How quickly will EVs penetrate the UK bus parc?

Low Emission Bus Workshop Cardiff, 19th July

Principality Stadium

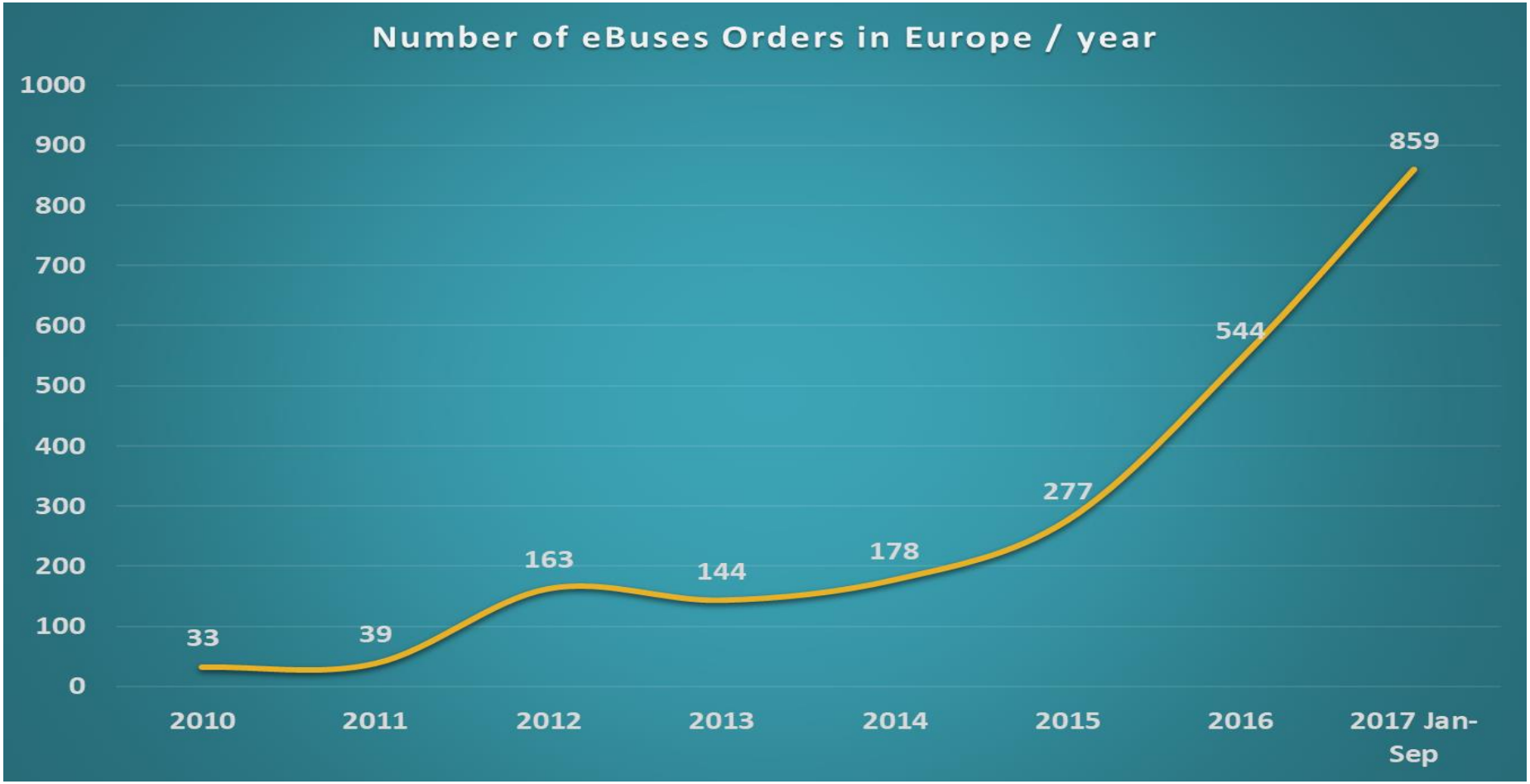
LowCVP
Low Carbon Vehicle Partnership
Connect | Collaborate | Influence

Discussion Panel

European EV uptake

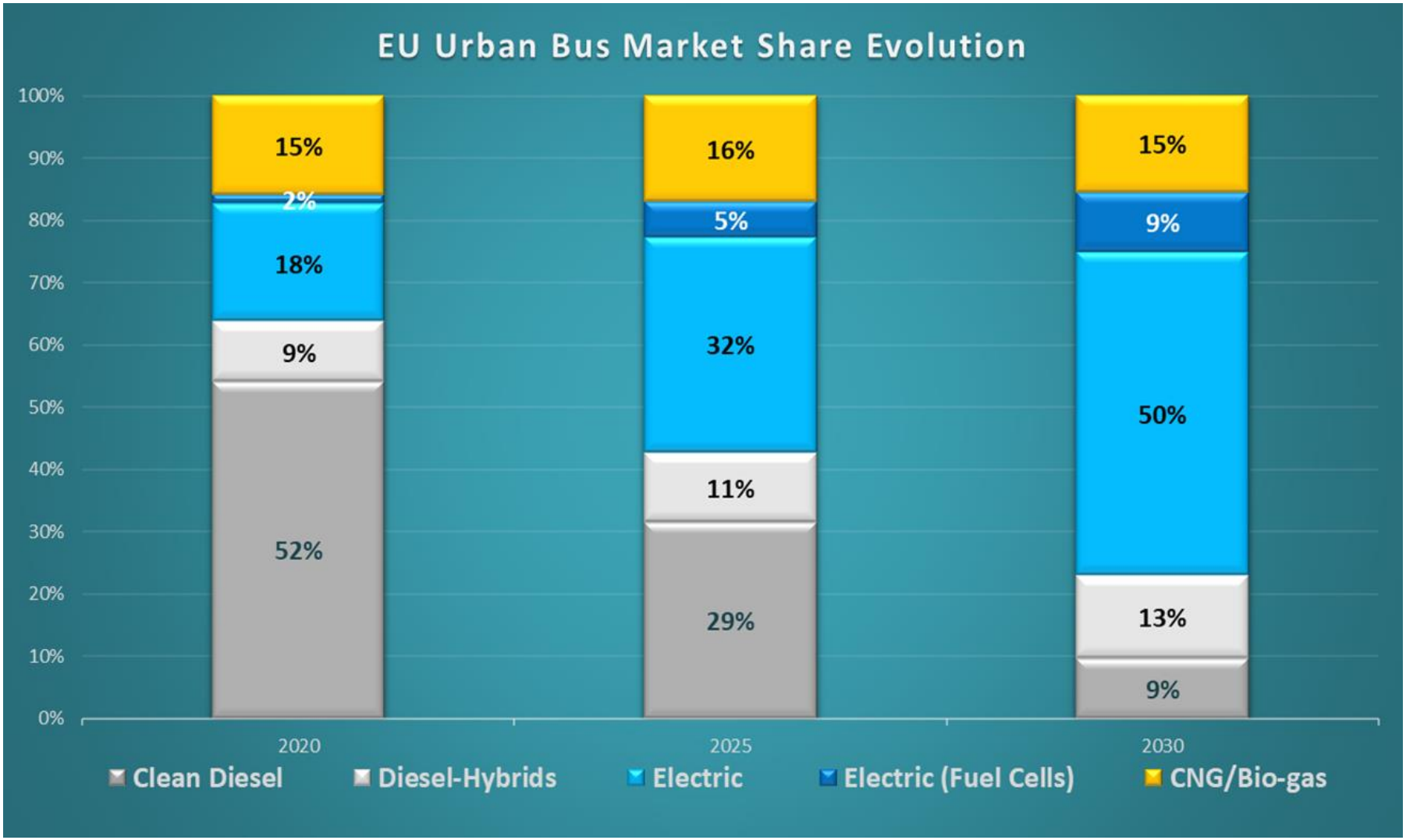
Connect Collaborate Influence

Significant increase in EV registrations across EU over last few years



Source: UITP 2017

EU Markey share predictions (UITP)

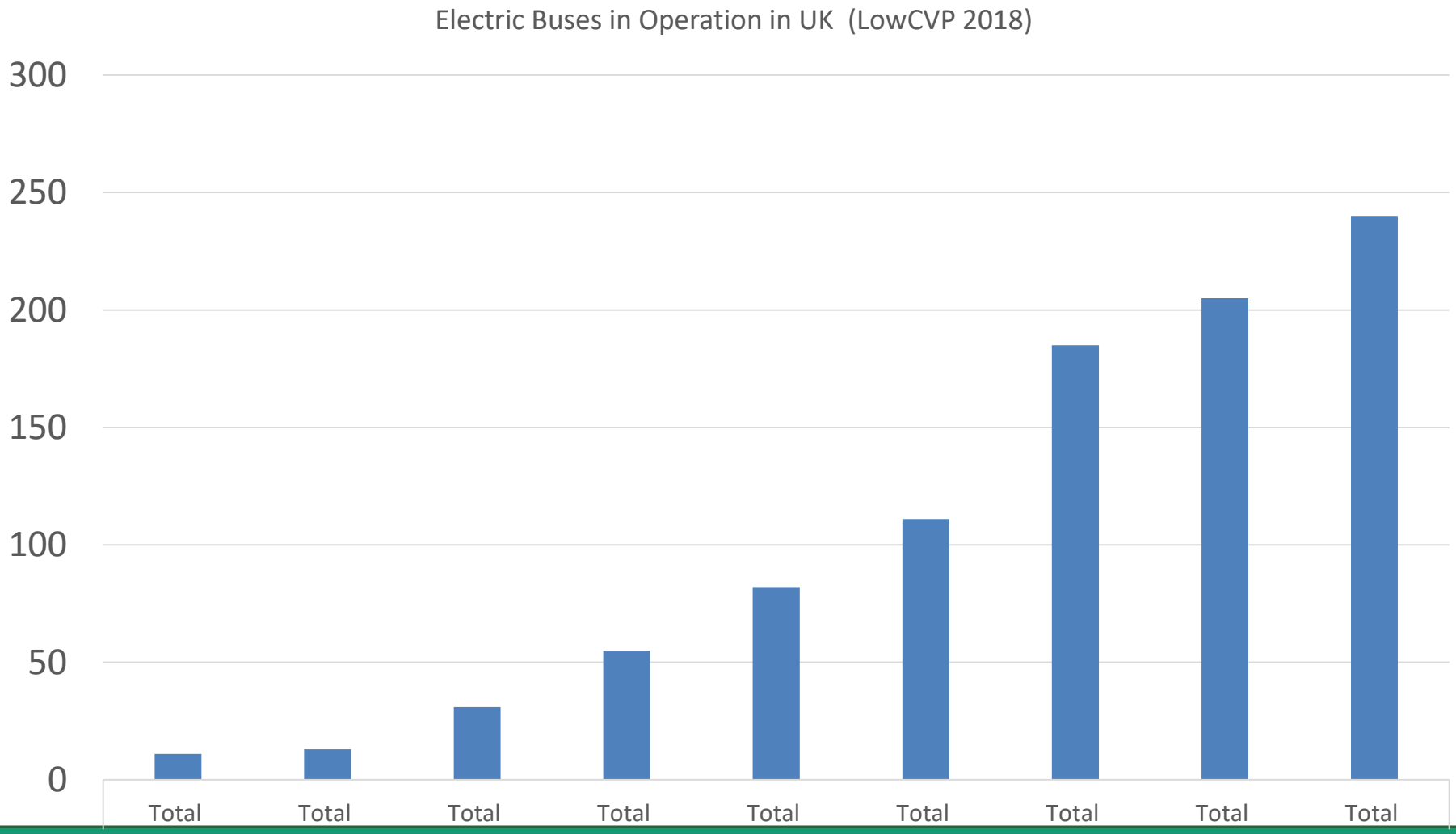


Source: UITP 2017

UK EV uptake

Connect Collaborate Influence

Steady EV deployment – still <1% total UK bus parc



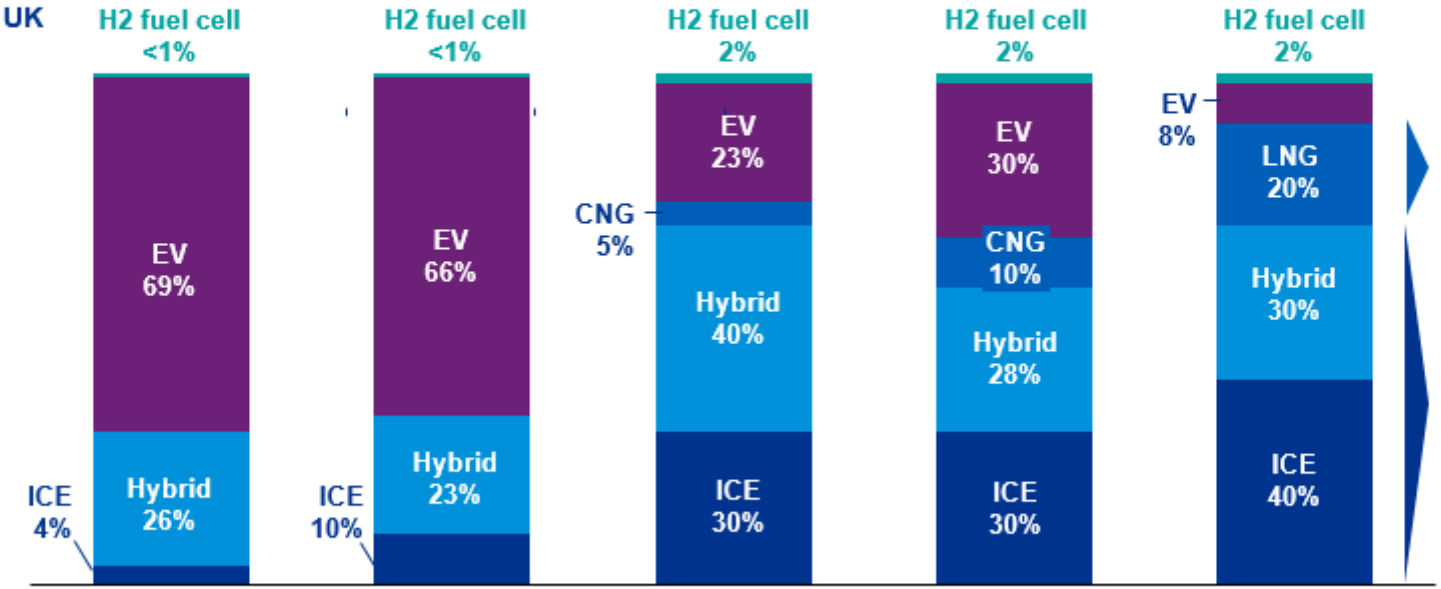
UK Parc by 2030 – KPMG Analysis

LowCVP Low Carbon Vehicle Partnership — Connect Collaborate Influence

2030	Passenger Cars	LCV	Bus & Coach	MCVs	HGVs
Total parc	32m	4m	75k	180k	375k
ULEV or low carbon % of parc	20%	25%	10%	14%	6%

KPMG

Market share - UK sales % by drivetrain type



'Sustainable' CNG/LNG would use bio-gas

Biofuels currently constitute 4.75% of the fuel mix. By 2032, this will be mandated to be 12.4% by volume

Notes: (1) Commercial vehicle classes defined by weight as: 3.5t (LCV); 3.5t-16t (Bus); 3.5t-16t (MCV); >16t (HGV); >40t (Gigaliner)

(2) Hybrid is non plug-in electric hybrid. (2) H2 Fuel Cells convert H2 to electricity in the vehicle. (3) EVs include BEVs and PHEVs only. (4) ICE include all vehicles using either petrofuels or biofuels.

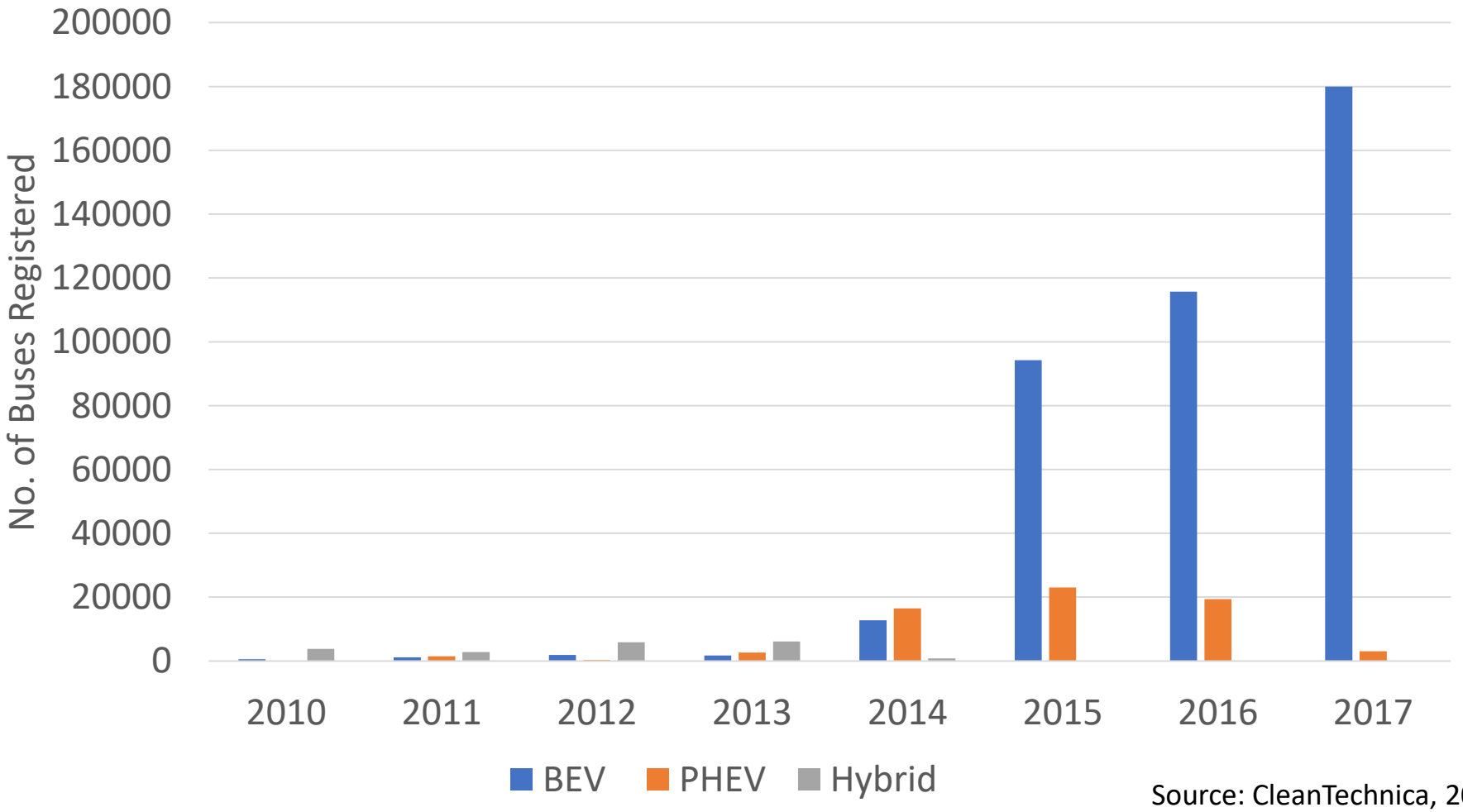
Source(s): (1) National Statistics: UK Department for BEIS (2) KPMG Mobility 2030 analysis (3) International Council on Clean Transport (4) SMMT (5) ACEA (6) TfL

Source: KMPG, Mobility 2030, 2018

Chinese market way out in front

Low Carbon Vehicle Partnership | Connect Collaborate Influence

Huge production volumes in China, one city has over 16,000 EV buses



Source: CleanTechnica, 2018

UK Battery Electric Suppliers

LowCVP Low Carbon Vehicle Partnership — Connect Collaborate Influence

Optare

WRIGHTBUS

Irizar e-mobility

VOLVO

ALEXANDER DENNIS

BYD Build Your Dreams

YUTONG

Small bus

mellor

Expected in future

SCANIA

Supporting infrastructure

LowCVP Low Carbon Vehicle Partnership | Connect Collaborate Influence

Overnight charging in depot

Slow/Fast: *4-8 hours*, low power: *3-80kW*

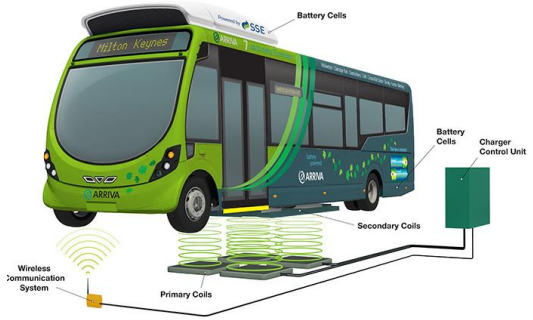
Stabilise cells in battery to ensure long-life

On–Route "Opportunity" Charging : Charge at start/middle/end of route at bus stop or during driver break.

Short charge time: *2mins – 1 hr* at high power: *40kW-650kW*.

Conductive – Pantograph/Plug-in connection

Inductive – power transfer between grid connected coils and bus



Battery Electric Buses

LowCVP Low Carbon Vehicle Partnership | Connect Collaborate Influence

OEMs: Optare, Wrightbus, ADL/BYD, Yutong, Irizar Magtec (reftofit)

UK Fleet: 230 in service across UK

Key Fleets:

London: 53x ADL/BYD E200EVs (plug-in charge)

York – 6 x Magtec retrofit double deck sightseeing buses (overnight + plug-in on route)

Nottingham – 45 Optare Solo/Versa + 13 BYD k9 (plug-in)

Milton Keynes: 10 x Wrightbus (overnight + inductive)

Harrogate: 8 x Volvo 7900 E (OppCharge on-route)

Lothian : 6 x Wrightbus StreetAir (plug-in – no gov't funding!)