

Reducing emissions from non-road mobile machinery

90th GRPE session
Geneva, Switzerland

Presentation by The Netherlands

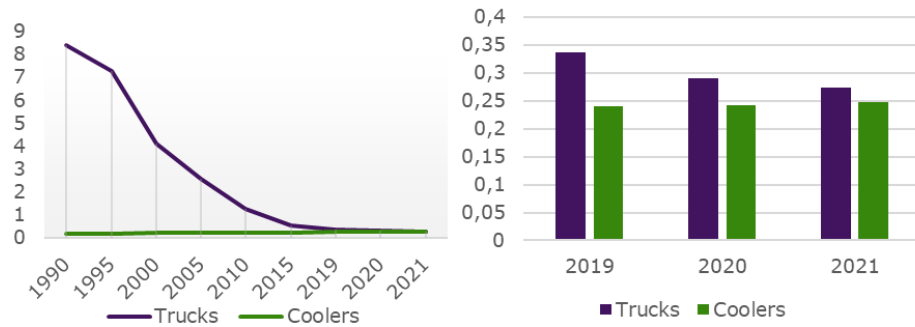
Contact: Theodoor.Stoverinck@minienw.nl

Flashback to June '23

- Presentation about reducing emissions from cooling units in road transport*

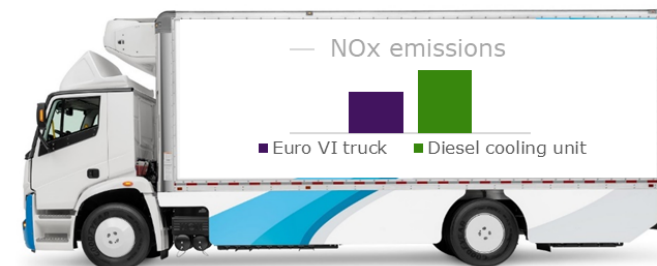
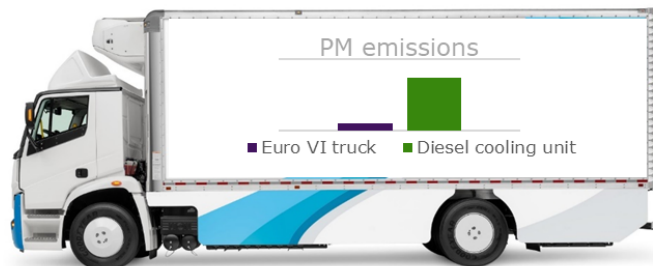
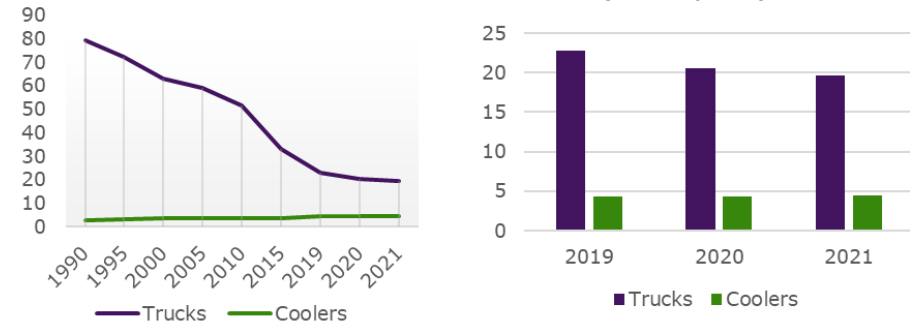
Data – PM

Total PM emissions NL (kton/year)



Data – NOx

Total NOx emissions NL (kton/year)



*[\(Netherlands\) Reducing Emissions from Cooling Units in Road Transport | UNECE](#)

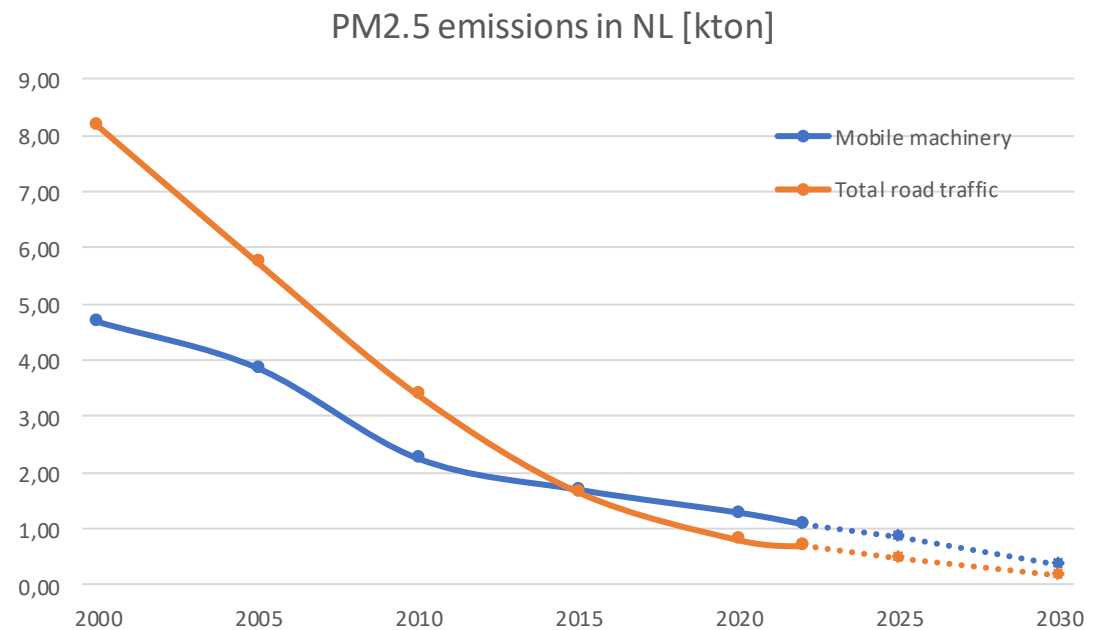
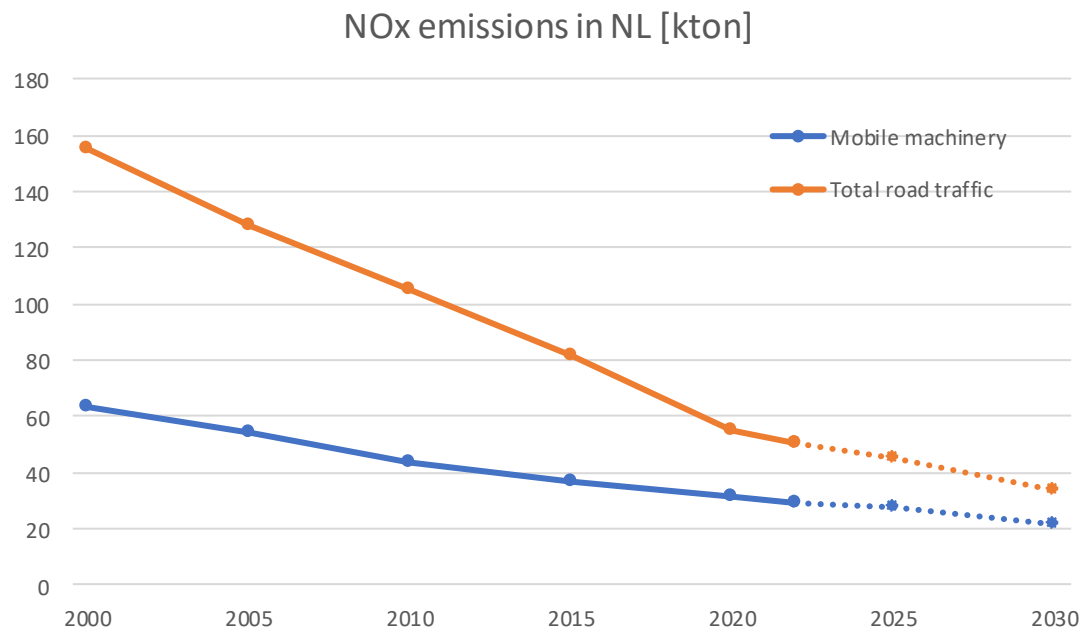
Today

- More data on NRMM with **P <19 kW**
 - Suggestion to work out adjustment of UN Regulation No. 96 on NRMM
1. More stringent emission limits
 2. Better coverage of emissions during idle and low load operation

Historical data

Total NO_x and PM emissions

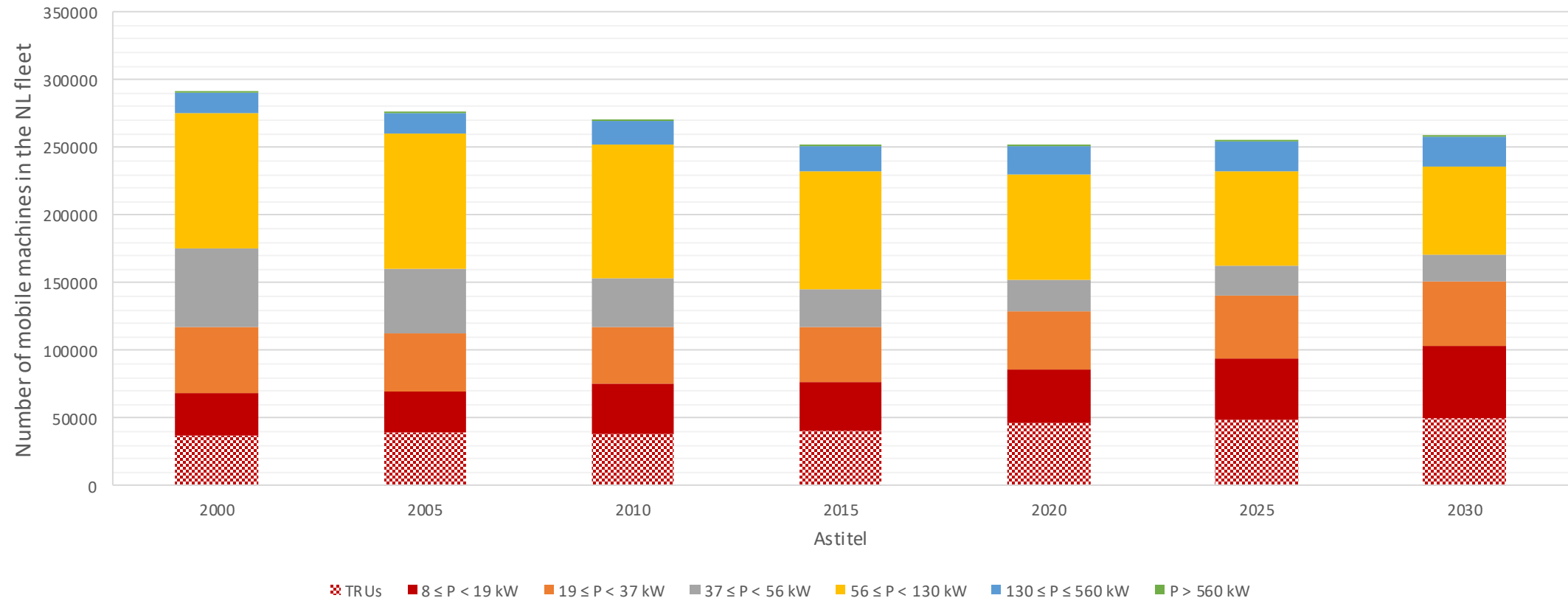
- Fast decrease in road traffic vs. slow decrease NRMM
- Total emissions in the same order of magnitude



Historical data

Registered NRMM

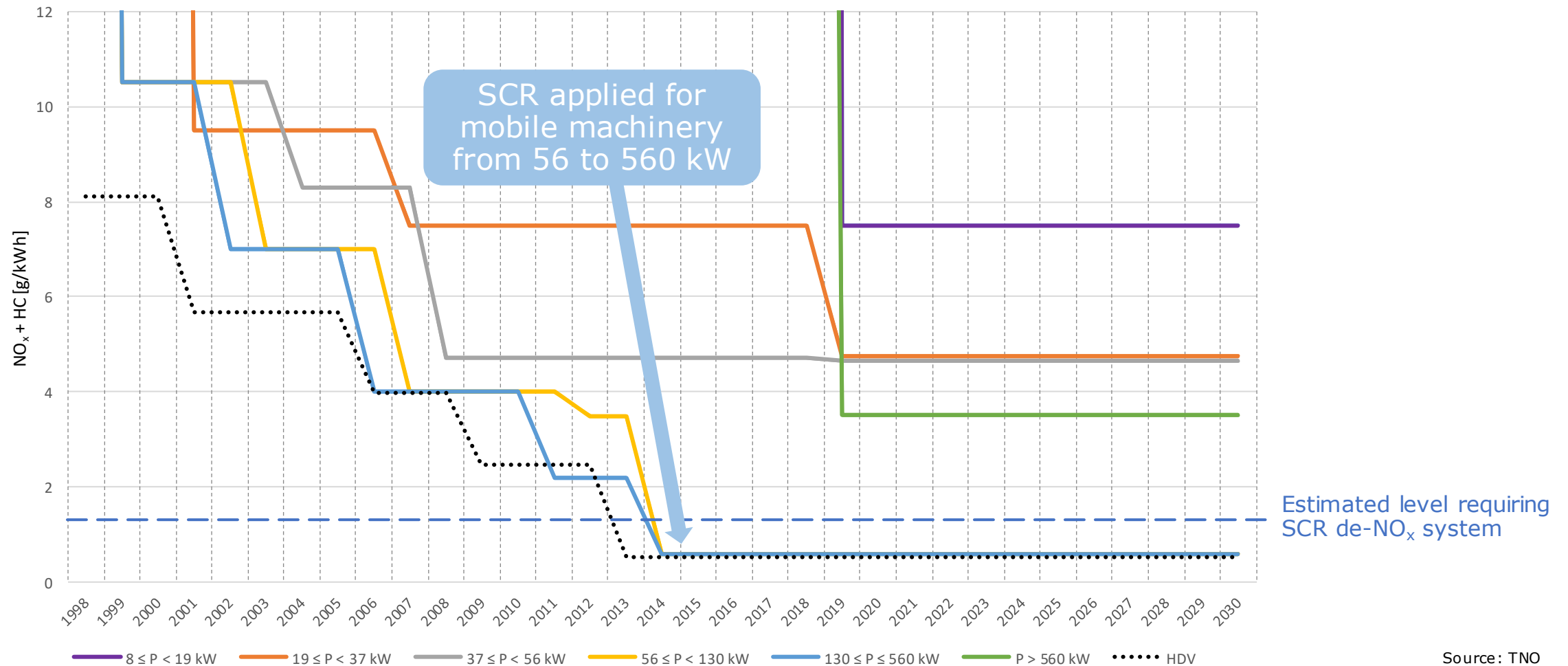
- Fleet comparison (2023): 253 thousand NRMM vs 11.2 million road vehicles



Historical data

Emission limits HC+NO_x

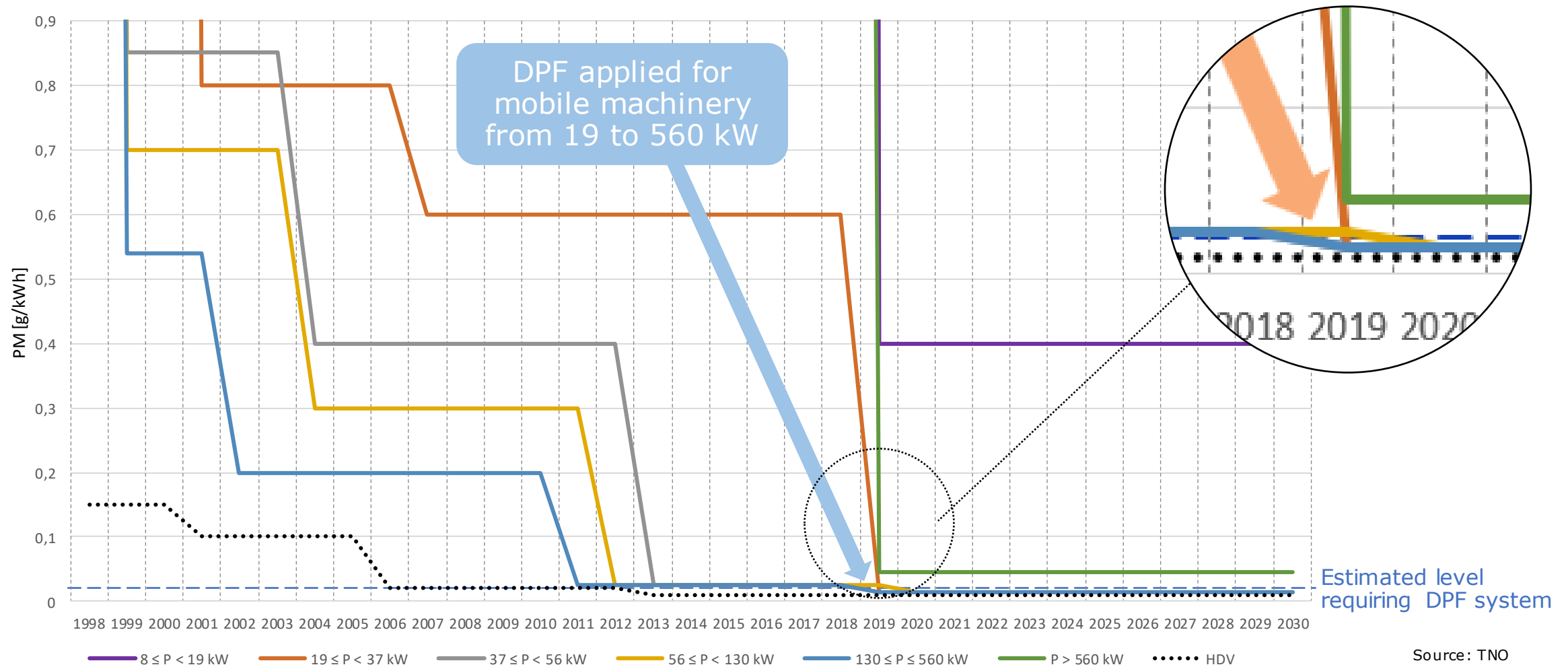
- With current regulations, only machines between 56-560 kW require an SCR



Historical data

Emission limits PM

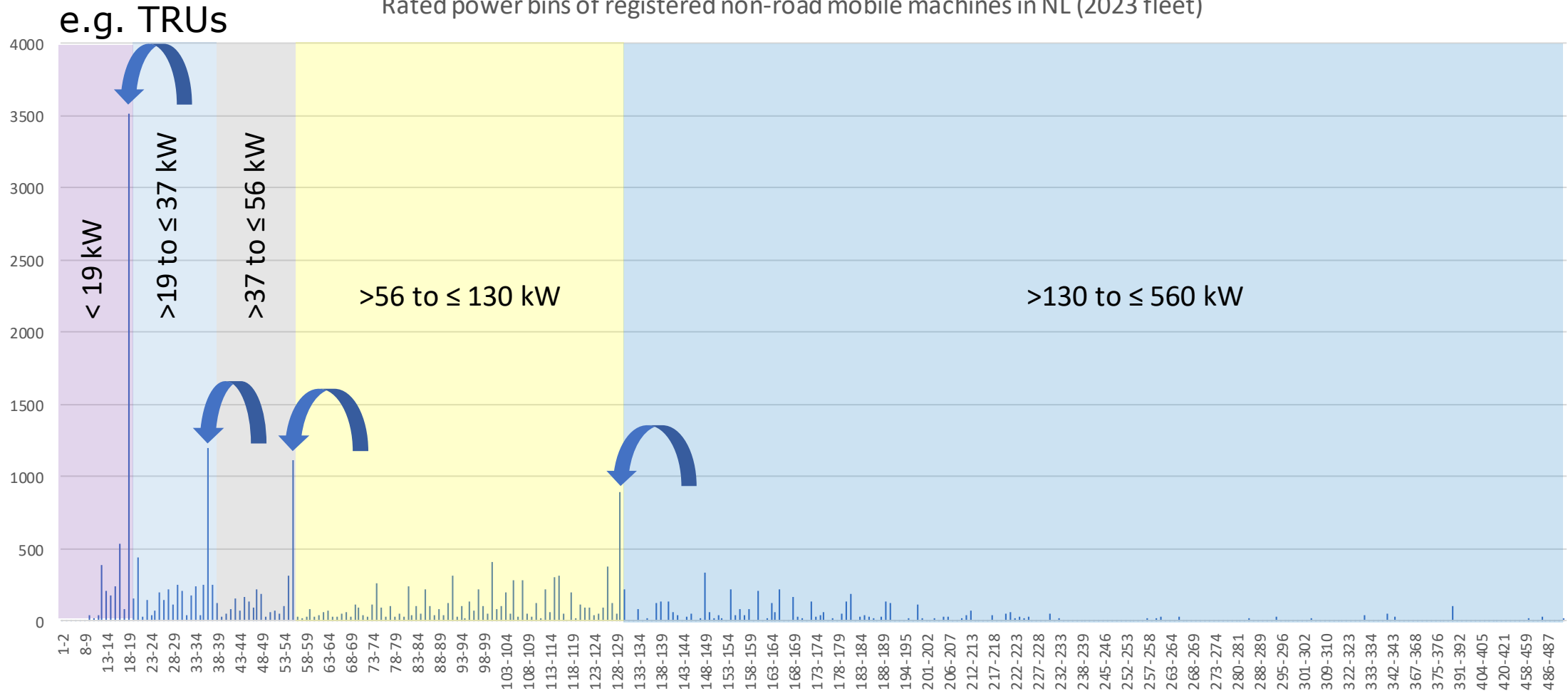
- With current regulations, only machines between 19-560 kW require a DPF



Registration data

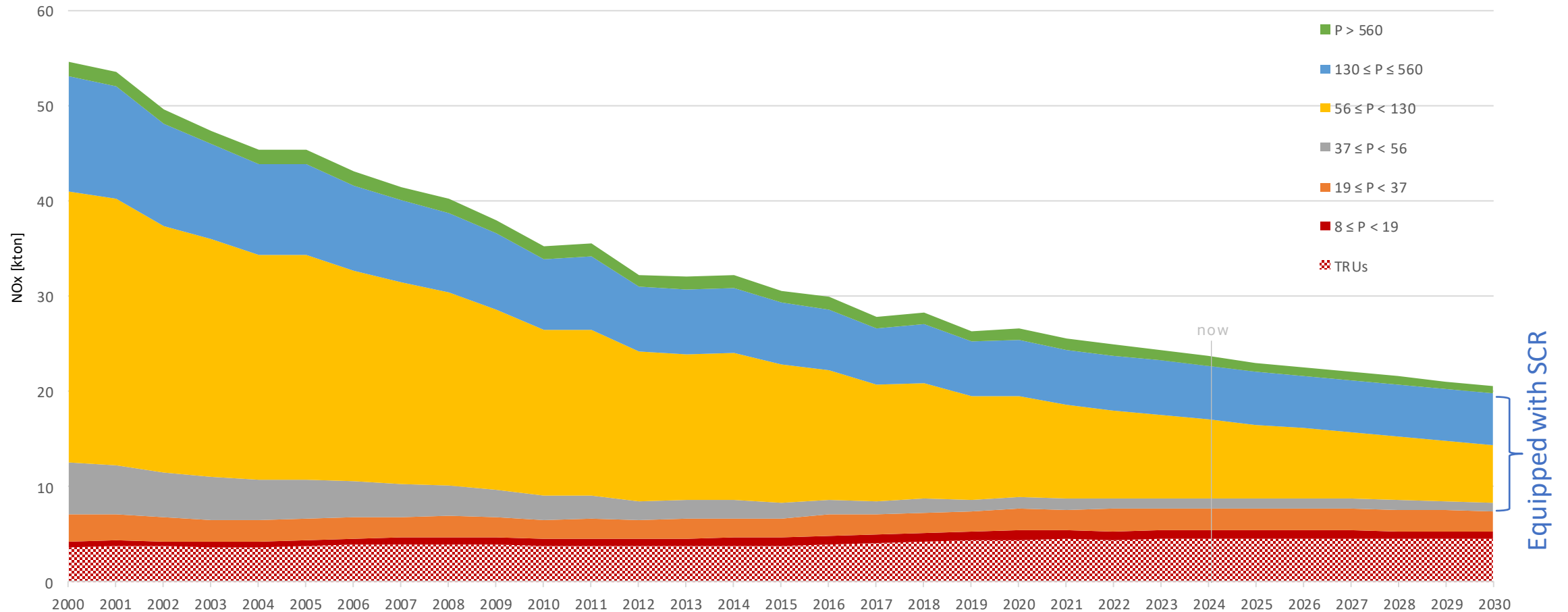
'Power bin hopping'

Rated power bins of registered non-road mobile machines in NL (2023 fleet)



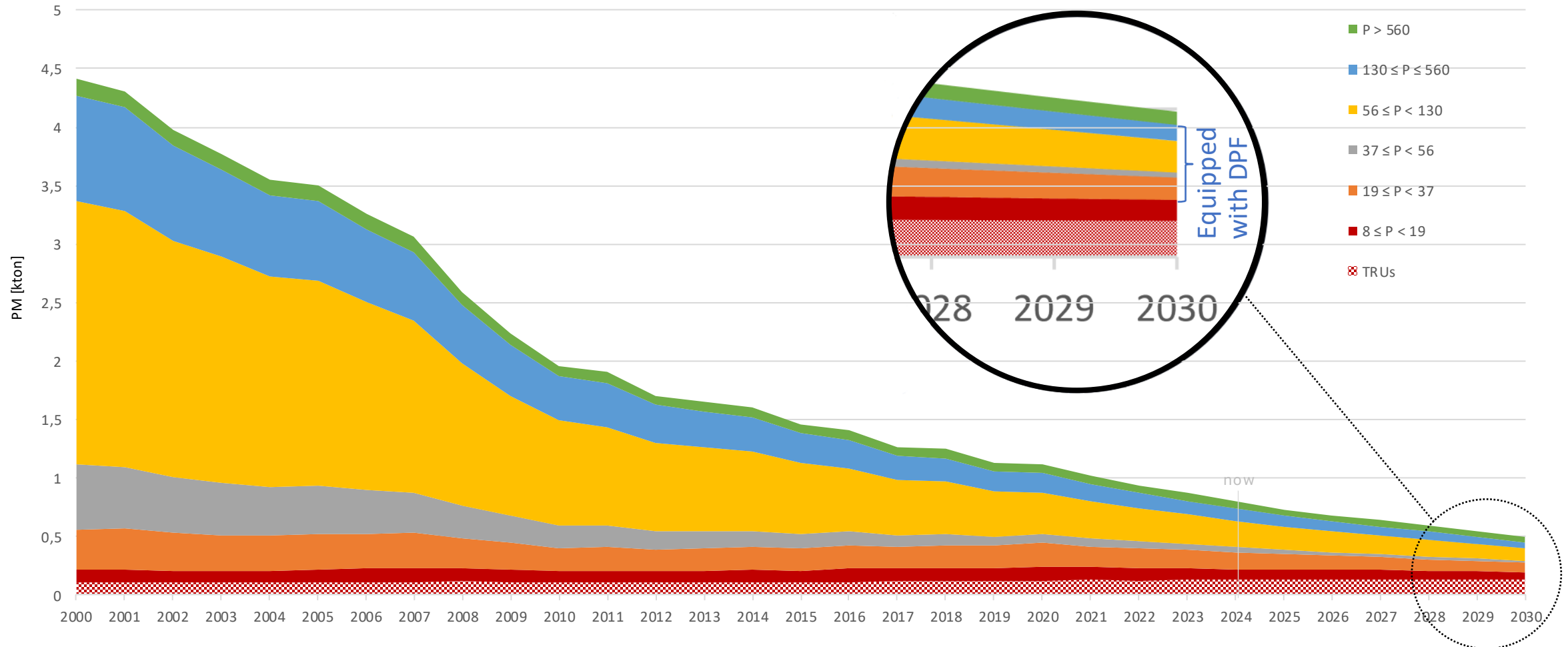
Historical data

NO_x emissions NRMM



Historical data

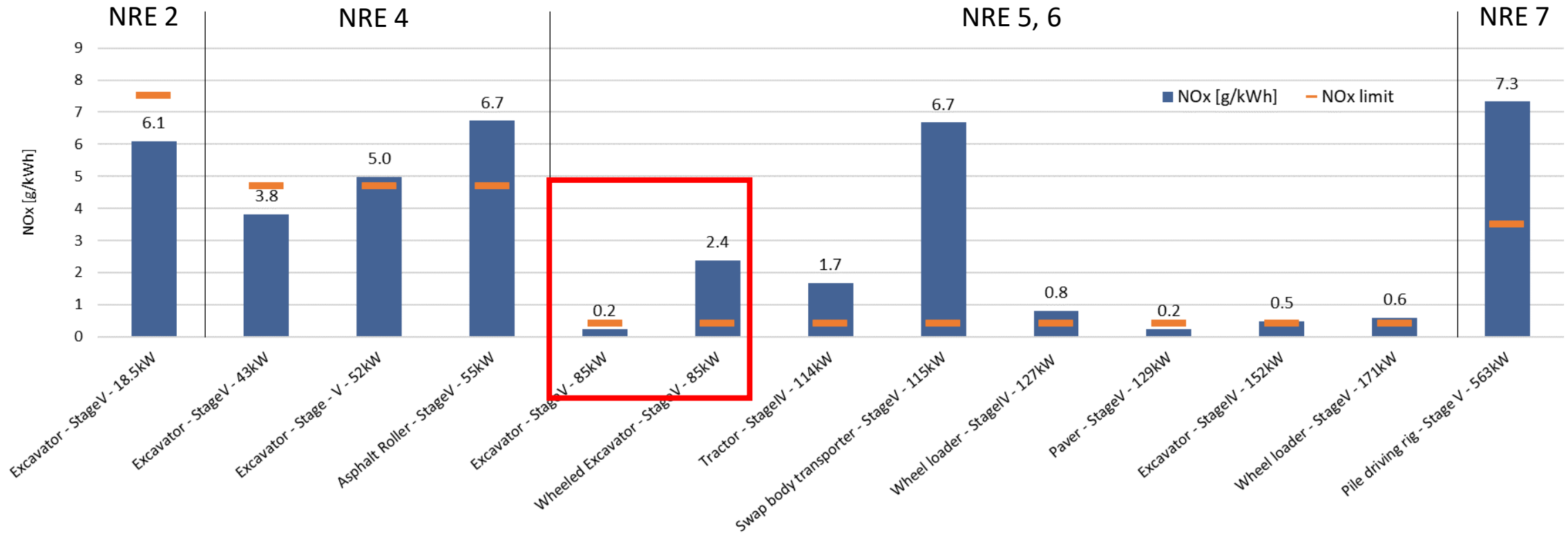
PM emissions NRMM



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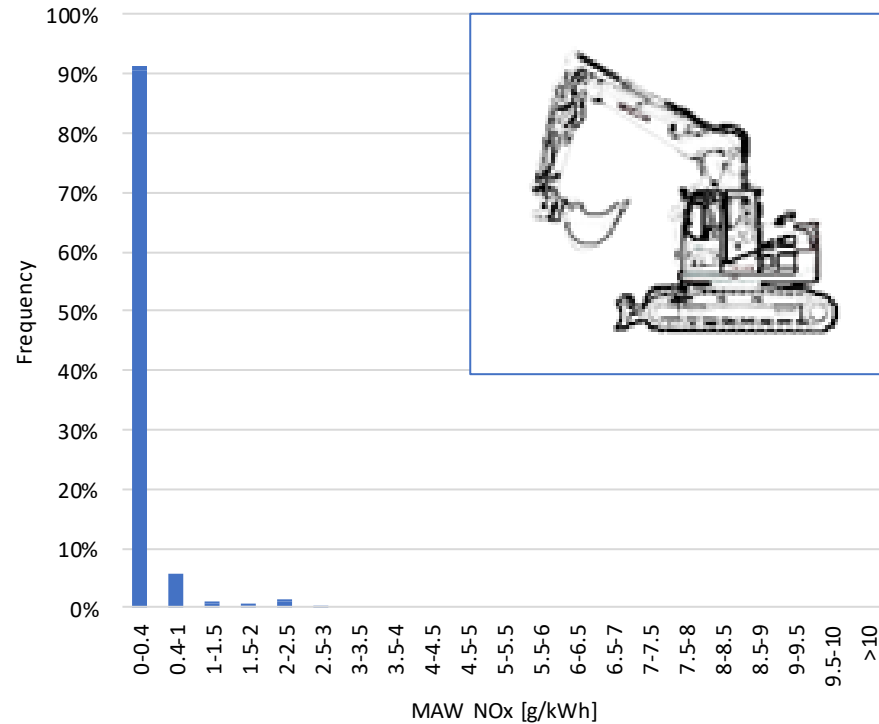
Real World Emissions NRMM



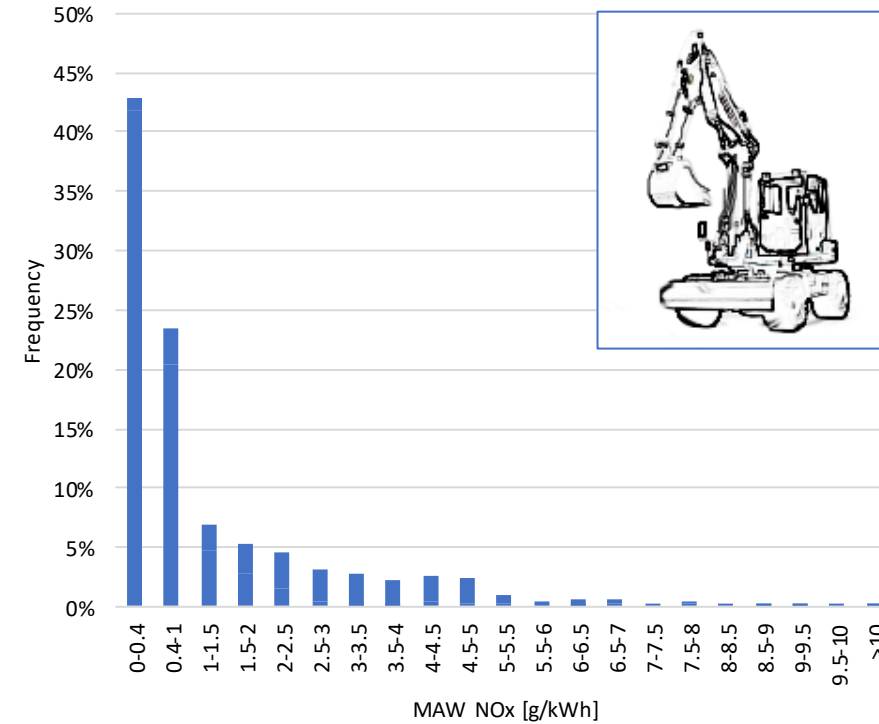
Real World Emissions NRMM

Excavator on wheels and tracks

Average test result: 0.2 g/kWh



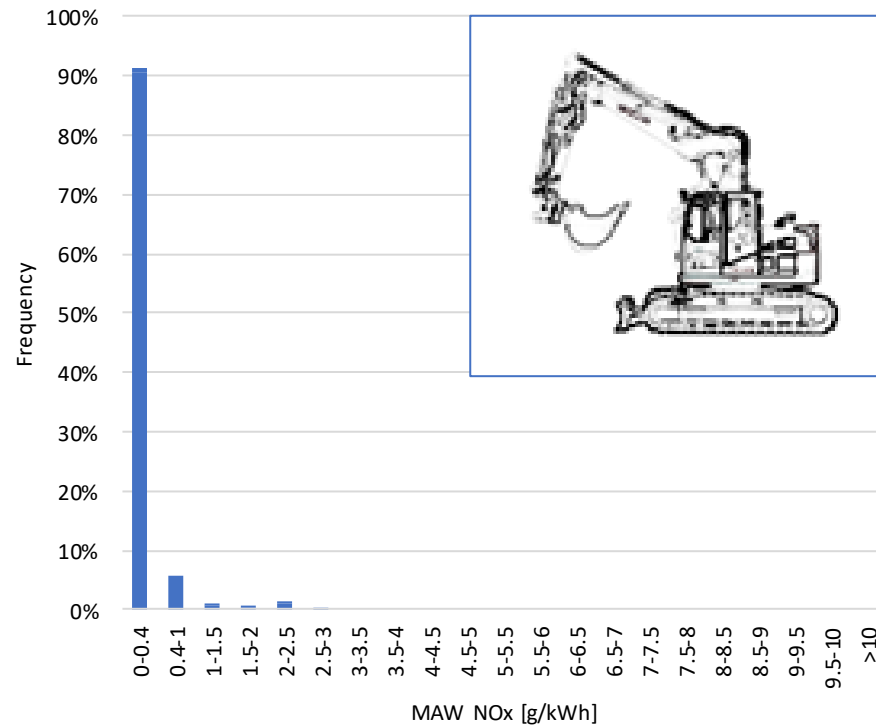
Average test result: 2.4 g/kWh



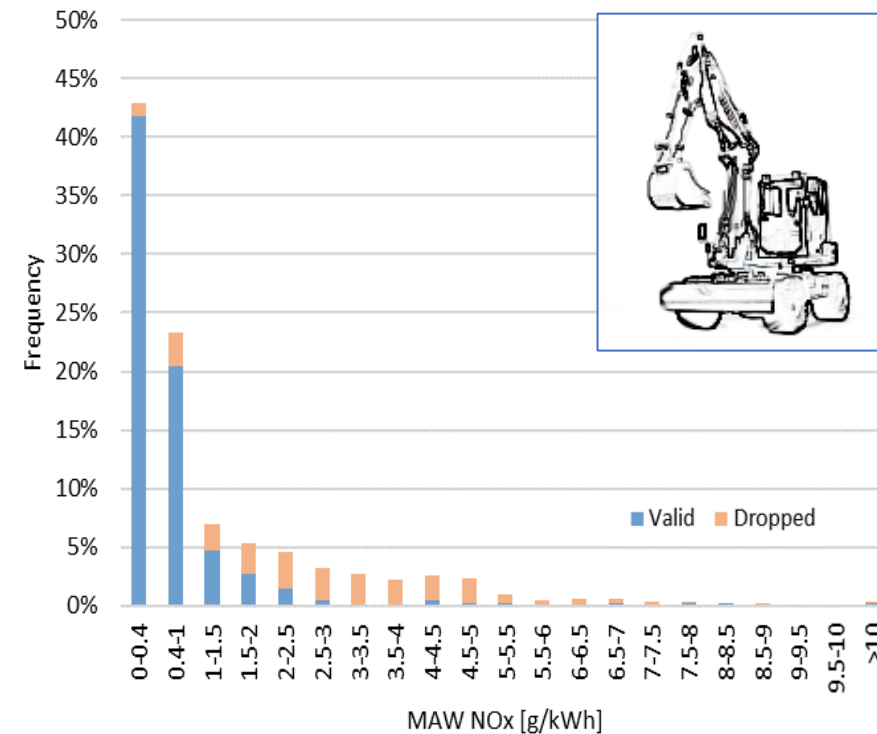
Real World Emissions NRMM

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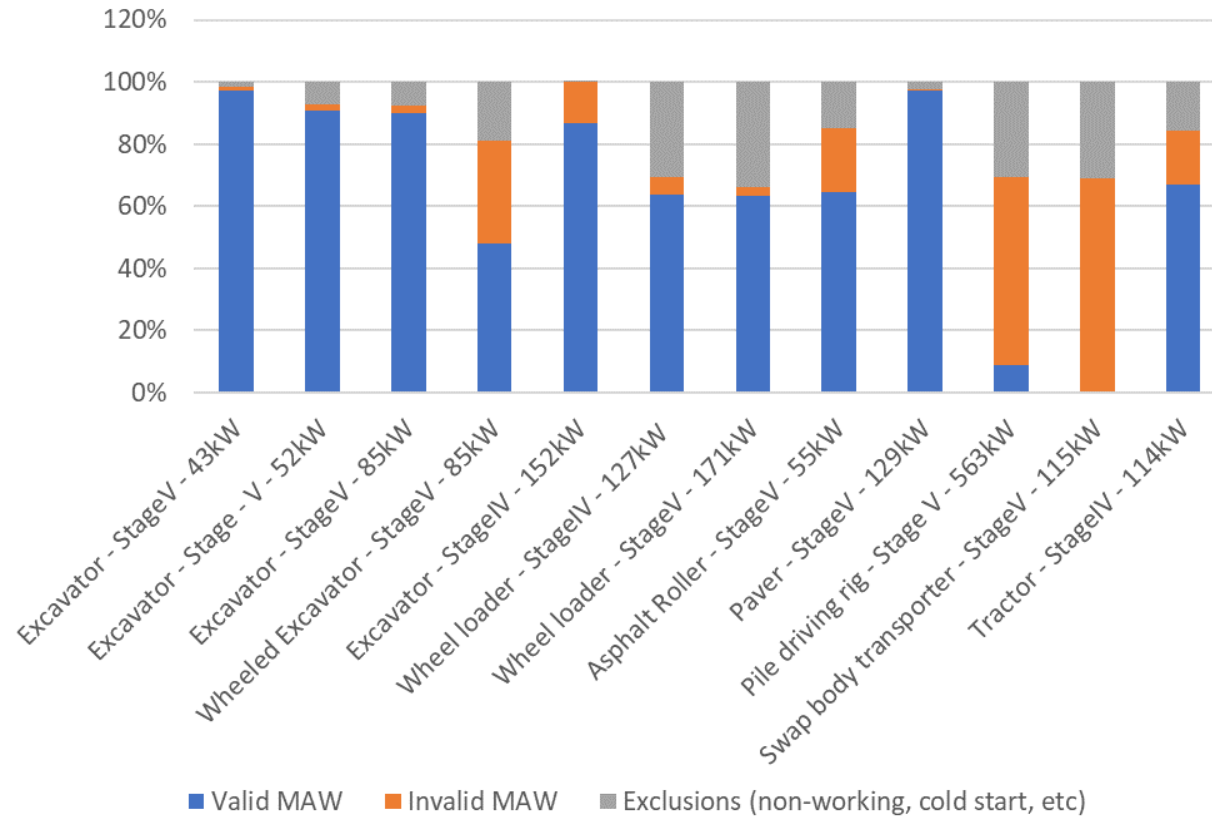


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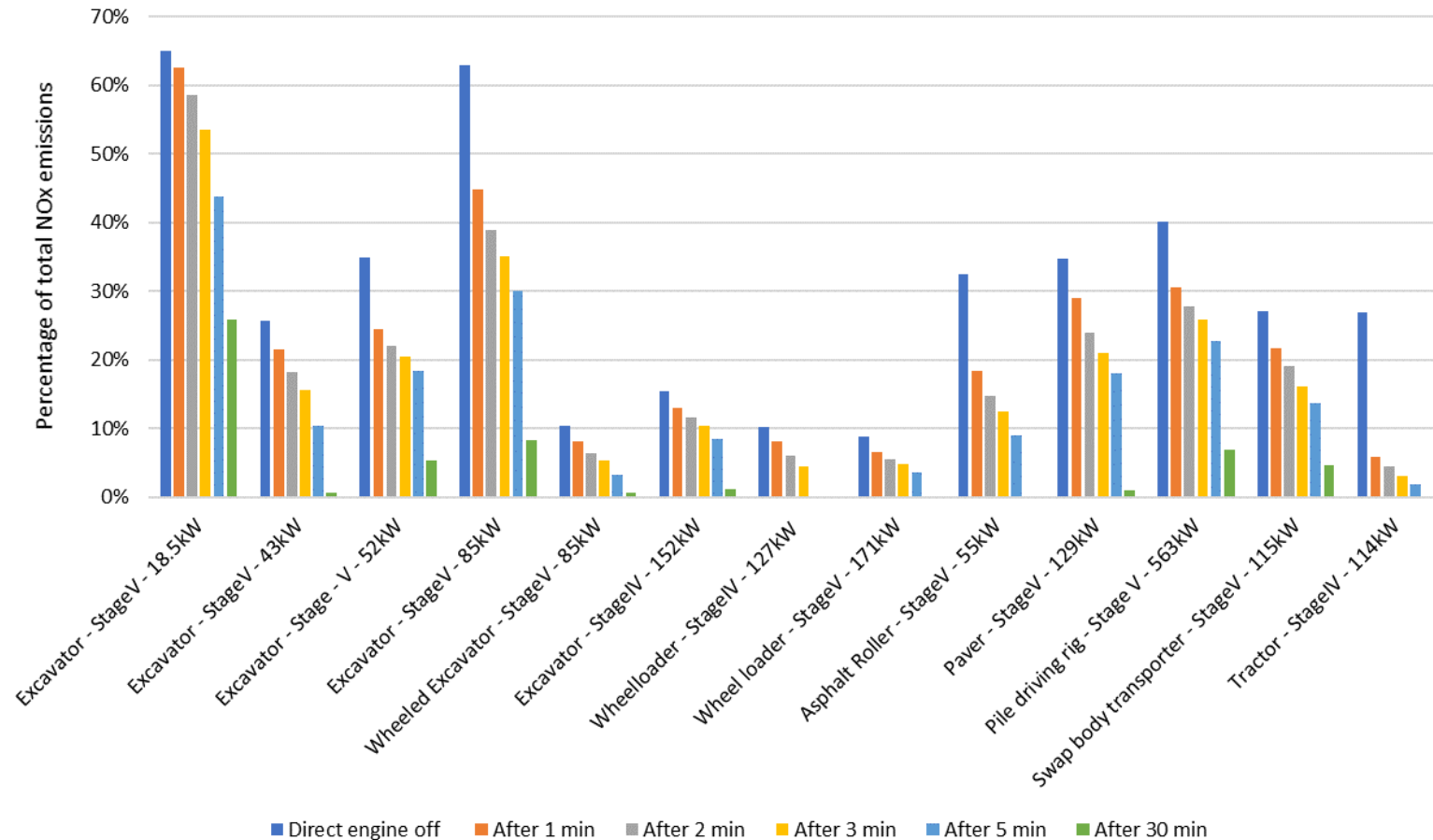


- The MAW-method is not suitable as a basis for future PEMS In-Service Conformity testing, as high emission bins are excluded

Real World Emissions NRMM



Reduction potentials using start/stop system



Conclusion

- UN-R96 needs more stringent emission limits for $P < 19$ kW
- UN-R96 needs better coverage of emissions during idle and low load operation

Next steps:

- NL will take initiative to start preparations of amendments to UN-R96:
 - May '24: Proposing concrete objectives and plan
 - January '25: Proposing informal document with adjustment of UN-R96
- We welcome support in this process from contracting parties and industry!
- If you're interested, please contact theodoor.stoverinck@minienw.nl

Relevant sources

- i. [Pilotproject Emissie Monitoring en Periodieke Keuring \(EMPK\) van bouwmachines \(tno.nl\)](#)
- ii. Real-world NOx emissions of Stage V NRMM, TAPSE 2023 conference paper, Gothenburg
- iii. [Real-world emissions of non-road mobile machinery \(tno.nl\)](#) (TRU in section 3.1) [Inventarisatie en categorisatie huidige en toekomstige aanbod duurzame mobiele werktuigen, bouwlogistieke voertuigen, spoorwerktuigen en vaartuigen die worden ingezet voor de waterbouw \(tno.nl\)](#)
- iv. [Eindrapport data onderzoek mobiele machines in Nederland \(tno.nl\)](#)
- v. [Dutch In-service Emissions Measurement and Monitoring programme for Heavy-Duty vehicles 2021 \(tno.nl\)](#) (TRU in section 3.3)
- vi. [NOx-emissies mobiele werktuigen onderschat \(tno.nl\)](#)
- vii. [Onderbouwing AERIUS emissiefactoren voor wegverkeer, mobiele werktuigen, binnenvaart en zeevaart \(tno.nl\)](#)
- viii. [De inzet van bouwmachines en de bijbehorende NOx- en CO2-emissies \(tno.nl\)](#) (NL version)
- ix. [Use of construction machines and the associated NOx and CO2 emissions \(tno.nl\)](#) (UK version)
- x. [Verkeer en vervoer | Emissieregistratie](#) (Chapter 9 and Tables 9.1-11C)
- xi. [TNO Kennisinbreng Mobiliteit voor Klimaat- en Energieverkenning \(KEV\) 2019. NRMM Binnenvaart en Zeevaart](#)