LowCVP Low Carbon Vehicle Partnership | Connect Collaborate Influence

Expanding The Market For Low Emission Buses

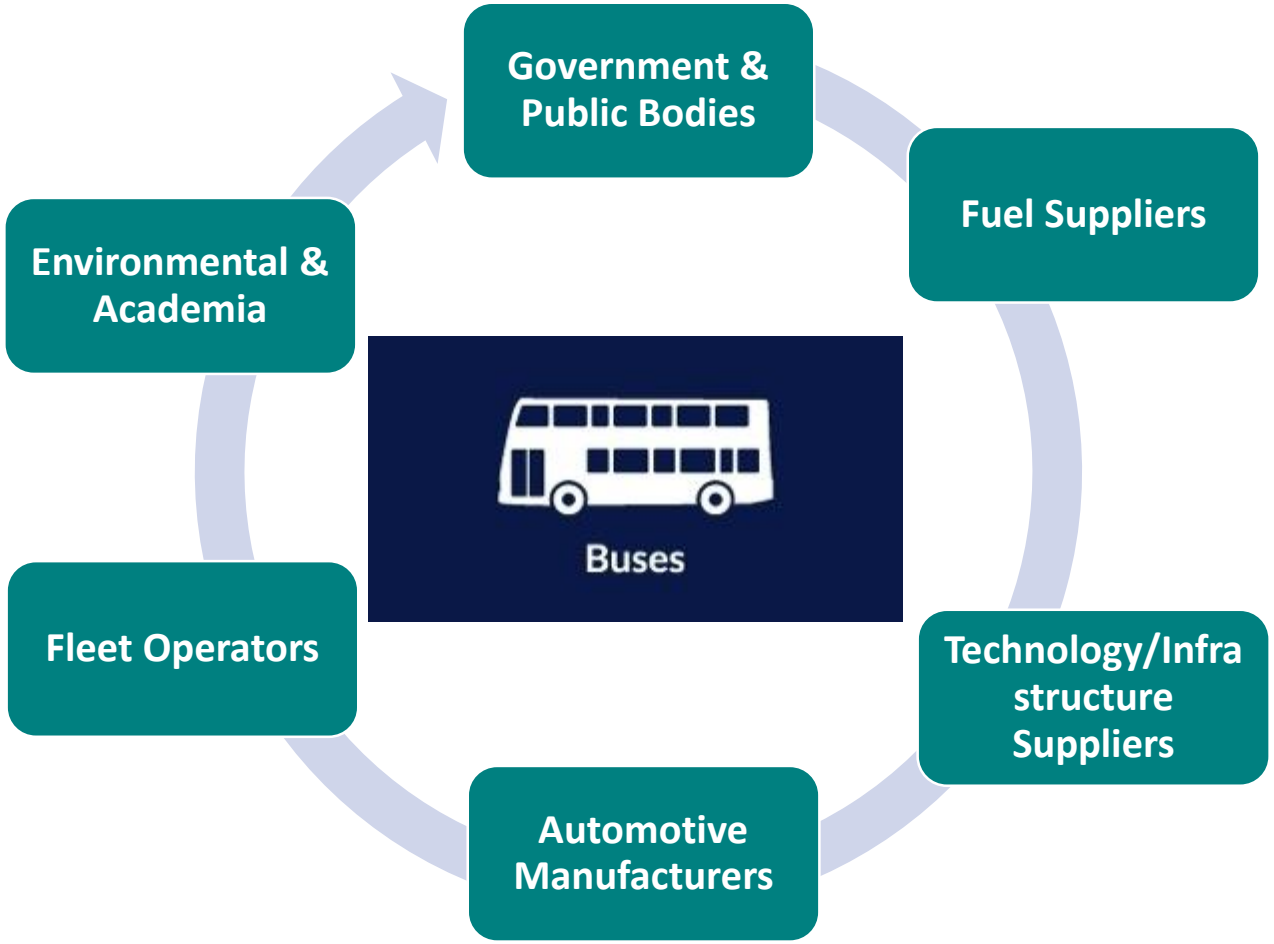
Euro Bus Expo, NEC Birmingham

Thursday, 3rd November 2016

Gloria Esposito, Head of Projects

LowCVP is a membership organisation whose mission is to accelerate the sustainable shift to low carbon vehicles and fuels

LowCVP Low Carbon Vehicle Partnership | Connect Collaborate Influence



Work Programme covers

Buses, Commercial Vehicles, Passenger Cars, Fuels and Innovation

Bus Working Group - 40 active members

- Influence Government policy
- Understanding market barriers & solutions
- Share information on latest low emission bus technologies/fuels
- Bus operator experience
- Produce technical/policy guidance

Why do we need low emission buses?

Benefits For The Environment

Improving Air Quality
- Reducing NOx/PM emissions from road transport, introduction of Clean Air Zones, Low/Ultra Emissions Zones

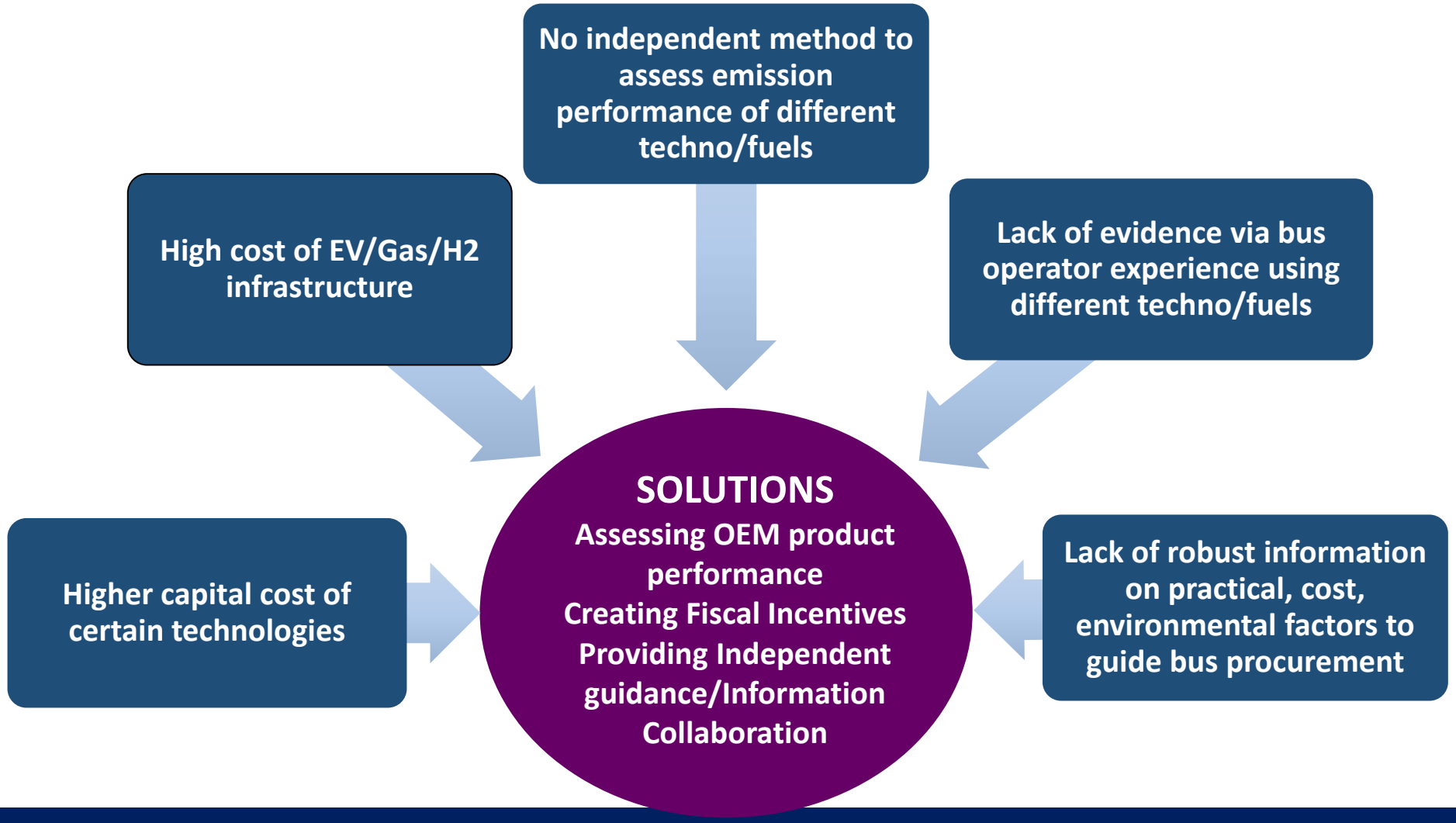
Mitigating Climate Change
- Reducing greenhouse gas emissions from road transport

Benefits For The Operator

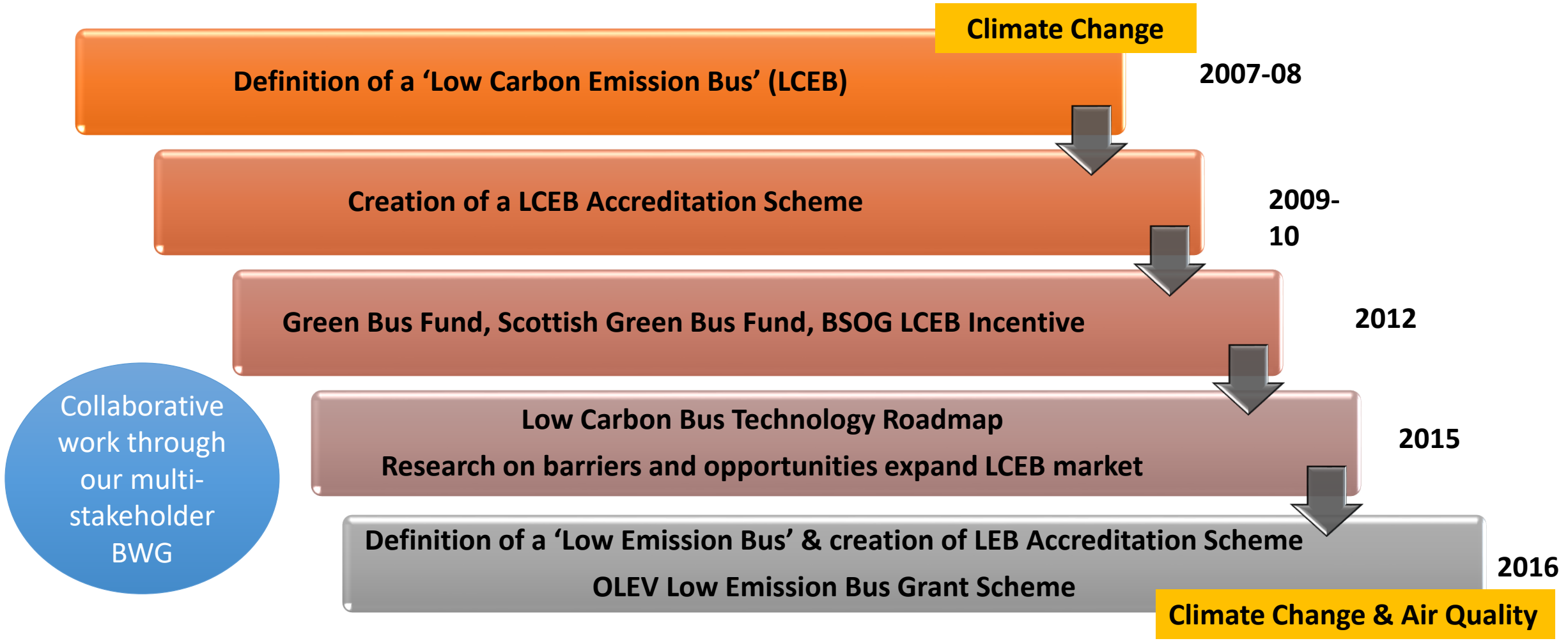
- Improved fuel efficiency
- Lower fuel costs
- Local authorities setting emission based procurement standards
- Corporate social responsible (SCR)

Variety of bus technologies and fuels to reduce air pollution and greenhouse gas emissions

Last decade LowCVP has focused on overcoming market barriers and creating mechanisms to increase the take up of green buses



LowCVP milestones in creating the market for low emission buses



What qualifies a bus technology as being an LCEB?

What is a Low Carbon Emission Bus?
A bus producing a minimum of **30% GHG emission saving on a Well-to-Wheel (WTW)** basis vs Euro III diesel equivalent.

Low Carbon Emission Bus Accreditation Scheme
Measurement technique to qualify OEM bus models as 'low carbon buses' based whole vehicle emissions testing

Well to Tank

Emissions associated with fuel production

GHG emissions - Carbon Dioxide (CO_2), Methane(CH_4) Nitrous Oxide (N_2O)

Tank to Wheel

Emissions associated with bus operation

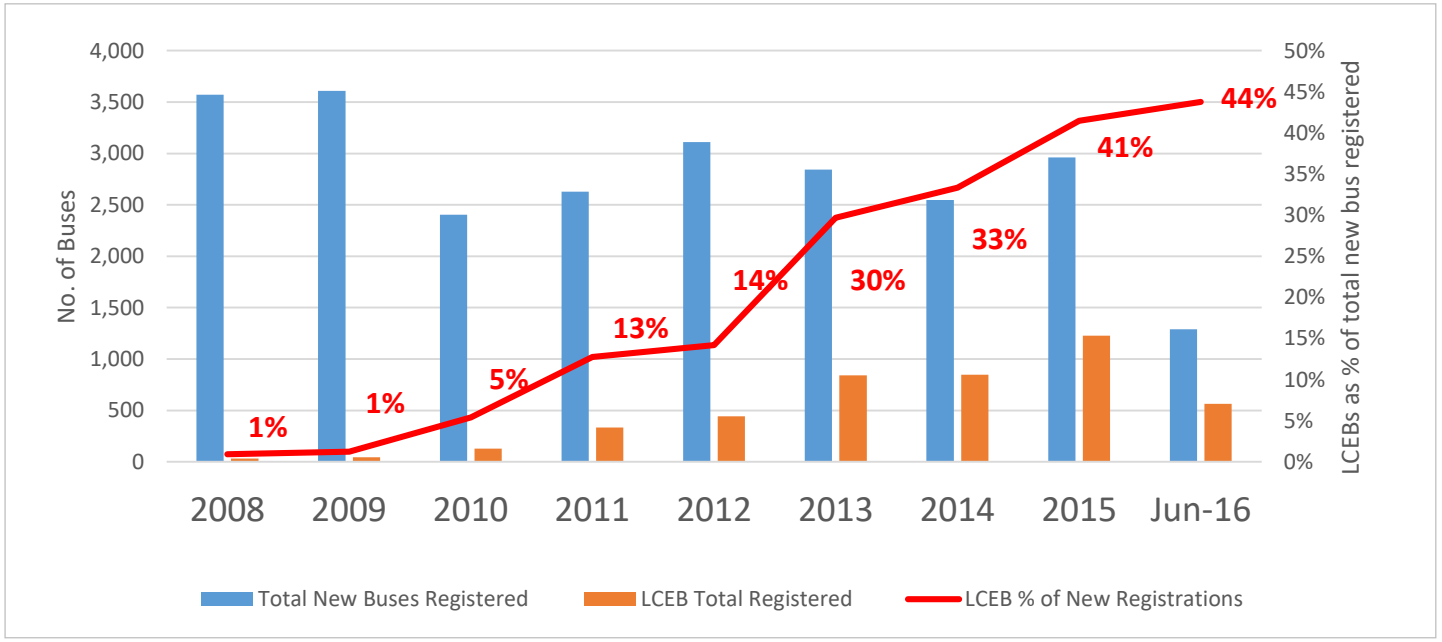
Created a real world bus test cycle with TfL - MLTB

= WTW GHG Emissions

LCEB certificate to qualify for fiscal incentives

LCEB market has experienced impressive growth over the last four years

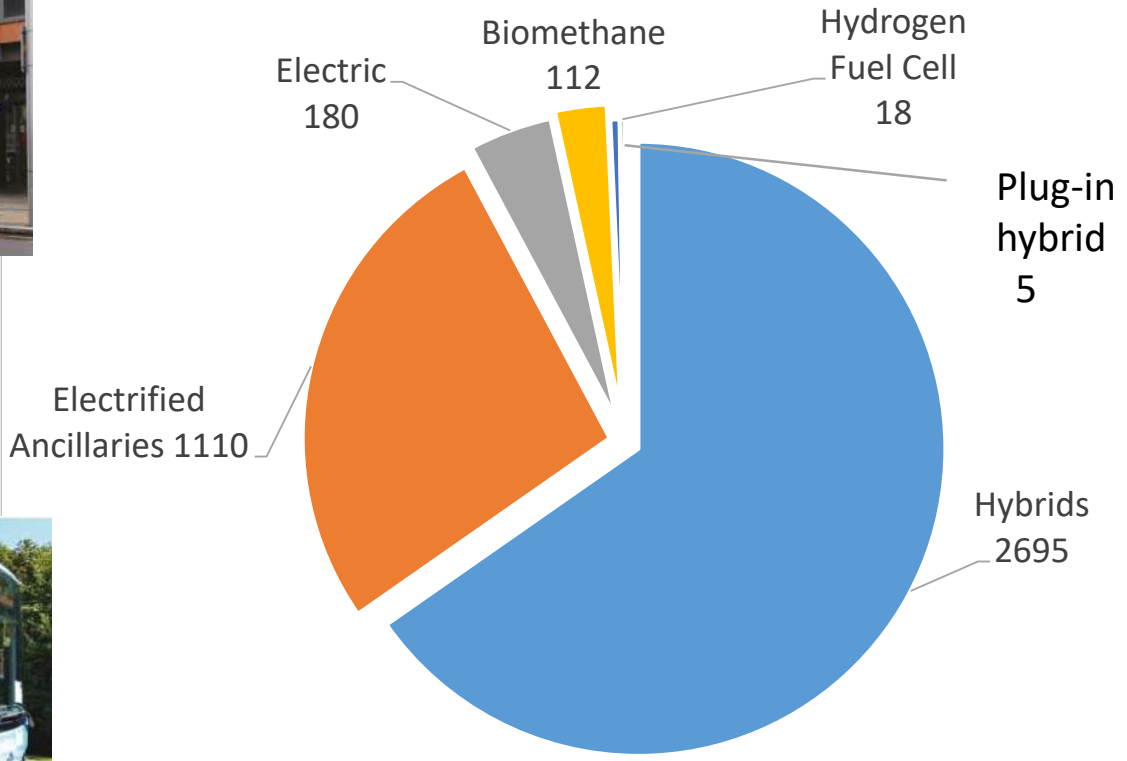
- **4,301** LCEBs current in service
- Top LCEB operators: First Bus, Arriva, Stagecoach, Go Ahead, Greater Transport For Manchester, Reading Buses, Nottingham City Transport
- 44% of new bus registrations in 2016 where LCEB



LCEBs operate across 35 regions of UK

[LowCVP Low Emission Bus Portal]

Six technologies and fuels, 27 different LCEB models



Scania, MAN,Volvo, ADL, Wrightbus, BYD, Optare, Van Hool,

New Funding, New Definition, New Bus Test Cycle

- ‘New’ **£30m Low Emission Bus Scheme 2015** - GHG reduction and improving air quality focus

  Support for capital cost of Low Emission Buses & refuelling/charging infrastructure

- ‘New’ **Low Emission Bus** definition:

  More **15% WTW GHG saving** compared to a Euro V diesel bus of equivalent passenger capacity achieve **Euro VI** or equivalent engine.

- **‘**New’ Low Emission Bus Accreditation Scheme **– LowCVP UK LUB cycle**

  LowCVP LUB cycle – inner and outer city (MLBT) plus rural

  LEB certificate – GHG & air pollution emissions, GHG savings, fuel/energy consumption, e range

- LEB certificate required for Government fiscal incentives. 15 bus models LEB certified –

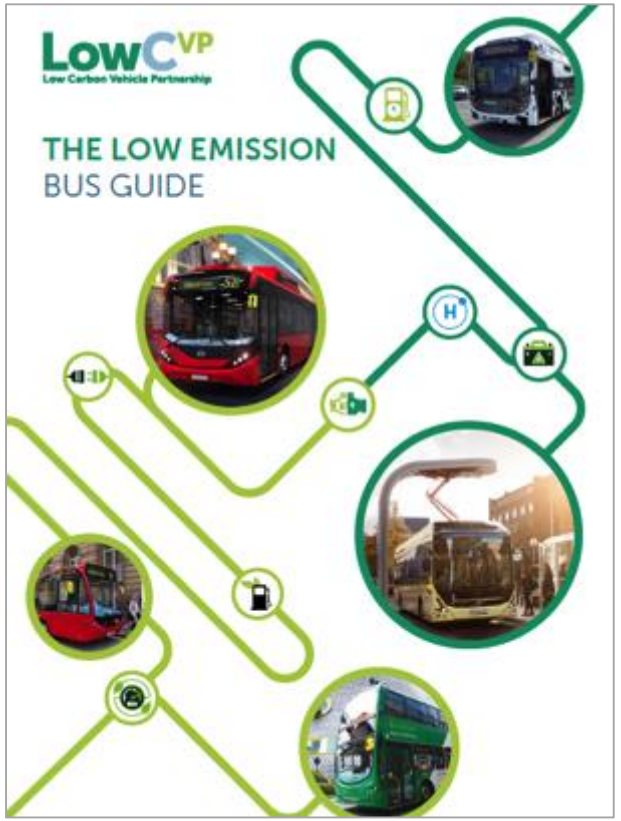
  Volvo, ADL, Wrightbus, BYD-ADL, Scania, MAN

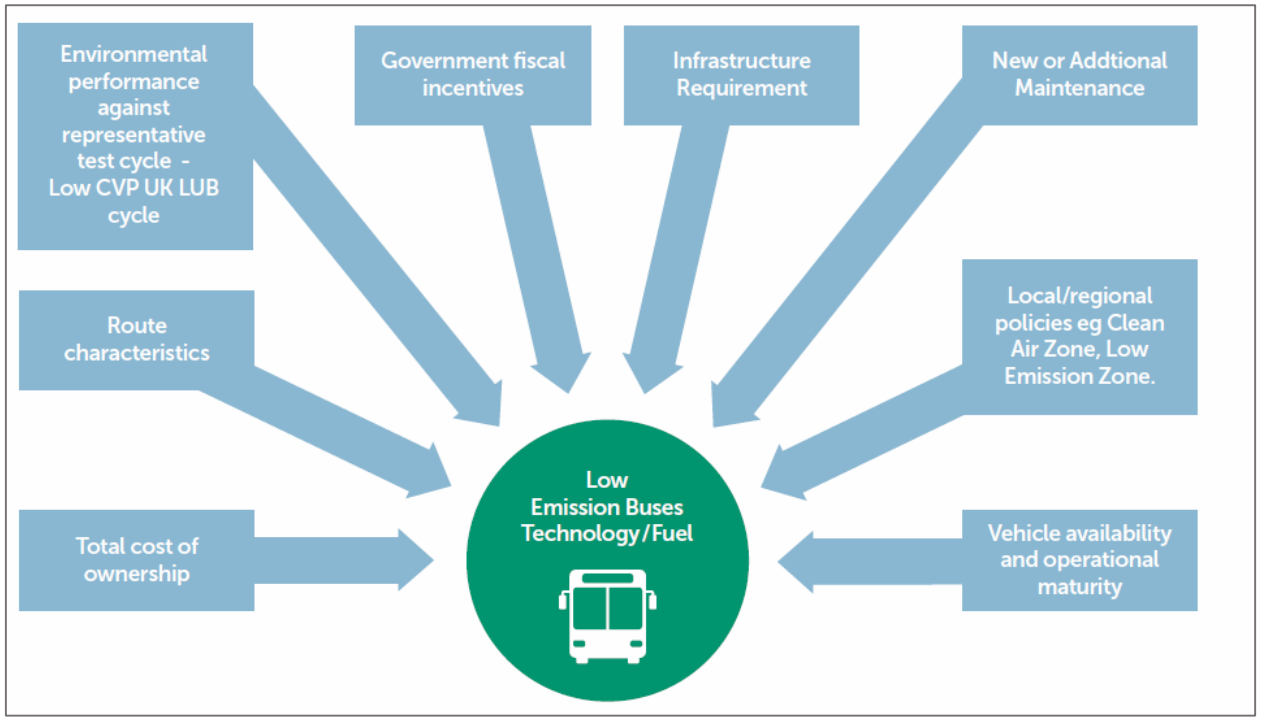
- LEB Grant funded 361 buses - hybrid, electric, biomethane, hydrogen plus infrastructure

LowCVP Low Emission Bus Portal displays all accredited LEBs.

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.





Electric
Plug-in Hybrid
Hybrid
Hydrogen FC
Gas (CNG)
Renewable fuels – biomethane, HVO, biodiesel
Euro VI diesel with electric ancillaries
Retrofit SCR

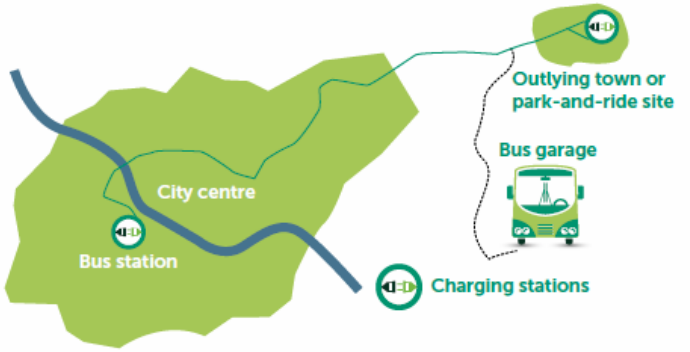
Outlines LEBs and infrastructure currently available

Low Carbon Vehicle Partnership | Connect Collaborate Influence

LEB Accredited Buses

	Electric Bus Models	Energy Consumption and Electric Range	WTW GHG and Air Pollution Emissions
	**Volvo 7900 Electric** Single Decker Length: 12m Passenger capacity: 83 GVW: 18,000 kg	84.7 kWh/100km Up to 39.3 km	WTW GHG Emissions: 447.3 gCO2e /km 5.3 gCO2e/passenger km WTW GHG savings: 65% Zero emission
	**Optare Solo EV** Single Decker Length: 9.2-9.9m Passenger capacity: 55 GVW: 11,300 kg	51.0 kWh/100 Up to 208km	WTW GHG Emissions: 307 gCO2e/km 5.6 gCO2e/passenger km WTW GHG savings: 69% Zero emission
	**BYD eBus** Single Decker Length: 12m Passenger capacity: 70 GVW: 18,700 kg	83.1 kWh/100km Up to 452.7 km	WTW GHG Emissions: 429.6 gCO2e/km 6.1 gCO2e/passenger km WTW GHG savings: 62% Zero emission
	**BYD-ADL Enviro200EV** Single Decker Length: 12m Passenger Capacity: 90 GVW: 18,600 kg	83.1 kWh/100km Up to 425.1 km	WTW GHG Emissions: 429.6 gCO2e/km 4.8 gCO2 e/passenger km WTW GHG Savings: 68% Zero emission

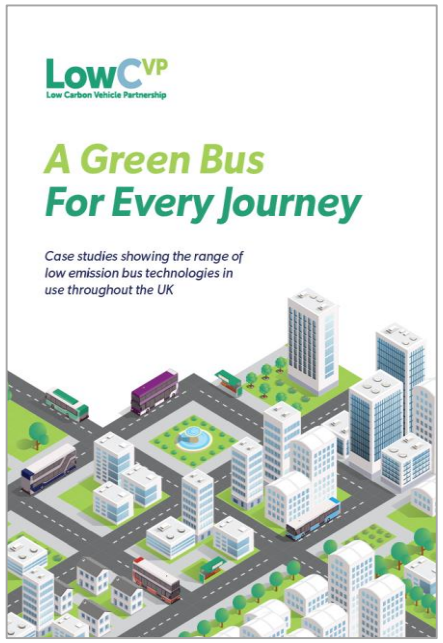
Overview of different charging strategies and what to consider regarding installation



Opportunity Charging

Plug-in Charging

Sharing real world experience of green buses – raising confidence in technology performance and demonstrating benefits



Released 10th November!!

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 LCEB
- 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

Further information and joining LowCVP

Gloria Esposito, Head of Projects
E: Gloria.esposito@lowcvp.org.uk
T: 0207 304 6831

http://www.lowcvp.org.uk