

# NO<sub>x</sub> and particulate emissions from London's taxis

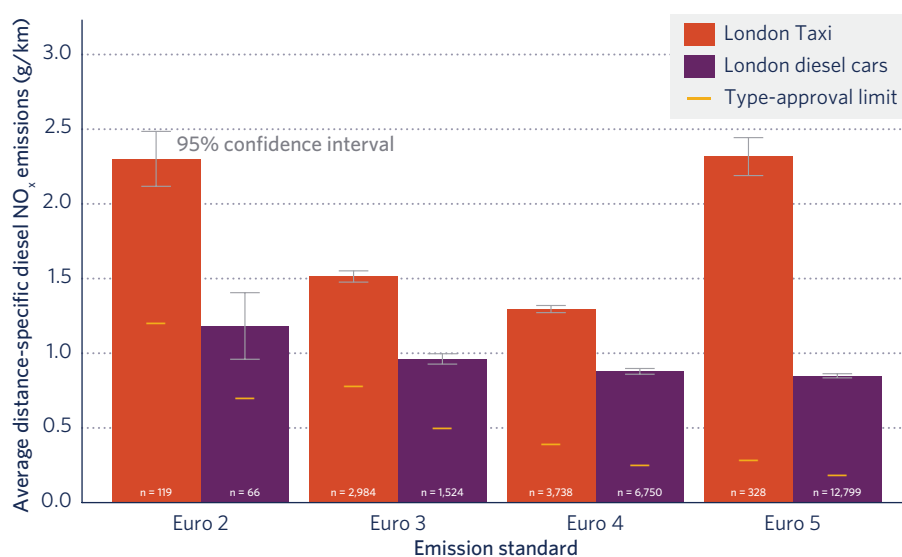
The Real Urban Emissions initiative (TRUE) deployed remote-sensing equipment to measure “real-world” emissions from vehicles from more than 100,000 vehicles at several sites around Greater London from November 2017 through February 2018.

The data collected in this TRUE project, combined with data from previous remote-sensing studies, yield in total 7,169 samples from London's iconic black taxis, many of which are powered by diesel engines. This data provides a clearer and more detailed picture of real-world emissions from London diesel black taxis than has been available before now.

London has taken several steps to reduce pollutant emissions from black taxis:

- No new diesel taxis licensed in London since January 1, 2018.
- Subsidies to scrap older taxis and to help purchase new Zero Emissions Capable (ZEC) models, mainly plug-in hybrids.
- Installation of vehicle charging locations across the city for (nonexclusive) use by ZEC taxis.
- Establishment of an Ultra Low Emission Zone (ULEZ) beginning April 2019. While black taxis are exempt from the surcharge on pre-Euro 6 diesel cars within the zone, taxis are subject to a 15-year age limit.

While black taxis are in general subject to the same emissions standards as



Distance-specific NO<sub>x</sub> emissions from diesel-fueled London taxis compared with other London diesel passenger cars by Euro standard. The number of measurements is presented at the bottom of each bar. Whiskers represent the 95% confidence interval of the mean.

diesel passenger cars, prior to the Euro 6 regulation they benefited from an exemption that allowed certain diesel vehicles to be classified as commercial vehicles (category N1 Class 3). Therefore, Euro 5 black taxis are subject to a more lenient emissions limit of 280 mg/km, instead of the 180 mg/km required of Euro 5 diesel passenger cars (category M1). This exemption was eliminated under Euro 6.

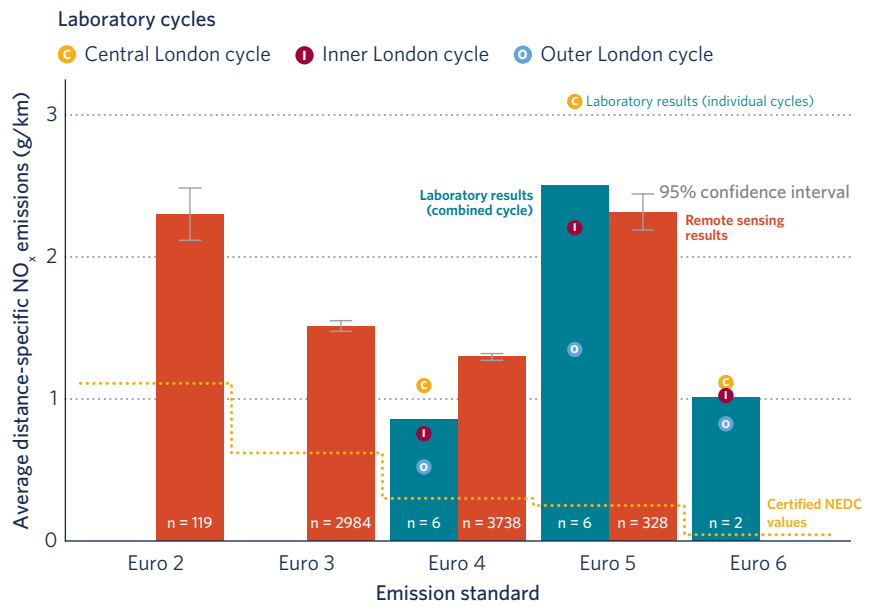
## KEY FINDINGS

- NO<sub>x</sub> emissions from London taxis consistently exceeded diesel passenger car emissions, even after accounting for the more lenient Euro 5 standard. Taxis emitted

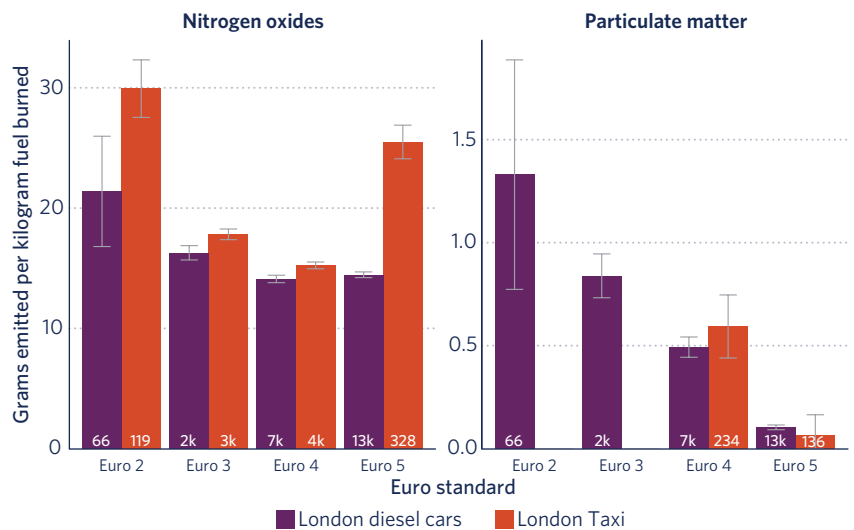
up to 7 times their Euro standard certification limits, while other diesel passenger cars emitted 4 times their limits.

- Euro 5 taxis were the highest emitters: at least 50% more NO<sub>x</sub> per kilometer than Euro 3 and 4 taxis, on average. The average per kilometer NO<sub>x</sub> emission rate for Euro 5 taxis is approximately 3 times the rate for Euro 5 diesel cars in London.
- A comparison of the 2017-2018 remote sensing test results with similar data collected in 2012-2013 shows no improvement, on average, in the NO<sub>x</sub> emissions performance of the London diesel taxi fleet over the past 5 years.

- The remote-sensing results for London taxis are in line with laboratory testing results obtained by Transport for London.<sup>1</sup> For Euro 4 and Euro 5 vehicles, for which both remote-sensing and laboratory data are available, the data sources correlate reasonably well. The average of the remote-sensing results from Euro 4 vehicles is 52% higher than the laboratory combined-cycle result. For Euro 5, the remote-sensing results are 7% lower than the combined-cycle result.
- Particulate matter (PM) emissions from black taxis were similar to those from diesel passenger cars for vehicles certified to Euro 4 and 5 standards. The PM emissions performance of Euro 5 taxis, which are equipped with diesel particulate filters, is improved relative to Euro 4 taxis.



Distance-specific NO<sub>x</sub> emissions from diesel-fueled London taxis by Euro standard measured in the laboratory and by remote sensing.



Fuel-specific NO<sub>x</sub> and PM emissions from diesel-fueled London taxis compared with other London diesel passenger cars by Euro standard. The number of measurements is presented at the bottom of each bar. Whiskers represent the 95% confidence interval of the mean.

<sup>1</sup> Transport for London commissioned laboratory tests of Euro 4, 5, and 6 black taxis over a customized London cycle made of three sections designed to represent driving conditions in inner, central, and outer London.



**TO FIND OUT MORE**

For details on the London remote-sensing project and related questions, contact **Rachel Muncrief, rachel@theicct.org**. For more information on TRUE, visit **www.trueinitiative.org**.

**DOWNLOAD THE PAPER**

“Remote sensing of motor vehicle emissions in London” **www.theicct.org/publications/true-london-dec2018**