

Real-world NO_x emissions of Euro 6d-TEMP and 6d passenger cars

In the autumn of 2020, The Real Urban Emissions (TRUE) Initiative measured the emissions of more than 130,000 unique vehicles operating on the streets of Brussels. The study provides among the first large-scale collections of real-world emissions data for vehicles certified to latest European emission standards for light-duty vehicles—Euro 6d-TEMP and 6d.

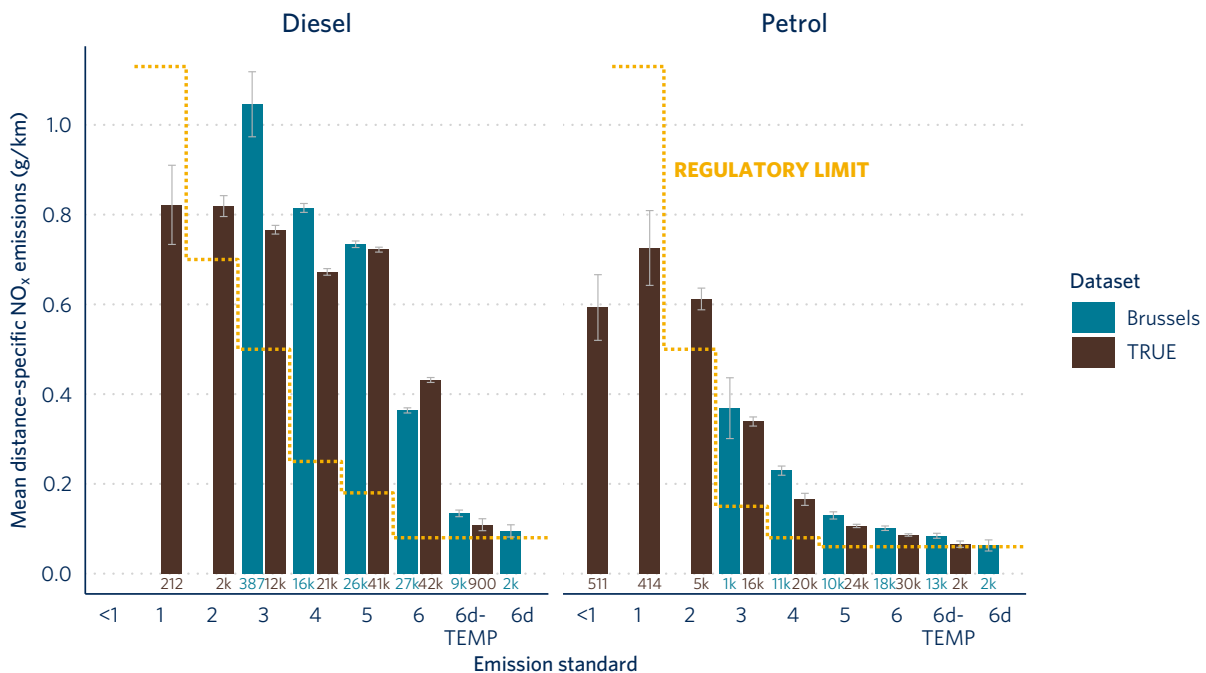
BACKGROUND

Vehicles certified as complying with 6d-TEMP and 6d standards are subject to real driving emissions (RDE) testing during the type-approval process to ensure vehicles meet on-road limits. During type-approval certification, 6d-TEMP vehicles are allowed to emit up to 2.1 times the laboratory nitrogen oxides (NO_x) limit

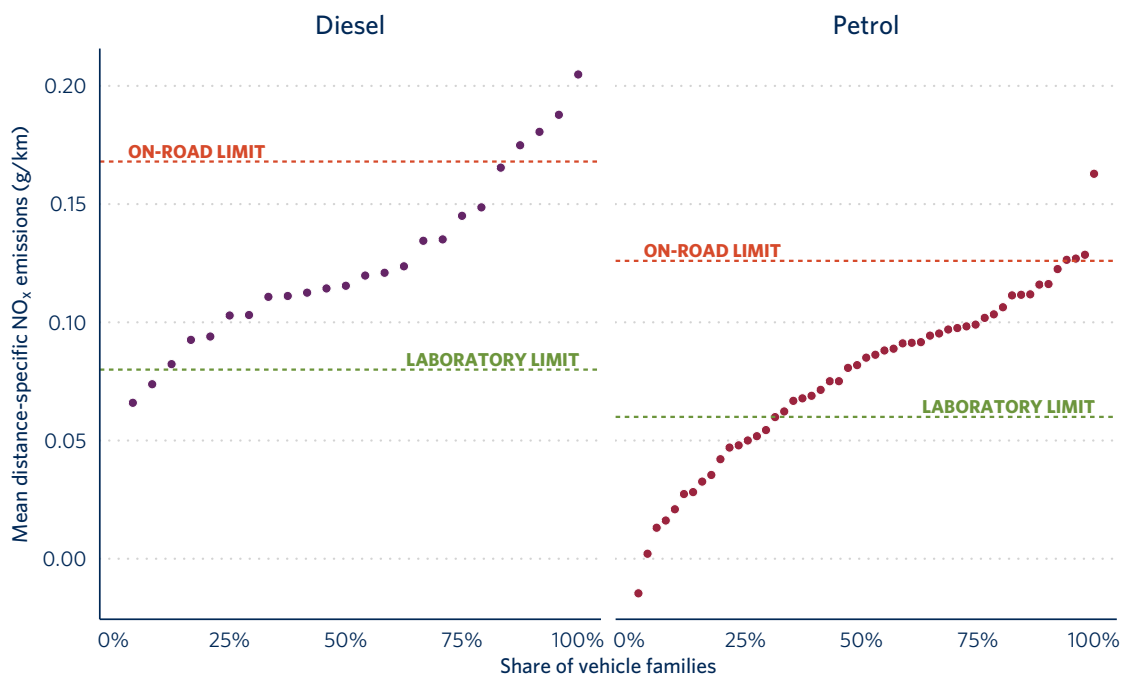
when tested under RDE test conditions, and 6d tightens this on-road limit to 1.43 times the laboratory limit. Expectations are that these requirements will lead to better real-world emissions performance, especially for diesel vehicles which typically emit excess pollution well above laboratory limits during actual on-road operation. TRUE analyzed the 35,000 emission measurements of 6d-TEMP passenger cars and 6,700 measurements of 6d cars collected during the Brussels remote sensing to provide insights into the effectiveness of 6d-TEMP and 6d standards in controlling on-road emissions in urban areas.

KEY FINDINGS

- On average, on-road NO_x emissions for diesel Euro 6d-TEMP, the first standard that required RDE testing,



Mean estimated distance-specific NO_x emissions from diesel and petrol passenger cars, grouped by emissions standard, for Brussels and TRUE remote sensing data. The number of measurements is presented below each bar. Whiskers represent the 95% confidence interval of the mean. Results are only shown for groups with at least 100 measurements.



Mean distance-specific NO_x emissions from Euro 6d-TEMP passenger cars, by vehicle family, for Brussels and TRUE remote sensing data combined.

are much lower (-63%) than those for pre-RDE diesel Euro 6 vehicles when expressed on a per kilometer basis. However, average real-world emissions from Euro 6d-TEMP diesel cars remain 60% greater than those of petrol vehicles certified to the same standard. Emissions of diesel Euro 6d are 74% lower than pre-RDE Euro 6 vehicles. Euro 6d petrol vehicles are the only passenger car group found to have average on-road emission levels below laboratory limits.

- There is significant variability in real-world emissions performance across different makes. The average distance-specific NO_x emissions for Euro 6d-TEMP vehicle makes in Brussels ranged from 0.057 g/km to 0.220 g/km for diesel cars and from 0.021 g/km to 0.123 g/km for petrol cars.
- Of the 6d-TEMP vehicles measured, approximately 31% of petrol vehicle families met the laboratory type-approval limit of 0.06 g/km, whereas only 8% of diesel vehicle families met the laboratory type-approval limit of 0.08 g/km. Further, 17% of vehicle families exceeded the on-road type-approval limit of 0.168 g/km for diesel vehicles, and 8% exceeded the on-road type-approval limit of 0.126 g/km for petrol vehicles. However, these findings do not necessarily indicate vehicle families with emissions exceeding on-road limits are out of compliance. Rather, it could be an indication that the RDE regulation might not

sufficiently cover all urban driving conditions, including conditions specific to Brussels.

- Euro 6d-TEMP and Euro 6d vehicles were relatively young at the time of measurement. Therefore, it is uncertain whether emissions performance will be maintained as vehicles and control equipment age. Under the proposed low-emission zone (LEZ) implementation schedule, Brussels will allow these vehicles to operate in the LEZ until 2030 in the case of diesel vehicles and 2035 for petrol vehicles. Continued monitoring of the real-world emissions of these vehicles should be performed as they age.
- The continued higher emissions level of the latest diesel vehicles relative to petrol and the poorer performance in true urban operating conditions for some vehicle families demonstrate the need for new regulatory provisions. The Euro 7 standard, which is expected to be the first technology-neutral regulation, should set significantly lower limits for pollutants, require enhanced emission durability requirements, and will likely consider more conditions typical of urban driving. However, Euro 7 is only expected to come into force starting in the 2025-2027 timeframe for new vehicles, implying Euro 6d-TEMP and 6d vehicles will likely be the predominant emissions standard in Brussels at the end of the decade.



FIA Foundation and the International Council on Clean Transportation (ICCT) have established The Real Urban Emissions (TRUE) Initiative. The TRUE initiative 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.

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TO FIND OUT MORE:

For details on the Brussels remote-sensing project and related questions, contact Yoann Bernard, y.bernard@theicct.org. For more information on TRUE, visit www.trueinitiative.org.

Download the paper “Evaluation of real-world vehicle emissions in Brussels” <https://theicct.org/publications/true-brussels-emissions-nov21>