

UK Policy Framework and Market Development

UK eBus Summit 2016 – 10th November 2016

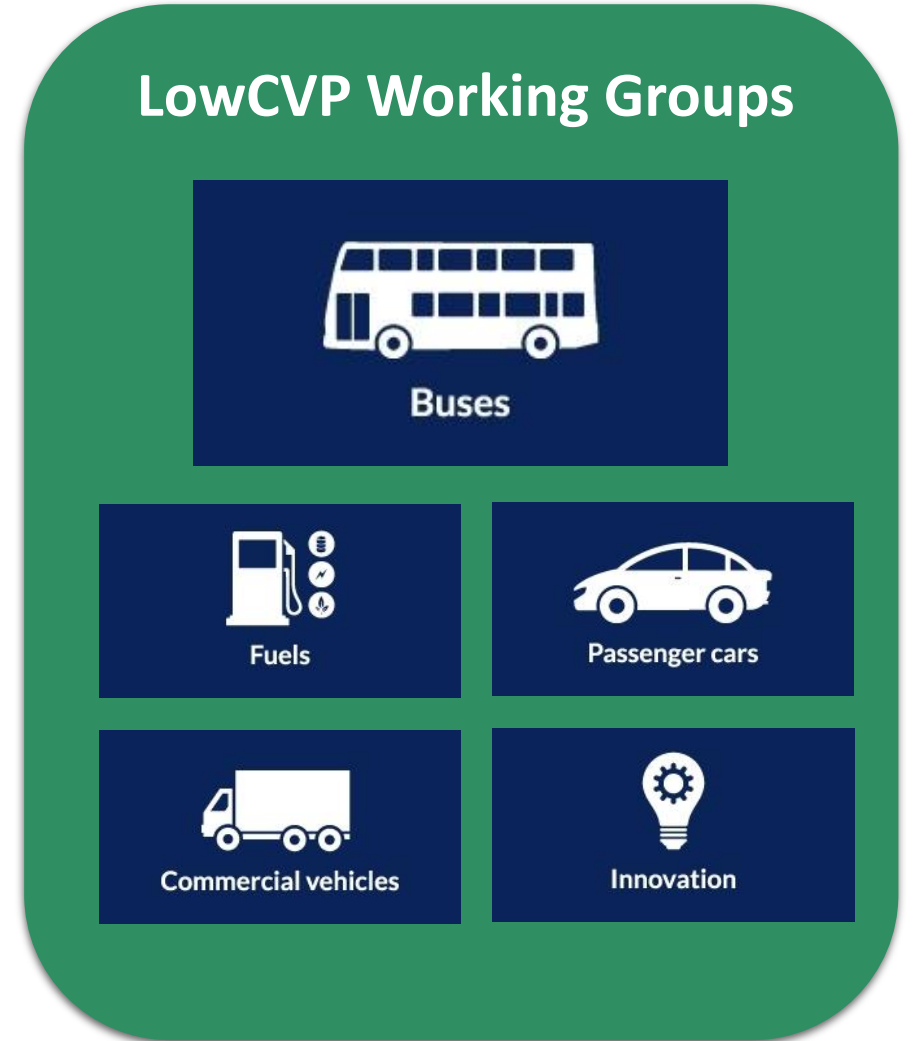
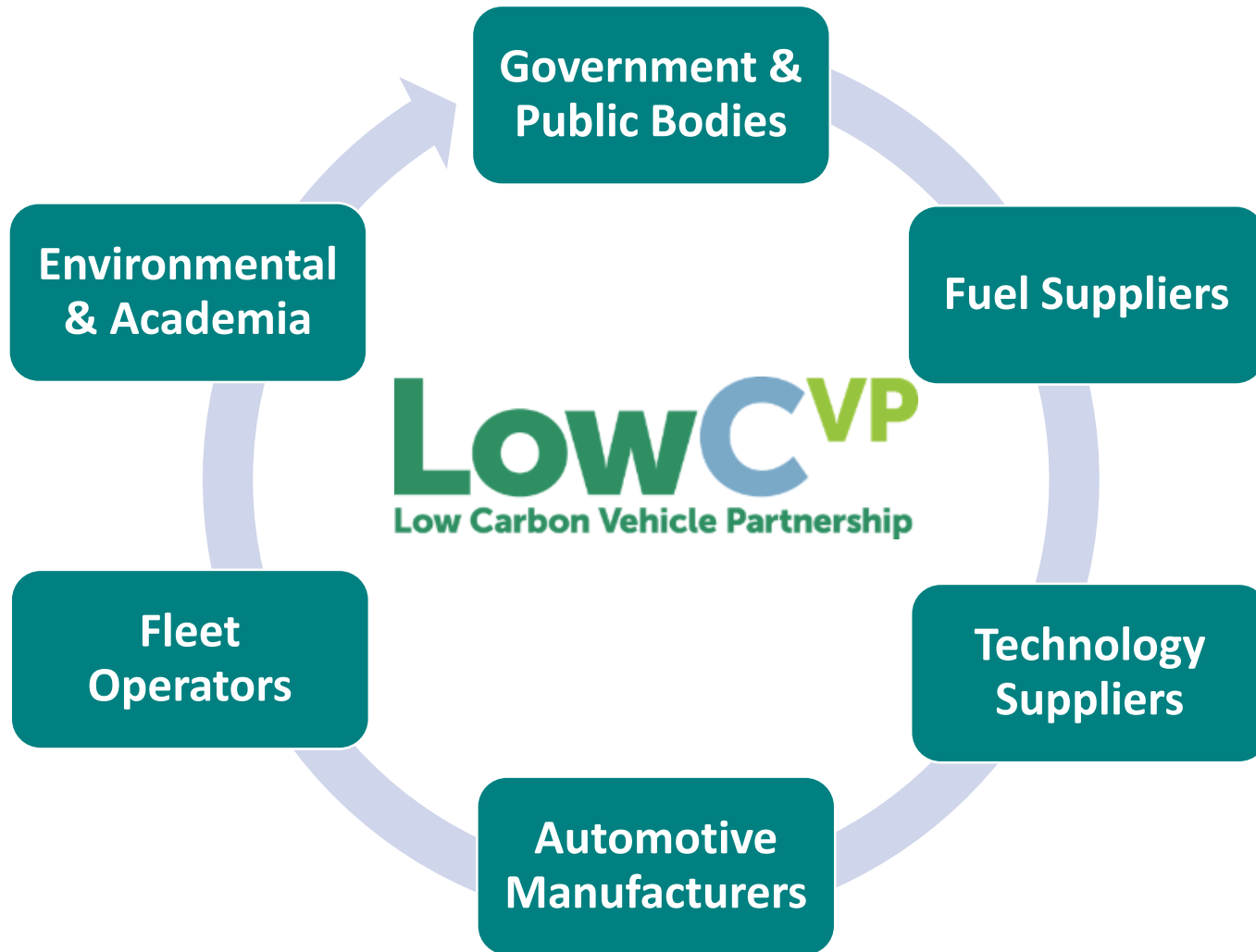
Holborn, London



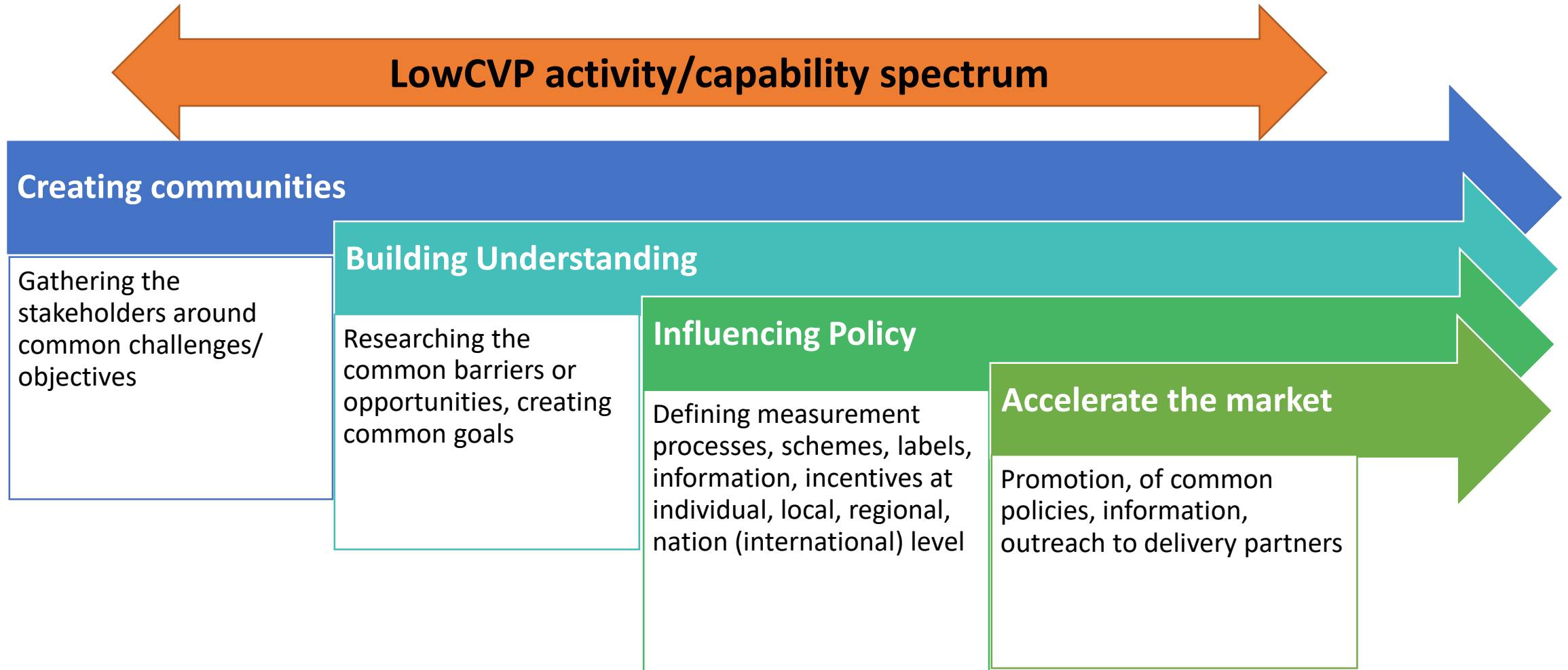
Andy Eastlake

Managing Director, LowCVP

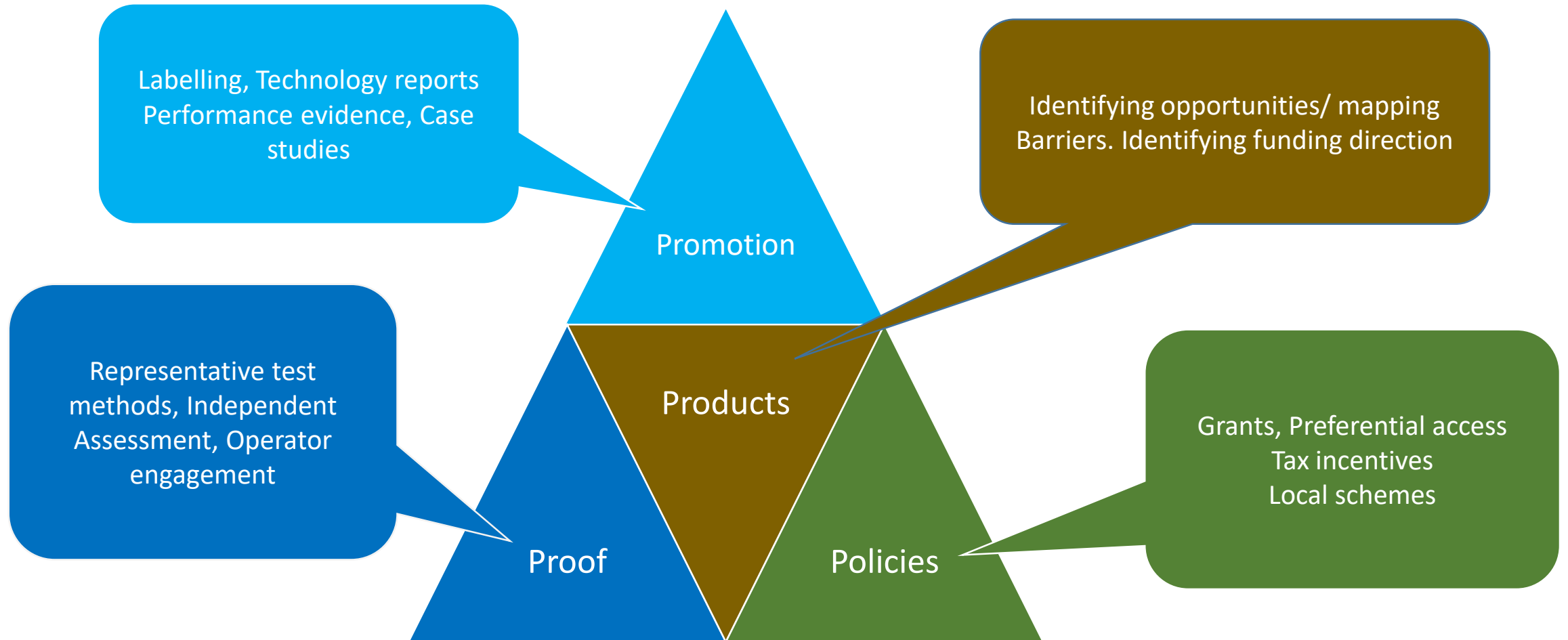
LowCVP is a unique public-private membership organisation that *exists to accelerate shift to low carbon vehicles and fuels and stimulate UK business opportunities*



How the LowCVP operate

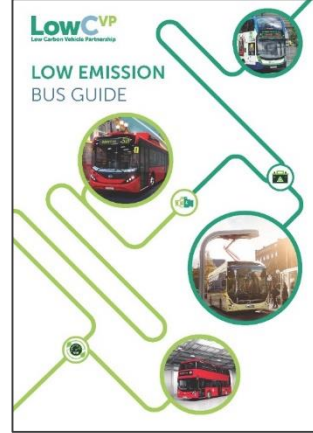
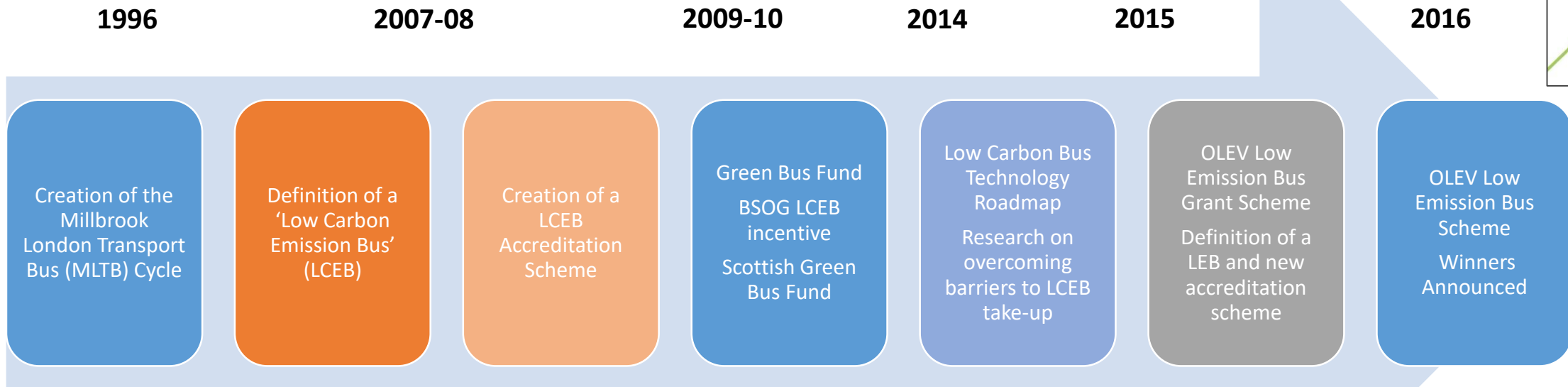


The 4 'P's – LowCVP role, creating shared solutions



How did we get here?

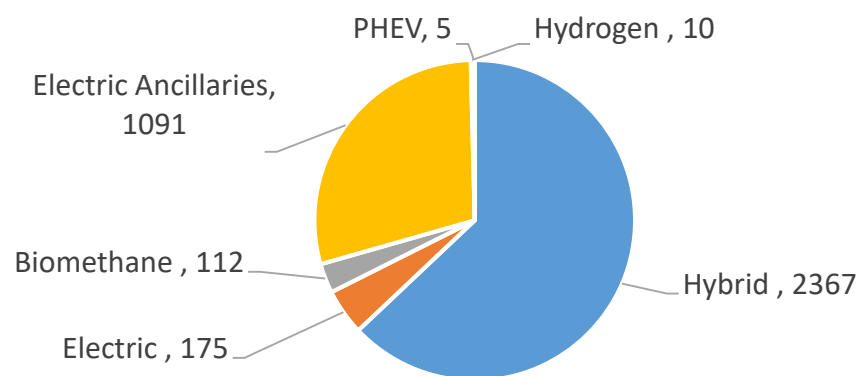
Key milestones in the evolution of green bus policy in the UK



20 years of collaborative development of products, performance and policy

Market: Stimulation and Growth

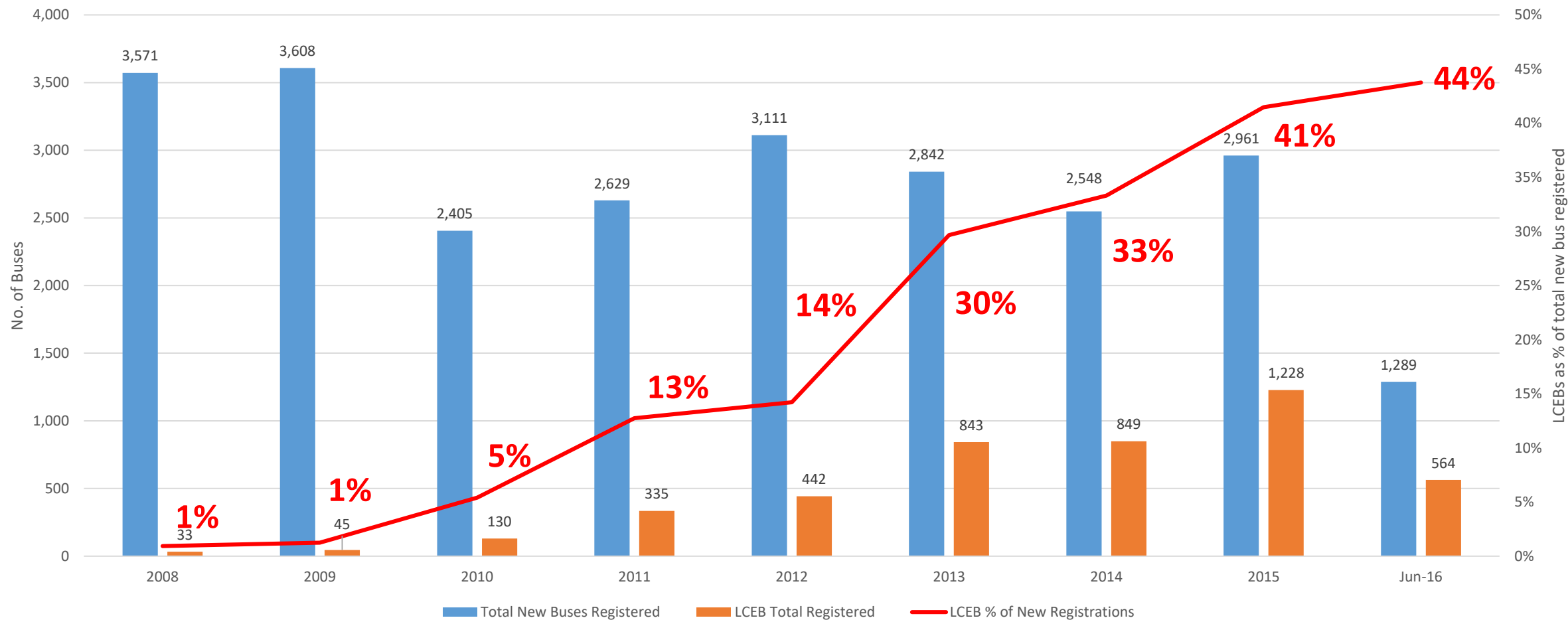
- Low Carbon Emission Bus (LCEB) defined as producing a minimum of **30% GHG saving** on a **Well-to-Wheel basis vs Euro III diesel equivalent**.
- DfT's Green Bus Fund distributed **£88m** to local authorities and operators across England to purchase **1240** Low Carbon Emission Buses (LCEBs).
- Operation support through BSOG LCEB incentive: 6p/km.
- Scottish Green Bus Fund supported **269** buses with £12.9m (+£3m for round 6)
- Operational success of LCEBs has led to **over 4,000** LCEBs in operation today (Oct, 2016).
- **41% of new bus registrations** in 2015 in the UK were LCEBs (SMMT New Bus Registrations).
- 6 unique technologies and fuels represented by 27 different models from 7 manufacturers.



Visit the
[LowCVP Low Emission Bus Portal](#)
for more information.

Growth of LCEBs in operation

LCEBs as a percentage of New Bus registrations (SMMT 2008-2016 TD)



Low Emission Bus Scheme

- **£30m** Low Emission Bus Scheme created to continue the push to decarbonise the bus market and target reduction in air quality emissions between 2016-2019.
- **LowCVP UK Bus (LUB)** test incorporates MLTB cycle with additional **rural** cycle.
- Creation of Low Emission Bus definition:
 - At least **15% GHG saving** on a Well-to-Wheel (WTW) basis vs. a Euro V diesel bus of equivalent passenger capacity.
 - **Euro VI** or equivalent engine.
- Focus on short-term challenges and long-term deployment:
 - **Proportional funding** for WTW GHG saving (greater savings = increased funding)
 - **‘Zero Emissions Capable’** range: £1,000 / km up to 30km.
 - Funding available for **supporting infrastructure**.

LowCVP Approved Test Facility MILLERPODS

Low Emission Bus Scheme Certificate

Customer: Scania Great Britain		Customer Address: Deane Drive, Tongwell, Milton Keynes	
Test Purpose: LEB testing		DYNAMOMETER SETTINGS	
Vehicle Manufacturer: ScaniaADL	Vehicle weight (kg): 11075.0	INLET(A): 3297 K3	
Vehicle Type & Number: Scania KUB YP14 TSD	Gross Weight (kg): 18250.0	P: 190.39 N	
Engine: OC88 101500 hp	Passenger Capacity: 70	P: 42300.0 N/mm²	
Transmission: Auto	Capacity within GVW: OK	P: 0.43004 N/mm²	
EURO VI equivalent Vm	Manufacturer Certified	P: 0.001444 N/mm²	
Net Heating Energy (MJ/kg): 47.89	Test Period: GBA Crosslinked Bioethane	Net Green Calculation:	
White Tank Factor (g CO2e/kg): 11.11	WTW method:		
Tank-to-Wheel Factor (g CO2e/kg): 5.49	Fuel Type: Biomethane		

Emissions and Energy consumption results from approved test facility - Average 3 tests

Test Phase	HC (g/km)	CO (g/km)	NOx (g/km)	PM (g/km)	CO ₂ (g/km)	CH ₄ (g/km)	H ₂ O (g/km)	Fuel Consumption (kg/100 km)
Rural	0.079	0.435	0.364	N/A	872.8	0.095	0.002	11.84
Urban London	0.250	0.380	0.528	N/A	1226.0	0.160	0.305	44.72
Urban London	0.388	0.426	1.523	N/A	1836.2	0.385	0.305	65.02
MLTB Average	0.223	0.370	0.735	N/A	1387.3	0.232	0.030	50.64
LUB Average	0.127	0.397	0.548	0.020	1154.4	0.107	0.305	42.11

Total Tank-to-Wheel GHG CO₂ equivalent

Test Phase	CO ₂ (g/km)	CH ₄ (g/km x 25)	N ₂ O (g/km x 298)	TTW GHG (CO ₂ g/km)
Rural	1.7	0.077	0.00	4.2
Urban London	2.5	0.399	0.00	6.4
Urban London	3.5	0.791	0.00	13.3
MLTB	2.8	0.610	0.00	9.4
LUB Total Average	2.7	0.176	0.00	6.8

Electric energy consumption and charge efficiency

Test Phase	Total measured energy consumed on vehicle (kWh)	Distance covered km	Charging efficiency
Rural	n/a	n/a	n/a
Urban London	n/a	n/a	n/a
MLTB	n/a	n/a	n/a
LUB	n/a	n/a	n/a

Well-to-Wheel GHG CO₂ equivalent

Test Phase	Fuel/Energy used (kg/km)	Total Fuel Energy (MJ/km)	Calculated WTT** GHG Emissions (CO ₂ equivalent g/km)	Calculated TTW** GHG Emissions (CO ₂ equivalent g/km)	Calculated WTW*** GHG Emissions (CO ₂ equivalent g/km)
Rural	0.118	15.76	149.43	4.21	173.65
Urban London	0.407	21.42	217.85	5.45	244.43
Urban London	0.609	31.86	320.51	13.31	353.82
MLTB	0.306	40.28	189.18	6.96	277.81
LUB Total Average	0.422	70.17	244.72	9.48	270.59

Date Generated by: [Signature] Date Approved by: [Signature]

On behalf of test facility: [Signature] On behalf of LowCVP: [Signature]

Low Emission Bus Certificate Summary

GHG Well-to-Wheel (g CO ₂ e / km)	230.8
Fuel V Average Diesel Equivalent (g CO ₂ e / km)	118.4
Zero Emission operating range (km)	N/A
WTW GHG saving† (g CO ₂ e / km)	906.8
% WTW GHG saving† (g CO ₂ e / km)	60%
Approved as Low Emission Bus† (15% saving or more)	YES

*** goes to input to LUB green fuel calculator

** TTW - Tank-to-Wheel

*** WTT - Well-to-Tank

† compared with Euro 5

COMMENTS: * Calculated measured via Fourier Transfer Spectroscopy (FTIR) values in RED are below level of detectability. ALL HC ASSIGNED TO BE MAXIMUM FOR GNC. N₂O ASSIGNED TO BE ZERO (LowCVP ARI) 43 correct + 27 Standard data from GBA.

Test Numbers: ML2015003 16/23/2015, ML2015004 16/23/2015, ML2015005 16/23/2015

Created/checked/signed by: [Signature] On behalf of bus manufacturer: [Signature]

Created/checked/signed by: [Signature] On behalf of LowCVP/WT: [Signature]

- **OLEV Low Emission Bus Winners: Total of 326 buses funded**
- **£7.65m** for Infrastructure to support future deployment of more LEBs.

Visit the
[LowCVP Low Emission Bus Portal](#)
 for more information on
 accredited LEBs.

Low Emission Bus Showcase at LCV 2016

- LowCVP members provided a selection of LEBs at largest Low Carbon Vehicle technology event in UK:
 - Pure electric, dedicated biomethane, diesel hybrids, biomethane range extender, flywheel hybrids.



ADL Enviro400H City



BYD Pure Electric 10.8m



Reading Buses Hybrid



Optare Solo EV



Scania ADL300



Torotrak Flybrid

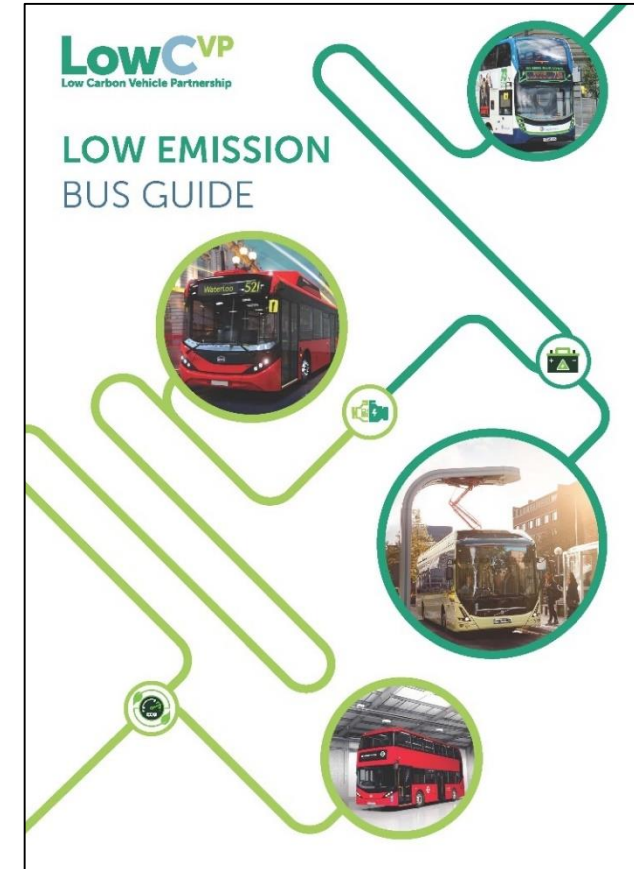


Volvo B5LH

**LowCVP aspiration for 2020:
Every new bus sold to be a Low Emission Bus!**

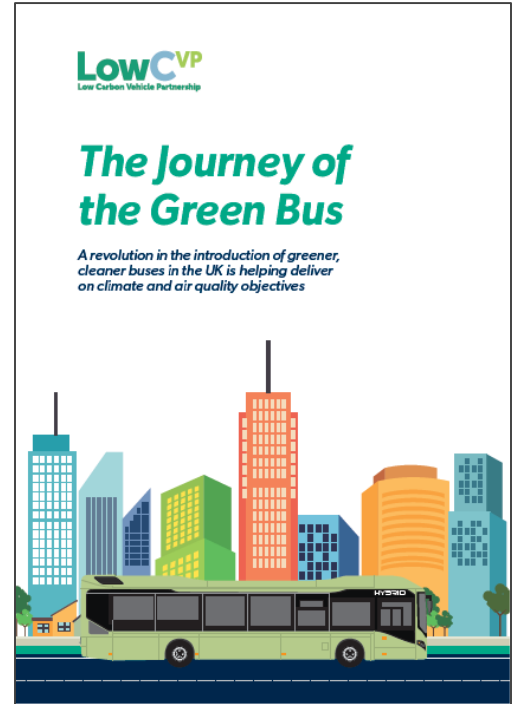
LowCVP Low Emission Bus Guide

- **Low Emission Bus Guide** created to assist bus fleet operators and local authorities procure clean and green buses.
- The LEB Guide:
 - Set out the **business, environmental and operational case** for using low emission buses including **OEM products** and **retrofit equipment**.
 - To provide greater depth of understanding about the **availability of low emission bus technologies and associated infrastructure**, and to identify the operational context to which they are best suited.
 - To provide case studies of real world experience of operators of LEBs.
- LEB Guide was launched at European Bus Expo 1-3rd November at NEC, Birmingham. [Interactive pdf available for free download](#) from LEB Portal.
- Dissemination workshops and webinars in 2017 for local authorities and operators.



Key LowCVP Events and Publications

- UK eLIPTIC e-Bus Summit: LowCVP ‘**A Green Bus for Every Journey**’ Launch
 - 10th November / DoubleTree by Hilton West End, London
- Zero Emission Bus Conference: LowCVP chaired session
 - 30th November & 1st December / City Hall, London
- Low Carbon Britain: Low carbon and low emission vehicle policy development
 - 1st December, Institution for Civil Engineers.
- LowCVP Bus Working Group meeting
 - 12th January, London
- UK Bus Summit 2017: LowCVP ‘**Any Journey by Green Bus**’ Launch
 - 9th February 2017 / QEII Conference Centre, London
- LowCVP Low Emission Bus Workshops 2017: Operators and Local Authorities
 - Manchester in early 2017, others tbc later in 2017

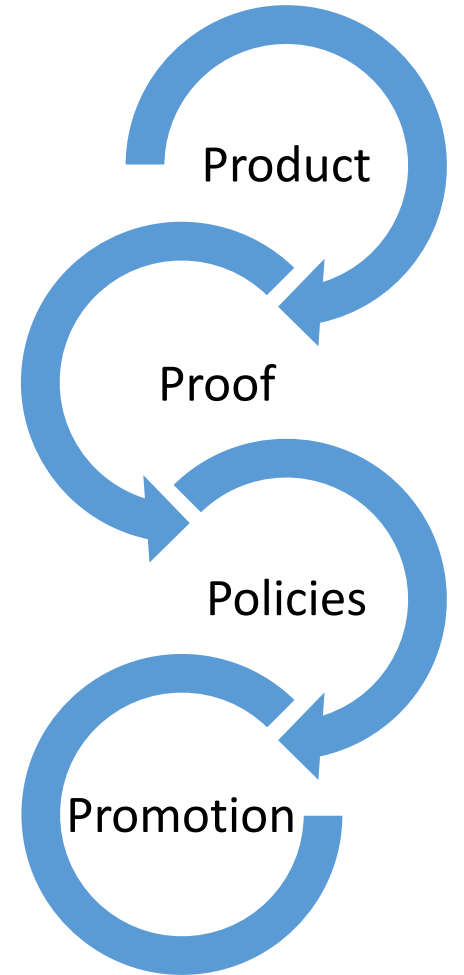


Visit the
[LowCVP Low Emission Bus Portal](http://www.lowcvp.org.uk/low-emission-bus-portal)
to download reports.

LowCVP Events: <http://www.lowcvp.org.uk/events.htm>

Summary of success through collaboration

- Two decades of development to truly make the shift to a lower carbon and lower emission bus market, illustrating **LowCVP membership benefits**:
 - **Long-term collaboration** to develop low carbon products
 - Developed world renowned **evidence-based testing** regimes.
 - **Influenced policies** which support growth of low carbon market in UK.
 - **Promoted range and benefits** of low carbon products to wider audiences.



Efficient mobility, lower carbon, cleaner air

Creating the platform for robust support of low emission and fuel efficient technologies

- ❑ **Connect:** With privileged access to information, you'll gain insight into low carbon vehicle policy development and into the policy process.
- ❑ **Collaborate:** You'll benefit from many opportunities to work – and network - with key UK and EU government, industry, NGO and other stakeholders
- ❑ **Influence:** You'll be able to initiate proposals and help to shape future low carbon vehicle policy, programmes and regulations

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LowCVP is a partnership organisation with over 180 members with a stake in the low carbon road transport agenda.