THE REAL URBAN EMISSIONS INITIATIVE

FACT SHEET

SEPTEMBER 2019

Effect of hot weather on diesel car NO_x emissions in Paris

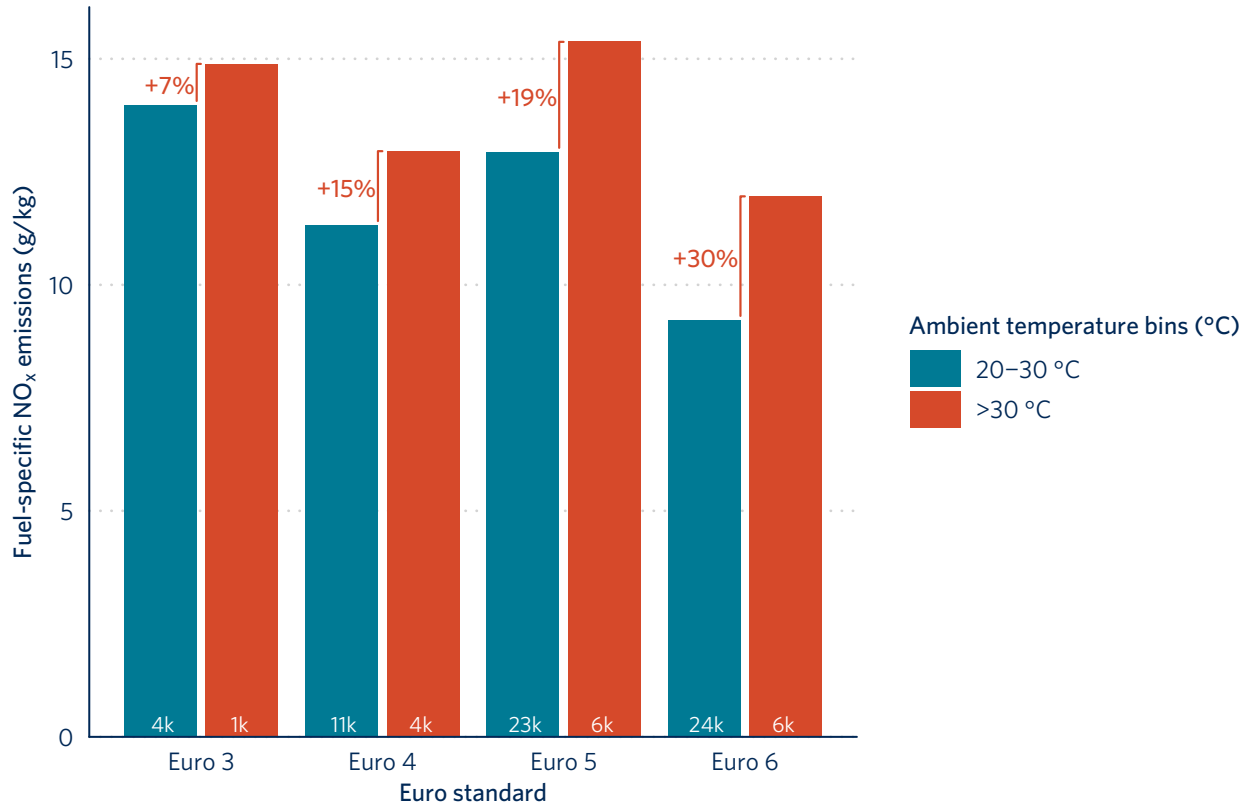
In summer 2018, The Real Urban Emissions initiative (TRUE) measured emissions from more than 180,000 vehicles on the road at three Paris sites. Approximately 30% of measurements were at ambient temperatures above 30 °C, a substantial sample set.

CONTEXT

The temperature range defined for pollutant emission type-approval tests on the NEDC test cycle, used for most vehicles in the EU market, is 20-30 ˚C. That range was recently narrowed to a smaller tolerance window around 23 ˚C for new models type-approved under the WLTP test cycle. The Real Driving Emissions (RDE) on-road test protocol establishes boundary values for ambient conditions. To be valid, an RDE test must be performed at temperatures not exceeding 35 °C. And the RDE test protocol allows NOx emissions to increase by 60% between 30 and 35 °C.

The inherent effect of rising temperatures between 30 and 40 °C on the performance of emissions control systems should be small. There is no obvious engineering reason why ambient temperatures in that range should significantly raise NO_x emissions.

Warmer temperatures increase ground-level ozone formation, so NO_x emissions at warmer temperatures have greater health impacts.



Average NOx emissions from diesel cars, in grams per kilo of fuel consumed. In hot weather, NOx emissions from Euro 6 cars were worse than emissions from Euro 4 cars at milder temperatures. The gap between in-use NOx emissions measured at ambient temperatures between 20 and 30 ˚C, which is the type-approval test range, and above 30 ˚C increases with every Euro standard, as type-approval NOx limits become more stringent.

FINDINGS

In-use NO_x emissions from diesel cars observed in Paris were significantly greater at ambient temperatures above 30 ˚C. NO_x emissions of Euro 5 and Euro 6 diesel cars were 20% to 30% higher than at temperatures within the NEDC type-approval test range (20–30 °C).

NO_x emissions from Euro 6 diesel cars between 20 °C and 30 °C are lower than from cars certified to earlier standards, a fact attributable to exhaust aftertreatment systems required by Euro 6 but not by earlier standards.

But when temperatures exceed the NEDC type-approval test range NO_x emissions rise significantly, and the hot-weather performance gap widens with each Euro standard. Above 30 °C, NO_x emissions from Euro 6 diesels are even slightly worse than emissions from Euro 4 diesels measured on road at temperatures within the type-approval range (20–30 ˚C).

The pattern observed in Paris of higher NO_x emissions from diesel cars in hot weather raises the possibility that manufacturers are employing strategies to reduce the efficiency of NO_x control systems at temperatures outside the certification test range.

In 2019, from 1 June through 31 August, recorded high temperatures in Paris exceeded 30 ˚C on 20 of 92 days. As the effects of climate change intensify, the number of days with comparably high or higher temperatures in Europe will rise, especially in urban heat islands such as Paris.

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TO FIND OUT MORE

For details on the Paris 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 Paris"
www.theicct.org/publications/xxxxxxxxx

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