

Low emission vehicles & LowCVP activities in accelerating the market

Tuesday 21nd November 2017

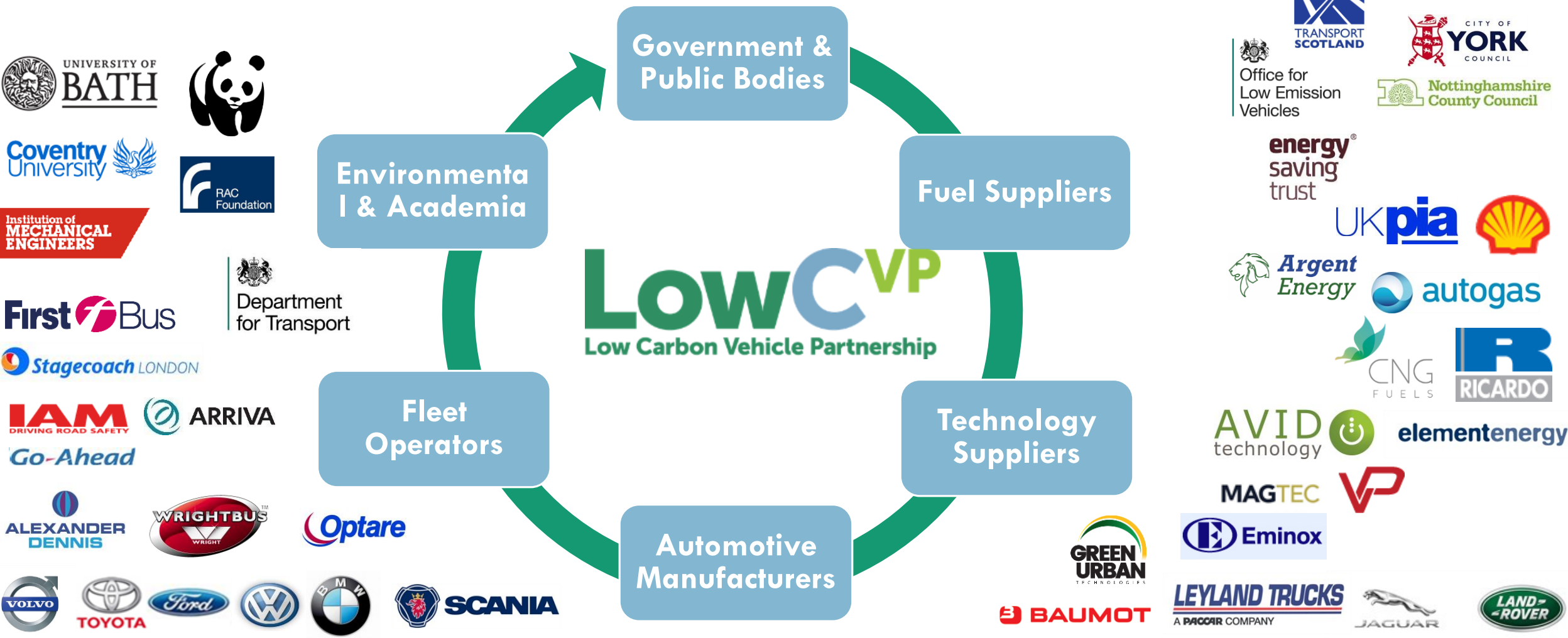
APSE Vehicle Maintenance & Transport Advisory Group Meeting



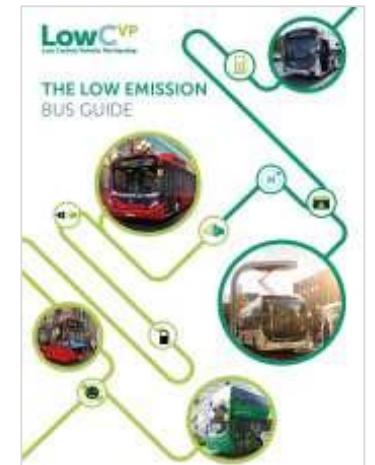
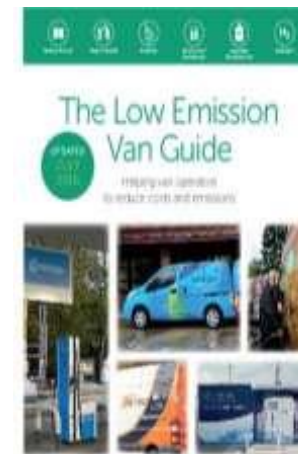
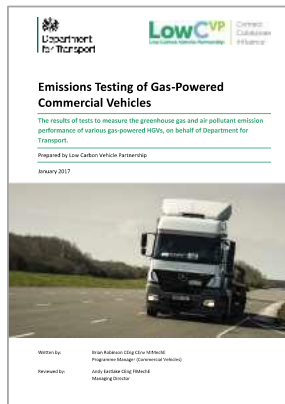
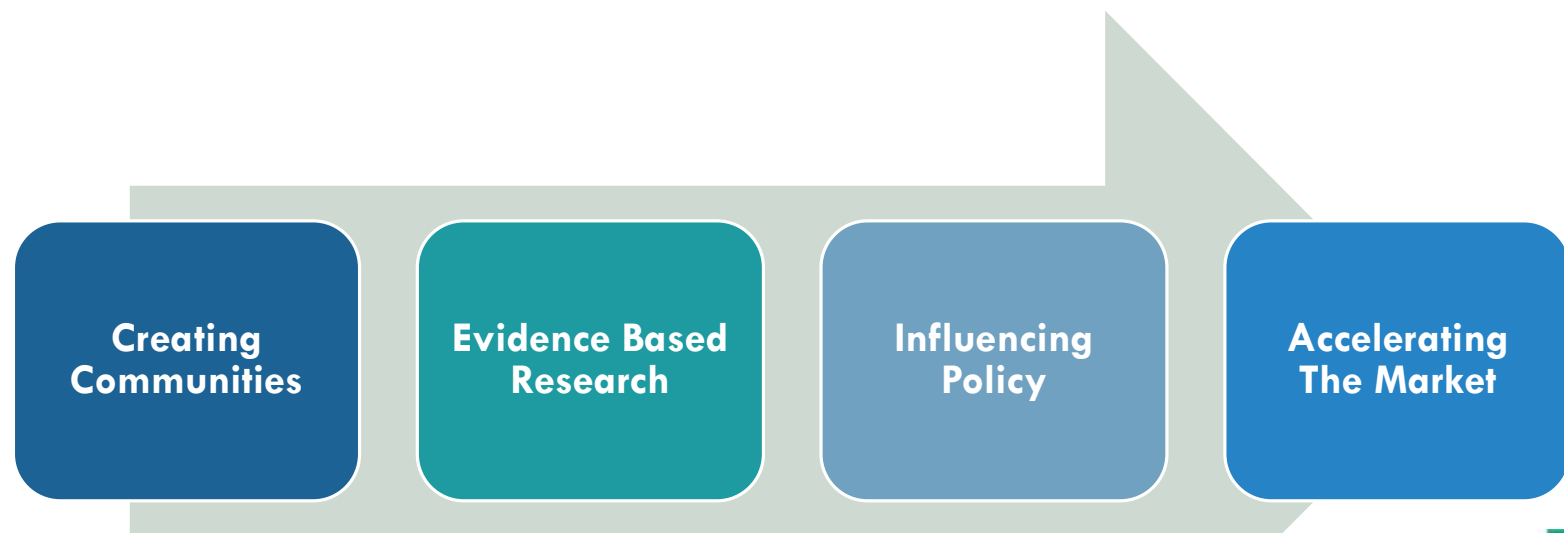
Gloria Esposito

Head of Projects

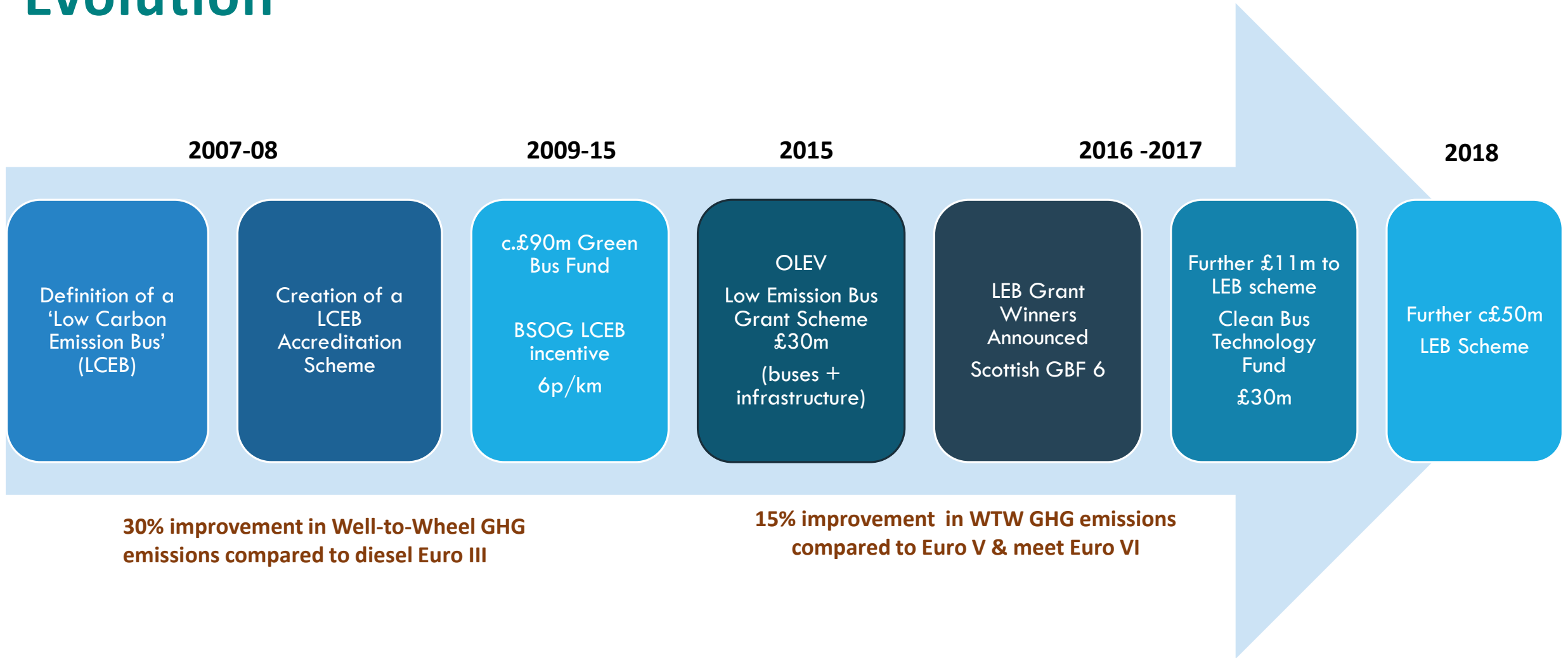
LowCVP is a public-private membership organisation, our mission is to “accelerate the sustainable shift to low carbon vehicles fuels & technologies ” in the UK.



What does our work focus on?



National Low Emission Bus Policy Evolution



LowCVP has influenced Government policy over the last decade and continues to drive ambition

Currently 5,674 low carbon emission buses running across the UK, largest electric and hybrid bus fleet in Europe!!

Leading cities Nottingham, London, Reading, Manchester, Leeds



LowCVP website

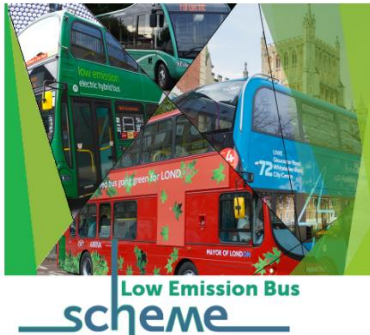
LowCVP LEB Web-Portal – all you wanted to know about low emission buses and more

Low Emission Bus Hub



A low emission bus (LEB) is one that operates using efficient technology or alternative fuels rather than just a traditional diesel engine. They are defined by the UK Government as producing 15% less Well-to-Wheel (WTW) emissions compared with an equivalent Euro V standard diesel bus.

Low emission buses can help lower the running cost and environmental impact of your fleet. [\[Click for More\]](#)



- Background [Click to view](#)
- Testing and Accreditation [Click to view](#)
- LEB Certificates [Click to view](#)

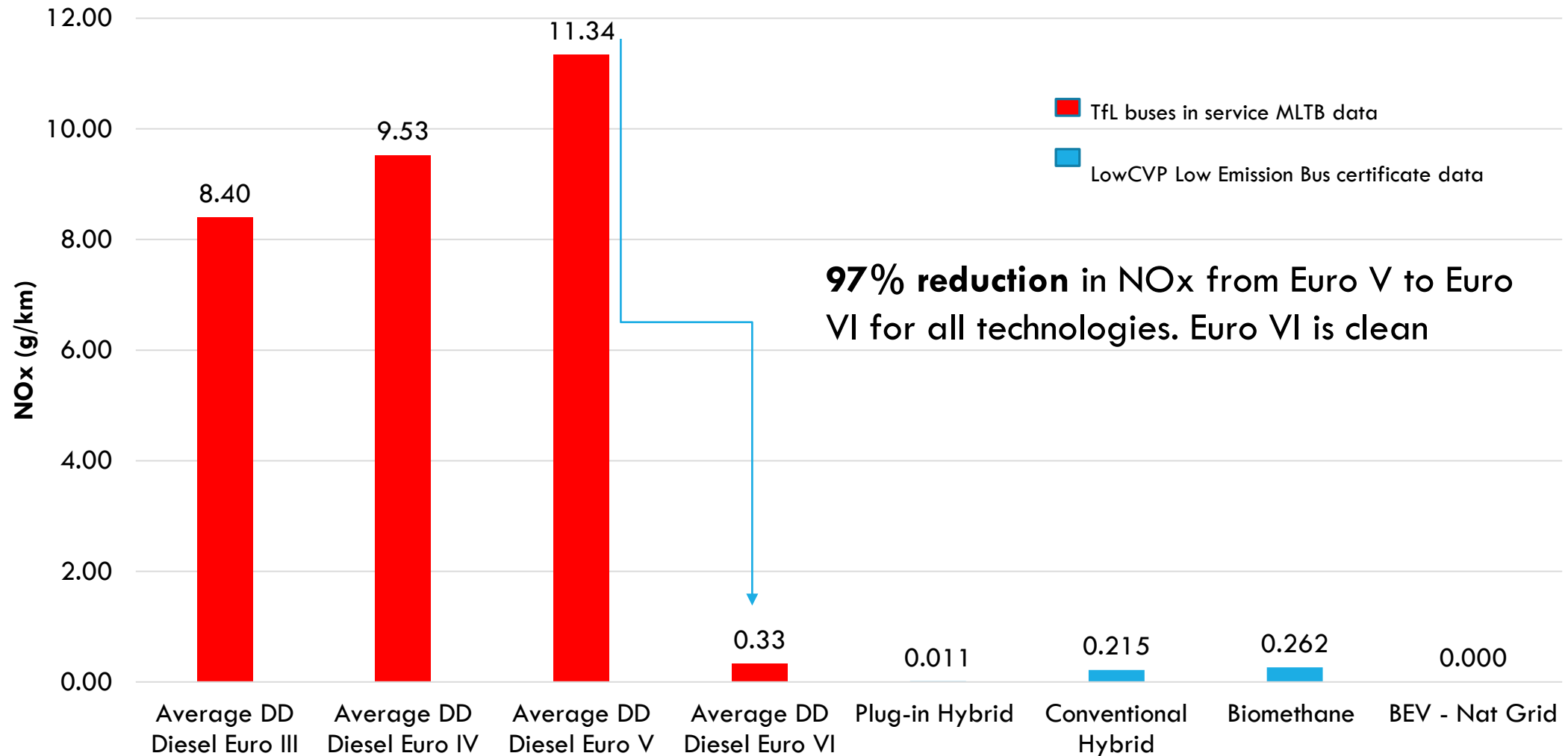


Low Emission Bus Accreditation Scheme – vehicles tested over LowCVP UK LUB cycle – certificates published on LowCVP website

<p>Optare Solo EV Pure Electric</p> 	<p>Fuel: UK Grid Electricity</p> <p>Well-To-Wheel GHG saving compared to Euro V diesel equivalent:</p> <p>69%</p> <p>Zero Emissions Range:</p> <p>>30km</p> <p>WTW CO₂e per passenger km:</p> <p>5.6 g CO₂e / pass km</p>	 <p>Click on the certificate to download</p>
<p>Scania / ADL 300 Biomethane</p> 	<p>Fuel: Biomethane – Gas Bus Alliance</p> <p>Well-To-Wheel GHG saving compared to Euro V diesel equivalent:</p> <p>82%</p> <p>Zero Emissions Range:</p> <p>N/A</p> <p>WTW CO₂e per passenger km:</p> <p>3.0 g CO₂e / pass km</p>	 <p>Click on the certificate to download</p>

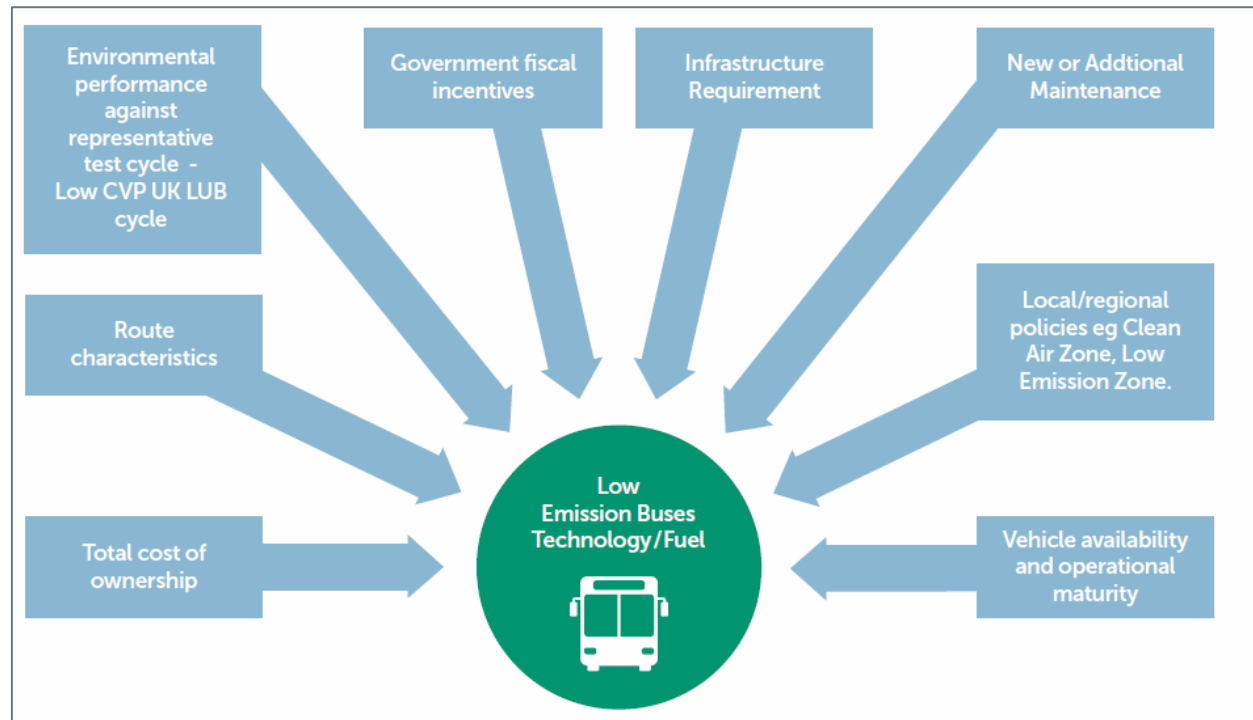
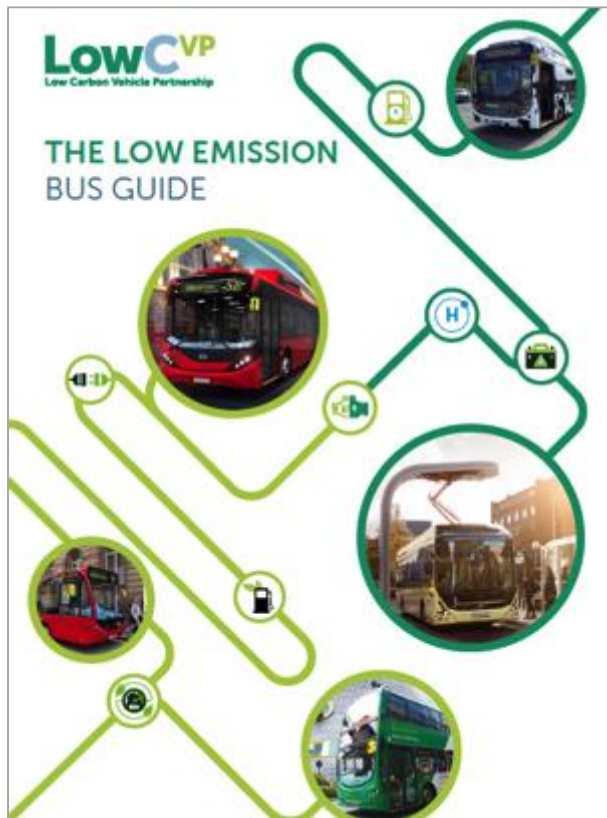
Low Emission Bus Testing

NOx emissions from Buses: Euro Standard emission comparison



LowCVP 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.



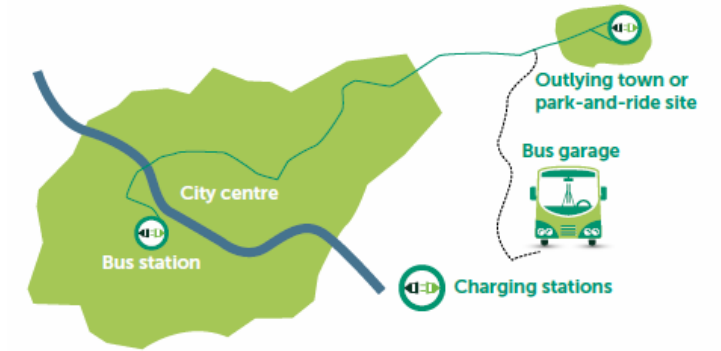
- Electric
- Plug-in Hybrid
- Hybrid
- Hydrogen FC
- Gas (CNG)
- Renewable fuels – biomethane, HVO, biodiesel
- Euro VI diesel with electric ancillaries
- Retrofit SCR

Outlines LEBs and infrastructure currently available

LEB Accredited Buses

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

Overview of different charging strategies and what to consider regarding installation



Opportunity Charging

Plug-in Charging



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



LowCVP collaboration with Greener Journeys

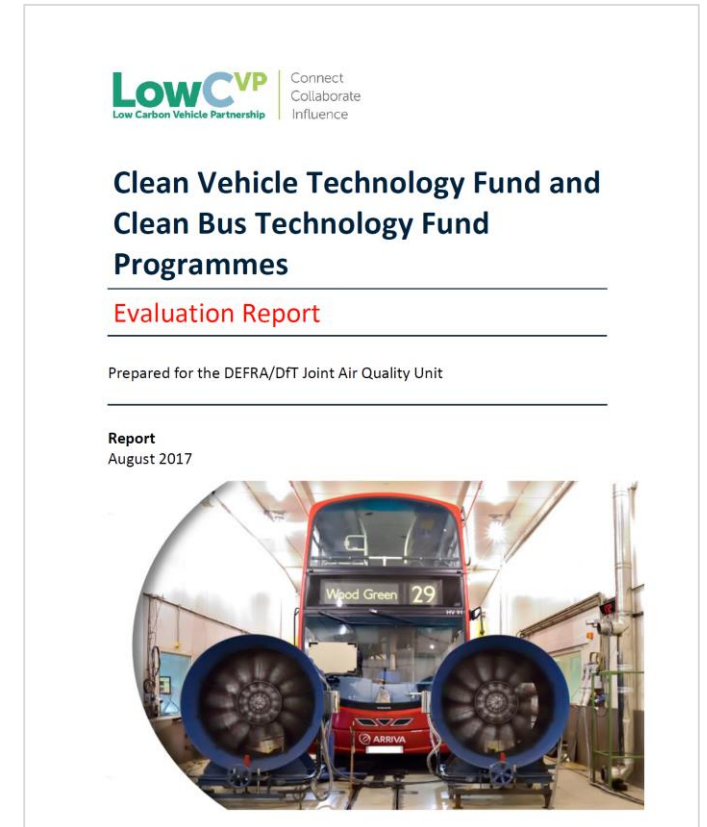
- 20 bus fleet operator case studies covering -
 - Hybrid, PHEV, BEV, HFC, electrified ancillaries
 - Renewable fuels - biomethane and biodiesel
- Real world experience of operating LCEB
- Environmental and cost benefits

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



Evaluating Retrofit Technologies

- The Clean Bus Technology Fund (CBTF) 2013/2015 and Clean Vehicle Technology Fund (CVTF) 2014 programmes were introduced by the DfT to help reduce NOx emissions from diesel vehicles in cities experiencing poor air quality.
- £19 million was shared between 30 local and regional authorities.
- Focus on buses, other vehicle types covered under CVTF 2014
- The LowCVP was commissioned by Defra/DfT to undertake an evaluation of the CVTF and CBTF programmes – determine technology performance.
- Report available on LowCVP's website.
- Helped inform the introduction of the £30m Clean Bus Technology Fund 2017



2137 Vehicles Funded. 11 Technologies. 9 Vehicle Types

	Retrofit Technology	Vehicle Types	No. of vehicles funded	Euro Standard	Covered in evaluation study
Exhaust After Treatment	Selective Catalytic Reduction	Bus, coach, fire engine, mini-bus, car	1,594	Pre Euro, Euro II - V Euro 4/5	Yes
	Thermal Management Technology	Bus	83	Euro VI	Yes
Fuel Saving	Flywheel hybrid	Bus	104	Euro III/V	Yes
	Mild Hybrid	Bus	40	Euro III-V	Yes
	Hybrid Assist	Van	18	Euro 4	Yes
	Battery powered ancillaries	Ambulance	109	Euro III	No
Engine Conversion	Battery Electric	Bus	7	Euro II	Yes
	Range extender battery electric using compressed biomethane gas	Bus	1	Euro III	No
	Spark ignition engine powered by CBG	Bus	16	Euro III	No
	Duel Fuel Compressed Natural Gas	Black Taxi	113	Euro 2,3,4	Yes
	Spark Ignition Engine powered by LPG	Black Taxi	65	Euro 1,2,3	No

Retrofit Technology	Vehicle Category	Euro Standard	Average NOx emission reduction	Average tail-pipe NOx emissions	
Exhaust After-Treatment Technology	SCR	Bus	Euro III	88%	0.3 g/km
			Euro IV	90%	0.7 g/km
			Euro V	98%	0.8g/km
		Coach	Euro II	86%	1.4 g/km
			Euro III	99%	0.2 g/km
		Fire Engine	Euro III	70%	2.7 g/km
		Mini-bus	Euro 4	77%	0.3g/km
	Car	Euro 4	60%	0.2 g/km	
	Ammonia storage for SCR	Bus	Euro V	98%	0.5g/km
TMT	Bus	Euro IV	29%	11g/km	
Fuel Saving	Flywheel Hybrid	Bus	Euro III	26%	6.1 g/km
	Mild Hybrid	Bus	Euro V	5%	6.3 g/km
	Hybrid Assist	Van	Euro 4	6%	0.3 g/km
Engine Conversion	Dual Fuel CNG	Black Taxi	Euro 4	3%	1.1 g/km
	Battery Electric	Bus	Euro III	100%	

Highest NOx emissions savings

- Selective Catalytic Reduction (esp buses)
- Conversion to Battery Electric

Other Emissions

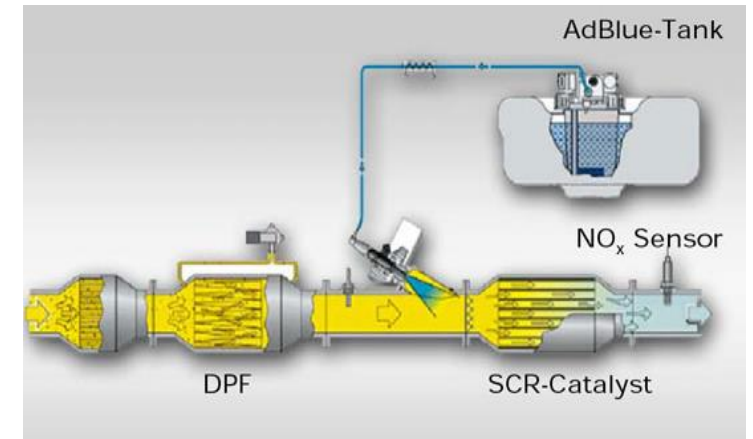
- SCR showed significant reduction in PM and NO₂ emissions, low ammonia.
- Significant increase in methane emissions CNG dual-fuel
- Slight increase in CO₂e for SCR (nitrous oxide)

Exhaust After-Treatment Technology: SCR

- Ammonia injected through a catalyst into the exhaust stream of a diesel engine.
- Chemical reaction occurs reducing NO_x to nitrogen and water; secondary emissions produced



- Ammonia commonly supplied as aqueous urea (Ad-Blue)
- New ammonia storage – ammonia salt dosing trialled by TfL
- SCR commonly fitted with diesel particle filters that reduce PM emission.
- TfL largest retrofit bus programme in the UK > 6000 vehicles (Euro III/V)
- Focus has been on retrofit SCR buses, opportunities for taxis and vans



Amminex ammonia salt

Engine Conversion: Battery Electric Buses

- The entire diesel engine drivetrain is completely removed and replaced with a battery-powered electric motor powertrain, resulting in zero tail-pipe emissions.
- York City Council won funding under the CBTF programme to convert six Euro II Dennis Trident double deck buses in Transdev's fleet.
- First double deck diesel bus conversion in the world carried out by Magtec
- Prototype bus been operation for two years, other five buses will be converted end of this year.
- Charged over night a Transdev depot.
- Good performance, 76 miles electric range, lower fuel cost.



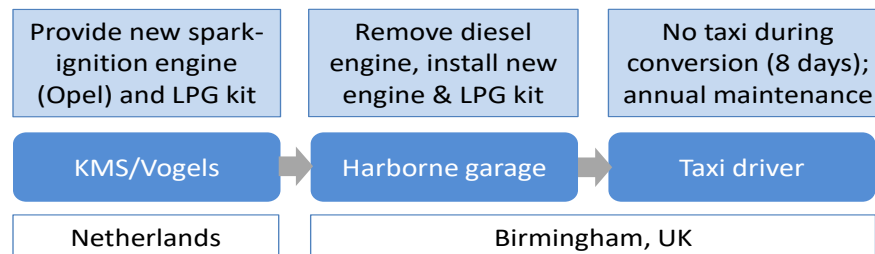
Transdev double deck fully electric sight seeing bus operating in York's CAZ.

Birmingham City Council Retrofit LPG

- TX1, TX2 and TX4 taxis operate with diesel (compression-ignition) engines and typically belong to Euro 2 to 5 classes, i.e. they emit high levels of NOx and Particulate Matter.
- In September 2014, Birmingham City Council received £500,000 from the Department of Transport to convert c.80 taxis to the use of LPG, a much cleaner burning fuel than diesel.



Current supply chain, established in 2015 for the Birmingham project

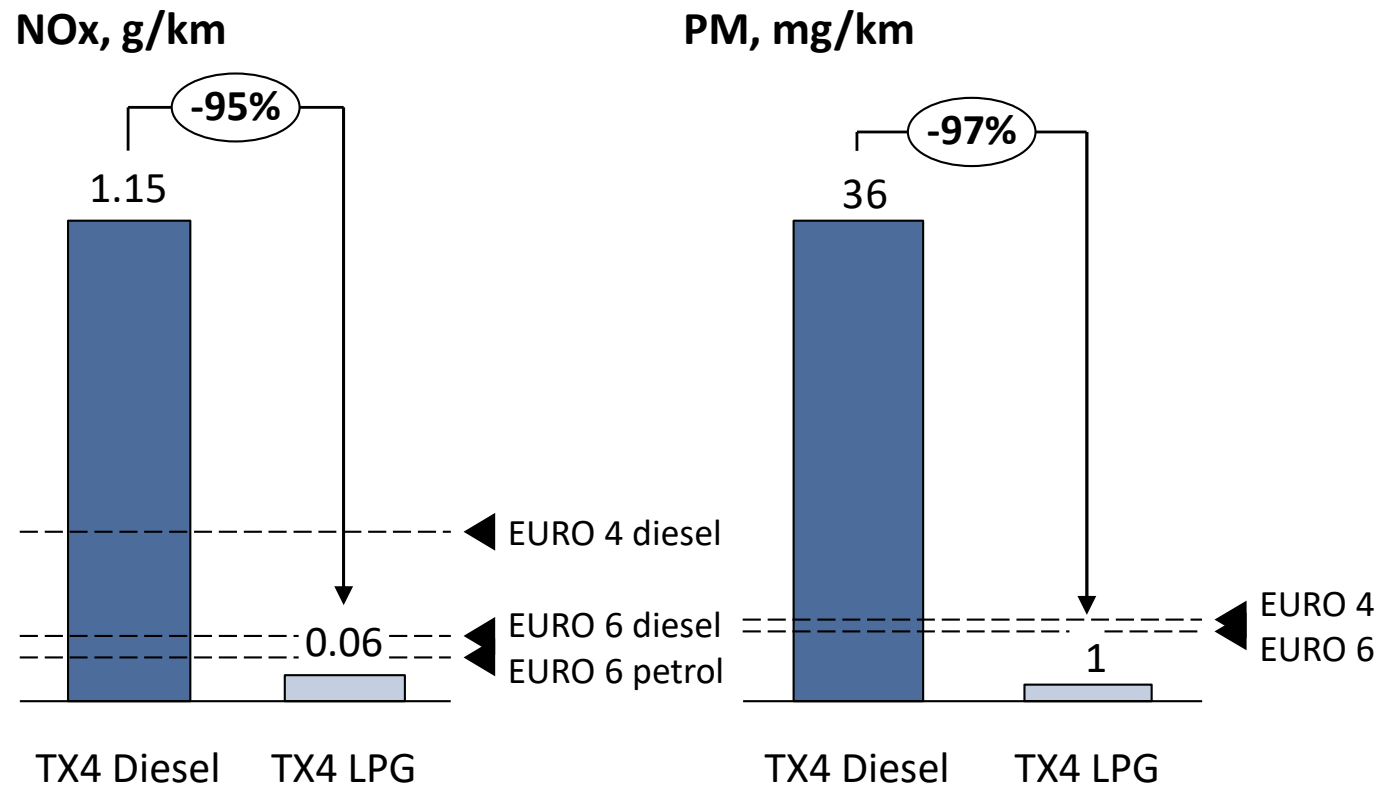


- KMS are providing the new Opel engines and the engineering of bespoke parts that are required to convert these engines to LPG into the taxi (TX1 & TX2 models – first tried on TX4).
- Vogels are providing KMS with all the standard LPG parts. Vogels' UK agent is National Autogas.
- Harborne garage removes the engines from the taxis, installs the new engine & LPG system. They calibrate the LPG system and can carry out the yearly maintenance.

Key points/lessons learnt

- Early and continued engagement with users underpinned the success of the project – taxi drivers are the ones adopting the change so should be given the opportunity to input in and question the project
- Cost and time should be communicated clearly, differentiating *estimates* from *final values*; VAT accounting rules should also be clearly communicated from the start

Vehicle emission testing results for BCC retrofit LPG black taxi – compliance with Euro 6




Courtesy of BCC & Element Energy (Sept 2017)

Clean Vehicle Retrofit Accreditation Scheme

energy saving trust | Renewable Energy | Home Insulation | Home Energy Efficiency | Tr

What is the Clean Vehicle Retrofit Accreditation Scheme (CVRAS)?

The CVRAS is a robust certification scheme for manufacturers of retrofit emissions reduction technology that will enable Clean Air Zone (CAZ) compliance of legacy fleet vehicles. This certification scheme supports the operation of Clean Air Zones and addresses the air pollution emissions from buses, coaches, heavy goods vehicles, mini-buses and vans.



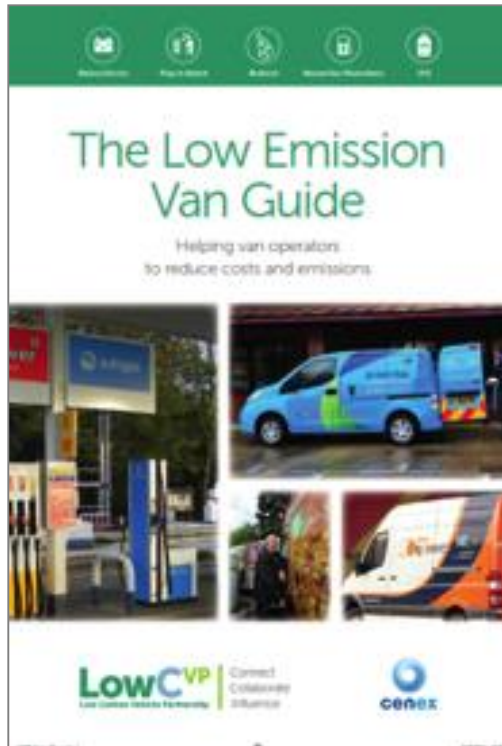
—
Further information and helpful documentation

- Approved manufacturers and devices
- Getting certified

- The CVRAS is an independent certification scheme for manufacturers of retrofit emissions reduction technology to enable Clean Air Zone compliance of legacy diesel vehicles.
- The certification scheme addresses the air pollution emissions from buses, coaches, heavy goods vehicles, mini-buses, black taxis and vans.
 - Emission limits for air pollutant and greenhouse gas emissions
 - Vehicle emission testing procedures
 - Requirements for in service durability
- Designed by LowCVP, on behalf of JAQU, and delivered in partnership with Energy Savings Trust.
- Buses are the first vehicle type to feature in the scheme, other vehicles will be ready soon.

www.EnergySavingTrust.org.uk/CVRAS

Other activities which could help local authorities



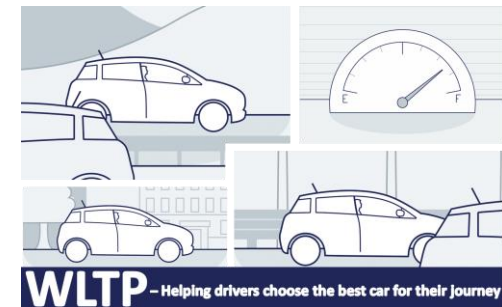
Workshops with local authorities to promote our guides



Fuel Economy		VED band and CO ₂
CO ₂ emission figure (g/km)		
0	A	
1-40	B	
41-75	C	
76-90	D	
91-120	E	
121-150	F	
151-180	G	
181-190	H	
191-200	I	
201-220	J	
221-250	K	
251-300	L	
301+	M	
		E g/km
Fuel cost (estimated) for 12,000 miles		
<small>A fuel cost figure indicates to the consumer a guide price for consumption purposes. This figure is calculated by using the combined drive cycle (own needs and highway) and average fuel price. The calculated annuality, the cost per litre as at Mar 2017 is as follows - petrol 132p, diesel 132p, LPG 10p.</small>		
VED for 12 months		
<small>Vehicle excise duty (VED) or road tax varies according to the CO₂ emissions and fuel type of the vehicle.</small>		
1 st Year rate*	Standard rate*	
Environmental Information		
<small>A guide on fuel economy and CO₂ emissions which contains data for all new passenger car models is available at any point of sale free of charge. In addition to the fuel efficiency of a car, driving behaviour as well as other non-technical factors play a role in determining a car's fuel consumption and CO₂ emissions. CO₂ is the main greenhouse gas responsible for global warming.</small>		
Make/Model:	Engine Capacity (cc):	
Fuel Type:	Transmission:	
Fuel Consumption:		
Drive cycle	Litres/100km	Mpg
Urban		
Extra-urban		
Combined		
Carbon dioxide emissions (g/km):		
<small>Important note: Some specifications of this make/model may have lower CO₂ emissions than this. Check with your dealer.</small>		
 Department for Transport	To compare fuel costs and CO ₂ emissions of new cars, visit: https://www.gov.uk/co2-and-vehicle-tax-tools	 Vehicle Certification Agency

Creating new car labels taking into account new fuel economy data and CAZ compliance

New 'official' fuel economy and emission test for cars – preparing Government policy and car buyer information



Producing a Low Emission Taxi Guide – Launch May 2018

Thank you for listening



Gloria Esposito

Head of Projects

Gloria.esposito@lowcvp.org.uk

Interested in joining the Partnership?



Driving Global Safety

APSE Advisory Group

John Murch

David Williams



Contents

- Who are Brigade?
- Current Market Concerns
- Vehicle Safety Solutions
 - Backeye360
 - Mobile Digital Recording
 - Pulsed Radar Reversing System

Chairman

We are in the business of saving lives.”

Chris Hanson-Abbott, OBE
Chairman and founder



Our Vision

No more lives lost in collisions with vehicles and mobile machinery.



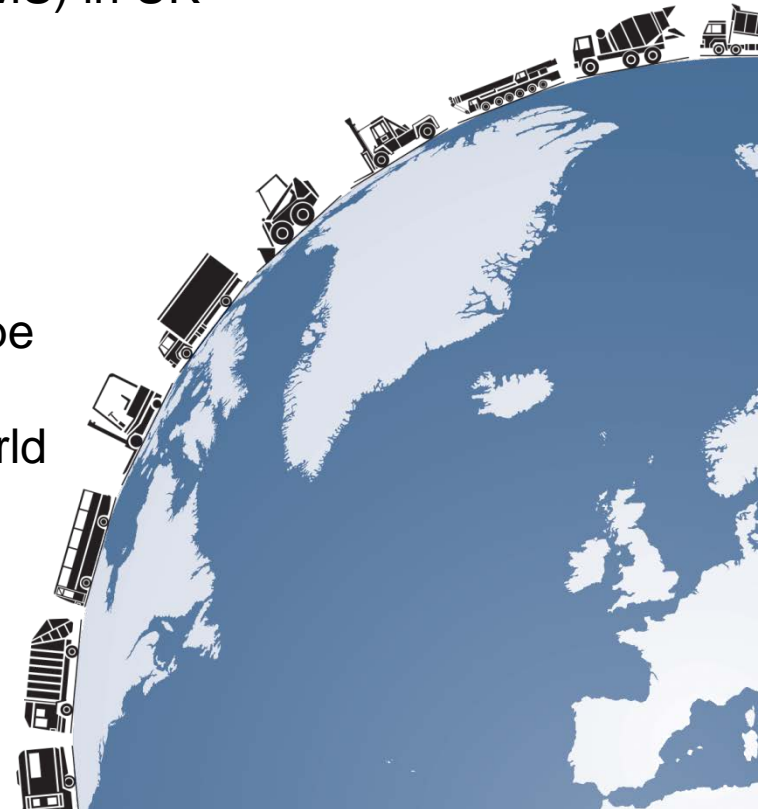
Overview

- A world leader in reversing safety systems.
- Safety & efficiency products for commercial vehicles and mobile plant machinery.
- Established in 1976. HQ in UK.
- Subsidiaries in USA, Canada, Germany, France, Italy, the Netherlands, South Africa, Poland & UK.
- Customers on every continent.
- OEM and aftermarket supply.
- ISO 9001:2008 compliant.



Pioneers

- **First** reversing alarm in Europe
- **First** rear-view Camera Monitor System (CMS) in UK
- **First** rear detection system in Europe
- **First** speaking reversing alarm in the world
- **First** self-adjusting reversing alarm in Europe
- **First** white sound reversing alarm in the world
- **Pioneer** of 'Birds Eye View' CMS for Commercial vehicles and mobile plant machinery



Current Market Concerns

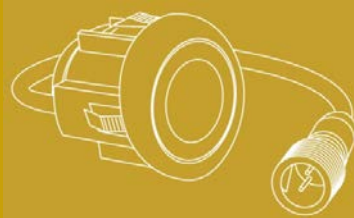
- Vehicle blind spots
- Vulnerable road user safety
- Driver Safety
- Driver information overload
- Crash for Cash scams and false insurance claims
- Specifications Schemes - CLOCS/FORS and Direct Vision Standard

Vehicle Safety Solutions

Camera Monitor Systems



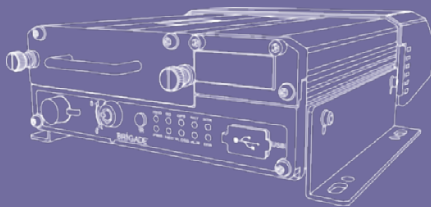
Ultrasonic Obstacle Detection



Reversing & Warning Alarms



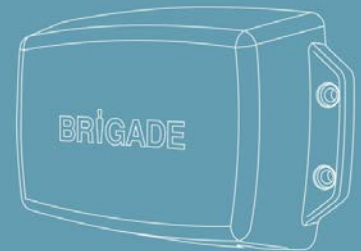
Mobile Digital Recording



Backeye® 360



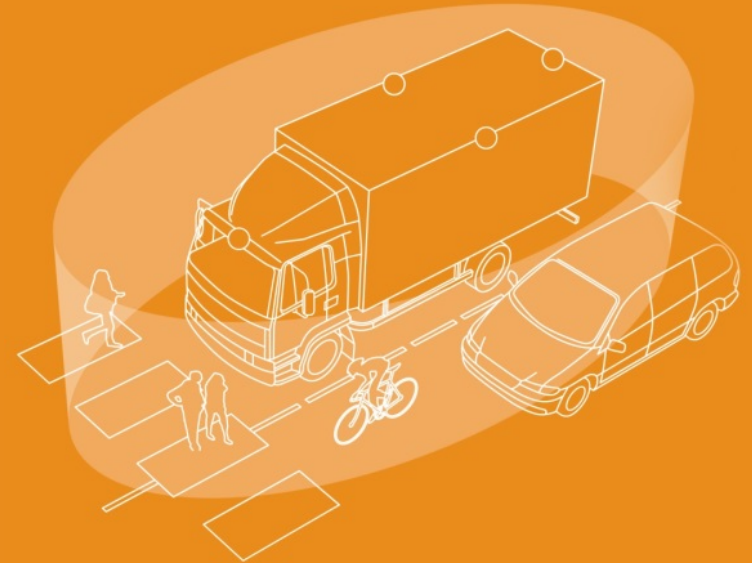
Radar Obstacle Detection



Backeye® 360

Backeye®360 is an intelligent camera monitor system designed to assist low-speed manoeuvrability by providing the driver with a complete surround view of the vehicle in real time.

4 Cameras
1 Image
0 Blind spots



Benefits

- ✓ Eliminates blind spots
- ✓ Comprehensive real time view of surrounding area in single image
- ✓ Wide angle camera views
- ✓ Reduced collisions with vulnerable road users
- ✓ Reduced vehicle damage and down time



EIS Waste

“Our driver was using a front end loader to empty large containers on a refuse collection. He emptied the first and second container, and while he was emptying the third staff began re-filling the empty bins. The manager later phoned to say we had not emptied one of the bins. I argued that we had, she disputed this but didn’t want to pursue the claim when I offered to send the CCTV footage recorded from the 360 cameras.

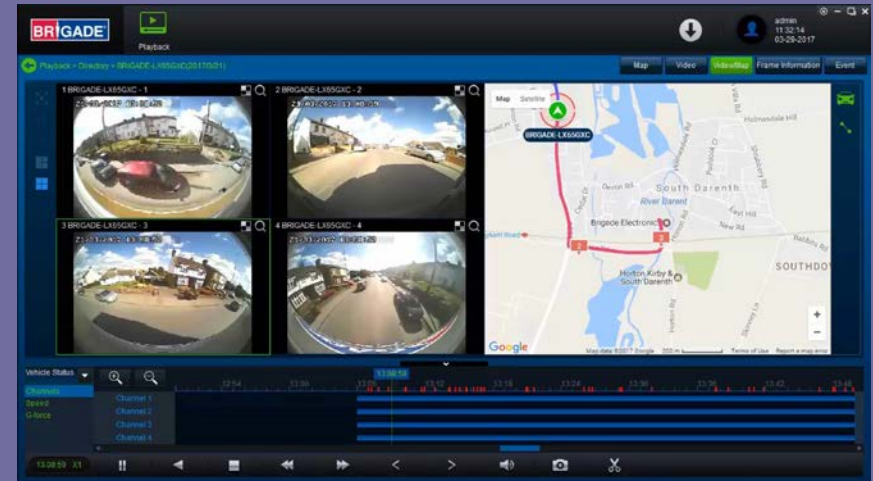
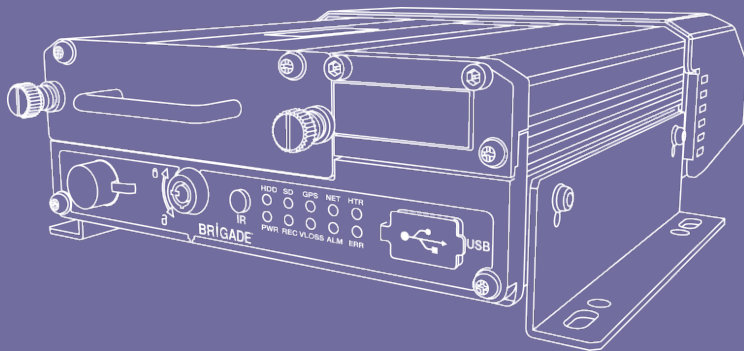
Before fitting the system, we would have returned to the site 20 miles away and re-empted the bin free of charge. The 360 degree camera systems are good for preventing accidents but there are greater benefits than safety alone. When connected to MDR, the wide angle lenses pick up much further a field than normal cameras.”

EIS Waste Transport Manager, Raymond Henderson

Mobile Digital Recording

8 & 4 Channel MDR – Mobile Digital Recorder

- Black box recorder
- 3G/Wifi capabilities
- Incident/accident analysis & evidence
- False claim prevention
- Theft & shrinkage deterrent



Features and Benefits

- Record up to eight channels simultaneously
- Up to 1164 hours (145 x 8 hour days) recording time
 - 500GB HDD storage – 4 Channel
 - 1TB HDD storage – 8 Channel
- Mirror/simultaneous recording on built in SD card
- Built in GPS receiver
- Built in G-Sensor (8 Channel only)
- Up to eight configurable trigger inputs
- Anti-vibration housing
- Audio Functionality
- Search by date, time or triggered events.
- Download the recording direct from MDR to a USB storage device

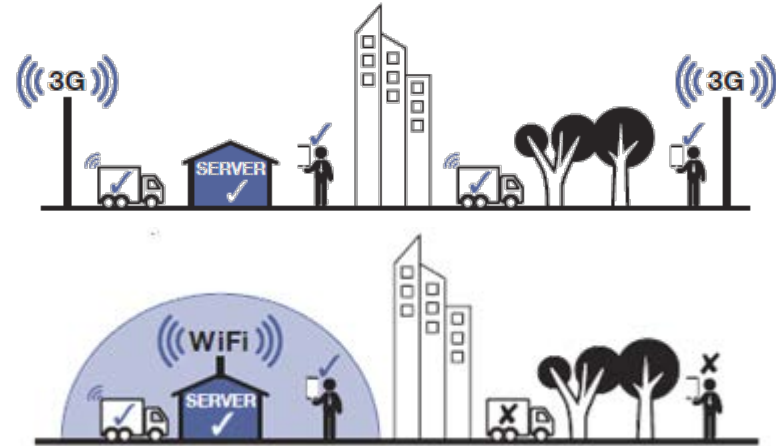


Benefits:

- ✓ Provides irrefutable evidence
- ✓ Protects drivers
- ✓ Assists in proving false claims
- ✓ Reduces insurance premiums
- ✓ Peace of mind for passengers and driver

3G/Wifi Capability

- Download data without physically going to the vehicle
- Set-up automatic download of triggered events
- Stream data remotely via 3G network
- Live View up to 36 cameras from multiple MDRs via 3G network
- Real-time GPS tracking via 3G network
- Immediate notification of triggered events via 3G network or scheduled summary of events on WiFi
- Mobile App to access live views, vehicle locations, create snapshots and receive alerts



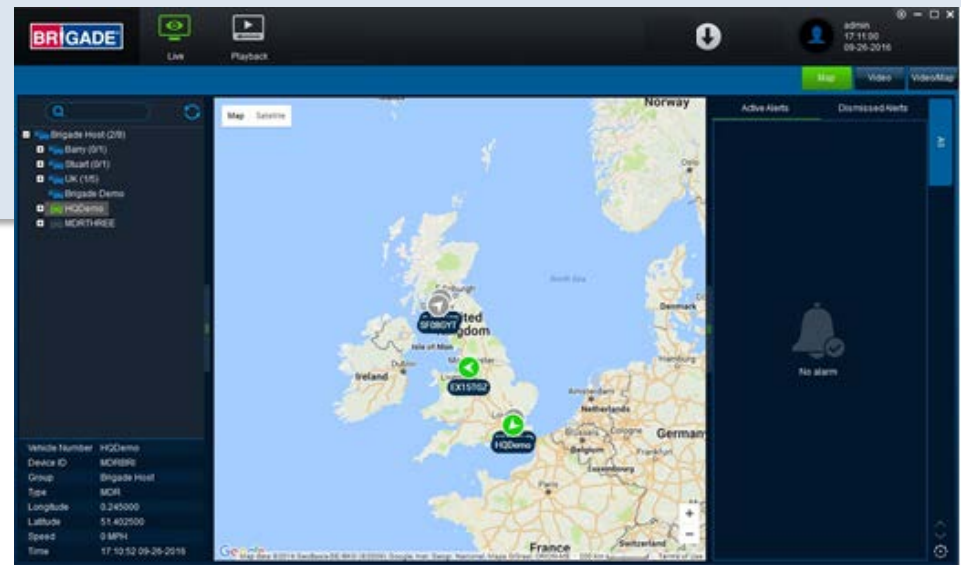
Brigade 3G Service Offering:

- 12 months 3G data service plan
- 500MB, 1GB or 2GB 3G SIM card
- Activation of SIM and set up of server
- Access to Brigade cloud server
- Identification of network/SIM issuers
- Technical helpline and online tutorial videos

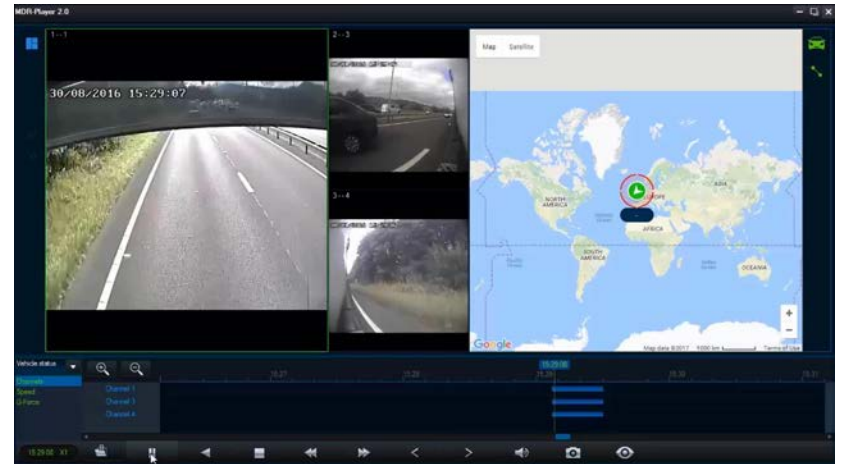
MDR with 3G

Brigade Service Offering

- Remote real-time access via dashboard or mobile app
- Playback of video
- Scheduled data downloads
- Triggered data downloads
- Manual data downloads



Footage



Benefits

- ✓ Irrefutable evidence in the case of accidents and legal proceedings
- ✓ Assists in proving false claims
- ✓ Provides protection for drivers
- ✓ Encourages driver best practise
- ✓ Enables effective driver training
- ✓ Reduces insurance premiums
- ✓ Peace of mind for passengers and drivers



EIS Waste

“In one incident our driver was on a dual carriageway and the lorry driver in front was driving erratically, speeding up and slowing down continuously. Our driver decided to overtake the vehicle to avoid it. He pulled into the outside lane to overtake and as he did the third party driver left their lane and bounced into our vehicle, ripping the side of their lorry.

The third party driver blamed our driver.

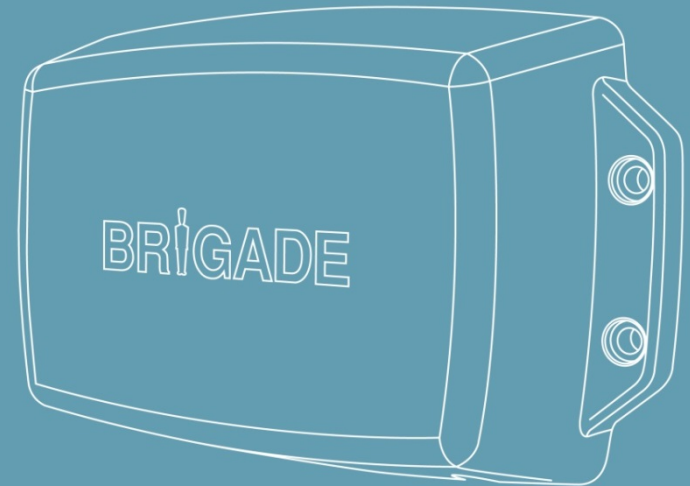
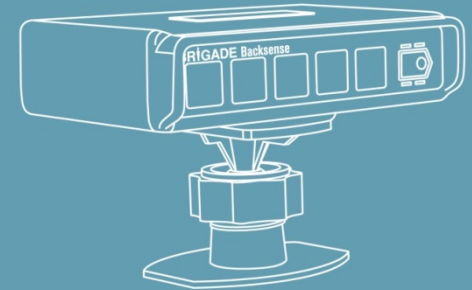
I sent a copy of the MDR footage to their transport manager who withdrew the claim.”

EIS Waste Transport Manager, Raymond Henderson

Radar Obstacle Detection

Backsense®

- Programmable Detection Range
 - BS-8000 – 3m to 30m detection range, 2m to 10m width
- Fixed Detection Range
 - BS-7030 – 3m detection range, 2.5m width
 - BS-7046 – 4.5m detection range, 3.5m width
 - BS-7060 – 6m detection range, 4.5m width



Features and Benefits

- Close detection zone with targeted beam pattern
- Controlled beam pattern to minimise false warnings
- Frequency modulated continuous wave radar technology
- Can trigger other safety devices such as camera monitor systems or reversing alarms
- 5 stage audible and visual display
- Suitable for both on- and off-road applications
- Rugged design for severe weather conditions and all terrains
- Effective through non-metallic objects
- Self-diagnostics alert
- Choice of detection ranges
- Comprehensive certification



Benefits:

- ✓ Unique to Brigade
- ✓ Well defined detection area
- ✓ Ideal for off-road applications
- ✓ Suitable for on-road applications
- ✓ Easy to use
- ✓ Comprehensive certification

Benefits

- ✓ Unique to Brigade
- ✓ Well defined detection area
- ✓ Ideal for off-road applications
- ✓ Suitable for on-road applications
- ✓ Easy to use
- ✓ Comprehensive certification



EIS Waste

“We have trialled the Backsense® system on Radar system on a Mercedes Econic refuse collection vehicle, as well as on some of the plant machinery, in operation at our busy recycling centre at Gallowhill. We want to give our drivers as much help as possible eradicating any blind spots and areas of danger around our vehicles. The Backsense device gives the driver an extra set of eyes at the rear of the vehicle and we will be installing the system to all plant on-site including forklifts and telehandlers.”

EIS Waste Transport Manager, Raymond Henderson

EV's & Hybrids Are Here



More than 2 million electric vehicles on the road worldwide

Hardware



Sample Sound



The Proof





Driving Global Safety

Any Questions?

Thanks For Listening



Bristol's Clean Transport Journey



Alex Minshull

City Innovation and Sustainability Service
Manager



BRISTOL

**2015 EUROPEAN
GREEN CAPITAL**

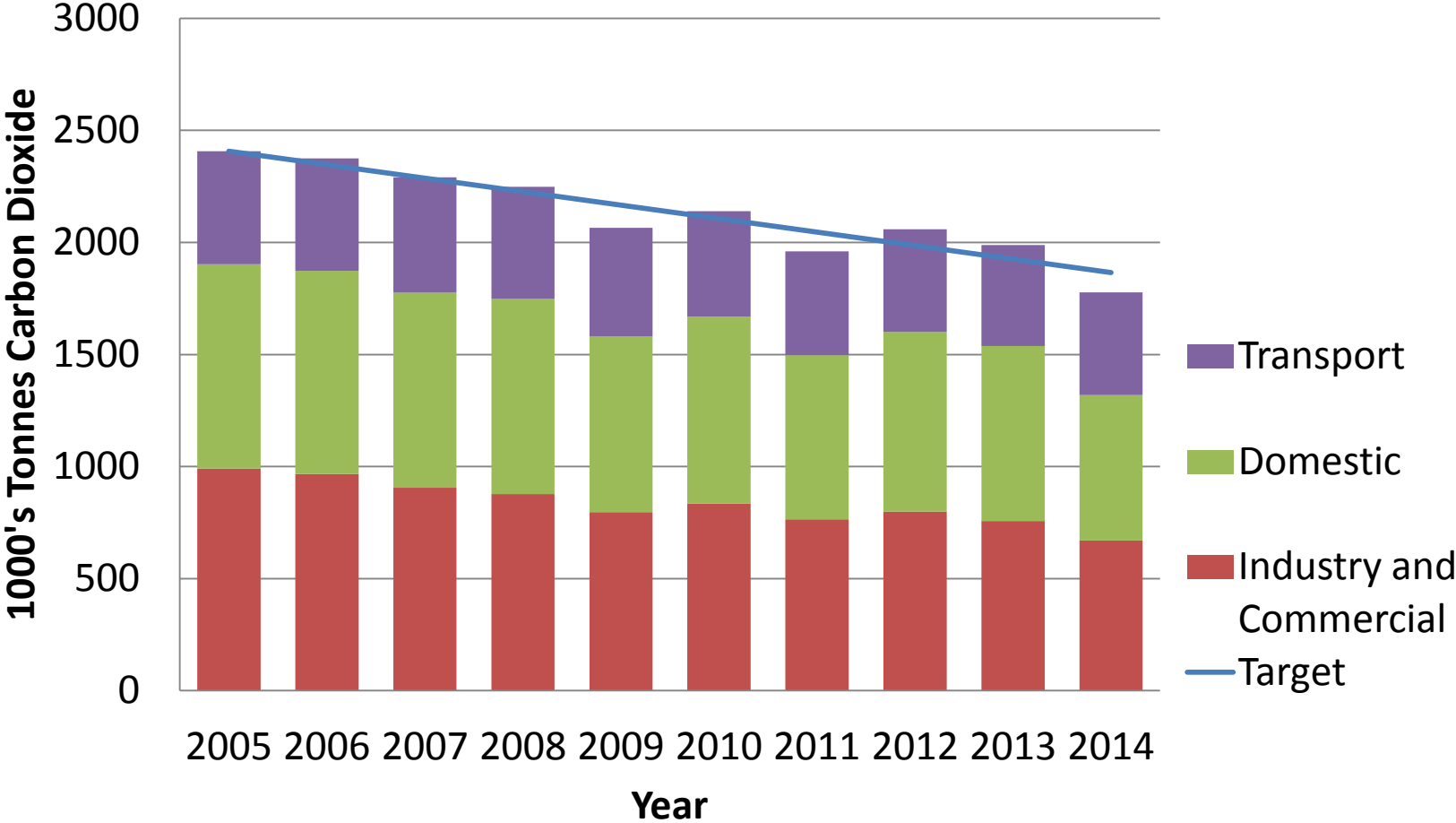
In it for good™

Continuing the Journey

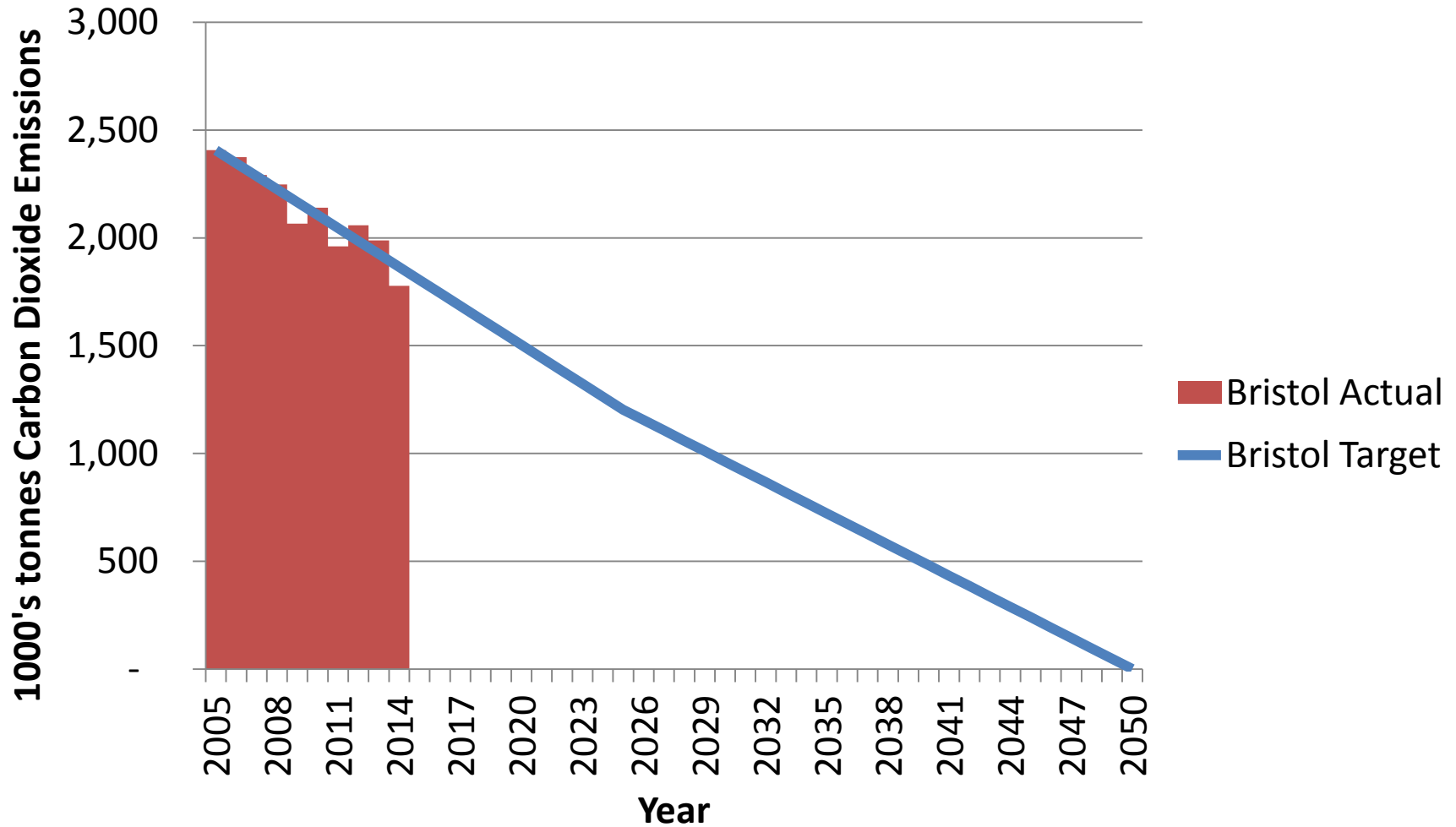
- Strong cross-party political commitment to action, specifically on:
 - Climate Change
 - Air Quality
- Mayor Marvin Rees elected with strong commitment to *“put Bristol on course to be run entirely on clean energy by 2050”*

Cleaning our Energy System

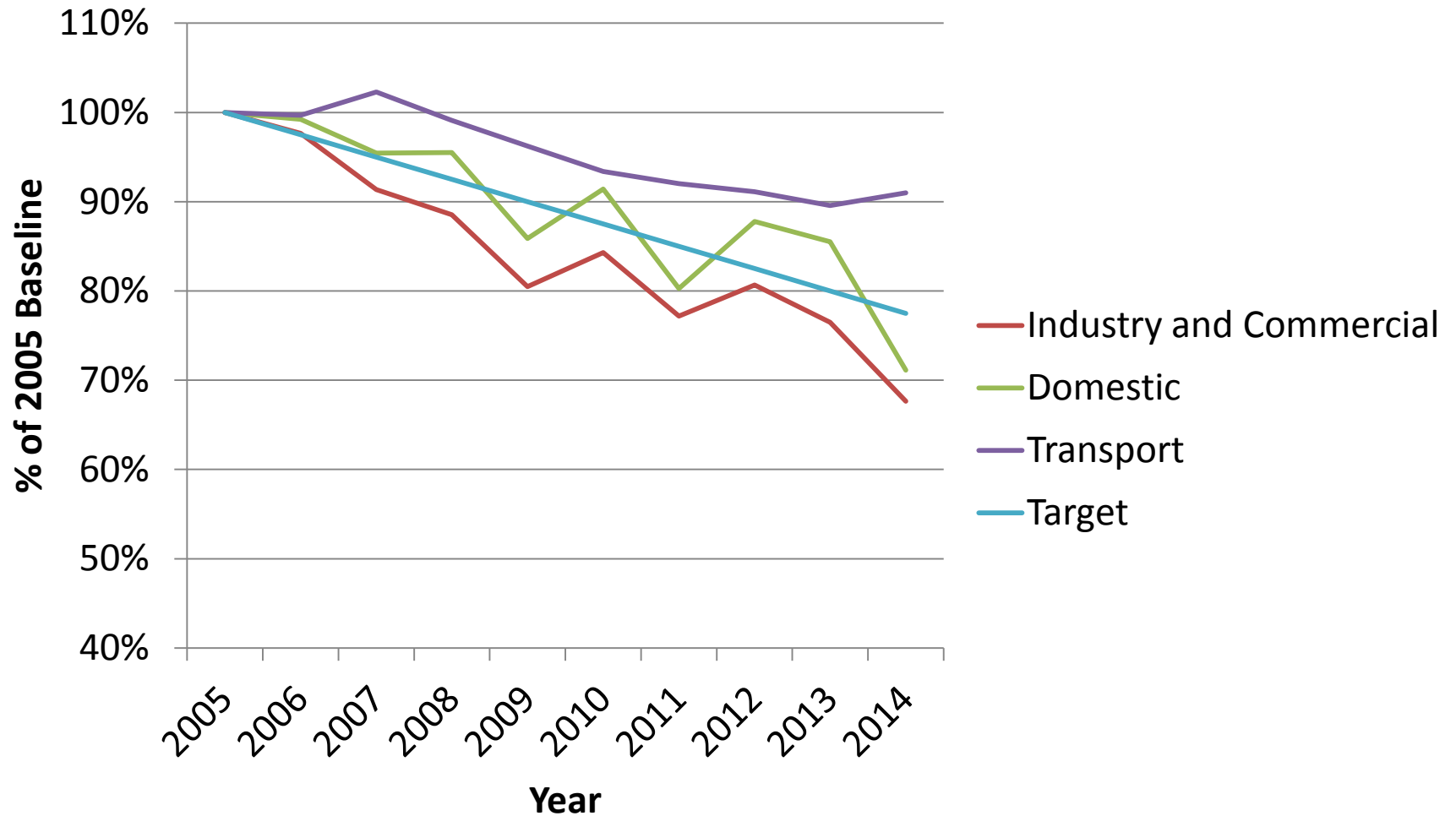
CO₂ emissions



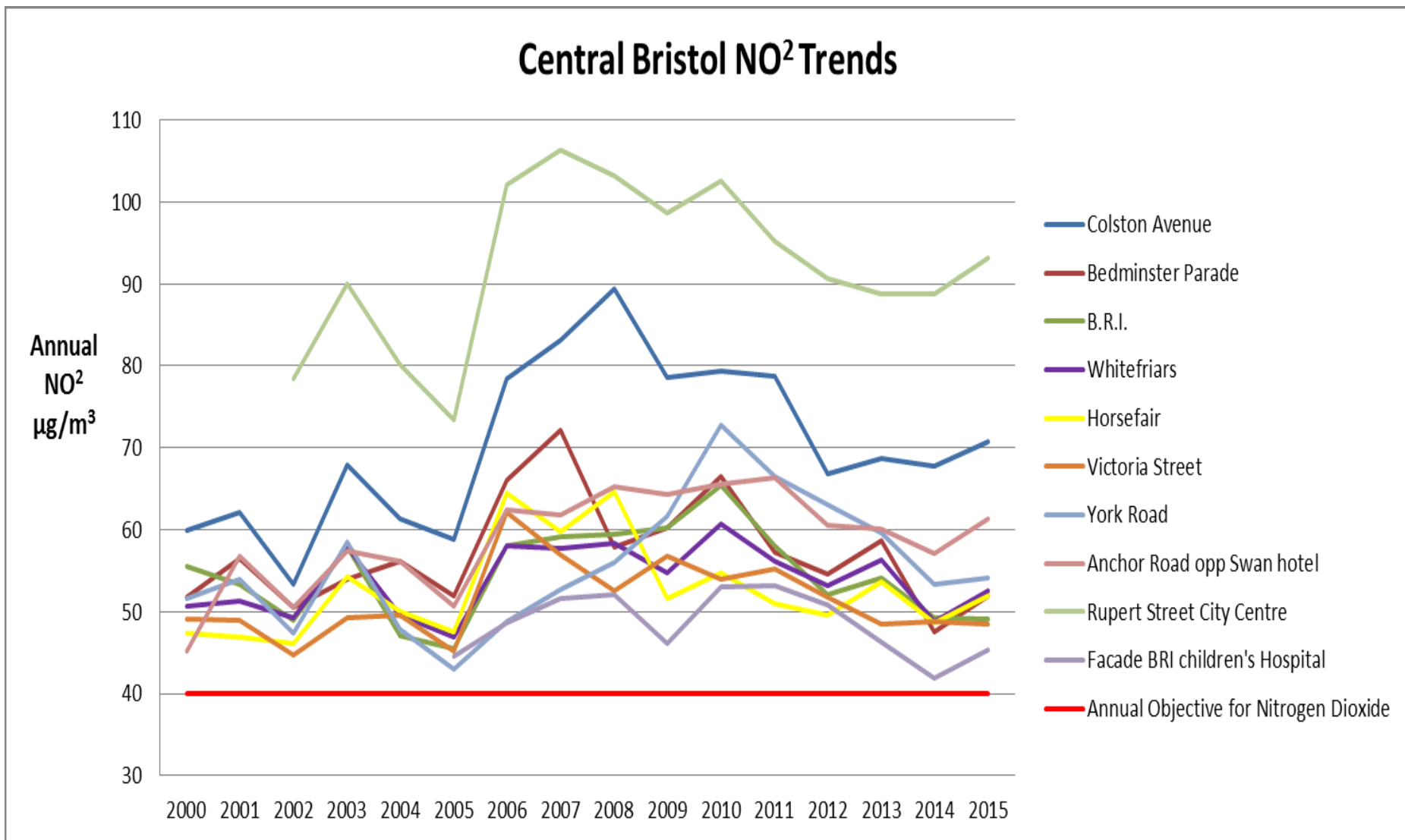
CO₂ On course for 2050!



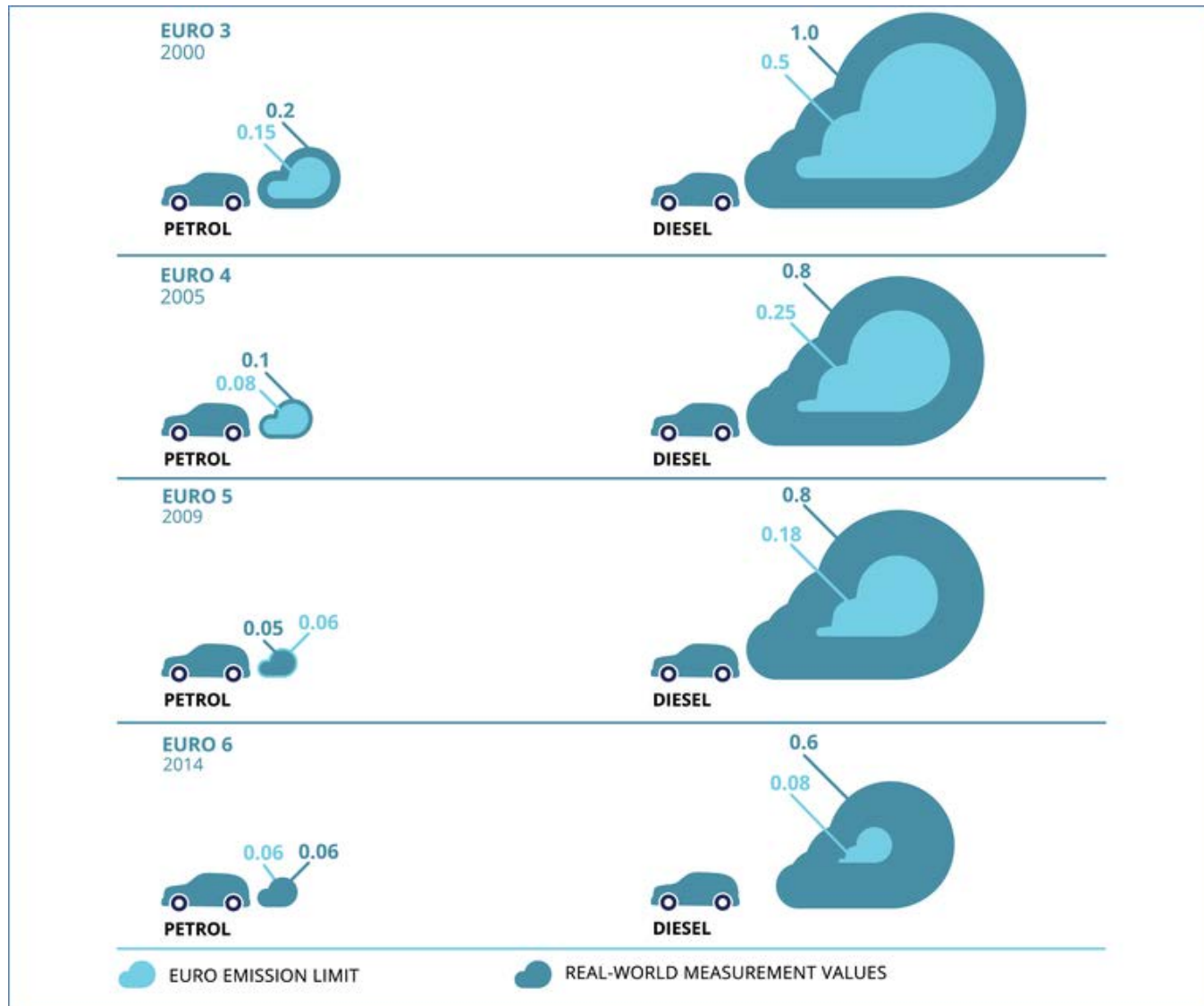
But not in the Transport Sector



Local air pollution is not improving



New vehicles aren't performing



Impacts of Air Pollution across the Life Course

Low birth weight

Smaller lungs

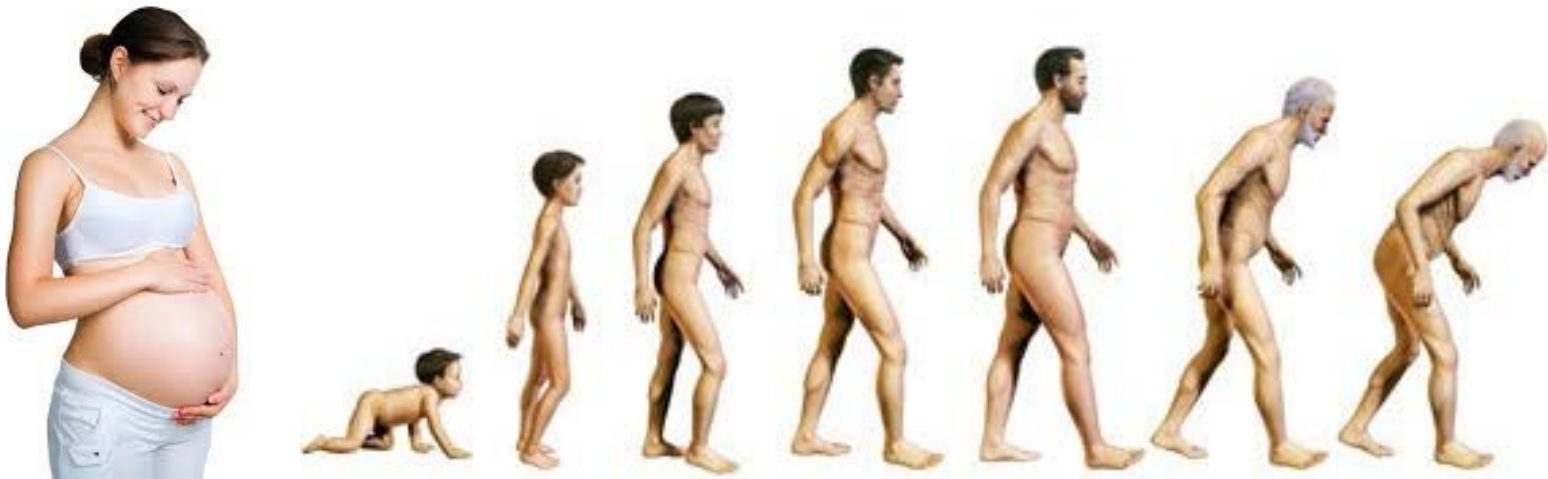
Cognitive ability?

Increased risk of chronic disease

Acute respiratory exacerbations

Acute and chronic

Premature death



Impacts of Air Pollution across the Life Course

Low birth weight

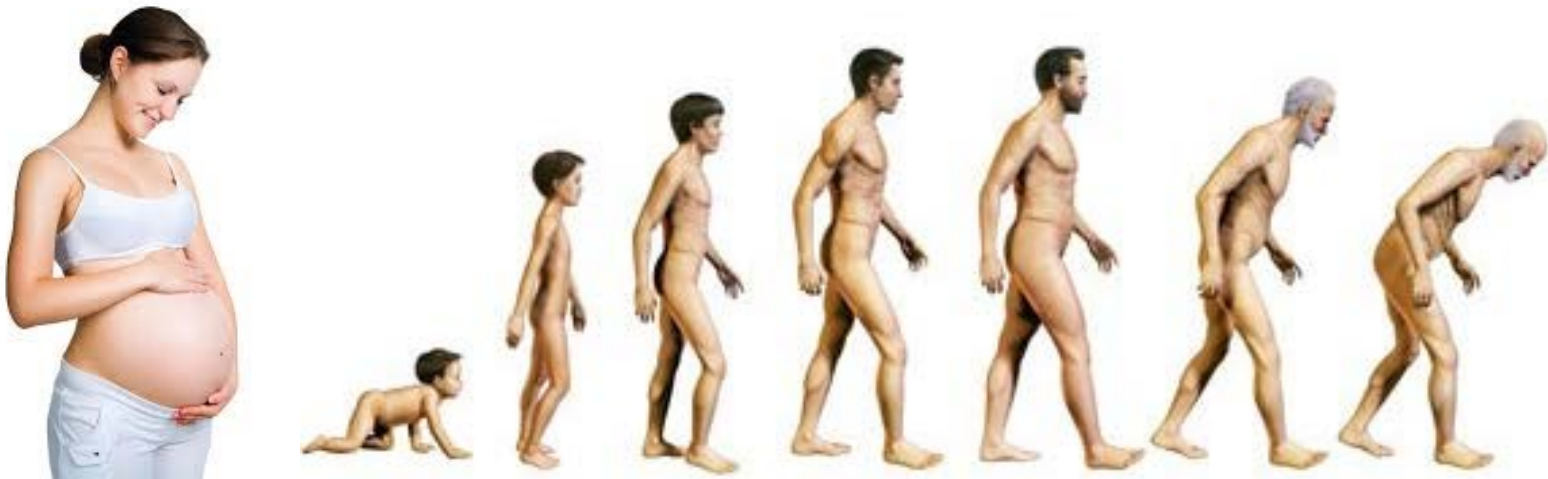
Smaller lungs

Cognitive ability?

Increased risk of chronic disease

Acute respiratory exacerbations

Acute and chronic
Premature death



Impacts of Air Pollution across the Life Course

Low birth weight

Smaller lungs

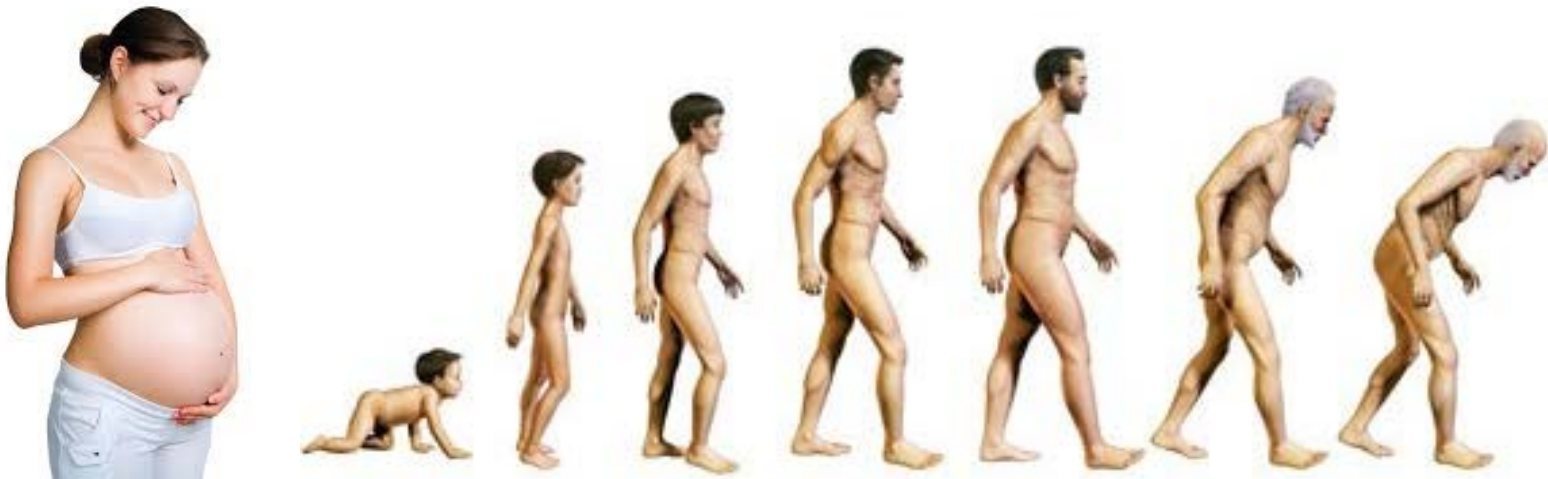
Cognitive ability?

Increased risk of chronic disease

Acute respiratory exacerbations

Acute and chronic

Premature death



Cleaning our transport system

Modal shift

- Suburban Rail (MetroWest)
- Rapid Transit (MetroBus)
- Cycling/Walking Development
- Resident's Parking
- 20mph
- Land Use Planning System

Cleaner vehicles

- Electric Vehicle Infrastructure: Go Ultra Low West
 - Clean Air Zones
-

GoUltraLow west



- Office of Low Emission Vehicles Funding Programme
 - Go Ultra Low Cities - £40m funding
 - Four cities: Nottingham, Milton Keynes, London and West of England
 - West of England's Programme £7m
 - Four Councils – Bristol, Bath, North Somerset and South Gloucestershire
-

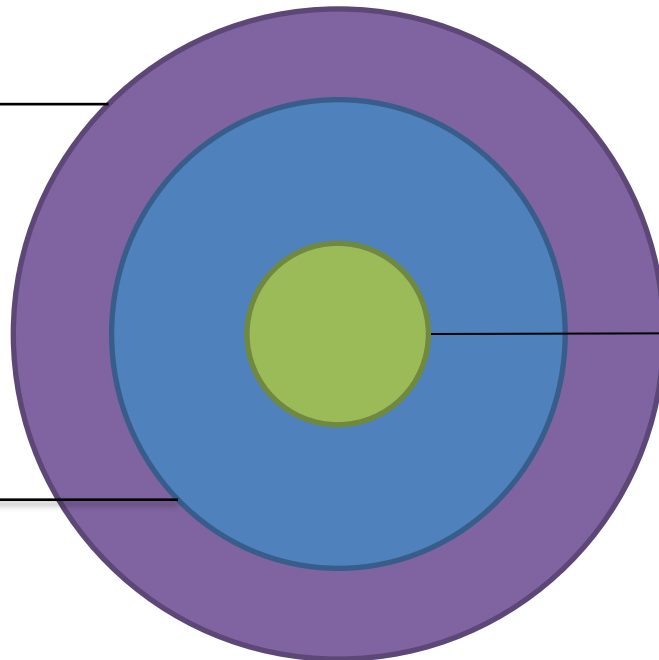
GoUltraLow west



Supporting infrastructure,
laying foundations for
growth

Communities and
engagement, raising the
profile of electric mobility

Low Emission Zones, making
electric mobility ubiquitous



GoUltraLow west



By **2020** we can achieve **5000** new ULEVS Appendix 1



Leading the way with **100+** ULEVs

200 additional charging points to take total up to **400** across the region



35 organisations have pledged **100** cars/vans

10%

Higher propensity for ULEV uptake than national average

3 HOV / Bus Lanes opened to ULEVs

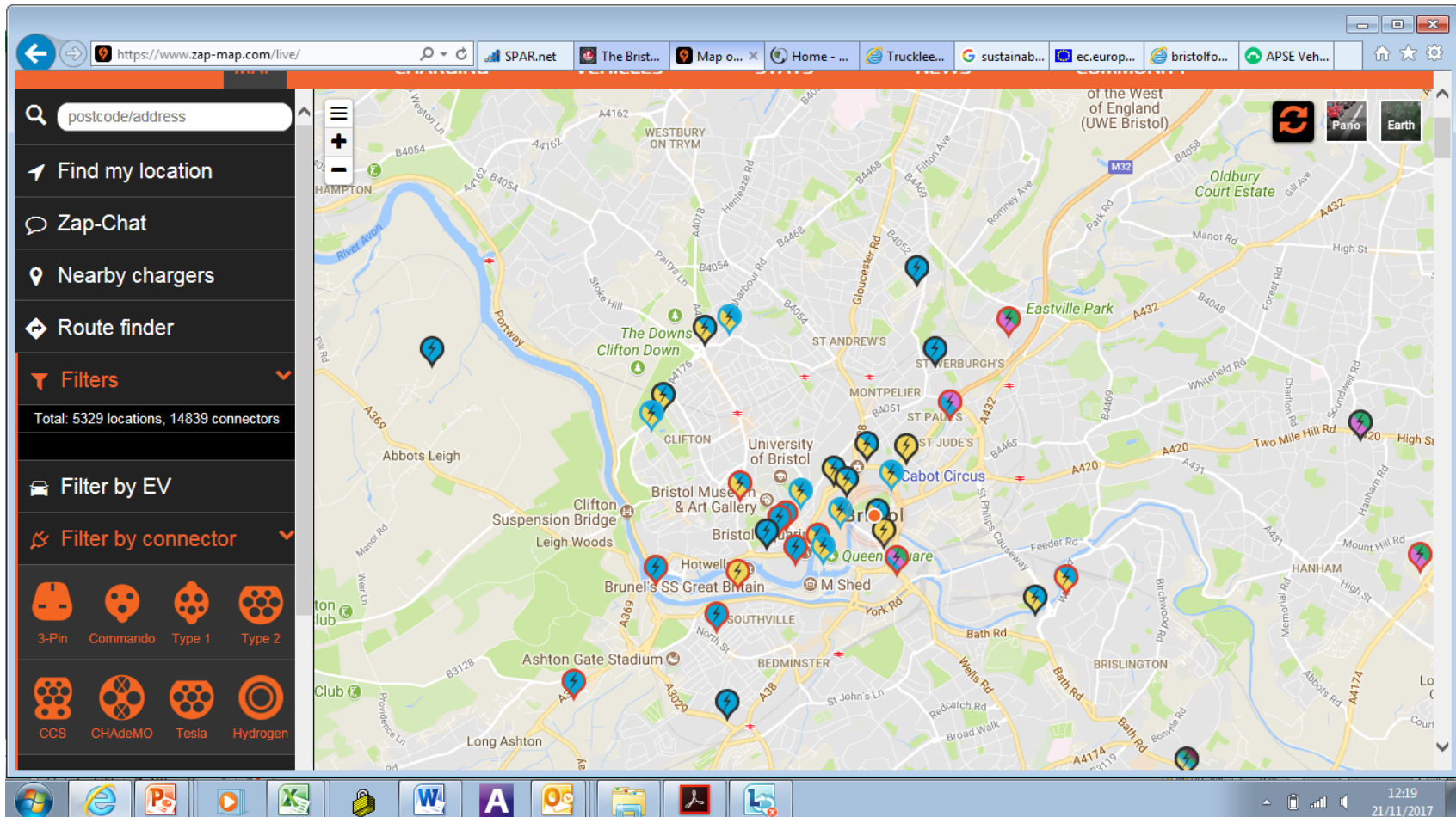


£

£

Fully considered business model to result in self sufficient charging network by 2020

Doubling the WoE 200 Charge Point Network



Electric Bristol City Council Fleet



All Electric Buses in Umea, Northern Sweden



Clean Air Zones

- New policy instrument from Government
- Charging vehicles to enter a zone based on their emission class
- 5 cities are required to implement them: Birmingham, Derby, Leeds, Nottingham, Southampton
- 20 other councils “Directed” to develop action plans by Government

National Clean Air Zone Framework

Clean Air Zone class	Vehicles included
A	Buses, coaches and taxis ²³
B	Buses, coaches, taxis and heavy goods vehicles (HGVs)
C	Buses, coaches, taxis, HGVs and light goods vehicles (LGVs)
D	Buses, coaches, taxis, HGVs, LGVs and cars

Vehicle type	NO _x Emissions limit
Bus/coaches	Euro VI
HGV	Euro VI
Van (1305-3500kg)	Euro 6 (diesel) Euro 4 (petrol)
Car/light commercial (up to 1305kg)	Euro 6 (diesel) Euro 4 (petrol)

Electric Freight Consolidation



130 new Biogas buses for Bristol



Looking Forward

- Comprehensive package of infrastructure, regulation and communication underway
 - We are actively driving the transition from Fossil Fuels to Clean Fuels
 - Innovation will create new opportunities and new threats
 - We are on an exciting journey!
-

Thank you!



Alex Minshull

City Innovation and Sustainability Service
Manager

alex.minshull@bristol.gov.uk

07795 446123

