

PHEM LIGHT

Passenger car and Heavy duty Emission Model

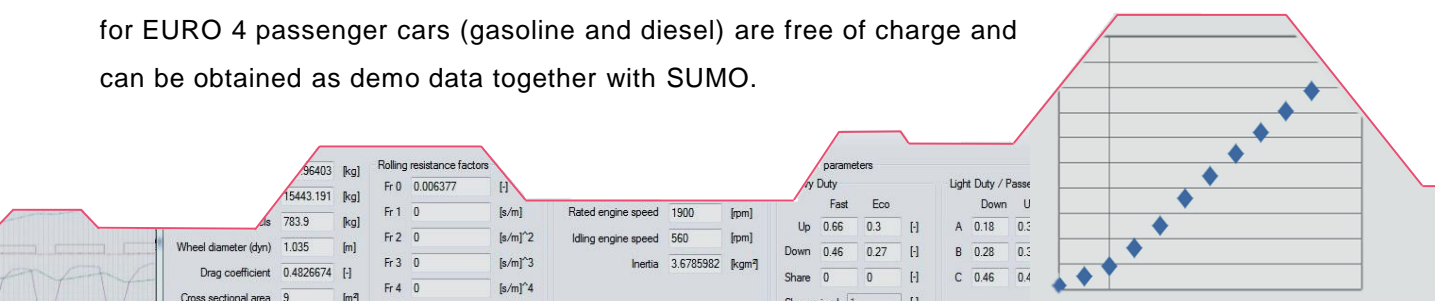
The model PHEMlight is a micro-scale model for simulation of fuel consumption and pollutant emissions of on-road vehicles. PHEMlight has been developed by the Graz University of Technology (TU Graz) in cooperation with FVTmbH. PHEMlight is based on the parent model PHEM (Passenger car and Heavy duty Emission Model) but as a model version with reduced model complexity tailor-made for a model link with micro-scale traffic models.

SOFTWARE

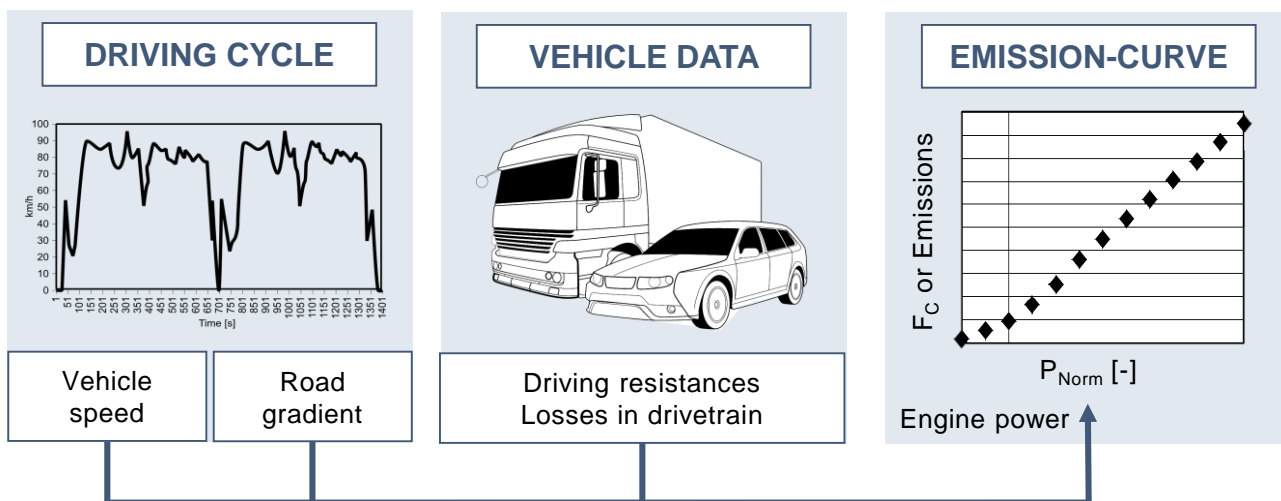
The software is available in two different versions:

1. As executable code (PHEMlight “standalone version”) provided by FVT with the features of simulation of 1 Hz driving cycles for:
 - single vehicles and
 - fleet average vehicles according to user defined fleet compositions.
2. Included in the SUMO code provided by DLR (Deutsches Zentrum für Luft- und Raumfahrt). Besides the software PHEMlight also features standard input data describing vehicle characteristics and emission behaviour for European fleet representative vehicles. These datasets have been either
 - derived from the standard vehicle dataset from PHEM for all Diesel and Gasoline vehicles or
 - elaborated at the FVT for CNG-vehicles as well as for hybrid or battery electric vehicles.

These datasets as well as the PHEMlight standalone software are property of FVT and can be obtained based on the licence conditions as described in this document. PHEMlight input data for EURO 4 passenger cars (gasoline and diesel) are free of charge and can be obtained as demo data together with SUMO.

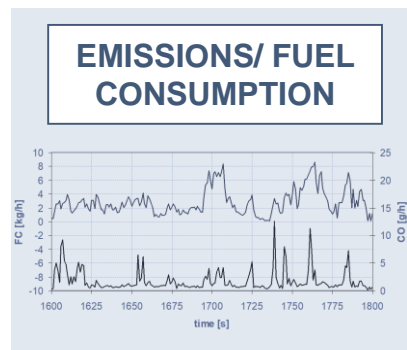


PHEMlight SIMULATION APPROACH



ENGINE POWER

- P_{norm} = P_{wheel} / P_{rated} for HDV and for FC of all vehicles
- = P_{wheel} / P_{drive} for regulated emissions of PC and LDV
- P_{drive} = wheel power at 70 km/h speed and 0.45 m/s^2



VEHICLE MODELS

VEHICLE CATEGORY	SIZE CLASSES	TECHNOLOGY	EMISSION STANDARDS
Passenger Car (PC)	average	Gasoline, Diesel, CNG, Gasoline HEV, Diesel HEV, BEV	EURO 0 to EURO 6d
Light Commercial Vehicle (LCV)	I, II, III	Gasoline, Diesel, CNG, Gasoline HEV, Diesel HEV, BEV	EURO 0 to EURO 6d
Heavy Duty Vehicle (HDV)	Rigid Truck (I, II), Truck+Trailer, Citybus, Coach	Diesel, CNG, Diesel HEV and BEV (only for Citybus)	Pre EURO to EURO VI

HEV ... Hybrid Electric Vehicle
BEV ... Battery Electric Vehicle

LICENCE CONDITIONS

The model PHEMlight was developed at the Graz University of Technology (TU Graz) in cooperation with the FVT mbH. The following sections describe the conditions and the price for licences.

1. DATA

With ordering the software and data package the user agrees to following conditions. The software is available in two different versions, the agreement is valid independently of the version used. Besides the software PHEMlight the agreement is valid also for the standard input data describing vehicle characteristics and emission behaviour for European fleet representative vehicles provided by FVT and IVT within the licence.

By purchasing a licence for these data sets, the licensee can use the software PHEMlight and the data files for any application not in contradiction to the “other conditions” as listed below. If the data files delivered with the software are changed by the licensee, the changes have to be mentioned in any publications related to simulation runs with changed data if the results are designated in the publication to the application of the model PHEMlight.

OTHER CONDITIONS

- If the software PHEMlight and the data files shall be used by the licensee for: work for HBEFA and the ERMES group and other projects directly ordered by the European Commission, for COPERT or any task aiming at the calculation of emission factors for Austria, Germany, Switzerland or the entire EU vehicle fleet, the licensee needs the written agreement from TU Graz - Institute for Internal Combustion Engines and Thermodynamics.
- The use of the software and of the corresponding data is at licensees own risk and the software is provided on an “as is” basis and without warranty of any kind.
- TU Graz and FVT make no warranty that the software and the corresponding data will meet all of licensees requirements, that the software and the corresponding data will be error-free or bug-free and regarding the security, reliability or the performance of the software.
- Errors in the software will be corrected by TU Graz if resulting in improper results and if possible within the overall software architecture. Errors have to be documented by the user in written form in English or in German.

- Suggestions for improvements in the software and in the corresponding data are welcome. TU Graz and FVT make efforts for ongoing improvements in the model PHEM and PHEMlight. However, no warranty is given that suggested improvements will be introduced in the model.

FVT and TU Graz own all rights, titles and interest in and to the software and the data distributed, including without limitation all Intellectual Property Rights therein. The licensee agrees that it will not, nor will allow any third party to

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The licensee agrees to hold harmless and indemnify TU Graz and FVT and its employees from and against any claim, suit or action arising from or in any way related to the licensee's use of the Software or the licensee's violation of these Terms of Service, including any liability or expense arising from all claims, losses, damages, suits, judgments, litigation costs and lawyers' fees, of every kind and nature. TU Graz and FVT shall not be liable for any direct, indirect, incidental, consequential or other damages resulting from the use or the inability to use the software PHEMlight and the related data.

2. DOCUMENTATION AND TRAINING

The model is described in a short user manual. The background of the model is published in COLOMBO deliverables. With this documentation users shall be able to apply PHEMlight without much additional support from TU Graz. If still questions arise, 5 hours support via phone and/or e-mail is included in the costs for software and/or input data files. Additional support has to be agreed separately. Default rate at FVT is € 87,- per hour.

Acceptance of the licence agreement by the licensee

Fill in:

Name: _____

Position: _____

Signature: _____

3. COSTS excl. VAT

Software for 3 years licence ⁽¹⁾	
PHEMlight standalone version	€ 1.000,-
Input data packages ⁽²⁾ including 5 hours of support	
Passenger Cars and Light Commercial Vehicles	€ 2.000,-
Heavy Duty Vehicles (trucks and buses)	€ 2.000,-
Total Package	€ 5.000,-

- (1) Within these 3 years updates of the software will be supplied for free. Any further 3 years extension of the licence can be gained for 50% of the regular licence fee (i.e. € 500,-).
- (2) PHEMlight input data for fleet representative vehicles are updated approximately every 2 years. The latest version of input data is dated with December 2017. A licensee can obtain updates of PHEMlight input data for 50% of the regular licence fee (i.e. € 1.000,- for PC and LCV as well as € 1.000,- for HDV) Support exceeding 5 hours can be added for € 87,-/hour.

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