

# LENS project

Leonidas Ntziachristos  
EMISIA & Aristotle University Thessaloniki

Webinar, 19.03.2025



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056777

**LENS** L-vehicles Emissions and  
Noise mitigation Solutions

suggestion that two-wheelers are a potential contributor to this enrichment. Considering the high use of two-wheelers in other European cities such as London or Barcelona if Europe is to decrease transport-related air pollution and inner city traffic, policy makers should consider finding alternatives to the conventionally-powered two-wheelers and supporting electric two-wheelers for example. © 2018 The Author(s)

*Salameh et al., DOI: 10.1016/j.aeaoa.2018.100003*

the period 1999–2012. Projections show that these vehicles will emit more than 7% and 20% of total road transport CO and HC, respectively, by the year 2012, if no additional regulatory measures are taken. In contrast, they will continue to be negligible NO<sub>x</sub> (0.7%) and CO<sub>2</sub> (<1%) emitters, while their particulate matter (PM) emission contribution is expected to decline to below 1% in the future. The relative importance of their emissions,

*Ntziachristos et al., DOI: 10.1016/j.atmosenv.2006.04.03*

Transportation sector contributes as the second largest polluter of the air pollution in Indonesia. Of the transportation sector, road transport has generated 70% of the air pollution, 81% of which is attributable to motorcycles. The motorcycles are currently accounting for 79% of the total motor vehicles. It is predicted that the number of motorcycles will continue to grow at an annual rate of 9-26%. However, due to little attention to the motorcycle's environmental

*Sopha et al., DOI: 10.52394/ijolcas.v1i1.3*

## Switzerland's strict new road noise rules now in force

17/01/2025 BY LE NEWS

Over the years, there has been much political debate on how to limit the noise from vehicles. At the beginning of 2025 new noise rules passed by parliament in 2021 came into force. According to the Federal Roads Office (FEDRO) any avoidable vehicle noise is now banned. This includes additional noise from vehicle modifications and unnecessary engine revving or exhaust back-firing.



## Belgian residents' groups take part in first international 'Motorcycle Noise Pollution' protest

Sunday 30 April 2023

By The Brussels Times with Belga



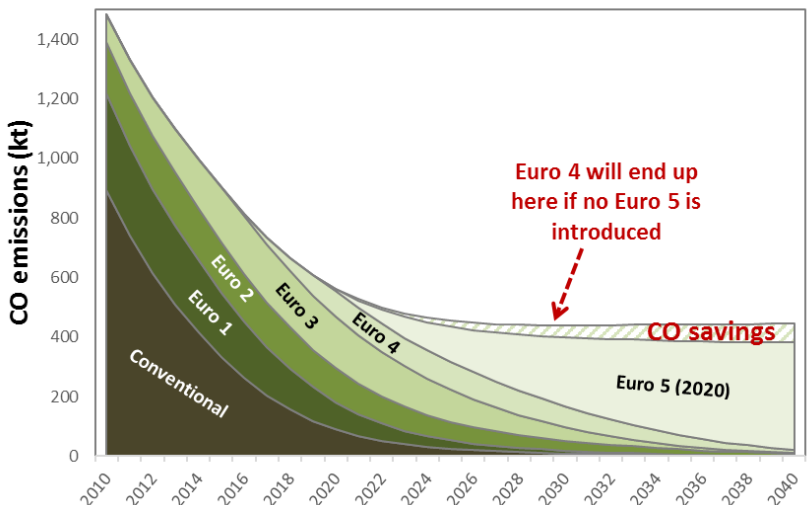
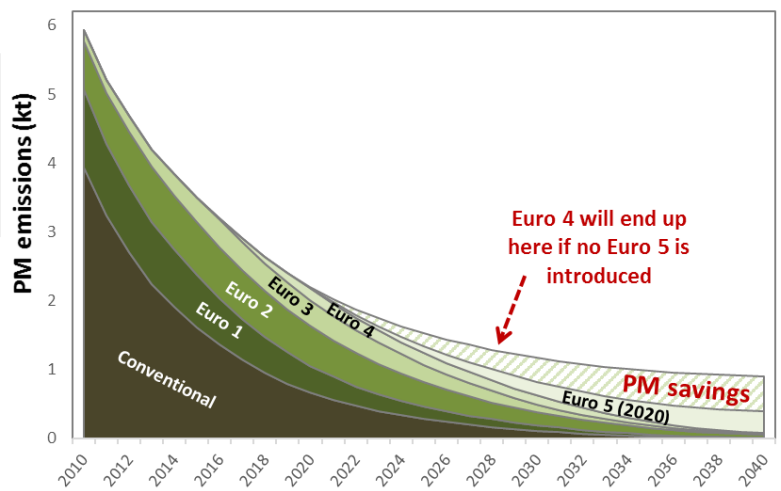
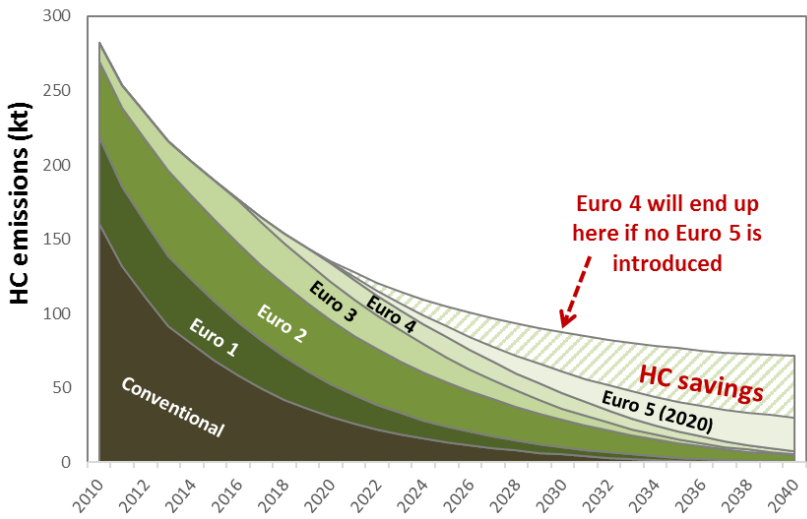
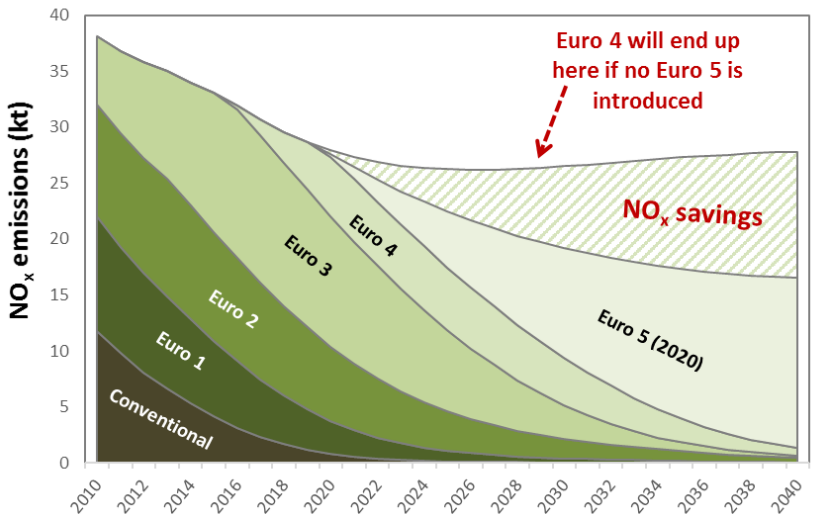
### Germany Motorcycle Noise Bans

Access regulated by other requirements

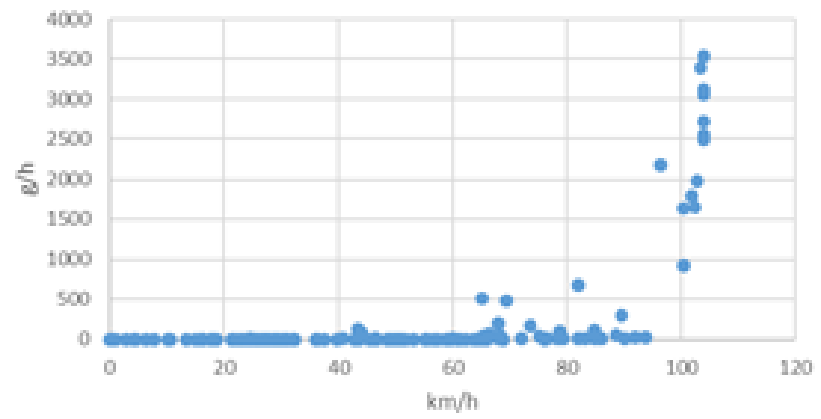


# Emission standards may not address all operation conditions

## Euro 5 emission standard design



## Example: <250 cc Euro 5 scooters



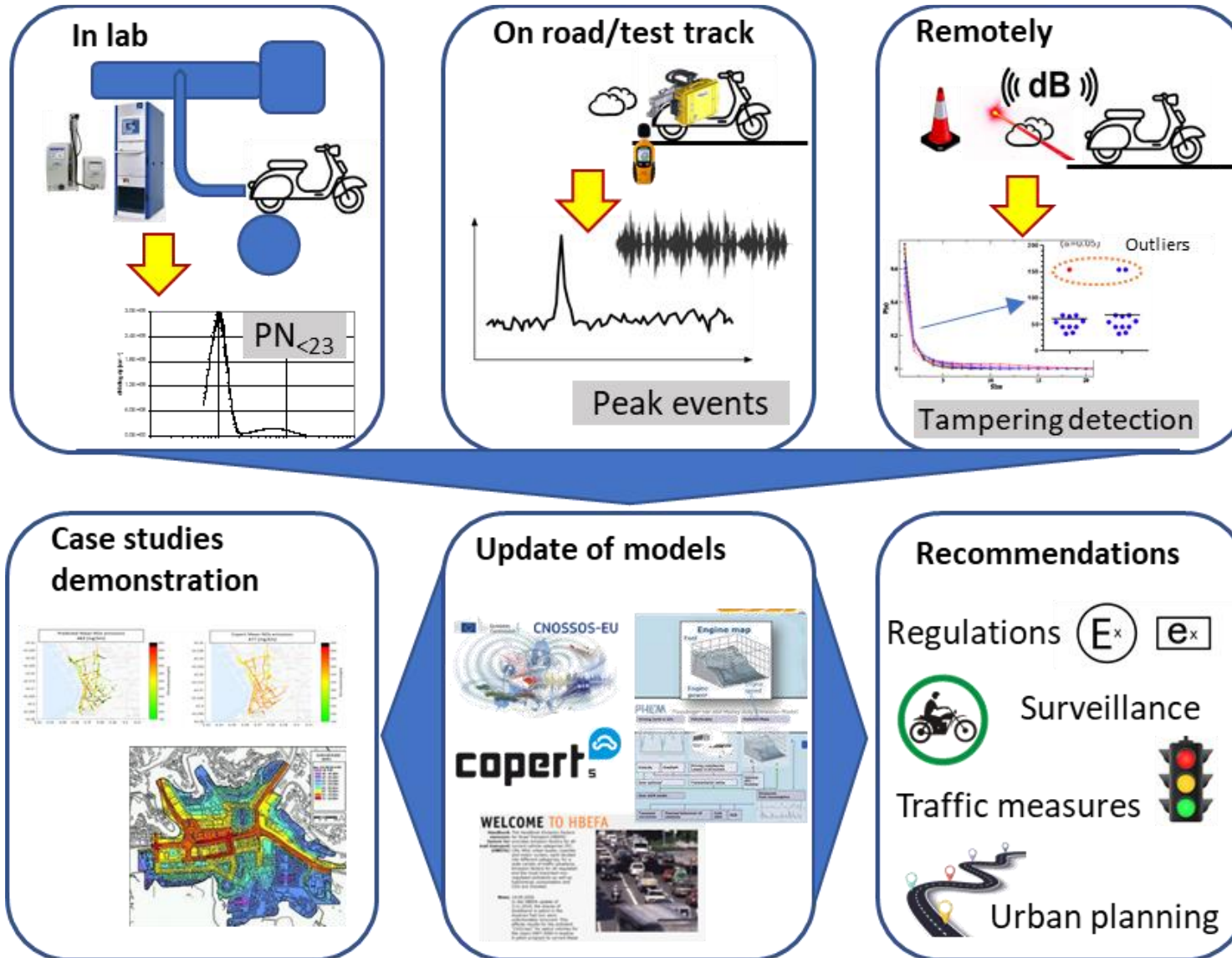
Dramatic increase of CO emissions at high speed due to fuel enrichment

Euro 5 environmental effect study for DG GROW in 2016 (doi: 10.2873/397876)

# LENS objectives

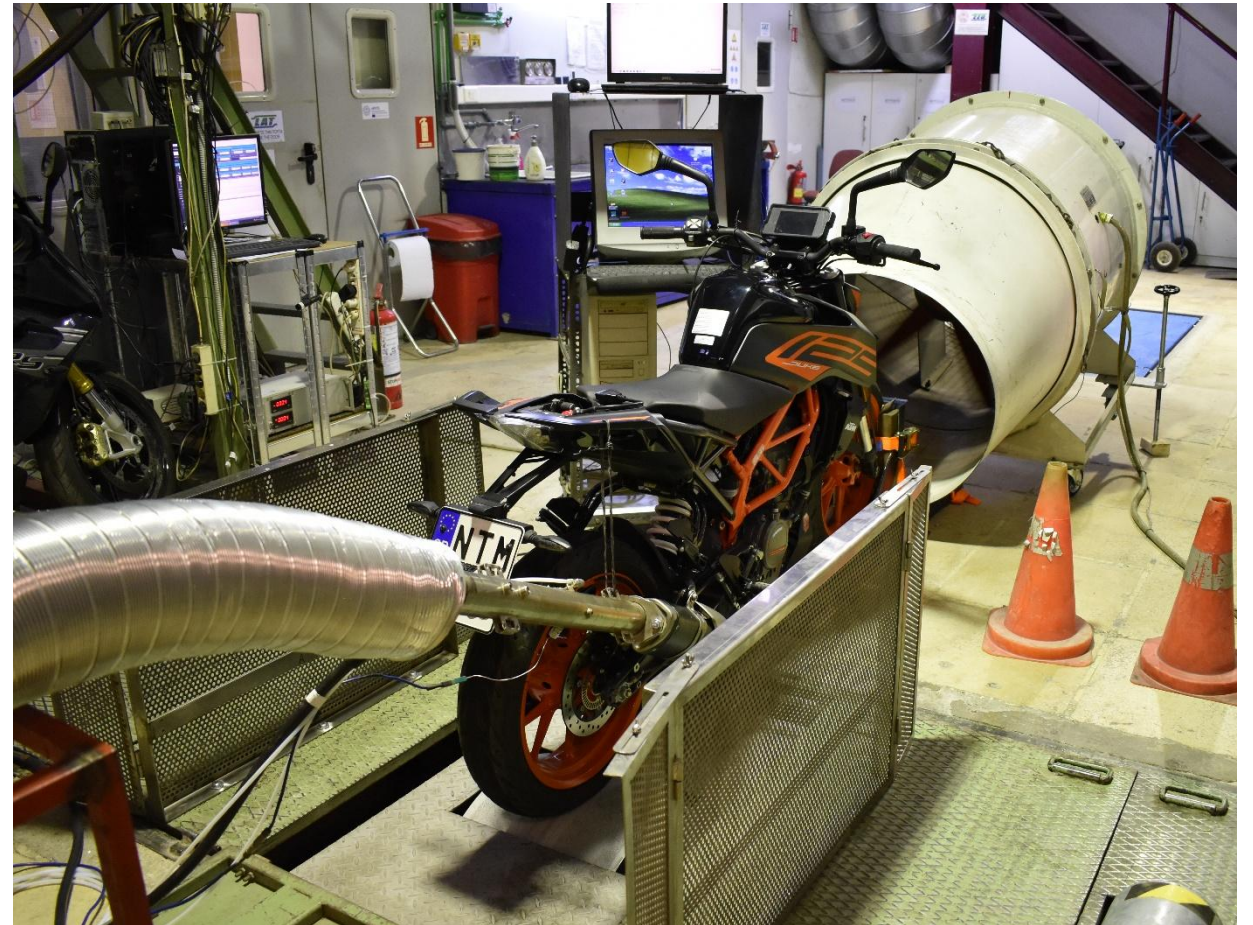
	What	Why
1	<b>Develop LVs emission &amp; noise measurement techniques</b>	<ul style="list-style-type: none"><li>→ To measure emissions &amp; noise</li><li>→ Real-world conditions</li><li>→ Cost-effectively</li></ul>
2	<b>Characterize noise &amp; pollutant emissions performance of LVs</b>	<ul style="list-style-type: none"><li>→ Understand current fleet emissions</li><li>→ Non-regulated pollutants</li><li>→ High emitters?</li><li>→ Feed emission inventories (COPERT, HBEFA, etc.)</li><li>→ Feed noise inventories (TRANECAM, etc.)</li></ul>
3	<b>In-field identification of tampered LVs</b>	<ul style="list-style-type: none"><li>→ Understand the extend of the problem</li><li>→ Provide tools and methods able to capture tampered vehicles in the field.</li></ul>
4	<b>Provide recommendations for decreasing noise and pollutants from LVs, and expected impact</b>	<ul style="list-style-type: none"><li>→ Inform regulators, national, local authorities on how emissions and noise from LVs can be decreased</li></ul>

# LENS Methodology



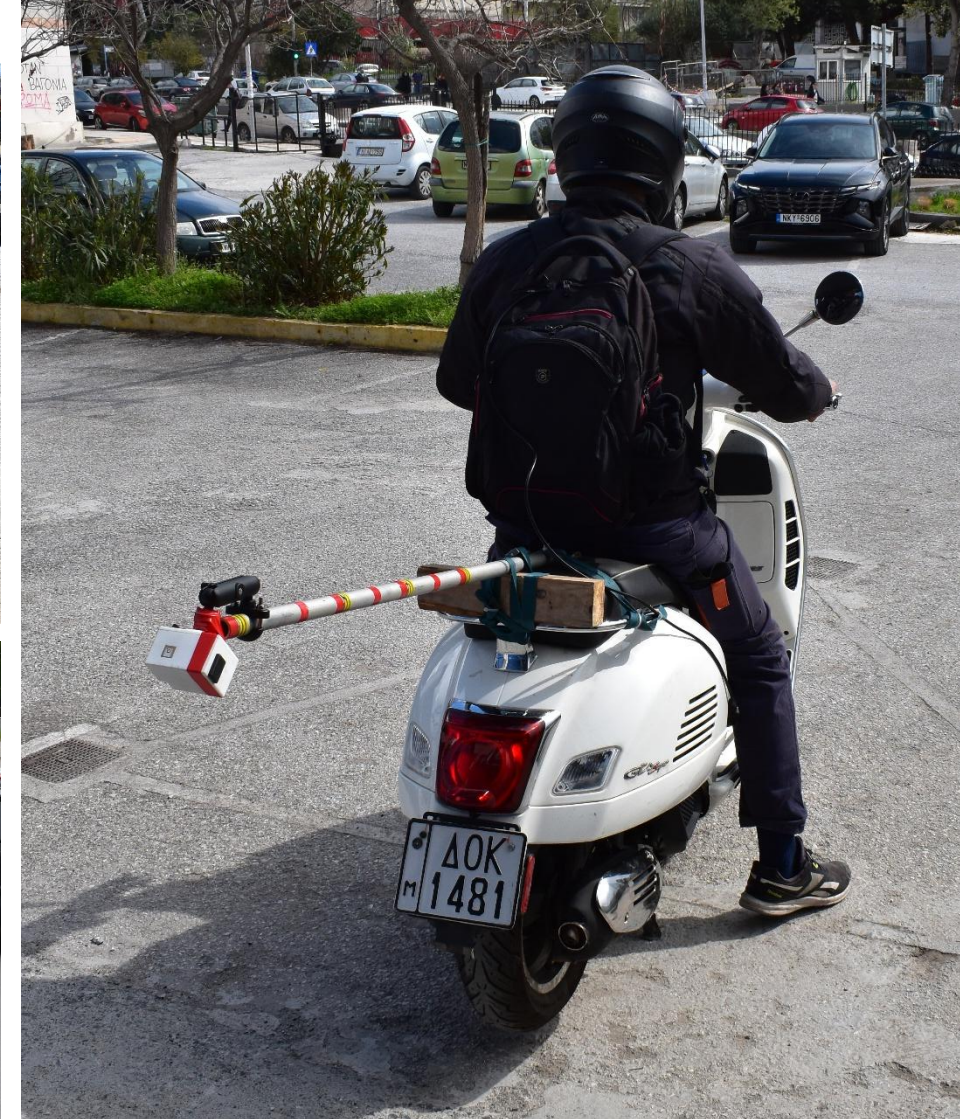
# Pollutant emissions testing – In lab

- Motorcycle dyno with CVS system
- Driving cycles: official WMTC & real-world alike RDC (Real Driving Cycle)
- Regulated pollutants: PM, CO, CO<sub>2</sub>, NO<sub>x</sub>, HC
- Non-regulated gaseous pollutants: NH<sub>3</sub>, N<sub>2</sub>O, etc.
- PN: 23nm, 10nm, 2.5nm, Solid & total
- Testing labs:
  - EMISIA/LAT
  - TUG
  - IFPEN
  - IDIADA
- Round-robin with 2 motorcycles in all labs → DONE



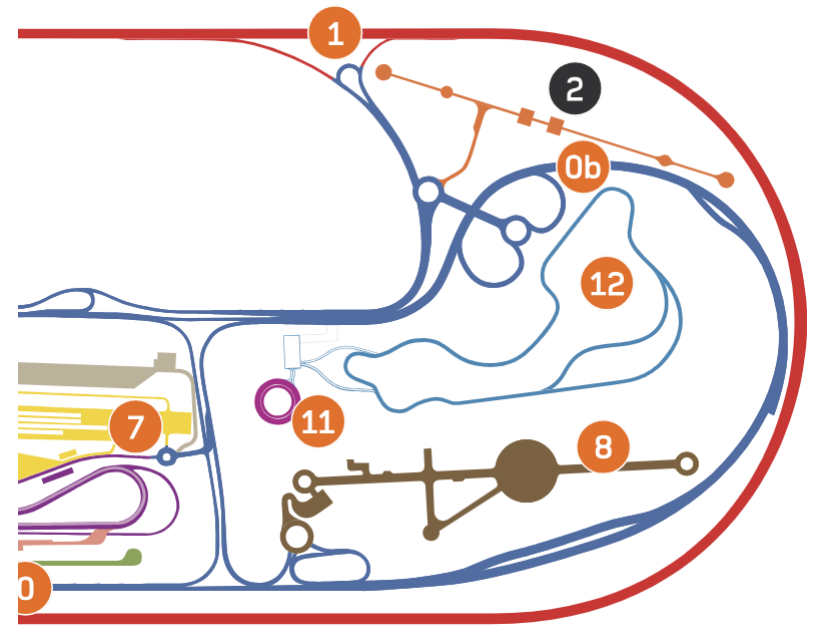
# On road noise testing

- On-board noise measurement device
- ECU data recorder (OBD)
- Locations:
  - IKA RWTH – Aachen
  - EMISIA – Thessaloniki
  - TUG – Gratz
  - IDIADA – Barcelona
  - IFPEN – Paris



# On track noise testing

- Noise TA testing on ISO certified track
- Noise testing of Real-world patterns on track
- Real-world patterns derived from on road noise measurements.
- Testing partners:
  - IKA RWTH
  - IDIADA
  - TUG





# On road pollutant emissions testing

- Portable emission measurement equipment
- GPS
- ECU data recorder (OBD)
- Locations:
  - EMISIA – Thessaloniki
  - TUG – Gratz
  - IDIADA – Barcelona
  - IFPEN – Paris
  - CZU – Prague



# Tempering detection & Remote sensing

- Roadside measurement of noise & pollutant emission.
- Field survey locations:
  1. Flanders - Leuven [May 2024]
  2. France - Paris region [September 2024]
  3. Spain - Barcelona [October 2024]



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

# Summary

- LENS provides evidence needed for effective policy in terms of PTW noise and emissions.
- Development of devices and methods for real world characterization and monitoring of emissions and noise
- We are now in the phase of calculating cost-benefit scenarios for different potential measures (project ends Q3.2025)

# Thank you!

**Giorgos Triantafyllopoulos, Mech. Eng., PhD**

EMISIA SA  
PO Box 8138, GR 57001, Thessaloniki, Greece

T: +30 2310 473374  
E: [giorgos.t@emisiasa.com](mailto:giorgos.t@emisiasa.com)  
W: [www.emisiasa.com](http://www.emisiasa.com)

*Disclaimer*

*Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the granting authority. Neither the European Union nor the granting authority can be held responsible for them.*

*Any communication or dissemination activity related to the action must use factually accurate information.*



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056777