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PROJECT
REPORT

CCR ULEV Taxi Business Case

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Prepared for:

Clare Cameron
Cardiff Council

Clare.Cameron@cardiff.gov.uk
03000 040414 ext. 19009

Prepared by:

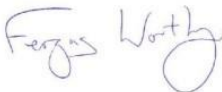


Carl Christie
Technical Specialist



Tom Allerton
Technical Specialist

Approved by:



Fergus Worthy
Senior Transport Consultant

Company Details

Cenex
Holywell Building
Holywell Park
Ashby Road
Loughborough
Leicestershire
LE11 3UZ

Registered in England No. 5371158

Tel: 01509 642 500
Email: info@cenex.co.uk
Website: www.cenex.co.uk

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BEV	Battery Electric Vehicle
CAZ	Clean Air Zone
CCR	Cardiff Capital Region
CCC	Committee on Climate Change
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNO	Distribution Network Operator
EV	Electric Vehicle
GHG	Greenhouse Gas
ICE	Internal Combustion Engine
kW	Kilowatt
PHEV	Plug-in Electric Vehicle
PM	Particulate Matter
NO _x	Oxides of Nitrogen
NPV	Net Present Value
REEV	Range Extended Electric Vehicle
TCO	Total Cost of Ownership
ULEV	Ultra-Low Emission Vehicle
WAV	Wheelchair Accessible Vehicle
WG	Welsh Government
ZEV	Zero Emission Vehicle

1 Executive Summary

Cenex has undertaken a WelTAG stage 2 assessment of potential incentive schemes to encourage the uptake of Ultra Low Emission Vehicle (ULEV) taxis in the Cardiff Capital Region. Outputs can be used to support a bid for funding provided by The Welsh Government (WG) to support the transition to ultra low emission vehicles (ULEVs). ULEV increase must be accelerated to reduce air pollution in order to deliver improved health outcomes, and to reduce greenhouse gas (GHG) emissions which contribute to climate change.

The Strategic Case for change is shown by the alignment of the benefits of increased ULEV taxi uptake with the objectives of key policies and strategies including The WG's commitment to cut GHG emissions by 95% by 2050, in line with the Committee on Climate Change's Net Zero report; Prosperity for all: A low carbon Wales; and The Wellbeing of Future Generations Act.

Cenex has assessed three options for this report: ULEV Taxi Events, financial grants and incentives, and development of the regional chargepoint network. Cenex developed the business case in line with WelTAG and the recommendations in the Cenex ULEV Taxi Strategy. The study has used Cenex's Fleet Assessment Tool and bespoke modelling to quantify the expected reduction in emissions and associated damage costs with different packages of incentives. We modelled five scenarios to show the impact of parameters including annual mileage and vehicle eligibility on outcomes.

The baseline scenario, which assumes approximately 20% of the fleet takes up an incentive, would deliver a reduction in NO_x, PM and CO₂ emissions of 18%, 28% and 10% respectively, giving a monetised benefit of £3.8 million. Under a scenario in which high mileage vehicles are included, respective figures rise to 15%, 25%, 35% and £5.4 million.

The report provides indicative costs for a range of incentives. These include:

- £10.6m to £14.4m for interest-free loans.
- £3.3m for non-repayable grants for operating costs.
- Around £150,000 for various trade engagement activities.
- £0.9m to £2.4m for a 'try before you buy' scheme.

Cenex estimated the charging infrastructure requirements ULEV taxis in the CCR.

- For the Baseline scenario the expected minimum requirement is for 14 chargers at a total cost of approximately £540,000.
- If drivers of higher mileage vehicles were to take the incentive, there is a potential requirement for 26 chargers at a total cost of approximately £960,000.

This report was produced in a short timescale and therefore without completing a feasibility study which would usually be required at this stage. There is significant uncertainty around these estimates for chargepoint numbers and associated costs

There are a number of risks which the CCR will need to consider when bidding for and delivering an incentive scheme. The two primary risks are:

1. The lack of a standardised regulatory and licensing environment across the CCR. A disjointed approach across the region could jeopardise the success of any incentive scheme. The CCR and local authorities should seek to align the individual regulatory requirements.
2. The lack of availability of plug-in wheelchair accessible vehicles (WAVs), including conversions of BEV small vans and national specification hackney carriage vehicles is likely to constrain ULEV uptake. CCR should contact WAV converters to understand the current market status, plans regarding BEVs and to demonstrate demand for ULEV wheelchair accessible vehicles.

Finally, the CCR will need to seek legal advice to ensure compliance with State Aid rules.

2 Introduction

In 2019, the Cardiff Capital Region (CCR) City Deal Office commissioned Cenex to write a strategy for ultra-low emission vehicle (ULEV) taxis, covering ten local authorities in South East Wales. The strategy recommended additional chargepoint infrastructure and a package of incentives to stimulate ULEV taxi uptake¹. The report proposed developing a business case to support funding applications to implement these recommendations.

The Welsh Government (WG) has subsequently announced £29m to support the transition to low emission vehicles, contributing to the WG's aim of a zero emission bus and taxi/private hire vehicle fleet by 2028. Funding can be used for measures including electric vehicle (EV) chargepoints. In order to prepare a robust bid for this fund, the CCR City Deal Office needs to develop a strategic business case to highlight the benefits of investing in measures to accelerate ULEV uptake.

WelTAG, the Welsh Transport Appraisal Guidance, provides best practice guidance for the development, appraisal and evaluation of proposed transport interventions in Wales. WelTAG combines the principles of the HM Treasury Green Book and the Five Case Model for Better Business Cases with WebTAG best practice for transport appraisal.

CCR has commissioned Cenex to apply WelTAG to the outputs of the Cenex Taxi Strategy to provide further insight into selected recommendations. The outputs will help the CCR City Deal Office develop a bid for WG funding to accelerate ULEV taxi uptake.

This report presents the results of our modelling and analysis to estimate the costs and benefits of investing in infrastructure and incentives to accelerate ULEV taxi uptake. It also outlines key risks and considerations that CCR should bear in mind when structuring a package of incentive measures.

¹ <https://www.cardiffcapitalregion.wales/wp-content/uploads/2019/07/taxi-strategy-for-south-east-wales-appendix-1.pdf>

3 Scheme Appraisal

This section sets out the overall strategic and transport case for incentivising the uptake of ULEV taxis, including the policy and legislative environment which drives the need for change, and the benefits that such a scheme would generate.

3.1 Strategic Context and The Case for Change

Accelerating ULEV uptake is essential to reduce road transport emissions and tackle climate change and air quality. These issues are well documented elsewhere.

The Office for National Statistics' report² on Road Transport and Air Emissions summarises the long-term trends across Great Britain from 1990 to 2018. In particular:

- Road transport has increased by 29% from 255 billion miles to 328 billion miles per year.
- Improvements in fuel economy mean that greenhouse gas (GHG) emissions have risen by 6% in this period from 111 Mt CO₂e to 118 Mt CO₂e.
- However, this contrasts with a total reduction of GHG emissions of 32% over the same period, indicating that transport is lagging well behind improvements in other sectors. The share of emissions from transport has risen from 13% to 21% of the total.

This indicates that the economic and social factors causing increased transport use outweigh the technological improvements and tighter regulations associated with conventionally fuelled vehicles. As further technological improvements in combustion engines are likely to be limited, and trends towards larger vehicles are causing average vehicle emissions to increase³, doing nothing is likely to result in emissions from road transport continuing to increase.

The following list indicates important national and local legislation, policy and strategy that are relevant to reducing emissions from taxi and private hire vehicles in South East Wales.

- **UK Net Zero⁴.** The WG has accepted the Committee on Climate Change's recommendations to cut GHG emissions by 95% by 2050, and have gone further by targeting net-zero by no later than 2050.
- **Prosperity for all: A low carbon Wales⁵.** The WG has published its plan for meeting its carbon reduction targets, and indicates that 7.7% of CO₂ emissions in Wales is from cars. Policy 53 is to reduce the carbon footprint of taxis and private hire vehicles to zero by 2028.
- **Wellbeing of Future Generations Act.** Sets out the overarching vision and goals of decisions and policies in Wales which includes the goals of a Wales which is prosperous, healthy and globally responsible.
- **Petrol and Diesel Car 'Ban' in 2035.** The UK Government has proposed to end the sale of petrol and diesel cars by 2035 at the latest, including plug-in hybrid vehicles. This will be subject to consultation.
- **Newport City Council: Sustainable Travel Strategy.** States that taxis should play a significant role in supporting a change to ULEV and Zero Emission Vehicles (ZEV).
- **Cardiff Council Clean Air Feasibility Study (Outline Business Case).** States that licencing changes could be used to help the uptake of ULEV taxis.

3.2 Options

3.2.1 Longlisted Options

The Cenex Taxi Strategy created for the CCR in 2019 made 8 recommendations to increase ULEV uptake and reduce emissions:

² <https://www.ons.gov.uk/economy/environmentalaccounts/articles/roadtransportandairemissions/2019-09-16>

³ <https://www.smmmt.co.uk/wp-content/uploads/sites/2/SMMT-New-Car-Co2-Report-2018-artwork.pdf>

⁴ <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

⁵ <https://gov.wales/prosperity-all-low-carbon-wales>

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1. Establish a regional ULEV taxi licensing working group consisting of representatives from each local authority.
2. Review and revise conditions of licensing to maximise ULEV availability, and approve current ULEV models for licensing.
3. Identify and introduce short term measures to incentivise the uptake of ULEVs.
4. Establish a programme of regional ULEV taxi events aimed at local trade representatives.
5. Develop an online ULEV taxi and private hire assessment tool aligned with the vehicle licence application process.
6. Agree to region wide adoption of proposed revised vehicle age and emissions policy. Develop a detailed implementation plan for the phased introduction of ULEVs commencing with newly licensed vehicles from 2022 onwards and resulting in all licensed vehicles being ULEV before 2028 in line with the target set by the Welsh Government.
7. Undertake an infrastructure requirements review to develop a proposed chargepoint network for CCR.
8. Develop a regional package of supporting measures and incentives to support the revised licensing policy, raise/apply for appropriate joint funding.

3.2.2 Shortlisted Options

Cenex believes that implementing all of these options will deliver the best outcomes in terms of ULEV taxi uptake. This report focuses on options 4, 7 and 8, as these are in scope of the WG funding for which CCR is developing a bid. Detail on each of these is as follows:

- **Option 4: Programme of Regional ULEV Taxi Events.** Engagement with the taxi trade is essential to get buy-in to proposals. Events provide a platform for stakeholders to find out more about ULEVs and could include Q&As about vehicles and infrastructure, vehicle demonstrations and trials, case studies and opportunities for feedback. Events can stimulate uptake by providing an opportunity for taxi drivers to gain exposure to ULEV options and to encourage discussion.
- **Option 7: Proposed Chargepoint Network for CCR.** Plug-in vehicles require a charging network to enable long distance travel and to make them a viable option for those without off-street parking. This is often seen as a “chicken and egg” problem, and by providing the infrastructure, it removes one of the barriers to adoption of ULEVs. This activity includes mapping the existing infrastructure provision and understanding what additional infrastructure is required and where it should go to meet the needs of additional ULEVs.
- **Option 8: Regional Package of Supporting Measures.** Providing financial incentives to taxi drivers to encourage the uptake of ULEVs. Although the total cost of ownership of EVs is generally lower than conventionally fuelled vehicles, the initial capital cost is usually higher and therefore a financial incentive can help to overcome this.

3.3 Wellbeing of Future Generations Act

Use of public money to accelerate ULEV taxi uptake must align with the goals stated in The Wellbeing of Future Generations Act (2015), which ensures all strategic and policy decisions will improve the social, economic, environmental and cultural well-being of Wales. The table below shows how the incentivisation of ULEV taxis and the resulting reduction in emissions from transport will contribute positively to a number of these goals.

Table 1: Contribution of ULEV Taxi Incentivisation to Wellbeing goals

Well-being Goal	How incentivising ULEV taxis would contribute to this goal
A prosperous Wales	EVs have lower operating costs than conventionally fuelled vehicles, reducing expenditure for taxi drivers. Financial support could help offset the increased capital cost of EVs.
A resilient Wales	Adoption of EVs will help to reduce noise pollution, particularly in cities and built up areas, and improve biodiversity in the region.
A healthier Wales	EVs reduce emissions which cause poor air quality, improving health outcomes for everyone in the CCR.
A more equal Wales	No impacts expected
A Wales of cohesive communities	Taxi services connect communities that may not be served by public transport; EV taxis will help ensure these services remain viable despite increasingly strict emissions regulations.
A Wales of vibrant culture and thriving Welsh language	No impacts expected
A globally responsible Wales	Reducing GHG emissions will help Wales play its part in tackling climate change and reducing negative impacts around the world.

3.4 Impact Assessment

Table 2, below, contains a description of the benefits of encouraging uptake of ULEV taxis. Selected benefits were modelled to quantify likely impacts, with the results presented in Section 4.

Table 2: Potential benefits of increased ULEV taxi uptake

Impact	Significance	Reason
Reduced pollution-related health issues	++	Plug-in vehicles have zero tailpipe NOx and PM emissions when run in electric mode
Reduced contribution to climate change	+	EVs reduce overall GHG emissions, even when emission from electricity generation are included
Reduced traffic noise	+	At low speeds, EVs are much quieter than petrol or diesel vehicles. Idling noise is eliminated
Increased awareness of ULEVs	+	Increasing ULEV taxi uptake will increase public experience of the technology and may increase wider ULEV uptake
Cost savings	+	For most taxi drivers, switching to a ULEV reduces total cost of ownership (TCO)

4 Methodology and Assumptions

This section details how Cenex quantified the expected emissions and social cost benefits of an increase in ULEV taxi uptake. Cenex has developed an outline business case for providing a package of incentives and chargepoint infrastructure to help accelerate uptake of ULEV taxis in the CCR. The business case has been developed in line with WelTAG and builds on the recommendations in the Cenex ULEV Taxi Strategy. Cenex undertook the following tasks.

- Market research into taxi incentive schemes offered by other UK local authorities:
 - Direct engagement with Drive Electric, Dynamo Motor Company, Leeds City Council, LEVC, Nottingham City Council, licensing officers in the CCR and Octopus Group.
 - Research into Clean Air Zone business case documents from Birmingham City Council and Southampton City Council.
 - Review of Cenex's experience of participating in taxi and fleet engagement activities including EV trials.
- Development of eligibility criteria and scenarios for which vehicles should be in scope for incentivisation.
- Modelled a range of financial incentives for different uptake scenarios and eligibility criteria.
- Quantification of estimated emissions savings, social damage cost savings, and funding needed to implement each incentive type and chargepoint infrastructure.

4.1 Scope and Assumptions

Analysis is based on the 5,044 vehicles (89% of the 5,680 in CCR) assessed by the 2019 ULEV Taxi Strategy. This excludes 315 vehicles that were not categorised: 284 vehicles in niche vehicle segments accounting for less than 5% of the fleet (such as luxury cars), and 37 vehicles which returned errors from the DVSA MOT history database.

The model calculates the expected reduction in emissions and associated social damage cost savings which would result from varying uptake of the proposed incentives based on different scenarios. We have assumed that the incentives would be available for all vehicles in the CCR, though the greatest benefits will be achieved under two conditions:

- When the oldest, most polluting vehicles in the parc are replaced, and;
- When vehicles which mostly operate in densely populated urban areas, particularly Cardiff and Newport, are replaced.

The scenarios are therefore used to illustrate the uptake that might be expected, and the social damage cost saving that would be realised, if certain segments of the taxi fleet were to take up the incentive package. Results can help with targeting an outreach campaign and other resources to particular types of drivers and operators.

Cenex has considered the following when constructing the scenarios:

- Incentives should be made available to both hackney carriage and private hire vehicles. This is to avoid distorting the market and to mitigate resistance from the taxi trade.
- Our modelling focusses on large cars (e.g. Toyota Avensis), medium cars (e.g. Skoda Octavia) and wheelchair accessible medium vans (e.g. Ford Transit Custom) because of their relatively large contribution to emissions and availability of suitable ULEVs replacement options. We assume that vehicles will be replaced on a like-for-like basis, though it is possible that the introduction of incentive schemes will alter the fleet composition over time.
- We assume that new vehicles will be pure EVs (battery electric vehicles or BEVs) and have not included plug-in hybrids (PHEVs) in the modelling. This is in line with the Cenex Taxi Strategy which showed PHEVs will increase CO₂ emissions and, for most drivers, TCO.

- BEVs have higher upfront costs and cheaper running costs than conventional vehicles. This means drivers are unlikely to see TCO savings at low annual mileages. In addition, environmental benefits are limited at low annual mileages. Therefore, our baseline scenario focusses on vehicles which cover more than 10,000 miles per year. It excludes drivers which cover extremely high mileages as they are less likely to opt for the incentives as a BEV may not meet their requirements.

4.2 Scenario Development

4.2.1 Scenario Parameters

In total there we used six parameters to develop scenarios, although three of them remain the same for all scenarios. These three parameters are:

1. **Geographical:** Vehicles from all local authorities in the CCR are included.
2. **Licence type:** Hackney carriages and private hire are included.
3. **Vehicle segment:** Large car, medium car and WAV medium vans are included as they cover the majority of the vehicles in the taxi fleet. Executive cars and MPVs are excluded because of a lack of ULEV replacements on the market. However, however operators and drivers of these vehicles would still be eligible to apply for incentives towards suitable vehicles.

The three parameters which are varied between the scenarios are:

4. **Euro standard:** This is the Euro emissions standard for diesel or petrol vehicles. Euro 6 vehicles emit significantly lower NOx and PM than older vehicles.
5. **Mileage:** The model incorporates annual and daily mileage as part of the assessment. Appendix A illustrates the operational suitability and TCO impact of different annual mileages.
6. **Uptake rate:** This is the proportion of the fleet that takes up the proposed incentives. This is included to show the impact different uptake rates will have on outcomes. Figures used are not an attempt to predict actual uptake rates.

4.2.2 Scenario Composition

Cenex initially created a baseline scenario which contains what we consider to be the most likely mix of vehicles to take up an incentive based on vehicle type, mileage and potential incentive uptake rates. From this baseline scenario we modelled several sensitivities to illustrate how these parameters affect the number of vehicles likely to take the incentive and the social damage cost savings.

The parameters in the Baseline scenario are set as follows:

- **Euro standard:** Euro 6 vehicles are excluded as the air quality benefits are minimal when switching from a Euro 6 vehicles to a ULEV.
- **Mileage:** Only vehicles which travel more than 10,000 miles per year and which can complete their estimated daily mileage with more than 20 miles of range remaining are included to maximise the environmental and TCO benefits.
- **Uptake rate:** The uptake rate is set at an “aspirational” target of 30% of the vehicle segments in scope. This matches the target rate for other incentive schemes in Cardiff⁶ and Nottingham.

Against this Baseline, Cenex tested the sensitivity of selected parameters. We emphasise that these aren't recommendations for eligibility or expectations of driver uptake; they are simply illustrations of the impact of different variables on costs and benefits.

- **Low annual mileage:** Includes vehicles which cover fewer than 10,000 miles.

⁶ <https://cardiff.moderngov.co.uk/documents/s30910/Cabinet%202013%20June%202019%20Clean%20Air.pdf>

- **High daily mileage:** Includes vehicles which may need to additional recharge events during the day.
- **Euro 6:** Includes Euro 6 vehicles (i.e. no restriction on Euro standard).
- **Road to Zero uptake:** Uptake rate is reduced to 6% of the baseline vehicles in line with the estimated EV market share in 2021 according to DfT's Road to Zero report. This shows what might happen with little or no incentivisation of ULEVs.

In each case, all other parameters are held constant as per the Baseline conditions.

Table 3, below, summarises the parameters for each scenario, with shading used to highlight changes.

Table 3: Variation in parameters in each scenario

Scenario Name	Variation in Parameters			
	Annual Mileage	Recharge needed during shift	Euro Standard	Uptake Rate
Baseline	More than 10,000	No	Excludes Euro 6	30% of included vehicle segments
Low annual mileage	Any	No	Excludes Euro 6	30% of included vehicle segments
High daily mileage	More than 10,000	Yes	Excludes Euro 6	30% of included vehicle segments
Euro 6	More than 10,000	No	All Euro standards	30% of included vehicle segments
Road to Zero uptake	More than 10,000	No	Excludes Euro 6	6% of baseline vehicles

4.3 Benefits Assessment Methodology

- Emissions savings have been calculated for CO₂, NO_x and PM for each of the 5,044 vehicles and each scenario using Cenex's fleet assessment model.
- Social cost benefits of the proposed incentives have been calculated by monetising using WebTAG environmental impact appraisal guidance⁷.
- We used a 7 year appraisal period as this is the average in-service lifecycle for a taxi. Emissions savings in year 1 are calculated compared to the current emissions of each vehicle and are reduced over time to account for natural churn in the fleet.

⁷ WebTAG monetises the cost to society of the emitted pollutants to account for mitigating the health and environmental damage caused by the emissions. The analysis uses central damage costs for each pollutant of £60.27 per tonne for CO₂, £10,699 per tonne for NO_x, and £203,331 per tonne for PM. These are the baseline 2017 prices which are proscribed by WebTAG and have been adjusted to 2020 prices as per the guidance. Damage cost savings are discounted by 3.5% per year in line with the WebTAG methodology, and net present value (NPV) of the saving calculated in 2020 prices.

5 Benefits Assessment

This section presents the estimated benefits of each scenario in terms of forecast ULEV taxi uptake and damage costs mitigated.

5.1 Mitigated Environmental Impact and Social Damage Costs

The following table shows the Baseline scenario and each of the four sensitivity scenarios.

Table 4: Benefits assessment of each scenario

	Estimated vehicle uptake	Emissions reduction vs 2019 levels			Social damage cost saving
		CO ₂	NO _x	PM	
Baseline	992	9.8%	17.6%	27.5%	£3.8 m
Low annual mileage	1,028	9.1%	17.3%	26.5%	£3.7 m
High daily mileage	1,102	14.8%	24.8%	35.4%	£5.4 m
Euro 6	1,006	9.7%	16.3%	23.9%	£3.7 m
Road to Zero uptake	78	0.8%	1.4%	2.1%	£0.3 m

The estimated vehicle uptake column shows the number of vehicles which the model assumes will take up the incentives. The first four scenarios have similar uptake figures because the assumption that 30% of the fleet will switch to ULEVs dominates the impact of all other parameters. The emissions reduction columns show the cuts compared to current emissions of the entire fleet. The final column shows the monetised benefits.

5.2 Interpretation of Results

The green highlighted row indicates that the greatest reductions in emissions are achieved when high mileage vehicles are in scope. These higher mileage drivers stand to make the greatest TCO savings by running a BEV, but must have access to opportunity rapid charging to meet their daily mileage requirements.

Conversely, the impact of including lower mileage and/or Euro 6 vehicles is marginal, compared to the Baseline. Therefore, there is no case for actively targeting a scheme towards these drivers. This complements the outcome of our strategic case analysis, which showed that low mileage drivers will experience an increase in TCO when moving to a BEV, and pollutant emissions savings are reduced when a Euro 6 vehicle is replaced.

The last line in the table, illustrating the impact of uptake levels in line with the Road to Zero forecasts, are effectively an alternative Baseline. They show what would happen in the absence of an incentive scheme; i.e. marginal emissions cuts only. Therefore, there is a strong case for a package of measures to encourage ULEV taxi uptake.

6 Cost Assessment: Incentives

This section presents indicative costs (in bold) for a range of incentives to support ULEV taxi uptake and, where applicable, cites examples of schemes implemented by other local authorities.

6.1 Introduction

Based on average vehicle ownership conditions (7 years at 24,725 miles per year) all BEVs assessed offer TCO savings. However, the average cost premium for a BEV compared to a conventional alternative is £9,300. Therefore, financial incentives will be required to encourage ULEV uptake.

Engagement with the taxi trade by Cenex has highlighted initial purchase cost and access to low interest finance as major barriers to ULEV adoption. Interest free loans likely to be more effective at overcoming the barrier to entry than non-repayable grants because:

- They are typically higher value than grants, and;
- They address the barrier around access to low interest finance (even with a grant, access to significant capital will likely be needed).

However, loans may be more difficult to implement than grants as credit and affordability checks must be carried out.

In addition to direct financial support, Cenex believes that organising roadshows with ride and drive opportunities which give drivers and operators hands-on experience of ULEVs are crucial in overcoming common misperceptions about the technology. However, as discussed below, such schemes are likely to be difficult to implement in year one.

6.2 Interest Free Loan Scheme

Cenex' understanding is that interest free loans are less likely to be classed as State Aid than direct grants for vehicle purchase, though legal advice must be sought to clarify this.

Example loan options:

- A loan of £10,000 (standard) and £14,000 (WAV) would be required to cover 30% of the purchase cost of a BEV. Providing this loan option under the Baseline scenario with the existing market share of WAVs would cost approximately **£10.6m**.
- A loan of £14,000 (standard) and £17,000 (WAV) would be required to cover the purchase cost premium of a BEV plus 20% of a diesel purchase cost. Providing this loan option under the Baseline scenario with the existing market share of WAVs would cost approximately **£14.4m**.

This gives an estimate of the approximate value of a loan scheme to support significant ULEV taxi uptake, assuming CCR and the local authorities could stimulate significant trade and driver uptake.

6.2.1 Example Scheme: Leeds City Council

Leeds City Council (LCC) is offering four-year interest free loans of up to £10,000 per vehicle for up to ten CAZ compliant vehicles⁸ on the following basis:

- The scheme is supported by £7.2m funding from Defra Clean Air Fund⁹.
- During consultation 82% of 38 respondents said they would be 'either very (66%) or fairly (16%) interested' in the interest free loan scheme¹⁰. Over 2,000 applications have been received since the scheme launched in April 2019¹¹.

⁸ <https://www.leeds.gov.uk/business/environmental-health-for-business/air-quality/support-for-taxis-and-private-hire-clean-air-charging-zone>

⁹ <https://news.leeds.gov.uk/clean-air-charging-zone-plans-approved-by-government/>

¹⁰ <https://democracy.leeds.gov.uk/documents/g8193/Public%20reports%20pack%2017th-Oct-2018%2009.00%20Executive%20Board.pdf?T=10>

¹¹ <https://democracy.leeds.gov.uk/documents/s191570/Clean%20Air%20Zone%20Cover%20Report%20170619.pdf>

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- Forecast uptake of 500 out of 720 loans¹², equivalent to 10% and 15% of the 4,948 vehicles on the fleet respectively. We understand that 30 loans have been paid and 70 provisionally approved in the first nine months (as of December 2019).
- Includes Euro 4 or higher petrol hybrids (four passenger vehicles) and Euro 4 or higher petrol and Euro 6 diesel vehicles (carrying five to eight passengers).
- The applicant must own, lease or operate one or more vehicles that were first licensed by LCC before 17 October 2018 and have driven more than 8,000 miles while performing taxi or private hire duties within the last 12 months. Applicants must have been licensed as a taxi or private hire driver or operator by LCC for at least 12 months and consent to LCC carrying out credit searches and affordability checks.

6.3 Non-Repayable Grant Scheme for Operating Costs

It should be possible to provide grants for operating costs without requiring additional State Aid clearance, subject to legal advice. Grants for vehicle acquisition are unlikely to be State Aid compliant.

A package of non-repayable grants could be offered to cover operating costs such as the licence fee, compliance test, change of licence fee (if applicable), and running costs such as chargepoint use, insurance and servicing. Incentive caps could range from £3,000 (as offered in Cardiff) to £5,000 (as per Birmingham). This could be used to cover the following:

- Average CCR licence fee – £210 per year.
- Average MOT / Compliance test – £55 per year.
- Change of licence fee (if applicable) – up to £115 (one off).

This would equate to a minimum incentive of around £1,000 over three years, up to a maximum of £5,000 if running costs are included.

Grants for licence fees and other minor expenses are unlikely to be sufficient to increase ULEV uptake, so schemes should include indirect running costs. Providing this option under the Baseline scenario would cost approximately **£3.3m**.

6.3.1 Example Scheme: Leeds City Council

LCC is offering non-repayable grants to cover transitional costs of up to £1,500 per vehicle for up to ten CAZ compliant vehicles.

- The scheme is supported by £0.7m funding from an Early Measures Fund.
- During consultation 63% of 38 respondents said they would find grant assistance 'either very (58%) or fairly (5%) useful'.
- Forecast uptake of 333 out of 466 loans, equivalent to 7% and 9% of the 4,948 vehicles on the fleet respectively.
- Eligibility criteria are as per the interest free loan scheme, plus applicants must be licensed as a taxi or private hire driver with LCC for at least 3 consecutive years following receipt of the grant and license the replacement vehicle for at least 3 consecutive years following receipt of the grant.

6.3.2 Example Scheme: Birmingham City Council

Birmingham City Council is offering non-repayable grants for hackney carriage and private hire vehicles¹³.

Hackney Carriage Scheme

¹²

<https://democracy.leeds.gov.uk/documents/s194755/Improving%20Air%20Quality%20Cover%20Report%20100919.pdf>

¹³ https://www.birmingham.gov.uk/downloads/file/14161/brum_breathes_taxi_mailing_booklet

CCR ULEV Taxi Business Case

- The scheme is supported by £5m funding from the Defra Clean Air Fund for hackney carriage grant scheme.
- Up to £5,000 contribution to the operating expenses (for state aid compliance) of a Birmingham licensed electric hackney carriage.
- Four annual payments of up to £1,250, which could be used to cover costs such as electric charging, insurance, servicing and rank fees. Before each payment the applicant must provide evidence that the vehicle is still in their possession and of running costs incurred.
- Up to £5,000 towards the installation of Clean Vehicle Retrofit Accreditation Scheme approved technologies (e.g. those that meet Euro 6 emissions standards).
- Funding is available for 1,000 vehicles, equivalent to 90% of the hackney carriage fleet.
- CAZ compliant vehicles (Euro 4 petrol and Euro 6 diesel) cannot apply for support

Private Hire Vehicle Scheme

- The scheme is supported by £7m funding from the Defra Clean Air Fund for private hire grant scheme.
- Up to £2,500 contribution to the operating expenses of a vehicle that is eligible for the plug-in grant (e.g. BEV or REEV).
- Two annual payments of up to £1,250. Up to £2,000 toward the purchase of a plug-in hybrid or hybrid vehicle. Up to £1,000 toward the purchase of a CAZ compliant petrol or diesel vehicle.
- Funding is available for 3,500 vehicles, equivalent to 85% of the private hire fleet.

6.3.3 Example Scheme: Cardiff City Council

Cardiff City Council (CCC) has secured funding to offer non-repayable grants¹⁴ of up to £3,000 to cover a proportion of the running costs of ULEVs.

- The scheme is supported by £1.86m of WG funding to improve air quality.
- Full details are to be determined but it is likely to be offered over three years with similar eligibility to other schemes.
- Funding is available for 620 vehicles, equivalent to 30% of the licensed fleet

6.4 EV Roadshow with Ride and Drive Opportunities

Trade engagement and education via events, ride and drive roadshows, advice tools and ULEV suitability reports can be a very effective way of encouraging uptake, though benefits are difficult to capture and have not been modelled for this report.

- An estimated cost of £5,000 per trade engagement event including ride and drives equates to **£50,000 for ten events**.
- **£35,000 to £50,000** would be required to develop an online electric taxi hub. This could include an EV suitability checker, details of approved vehicles, events page, details of incentive schemes and updates regarding chargepoint network.
- Personalised EV suitability reports would cost an estimated £350 per report, which equates to **£42,000 for 100 reports** including set up. CCR should investigate the feasibility of providing a small financial incentive such as a cash payment or free vehicle test to encourage uptake of this scheme. This option would require drivers to agree to have a GPS tracker fitted to the vehicle, which is likely to be challenging and constrain uptake.
- Monthly newsletters for one year would cost around **£6,000**.

¹⁴ <https://www.smartcitiesworld.net/news/news/cardiff-secures-21m-for-air-quality-improvements-4986>

The total estimated cost of all engagement activities described above is £50,000 to £148,000 in year one.

6.5 Try Before You Buy Scheme

A try before you buy scheme could involve the CCR or other regional stakeholder procuring vehicles for long-term trials by operators and drivers. Costs for a council run scheme would include:

- Procurement of non-WAVs. From £0.45m (12 vehicles, c. 300 participants) to £1.8m (48 vehicles, c. 1,250 participants)¹⁵. We understand that LCC is the only local authority offering an EV trial scheme for private hire drivers
- Procurement of WAVs. From £0.5m (10 vehicles) to £1.5m (30 vehicles)¹⁶.
- Insurance costs. Up to £4,000 per vehicle.
- Management and storage costs. Up to £400,000.

Total cost = £0.9 to £2.4m.

Cenex does not recommend CCR or any local authority manage this themselves because there are numerous associated challenges including:

- Timescales to implement: 1 year to procure vehicles and set up, 1 year to deliver.
- Local authorities may need to set themselves up as the vehicle proprietor and taxi operator, including undertaking literacy and other tests.
- There is a significant administrative burden, including bookings, valeting, repairs and handovers.
- Utilisation can be low, particularly at the start of the program
- Drivers' current vehicles may need to be stored.

A preferred approach would be to engage with a dedicated EV provider (such as Drive Electric, Lex Autolease, Octopus Investment or Tusker) to run a try before you buy scheme.

6.6 Example Scheme: Birmingham City Council – Electric Taxi Rental Scheme

BCC is creating a fleet of at least 50 hackney EVs which will be provided for rentals or on a short term 'try before you buy' basis.

- The scheme is supported by £2.75m funding from the Defra Clean Air Fund for Electric Taxi Rental Scheme.
- For the full rental scheme, the applicant must sell or scrap a noncompliant vehicle and provide evidence that this has happened. Sale or scrappage not required for the short term 'try before you buy' rental scheme.
- Vehicles may be based at one of several locations, depending on the rental arrangement and the facilities of the rental partner.
- Vehicles cannot be sub-leased.

¹⁵ Costs calculated as follows. Cost per twelve vehicles = two large cars (£39,000 each), three medium cars (£30,000 each), three long range medium cars (£33,000 each), one LEVC TX (£56,000 each), two Dynamo Nissan e-NV200 (£48,000 each) and one small van / MPV (£31,000 each)

¹⁶ Costs calculated as follows. Cost per ten vehicles = eight Dynamo Nissan e-NV200 (£48,000 each) and two LEVC TX (£56,000 each)

7 Cost Assessment: Infrastructure

This section presents indicative costs for rapid chargepoint infrastructure to support ULEV taxi uptake.

7.1 Caveats

In order to estimate chargepoint requirements and associated costs for taxis (or any vehicles), Cenex would typically carry out a feasibility study to gather data on vehicle duty cycles, estimate ULEV uptake rates, and engage with stakeholders including the local distribution network operator (DNO) to provide accurate forecasts. Given the limited time and budget available, this has not been possible.

In addition, the analysis does not account for the required spatial distribution of chargers. It is likely that additional chargers would be required to ensure sufficient coverage across the CCR region to give drivers confidence to operate a ULEV, even if this is more than would be theoretically needed.

We therefore emphasise that the estimates provided here have significant uncertainty around them, and that further work, including a feasibility study, must be undertaken before any investment decisions are made.

7.2 Assumptions

Cenex has estimated the number of chargepoints required to fulfil the additional demand from likely uptake of ULEVs for the Baseline scenario. The analysis assumes that:

- Early adopters will use home-based charging as much as possible. Rapid (50kW) chargers will only be required to fulfil charging requirements from early adopters who do not have off-street parking and are therefore unable to charge at home. We have assumed the national average of 40% of properties will not have access to off-street parking.
- Chargers would also be used by drivers who travel further than a single charge would take them in a day. Most drivers will be able to complete the majority of their daily mileage requirements on a single overnight home charge.
- Chargepoints will be for the exclusive use of taxi and private hire vehicles. The model does not account for significant peak demand at certain times of the day and locations. The numbers provided below should therefore be treated as a minimum; a feasibility study may recommend more units in order to give depth of coverage at particular locations and breadth of locations across the CCR.

7.3 Estimated Costs

A typical capital cost to install a rapid charger is £35,000, which includes equipment costs, electricity connection, enabling works and warranty. It does not include grid reinforcement costs, land purchase or any operating costs. Cenex estimates that operating costs (excluding electricity) would be about £500 per chargepoint per year for data connectivity, maintenance and back-office systems.

Estimated chargepoint numbers and costs are as follows:

- For the Baseline scenario the expected minimum requirement is for **14 chargers at a total cost of approximately £540,000**.
- If drivers of higher mileage vehicles were to take the incentive, there is a potential requirement for **26 chargers at a total cost of approximately £960,000**.

We emphasise that there is significant uncertainty around these estimates for chargepoint numbers and associated costs.

Additional costs will be incurred to plan and manage the installations. Typical costs for the scale of network proposed in this report are:

- £20,000 to £40,000 for research, strategy and planning of the installation.
- £7,000 to £10,000 for project management and health and safety advice and auditing.

These costs should be considered as an investment; for example, by understanding potential grid constraints, grid reinforcement costs can be mitigated.

7.4 Other considerations

Chargepoints could be installed in 6 months providing sites are on council owned land and there are no significant issues from the DNO. However, if land is to be leased and/or the DNO highlights network issues, this timescale could be 12 or even 18 months. This is therefore a risk for funding that must be spent within one year.

We propose that 'free' electricity should be included to encourage uptake, based on a successful in scheme in Dundee. Costs for this are not included in the above estimates.

The requirement for rapid charging will be low in 2020-21 while there are relatively few ULEV taxis on the road and much of the demand is met by domestic charging. Moving further into the 2020s, demand for rapid charging will increase as more drivers switch to ULEVs. However, installing a large network of rapid chargers in 2020-21 will mean many units are under-utilised initially and may represent inefficient use of public funds. There is a balance to be struck between future-proofing and prudent investment.

8 Risks, Mitigation and Eligibility Criteria

This report has presented a range of incentive options for stimulating ULEV uptake. The CCR will need to review these and determine for which combination of measures to seek funding. This section highlights key risks and considerations that can inform this decision making process and, where known, potential mitigating measures. It also recommends incentive eligibility criteria.

8.1 Risks and Mitigation

- **Risk:** The lack of a regional regulatory requirement for BEVs, standardisation between local authorities, and clarity of future licensing policy landscape present significant risks as they could significantly constrain ULEV uptake. Failing to standardise conditions across the region could jeopardise the success of any incentive scheme.
 - **Mitigation:** The CCR and local authorities should seek to align the individual LA regulatory requirements. These organisations should develop a detailed shared delivery plan for the phased introduction of ULEVs and communicate this to the trade.
- **Risk:** BEV model availability will be limited by current conditions of licensing (e.g. window tints, crossover SUV bodies, some dimensional constraints). Lead times are still quite long on some models (up to 6 months on some models).
 - **Mitigation:** revise conditions of licensing to maximise availability of suitable BEVs and reiterate the requirement to proactively licence BEVs before presentation by the trade. Publicise a list of licenced vehicles.
- **Risk:** The lack of availability of suitable plug-in WAVs, including conversions of BEV small vans and national specification hackney carriage vehicles is likely to constrain ULEV uptake. This will be particularly felt in the hackney carriage fleet which contains 90% of the WAVs in the CCR.
 - **Mitigation:** contact converters of WAVs (e.g. Brotherwood, Cab Direct, Vic Young etc.) to understand the current market status, plans regarding BEVs and to demonstrate demand for ULEV wheelchair accessible vehicles. Discussion should focus on current BEV small vans (e.g. Nissan e-NV200, Renault Kangoo) and upcoming BEV / REEV medium vans (e.g. Mercedes-Benz eVito, new version of the Peugeot Expert, Ford Transit Custom).
- **Risk:** Cenex proposed excluding Euro 6 taxis from the proposed scheme because of the limited emissions benefits when shifting to ULEVs. This will disadvantage operators and drivers of these vehicles.
 - **Mitigation:** Allow drivers and operators of these vehicles to access funding for a new ULEV, providing their Euro 6 vehicle remains in the CCR taxi fleet.
- **Risk:** CCR would need to appoint a preferred partner (e.g. finance company or similar) to manage an interest free loan scheme. It may be challenging to set up a scheme within required timescales.
 - **Mitigation:** we advise speaking to LCC regarding challenges (such as credit checks) and BCC regarding how they plan to manage their scheme. Cenex can provide contact details of relevant local authorities and suppliers.
- **Risk:** Legal guidance is required to ensure compliance with State Aid. The UK Government has negotiated a sum of money under the EU General Block Exemption Regulations to be used for the plug-in grant scheme. As such, providing direct financial support for vehicles which are eligible for the plug-in grant is likely to be prevented under State Aid rules. Several UK Government funding programmes, such as Defra's Clean Air Fund, do not allow funding to be used to provide direct financial support for purchasing plug-in grant eligible vehicles unless local authorities can provide strong legal assurances around state aid compliance.
 - **Mitigation:** CCR must seek legal advice to clarify State Aid rules.

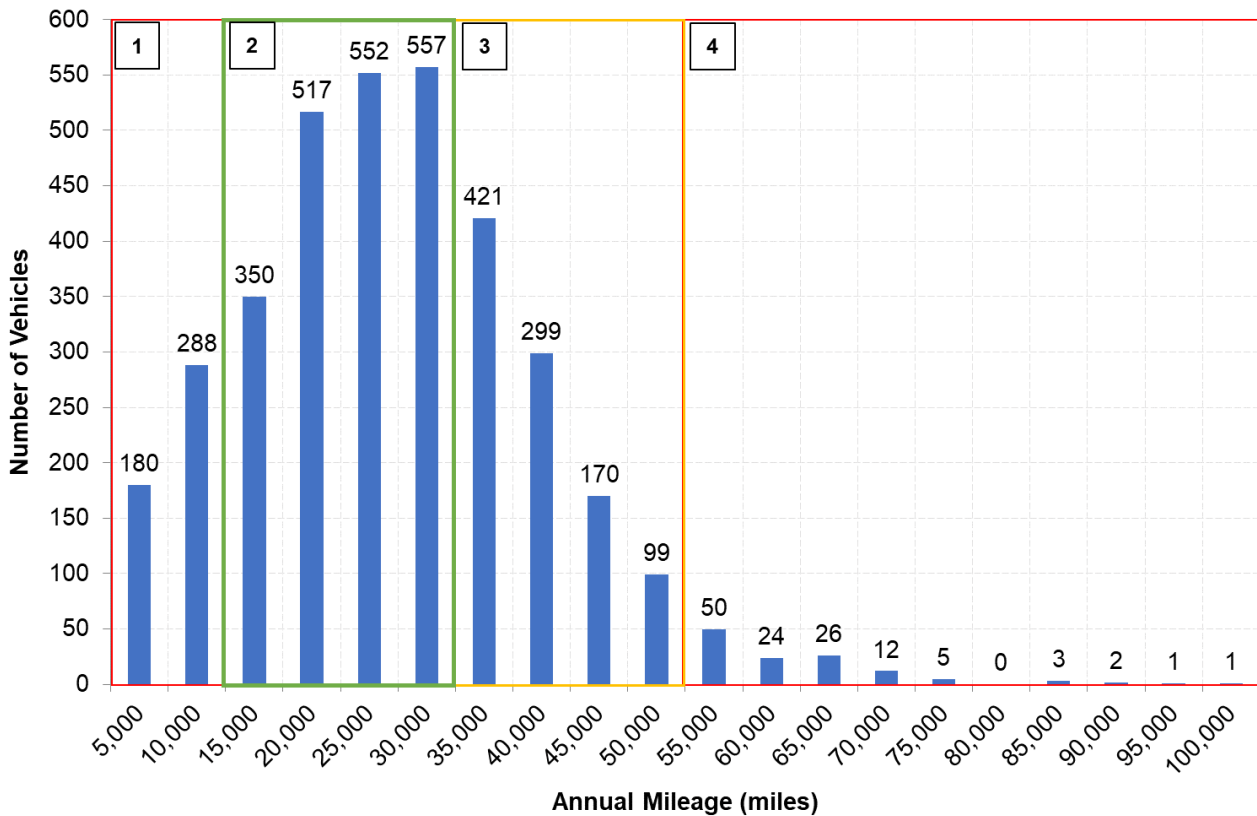
8.2 Recommend Eligibility Criteria

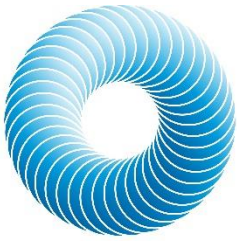
- WAVs should be replaced by WAVs, to maintain the number of accessible vehicles on the fleet in the short term.
- Driver's incumbent vehicle must have been licensed for one year in the CCR.
- The replacement ULEV must remain licensed in CCR for 3 years.
- Set a maximum eligible number of vehicles per proprietor.
- Vehicle proprietors and drivers must agree to share data.
- Replacement ULEVs must cost less than £50,000 (standard) and £60,000 (WAV).

Appendix A

The following graph illustrates the impact that vehicle annual mileage has on the TCO and emissions savings of moving from a diesel ICE to a BEV.

1. **Low mileage:** The total cost of ownership is increased compared to diesel.
2. **Average mileage, less than one charge per day:** There is a total cost of ownership saving compared to diesel, this is the target for incentivisation.
3. There is a total cost of ownership saving compared to diesel There is a total cost of ownership saving compared to diesel, it is a target for incentivisation and has more emissions savings, but is reliant on public infrastructure.
4. **Very high mileage, more than two charges per day:** Unlikely to work, vehicles may be used by multiple drivers and owned by fleet operators – owner driver TCO model not as relevant, although emissions savings would be very high,





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Cenex
Holywell Building,
Holywell Park,
Ashby Road,
Loughborough,
Leicestershire,
LE11 3UZ

Tel: +44 (0)1509 642 500

Email: info@cenex.co.uk

Website: www.cenex.co.uk

Twitter: [@CenexLCFC](https://twitter.com/CenexLCFC)

LinkedIn: [Cenex](https://www.linkedin.com/company/cenex)