

How quickly will EVs penetrate the UK bus parc?

Low Emission Bus Workshop Cardiff, 19th July

Principality Stadium



LowCVP
Low Carbon Vehicle Partnership

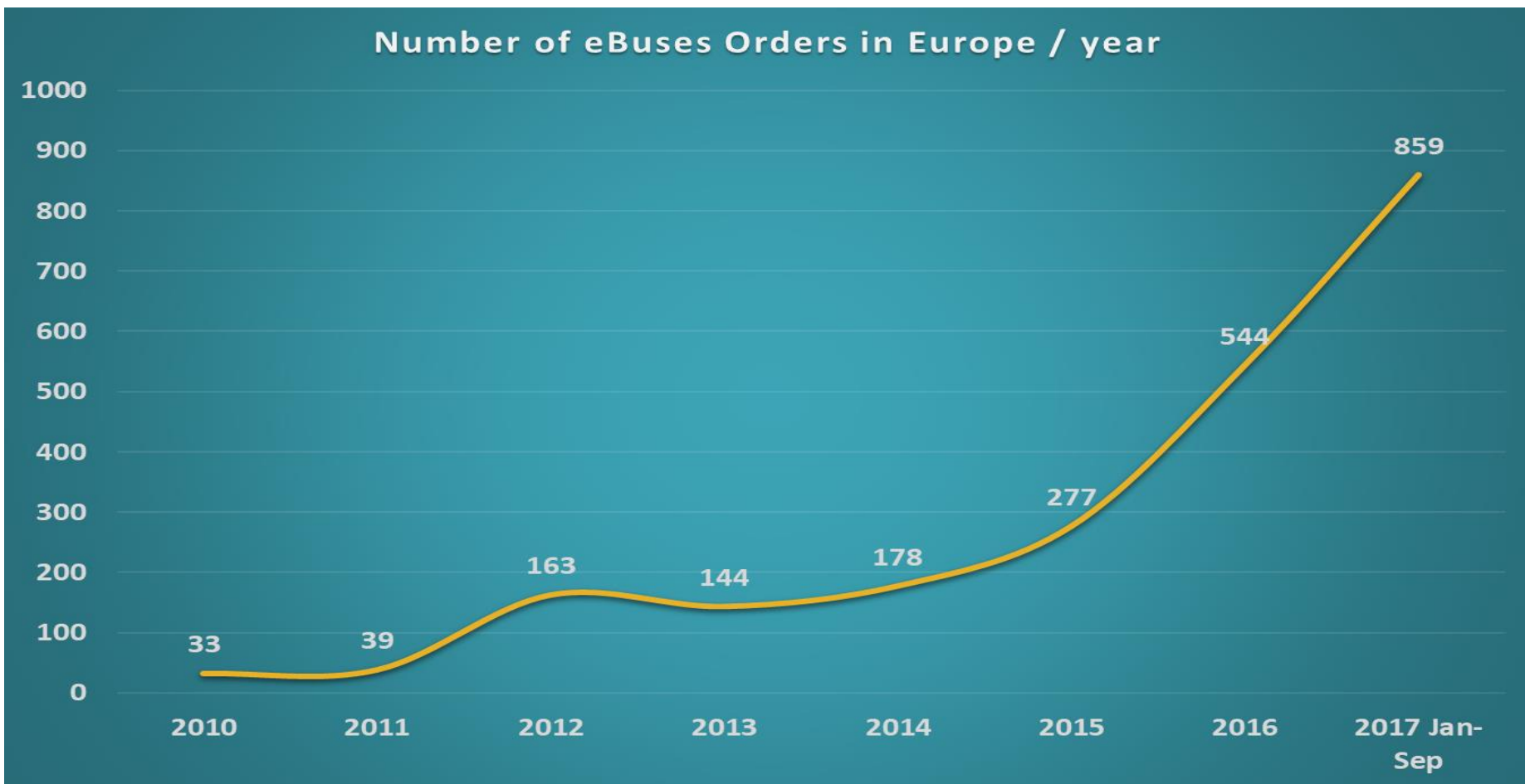
Connect | Collaborate | Influence



Discussion Panel

European EV uptake

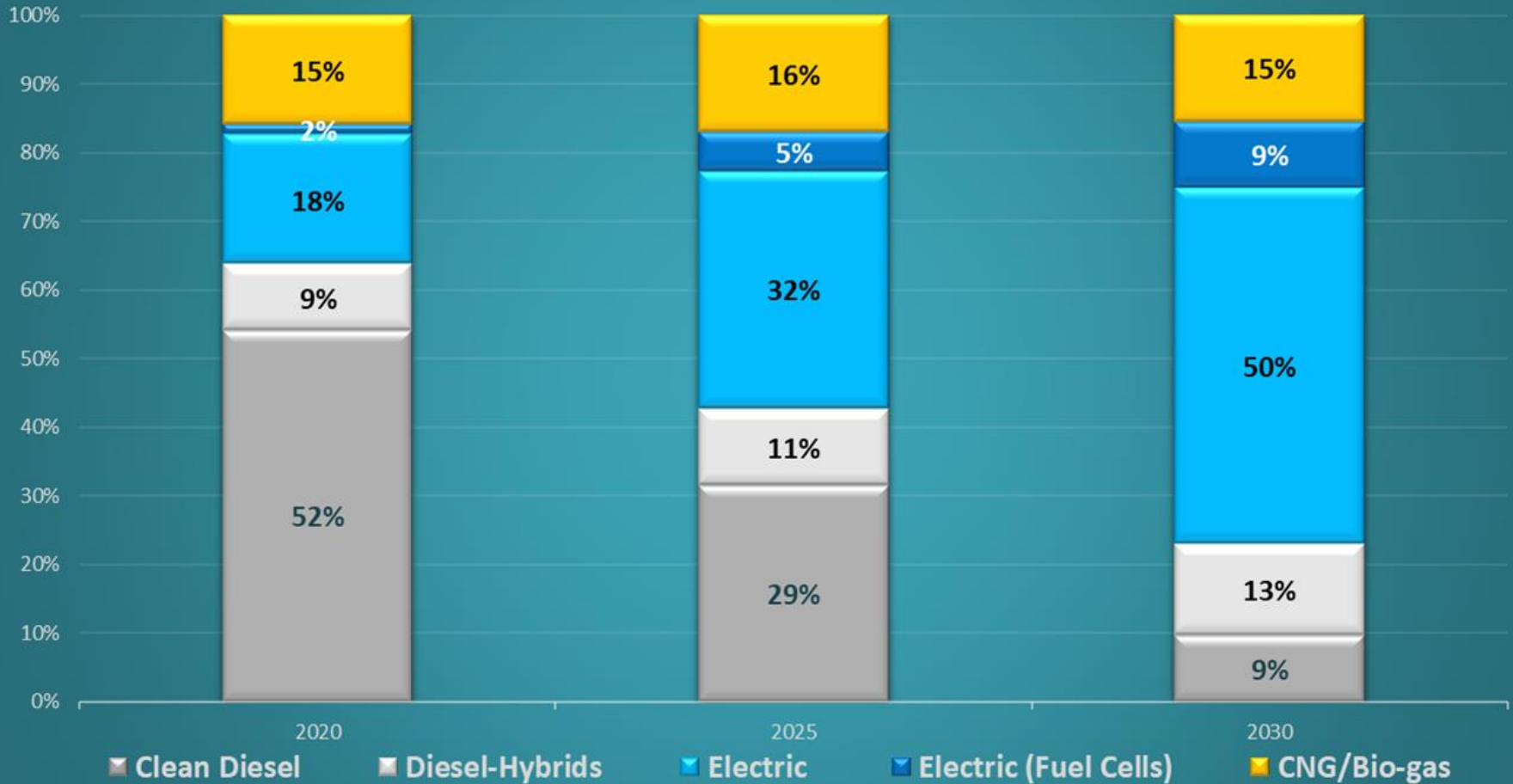
Significant increase in EV registrations across EU over last few years



Source: UITP 2017

EU Market share predictions (UITP)

EU Urban Bus Market Share Evolution

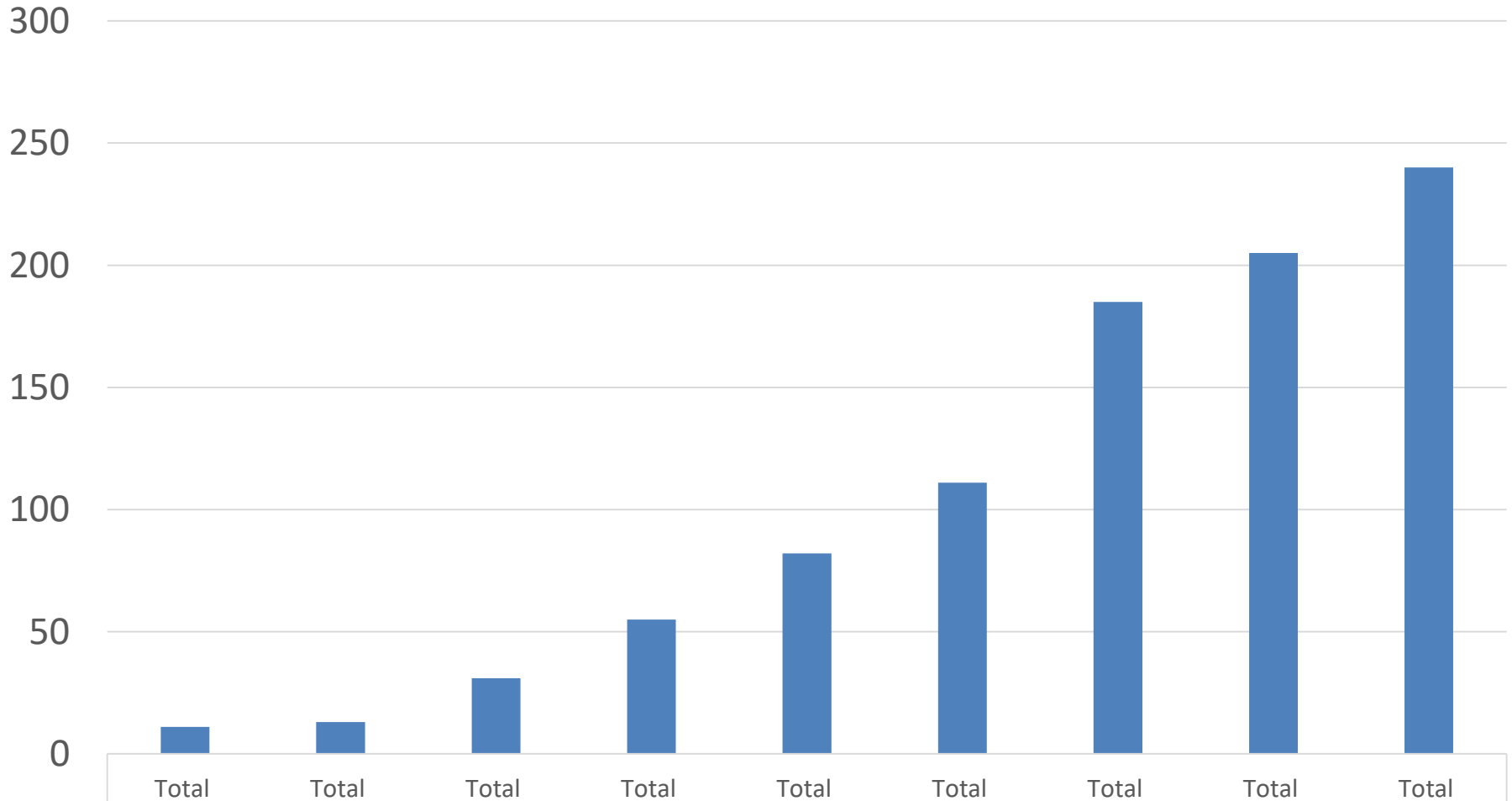


Source: UITP 2017

UK EV uptake

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

Electric Buses in Operation in UK (LowCVP 2018)

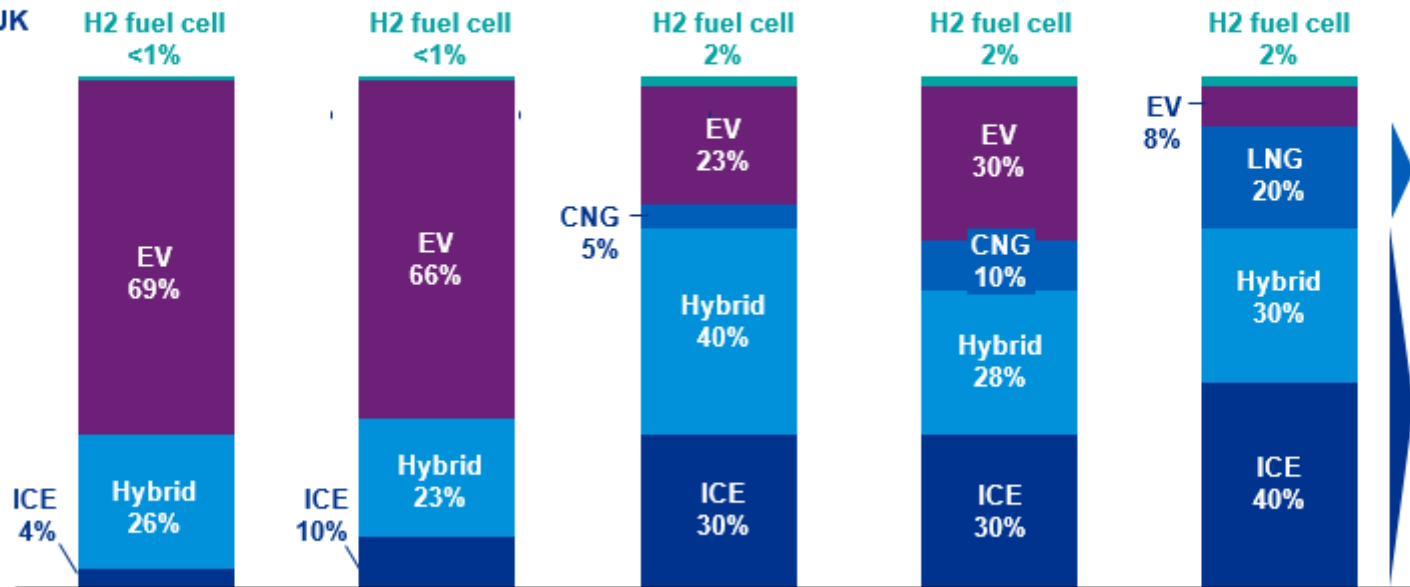


UK Parc by 2030 – KPMG Analysis

| 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% |



Market share - UK sales % by drivetrain type



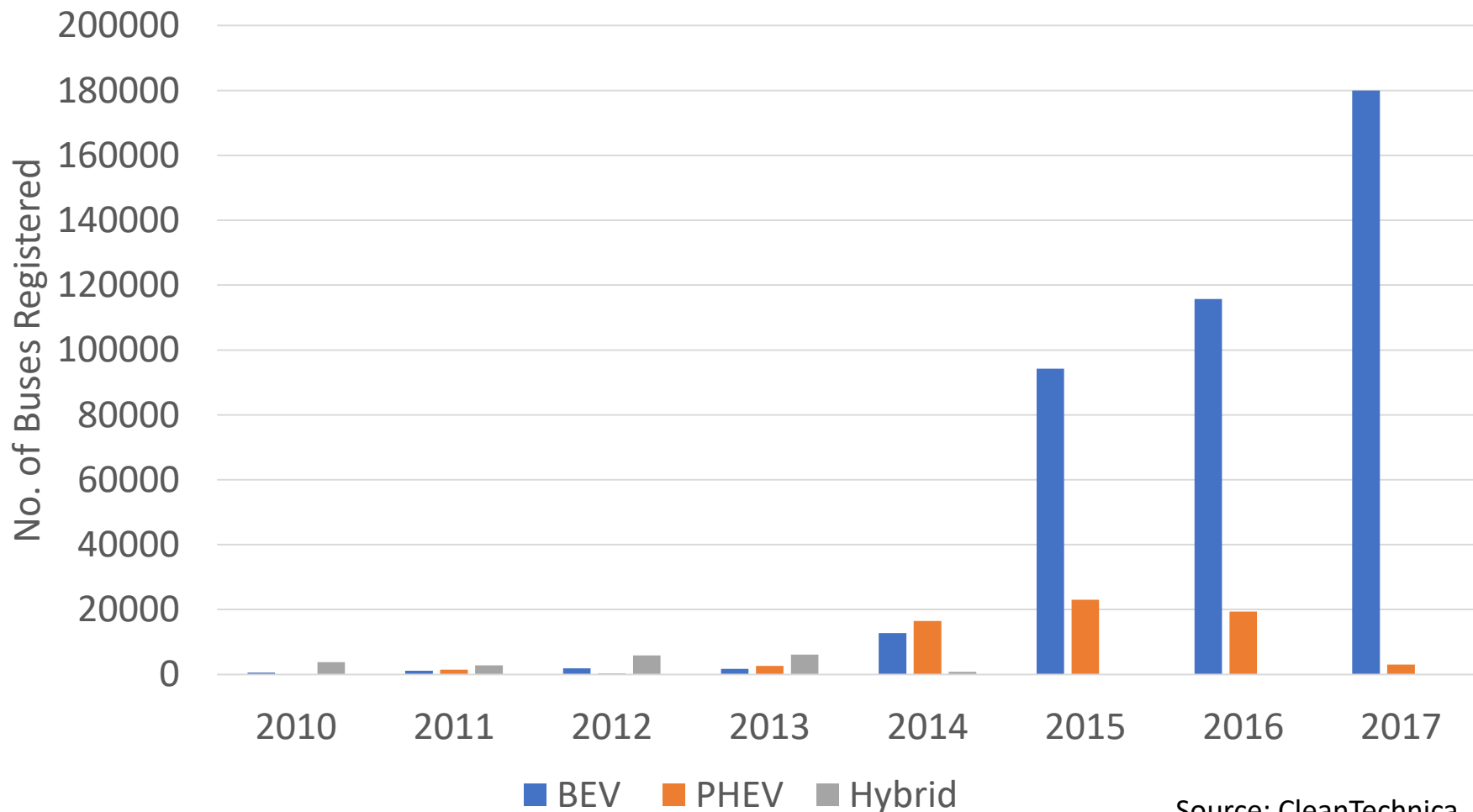
'Sustainable' CNG/LNG would use bio-gas

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 petrolfuels 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) TIL

Chinese market way out in front

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



Source: CleanTechnica, 2018

UK Battery Electric Suppliers



Build Your Dreams



Small bus



Expected in future



Supporting infrastructure

Overnight charging in depot

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

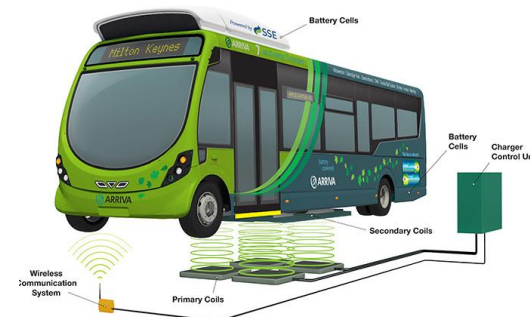
Stabilise cells in battery to ensure long-life

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

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!)

