



Department
for Transport

Vehicle Emissions Test Programme

October 2015 – April 2016





Background

- ▶ Revelations in September 2015 that VW Group used software to distort emissions tests
- ▶ UK Government took swift action to protect consumer interests and the environment:
 - ▶ Contacted all manufacturers with UK-approved vehicles
 - ▶ Launched Vehicle Emissions Testing Programme
 - ▶ Lobbied successfully for the early introduction of Real Driving Emissions (RDE) testing



Objectives

Secretary of State informed Parliament of UK's Vehicle Emissions Test Programme on 10 November 2015, to:

- ▶ Establish whether the use of strategies to defeat emissions tests goes wider than the VW Group
- ▶ Gather much-needed evidence to restore public confidence and improve our understanding of the real world emissions performance of vehicles





How vehicles selected

- ▶ Produced list of 100 top selling diesels (based on study of buying preferences 2010-2015)
- ▶ Aimed to capture 75% of sales of top 70 vehicles, representing >50% of all diesels on UK roads
- ▶ All major manufacturers
- ▶ Engine sharing effectively increases the size of our sample
- ▶ Even split of Euro 5 and Euro 6
- ▶ Snapshot in time of a single example of each model's NOx performance



Methodology – set up

Vehicles

- ▶ Sourced from car hire fleets
- ▶ Unmodified and no defects
- ▶ <30,000 miles
- ▶ Typical winter grade diesel

Tests

- ▶ Lab: Full lab-grade analysers (plus PEMS to confirm calibration)
- ▶ Track and road: Portable Emissions Measurement Systems (PEMS)



Methodology – tests

Laboratory

1. Official NEDC test with cold engine at 20-30°C ambient
2. Official NEDC test with fully warmed up engine (repeated)
3. Reversed NEDC test with fully warmed up engine

Track

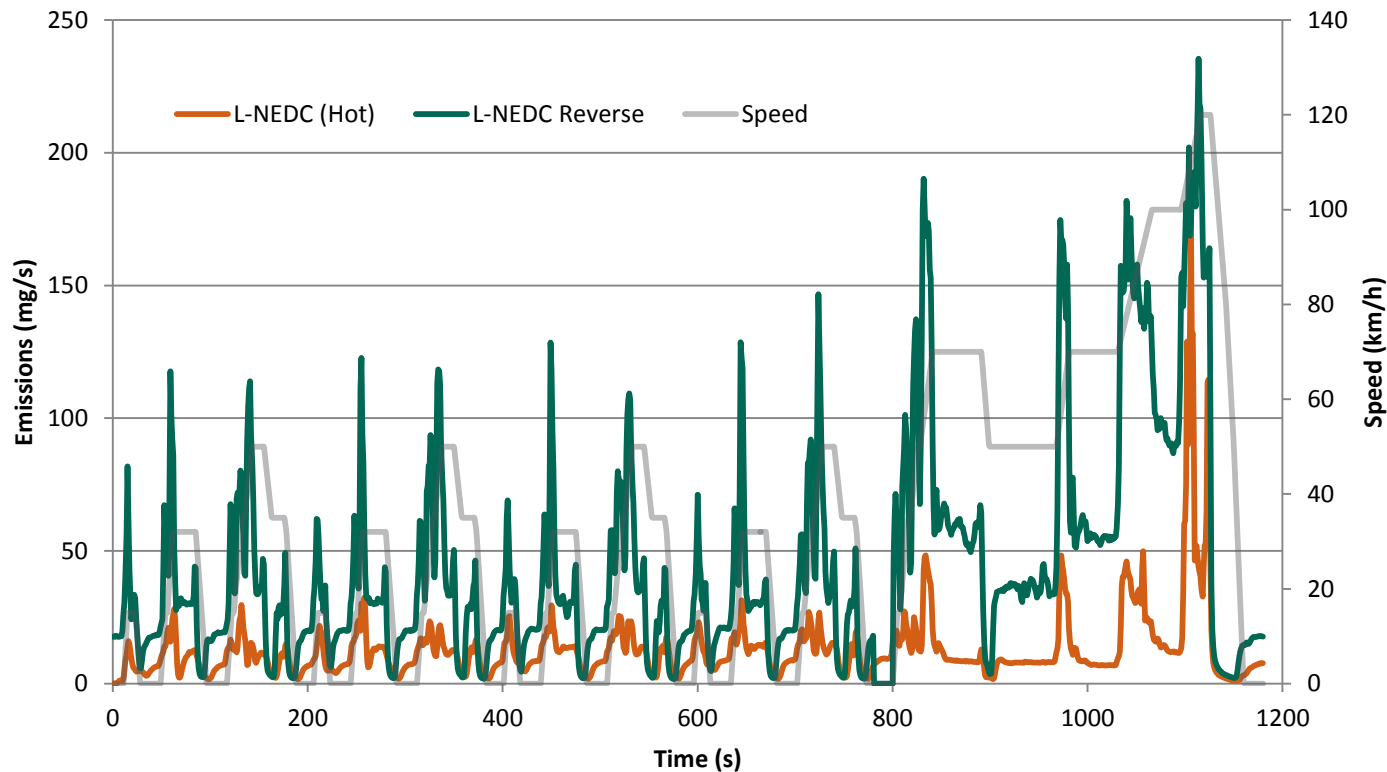
Replicate official NEDC test plus laboratory variations (as above) plus a further NEDC test with fully warmed up engine but driving speed increased by 10%

On road

Approximation of RDE test (pending confirmation of final requirements) – 1.5 hours on public roads including urban, rural and motorway

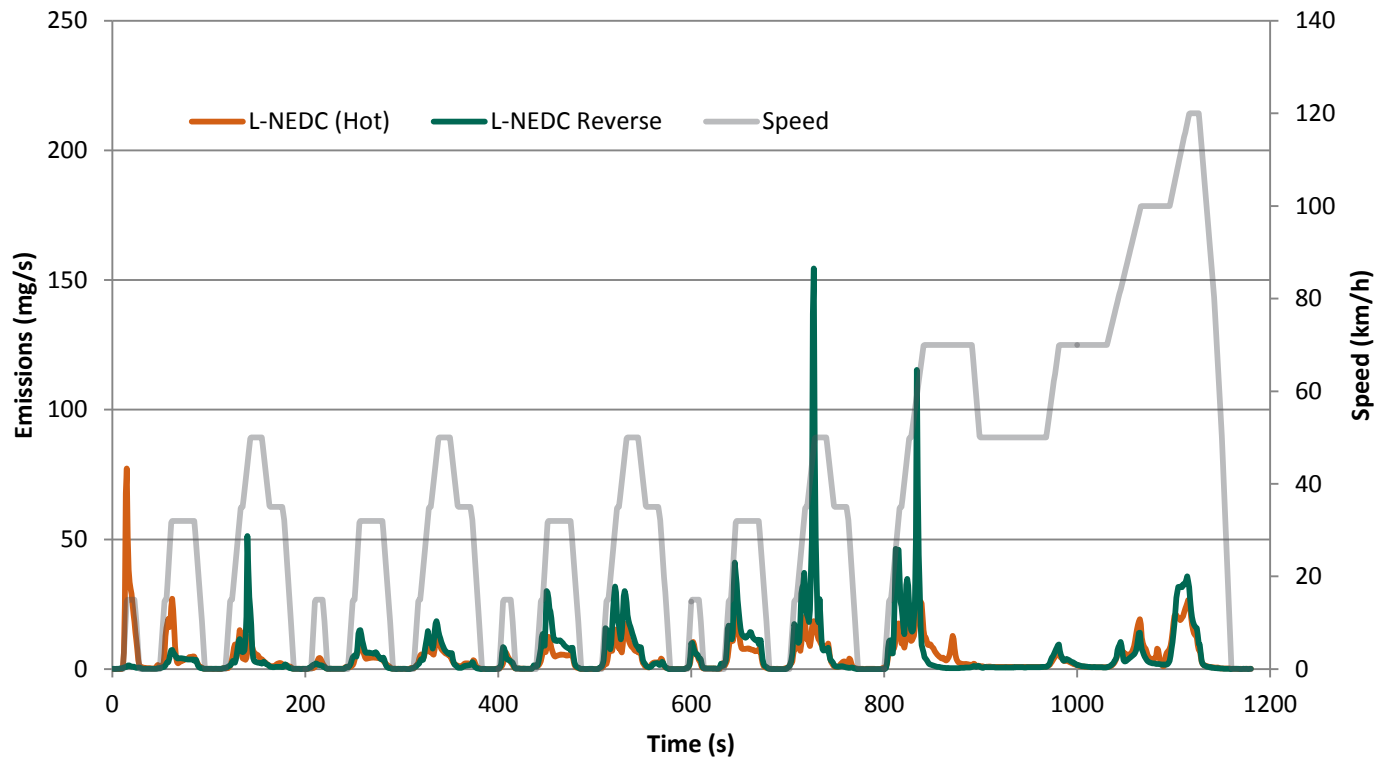


Comparison of NO_x emissions on NEDC tests showing impact of VW Group cycle recognition software





Comparison of NO_x emissions on NEDC tests showing vehicle which does not appear to vary emissions behaviour

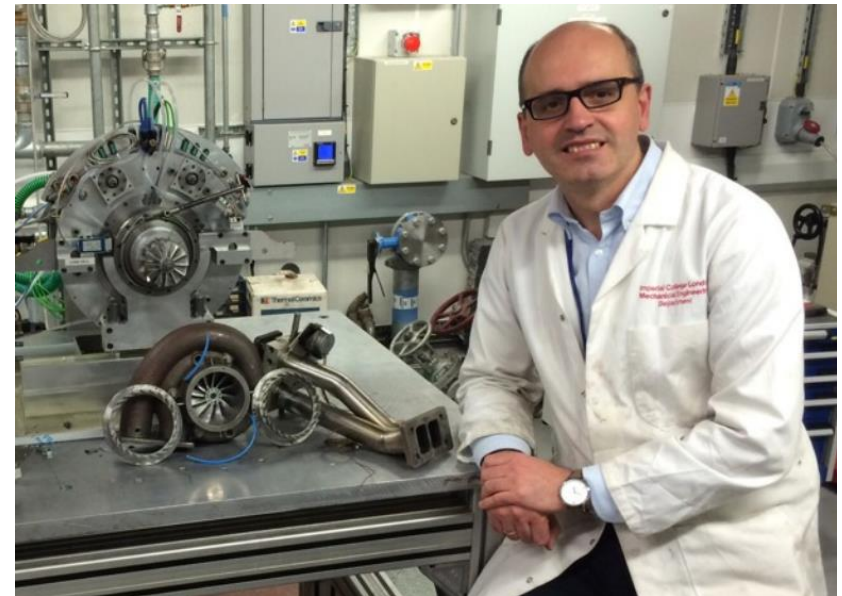




Independent assessment

Professor Ricardo Martinez-Botas, Head of Thermofluids Division,
Mechanical Engineering Department, Imperial College London

- ▶ Independent oversight of programme to confirm integrity of processes
- ▶ Involved in vehicle selection
- ▶ Full access to tests across all laboratories and test tracks
- ▶ Witnessed tests and processing of results
- ▶ Tests undertaken at independent laboratories



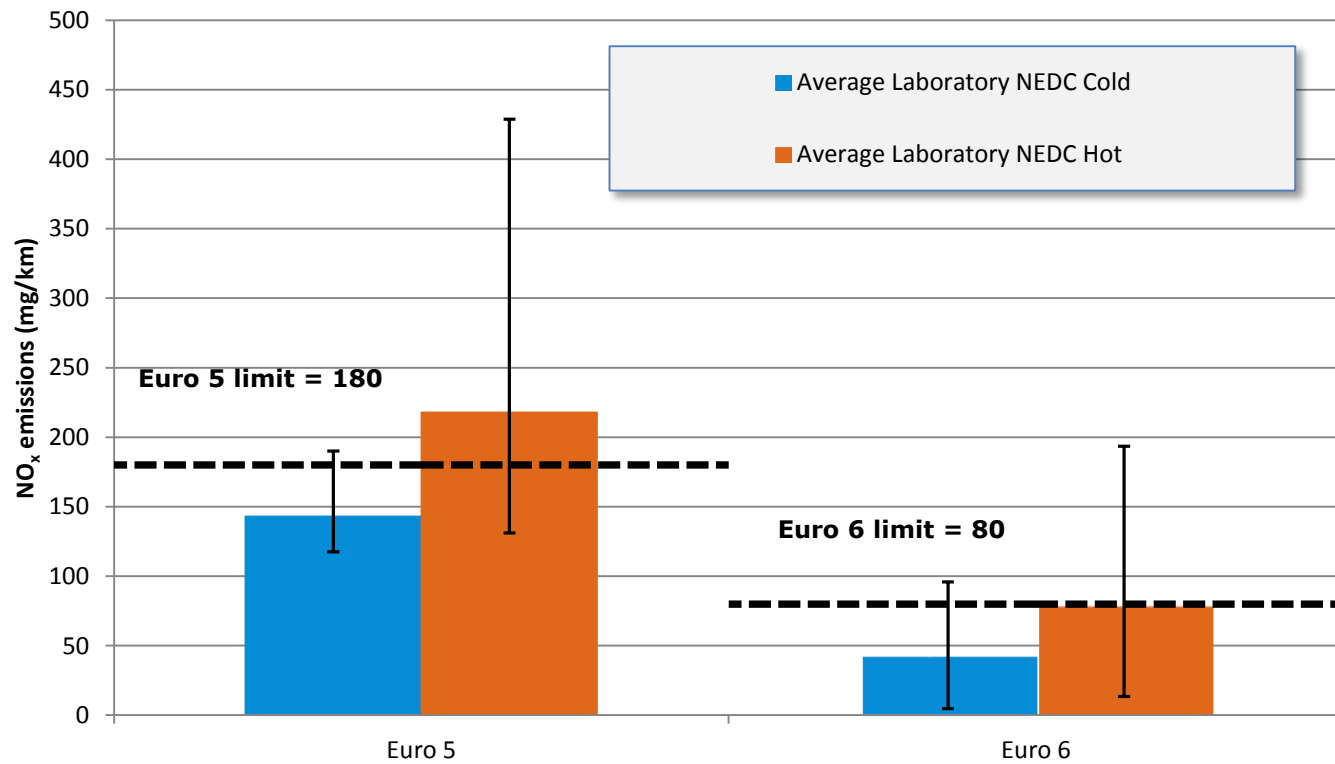


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Results

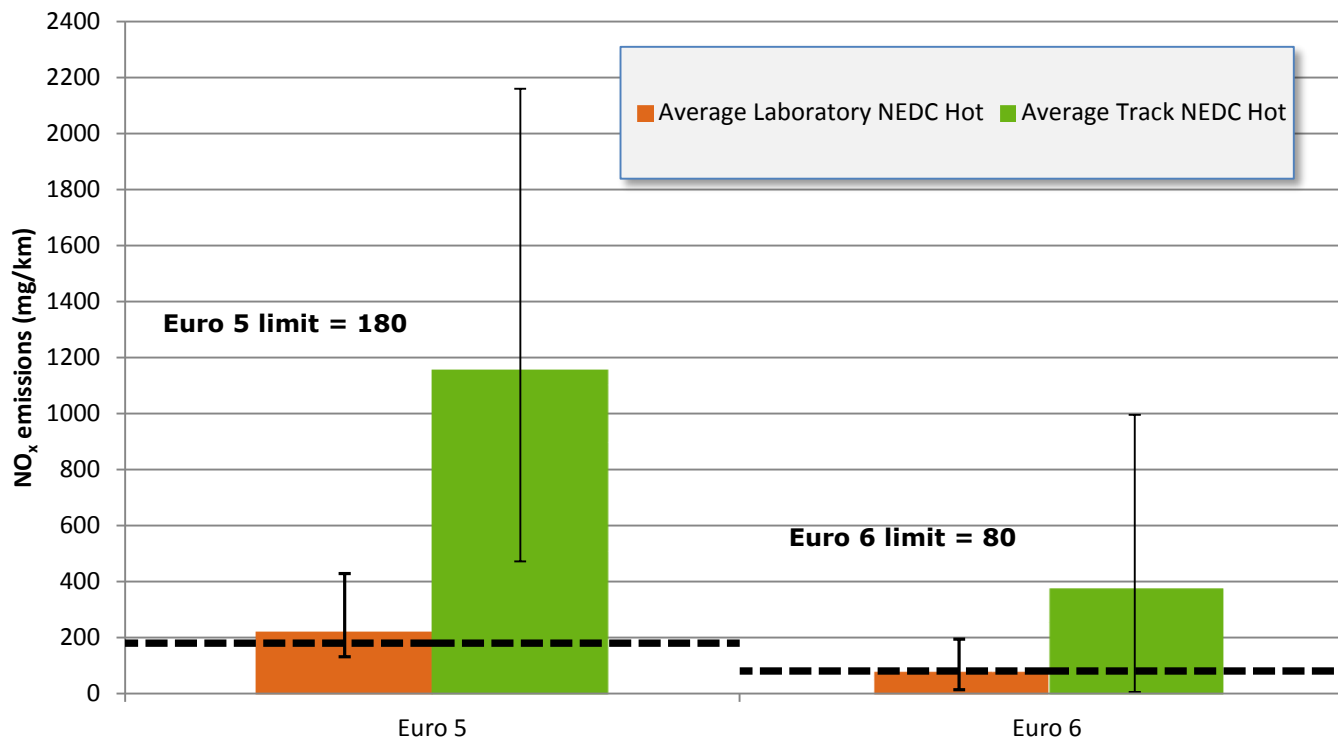


'Cold' versus 'hot' NEDC NO_x emissions - lab results





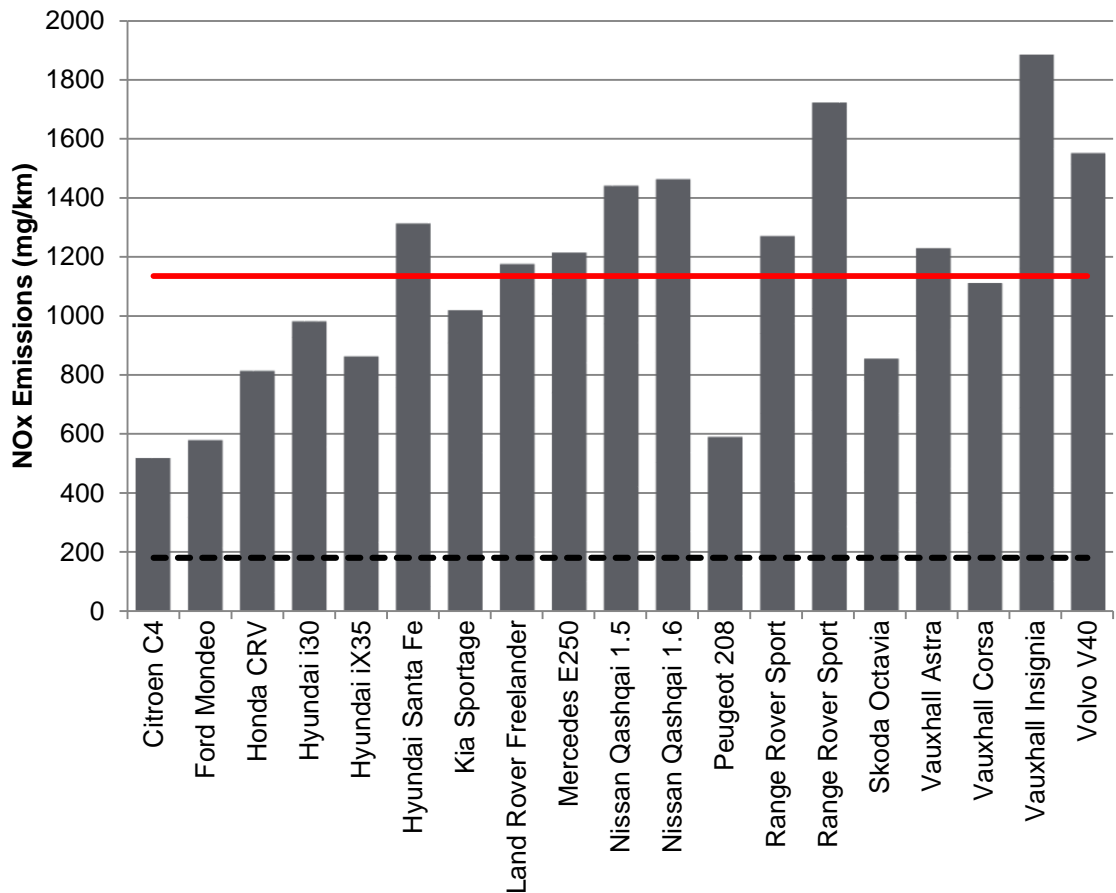
Comparison of 'hot' NEDC in lab and on the track





Real driving NOx emissions - Euro 5 vehicles

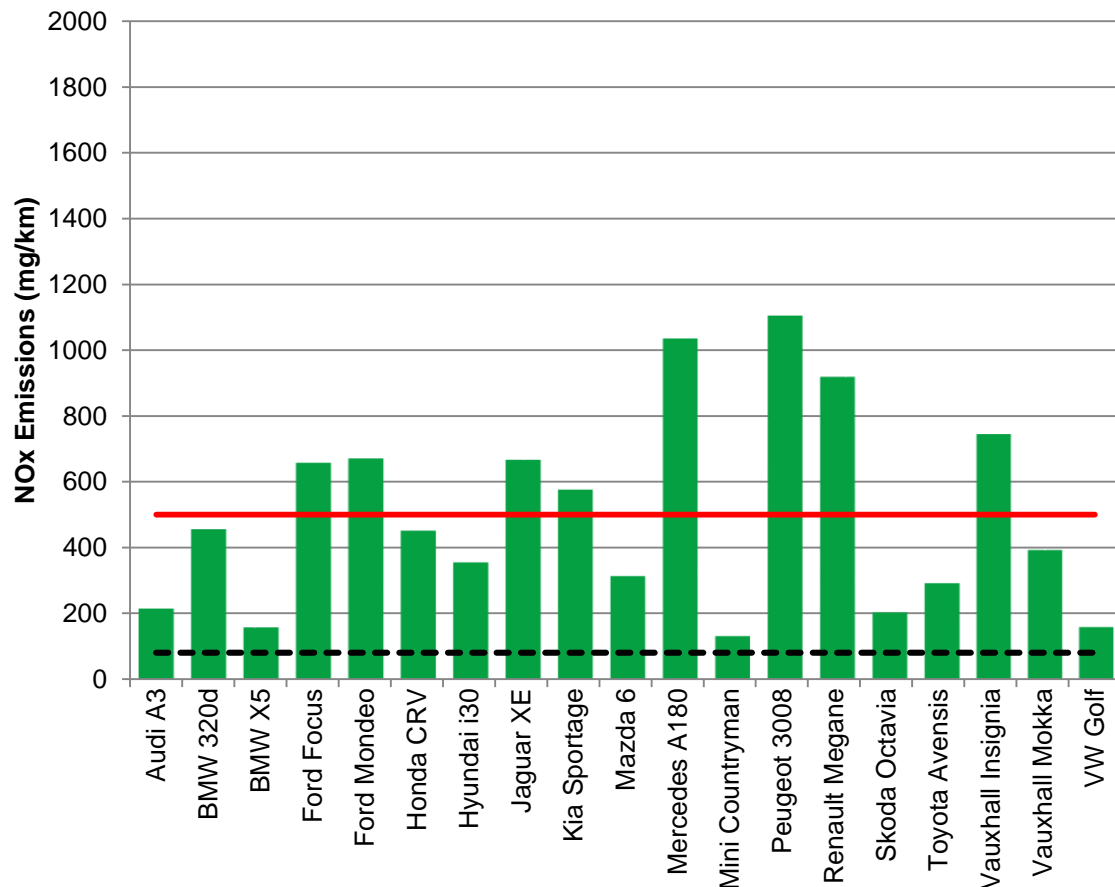
(note: direct comparisons should not be made between vehicles as test conditions varied)





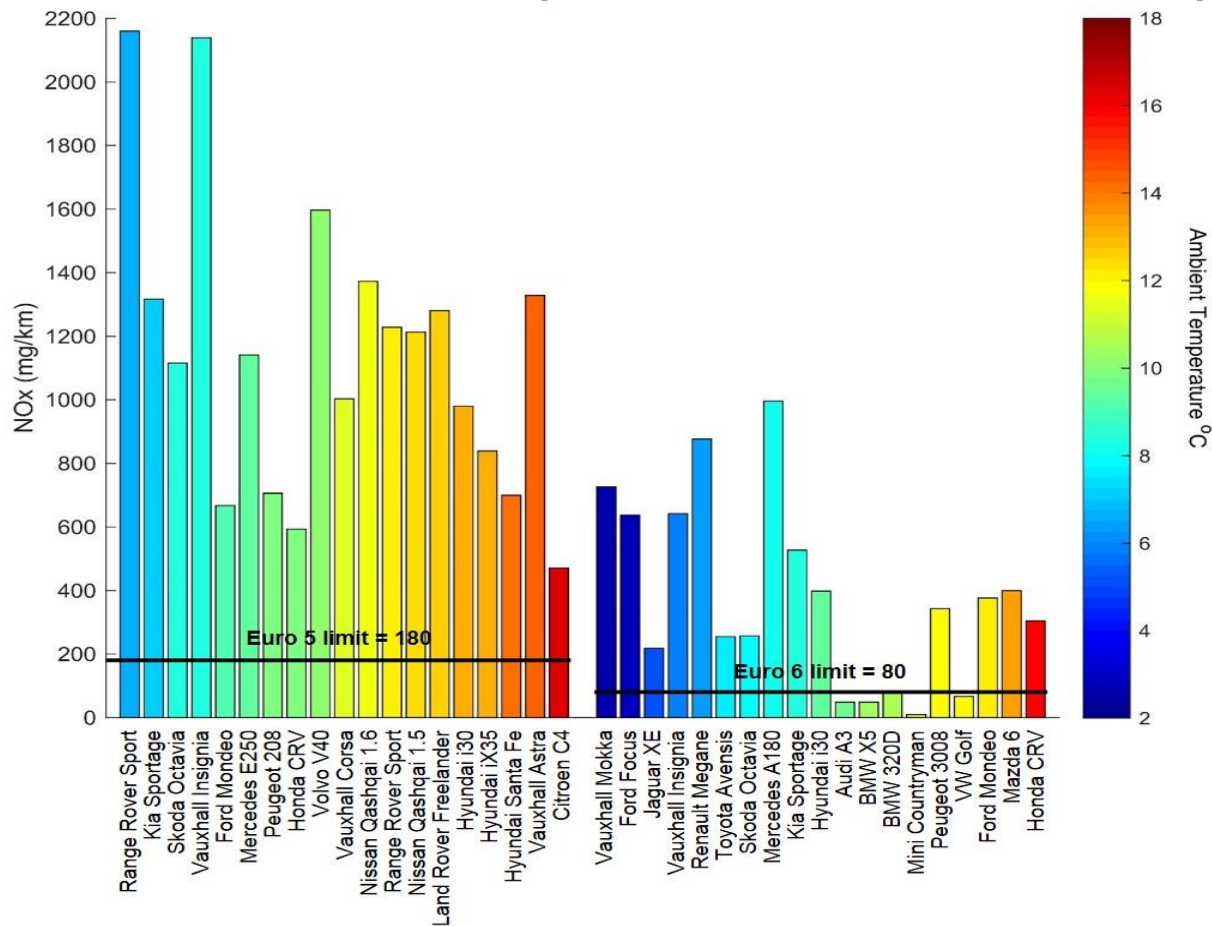
Real driving NOx emissions - Euro 6 vehicles

(note: direct comparisons should not be made between vehicles as test conditions varied)





Track test results plotted in ambient temperature order





Observations

- ▶ Observable cycle recognition strategy on Skoda
- ▶ No evidence other manufacturers have acted in the same way as VW Group
- ▶ Large difference between laboratory and track/road results
- ▶ Emission controls are often significantly temperature dependent – but manufacturers say this change with ambient temperature is necessary “*to protect the engine from damage*”
- ▶ Incoming WLTP and RDE testing will overcome these issues and remove the ability to manipulate tests
- ▶ Third parties will be able to conduct their own RDE tests



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Thank you