IWG A-LCA
SG4 Use Phase
Status Update

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Decision Status in SG4

List of Topic	Status			Comment
	Concept /Orientation	Methodology (Detailed requirement)	Draft (justification & guideline)	
Functional unit	Agreed	Agreed	Under discussion	
System Boundary	Agreed	Under discussion	Under discussion	
▪ Out of country of sale usage	Under discussion	Under discussion	Under discussion	
▪ Second life of parts	Exclude from scope	Under discussion	Under discussion	Reopen in phase 2
Production of fuel or electricity	Agreed (covered by SG6)	SG6	SG6	
Energy consumption	Agreed	Under discussion	Under discussion	
▪ Conversion to MJ	Under discussion	Under discussion	Not yet started	
▪ Deterioration factor	Under discussion	Under discussion	Under discussion	
▪ Discrepancy factor	Under discussion	Under discussion	Under discussion	
Maintenance	Agreed	Agreed (tbc fixed value)	Under discussion	
▪ Fixed factor value	% of upstream emission	Under discussion	Not started	
▪ Part transportation	Exclude from scope	Under discussion	Not started	
Other leakage	Under discussion	Not started	Not started	
▪ Emission of fluorocarbon	Under discussion	Not started	Not started	
Service life	Under discussion	Under discussion	Not started	
Representative vehicle	Under discussion	Under discussion	Not started	
Level concept	Under discussion	Under discussion	Not started	

Discussion items for SG4

- ❑Functional Unit
- ❑System Boundaries
  - ❑Second Life of parts/Usage in countries out of sale region
- ❑In-use Energy Consumption
- ❑Maintenance and Consumables
- ❑Feedback on Drafting Document to SG7
- ❑Next steps

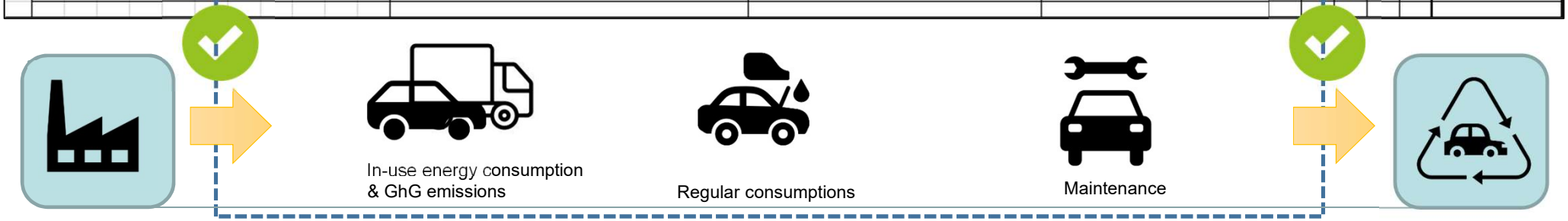
Functional Unit

- The primary function of a passenger car is to transport people from one location to another. Therefore, the **functional unit (FU) for 'category 1 vehicle' is defined as 1 km of distance travelled** per passenger **over the vehicle's lifetime**.
- A more conservative approach should be considered and **single passenger per vehicle should be assumed**. This will also ensure comparability between different vehicles and different regions.
- Considering the above assumption, the functional unit (FU) for 'category 1 vehicle' is defined as **the transportation of 1 passenger over 1 km of distance travelled** over the vehicle's lifetime.

- The reference flow for a vehicle is defined as the total distance (in km) it is expected to travel over the vehicle service life. Since the actual service life and lifetime distance reference flow of the vehicle varies in different regions, it is appropriate to define and **use different standardized values in different regions**.
- Other categories such as trucks, buses, motorcycles, etc. will be added later.

System Boundaries

	area	SG4 Decision	rule				existing methods					Your Position
			ToR purpose	fixed or varied	primary or secondary	(any other suggestions are welcom	A	B	C	D	...	
Transportation												
mining to initial processing plants	SG2		NA		NA(secondary)	NA						
between initial processing plants	SG2		NA		NA(secondary)	NA						
deliver to part/production plants	SG2/3		NA		NA(secondary)	NA						
within the part/production plants	SG3		NA		NA(secondary)	NA						
between part/production plants	SG3		NA		NA(secondary)	NA						
deliver to customer	SG3/4		NA		NA(secondary)	✔						SG3
maintenance parts	SG4		NA		NA(secondary)	✔						ok
fuel	SG4		NA		✓(primary)	✔						SG6
electricity	SG4		NA		✓(primary)	✔						SG6
deliver to disposal plants	SG4/5		NA		NA(secondary)	NA						SG5
deliver to the parts recover plants	SG5		NA		NA(secondary)	NA						
recover plants to production plant	SG5/3		NA		NA(secondary)	NA						
...												



Covering activity from circulation to end-of-life

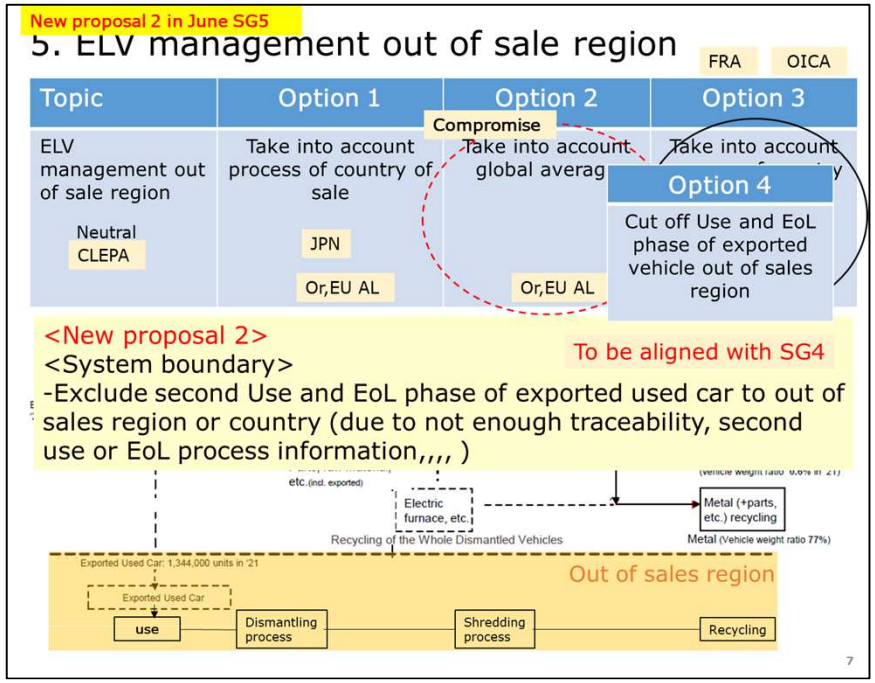
System Boundaries

Second Life of parts/Usage in countries out of sale region

SG4 is considering two options:

1. Modelling the secondary usage with an average global/regional value.
2. Cutting off until a robust statistic is available

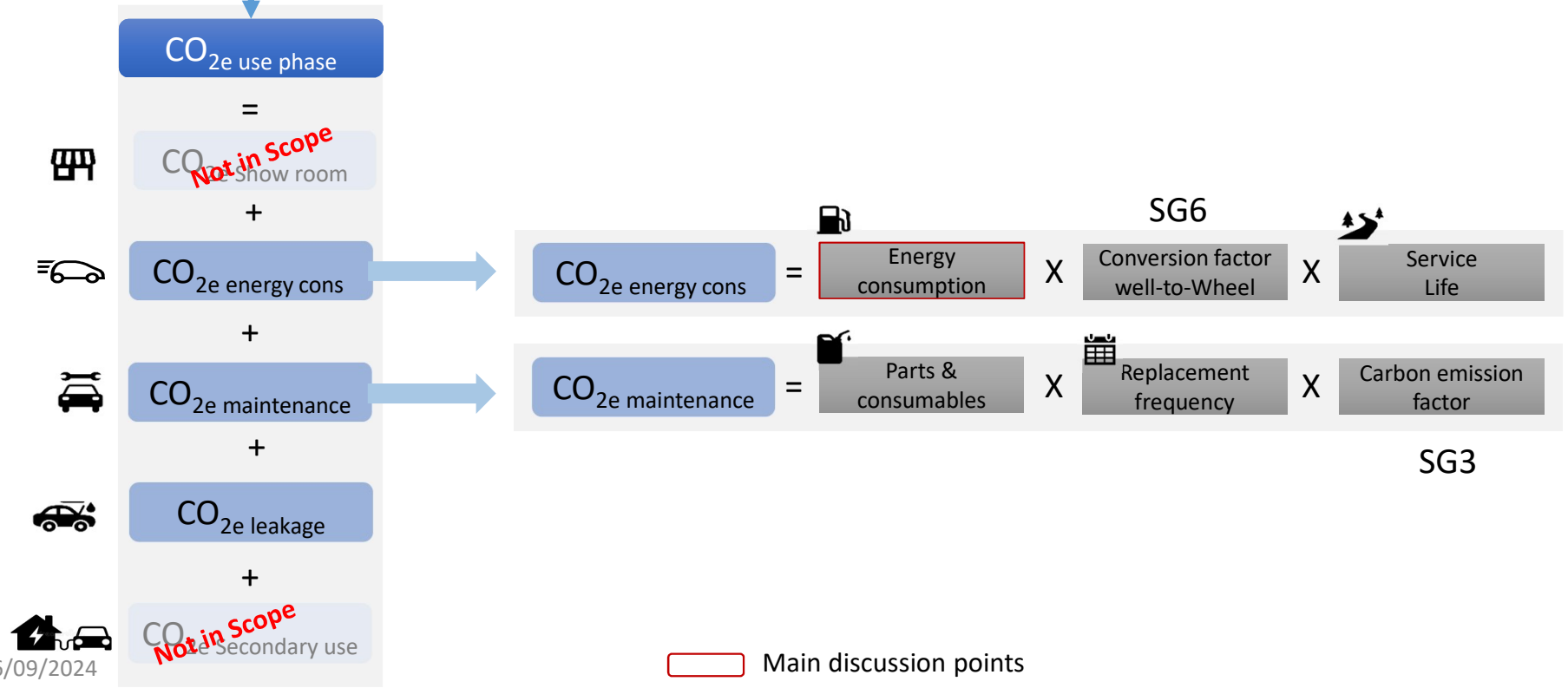
COMMENTS



- ❑ Using TA values and service life of the country where they were exported would a lot of unnecessary complexity. This can be considered for further scenario analysis, therefore…
- ❑ The **full service life** period (km) should be considered (from all regions/countries), but a it is reasonable to assume the fuel mix and the energy **consumption** performance of the **original region** of sale/use.
- ❑ As for second life of **components**, it is well known that certain parts of a vehicle can be re-used or repurposed. Same options would apply, but currently no reliable data available on the percentage of secondary usage of traction batteries or other vehicle components. Therefore, general believe is that second-life use should not included in the scope at this stage > TO BE DEFINED

In-Use Energy Consumption

CO_{2e} =$CO_{2e\ Material}$ +$CO_{2e\ Production}$ + **(EC X CF X Service life) +$CO_{2e\ maintenance}$ + $CO_{2e\ leakage}$** +$CO_{2e\ Recycling}$

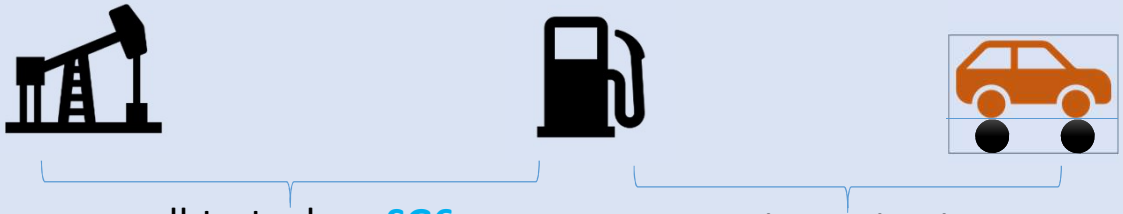


Main discussion points

In-Use Energy Consumption

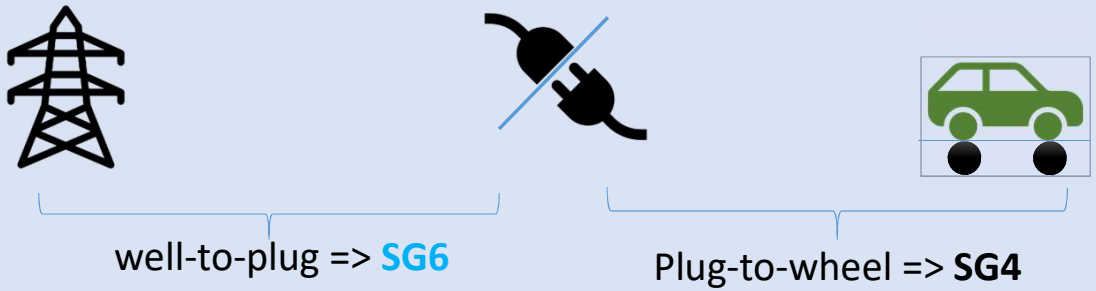
Energy consumption

ICE

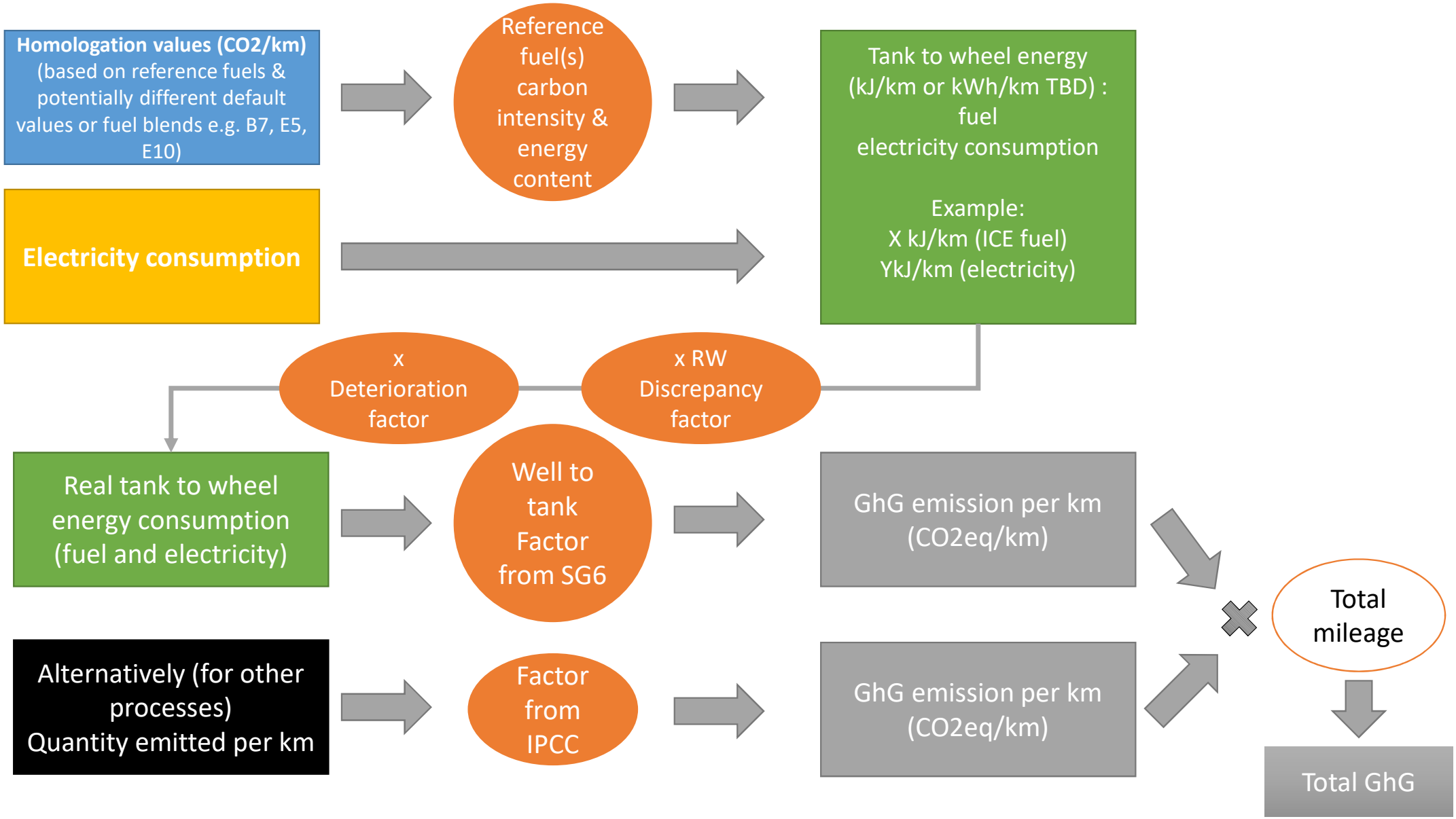


Certification value : TA Fuel consumption is measured over the chassis dyno.

EV

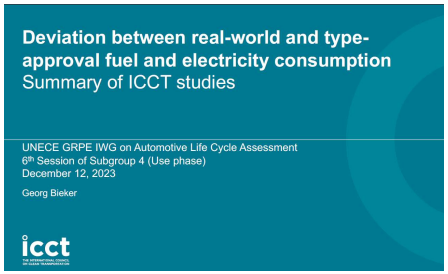


Certification value : **AC energy** charged from the charging point (this includes the efficiency of the energy converters inside vehicle but not in the charging station)


Homologation values (CO2/km) (based on reference fuels & potentially different default values or fuel blends e.g. B7, E5, E10)
Reference fuel(s) carbon intensity & energy content
Tank to wheel energy (kJ/km or kWh/km TBD) : fuel electricity consumption
Example: X kJ/km (ICE fuel) YkJ/km (electricity)
Electricity consumption
x Deterioration factor
x RW Discrepancy factor
Real tank to wheel energy consumption (fuel and electricity)
Well to tank Factor from SG6
GhG emission per km (CO2eq/km)
Alternatively (for other processes) Quantity emitted per km
Factor from IPCC
GhG emission per km (CO2eq/km)
Total mileage
Total GhG

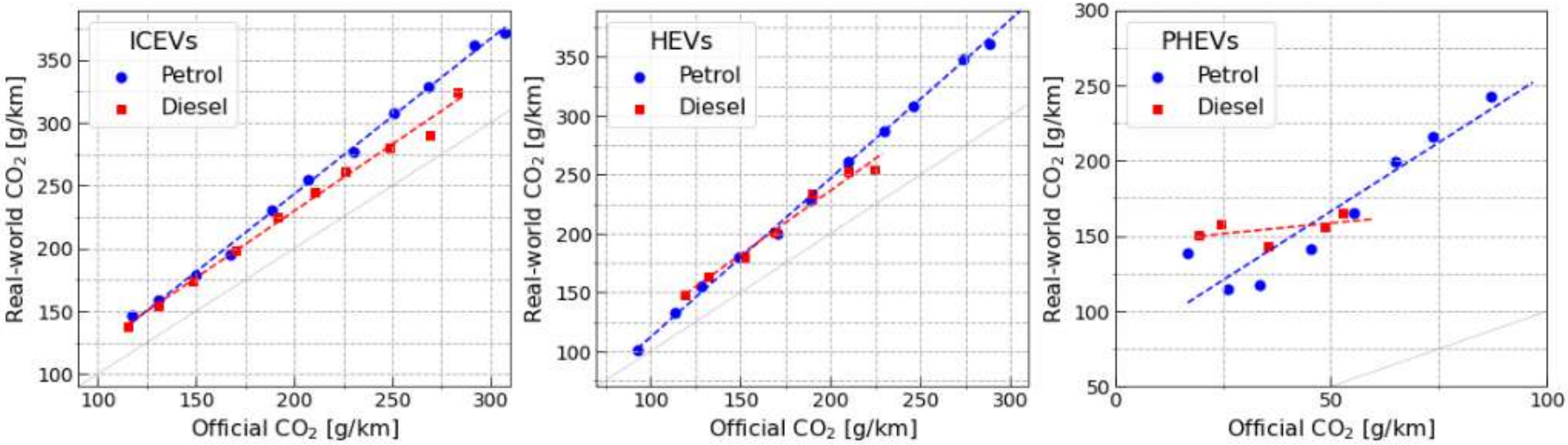
RW Discrepancy Factor

Also available…



JRC internal analysis:

- EU27 data OBFCM
- 2,384,984 registered in 2021
- 6 categories combining powertrain (ICEs, HEVs and PHEVs) and fuel type (petrol/diesel)
- Good correlation between TA and RW CO2 for ICEV and HEV
- PHEVs show higher variability and discrepancy from TA values



Source: JRC internal

RW Deterioration Factor

UNDER DISCUSSION

- [Ricardo's proposal] For **fuel cells**, efficiency losses occur over the vehicle lifetime. The average loss of efficiency (used to calculate an amended lifetime average energy consumption in MJ/km) can be calculated based on the FC durability assumptions and operational lifetime (km).

- For **PHEVs**, methodology needs to address the effect of the change in the battery capacity (i.e. SoH) over the lifetime of the vehicle and its impact on Utility Factors and electric range > NO PROPOSAL so far

Maintenance and Consumables

- Two types of maintenance are included in the guideline:
  - Consumables: items that will need to be refilled periodically
  - Maintenance parts: replacement of parts due to normal wear and tear, including components that are not designed to last the entire lifespan of a vehicle
- If list of maintenance parts/consumable and associated frequency is provided by the **OEM**

$$CO_{2eq.maintenance} = \sum_{i=1}^{n} CEF_i * f_{i.maintainence}$$

- If list of maintenance parts/consumable **not** available then a fixed percentage of upstream emission can be attributed
- SG4 working on a list of consumables and parts for guidance.
- **Open point**: although HV traction battery and FC stack are designed to last over the entire vehicle lifetime, shall this methodology, for the sake of completeness, include an approach for calculating the need for replacement(s) and their impact on the vehicle LCA?

Feedback on Drafting Document to SG7

- First draft submitted to SG7 on 13th on September
- Meanwhile, SG4 is working to collect feedback and improve the methodology and the draft text
- Aspects covered by the document so far:
  - Goal and Scope (Vehicle lifetime definition, Functional unit, etc)
  - System Boundaries
  - Some of the Processes included in the scope
    - CO2 equivalent calculation from Use phase
    - Maintenance and Consumables
    - Second life of parts/use phase in regions out of country of sale
  - Data collection item list

Next steps

- ❑Progress on vehicle lifetime definition
- ❑Progress on Leakage topic and their calculation
- ❑Progress on RV and Level Matrix
- ❑Finalize In-use consumption calculation
- ❑Finalize Maintenance CO_2 calculation
- ❑Comments/feedback on Drafting document > work on v2
- ❑Next SG4 meeting on October 21st

SG4 Meeting Schedule Plan

July	August	September	October	November	December
29 – SG4 13th meeting		10 – A LCA 16th IWG			
-	-	24 – SG4 14th 3 – SG4 15th	18 – A LCA 18th IWG @Geneve	18 – SG4 167th meeting	9 – SG4 18th meeting
		26/27 – A LCA 17th IWG @Brussels	21 – SG4 16th meeting		

Thank you

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