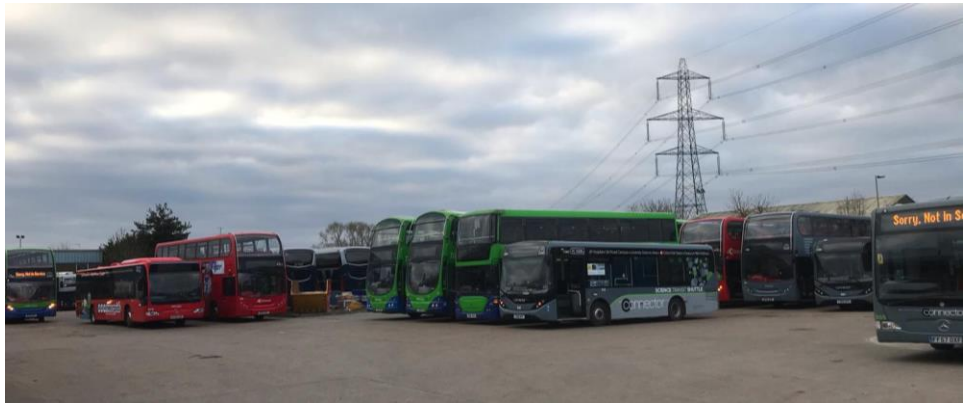
# Heavy duty vehicle power

Luke Marion, Finance & Commercial Director

23 March 2022

# It’s been a while….



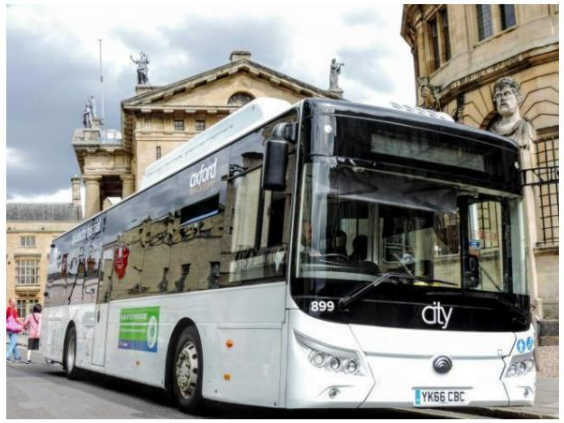
# Things have been moving - albeit slowly....

News

25th February

## Oxford bids for electric buses from Government ZEBRA scheme

By Liam Rice | @OxMailLiamRice
Reporter




File photo of an electric bus being trialled in Oxford city centre by Oxford Bus Company

16 comments

*Efficiency & Environment, Infrastructure, Top Stories*

## Oxford charges ahead with massive electric bus plan

As many as 159 electric buses could soon hit Oxford's streets

Dimitris Mavrokefalidis

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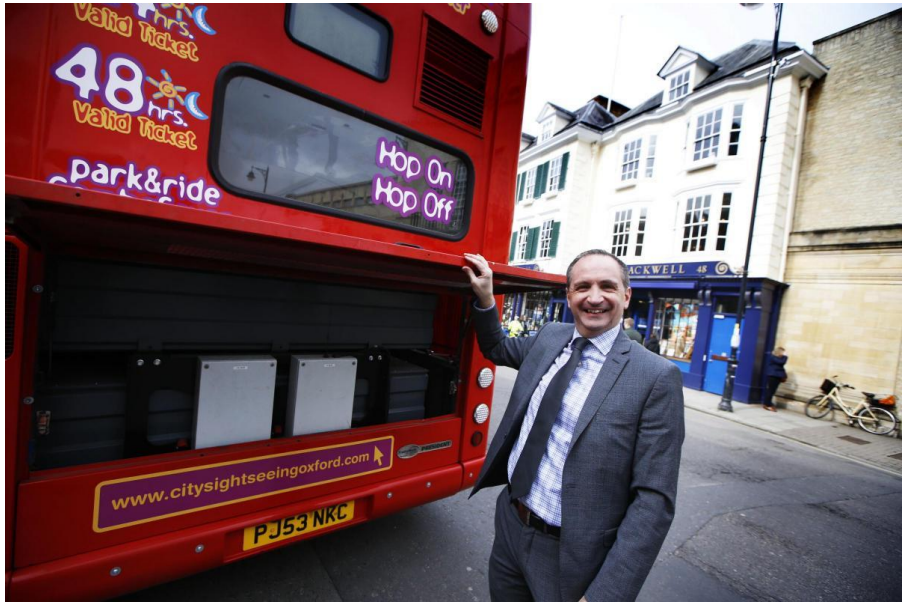
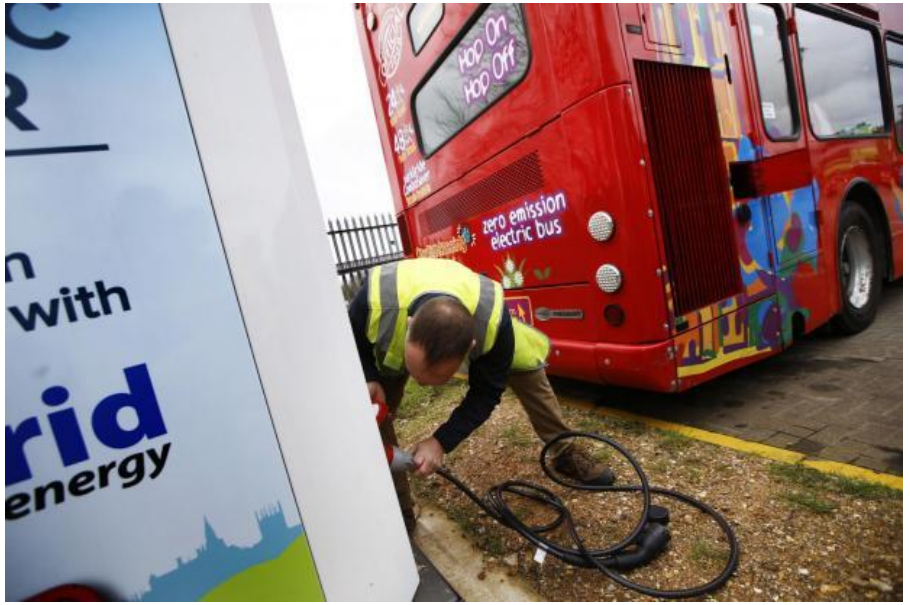
*Thursday 24 February 2022*

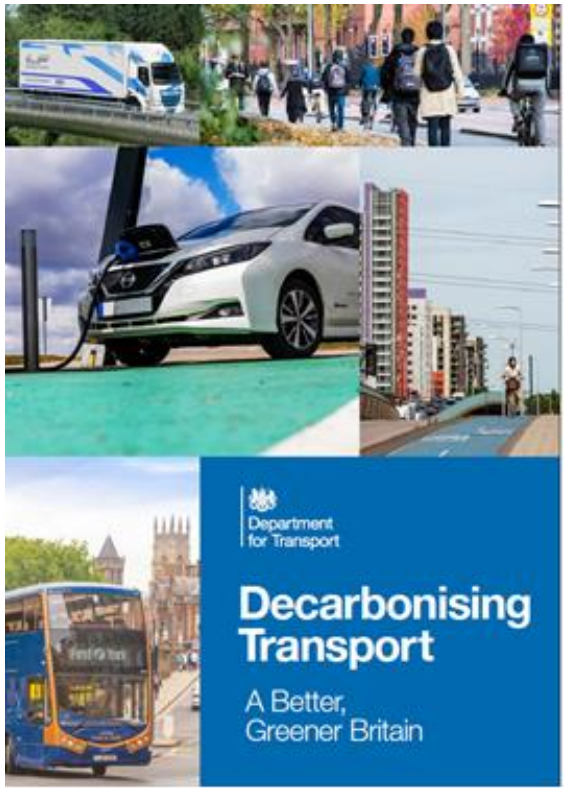
# …and we've started actually operating some electric vehicles!



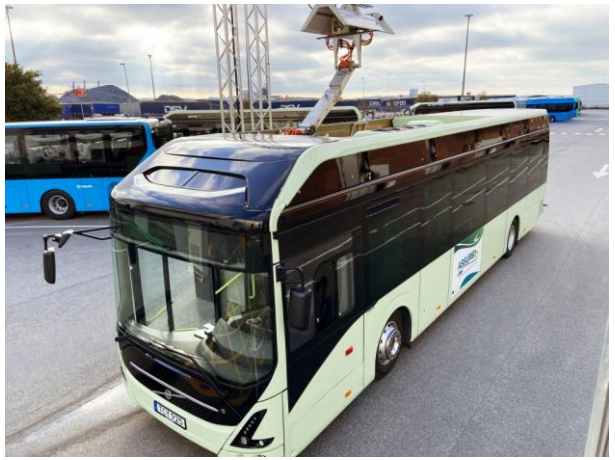
# We've successfully lobbied the government for subsidy equivalency on ZEBs

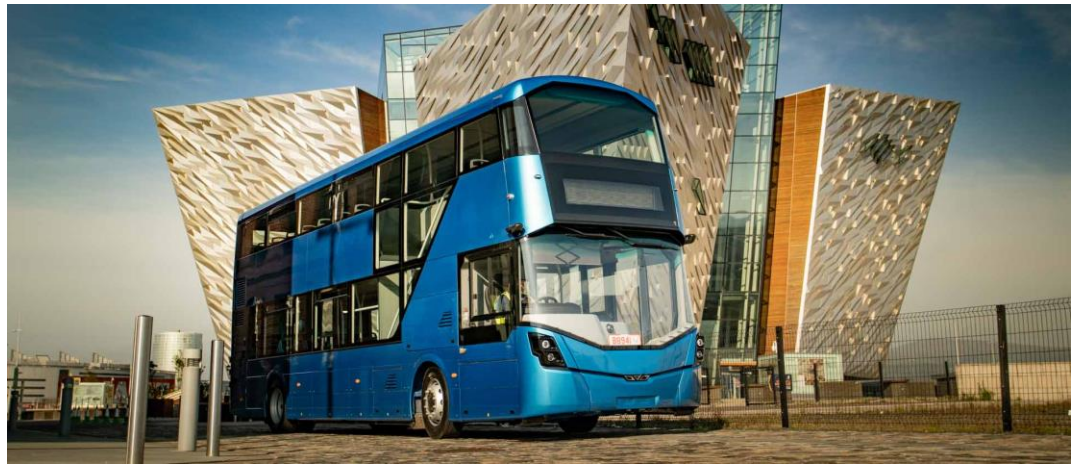
- Currently bus operators receive a rebate of £0.3457 / litre for burning diesel
- This is enhanced with an extra 6p per km for "ULEB" vehicles
- Up to 31 March 2022 this 6p was the only subsidy for operation of ZEBs
- The decarbonisation strategy has introduced an extra 16p per km, giving 22p / km in total, from 1 April 2022
- This makes the business case for ZEBs with the "75% cost difference to diesel" government funding structure start to make sense and so should start to see investment in ZEBs in England coming forward – providing the government keeps running the funding competitions.
- This change follows similar changes already made in Scotland which saw large numbers of ZEBs deployed in the run up to COP26.



# Where is the market now at on ZEBs?

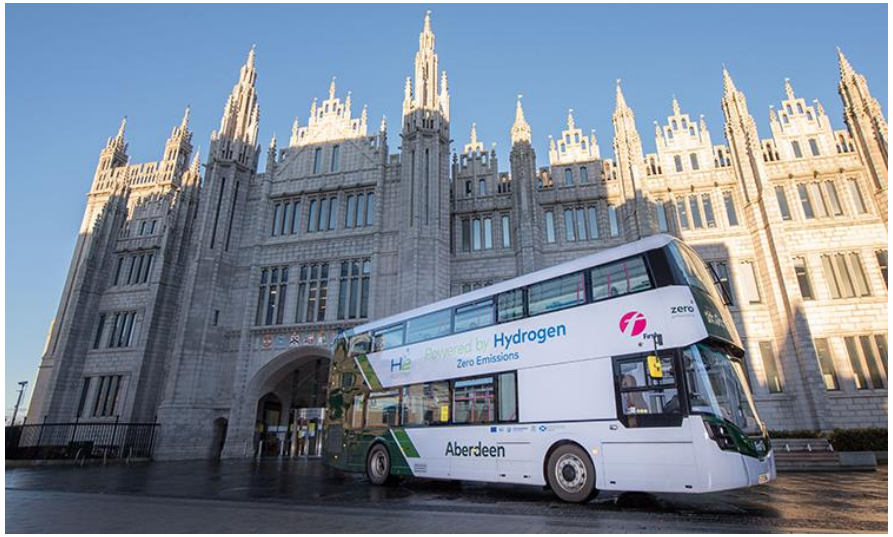
- Double deck BEV vehicles now starting to roll out in larger numbers, particularly in London where funding has been available.
- Typically with up to 450kwh battery packs and able to reliably operate 150-170 miles between charges, taking into account weather variations
- Heating load can significantly reduce usable range – TfL have amended their saloon temperature specs to take account of this!
- Axle weight maximums increase to 19t to allow heavier weight batteries with less impact on passenger loads
- Charging time still a concern with typically 150kw charging the maximum
- Limited uptake in UK of “opportunity charging” solutions such as pantographs





# Hydrogen buses - developing

- Hydrogen offers the benefits of zero-emission operation with longer range – up to 230-250 miles between refills, with heating. Buses can carry up to 40kg.
- Refilling also faster at c.10 mins per bus
- Aberdeen have rolled out a fleet of these vehicles and now have 18 months' experience of operating them. Further examples also rolled out in London last year, and our group colleagues in Crawley have an order for 20 on the way.
- Infrastructure is challenging in terms of cost, lead times and safety requirements
- Supply of green hydrogen limited at present meaning commercials are challenging
- Top speed of current generation vehicles limits "usable range"

# Challenges of zero-emission to operators

- Charging infrastructure is expensive and brings additional space and planning constraints within depots – less vehicles can fit in the garage
- It can be difficult to get the power required to site – in Oxford we benefit from the “Energy Superhub” project meaning we could get an 8MVA supply, but still challenging to site and construct the sub station
- Financing models (eg zero emission buses as a service!) require careful thought – what does this mean for how the industry’s finances have traditionally been structured?