

# Mobile Emissions

New and recent developments in The Netherlands

Dr. Jessica M. de Ruiter & Ir. Emiel van Eijk

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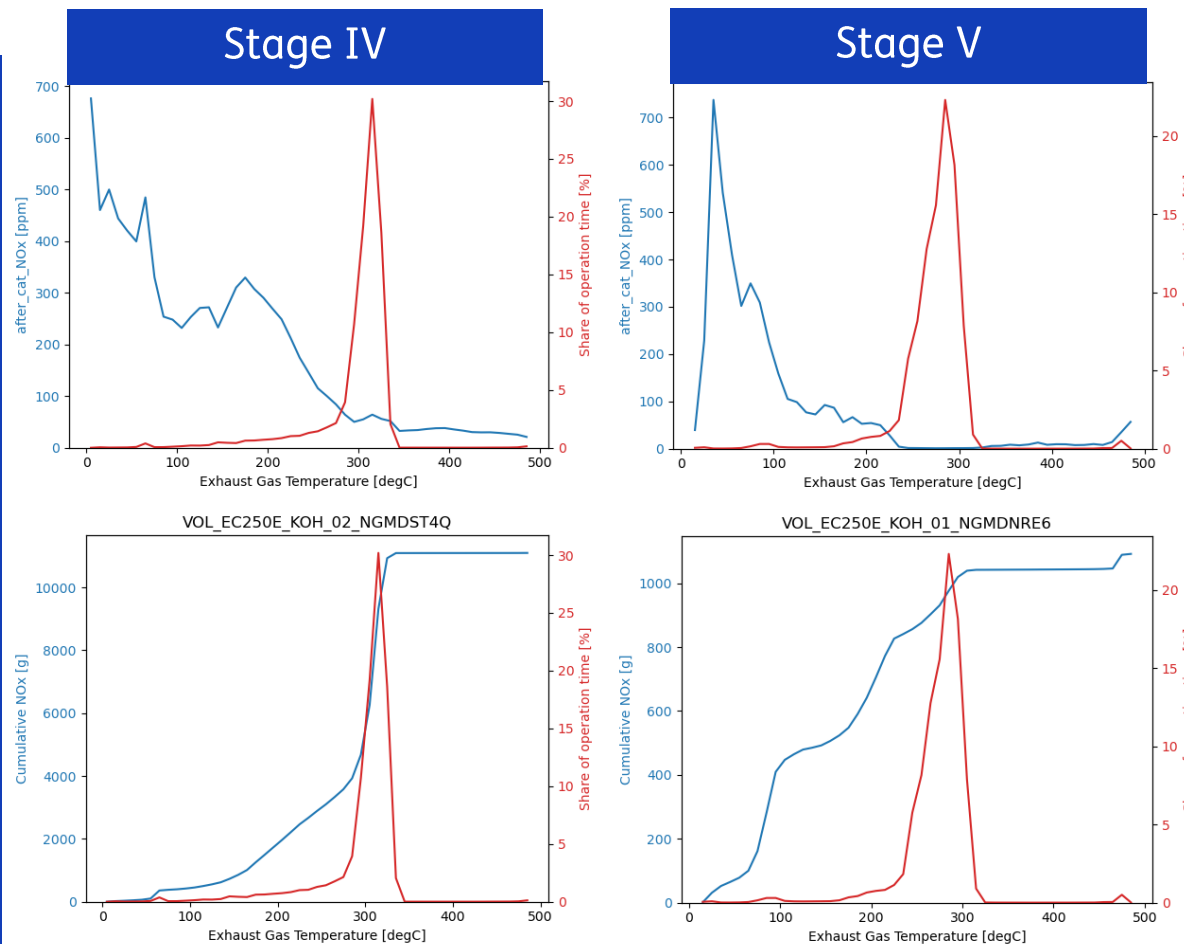
# Current topics for Dutch emission factors



1. Mobile machinery emissions
2. Replacement and sport catalyts
3. PTI effectiveness + PTI NO<sub>x</sub> test
4. Temperature-controlled transport
5. Quantifying effect of deterioration & defects
6. Driving behaviour (cold starts, idling, speeding)
7. Particulate emissions (incl. volatiles, etc.)
8. Non-regulated pollutants
9. Fuel affecting emission levels
10. Motorbikes & mopeds
11. Shipping emissions

# Mobile machinery monitoring

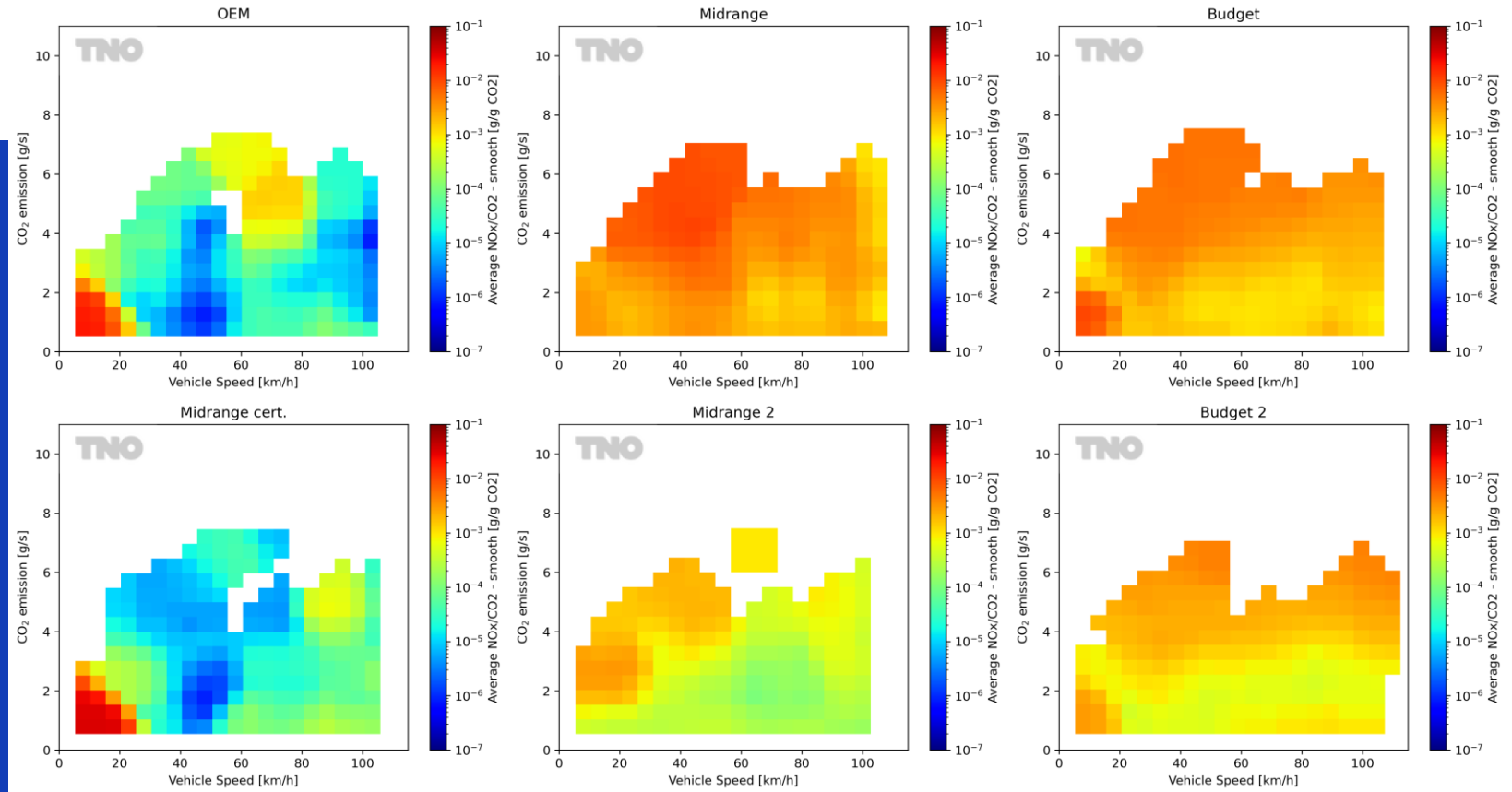
- Stage IV vs V shows clear differences in both PPM and cumulative NO<sub>x</sub> distribution
- This appears to be a broader trend
- SCR “off” is dominant in NO<sub>x</sub> contribution
- 7 % time can lead to 92% NO<sub>x</sub>
- Note that these have relatively high engine load compared to those monitored previously
- Cold start and (especially) low-load operation is most relevant for total emissions



	BOM BF700		Dynapac 2500		VOG_1800i		WIR_250_1		WIR_250_2		LIE_R926W	
	SCR off	SCR on	SCR off	SCR on	SCR off	SCR on	SCR off	SCR on	SCR off	SCR on	SCR off	SCR on
Time [%]	9	91	7	93	25	75	29	71	11	89	19	81
Avg. NOx/CO2 [ppm/%]	46	1,9	57	0,4	34	0,8	36	1,3	30	1,9	56	1,5
Total NOx [%]	<b>71%</b>	29%	<b>92%</b>	8%	<b>94%</b>	6%	<b>92%</b>	8%	<b>66%</b>	34%	<b>90%</b>	10%

# Quantifying high emitters

- Estimated that 6% of the older petrol vehicles have a defective TWC system and are responsible for about half the NO<sub>x</sub> emissions of petrol vehicles.
- When TWC catalysts are stolen, replacement catalysts are typically inferior quality.



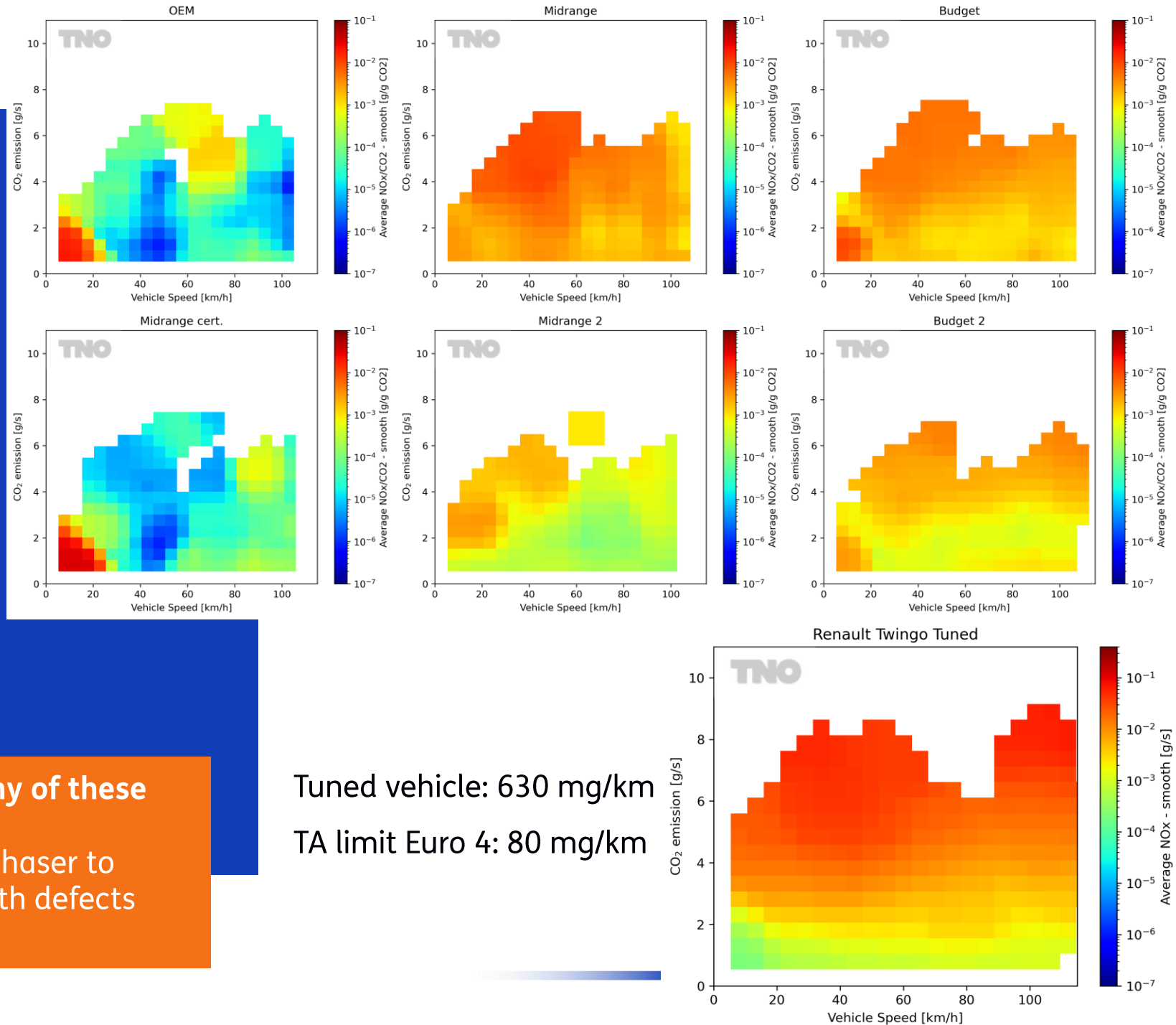
<i>NOx emissions</i>	Urban	Rural	Motorway		Factor over OEM	Urban	Rural	Motorway
<b>OEM</b>	35.4	36.8	4.7	<i>mg/km</i>		1.0	1.0	1.0
<b>Midrange</b>	1202.2	579.0	259.0	<i>mg/km</i>		34.0	15.7	55.1
<b>Midrange 2</b>	179.2	76.1	52.3	<i>mg/km</i>		5.1	2.1	11.1
<b>Midrange cert.</b>	3.8	5.3	18.4	<i>mg/km</i>		0.1	0.1	3.9
<b>Budget</b>	674.5	397.3	257.6	<i>mg/km</i>		19.1	10.8	54.8
<b>Budget 2</b>	330.4	244.6	159.4	<i>mg/km</i>		9.3	6.6	33.9

# Quantifying high emitters

- Estimated that 6% of the older petrol vehicles have a defective TWC system and are responsible for about half the NO<sub>x</sub> emissions of petrol vehicles.
- When TWC catalysts are stolen, replacement catalysts are typically inferior quality.
- Sports catalysts (more noise and power) lead to increased emissions.

**Current PTI tests do not detect any of these problems:**

→ Further development of plume chaser to quantify the fraction of vehicles with defects and their impact

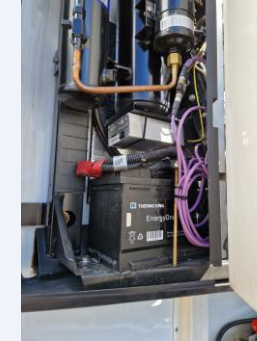


Tuned vehicle: 630 mg/km  
TA limit Euro 4: 80 mg/km



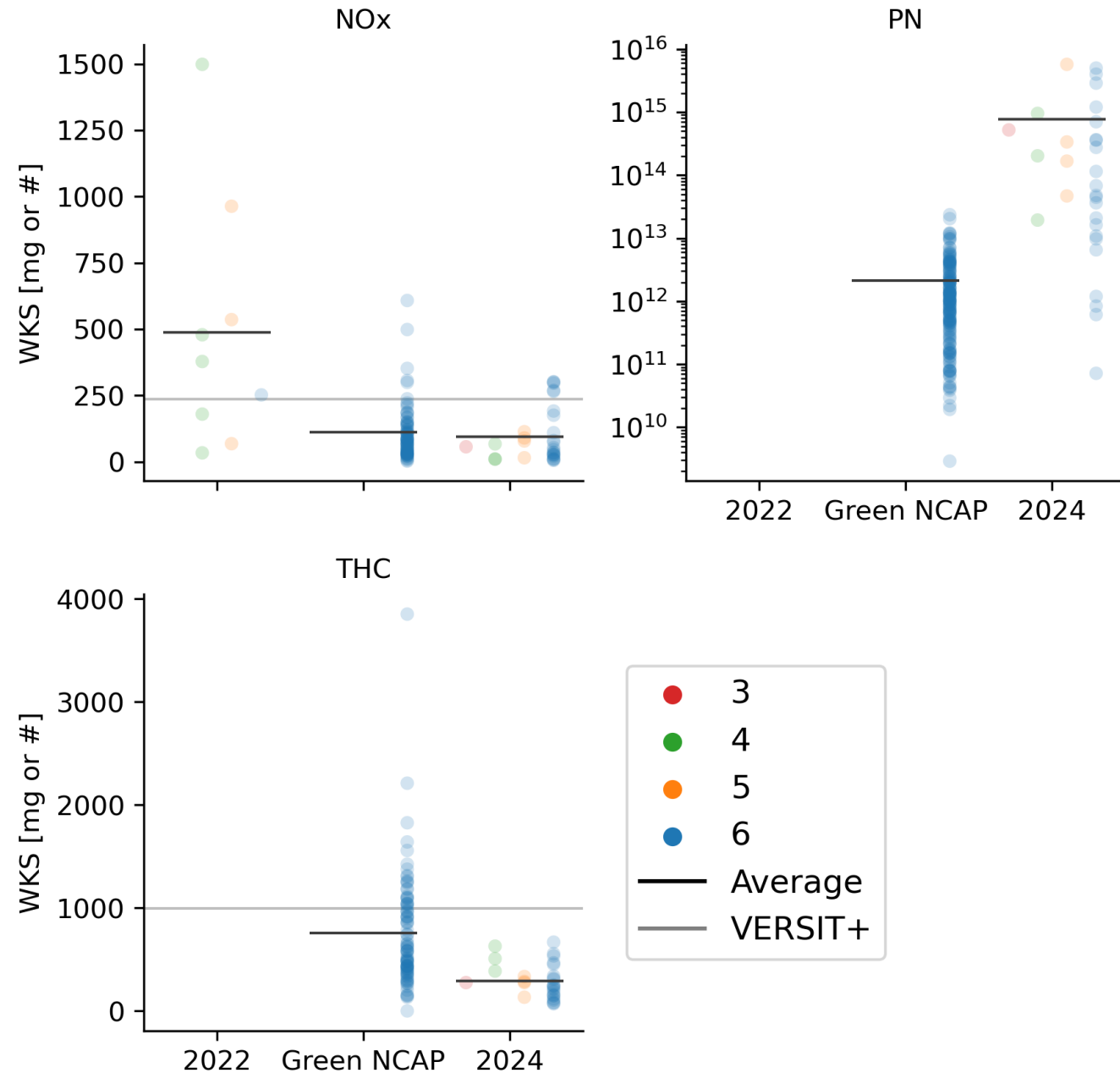
# Monitoring temperature-controlled transport

- Year-long monitoring campaign
- Additional emissions calculated for road transport
- On average 39 g/hour leads to ~ 1.8 kton NO<sub>x</sub> annually, but large variation due to operational profile
- Some machines are also plug-in, which leads to lower NO<sub>x</sub> during loading & unloading
- PM measurements to be conducted Q4 2024



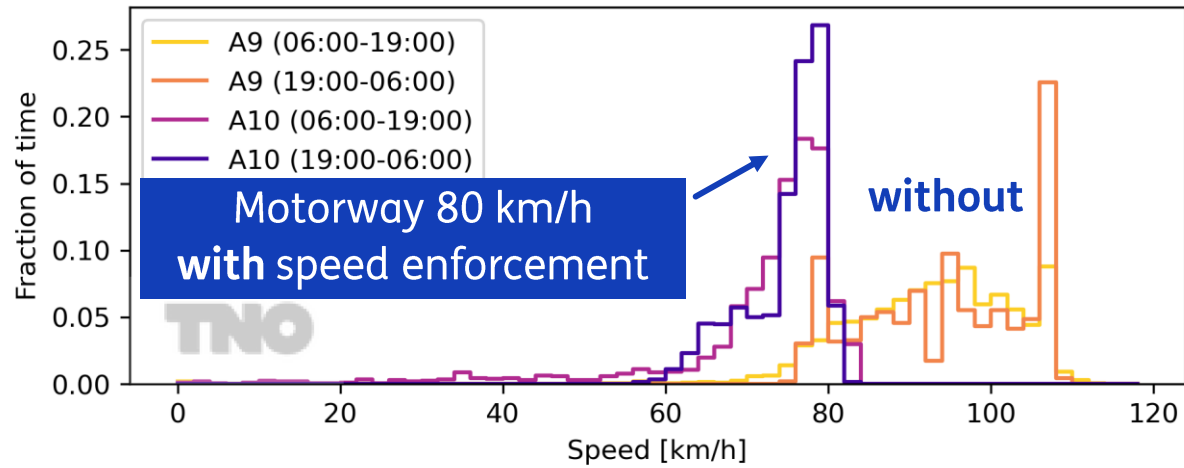
# Cold start as a point source

- Integrated in VERSIT+ with annual kilometre dependence
- New campaign: 31 random petrol vehicles
  - Idling + restart
  - Most cold start emissions within 20 – 30 sec
  - THC will be updated to ~ 760 mg

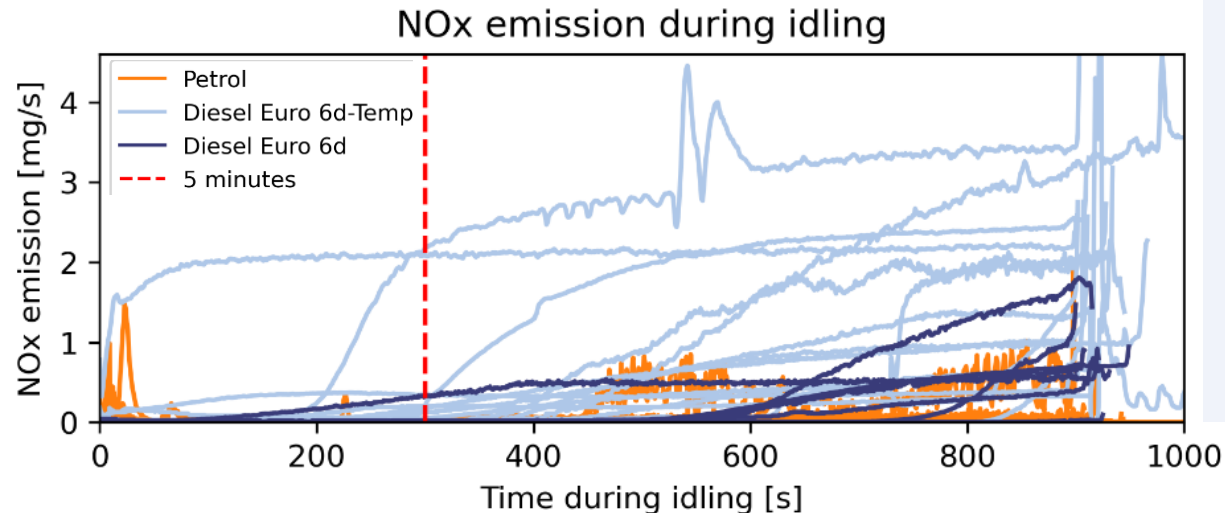


# Driver behaviour

11-2024



- Chase car campaign shows effectivity of speed enforcement
  - 80 km/h on the motorway
  - Many vehicles could not be followed due to high speeds
- Newest idling measurements show newer diesels perform better during idling, but some still have higher emissions after 10 min
  - “Oh, I’m just charging my phone”





# Literature (from 2023-2024)

- [Emissiefactoren voor luchtkwaliteit en stikstofdepositie | VERSIT+ Emission Factors](#)
- [Emissiefactoren wegverkeer 2024 - Wijzigingen in de ER en SRM emissiefactoren voor luchtkwaliteit, stikstofdepositie en klimaat](#)
- [Opties voor monitoring van de NOx-emissies van mobiele werktuigen](#)
- [NOx high emitters in the Dutch fleet. Characterizing the problem and researching methods for recognizing petrol high emitters](#)
- [Real-world emissions of temperature-controlled transport in the Netherlands](#)
- [Analysis of the emission performance of vehicles tested within the Green NCAP programme](#)
- [Real-world fuel consumption and electricity consumption of passenger cars and light commercial vehicles 2023](#)
- [Emissiemetingen Stadler passagierstrein met diesel en HVO](#)
- [Tailpipe emissions of Euro 5 mopeds](#)
- [Reductiepotentieel van de milieu- en klimaatimpact van binnenvaart - Meten op Schepen](#)