Low Emission Vehicles and Retrofit Technologies

APSE Vehicle Maintenance and Transport Advisory Group Meeting

Wednesday 8th March 2017

Gloria Esposito – Head of Projects

LowCVP is a public-private partnership that exists to *accelerate the shift to low carbon vehicles and fuels whilst protecting air quality*

Creating Communities

Gathering multiple stakeholders to address common challenges/ objectives

Building Understanding

Researching market barriers, evidence to inform policy, other measures to increase market take up

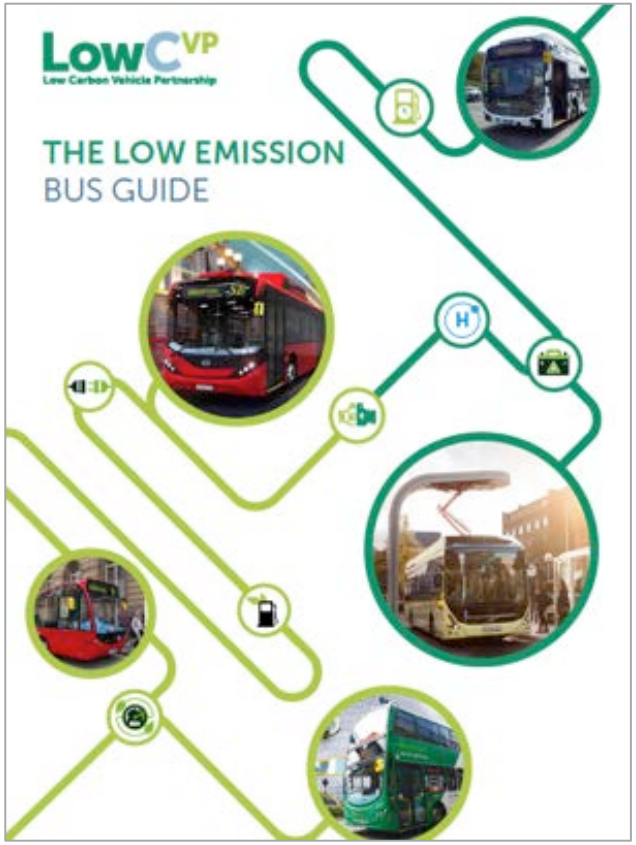
Influencing Policy

Defining measurement processes, designing incentive schemes, create policy guidance, input into consultations

Accelerate the Market

Promotion of common policies, fleet operator guidance, outreach to delivery partners

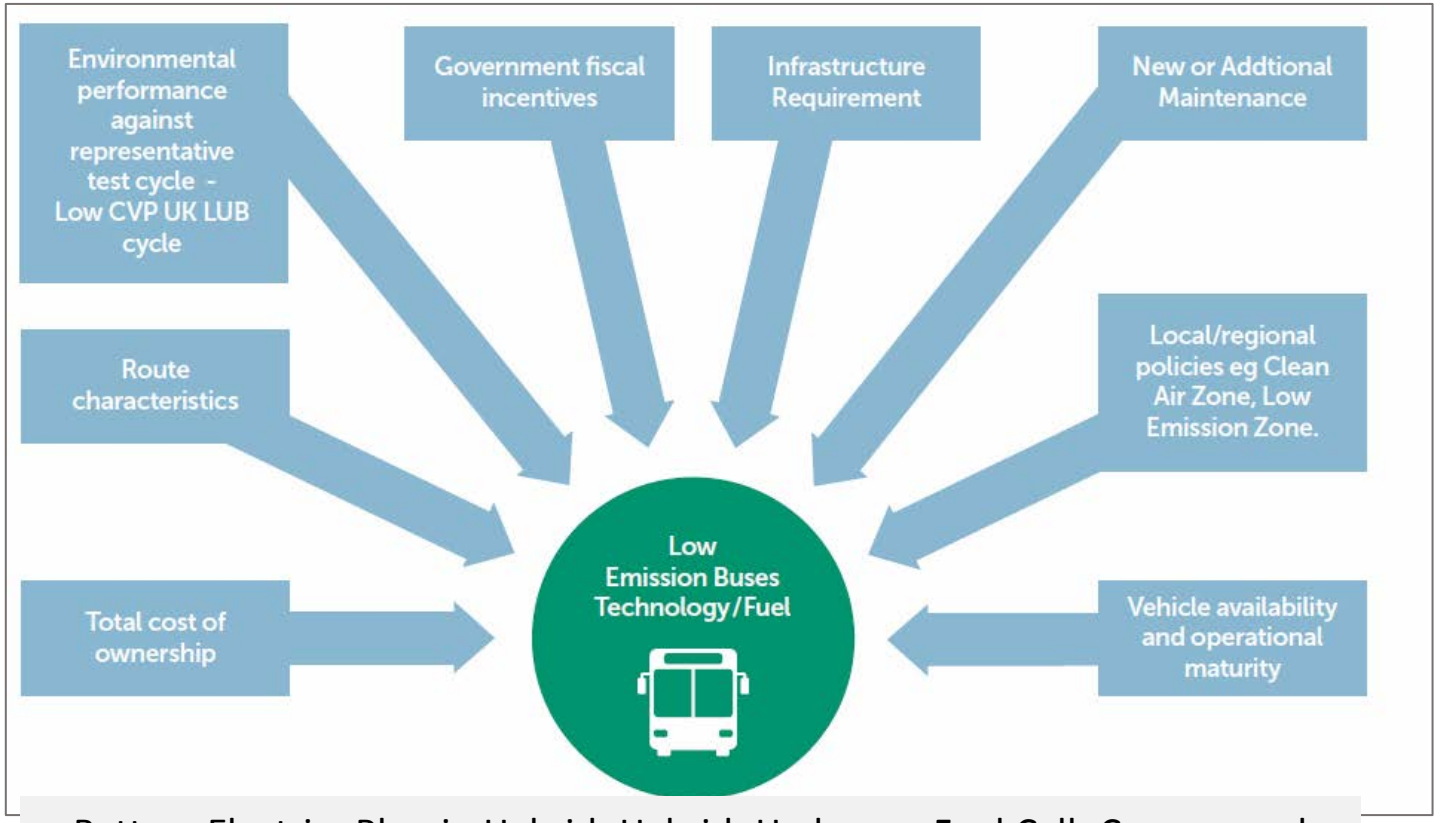
Improving provision of information on bus technologies and fuels



Low Emission Bus Guide created to assist bus fleet operators and local authorities procure the latest clean and green buses and retrofit technology for diesel buses.

- National Policy Framework
- 9 Low Emission Technologies/Fuels
- Infrastructure options and installation
- Environmental performance
- Current Market
- Accredited Low Emission Buses
- Bus Operator Case Studies

What to consider when purchasing different low emission bus technologies and fuels



Battery Electric, Plug-in Hybrid, Hybrid, Hydrogen Fuel Cell, Compressed Natural Gas

Renewable fuels –biomethane, HVO, biodiesel

Efficient Euro VI diesel

Retrofit Selective Catalytic Reduction

How do we qualify different bus technologies and fuels as a 'Low Emission Bus'?

A Low Emission Bus (LEB) "produces more than 15% Well-to-Wheel (WTW) GHG emissions saving compared with an equivalent Euro V diesel bus and meets the Euro VI engine standard."

Well-to-Tank

GHG emissions associated with fuel production

Tank-to-Wheel

GHG emissions associated with bus operation plus air pollution emissions

= WTW GHG Emissions

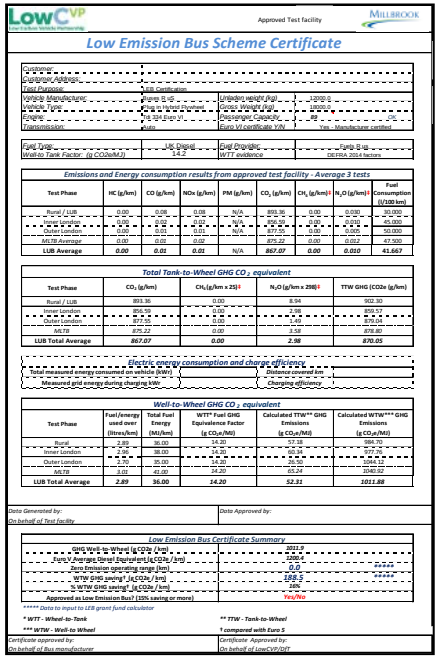
Low Emission Bus Accreditation Scheme

Measurement technique based on vehicle emission testing – demonstrate compliance with LEB definition.

Based on a real world bus drive cycle.

Certification required for Government funding.

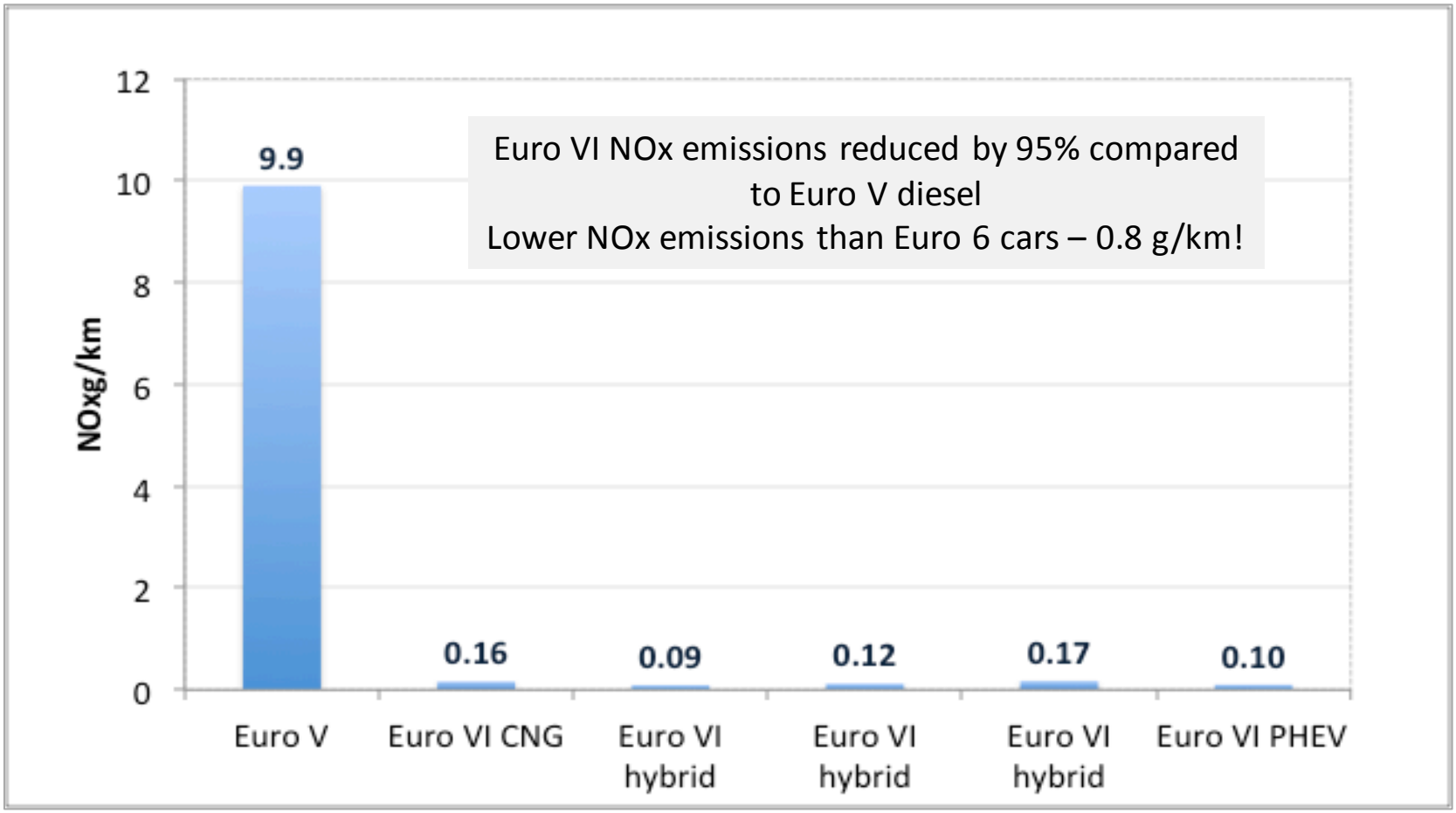
16 models LEB accredited – certificate on LowCVP webite



Low Emission Bus Scheme Certificate

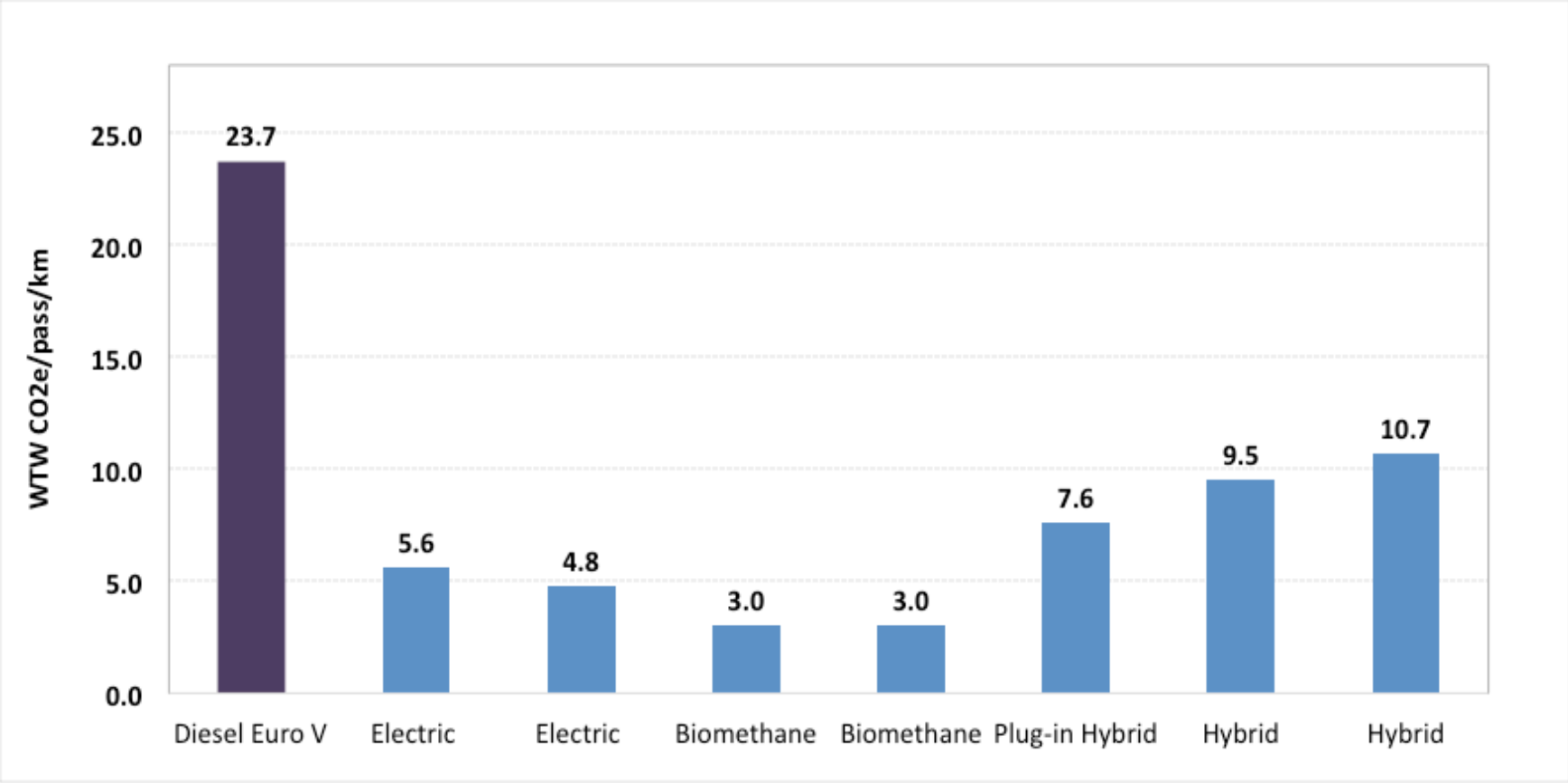
http://www.lowcvp.org.uk/initiatives/leb/Home.htm

Accredited low emission buses are achieving very low NOx emissions at Euro VI



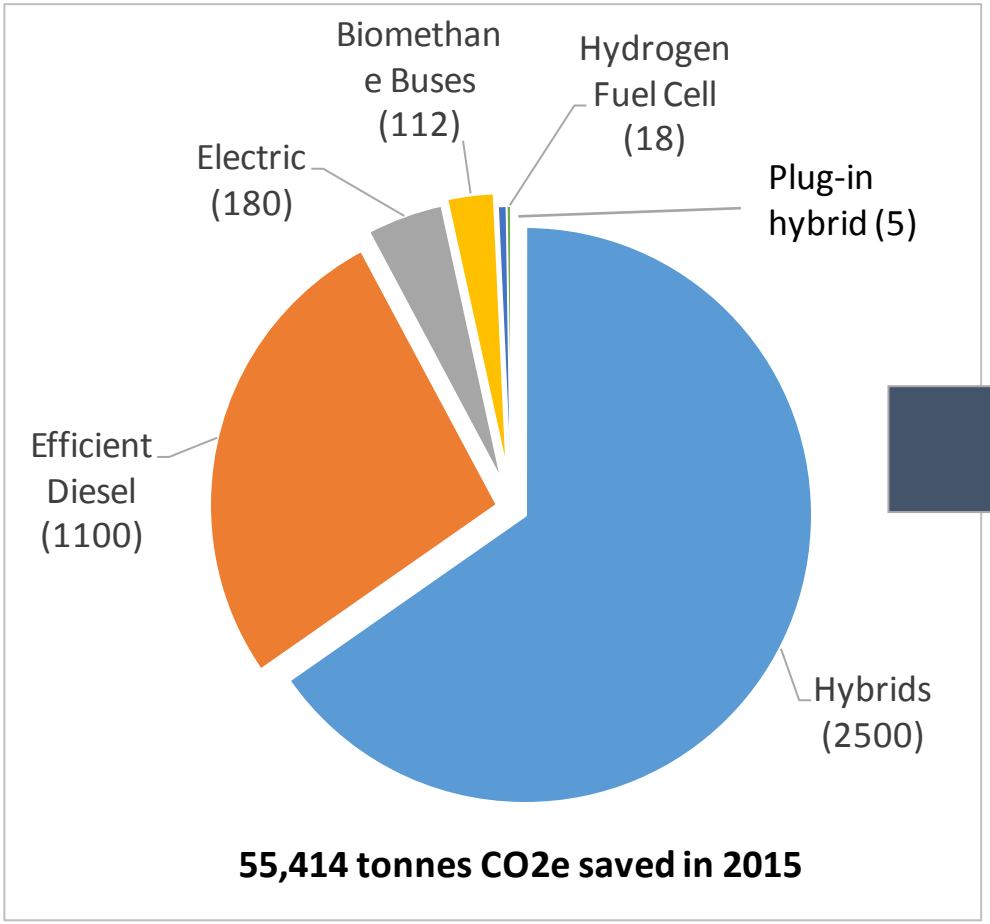
Source – LEB Accreditation Scheme vehicle emission test data

Carbon footprint of accredited low emission buses is significantly lower than conventional diesel buses



Source – LEB Accreditation Scheme vehicle emission test data

Success to date - 4,301 low carbon buses in service across the UK from Brighton to Scotland



Also > 3000 buses running on B20 biodiesel

Low carbon buses operate in 35 cities, all shown on LowCVP LEB web-portal

Electric buses operate in eight UK cities

Electric Bus Market

- 180 electric buses in operation
- Largest fleets London & Nottingham
- 4 manufacturers

Charging Infrastructure

- Plug-in, inductive & conductive pantograph Depot, park & ride, bus stops
- Capacity of local electricity network important

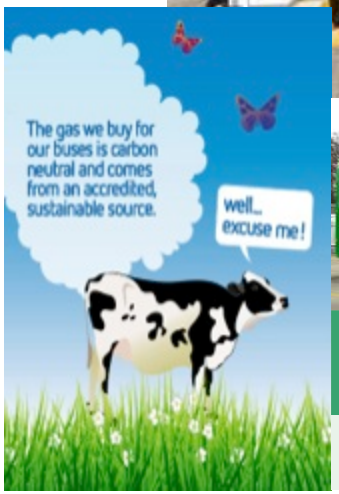
Environmental Benefits

- Zero tail-pipe emissions
- 64% CO_2e savings compared to Euro V diesel bus (*based on UK grid*)

ead to the creation of low emission zones, eliminating the use of fossil fuels by vehicles in city centres."

STEVE CORNES, PRINCIPAL PROJECT OFFICER, PUBLIC TRANSPORT, NOTTINGHAM CITY COUNCIL

Gas buses run on biomethane in six UK cities



Gas Bus Market

- 112 gas buses fuelled by biomethane
- MAN and Scania
- Largest fleets in Reading & Sunderland, next year Nottingham
- Only LEB/LCEB when using biomethane

Biomethane

- Produced from anaerobic digestion of organic waste & injected into gas grid
- CNG refuelling infrastructure
- Green gas certificates required

Environmental Benefits

- Very low NOx/PM
- 82% CO2e savings compared to Euro V diesel
- Sustainable and renewable fuel

Sharing real world experience of green buses

LowCVP collaboration with Greener Journeys

- 20 bus fleet operator case studies covering -
  - Hybrid, PHEV, BEV, HFC, electrified ancillaries
  - Renewable fuels - biomethane and biodiesel

- Real world experience of operating low carbon buses
- Demonstrating environmental and cost benefits

- Fleets covered - Arriva, Stagecoach, First Bus, Go Ahead, Reading Buses, Lothian Bus, Nottingham City Transport, Transport for London, Oxford Bus Company

LowCVP running 4 FREE regional Low Emission Bus Workshops in 2017

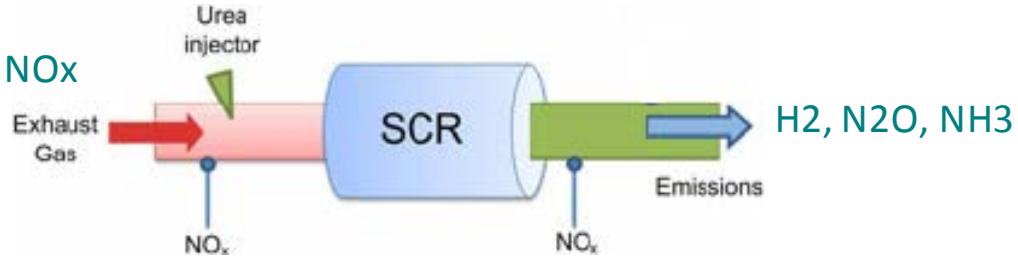
1st Workshop 30th March 2017 in Manchester
Register on LowCVP website

Example of retrofit technologies for diesel buses

Selective Catalytic Reduction – Buses

3000 Euro III diesel buses retrofitted including 2100 in London, TfL plans for 2000 Euro V planned over next 2 years

Euro III school buses retrofitted by TfGM and South Yorkshire PTE



Achieves 90% reduction in NOx emissions
Certain manufacturer can meet Euro VI NOx levels

Example of retrofit technologies for diesel buses

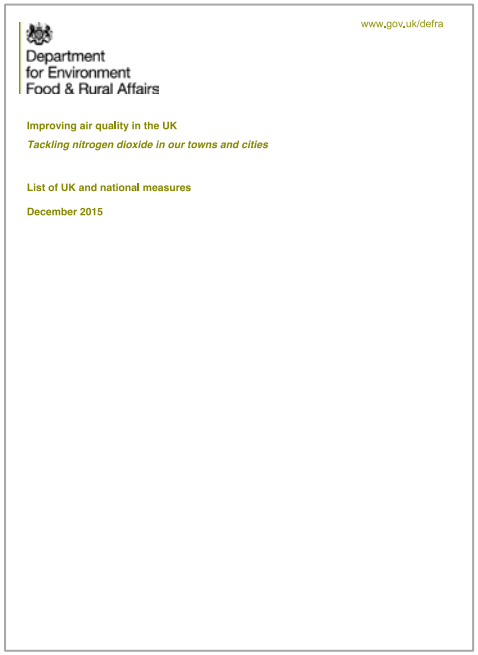
Engine and Powertrain Conversions Buses

Diesel double decker bus engine conversion to battery electric – York City Council
Zero emission, fuel cost savings

Reading Buses converting hybrid buses to battery electric with range extender powered by biomethane – zero emission, range extender low NOx and PM, fuel cost savings.

Designing A Clean Vehicle Retrofit Accreditation Scheme for Defra

Defra's NO_2 Action Plan (2015) – 'The Department of Transport has commissioned the Low Carbon Vehicle Partnership to develop a new Clean Vehicle Retrofit Accreditation Scheme. The scheme will cover a range of vehicles – buses, coaches, trucks, vans, mini-buses and taxis, and will facilitate the development of an approved list of suppliers and technology.'


www.gov.uk/defra

Department for Environment Food & Rural Affairs

Improving air quality in the UK

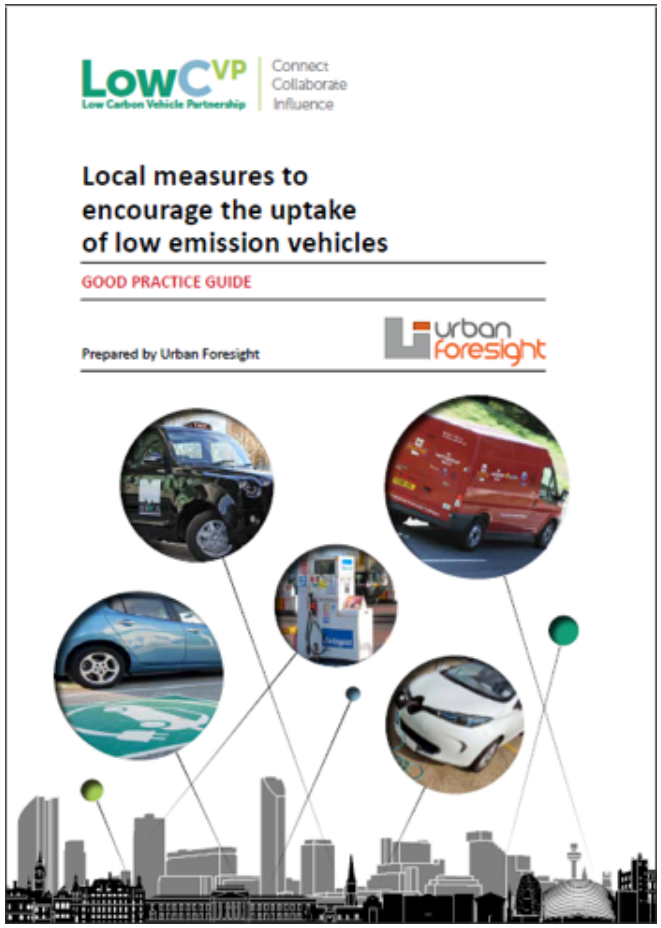
Tackling nitrogen dioxide in our towns and cities

List of UK and national measures

December 2015

- The scheme will to certify retrofitted technologies in terms of NOx emission performance – achieve Clean Air Zone standards
- LowCVP establishing emission limits for each vehicle class (air pollutants and GHG emissions) plus vehicle emission testing procedures
- Launching over the next five months.

Examples of our work relevant to local authorities



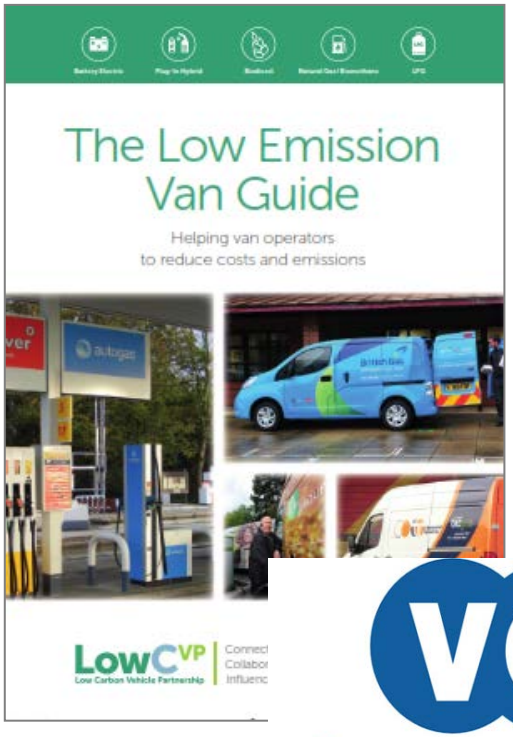
60 local measures to increase the take up of low emission vehicles

Go Ultra Low City Signage for ULEV use in bus lanes – finalised next month

-Nottingham Eco Expressway ULEV access -

- Milton Keynes ULEV in bus lanes

Low emission vehicle guides and tools for local authorities and fleet operators



Low Emission Van Portal on LowCVP's website

2017 Producing a Low Emission Taxi Guide -black taxis and PHV

VC3 Van Cost & Carbon Calculator

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LowCVP

THANK YOU FOR LISTENING AND PLEASE JOIN LowCVP!

Further information or collaboration with LowCVP

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