Using real-world emission data to inform low-emission transportation policies and actions

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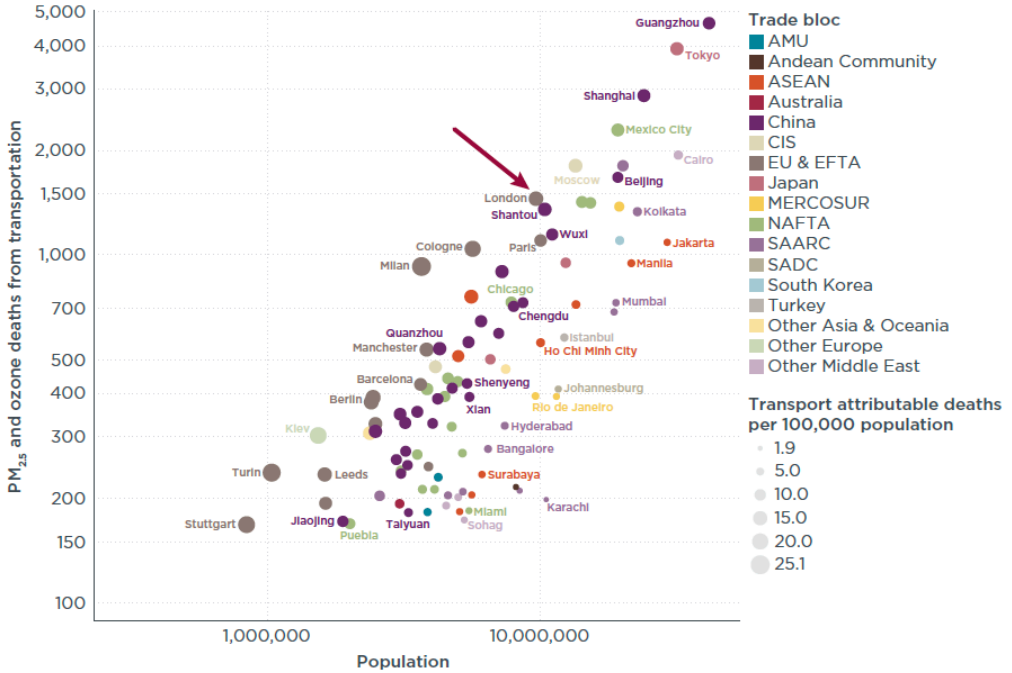
true
THE REAL URBAN EMISSIONS INITIATIVE

Transportation emissions have a significant health burden, particularly in cities



Transportation-attributable deaths from $PM_{2.5}$ and ozone pollution, mortality rates, and population in 100 major urban areas, 2015. Bubble color indicates the trade bloc in which an urban area is located. Bubble size indicates the transportation-attributable mortality rate per 100,000 population.[1]

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Source: https://www.theicct.org/publications/health-impacts-transport-emissions-2010-2015

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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: FIA FOUNDATION icct THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

TRUE Europe remote sensing studies

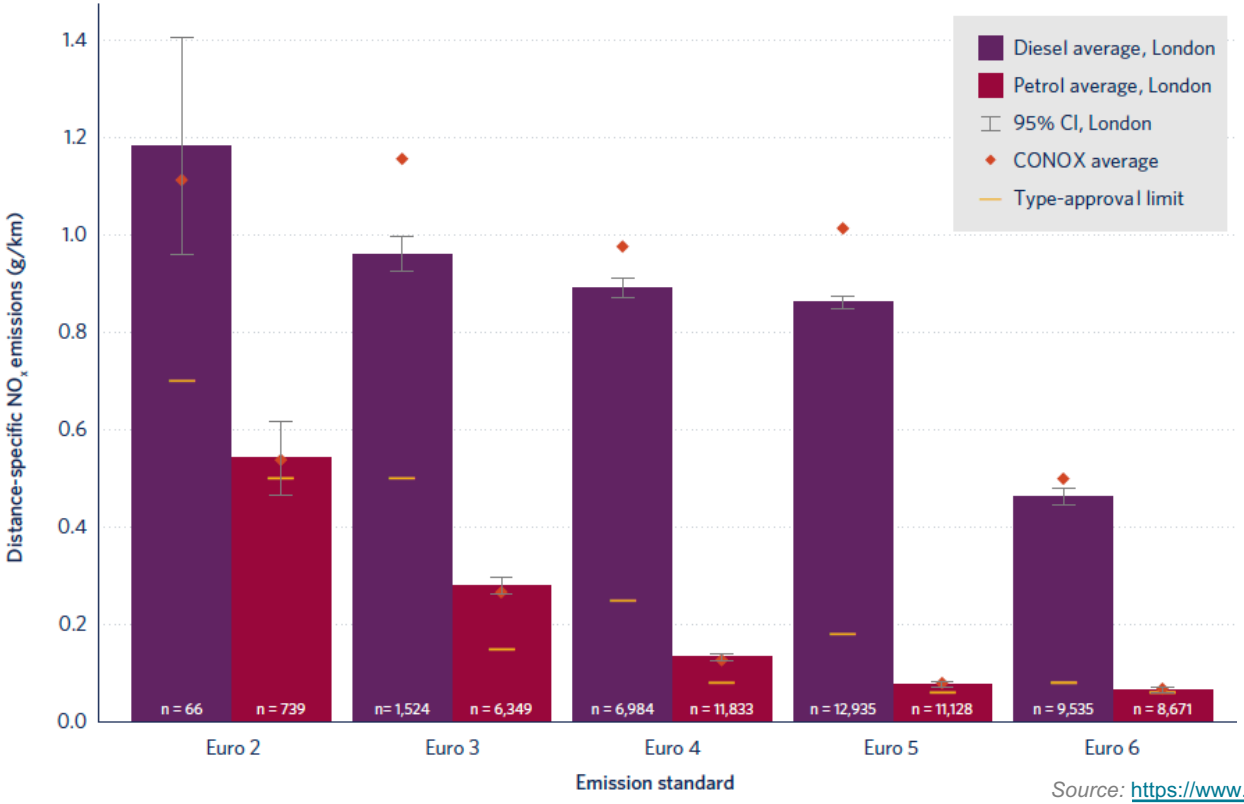
London 2017–2018

Brussels 2020

Paris 2018

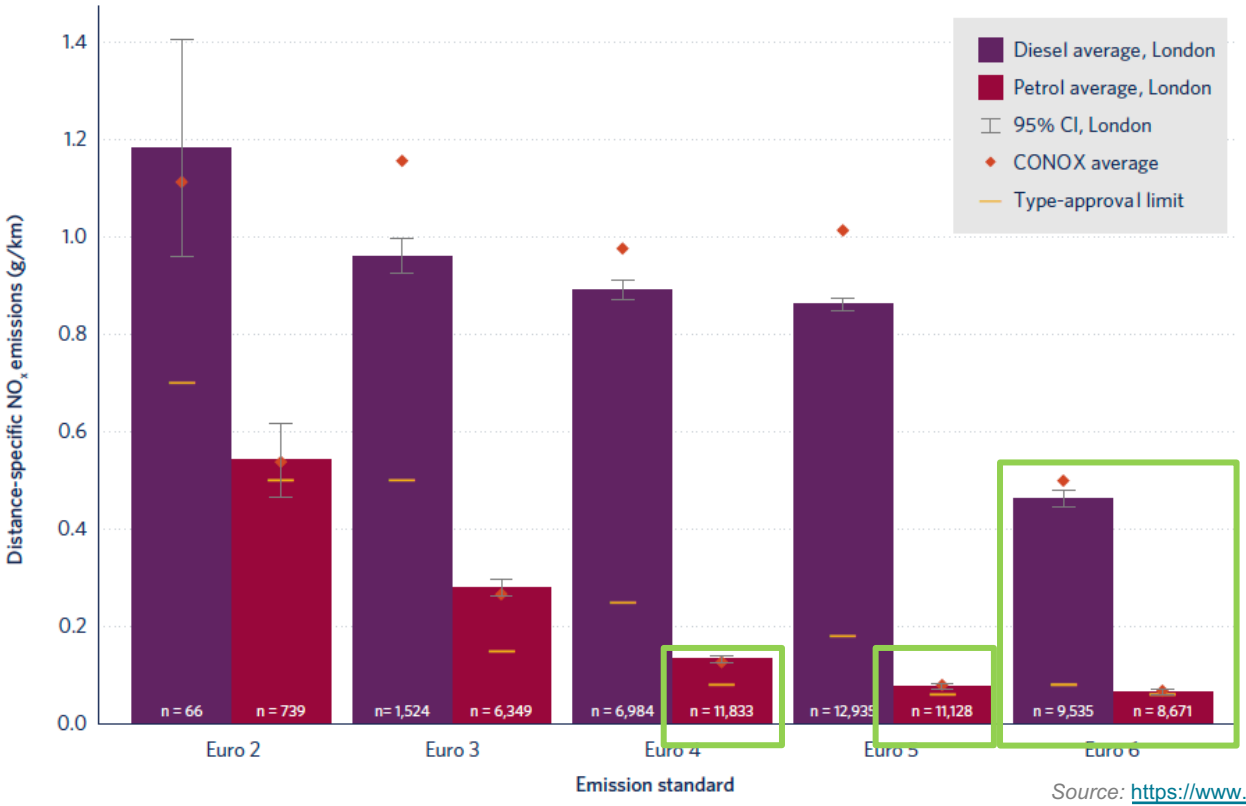
Warsaw 2020

London data show elevated NO_x emissions from diesel passenger cars



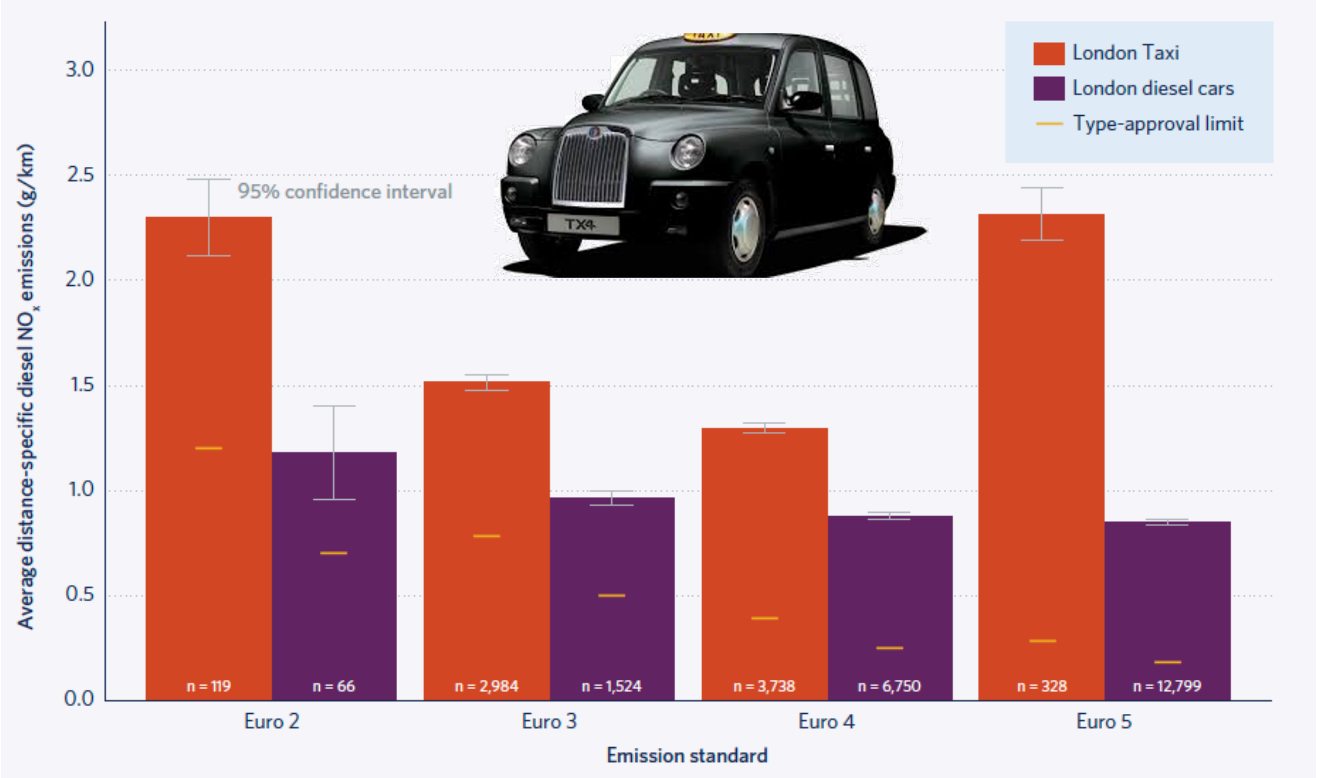
Source: https://www.theicct.org/publications/true-london-dec2018

Implementation of Ultra Low Emission Zone (ULEZ) limited access to diesels accounting for 61% of total passenger car NO_x emissions



Source: https://www.theicct.org/publications/true-london-dec2018

Remote-sensing data provide evidence of very high emissions from the London diesel taxi fleet

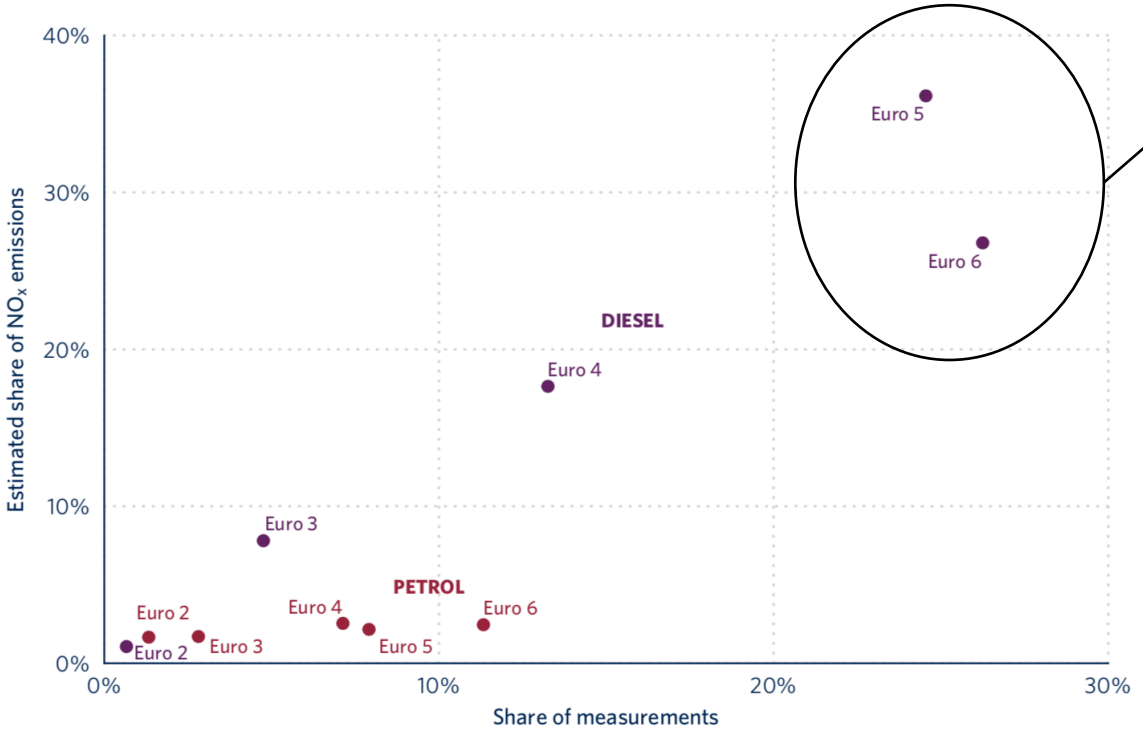


London “black” taxis

- Euro 5 NOx emissions are as high as Euro 2…
- And 10x type-approval limits

New policies enacted to speed transition to zero emission capable alternatives

Diesel vehicles are predominant in Paris and NO_x emissions are well above regulatory limits



Euro 5 and 6 diesels account for >60% of total NO_x from cars in Paris

Figure 11. Estimated share of annual NO_x emissions from passenger cars and respective share of remote sensing measurements in Paris, differentiated by Euro standard and fuel type.

Source: https://www.trueinitiative.org/data/publications/remote-sensing-of-motor-vehicle-emissions-in-paris

Paris data applied to assess impacts of Paris Low Emission Zone implementation

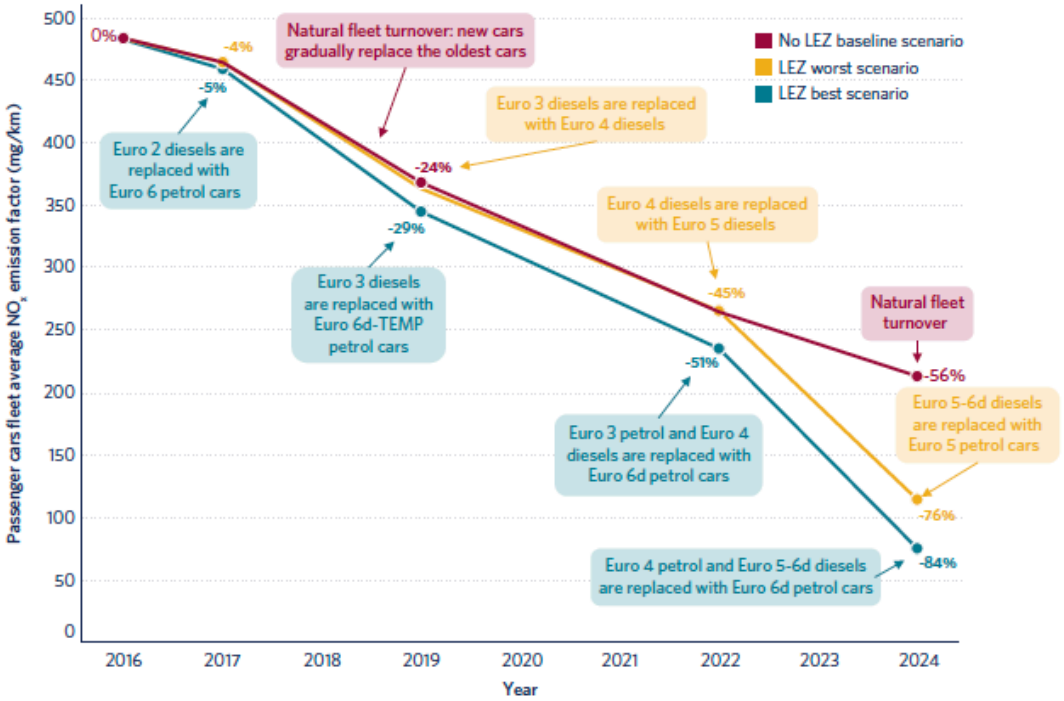
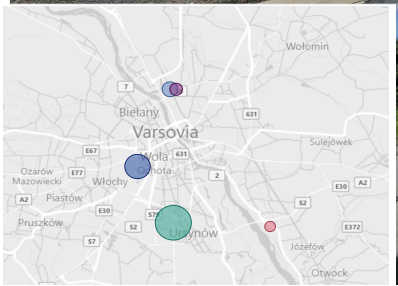


Figure 6. Estimated effects of Paris LEZ on passenger car fleet average NO_x emission factors, with summer emission factors and optimistic registration assumptions.

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

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

Brussels and Warsaw 2020 remote-sensing campaigns



Test program:

- Sampling over 4 weeks from end of September to November
- 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)

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TRUE U.S. work aims to leverage existing remote sensing data

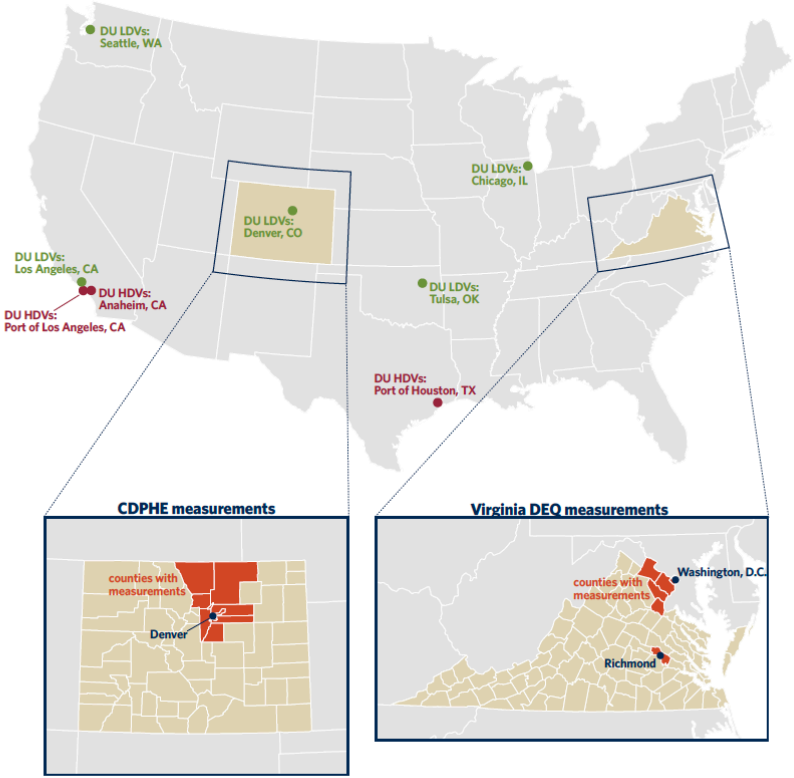


Figure 2. Measurement locations for data compiled in TRUE U.S. database.

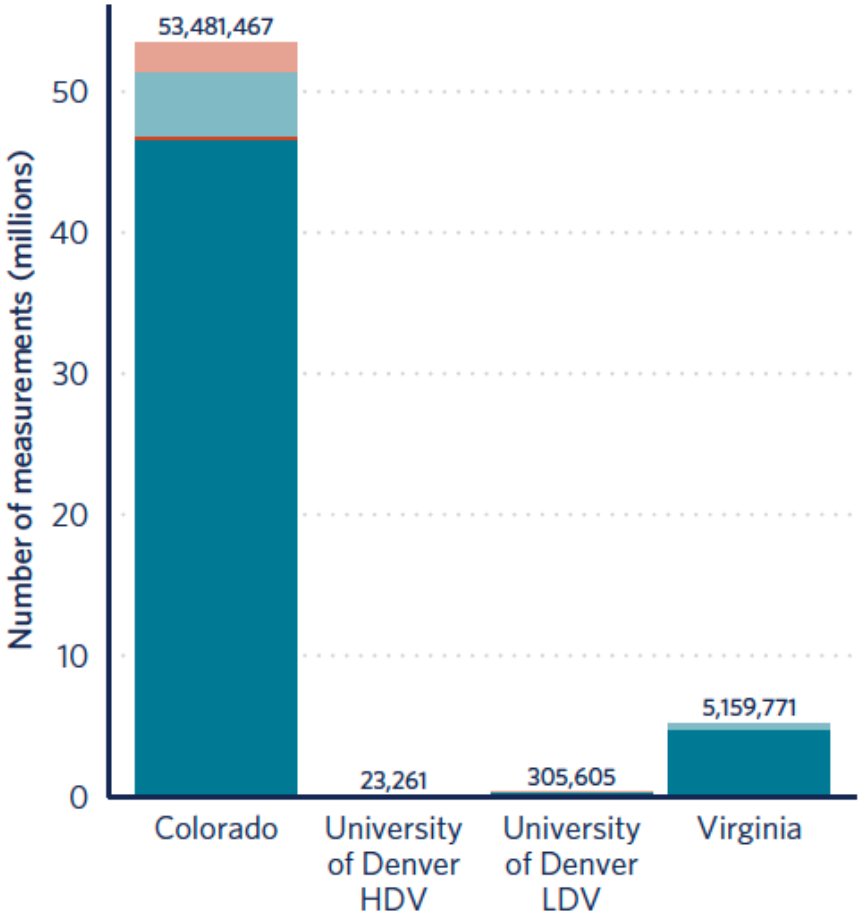
Millions of remote sensing records are collected each year in the United States.

This work focused on compiling data into a single database and exploring how data can be analyzed to better understand the real-world emissions of the U.S. fleet.

Records by data source

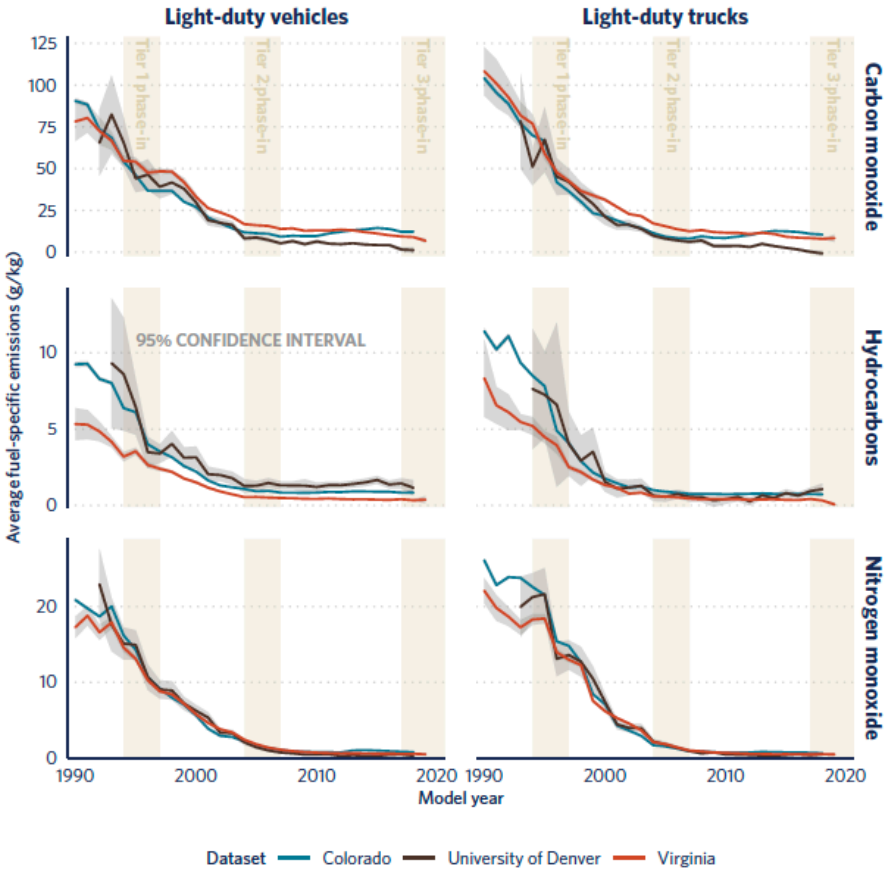
TRUE U.S. database overview

- ~60 million records
- Data collected from 2010–2018
- Hundreds of sampling sites
- Most data for LDVs and LDTs
- Data represent broad range of driving and ambient weather conditions



LDV and LDT emission trends

Fleet-average emissions for gasoline LDVs and LDTs show significant downward trend in response to implementation of more stringent standards.



Average fuel-specific pollutant emissions (g/kg fuel) of gasoline light-duty vehicles by vehicle class and data source.

https://theicct.org/publications/true-us-databasedevelopment-oct2020

HDV NO_x emission trends

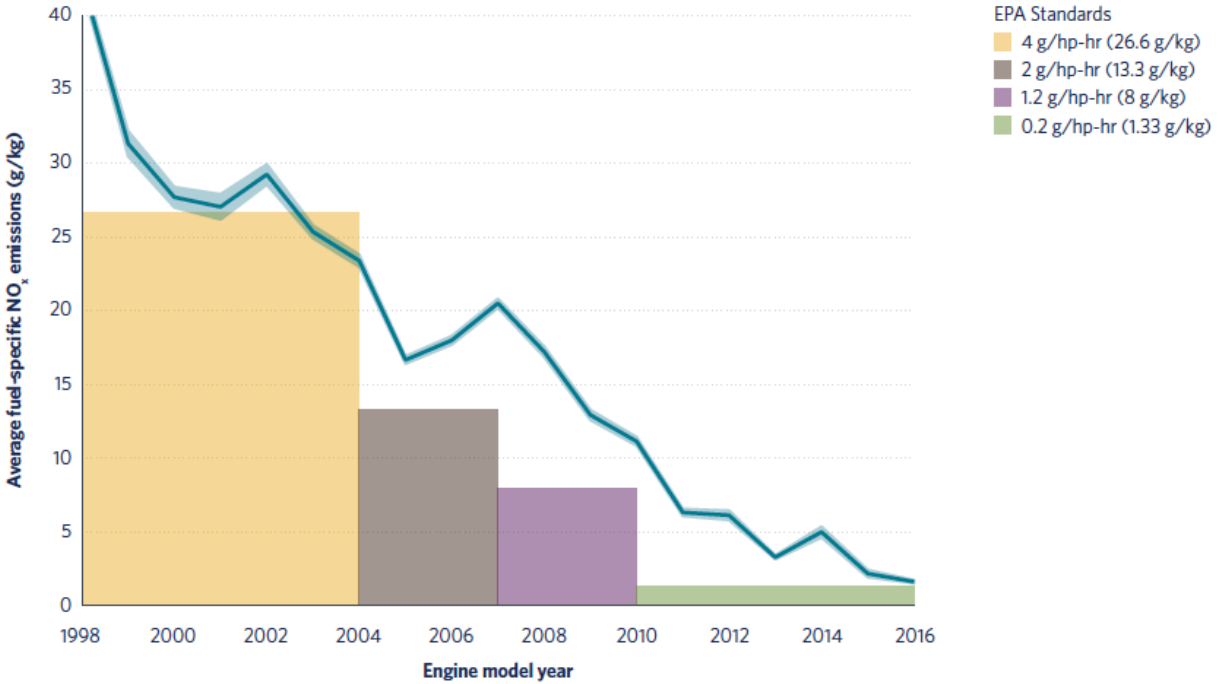


Figure 3. Average fuel-specific NO_x emissions by engine model year and comparison to U.S. EPA standards. Uncertainty band shows the 95% confidence interval.

Average NO_x emissions from HDVs have also improved over time, though real-world emissions are higher than regulatory limits and real-world emissions reductions have lagged standards.

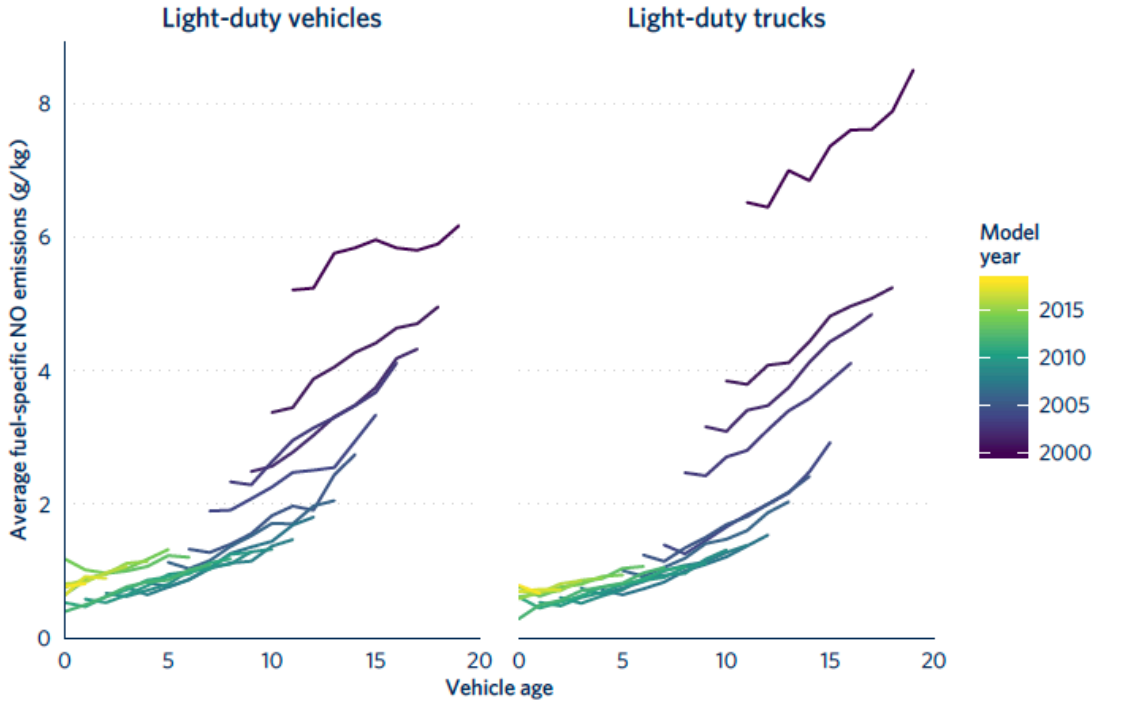
Data also provide further evidence of elevated NO_x emissions from diesel trucks under low-speed urban operating conditions.

https://theicct.org/publications/true-us-database-hdvemissions-oct2020

Impact of vehicle age on emissions

Database provides detailed information on how emissions change as vehicles age.

Real-world deterioration rates can be many times higher than manufacturer reported values.



Average fuel-specific NO emissions of gasoline light-duty vehicles and light-duty trucks per model year and vehicle age.

https://theicct.org/publications/true-us-databasedevelopment-oct2020

Emissions distribution by vehicle age

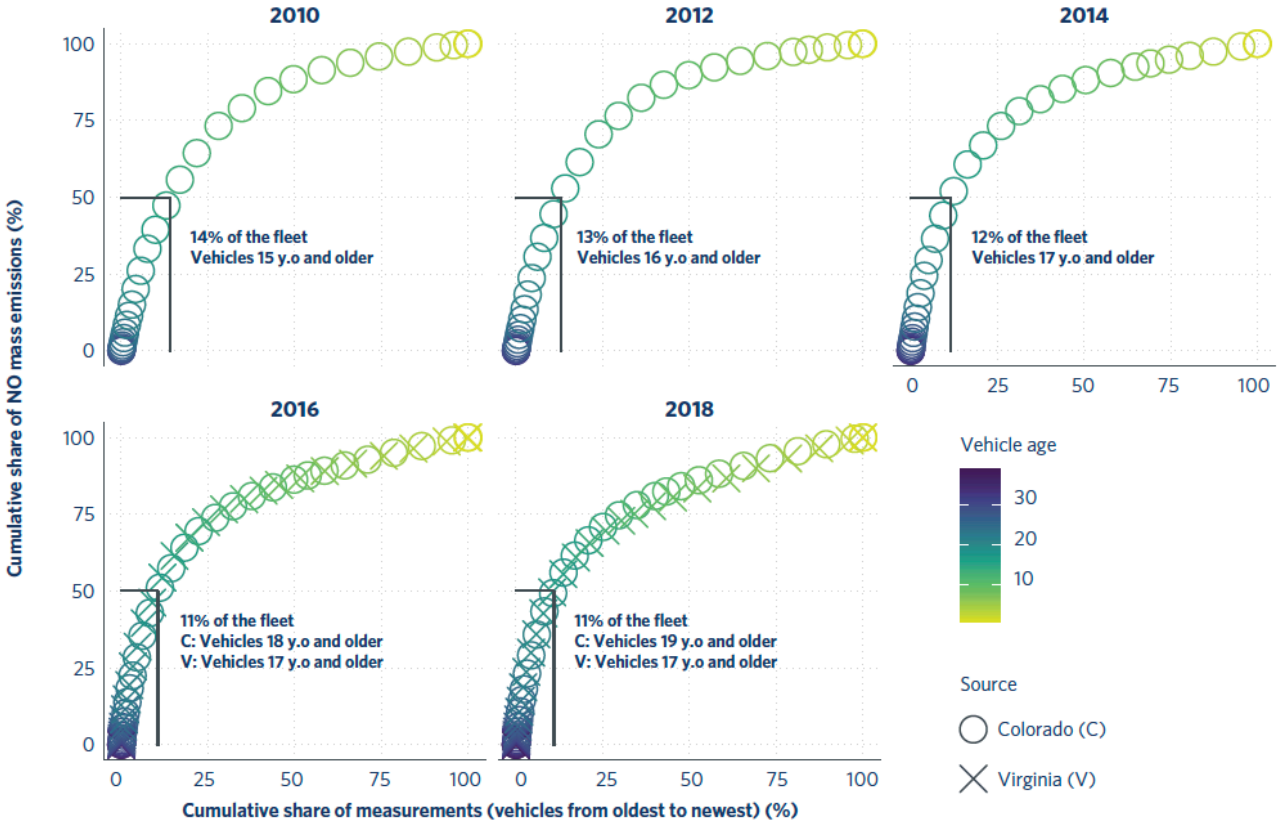


Figure 3. Cumulative share of light-duty NO mass emissions by vehicle age.

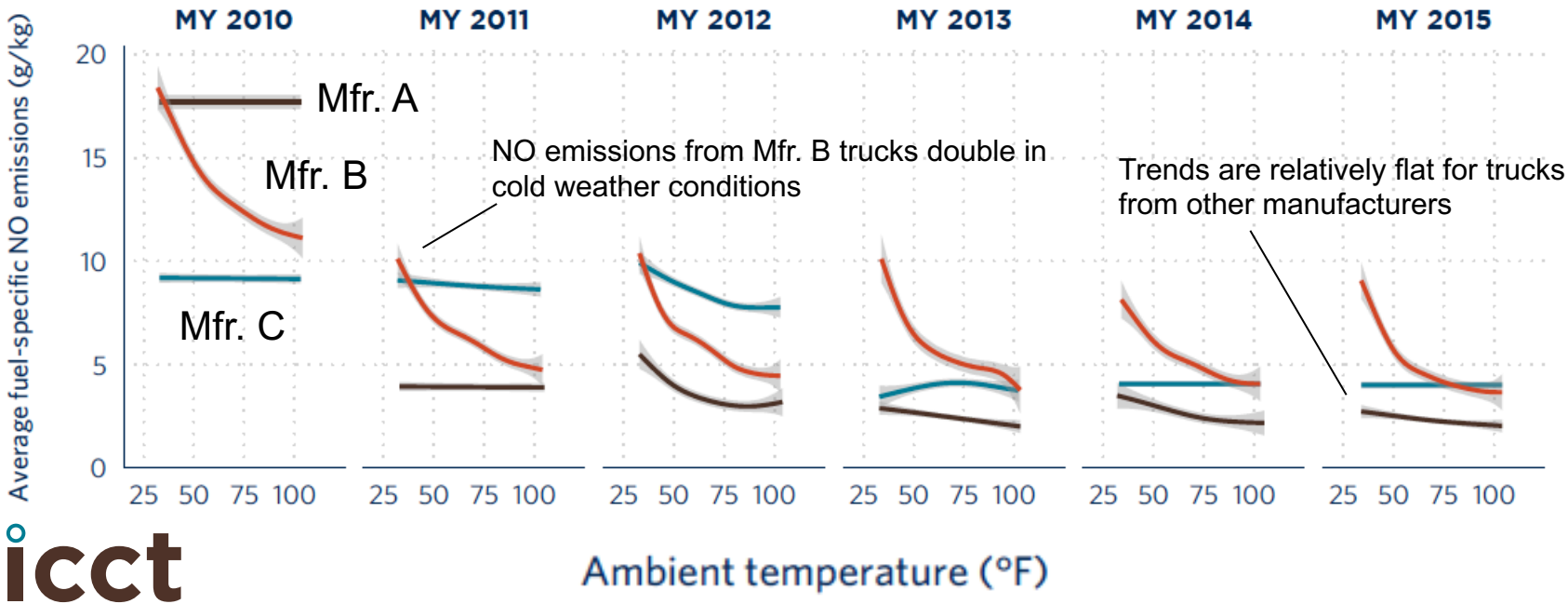
For LDVs, the contribution of the oldest vehicles in the fleet to total NO mass emissions has increased over time.

Policies targeting the oldest vehicles in the fleet can have outsized impact.

https://theicct.org/publications/true-us-databaseemissions-distribution-oct2020

Identification of atypical real-world emissions performance

Influence of ambient temperature on diesel pickup truck emissions



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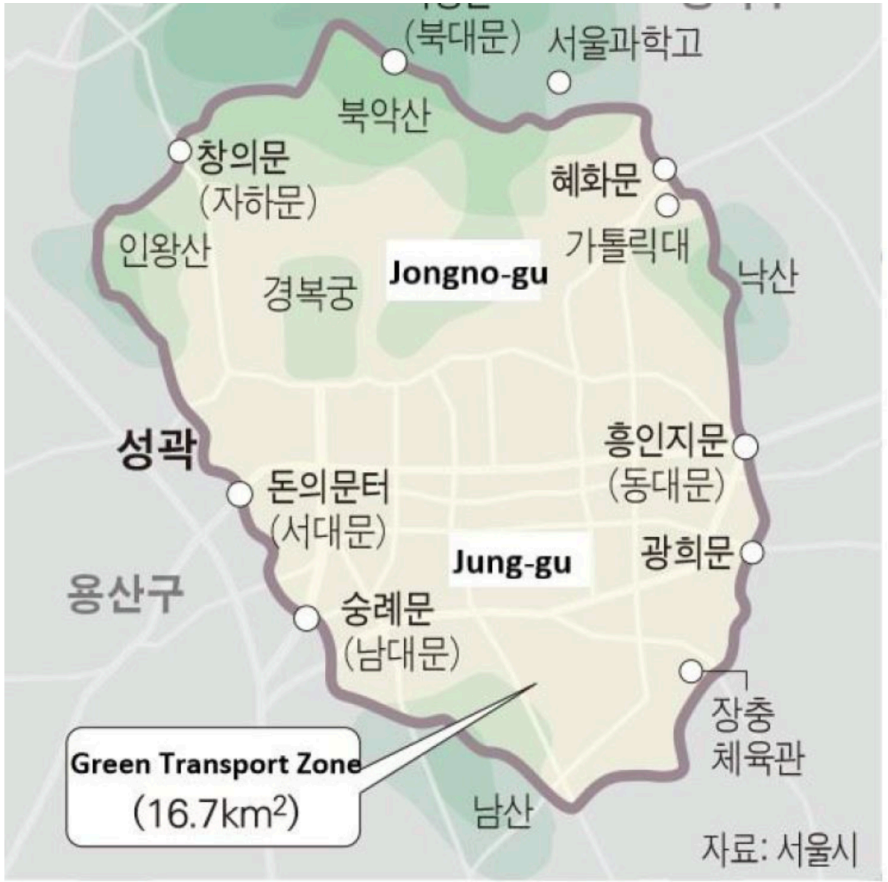
https://theicct.org/publications/true-us-databasedevelopment-oct2020

Seoul

- Analysis of 1-yr of remote sensing data collected in Seoul
- >500,000 records
- Detailed evaluation of emissions from Seoul fleet and implications for emission control policies such as the Green Transport Zone

Seoul & Provinces

Seoul moves to block high-emission vehicles from city center



Green Transport Zone / Courtesy of Seoul Metropolitan Government

http://www.koreatimes.co.kr/www/nation/2020/10/281_274335.html

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Jakarta remote sensing testing

- 3-month testing study (2021)
- Improve understanding of real-world emissions
- Inform existing and planned emission control policies
  - Implementation of Euro 4 emission standards
  - Vehicle inspection program
  - Access restrictions
  - Vehicle age limits

Mexico City

- Data regularly collected by Mexico City
- Most recent data collected in 2019 show high HC emissions, especially from taxis
- Evaporative emissions likely contribute to high HC readings

Figure 2. Mean HC by Model Year for CDMX Private Vehicles & Taxis, with 95% CI

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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 and national levels

Questions?
Contact t.dallmann@theicct.org

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