HBEFA 5.1: Update December 2025 (Version number 5.1.002)

16. Dezember 2025 | HBEFA5.1.002_Update_Dec2025.docx

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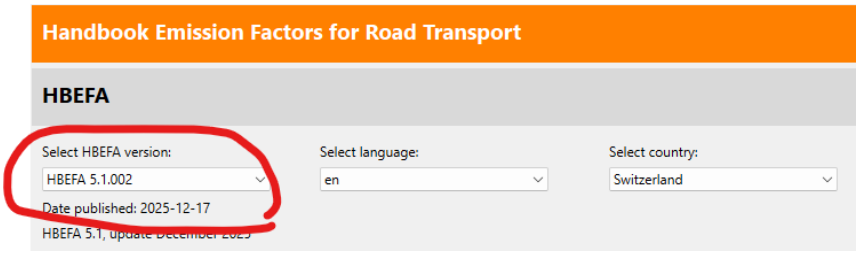
Introduction

HBEFA 5.1 was released on October 22, 2025. In the first months after publication, a few errors became apparent that hadn't been discovered yet during Beta testing. The update with version number 5.1.002, released December 17, 2025, corrects these errors. The present document lists and explains the corrections and also explains why some emission factor values are correct with a value of 0.

HBEFA users do not have to download a fresh desktop client (front-end application) due to the update. The corrections are implemented on the server. After the implementation, the **updated version will automatically be selected after restarting the desktop client**, which can be seen on the start screen (see Figure 1).

(It is still possible to use the first published version by explicitly selecting it on the start screen – but this is in general not recommendable, as the current update corrects errors.)

Figure 1: Display of the update on the start screen of the HBEFA desktop client application.



Source: HBEFA 5.1

The **only update of the desktop client (front-end application)** concerns the menu structure: So far, some users did not find the **Help file** (the command to open was under menu *Settings* > *Open Help file*). Therefore, we have **moved this command to a new separate menu "*Help*"**. However, the desktop client (front-end application) does not have to be downloaded because of this – only if one wants the adapted menu structure.

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The French country data are unfortunately still not ready yet, but will be added as soon as they are available.

Corrections in HBEFA Version 5.1.002

Overview

Table 1 provides an overview of the corrections implemented in HBEFA Version 5.1.002 (compared to the HBEFA 5.1 version first published in October 2025). The following subchapter provides a short explanation for each correction and additional information where necessary.

Table 1: Overview of corrections in HBEFA Version 5.1.002

Correction	Affected vehicle types	Affected pollutants	Affected traffic situations	Affected countries
Added EF for LCV, traffic situation "Rural/Semi-MW/90/Stop+Go2"	All LCV (idvehcat = 2)	All pollutants	idts = 112095 ("Rural/Semi-MW/90/Stop+Go2")	All
"idconcept_mileage" for some Euro-6 PC/LCV subsegments	Mostly PHEV and bifuel LDV - see Table 2	Regulated, CO2, pollutants derived thereof (HC components, NO2, CO2e)	All	All
Missing "idenergy" for some CNG/HEV HDV	CNG HDV from Euro-V to Euro-7, and HEV urban buses	NH3, N2O, CH4, NMHC, Benzene, Toluene, Xylene	All	All
N2O and NH3 mileage correction function for HDV	All HDV (HGV, buses, coaches)	NH3, N2O	All	All
NMHC as difference of HC – CH4 also for newer vehicles	All Euro 6de/VI DE vehicles	NMHC (hot emissions only)	All	All
PN-nonexhaust emissions not divided by 1000	All	All PN-nx pollutants (tyre, brake, road, resuspension, total)	All	All
FC in l/100 km for HGV, empty and full load	All HDV (HGV, buses, coaches)	FC - only with unit = "l/100km" at 0% and 100% load	All	All
2-stroke petrol in German fuel mix	All 2-stroke motorcycles	EC, FC, CO2, CO2e	All	DE
Updated Austrian fleet	All with cold start	All cold start extra EF, possibly hot EF	n/a	AT
Updated aggregated traffic situation patterns for Austria	All	All	Aggregated traffic situations for motorway and overall average	AT

Added EF for LCV, traffic situation “Rural/Semi-MW/90/Stop+Go2”

Emission factors for all pollutants and subsegments were missing for the traffic situation “Rural/Semi-MW/90/Stop+Go2” (idts = 112095, “Land/Semi-AB/90/Stop+Go2” in German). This was already the case in HBEFA 4.2, but nobody had ever noticed this.

Emission factors for LCV for the missing traffic situation have been added.

All LCV subsegments (idvehcat=2), all pollutants, and all gradients are affected for idts = 112095.

No aggregate traffic situation (or emission factors for aggregate traffic situations) is affected: idts = 112095 occurs in aggregate traffic situations for Sweden and Norway, but only with mileage shares of 0%.

“idconcept_mileage” for some Euro-6 PC/LCV subsegments

The “concept_mileage” is the classification used to assign mileage correction functions to subsegments in HBEFA. The mileage (catalyst deterioration) function and their corresponding IDs have been newly differentiated between the different Euro-6 substeps (Euro-6 abc, d-temp, de) for LDV. However, the new IDs were not correctly assigned to all subsegments – mainly for PHEV and bi-fuel vehicles still the old IDs were in place. This resulted in zero values of emission factors for corresponding subsegments. The affected subsegments are listed in Table 2. The “idconcept_mileage” of these subsegments have been corrected with the update.

Table 2: Subsegments affected by the corrected idconcept_mileage.

idsubsegment	Subsegment
132961	PC CNG/petrol Euro-6_(CNG)
132962	PC CNG/petrol Euro-6_(P)
141961	PC FFV Euro-6 _(E85)
141962	PC FFV Euro-6 _(P)
154958	PC PHEV petrol Euro-6de_(P)
154965	PC PHEV petrol Euro-6abc_(P)
161961	PC LPG/petrol Euro-6_(LPG)
161962	PC LPG/petrol Euro-6_(P)
155958	PC PHEV diesel Euro-6de_(D)
155965	PC PHEV diesel Euro-6abc_(D)
121962	PC diesel Euro-6ab SU after software update
121961	PC diesel Euro-6ab SU before software update
233161	LCV CNG/petrol M+N1-I Euro-6_(CNG)
233162	LCV CNG/petrol M+N1-I Euro-6_(P)
233261	LCV CNG/petrol N1-II Euro-6_(CNG)
233262	LCV CNG/petrol N1-II Euro-6_(P)
233361	LCV CNG/petrol N1-III Euro-6_(CNG)
233362	LCV CNG/petrol N1-III Euro-6_(P)
242161	LCV FFV M+N1-I Euro-6 _(E85)

idsubsegment	Subsegment
242162	LCV FFV M+N1-I Euro-6 _(P)
242261	LCV FFV N1-II Euro-6 _(E85)
242262	LCV FFV N1-II Euro-6 _(P)
242361	LCV FFV N1-III Euro-6 _(E85)
242362	LCV FFV N1-III Euro-6 _(P)
254162	LCV PHEV petrol M+N1-I Euro-6_(P)
254262	LCV PHEV petrol N1-II Euro-6_(P)
254362	LCV PHEV petrol N1-III Euro-6_(P)
212161	LCV petrol M+N1-I Euro-6ab
255162	LCV PHEV diesel M+N1-I Euro-6_(D)
255262	LCV PHEV diesel N1-II Euro-6_(D)
255362	LCV PHEV diesel N1-III Euro-6_(D)

Missing “idenergy” for CNG and HEV HDV

The ID for “energy” (energy carrier) had to be added to the base emission factor tables as additional primary key for HBEFA 5.1, since for PHEV HGV, there can be fuel consumption in charge-depleting mode, the corresponding energy consumption of which could otherwise not be differentiated from electricity consumption. Unfortunately, “idenergy” was not assigned to CNG HDV from Euro-V to Euro-7, and HEV urban buses. This has been corrected with the update.

N2O and NH3 mileage correction function for HDV

An older, outdated version of the N2O and NH3 mileage correction function parameters for HDV was still implemented. This has been corrected.

NMHC as difference of HC – CH4 also for newer vehicles

HC components stem from different sources in HBEFA: For older vehicles, they are calculated based on shares in HC. The shares of CH4 and NMHC always add up to 100%. For newer vehicles (from Euro-6de/VI DE), more detailed CH4 emission factors are available for hot emissions. However, NMHC was still calculated using the shares based on less detailed sources. Therefore, the sum of CH4+NMHC was not equal to HC for newer vehicles. This has now been corrected – NMHC is now calculated as the difference of HC minus CH4 for newer vehicles as well.

FC in l/100 km for HGV, empty and full load

The output of FC (fuel consumption) in litres per 100 km was not yet correct for HGV at empty (0%) and full (100%) load. The unit conversion simply did not take place. This has now been corrected.

PN-nonexhaust emissions not divided by 1000

PM (particulate matter, i.e. mass) base emission factors are given in mg/km and need to be converted to g/km by division by 1000 in HBEFA. This conversion was so far incorrectly applied to PN (particle number) as well. This has been corrected.

2-stroke petrol in German fuel mix

2-stroke petrol is considered a separate energy carrier from petrol used in 4-stroke motors, since due to lubricants it has different properties. Therefore, also the fuel mix (i.e. shares of fossil and biofuels in the mix) is differentiated between 2- and 4-stroke petrol. For Germany, the 2-stroke mix has still been missing. This resulted in zero values of all energy-dependent components (EC, FC, CO2 etc.) for all 2-stroke vehicle types (all of which are in the MC vehicle category).

Updated Austrian fleet

The last update of the Austrian fleet model (traffic scenario) was run through the fleet model. This was corrected for the update. Certainly, trip length distributions used for cold start extra emission factors are affected; it is not quite clear whether hot emission factors are also slightly impacted at aggregated fleet levels.

Updated aggregated traffic situation patterns for Austria

The shares of individual traffic situations were not yet correct in the Austrian aggregate traffic situation. On motorways, to low average speeds resulted. Therefore, new patterns have been provided in the update:

- “Ø-MW 2025” (idtsgrad = 125)
- “Ø-Rural 2025” (idtsgrad = 126)
- “Ø-Urban 2025” (idtsgrad = 127)
- “Ø 2025” (idtsgrad = 128)

The patterns used so far are still visible, but are marked as “outdated” in the comment columns. When querying emission factors for aggregate traffic situations, the new default pattern that is used if a user does not make an explicit selection is “Ø 2025” (idtsgrad = 128).

Correct zero EF values for non-electric vehicles

Even though it may contradict intuition, emission factor values of 0 may be correct for some pollutants and some non-electric vehicle types. The following subchapters list the cases that HBEFA users have asked about since publication. It is not an exhaustive list – there may be some correct zero values that are not listed.

Hot EF

- CO is zero for some combinations of subsegments and traffic situations. E.g. for PC diesel Euro-5 EA189 after software update (idsubsegment 121953) in traffic situation Rural/MW/120/Freeflow, CO is zero.
  - In some cases, CO is close to zero for new HDV, and a negative mileage correction function (meaning that less CO is emitted with aged than with new catalysts) can set it to 0 for older vehicles.
- PM10, PM2.5, BC exhaust for LPG vehicles: There are few measurements for LPG vehicles only; they suggest that exhaust particle emission factors are close to zero. In HBEFA, they are therefore set to 0.

Cold start extra EF (CSEE)

- NH3 CSEE for vehicles older than Euro-6de/VI DE have been calculated based on the EMEP/EEA (COPERT) Methodology. Resulting negative values have been set to 0. Also, for Euro-6de/VI DE, some CSEE of 0 result from the cold start model implemented in PHEM.
- Some HC CSEE are also intentionally 0.