### Recent studies in European cities using commercial remote sensing techniques

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# Overview of commercial vehicle remote sensing technologies



THE INTERNATIONAL COUNCIL

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## Remote-sensing testing and data pooling has expanded in Europe since the CONOX project





Umwelt 🌍 Bundesamt

## Overview of recent vehicle remote sensing campaign in Europe



#### EU H2020 funded CARES project: **City Air Remote Emission Sensing**

icci



# CARES objective to further deploy commercial and non-commercial remote-sensing techniques

• Open-path techniques



• Plume chasing



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Figure 3a: Schematic setup of a plume chaser installed in vehicl measuring the exhaust emissions from the truck in front



Figure 3b: Schematic setup of a stationary air sampling system.

# Point sampling Cont



TRUE seeks to supply cities with data regarding the real-world emissions of their vehicle fleets and equip them with technical information that can be used for strategic decision making.

- Leverage real-world emissions data to garner public support for new policies and help consumers make better purchasing decisions
- Utilize real-world data to calculate and compare the potential impact of different policy options
- Regular data collection through targeted campaigns or remote sensing networks to track real-world emissions in the city and enable rapid policy responses to new information
- Share real-world city-level emissions with state and federal authorities to promote impactful decision making throughout all levels of government
- Support the transition to zero tailpipe emissions vehicles

Partners:





# Real-world emissions from passenger vehicles using the CONOX remote sensing data (2018)

- Performance of vehicle families
  - No (pre-RDE) Euro 6 diesel below the typeapproval limit
  - Most Euro 6 petrol under or close to it





## Pilot programs in London and Paris highlight applications of remote sensing data



THE INTERNATIONAL COUNCI ON CLEAN TRANSPORTATIO https://www.trueinitiative.org/data/publications/remote-sensing-of-motor-vehicle-emissions-in-london

### Paris data applied to assess impacts of Paris LEZ implementation



Implementation of Phase 5 of Paris LEZ in 2024 will accelerate  $NO_X$  reductions by 7-10 years

Figure 6. Estimated effects of Paris LEZ on passenger car fleet average NO<sub>x</sub> emission factors, with summer emission factors and optimistic

registration assumptions.

https://www.trueinitiative.org/data/publications/impacts-of-the-paris-low-emission-zone-and-implications-for-other-cities

#### Analysis of the summer 2019 Krakow remotesensing campaign



Pre-Euro 6 diesel and pre-Euro 3 petrol are predominant sources of passenger car NO<sub>x</sub> emissions.

https://theicct.org/publications/remote-sensing-krakow-Sept2020

Diesel

Petrol

# $NO_{\rm x}$ emissions from taxis are higher than other passenger cars



- A higher share of poorly-performing Euro 5 diesel
- Higher emissions from gasoline taxis

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### Warsaw 2020 remote-sensing campaigns





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Test program:

- Sampling over 4 weeks from end of September to October
- Over 250,000 records with a valid gas reading

#### Objectives:

- Study the performance of latest Euro 6d vehicles
- Quantify the average fleet emission impact of vehicles
  movement from Western to Eastern Europe
- Inform LEZ in place (Brussels), or yet to come (Warsaw)

### Brussels 2020 RS campaign

Test program:

- Sampling over 6 weeks from end of October to November
- Over 250,000 records with a valid gas reading
- For the first time RS is collocated with noise measurement and onroad particulate number inspection targeting DPF fraud/malfunctions











## On-road check of Diesel Particulate Filter malfunctions

- About 4% of tested diesel Euro 5 and 6 exceeded
   1 Million particles / cm-3

 That represents about 85% of total PN emitted by this category







Belgium to adopt PTI-PN test for DPF inspections, (April 2021)

#### Summary

- Measuring and publishing real-world emissions data can be impactful
- Remote sensing is a well suited for obtaining fleetwide real-world emissions data
- Remote sensing data can be applied in many ways to build understanding of real-world emissions and inform evidence-based policy evaluation and development – at both city, national and EU levels



#### Questions? Contact y.bernard@theicct.org



