

Trends in emissions

STEP Summer Seminar – 7 June 2017



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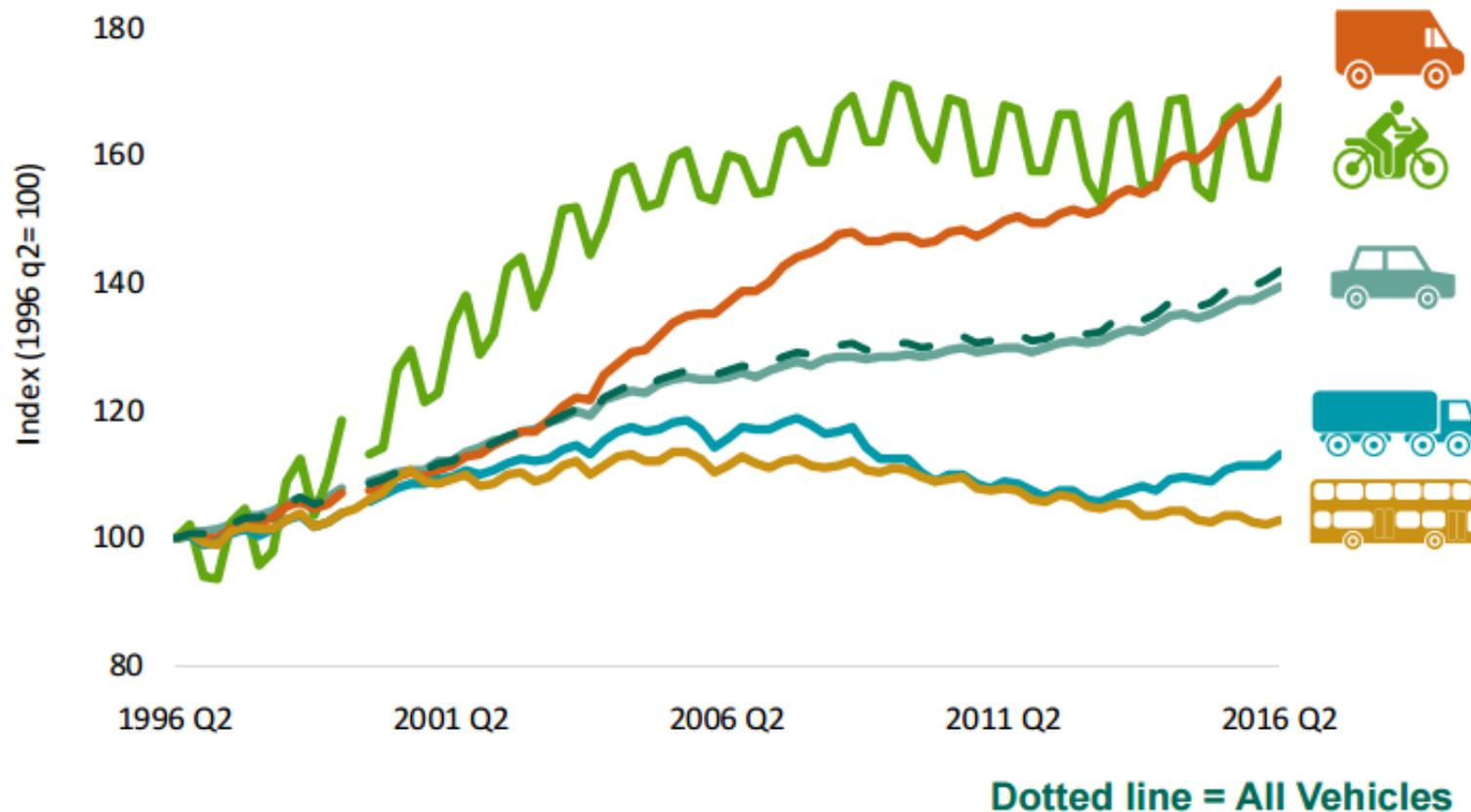
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Public Private Partnership

"To accelerate a sustainable shift to low carbon vehicles and fuels in the UK and thereby stimulate opportunities for UK businesses".

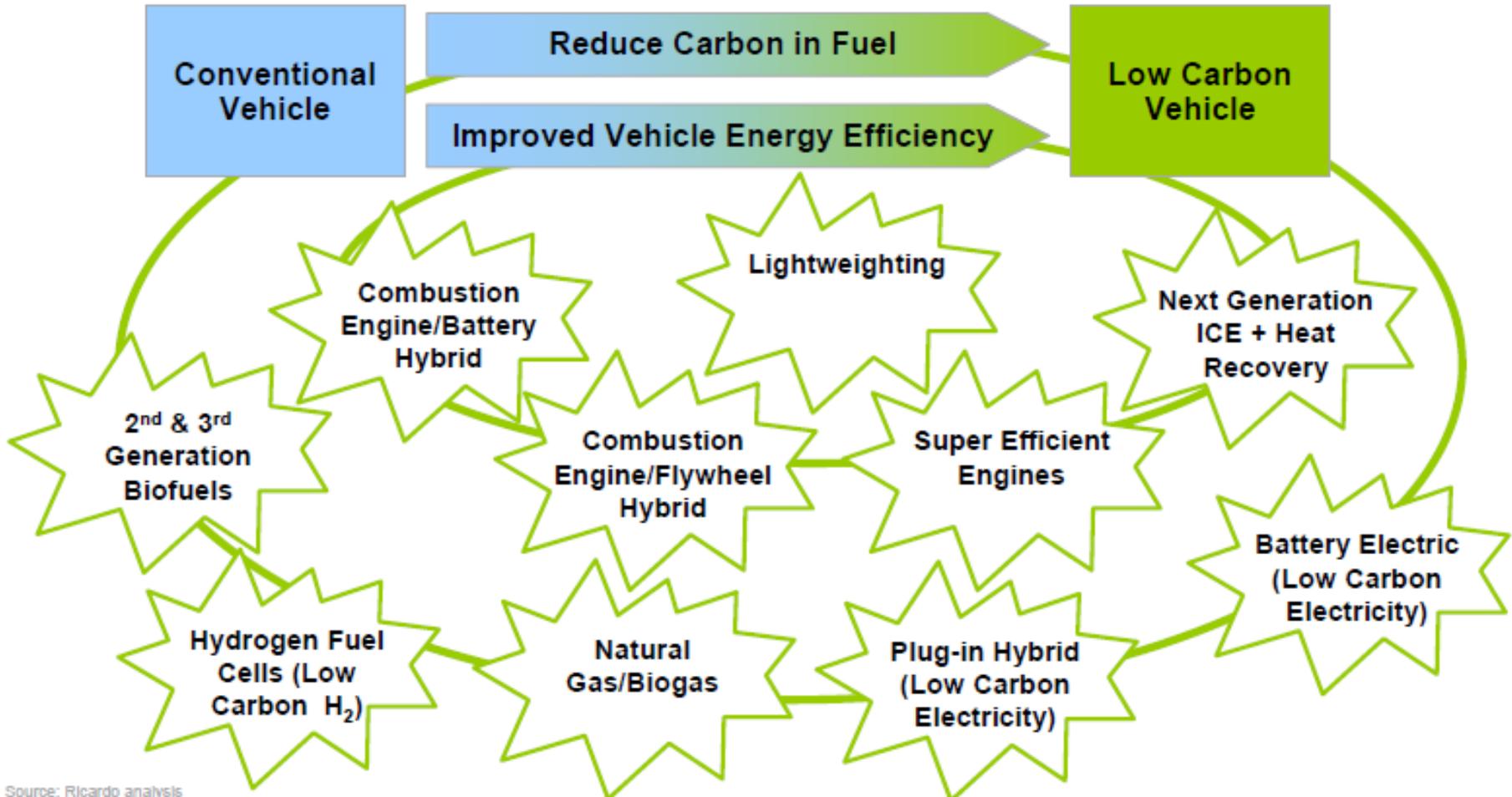
Evolving regulations to tackle impact of growth in vehicles. Commercial goods vehicles - next big focus?

Figure 5: Licensed vehicles by type, GB: Q2 1996 - Q2 2016



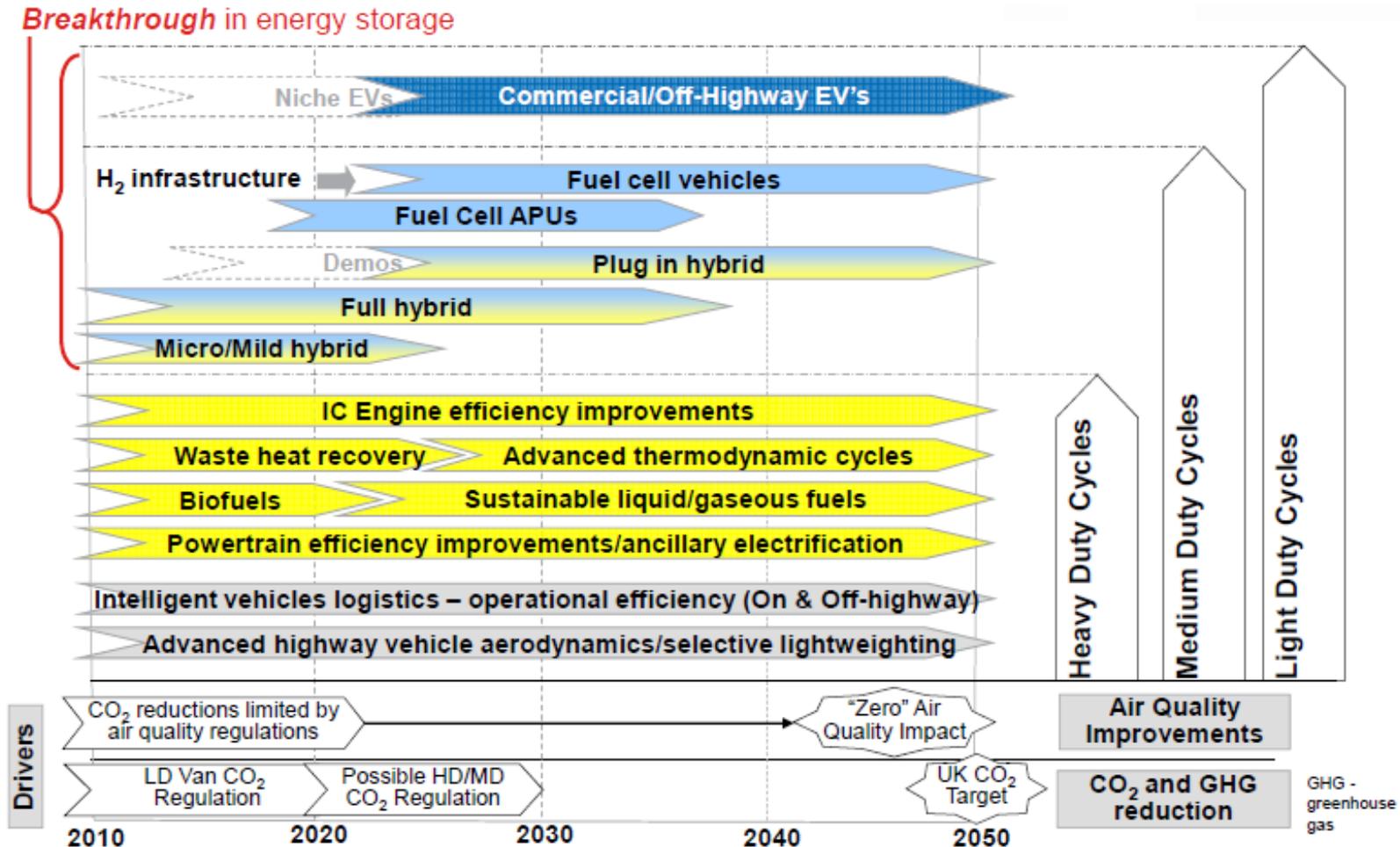
There are many technical options to reducing vehicle CO₂ and improving air quality. All have challenges and are suitable to different applications. We are likely to need all of them.

- Low carbon vehicles achieved through improved efficiency and/or low carbon fuels:

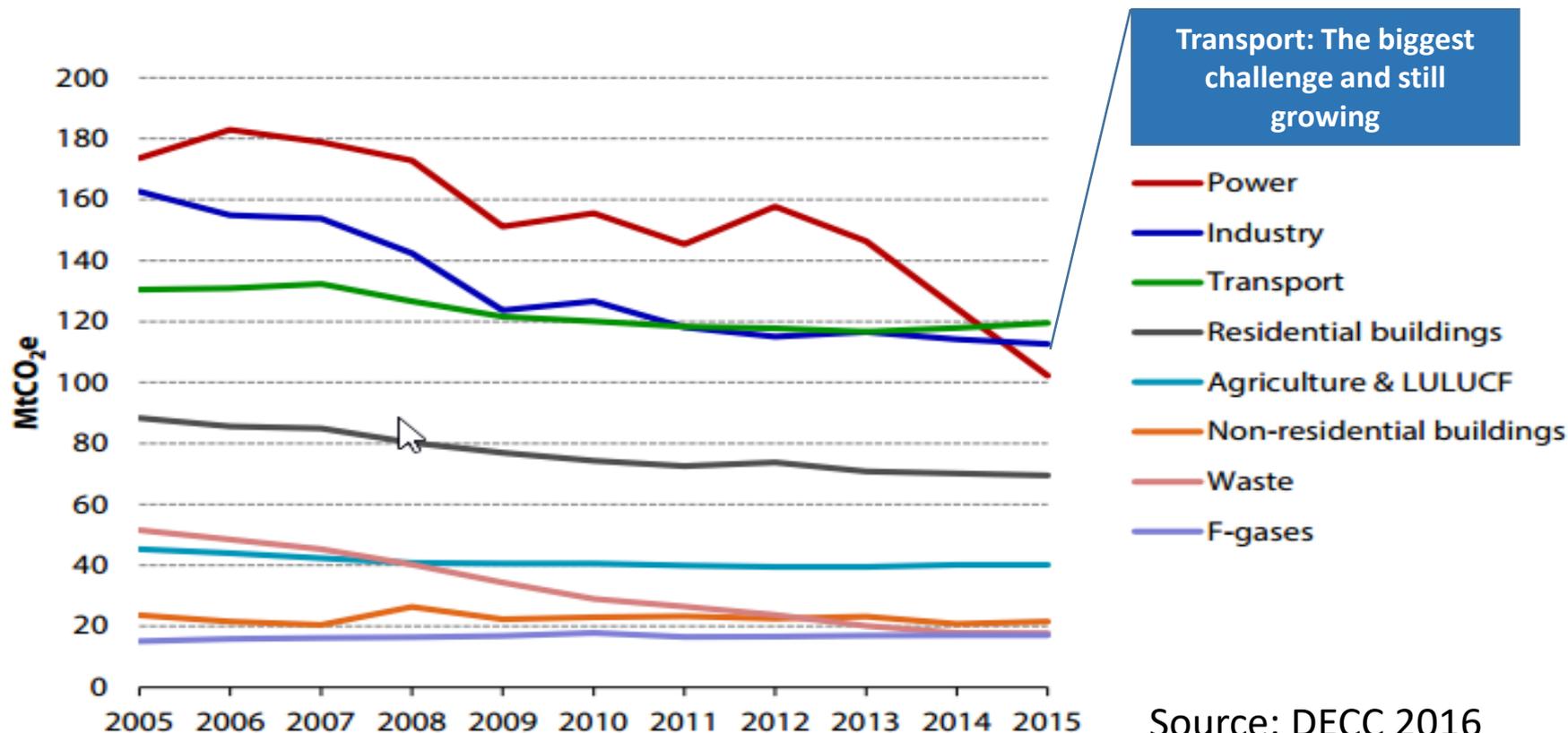


Source: Ricardo analysis

A number of technology roadmaps have been developed for CVs. The Automotive Council UK's provides the UK consensus view driving investment.

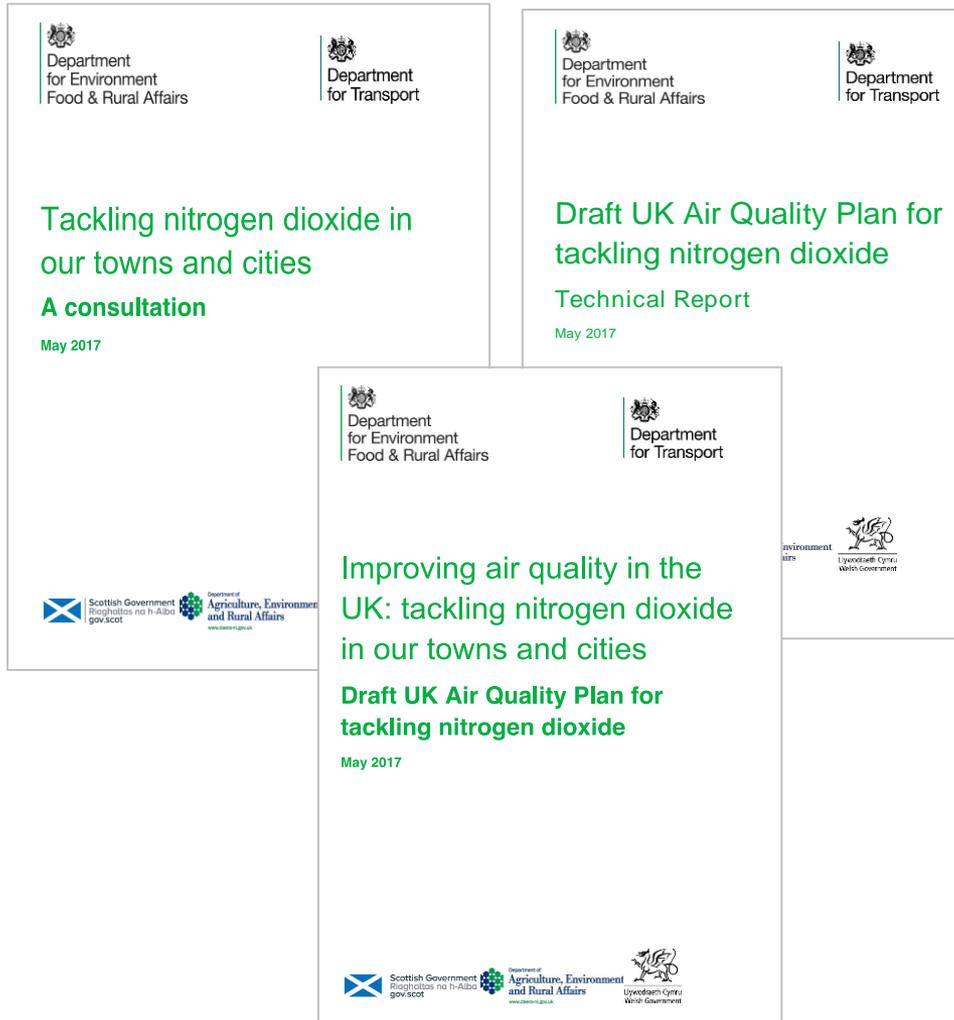


Decarbonising UK Transport - Is it working?



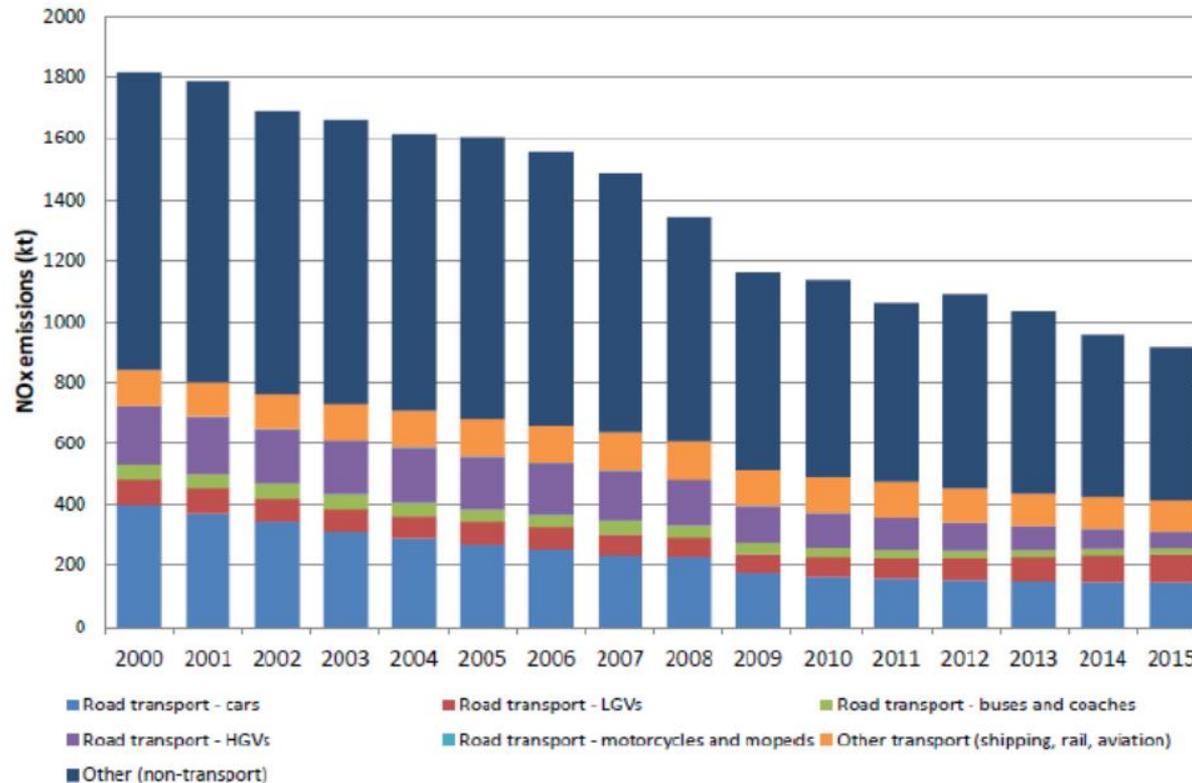
- EU Fleet Average CO2 targets for Cars and LCV.
- Commercial pressure for efficient vehicles from fleets.
- CCC in June 2016 identified a **gap** between transport policies and the trajectory to deliver the required carbon reductions from transport.

Need to improve air quality



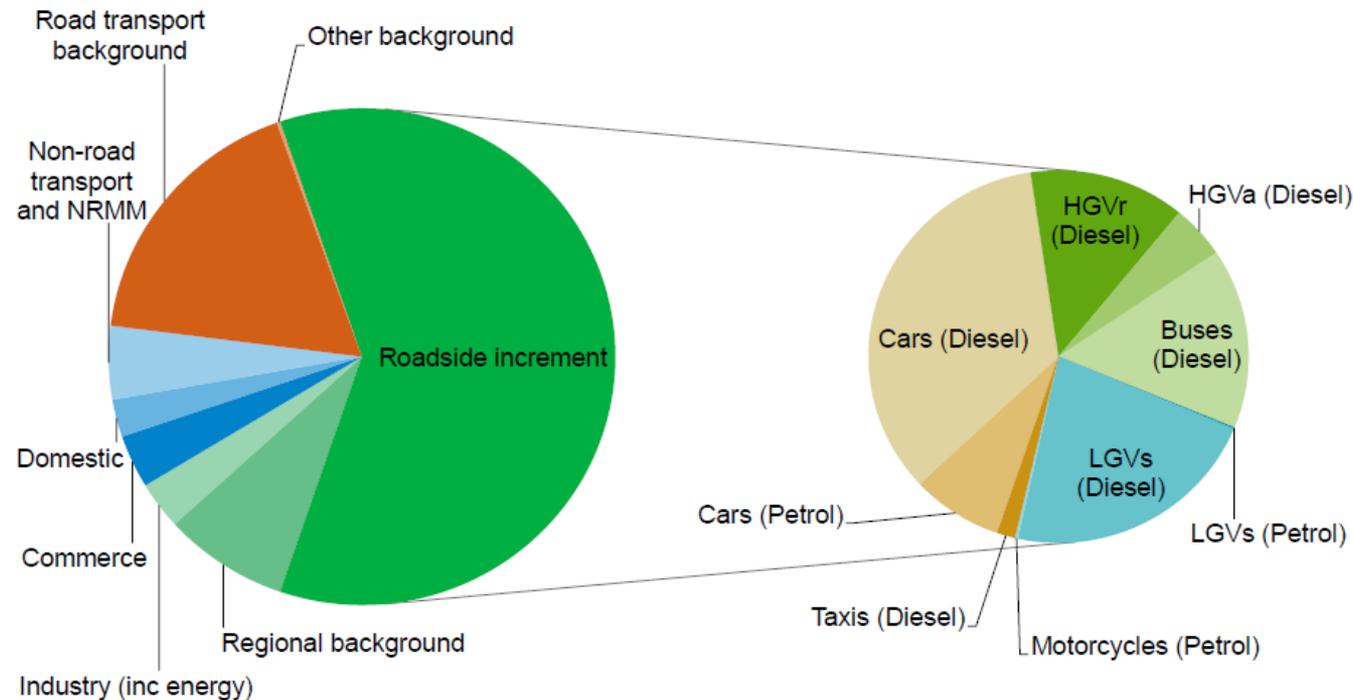
- Follows on from the Draft CAZ Framework Consultation (2016) and the Air Quality Plan for Nitrogen Dioxide in UK (2015)
- Heavily focussing on reducing NOx emissions from road transport – in particular diesel vehicles
- Compliance with EU NO2 limit value required by 2020
- Six week consultation period – **deadline 15th June**

UK emissions of NOx fell by almost 70% between 1970 and 2015



- 37 zones exceeded the statutory annual mean limit value for nitrogen dioxide (NO₂).
- The most immediate air quality challenge is tackling the problem of NO₂ concentrations around roads.
- The only statutory air quality obligation that the UK is currently failing to meet.

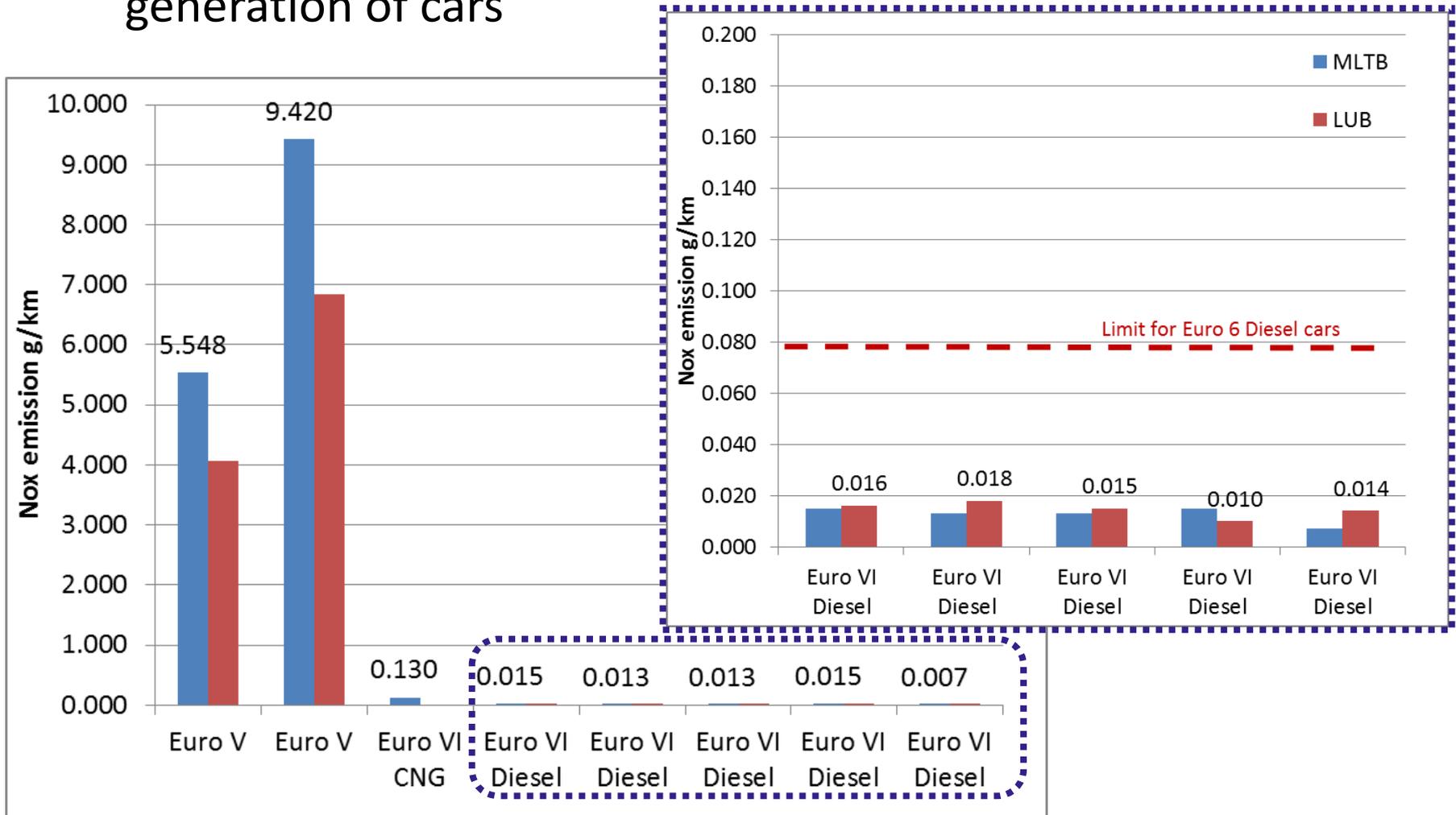
Diesel vehicles main source of road side concentrations



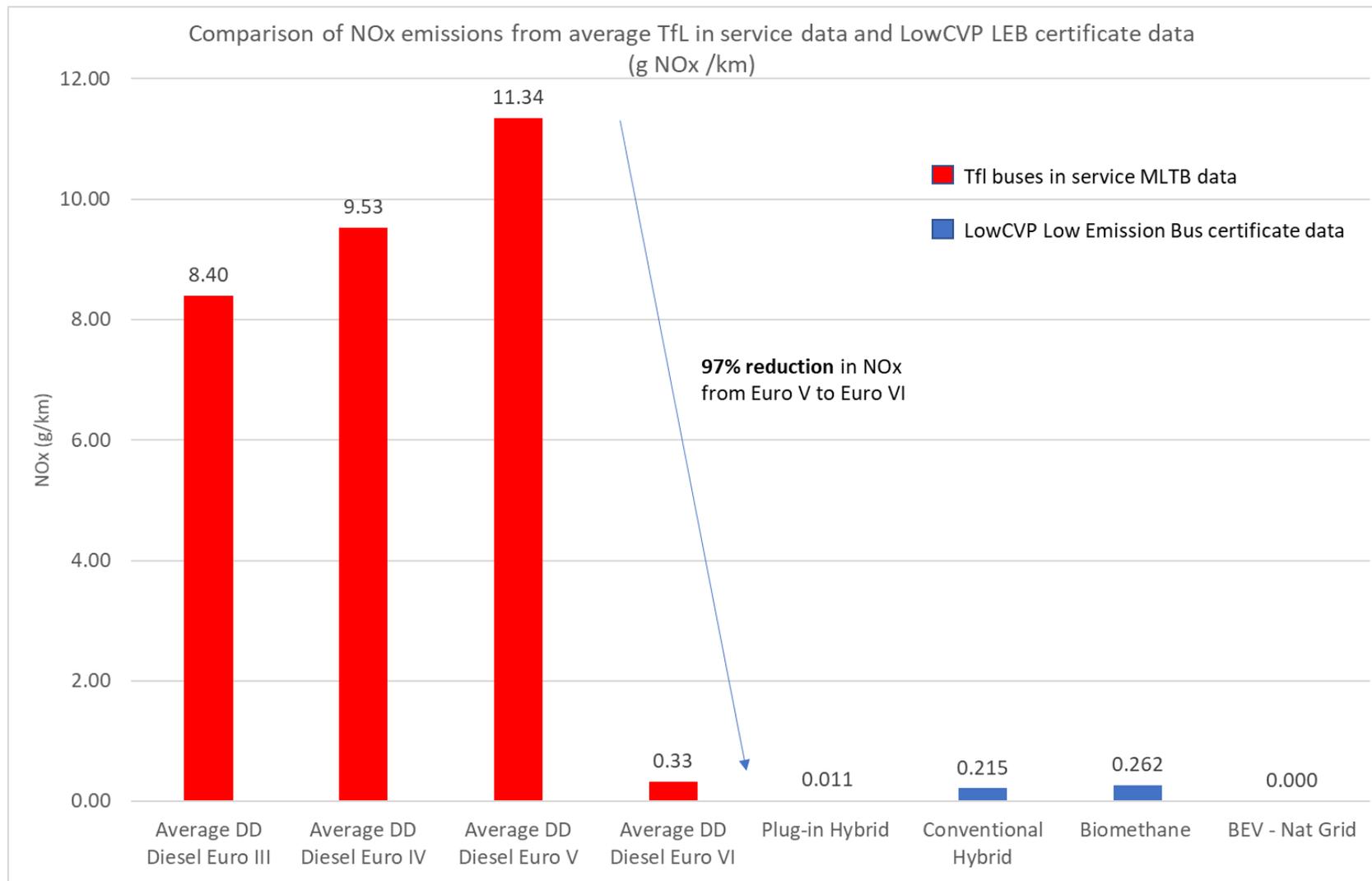
- Road transport is responsible for some 80% of NO_x concentrations at roadside, with diesel vehicles the largest source.
- This is due to both the significant growth in vehicle numbers, particularly diesel vehicles, and emission standards not delivering the expected improvements under real world driving conditions.

Myth – “All diesels are dirty”

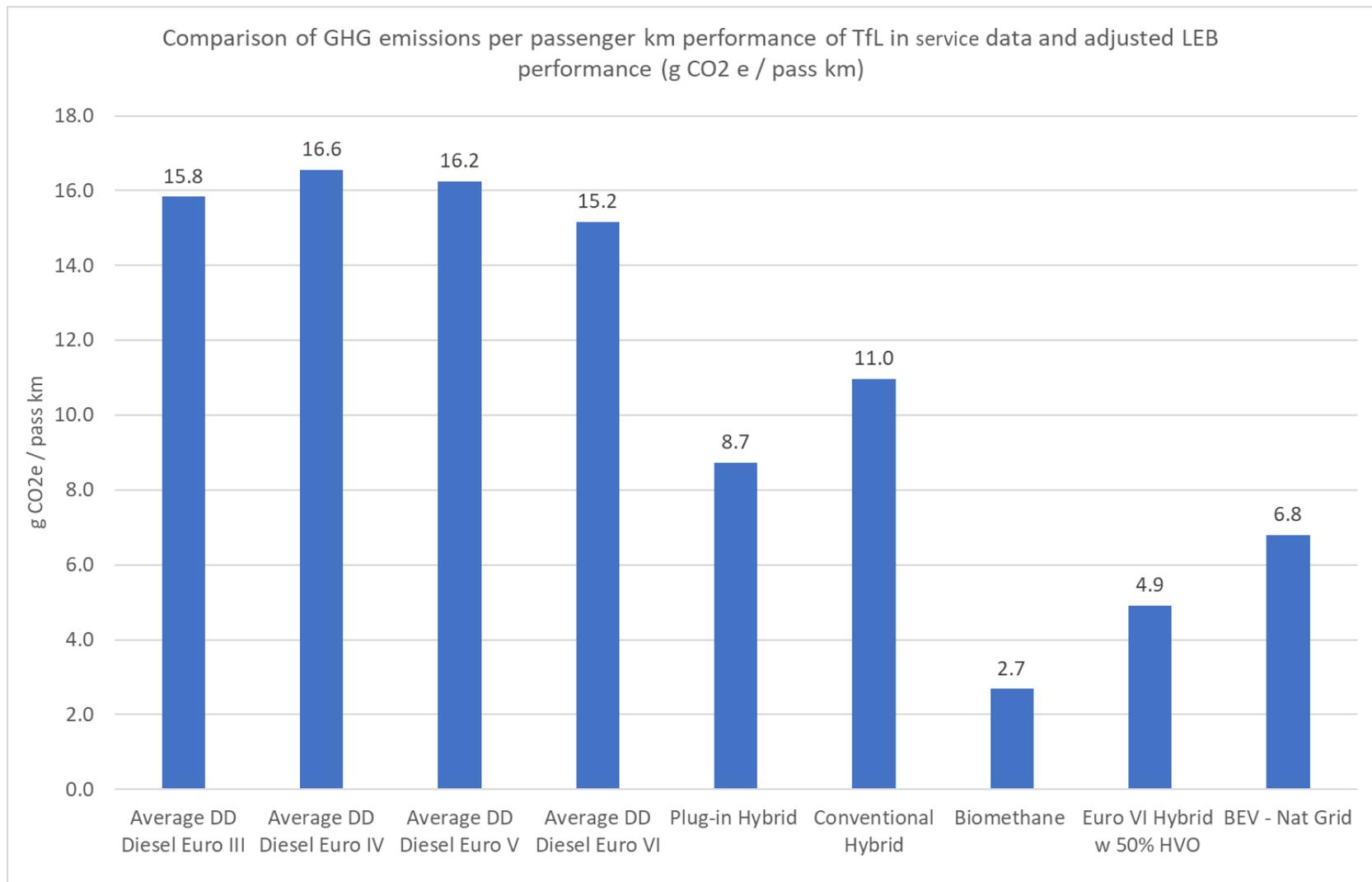
- Euro VI HDV engines (in buses and trucks) deliver NOx levels in representative testing far below those required for the next generation of cars



Number of technologies capable of reducing NOx – proven in bus market



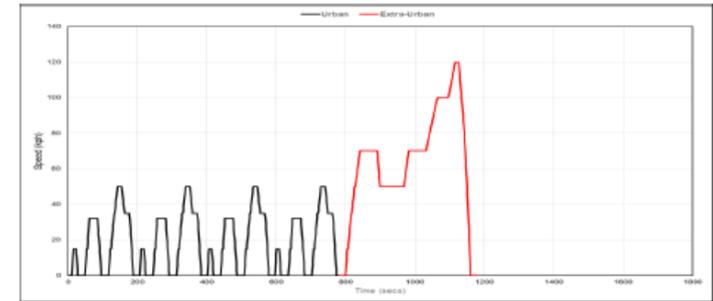
Number of technologies capable of reducing GHG also – proven in bus market



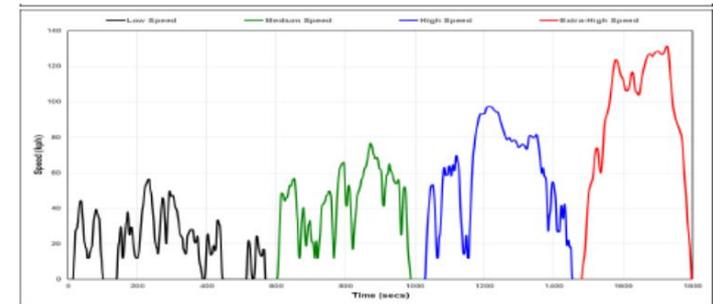
Cars and Vans moving to new emission testing regime – real world based

- The New European Drive cycle (NEDC) for light duty vehicles has been used to measure fuel consumption and emissions since 1997.
- The NEDC will be replaced by the World Harmonised Test Cycle (WLTC) and associated vehicle emissions test procedure (WLTP).
- WLTP will be mandatory for new type approvals for passenger cars from 1 September 2017 and for all light duty vehicles from 1 September 2018.
- It is intended to be more demanding and representative of real world driving.
- NEDC approved cars will no longer be built or sold after September 2019.

NEDC Test Cycle



WLTP Test Cycle



Real World Impacts

- Real Driving Emissions (RDE) is an additional type approval requirement being introduced from September 2017 to ensure real world air quality performance.
- Tested using Portable Emissions Measurement (PEM) equipment and not in a controlled laboratory.
- RDE takes into account real world influences such as; road profile, environmental conditions, traffic as well as the driver behaviour.
- However, one-to-one comparison of RDE test results will not be possible; instead it is necessary to evaluate RDE test results using statistical methods.



| Component | Permissible tolerance |
|-------------------------|---|
| Distance [km](1) | ± 250 m of the laboratory reference |
| CO [mg/km] | ± 150 mg/km or 15% of the laboratory reference, whichever is larger |
| CO ₂ [g/km] | ± 10 g/km or 10% of the laboratory reference, whichever is larger |
| NO _x [mg/km] | ± 15 mg/km or 15% of the laboratory reference, whichever is larger |

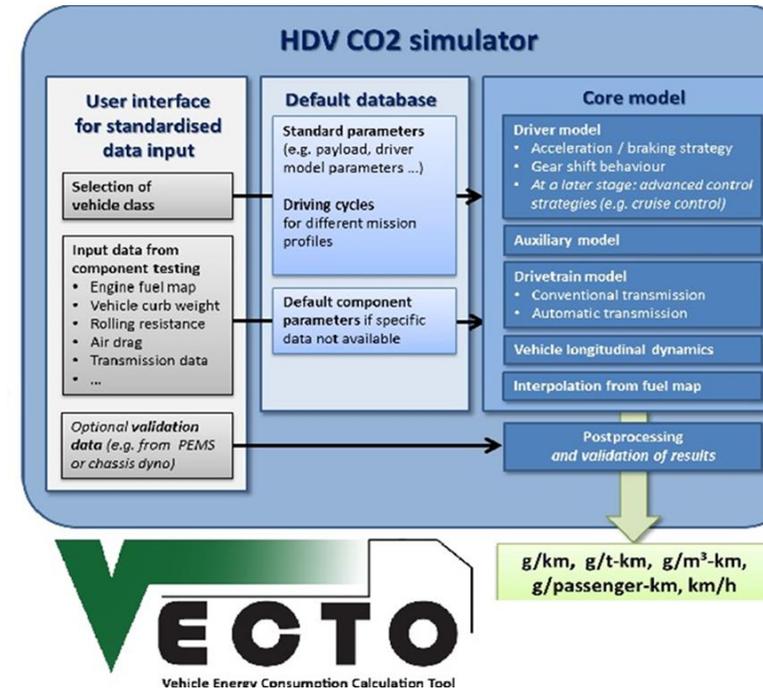
The EC has developed a computer simulation tool, VECTO, to measure CO2 emissions from new HDVs.

The EC will use VECTO to propose legislation which would require CO2 emissions from new HDVs to be certified, reported and monitored.

Vecto has three purposes

1. OEM – robust and objective tool to assess vehicles
2. Legislator – to assess emissions and develop measures to improve CO2 from HDV
3. Member states – to implement additional measures for more energy eff vehicles

Likely to be simulation approach (VECTO) for certification, but conformity and post validation see vehicle testing benefits



g/km, g/t-km, g/m³-km,
g/passenger-km, km/h

VECTO
Vehicle Energy Consumption Calculation Tool

LowCVP Initiative – Accreditation scheme for low carbon technologies

Carbon saving technologies face a major hurdle to penetrate the market.

- Operators are highly sceptical of technology manufacturer performance claims
- There is no widely accepted process to test technology and validate claims
- Vehicles are used for a range of operations (driving cycles) and testing for every situation is prohibitive.



Office for Low
Emission Vehicles



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Certification Scheme for Aftermarket Technologies
Certificate No: CSAT-2014-C123

This is to certify that the following product(s) have been assessed under the Low Carbon Vehicle Partnership's Certification Scheme for Aftermarket Technologies;

| | |
|---|------------------------|
| Manufacturers Product designation: | Product Type: |
| <i>Super Duper Aero Doofer</i> | <i>Aerodynamic Aid</i> |
| Manufactured By: | |
| Super Duper Doofer Inc. | |

The product has been tested in accordance with the following standard(s) and test methods / duty cycles:

- LowCVP CSAT Standard CSAT-2014-SD001

Test method / Duty cycle(s)

- LowCVP CSAT Test CSAT-2014-T001: Track-based UK truck duty cycles

The full results are reported in the following Product Assessment Report

- Product Assessment Report CSAT-2014-PR123

Fuel / CO₂ savings with product fitted relative to standard vehicle (% difference, +ve indicates fuel consumption increases with product fitted)

| Vehicle tested: Tractor-semitrailer 70% loading factor | Long Haul (mainly motorways) | Regional Delivery (mainly rural and trunk A-roads) | Urban Delivery (mainly town/city centre driving) |
|--|---------------------------------|---|---|
| Per vehicle-km | -7.8 % | -7.0 % | -1.8 % |
| Per tonne-km carried | -7.8 % | -7.0 % | -1.8 % |
| Per m ³ -km payload volume | -7.8 % | -7.0 % | -1.8 % |
| Colour coding: | Savings > 5 % | Savings > 1 % | Savings < 1% |

Authorised Signatory:

Mr A Eastlake, Scheme Director
Date: 29 August 2014











LowCVP Certification Scheme for Aftermarket Technologies

The scheme will help to build the market for low carbon HDVs

Evidence

- Operators get reliable, trustworthy and relevant information on likely effectiveness for their duty cycles
- Suppliers can demonstrate realistic savings, independently evaluated

Recognition

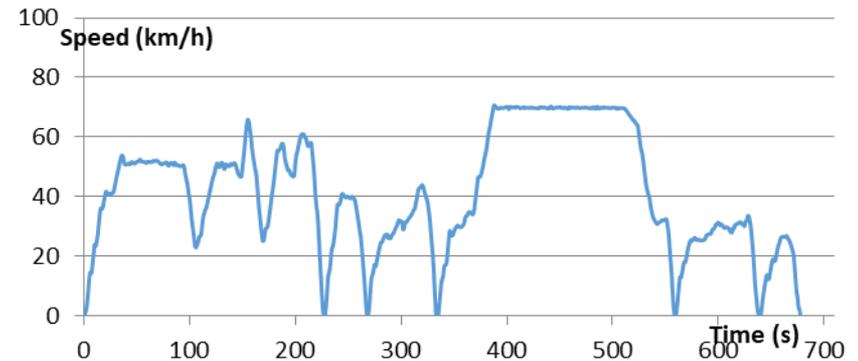
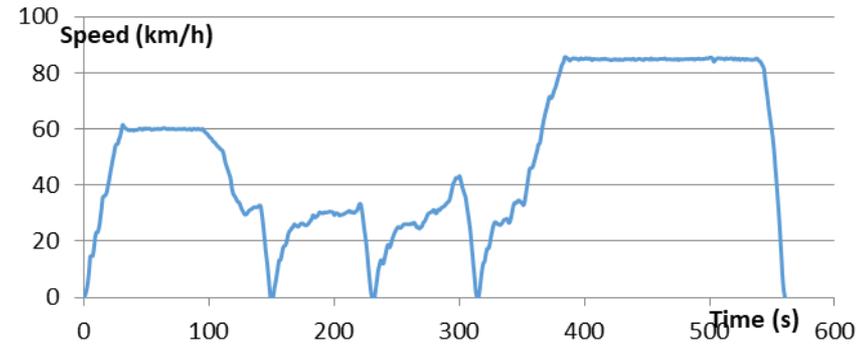
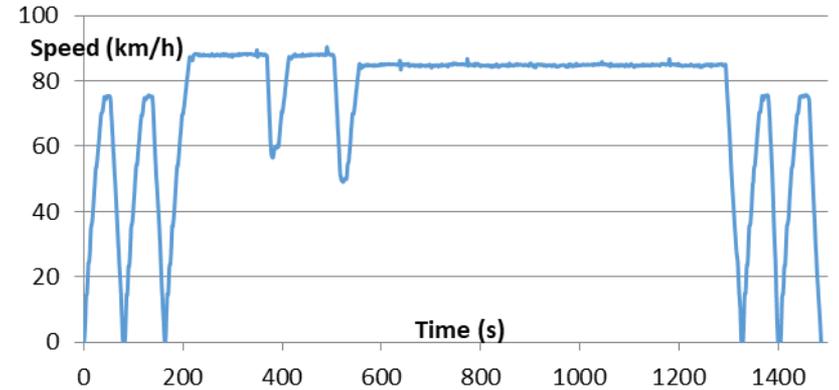
- Suppliers gain marketing opportunities, able to distinguish themselves from the snake oil salesmen
- Innovative and genuinely effective products encouraged
- Certificate issued for products that meet the mark

Incentives

- Win-win for suppliers and operators via increased sales and fuel savings
- Government can properly target support mechanisms towards genuinely effective products

What are the schemes objectives?

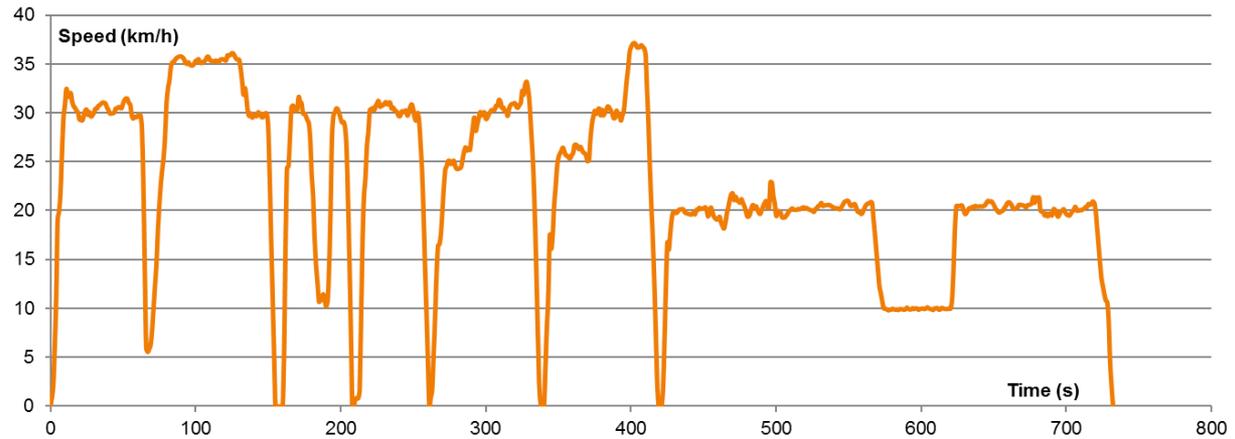
- Designed, managed and run for the benefit of UK operators.
- Will support UK Government policy and the achievement of CO₂, air quality and energy security targets
- Will add value to the development of a market for low carbon HGVs by addressing one of the key existing market failures – operators don't have a 'go-to' source of reliable information.



TfL LoCITY city centre challenge

- City Centre Operation – low speed, start/stop (22km/h)

- Van focussed
- Correlated
- 60% load
- Range extenders



Certification that supports emission zones.

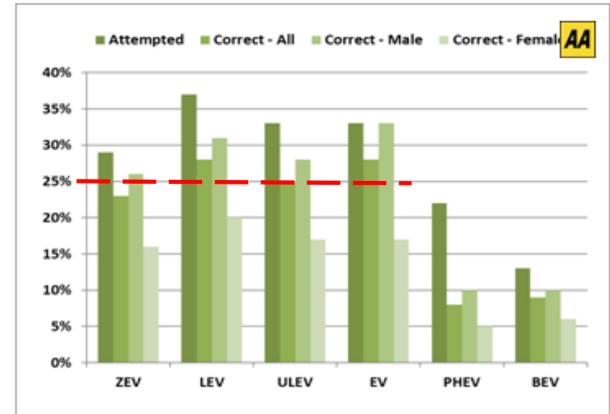
ULEV traffic signs project – three key lessons

There is significant confusion over the detailed definition and thresholds of ULEVs, but...

1

There is clear understanding of the hierarchy of common phrases and tech implications:

- *Hierarchy: Zero – Ultra Low – Low*
- *ULEVs: Not all capable of electric operation*



Strong preference shown for the 'Green roundel + ULEV' sign for ULEV access identification

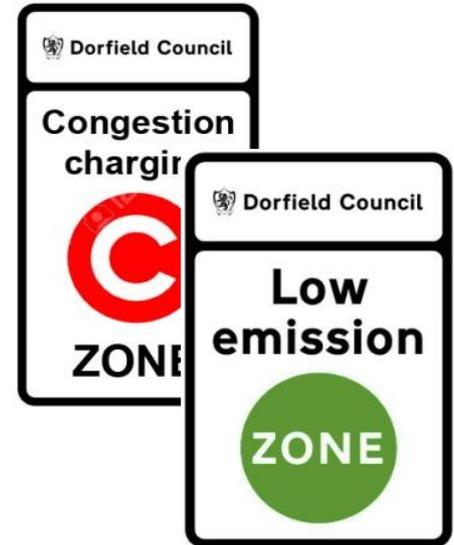
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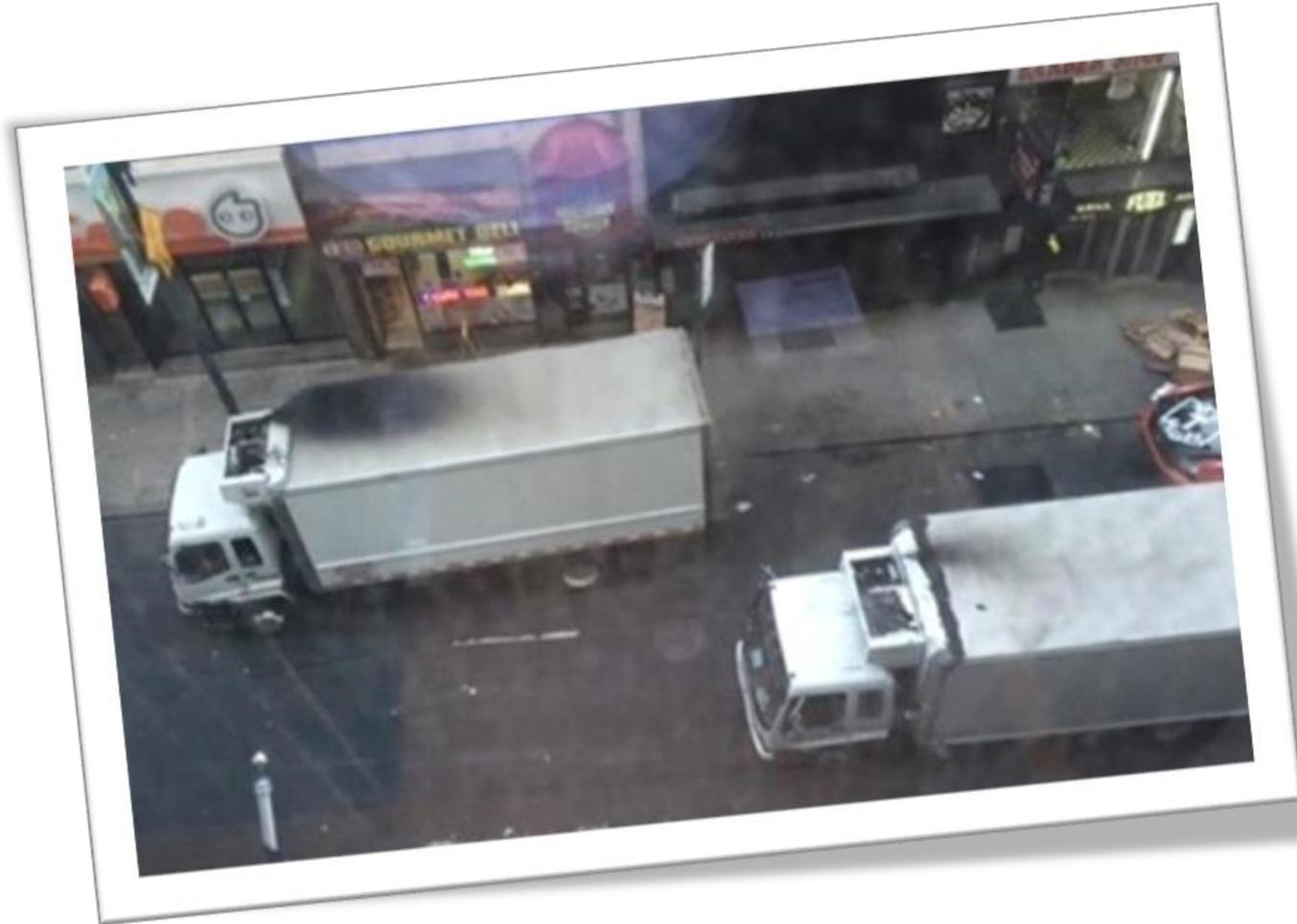
Two current zone signs are identified differently as 'charging area' or as 'access restriction'

3

For 'charging area' signs payment info greatly improves message so not seen as access restriction



Auxiliary temperature reduction units - an area which needs to be tackled



In summary

- Increasing numbers of CVs, particularly LCVs, increasing source of GHG and impact on air quality.
- Reductions in GHG and air quality emissions are being achieved, further work is need to achieve carbon targets and improve road side air quality.
- Range of technologies which are capable of reducing GHG and improving air quality.
- Accreditation schemes for vehicles and components can provide marketing opportunity for manufacturers, confidence for fleet operators and metric for Govt to set incentives against.
- Schemes need to align with low emission zone criteria to be effective and avoid confusion.
- Auxiliary equipment needs to be tackled.

Thank you!

Jonathan Murray
Low Carbon Vehicle Partnership
www.lowcvp.org.uk