each energy source (please refer SG4-03-JPN02 for detail)	SG6	NA	unit should be GHG/J
5. tbd			

Level Concept for SG4 – UN F. Cuenot

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)	Generic charging efficiency (?)	Generic	Generic/Global	
Pre vehicle sale	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	
~~Pre vehicle sale~~	~~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~~	
Pre vehicle sale	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	
Post vehicle sale	Level 5	Same Model/powertrain	Individual vehicle VIN specific	OBFCM or equivalent on-board device	Proper values	Real maintenance	Real vehicle mileage /age	

Level Concept for SG4 – Ricardo feedback on potential revisions 10/10/23

Up to the relevant CP/ region to decide what is needed/used or not.

USE PHASE	Reference Vehicle	Representativeness	Energy consumption		Maintenance	Service Life	Other
			In-use	Charging			
Level 1 (Generic)	General concept per powertrain tech /energy carrier	Global average	Average regional homologation value (*ideally* normalized to WLTP) corrected for RW (e.g. basic global SBTI value of 1.1)	Generic charging efficiency (unless already included in homologation)	Generic by powertrain	Generic/Global	Projected energy mix use (current policy); Default factors fugitive emissions + degradation
Level 2	Same as Lv 1	Regional (EU/US/JP/KR/CN…)	+Regional RW correction (can be =Lv1 if required by specific CP)	+Regional charging efficiency value (standardised)	As for Level 1	Regional / Unique service life	As previous level, plus specific sensitivities?
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 corr. *or optional* OEM specific alternative assumptions for RW performance	OEM model efficiency (standardised)	OEM model-specific (for the representative configuration) by powertrain	Regional with *option* for OEM to declared higher life with evidence	As previous level
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

Level Concept for SG4 – Ricardo simplified alternative 10/10/23

Up to the relevant CP/ region to decide what is needed/used or not.

USE PHASE	Reference Vehicle	Representativeness	Energy consumption		Maintenance	Service Life	Other
			In-use	Charging			
Level 1 (Generic)	General concept per powertrain tech /energy carrier	Global or regional average (EU/US/JP/KR/CN…)	Average global or regional homologation value (*ideally* normalized to WLTP) corrected for RW (global, e.g. SBTI value of 1.1, or regional RW if required by CP)	Generic global or regional charging efficiency (unless already included in homologation)	Generic by powertrain type	Generic global or regional	Projected energy mix use (current policy); Default factors fugitive emissions + degradation factors
Level 2							
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 corr. *or optional* OEM specific alternative assumptions for RW performance	OEM model efficiency (standardised)	OEM model-specific (for the representative configuration) by powertrain	Regional with *option* for OEM to declared higher life with evidence	As previous level, plus specific sensitivities *(to be agreed)*
Level 4 (OEM optimal)	**None:** OEM specific vehicle model and variant /configuration (i.e. engine, battery size, other options)	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

Methodological question

- What happens if the user selects values from different levels because of data availability eg 4/6 values are level 4 one value is level 3 and one is level 2?
    - Is that acceptable? We use the guidebook method developed by UN ECE assessed every year and it is as realistic as possible (NOT ALL countries)
- If yes, then lower levels should have more conservative values to encourage measurement/data provision
- Other boundaries to be included?
- JRC proposes to have 2 levels: default (guidebook) normalized and actual RW

SG4 participants' feedback

- Ricardo proposes to use **real driving values**: use fuel consumption monitoring (in EU) as a basis. Currently reporting is only mandatory for conventionally fuelled vehicles/vehicles with ICE (i.e. including hybrids and PHEVs), but does not include BEV or FCEV… though this data should be available (just not required to be collected). Also, only for LDVs at the moment.
- UTAC proposes that for Europe the existing **OBFCM** data can be used – JRC: fully available data in EU and trustworthy. JRC: shall we create 2 approaches w and w/o data available? i.e. 2 instead of 4
- Green NCAP: even if CPs decide separately on CF parameters, don't we need some default parameter for general comparison? Otherwise we risk that vehicles from different regions are per se not comparable – JRC: totally in agreement
- Green NCAP **maintenance** frequency: they can show an excerpt of a maintenance database, which potentially can be used as input. Maintenance data can come from manufacturers or from data suppliers.

SG4 participants' feedback

- JRC suggests to enlarge the scope and consider the **charging efficiency** Green NCAP: where the losses occur? At vehicle on-board charger side or at DC charger. If DC charger – do we leave this to Subgroup 6? – JRC: whatever is included in the vehicle so up to OBC, the rest is for SG6
- ICCT propose to discuss **energy efficiency** topic also with **SG6**, and define lifetime use (duration and not only distance). Take into account the **lifetime** in the registration country but should also take into account lifetime outside the registration country.
- Green NCAP and Ricardo share the same view of ICCT
    - JRC: can you reiterate the importance of including duration other than mileage?
- Japan suggested that the use phase parameters should be region specific and CPs should decide. Also lifetime and distance should be for the CPs to consider.

SG4 participants' feedback

- RICARDO wants to include: (1) GHG emissions not directly related to fuel consumption - i.e. fugitive emissions/leakage (storage only), or from emissions aftertreatment (e.g. N2O); (2) emissions resulting from use of Urea in SCR systems (direct emissions, plus production of Urea); (3) other aspects besides remaining parts (i.e. consumed fluids, etc.).
- Green NCAP proposes to use dependent factors such as lubrication/oil consumption or other consumption. If these factors are not available at first, we can set them to value 1.
- Ricardo: compile a specific list of maintenance items that we should EXPECT to be included (minimum) by powertrain type, and optionals depending on specific circumstances (e.g. in wetter/cooler climates like the UK, effectively all ICE vehicles will have at least one replacement exhaust system in their lifetime due to corrosion, but this may not be the case for dryer/warmer climates – this can be a more significant effect (due to mass and catalyst materials); in some cases there may also be other regional effects – e.g. brake pad/disc replacements more frequent in regions with more significant elevation variations – e.g. Netherlands vs Switzerland, but probably a relatively minor effect on the overall footprint)

SG4 Meeting Schedule Plan

September	October	November	December	January	February
7th – A LCA 10th IWG	17/18th – A LCA 11th IWG @BRU		12th – SG4 6th meeting	16th – SG4 7th meeting	TBD

Thank you

European Commission