

HC Fleet Affordability and Emissions Update 2024

There are a few key differences between 2019 and 2024, both regarding, the affordability of electric Hackney Carriages (HC) and regarding the Emissions benefit from the investment in such vehicles that should be considered in the context of this paper.

In summary, in 2018/19, over 50% of HC’s licenced in Oxford had Euro 3 or lower standard engines, emitting up to 8.7tonnes of NOx pa. The Zero-Emission Capable Licensing Standards brought in, in 2019, required a minimum of Euro 4 standard engines, with all HC’s to be zero-emission capable by 2025. These standards have been very effective, reducing emissions from the HC trade by over 50%. This is a significant achievement and shows the general commitment by the trade to electrify.

However, the affordability of the electric HC vehicles has significantly worsened recently, with the cost for power and interest rates more than tripling. This is unlikely to significantly improve within the next 12 months.

Consideration for the Licensing decision should include finding the right balance to continue to deliver cleaner air, taking into account the overall emissions contribution that is made by Hackney trade, in the context of the service they provide and the current economic climate.

1. Financial Implications

↳ In 2019, investment in an electric LEVC eTX showed a small return on investment at 6 years (see GPLC Paper 23/01/2019, Emissions Standards, §21).
 ↳ The business case for the trade at that time, based on a Feasibility study conducted by Cenex, was aligned with the Council’s ambition to reduce emissions. In 2023/24 this business case has declined substantially:

By 2023/24 the energy and cost of living crisis have had a significant impact on electricity cost (3 to 4 times higher) and borrowing costs (3 times higher). Costs used in calculations by Cenex in 2018 are shown in the table below versus the costs in 2023/24 and % increase.

Table 1 - Fuel & Electricity Costs Comparator (2018 vs 2023/24)

Fuel	2018	2023/24	% Increase
Diesel p/l	121	145	20%
Petrol p/l	119	135	13%
Electricity Home Charging p/kWh	10.7	34	219%
Electricity Public Rapid Charging p/kWh	18	69	283%

Taking into account the total cost of ownership per annum, the cheapest type of HCV to own is now a second-hand conventional fuel TX4.

The cheapest way to electrify is to purchase a second-hand LEVC e-TX. Costs of operation are estimated to be approx. £2k higher than operating a diesel fuelled Euro 4 (TX4) per annum. This is based on a ratio of 70% home charging and 30% public rapid charging. The higher cost of public rapid charging also means that drivers and operators without access to a home charger face additional cost increases.

Table 2 – Costs of Ownership in 2024

<i>Vehicle</i>	Option 1	Option 2	Option 3	Option 2
	New LEVC-TX Leased	New LEVC-TX Bought	2019 LEVC-TX Bought	2013 Euro 4 Bought
Net purchase price (after grants)		£ 64,842	£ 42,500	£3,000
Purchase/lease	Lease	Purchase	Purchase	Purchase
Total cost per annum using 30% petrol	£18,191	£14,009	£11,449	£10,578
Total cost per annum 100% electric	£19,229	£15,047	£12,487	£10,578
Cost per mile	£0.73	£0.56	£0.46	£0.42
NOx Emissions g/per mile	0.13	0.13	0.13	0.62
PM Emisions g/per mile	0.008	0.008	0.008	0.096

A more detailed estimate of costs of ownership between an LEVC eTX and Diesel (Euro 4) TX4 are shown in Annex 1.

2. Expanding ZEZ Implications & Charges

The original Emissions Pathway anticipated ZEZ cost implications for HCVs and PHVs fuelled conventionally: Based on a ZEZ access cost in 2025 of £8 per day and 250 journeys into the ZEZ per annum this would offset the price differential between the second hand TX4, and a second hand LEVC TX of approx. £2k per annum, giving zero emission taxi's a competitive advantage over conventionally fuelled vehicles, supporting the overall business case.

However, if ZEZ access is free for all HCs and PHs, then this advantage is lost, adding risk to the investment into an electric HC or PH vehicle. This is challenging for HC operators which face nearly twice the up-front cost for their accessible electric vehicles than PH operators do.

3. Emissions

The difference between HCV fleet emissions in 2018/19 and 2023/24 is shown in Annex 2 below. The investment of the Operators and the Council (via grant funding) in new vehicles has had a marked effect: In 23/24 one third of the Oxford HC fleet are ULEV compliant, emissions from the HC fleet have more than halved. The remainder of the fleet are operating Euro 4 Diesel Cabs (London Cab -TX4) and a few Euro 6 Diesel HCs.

There are two different data sources for calculating emissions, both of which are summarised below;

1. EU Euro standard calculations show that NOx, HCNOx and PM have reduced by 73% of original emissions. LEVC eTX are range extended vehicles and it is cost effective to run on petrol, so these assumptions include 30% of mileage in these vehicles is petrol fuelled.
2. Real World data (used for calculations in 2018/19). The comparison between 2018/19 and today, shows NOx have reduced to 54% of the original total. Note – we do not have accurate data for Real World petrol extended emissions, so an estimate for real world petrol emissions has been used.

The Air Quality Source Apportionment report (2020) for road transport only emissions, shows that NOx and PM emissions from Taxis are generally low (less than 1%) on a city-wide basis. The same report identified that in areas of higher taxi density, Hackney and Diesel taxis, have a more significant impact. Unfortunately, we do not have the same report for 23/24, so we are not able to confirm how apportionment has changed via the current electrification numbers, other than to confirm that overall Hackney NOx and PM emissions have reduced by over 50% and up to 73%.

73

Table 3 - Apportionment of Taxis as part of overall Transport emissions in Oxford (Report 2020, Data 2018)

City Wide (2020)	NOx	PM2.5	PM10
Hackney Cabs	0.07%	0.10%	0.07%
Petrol Taxis	0.01%	0.14%	0.16%
Diesel Taxis	0.11%		
Taxis Total (City-Wide)	0.19%	0.25%	0.23%
Worcester Street (2020)	NOx	PM2.5	PM10
Hackney Cabs	1.7%	2.2%	1.6%
Petrol Taxis	0.4%	3.0%	3.5%
Diesel Taxis	3.0%		
Taxis Total (Worcester St)	5.1%	5.2%	5.1%

ANNEX1: Comparative Costs of Hackney Ownership.

Vehicle	Option 1	Option 2	Option 3	Option 2
	New LEVC-TX Leased	New LEVC-TX Bought	2019 LEVC-TX Bought	2013 Euro 4 Bought
Net purchase price (after grants)		£ 64,842	£ 42,500	£ 3,000
Purchase/lease	Lease	Purchase	Purchase	Purchase
Running Costs (annual)				
Fuel/Charging 70% home, 30% fuel	£3,889	£3,889	£ 3,889	£4,768
Servicing & Maintenance	£620	£620	£920	£3,425
Insurance	£1,200	£1,200	£ 1,200	£1,200
Road Tax (annual)	£0	£0	£ -	£555
Congestion/ULEZ charges	£0			£0
Lease cost (annual)/Interest	£12,482	£3,891	£2,550	£180
Depreciation		£4,409	£2,890	£450
Total Cost	£12,482	£8,300	£5,440	£630
Total cost per annum using 30% petrol	£18,191	£14,009	£11,449	£10,578
Total cost per annum 100% electric	£19,229	£15,047	£12,487	£10,578
Cost per mile	£0.73	£0.56	£0.46	£0.42
NOx Emissions g/per mile	0.13	0.13	0.13	0.62
PM Emissions g/per mile	0.008	0.008	0.008	0.096

Please note: The average Hackney cab mileage used for calculations is 25,000 miles per year.

ANNEX 2: Emissions Impact (2018 vs 2023/24)

																	Average km Per Annum			Average km using fuel (if electric)				
https://dieselnet.com/standards/eu/ld.php																	40000			12000				
2018/19 Data for Hackney Cabs Licenced in Oxford																	g/ km per annum Standards classification Euro engines			Total kg/km per annum			Real World	
Age of Vehicle (First registration)	<2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Grand Total	NOx Commercial Vehicle	HCNOx	PM	NOx Commercial Vehicle	HCNOx	PM	Nox g/km	NOx Total per annum kg/km
Engine Type																								
E0	19	1													20	1.8	2	0.25	1440	1600	200	2.7	2160	
E1	23	4	2												29	1.5	1.7	0.25	1740	1972	290	2.4	2784	
E3	6		5	1	3										15	0.78	0.86	0.1	468	516	60	1.5	900	
E4						1	7	9	9	6	8				40	0.39	0.46	0.06	624	736	96	1.3	2080	
E5												3	2	3	8	0.28	0.35	0.05	90	112	16	2.4	768	
Grand Total	48	5	7	1	3	1	7	9	9	6	8	3	2	3	0	112			4362	4936	662		8692	
kg																								
2023/24 Data for Hackney Cabs Licenced in Oxford																	g/ km per annum Standards classification Euro engines			Total kg/km per annum			Real World	
Age of Vehicle (First registration)	2006	2007	2008	2009	2010	2011	2012	2014	2015	2018	2019	2020	2021	2022	2023	Grand Total	NOx Commercial	HCNOx	PM	NOx	HCNOx	PM	Nox g/km	Total NOx kg/km per annum
Engine Type																								
Euro 4 - TX4 (Diesel)	1	10	11	22	12	13	3	1								73	0.39	0.46	0.06	1138.80	1343.20	175.20	1.30	3796.00
Euro 6 (Diesel)									1	1						2	0.125	0.215	0.005	10.00	17.20	0.40	1.00	80.00
ULEV compliant - LEVC-TX - Euro 6 (petrol)										4	4	7	5	13	1	34	0.082	0.082	0.005	33.46	33.46	2.04	0.25	100.37
Grand Total	1	10	11	22	12	13	3	2	1	4	4	7	5	13	1	109				1182.3	1393.9	177.6		3976.4
Emissions Reduction %																				73%	72%	73%		54%
100% ULEV COMPLIANT - EURO 6																107	0.082	0.082	0.005	107.256	107.256	6.54	0.25	321
Emission Saved through 100% electrification																				1075	1286.6	171.1		3655.4

75

No real world data - this is estimated

This page is intentionally left blank