

TREMOVE Contact Group Meeting

21 June 2004

Road Emission Factors

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Presentations on road vehicle emission factors

1. Current modelling for air pollution (COPERT III)
2. Current modelling for fuel consumption & CO₂
3. Future modelling

Feedback from DG ENV and ACEA meeting - 17 June 2004

Presentation structure (all modes)

1. Input from demand and vehicle stock modules
2. Emission factors used in TREMOVE :
 - Sources
 - Values
3. Apparent emission factors (overall g/veh.km)
4. Further work
5. Q & A / Discussion

1. Input from demand and vehicle stock modules

Vehicle-kilometre by road transport mode

+
influencing variables :

Vehicle related :

- ~ Vehicle type
- ~ Vehicle technology
- ~ Vehicle vintage

Usage related :

- ~ Speed
- ~ Road type
- ~ Trip Length
- ~ Load / Occupancy

Other inputs:

- ~ fuel specifications
- ~ ambient temperature

1. Input from demand and vehicle stock modules : road vehicle types

Mopeds

2-stroke < 50 cm³

Motorcycles

2-stroke > 50 cm³

4-stroke < 250 cm³

4-stroke 250 - 750 cm³

4-stroke > 750 cm³

Cars

Gasoline < 1400 cc

Gasoline 1400 – 2000 cc

Gasoline > 2000 cc

Diesel < 1400 cc

Diesel 1400 - 2000 cc

Diesel > 2000 cc

Buses & Coaches

Light duty vehicles

Gasoline

Diesel

Heavy duty trucks

Diesel 3,5 - 7,5 t

Diesel 7,5 - 16 t

Diesel 16 - 32 t

Diesel > 32t

1. Input from demand and vehicle stock modules : e.g. level of detail

Gasoline car technologies : Road types :

PRE ECE
ECE 15 00-01
ECE 15 02
ECE 15 03
ECE 15 04
Improved Conventional
Open Loop
Euro I - 91 441 EC
Euro II - 94 12 EC
Euro III - 98 69 EC
Euro IV - 98 69 EC

Motorway
• peak
• offpeak
Rural road
• peak
• offpeak
Urban road
• peak
• offpeak

2. Emission factors used in TREMOVE : Information Sources

- ARTEMIS : not yet available (early 2005?)
 - Consequently we use COPERT III
 - Developed for EEA, commonly used in EU projects
 - ARTEMIS results are already partial included in national models, of which :
 - German-Swiss-Austrian handbook (INFRAS et al.)
 - NL Versit methodology (TNO)
- Nevertheless, preference for an EU source prevails

2. Emission factors used in TREMOVE : Information Sources

Copert Methodology - Level of detail :

- ♦ Hot emissions
 - Speed-dependency
 - Catalyst degradation
 - Effect of HDV load
 - ...
- ♦ Cold Start emissions
- ♦ Evaporative emissions

2. Emission factors used in TREMOVE : Information Sources

1 Addition to COPERT III methodology

Particulate matter emissions from :

- Gasoline vehicles
- non-exhaust sources (road abrasion, tyre wear, ...)

Taken from Tremove version for Auto-Oil II programme

2. Emission factors used in TREMOVE : Values : Some examples (EU 15 avg)

CO emission factor (gram per km)			
Gasoline car 1400 - 2000 cc		Diesel car 1400 - 2000 cc	
RTG2 - ECE 15 00-01		23.17 RTL1 - Conventional	0.62
RTG3 - ECE 15 02		19.24	
RTG4 - ECE 15 03		19.53	
RTG5 - ECE 15 04		10.69	
RTG6 - Improved Conventional		5.18	
RTG7 - Open Loop		5.63	
RTG8 - Euro I - 91 441 EEC		8.45 RTL2 - Euro I - 93 59 EEC	0.40
RTG9 - Euro II - 94 12 EC		6.17 RTL3 - Euro II - 96 69 EC	0.40
RTG10 - Euro III - 98 69 EC Stage20		4.98 RTL4 - Euro III - 98 69 EC	0.39
RTG11 - Euro IV - 98 69 EC Stage200		1.61 RTL5 - Euro IV - 98 69 EC	0.39

3. Apparent emission factors (overall g/veh.km) EU 15 avg

	CO2		PM		VOC		SO2	
gasoline car	243	190	0.032	0.010	2.185	0.162	0.046	0.005
diesel car	232	159	0.207	0.031	0.159	0.059	0.066	0.004
PCDS small diesel car -1.4 l		132		0.030		0.058		0.003
PCDM medium diesel car 1.4-2.0 l	201	171	0.208	0.032	0.159	0.060	0.058	0.004
PCDB big diesel car +2.0 l	277	231	0.206	0.033	0.158	0.061	0.080	0.006
motorcycle	90	68	0.078	0.058	6.333	2.501	0.017	0.002
bus	898	857	0.567	0.069	1.242	0.525	0.258	0.022
LDV	265	243	0.265	0.035	1.212	0.112	0.067	0.006
HDV	826	831	0.528	0.031	1.072	0.413	0.237	0.021

4. Further work

- ✓ Adding motorcycle EURO II technology
 - ✓ Additions wrt fuel consumption and CO2 modelling
- Next presentation
- ✓ Partial upgrade to ARTEMIS and long term perspective
- Feedback from 17 june ACEA - DG ENV meeting