
CO₂/FC correction for (N)OVC-HEV/(N)OVC-FCHV

Proposed update by ACEA EV for WLTP SG EV to give the option to avoid unnecessary testing without additional value (**updated proposal**)

Status: 05.03.2020

NOVC-HEV/NOVC-FCHV: CO₂/FC correction

Proposal ACEA EV for SG EV (example here based on NOVC-HEV) (status: February 26th)

- ACEA EV is supporting the approach of a generic worst case correction as for pure ICE vehicle due to
 - the high measurement effort nowadays without any additional value (as factor are similar/identical)
 - the procedure is not reproducible due to measurement inaccuracies caused by small REESS compared to absolute CO₂ values; therefore massively different corrections could be the consequence)
- It should be at the option of the manufacturer to use a generic worst case correction or to use a physically determined K_{CO₂} factor
- Proposal: Use of the pure ICE vehicle approach but apply different generator efficiency depending in the case of REESS charging
 - Generator efficiency “n_{alternator} = 1” is “Worst case approach”

	Willans Factor	Generator efficiency with neg. REESS Balance (Discharging)	Generator efficiency with pos. REESS Balance (Charging)
Diesel (B7)	161 (unchanged)	0,67	1
Petrol (E10)	184 (unchanged)	0,67	1

Calculation of CO₂-Delta which need to be corrected:

$$\Delta M_{CO_2,j} = 0,0036 \times \Delta E_{REESS,j} \times \frac{1}{\eta_{alternator}} \times Willans_{factor} \times \frac{1}{d_j}$$

→ With n_{alternator} = 1 → smallest ΔM_{CO₂,j}

Calculation of corrected CO₂ value:

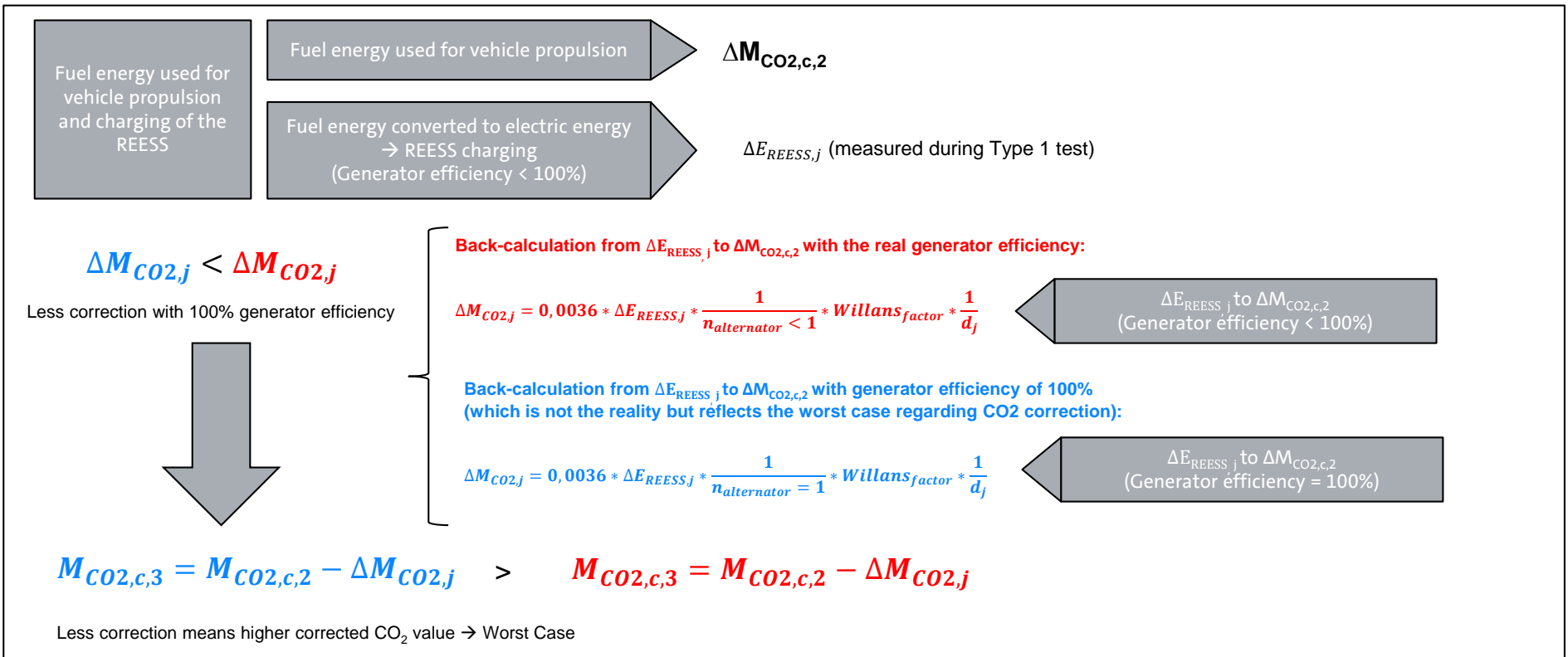
$$M_{CO_2,e,3} = M_{CO_2,e,2} - \Delta M_{CO_2,j}$$

→ With smallest ΔM_{CO₂,j} → highest M_{CO₂,e,3}

NOVC-HEV/NOVC-FCHV: CO₂/FC correction

Proposal ACEA EV for SG EV (example here based on NOVC-HEV) (added: March 4th)

Explanation why assuming a generator efficiency of 100% ($n_{\text{alternator}} = 1$) is the worst case in the context of CO₂/FC correction



Is the generic approach also the worst case compared to K_{CO_2} derived by measurements?

→ Yes, because measurements reflect real life situation and therefore a generator efficiency of less than 100% (which is not the worst case)

(N)OVC-HEV: K_{CO_2} correction factor family

Updated proposal ACEA EV for SG EV (status: February 26th)

K_{CO_2} family for NOVC-HEVs and OVC-HEVs

Only OVC-HEVs and NOVC-HEVs that are identical with respect to the following characteristics may be part of the same K_{CO_2} family at which K_{CO_2} shall be determined with vehicle H of one of the included interpolation families:

- a. Type of internal combustion engine: fuel type (or types in the case of flex-fuel or bi-fuel vehicles), combustion process, engine capacity, ~~full-load characteristics~~, engine technology, and charging system, and also other engine subsystems or characteristics that have a non-negligible influence on ~~CO₂ mass emission~~ K_{CO_2} under WLTP conditions;
- b. Operation strategy of all ~~CO₂ mass emission~~ K_{CO_2} influencing components within the powertrain;
- c. Transmission type (e.g. manual, automatic, CVT) and transmission model (e.g. torque rating, number of gears, number of clutches, etc.);
- d. Type and number of electric machines: construction type (asynchronous/ synchronous, etc.), type of coolant (air, liquid) and any other characteristics having have a non-negligible influence on ~~CO₂ mass emission and electric energy consumption~~ K_{CO_2} under WLTP conditions;
- e. Type of traction REESS (model, capacity, nominal voltage, nominal power, type of coolant (air, liquid));
- f. Type of electric energy converter between the electric machine and traction REESS ~~and between the traction REESS and low voltage power supply~~ ~~and between the recharge plug-in and traction REESS~~, and any other characteristics a non-negligible influence on ~~CO₂ mass emission and electric energy consumption~~ K_{CO_2} under WLTP conditions. ~~At the request of the manufacturer and with the approval of the approval authority, electric energy converters between recharge plug-in and traction REESS with lower recharge losses may be included in the family;~~