

Initial results from roadside measurements of L-category vehicle emissions in the LENS project



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LENS L-vehicles Emissions and Noise mitigation Solutions

LENS - L-VEHICLES EMISSIONS AND NOISE MITIGATION SOLUTIONS

- 5 M€ RI project
- 15 partners:
 - Research institutes
 - Universities
 - OEMs
- Sep 2022 – Aug 2025









<https://www.lens-horizoneurope.eu/>








LENS L-vehicles Emissions and
Noise mitigation Solutions

LENS objectives

- Develop beyond state-of-art LV pollutant emission and noise measurement techniques
- Characterise LV's noise and pollutant emissions performance
- Carry out in-field identification of tampered LVs in three European cities/regions
- Provide recommendations and expected impact of decreasing noise and pollutants from LVs

L-category vehicles

Category	LV sub-category
L1e	L1eB - Two-wheel moped 
L2e	3-wheel moped 
L3e & L4e	L3e-A1 Low-performance 
	L3e-A2 Medium-performance 
	L3e-A3 High-performance 
	L3e-AxE Enduro 

Category	LV sub-category
L5e Tricycle	 
L6e	L6e-A Light on-road quad 
	L6e-B Light quad/mobile  
L7e	L7e-1 All terrain quad 
	L7e-B2 Side By Side Buggy 

The noise and pollutant emissions from 150 LVs are measured in the lab and/or on-road (PEMS)

Objectives of the LENS roadside measurements

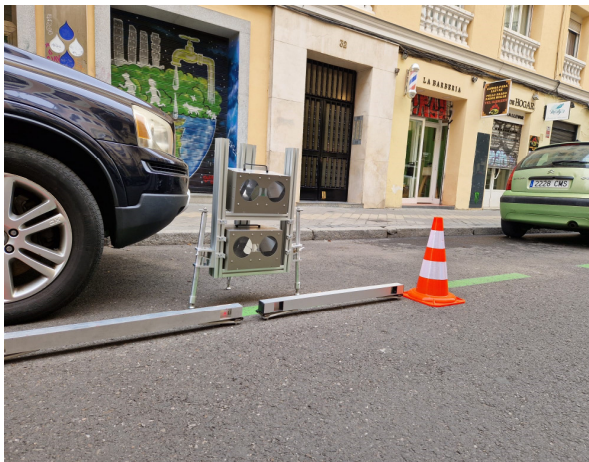
- Deploy roadside detection techniques in field surveys to screen for tampered LVs
- Link results from screening surveys directly to roadside inspections of screened LVs
- Define criteria to identify tampered LVs supported by LENS onboard and test-bench data
- Synthesize the survey results to propose mitigation actions to prevent tampering of LVs

Measurement methods

- Dual Opus
RSD 6000



- TU Graz PN/BC
+ IVL EEPS
point sampling



- KU Leuven noise
microphone array

Measurement scope

- Measure noise & pollutant emissions from $\geq 3,000$ LVs from the roadside in three cities
- By means of authorized staff pull over ≥ 300 LVs subject to roadside inspections

Measurement campaigns

Leuven 13-16 May



Paris region 16-21 Sep



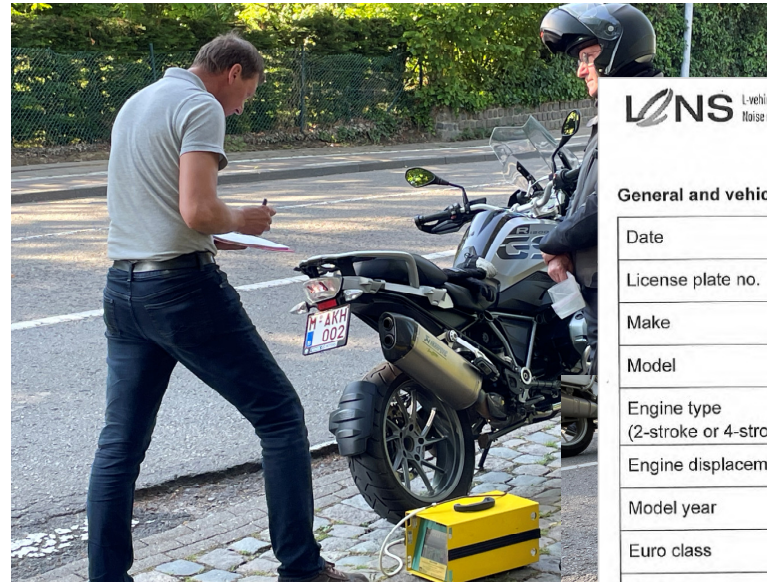
Barcelona 14-18 Oct



Roadside inspections



- Check of driver documents (certificates)



- Driver interview
- Visual inspection

LNS L-vehicles Emissions and Noise mitigation Solutions

WT 5.3 Roadside inspection form

General and vehicle info 154

Date	
License plate no.	SBQC 608
Make	Derbi
Model	Senado XTREME
Engine type (2-stroke or 4-stroke)	2
Engine displacement	50
Model year	2003
Euro class	
Mileage	19 884
Other	Muffler Afterburner,

Measurement checks

% CO idle	4,1
ppm HC idle	14000

5500 : 91,9

Leuven



Rueil Malmaison









Dampierre en Yvelines



Barcelona



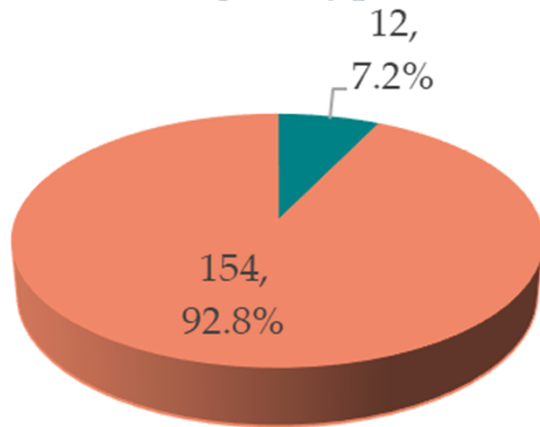
Preliminary data collection overview

Campaign	# Roadside measurements (LV noise)	# Roadside inspections
Leuven	230 	166 
Paris region	953 	- (?) 
Barcelona	1082 	100 
TOTAL	2 265	≥266
KPI/goal	3 000	300

Initial results (from Leuven only)

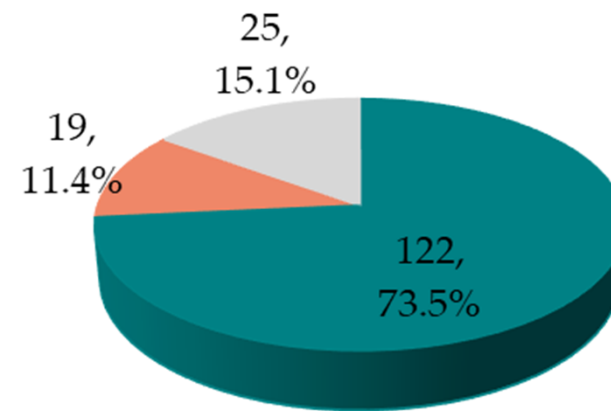
Engine type and size distribution

Engine type



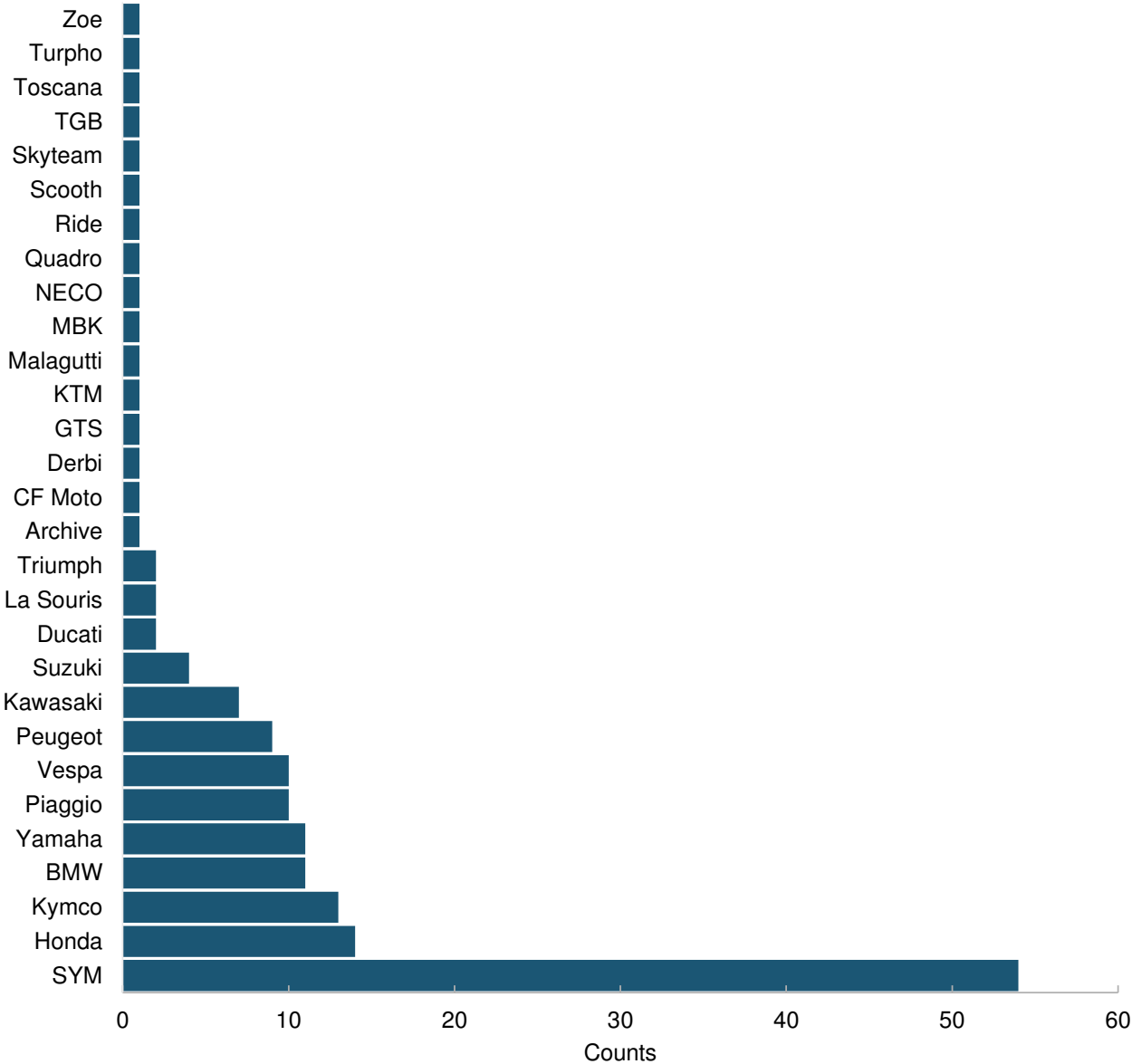
■ 2-stroke ■ 4-stroke

Engine displacement

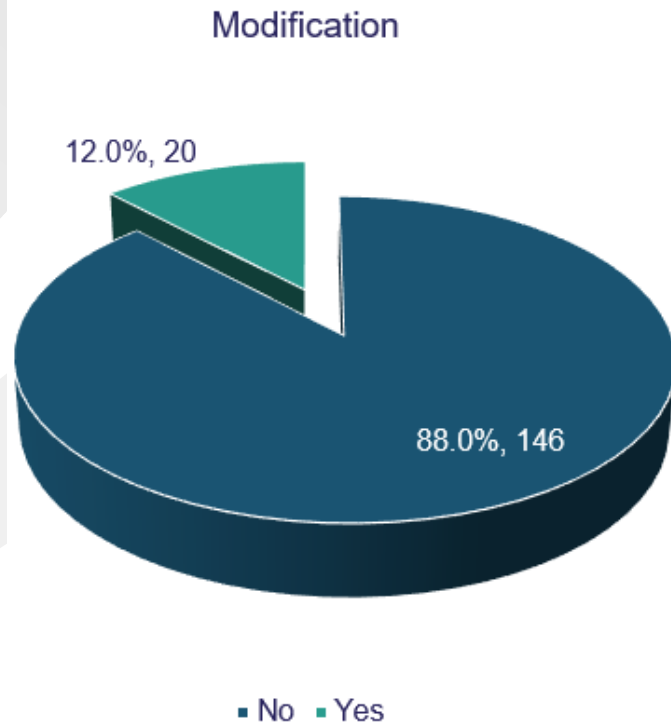


■ ≤250 ■ 250~750 ■ >750

Vehicle make distribution



Inspections/assessments of modifications



Modifications:

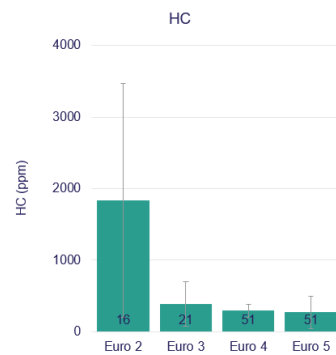
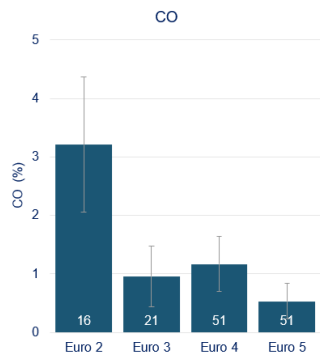
- Exhaust system (45%)
- Muffler (45%)
- Both exhaust and muffler (20%)

Other remarks:

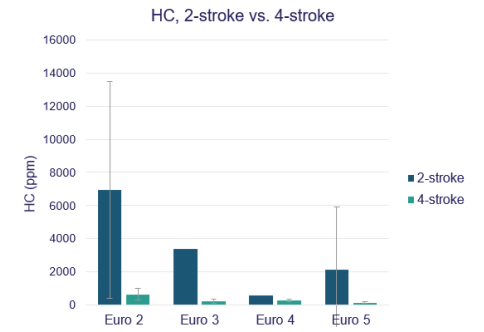
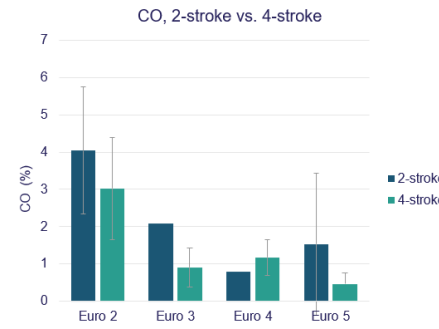
- Rusty/old/broken exhaust (38%)
- Akrapovic muffler (29%)
- High idle (14%)

Roadside idle tests

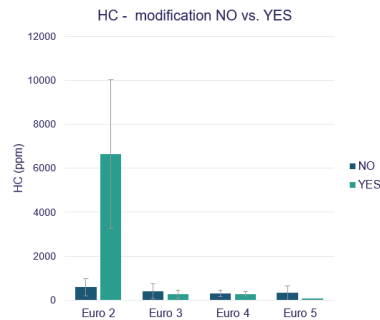
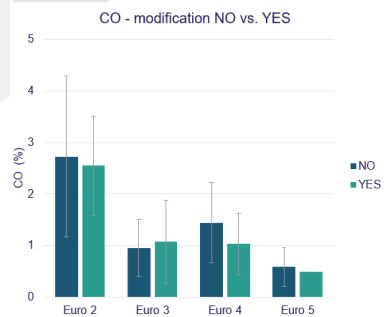
Idle test emissions - by Euro standard



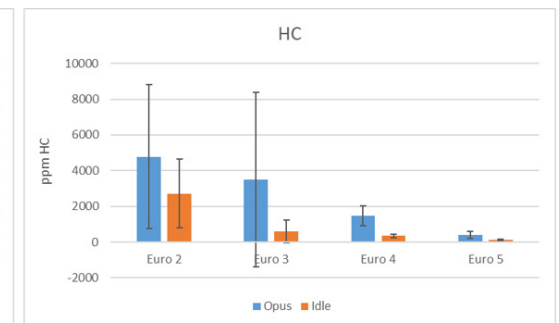
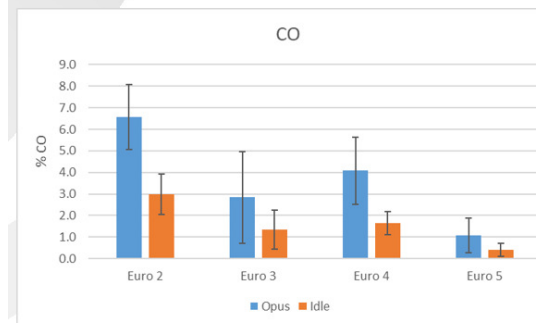
Idle emissions – 2-stroke vs. 4-stroke



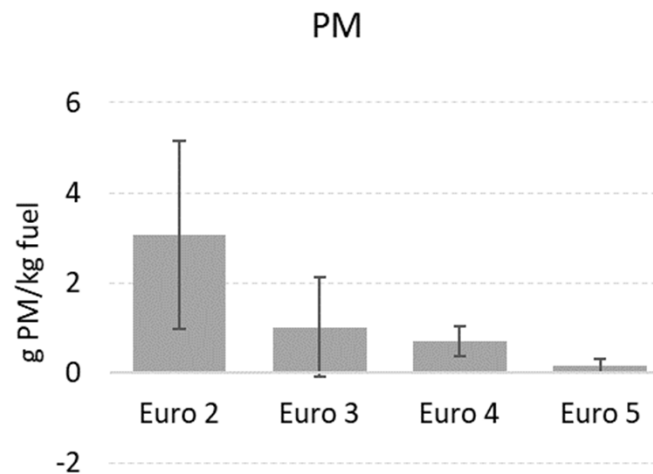
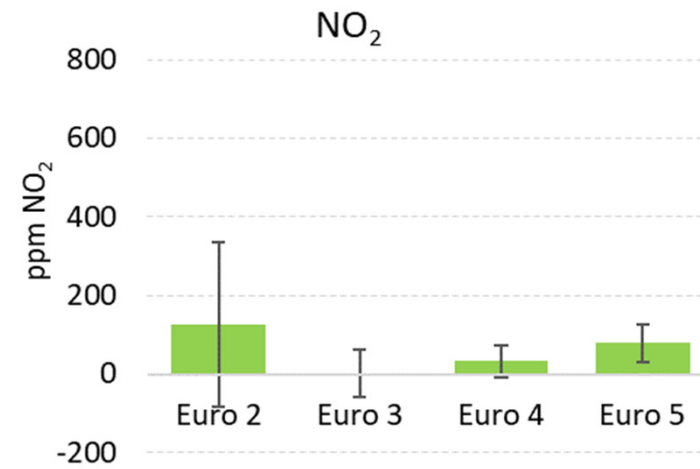
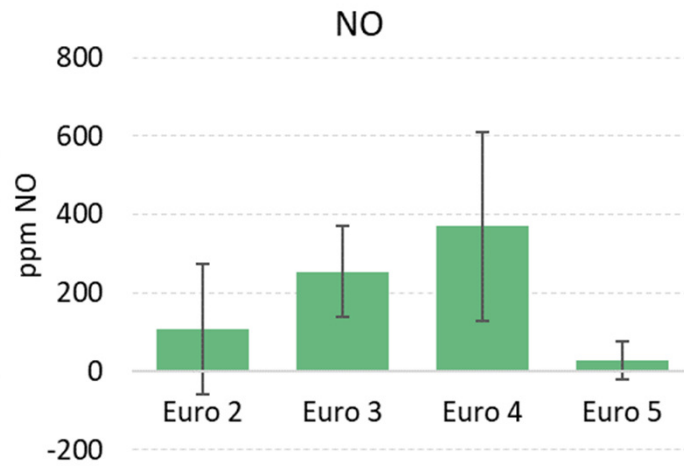
Idle emissions – w/wo modifications



Leuven on-road remote sensing vs idle test results



Opus remote sensing only



Upcoming public report in 2025

- Deliverable report covering all the three measurement campaigns: “Results of field surveys on LV tampering.”
- Presenting the results from the three dedicated tampering field surveys, including measured and estimated shares of tampered and by other means high-emitting LVs (noise and gaseous and particulate pollutants), identified types of tampering, other causes to noise and pollutant emission anomalies
- To be submitted to the Commission no later than 31 May 2025.

Thank you for your attention!

Questions?

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