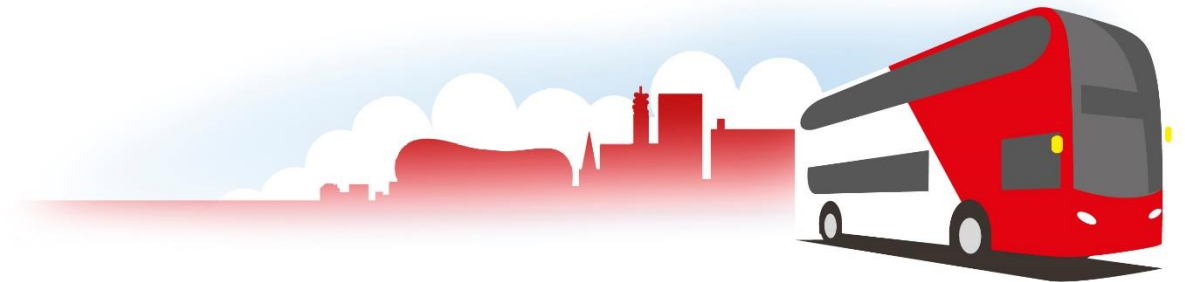


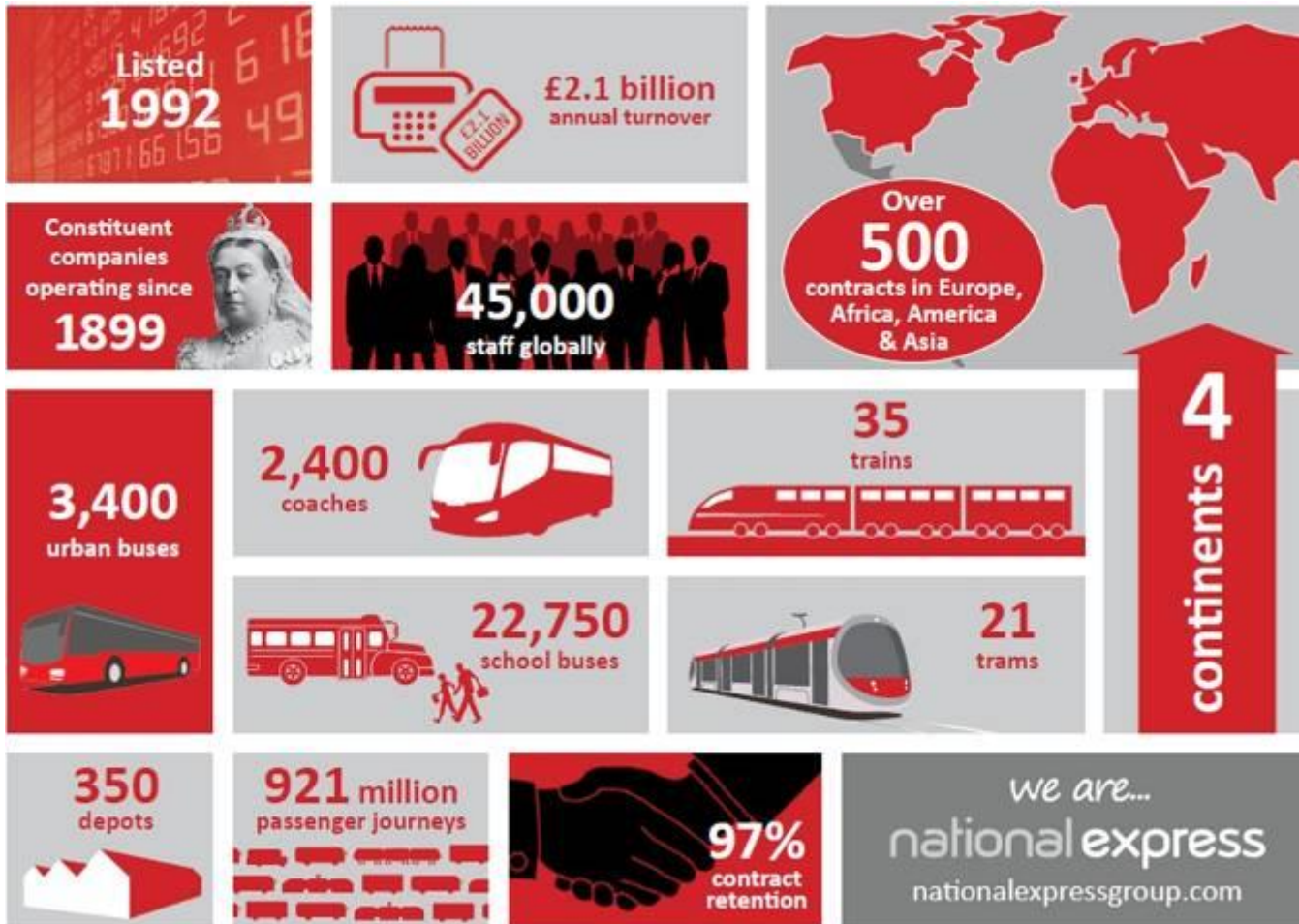
National Express Buses Meeting the Clean Air Challenge



Martin Hancock
Development Director
National Express



Part of National Express Group plc



West Midlands Clean Air Targets

Birmingham Clean Air Zone

2020 100% Euro VI

Wolverhampton City Centre – AQPS

% of journeys

April 20 50% Euro VI

April 21 75% Euro VI

April 22 100% Euro VI

Solihull Town Centre - AQPS

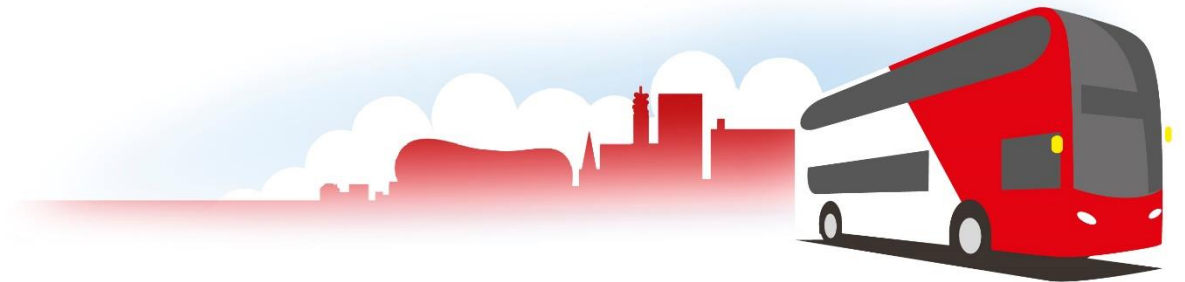
Jan 2020 100% Euro V

Jan 2021 100% Euro VI



Actions

- **New Euro VI purchase**
- **Retrofit**
- **Electric**
- **Re-allocation of vehicles by route**





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Actions

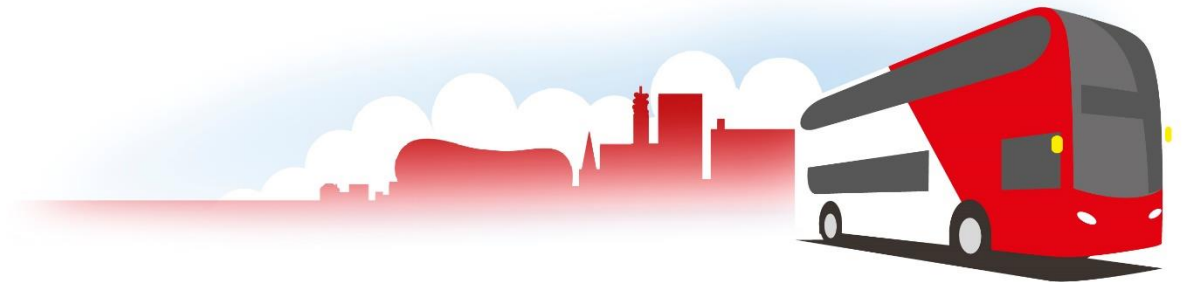
- **New Euro VI purchase**
 - **Capital Requirement c £250k per bus**
 - **Distort route deployment of new vehicles**





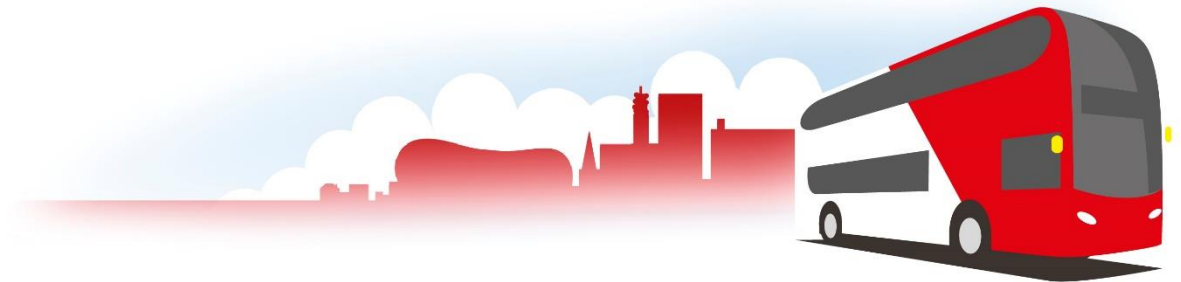
Actions

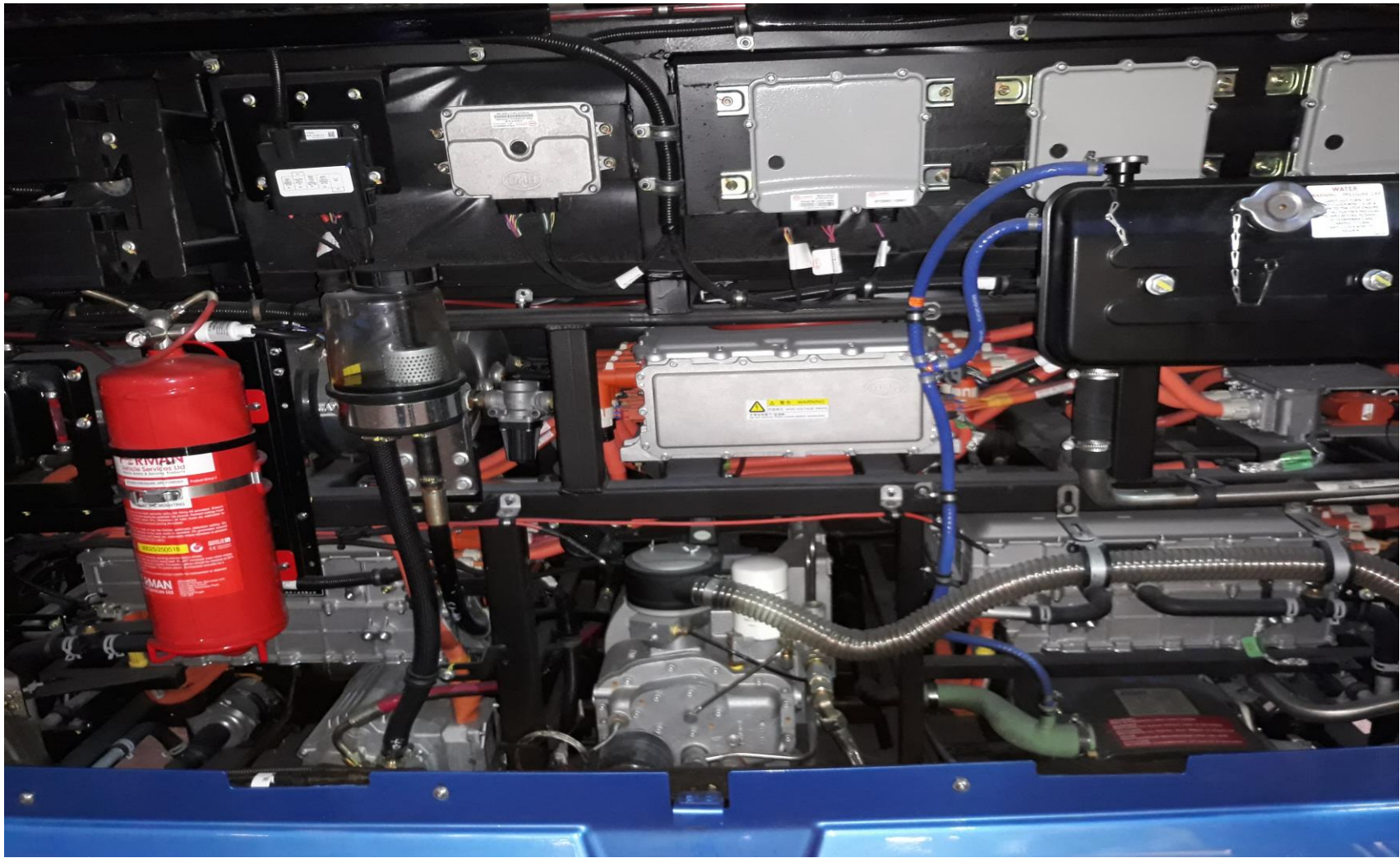
- **Retrofit**
 - **Logistics of fitting**
 - **Maintenance costs – eg cleaning**
 - **Impact on fuel consumption**





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The future of buses could be electric

Scottish bus manufacturer Alexander Dennis Ltd kindly lent us one of their new electric Enviro200Ev for two weeks to test it on the streets of Birmingham, Solihull and Coventry.

Engineering Director Bernie Cassidy said: "We believe that electric buses are the future. We're working closely with central government, local councils and Transport for West Midlands through the Bus Alliance to make this a reality. Within 18 months we plan to have electric buses operating regularly in Solihull, Birmingham and Coventry.

"However, although electric cars have been around for a while, this technology is relatively new in buses, and it's very different from the vehicles we already have. So my team was really keen to get their hands on this demonstration model electric bus. We'll be putting it through its paces so we can see what it's like to drive and maintain."

The ADL Enviro200Ev does not have one central "engine". Electricity from a 307kw battery drives each back wheel separately using 90kw hub motors. The bus can do 160 miles on one AC charge. The lithium-ion iron phosphate battery sits on the roof of the bus and can be fully charged up in under four hours.

Customers will notice a smoother drive, as well as the bus making no engine noise. And of course they can ride easy knowing they are making no emissions at all.



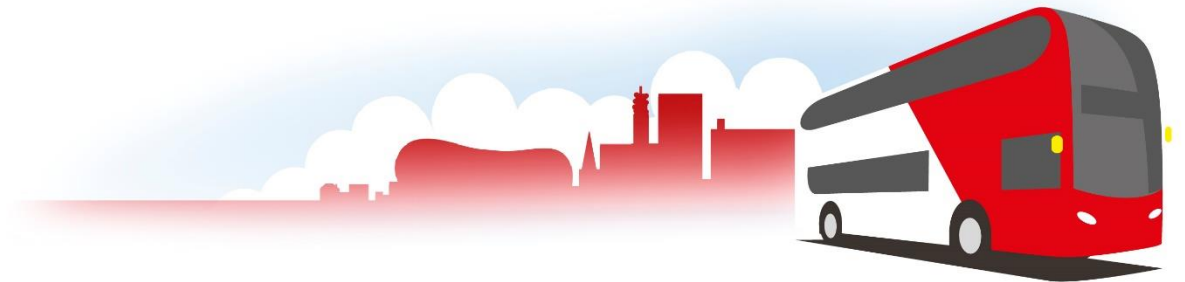
Electric facts:

- * The ADL Enviro200Ev does not have one central "engine"
- * Electricity from a 307kw battery drives each back wheel separately using 90kw hub motors
- * The bus can do 160 miles on one AC charge
- * The lithium-ion iron phosphate battery sits on the roof of the bus
- * The bus can be fully charged up in under four hours
- * This vehicle has two rear view cameras instead of wing mirrors



Actions

- **Electric**
 - **Cost : 75-100% above diesel**
 - **Range**
 - **Battery Life**
 - **Infrastructure and connection costs**





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Actions

- **Re-allocation of vehicles by route**
 - **Older buses tend to get moved to non 'clean air zones' ..but do these actually have the same issues ?**



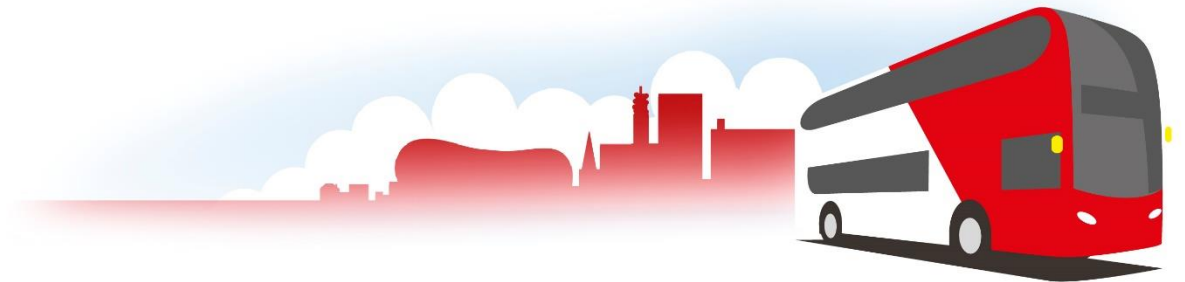
Fleet Composition % by Euro Rating

	2015	2018	2020
Euro 2	7%	-	-
Euro 3	40%	16%	5%
Euro 4	15%	15%	5%
Euro 5	33%	33%	14%
Euro 6 OEM	6%	20%	30%
Retrofit	-	17%	46%



The Biggest Challenge

VHS or Betamax – Which emission technology to choose ?



The Biggest Challenge ?

The future is a foreign country: they do things differently there",

(Apologies to L.P.Hartley, The Go-between)

