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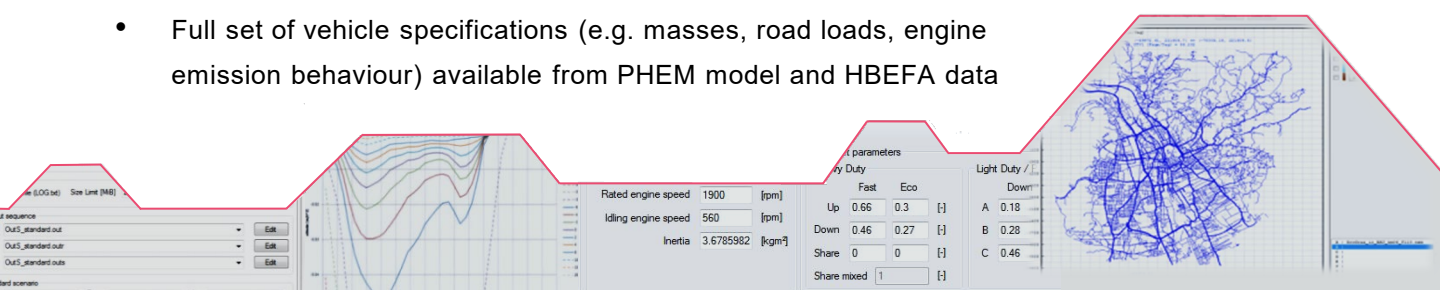
NEMO
Network Emission Model

MODEL FEATURES

- Comprehensive and efficient solution for emission calculation for transport networks
- Covers transport sectors road, rail and inland waterway transportation
- Combines detailed simulation of fleet composition and vehicle emission factors
- Full flexibility for defining scenarios regarding fleet composition, vehicle technology etc.
- Model results are provided in spatial resolution
- Provides good model accuracy in comparison with micro-scale emission models
- Interfaces for transport and air quality models implemented
- „Inventory“ mode available for calculation of region/nationwide emission inventories

METHODS

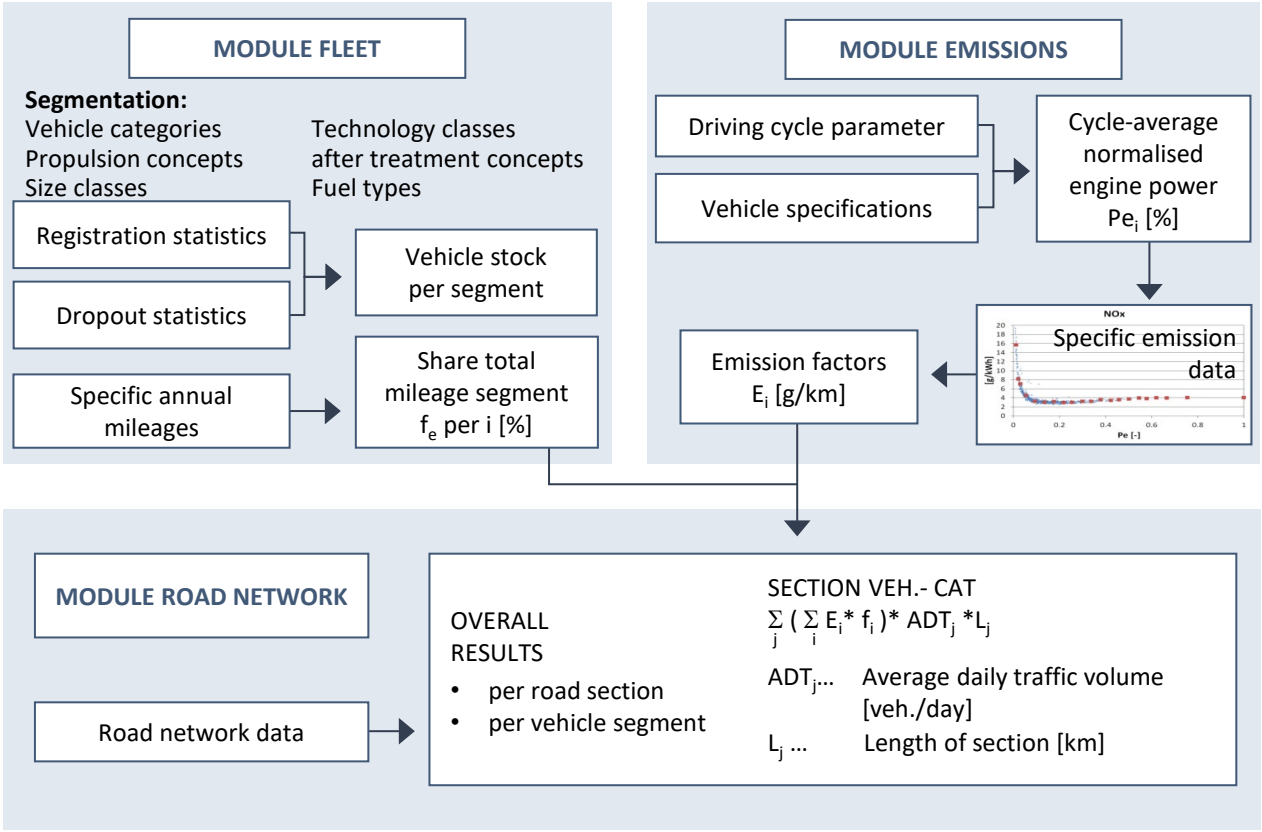
- Vehicle fleet composition is simulated based on yearly registration statistics and vehicle category and age dependent survival probabilities
- Vehicle technologies (e.g. “EURO class”) are allocated to new registrations based on registration year
- User defined simulation horizon (e.g. 1990 to 2050)
- Emissions are calculated from road section specific average engine power demand and characteristic curves on engine emission behaviour
- Average engine power demand is calculated for each road section (average speed, gradient) based on longitudinal dynamics
- Full set of vehicle specifications (e.g. masses, road loads, engine emission behaviour) available from PHEM model and HBEFA data



MODEL STRUCTURE

BASIC PRINCIPLES

- Network is subdivided into homogenous street sections
- Every street section is simulated by an average driving behaviour



Following vehicle segments are available as predefined datasets:

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, City bus, Coach	Diesel, CNG, Diesel HEV and BEV (only for City bus)	Pre EURO to EURO VI
Two-wheelers (MC)	Moped, Motorcycle 2-stroke, Motorcycle 4-stroke	Otto, BEV	Pre EURO to EURO 5

HEV … Hybrid Electric Vehicle

BEV … Battery Electric Vehicle

LICENCE CONDITIONS

The software NEMO was developed in cooperation between the Graz University of Technology and FVT mbH.

1. DATA

With ordering the software and data package the user agrees to following conditions. Besides the software NEMO 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 TU Graz within the licence.

By purchasing a licence for these data sets, the licensee can use the software NEMO 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 NEMO.

OTHER CONDITIONS

- If the software NEMO 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 NEMO. However, no warranty is given that suggested improvements will be introduced in the model.

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2. DOCUMENTATION AND TRAINING

The model is described in user manual available in English and German language. The background of the model is the PhD thesis “Entwicklung eines Simulationsmodells zur Ermittlung von Energieverbrauch und Emissionen auf Verkehrsnetzwerken“ in German language by Dr. Martin Dippold. With this documentation users shall be able to apply NEMO 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 € 110,- per hour.

3. COSTS excl. VAT

LICENCE MODEL (1)	COSTS
NEMO Complete	**€ 2.750,-**
• Full use of all model functionalities (road, rail, ship) with Graphical User Interface	
• 2 years licence applying to 2 PCs	
• Within these 2 years updates of the software or datasets is supplied for free	
• including 5 hours of support	
Licence for additional PCs (NEMO Complete)	*€ 330,- / PC*
NEMO Compact	**€ 1100,-**
• NEMO Software to be used in GRAL background application	
• Unlimited licence applying to 2 PCs	
• No updates included (only bug fixes)	
• Including 5 hours of support	
Licence for additional PCs (NEMO Compact)	*€ 120,- / PC*
NEMO Test	**€ 0,-**
• Test NEMO Software useable for 1 month	
Additional Support	€ 110,- / hour

(1) Any further 2 years extension of the licence can be gained for 50% of the regular licence fee.

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