

Draft CO₂eq Calculation (JRC)**

Lifetime GhG [CO₂eq] = GhG [CO₂eq] * total average distance [km] + Maintenance * occurrences + waste (total)

...(g/km)?

Might also consider age-dependent km/yr; or too complex?

Urea use related to energy consumption, rather than 'occurrences' at least for HDV

Not clear what arrows mean is this a sequence or change?

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

Might be related to energy consumption not km in some cases – e.g. H₂

Unclear why twice/two units – do you mean for operation on more than one energy type?

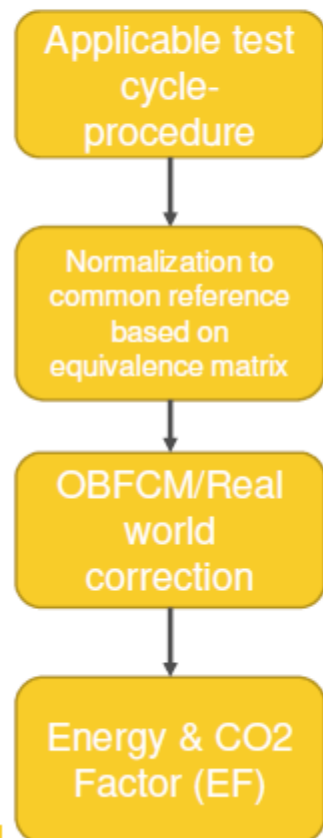
Energy consumption OR Fuel energy consumption = TA Value (or equivalent) * RW correction factor [lvl1, lvl2, lvl3, lvl4] * degradation factor [lvl1, lvl2, lvl3, lvl4] * other factors (?)

e.g. fuel cell efficiency over lifetime?

Somewhere: how to account for share of operation on multiple modes, e.g. PHEV, dual-fuel or Catenary vehicle

** Important to define levelling concept [lvl1, lvl2, lvl3, lvl4] 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							■

Specify for each type of vehicle, cycle (i.e. for HDVs there may be multiple for the same vehicle sub-class), and powertrain

Also need to consider different shares/definitions for powertrain operation on multiple fuels? E.g. PHEV, REEV, Catenary vehicles operating on overhead vs battery or gaseous or liquid fuel?

But this is also likely to be regional... and also cycle-specific: more complex for different HDV operational cycles...

Vehicle specification defined at least by class/subclass, cycle and powertrain... (for reference model variant, or specific model variant)

Vehicle class	Vehicle sub-class (Is globally generic possible?)	Cycles (regional variations)	Powertrain
Passenger car (M1)	e.g. Mini, small, lower medium, etc. ?	e.g. WLTP, etc.	Gasoline ICEV, Gasoline HEV, Diesel ICEV, ..., Gasoline PHEV, ..., BEV, FCEV, etc.
Van/LCV (N1)	e.g. N1 Class I, II, III?	e.g. WLTP, etc.	
Heavy rigid truck/van (N2, some N3)	e.g. heavy vans, various rigid GVW categories, e.g. EU Vecto classifications or as defined in regions	e.g. EU certification cycles: Urban delivery, Regional delivery, ..., other regional cycles	
Heavy articulated truck (N3)	e.g. EU Vecto classifications		
Minibuses, buses and coaches (M2, M3)			
2/3 wheelers			

Level Concept for SG4

I would argue for Level 4 it should be specific model/variant, not just a 'reference vehicle'

We may need to agree always standard global or regional, AS WELL as a more specific variation for >Level 1?

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 (by powertrain)	Generic/Global
Level 2	Same as Lv 1	Regional (EU/US/JP/KR/CN...)	Regional RW correction	Regional charging efficiency value (standardised)	Generic/regional (by powertrain)	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 (by powertrain)	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

Already included in WLTP, NEDC. Do you mean a correction, or accounting for rapid charging or for other cycles where might not be already included?

This should already be OEM and model-specific (for the representative configuration) at Level 3? There is really no excuse for it not to be.

Missing: (i) rules for using default energy mix projection (SG6 defines method), (ii) Recommended sensitivities for use-phase, e.g. activity/lifetime, real-world or use-case sensitivities, battery/V2G sensitivities, etc.

“OEM’s specific vehicle model **and variant /configuration**” – i.e. engine, battery size, other options

Should already be a “Representative vehicle **model variant /configuration** for each...”

Here it might be further specific to a particular vehicle model **and variant/configuration**?

Methodological question

- What happens if the user selects values from different levels because of data availability e.g. 4/6 values are level 4 one value is level 3 and one is level 2?
 - Is that acceptable?
 - RIC: Yes, I think we should always encourage maximum fidelity/level possible, however if we were to consider 'certification' it would only be possible to be (for example) 'Level 3' if compliant with all elements. Perhaps could consider a Level X+ (e.g. Level 2+) to indicate that some elements go beyond the minimum requirements for the level.
- If yes, then lower levels should have more conservative values to encourage measurement/data provision
 - RIC: Not necessarily; this could potentially be counter-productive in providing as accurate as possible information to the consumer at different levels. Perhaps selectively – needs discussion.
- Other boundaries to be included?
 - RIC: Unsure what this question means...



Thank you

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Ricardo's initial conceptual thinking

Potential options to apply the levels concept to the Use Phase

Colour key:

OEM foreground

Vehicle variant specific reporting

Informing internal strategy or policy analysis

Level	Potential assessment methods / items for development by SG
Lv.1	<ul style="list-style-type: none"> Define default operational cycles to be considered (also for relevant regions), e.g. vehicle specific energy consumption and CO₂ on driving cycles, e.g. WLTP or VECTO Develop guideline for basis and coverage of emission components, and operation/maintenance aspects; e.g. for non-CO₂ GHG from exhaust or fugitive emissions (e.g. CH₄, N₂O, H₂), generic definition of default fluids and parts consumed/replaced, intervals, etc. Define key sensitivities that should be considered (for policy/internal use), including accounting for real-world effects on energy consumption/CO₂
Lv.2	<ul style="list-style-type: none"> Develop an approach for model-specific maintenance, part replacements and consumables Define also approaches for alternative regional use cases and/or sensitivities
Lv.3	<ul style="list-style-type: none"> Add manufacturer-specific accounting for real-world performance (i.e. from monitoring of products)? Extend detailed LCA to provide specific accounting for model variants/configurations [also production] Add sensitivities for other considerations e.g. battery 2nd life, V2G (or other consequential aspects)
Lv.4	<ul style="list-style-type: none"> Develop guidelines for accounting for higher-resolution manufacturer-specific real-world performance accounting (i.e. from monitoring of similar existing products)

