

# UPDATE VERSIT+ EMISSION FACTORS 2017-2018

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# UPDATES AND ONGOING INVESTIGATIONS IN THE NETHERLANDS

- › Test program **Euro-6 LCV's** → lowering of the emission factors
- › Driving behaviour of trucks → using monitoring data for emission factors
- › Risk of NH<sub>3</sub> emissions (with SCR) → incidents with high emissions
- › Euro-VI **minimal deterioration** observed → first generation trucks with 500k
- › Testing **older petrol vehicles** → lower PM emission factors, some risks
- › **Inspection testing** of DPF failure and DPF removal → no consistent picture
- › **Heavy duty CNG** testing for pollutants and GHG emission → mixed picture
- › **Special Euro-VI** vehicles (e.g. refuse trucks) → relevance for urban emissions?
  
- › **The end of instantaneous emission modelling?:**
  - › Euro-VI emission risks → incomplete picture, some cases of high emissions
  - › Speed limit enforced motorway 80 km/h: over-estimating model predictions

# TEST PROGRAM ON THE ROAD WITH A VARIETY OF TESTS

## › SEMS (Smart Emission Measurement System)

No.	Trip	Type		Day	Distance	Av. velocity	Payload	Driving style
					[km]	[km/h]	[%]	
1	RDE_C	Urban/rural/motorway	Cold start	1	74.7	43	28	Economy
2	Motorway	Motorway	Hot start	1	89.5	79	28	Regular
3	RDE_H	Urban/rural/motorway	Hot start	1	74.7	43	28	Regular
4	Congest_H	Motorway	Hot start	1	84.3	56	28	Regular
5	Congest_C	Motorway	Cold start	2	85.3	83	95	Regular
6	City	Urban	Hot start	2	27.8	21	95	Regular
7	Rural	Rural	Hot start	2	64.6	50	95	Regular
8	RDE_H	Urban/rural/motorway	Hot start	2	74.7	43	95	Sportive
9	City to City	Urban/motorway	Hot start	2	21.2	36	95	Regular
10	RDE_C	Urban/rural/motorway	Cold start	3	74.7	43	55	Regular
11	Short trip	Urban	Hot start	3	4.3	28	55	Regular
12	Delivery trip	Urban	Hot start	3	17.4	12	55	Regular
13	ISC_H	Urban/rural/motorway	Hot start	3	122.7	57	55	Regular
14	City to City	Urban/motorway	Hot start	3	21.2	36	55	Regular
	Total				837.1			

## › input for VERSIT+ emission model

Emission test results of main stream Euro 6 diesel Light Commercial Vehicles

# EMISSION FACTORS NOX 2018 LIGHT DUTY DIESEL VEHICLES

passenger cars

	urban	rural	motorway
Euro 0	0.798	0.659	0.820
Euro 1	1.058	0.453	0.694
Euro 2	0.800	0.549	0.666
Euro 3	0.796	0.549	0.702
Euro 4	0.431	0.376	0.515
Euro 5	0.675	0.531	0.588
Euro 6	0.428	0.344	0.410
Euro 6 RDE	0.228	0.170	0.171

2016 testing of 18 LCV's  
weighted with sales numbers

2016 testing of 15 passenger cars  
weighted with sales numbers

*RDE values based of 2015 estimate*

light commercial vehicles Class III

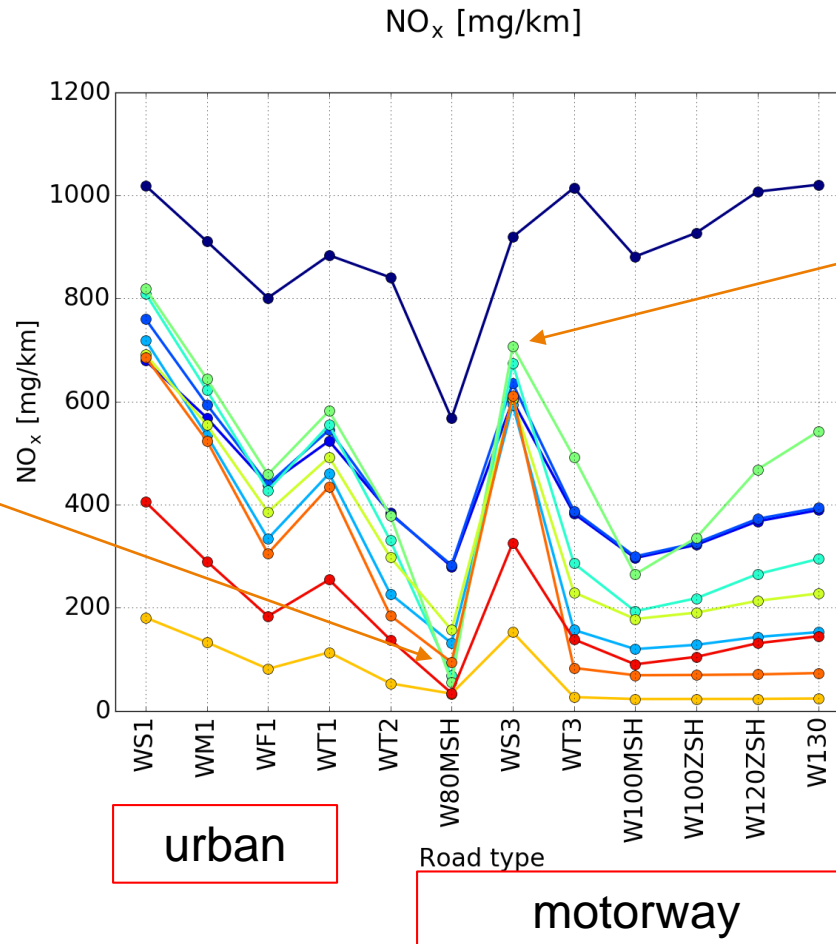
	urban	rural	motorway
Euro 0	0.912	0.870	0.826
Euro 1	1.204	0.837	1.342
Euro 2	1.471	0.809	1.127
Euro 3	1.242	0.857	1.095
Euro 4	1.437	0.860	1.291
Euro 5	1.596	1.289	1.532
Euro 6	0.470	0.298	0.290
Euro 6 RDE	0.303	0.252	0.303

# BANDWIDTH IN EURO 6 LCV RESULTS

## *SALES NUMBERS ARE IMPORTANT*

**Dutch emission factors for Euro 6 LCV in all traffic conditions**

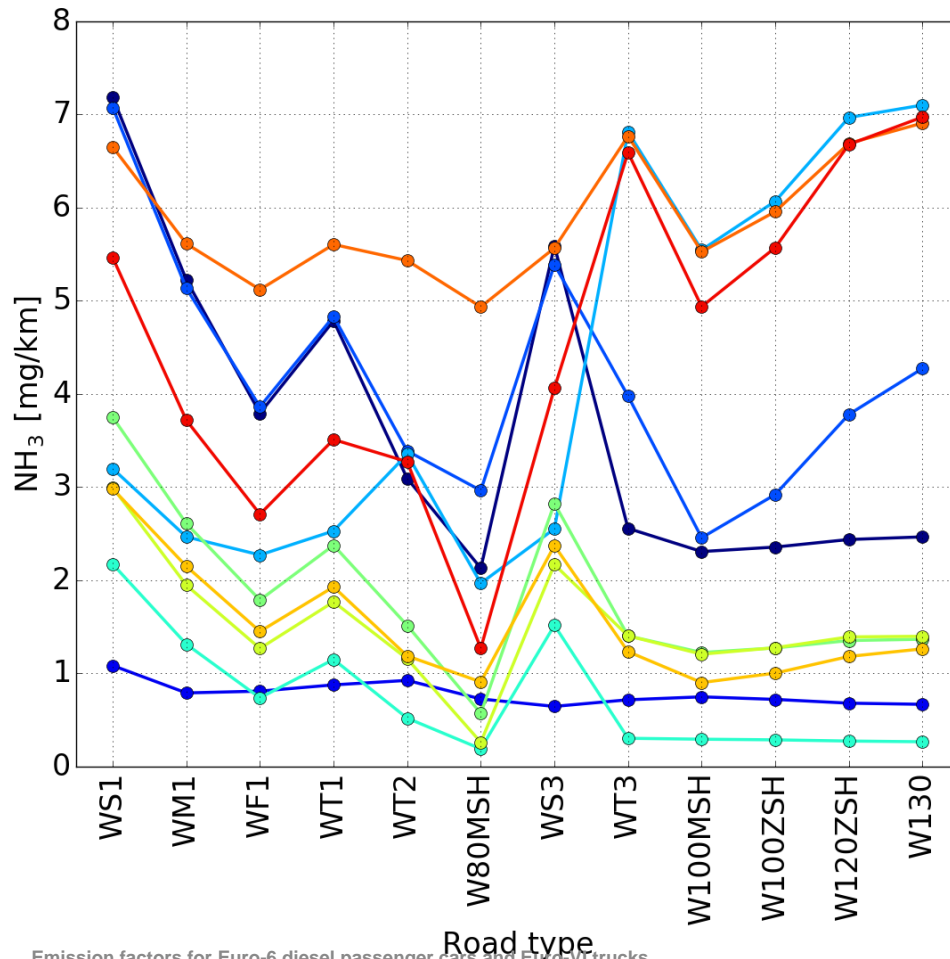
80 km/h speed limit on the motorway



motorway congestion

# NH<sub>3</sub> WITH SCR A GROWING PROBLEM?

NH<sub>3</sub> [mg/km]

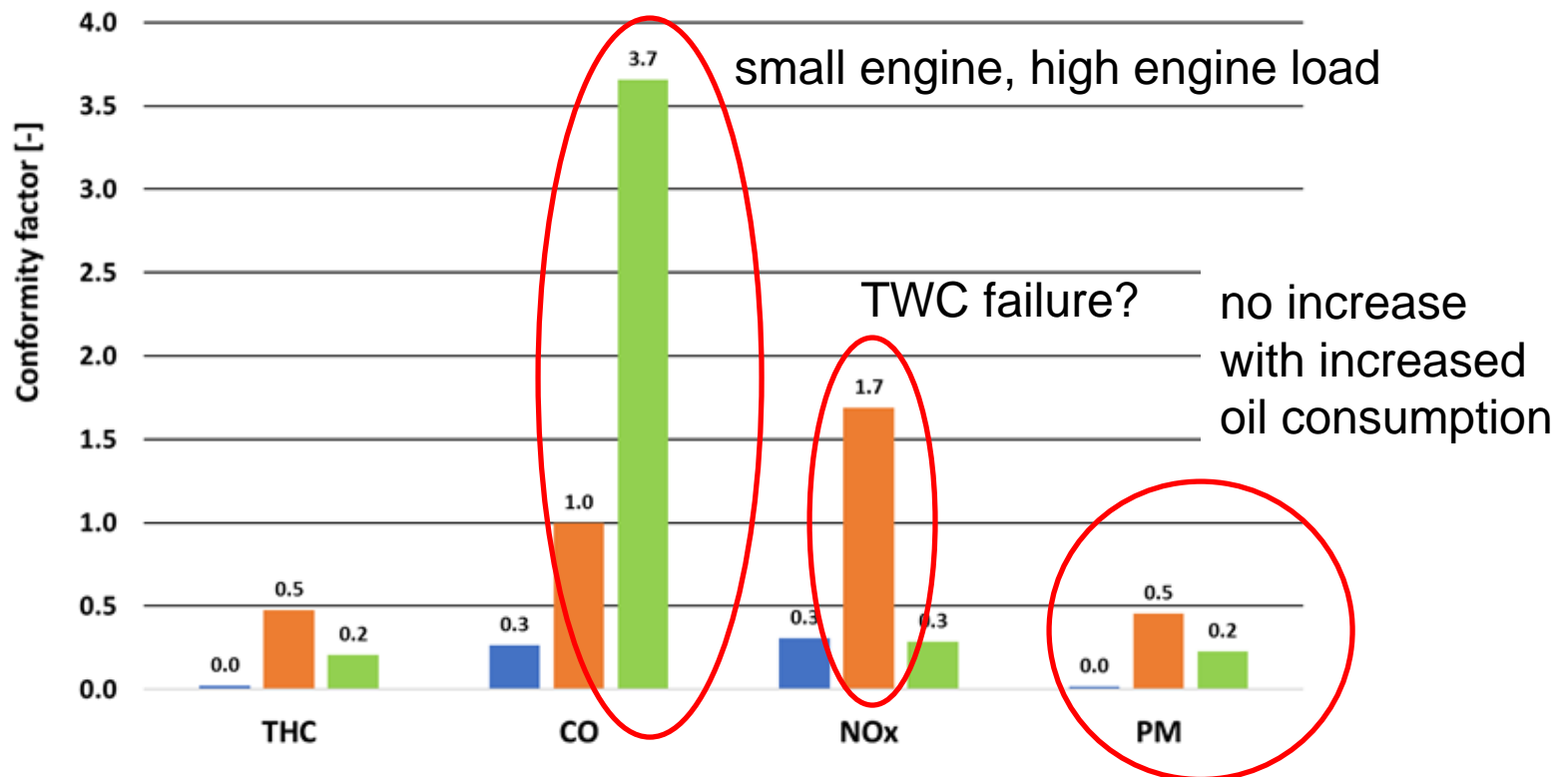


SCR the common solution,  
also for light duty vehicles

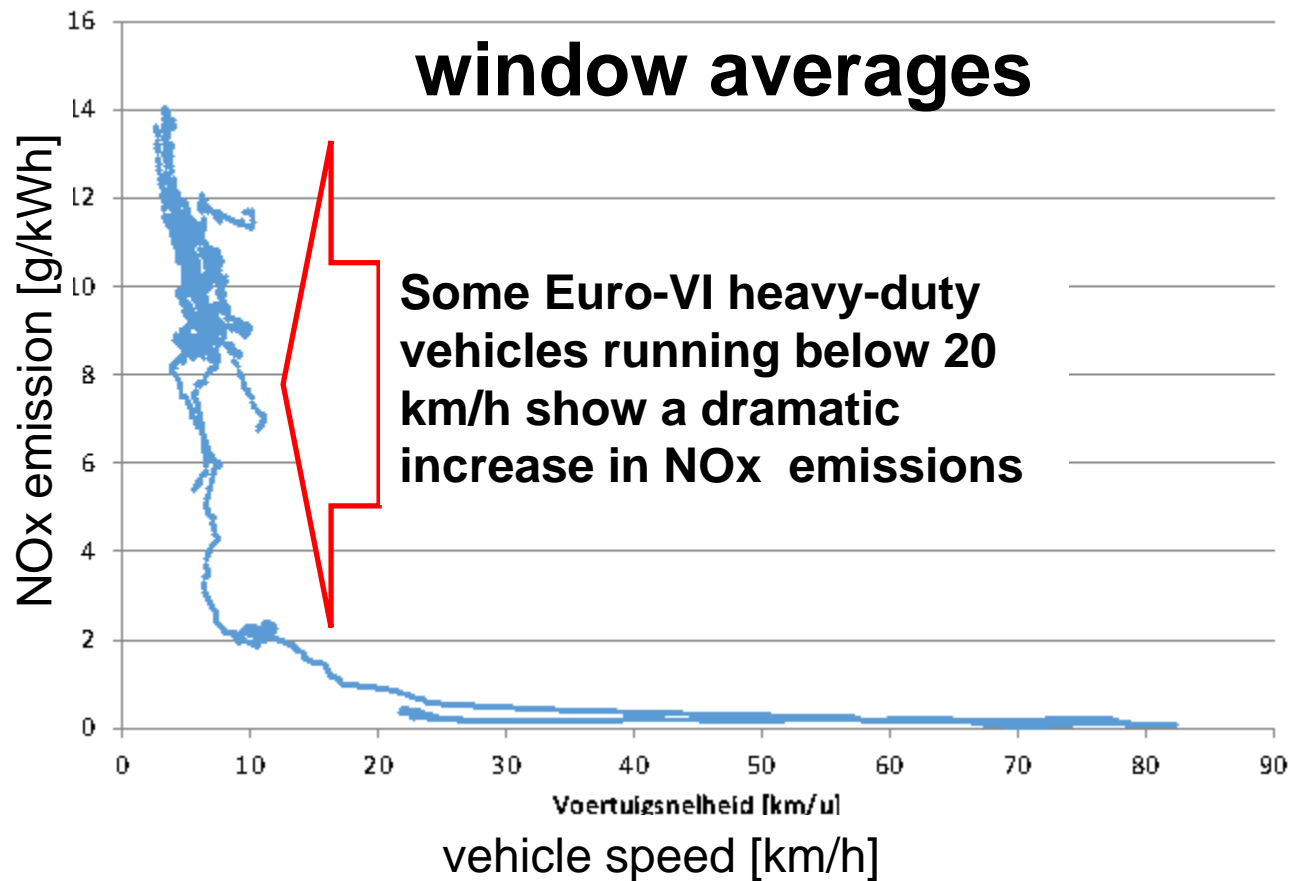
may generate more NH<sub>3</sub> slip

# OLDER PETROL VEHICLES ~200,000KM

Conformity factors CADC tests of three aged petrol vehicles



# HEAVY-DUTY VEHICLES IN URBAN USE UTILITY VEHICLES, REFUSE, ETC.





# MEASUREMENTS ON ON-ROAD MOBILE MACHINERY

**on diesel trains, inland ships, and building machines**

› common themes:

1. typical engine load is lower than normally assumed. Engines are “on” the whole day, but may operate only a fraction of that time. Or conditions require only limited loads. (“hours, nor powers”)
2. If loads drop under 20% the  $\text{NO}_x/\text{CO}_2$  ratio increases two-fold to four-fold (up to 35 g/kg  $\text{NO}_x/\text{CO}_2$ ), making low-load operations often an important part in the total  $\text{NO}_x$  emissions of non-road mobile machinery.
3. dynamic operation, as opposed to constant load, may yield a manifold increase in  $\text{NO}_x$  emissions

→ short test programs are insufficient, monitoring is needed

# IN THE TAP CONFERENCE

- › Veerle Heijne:
  - › talk the Euro-6 LCV testing
  - › poster on driving behaviour and fuel consumption
- › Pim van Mensch
  - › talk on emissions in normal usage versus RDE testing
  - › poster on moped emissions
- › Norbert Ligterink
  - › talk on on—road CO<sub>2</sub> emission determination
  - › poster on tackling PM emissions increase over lifetime

# THANK YOU FOR YOUR ATTENTION

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