



Assessing Transport for London's Congestion Charge proposals

Prepared for Addison Lee Group

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Executive summary

In March 2018, the Mayor of London set out the transport challenges for London as including congestion and air pollution, alongside road safety and a lack of physical activity among Londoners.¹

To support the objectives of reducing congestion and improving air quality, Transport for London (TfL) is consulting on two changes to transport policy in London:²

- to remove the exemption from the Congestion Charge that is currently applied to private hire vehicles (PHVs), but retain this exemption for licensed taxis;
- to replace the Ultra Low Emission Discount (ULED) with a new, phased Cleaner Vehicle Discount (CVD).

These policy proposals have been based on analysis conducted for TfL by CEPA and Mott MacDonald. $^{\rm 3}$

Addison Lee has commissioned Oxera Consulting LLP (Oxera) to provide an independent economic review of the analysis conducted by CEPA and Mott MacDonald, and to assess a package of policy options developed by Addison Lee as an alternative to TfL's proposals.

Removal of the exemption will have no tangible impact on congestion and could make things worse

According to CEPA's analysis, TfL's proposals would result in a reduction of 1% in overall traffic within the Congestion Charge Zone (CCZ) during charging hours. TfL states that 'although a one per cent reduction in traffic appears modest, we believe that it is an important step in managing and reducing congestion in central London.'⁴

However, the 1% reduction in traffic is not supported by evidence. CEPA caveats its overall finding, saying that its 'quantitative outputs should be considered as "broad estimates" rather than "firm results"⁵ CEPA does not provide estimates of the uncertainty around its finding of a 1% reduction; however, the lack of strong support for this figure in its analysis suggests that the effect on traffic is likely to be small and could be indistinguishable from zero: meaning that this scheme may not meet its objectives in materially reducing congestion.

TfL's evidence base is not robust

The evidence base for TfL's proposals is not robust in supporting the outcomes it claims or in meeting its objectives. Oxera's assessment of TfL's analysis finds weaknesses in the logic linking vehicle entries into the CCZ, trips and distance, and consequently the congestion and air quality impacts. The work

¹ Mayor of London (2018), 'Mayor's Transport Strategy', March, p. 14.

² Transport for London (2018), 'Have your say on proposed changes to the Congestion Charge', <u>https://consultations.tfl.gov.uk/policy/private-hire-charge-exemption/</u>. TfL also proposes a number of minor changes to the Scheme Order, which are not the subject of this report.

 ³ Mott Macdonald (2018), 'Changes to the London Congestion Charge scheme – Integrated impact assessment', analysis for TfL, July 3.
 ⁴ Transport for London (2018), 'Why remove the exemption from the Congestion Charge for Private Hire

⁴ Transport for London (2018), 'Why remove the exemption from the Congestion Charge for Private Hire Vehicles?', available from: https://consultations.tfl.gov.uk/policy/2e97d2cb/

⁵ CEPA (2018), 'TfL – PHV congestion charge study', 27 March, p. 3.

by CEPA and Mott MacDonald is overly reliant on stakeholder views and does not cite academic or industry evidence in support of some key drivers of the findings. TfL has also misinterpreted the context and accuracy of the heavily caveated analysis.

The assumption of specialisation is flawed

The most critical weakness in the analysis being used to support the proposals relates to operator specialisation. CEPA's analysis rests on the critical assumption that, in response to having to pay the charge, larger PHV operators (such as Addison Lee and Uber) would specialise, bringing different fleets in to operate inside and outside of the CCZ. However, this assumption does not reflect the commercial realities of ride-hailing businesses such as Uber or Addison Lee's operating model.

Ride-hailing business models rely on many drivers making independent decisions on which passenger trips to serve. Typically a driver cannot see the destination of a rider (and hence whether it would need to enter the CCZ) until after accepting that rider. As there is no central allocation of rides/trips, these businesses cannot commit to specialisation.

Addison Lee operates a dispatch system that it has developed over many years to optimise vehicle allocation to customer jobs. For Addison Lee's operations in London, approximately 70% of the passenger trips start or end outside the CCZ,⁶ and thus involve trips that cross the CCZ boundary. Vehicles that would need to be allocated to trips that involve travel to or from the CCZ would spend most of their time outside the zone. Imposing a restriction like this would be sub-optimal for the business, and could lead to a reduction in the efficiency of its business model and an increase in congestion.

Given this, it seems unlikely that either Uber or Addison Lee would or could specialise in the way that CEPA suggests. Since this is the fundamental assumption behind CEPA's finding of a 1% reduction in traffic, we conclude that the proposed scheme is unlikely to reduce congestion.

The analysis of who will bear the Congestion Charge is unclear

In view of the extent of demand for cross-CCZ boundary travel outlined above, if the Congestion Charge exemption that is currently applied to PHVs is removed, and licensed taxis continue to be exempt from paying the charge, the balance of the costs of the Congestion Charge will need to be met. The net cost of this policy could fall on three distinct groups, as follows.

- **Drivers**: in many cases, the driver of a PHV is also the registered keeper of the vehicle. They will therefore be faced with paying the Congestion Charge themselves, unless this new cost were absorbed by the PHV operator (see below). If drivers are not able to be compensated by the CC (i.e. increased wages), they would absorb the charge. Facing a drop in income, drivers may seek employment elsewhere in the PHV sector or leave the market altogether.
- **PHV operators**: PHV operators could choose to pay the Congestion Charge on behalf of their drivers or offset the income loss to drivers in another way (by increasing their pay). This may limit the supply-side risk of drivers leaving their firms. PHV operators may also adjust existing fares to

⁶ Oxera analysis of Addison Lee data

passengers to account for cost increases. These responses would reduce profit or passenger volumes for PHV operators respectively in an industry where margins are already challenged.

• **Passengers**. If PHVs increase their fares to passengers, this could result in some passengers not making trips, others paying more, and a switch from PHVs to licensed taxis and other modes of transport.

In reality, the outcome would be likely to be some combination of these responses.

CEPA's description of cost absorption and pass-through lacks transparency; only final fare changes are shown (without the underlying assumptions and intermediate steps). The analysis relies on stakeholder inputs (but not a recognisable economic framework) to determine the likely response. This could result in internal inconsistencies in the analysis.

TfL's policy proposal will distort competition between PHVs and licensed taxis

PHVs and licensed taxis do compete with each other, as the Competition and Markets Authority has previously highlighted to TfL.⁷ The differential treatment of PHVs and licensed taxis within this specific proposal has the potential to create further regulatory divergence. Imposing an additional cost on PHVs is likely to distort competition within the CCZ. CEPA's analysis suggests that smaller operators are likely to lose significant passenger volumes. To the extent that some operators exit, this may restrict the choice available to consumers in this market.

Market testing, undertaken by Addison Lee, suggests that if it were to increase fares to cover the increases in its costs from the proposed new policy, and if other transport providers and its competitors did not do the same, many of its passengers would switch to alternatives. As a consequence, the policy will have an impact on Addison Lee and other PHV operators profitability, leaving it with less revenue to invest in electrification of their fleets, at a time when TfL is hoping that the PHV market will switch to electric vehicles and charging infrastructure.

TfL's proposals will have unintended consequences

Poorer air quality and increased congestion

TfL's analysis does not fully consider the consequences of specialisation by operators, even if it did occur (which Oxera analysis suggests it would not). Specialisation may cause PHV drivers to congregate at the CCZ boundary, entering the zone only when a fare becomes available. This could unintentionally raise congestion in key locations within London.

To the extent that there is shift from PHVs to licensed taxis, this is likely to worsen rather than improve air quality because, on average, licensed taxis have higher emissions than PHVs, as illustrated in the figure below.

⁷ Competition and Markets Authority (2015), 'Competition and Markets Authority response to Transport for London's private hire regulations proposals', response to consultation, December 2.

Weighted average emissions standards by fleet, based on vehicle age, compared to Euro 6 (i.e. Euro 6 limit = 1)



Source: Oxera.

Furthermore, CEPA has not considered the possibility of a demand shift (or supply shift) in the PHV market that would, for example, defer journeys until after charging hours. While a demand shift could reduce congestion, TfL data on entries into the CCZ shows that the busiest two hours in the day are from 18:00 to 20:00, outside charging times. Adding further traffic to these two hours is likely to increase congestion.

Minorities will be disproportionately affected

The effects of TfL's proposed policies on licensed tax and PHV drivers would fall largely on individuals of particular ethnic groups, as illustrated in the figure below.



Taxi and PHV driver ethnicity

Source: Oxera analysis of TfL data.

In short, the evidence does not support TfL's proposed policies. The evidence itself has a number of conceptual issues; the proposed policies have the potential for some unintended consequences; and some of these consequences would fall disproportionately on drivers among minority groups.

Addison Lee's policy alternative is more effective in meeting TfL's objectives

Addison Lee is keen to work with TfL to develop policies that would, in the longer term, have widespread benefits in improving London's air quality and reducing congestion.

Addison Lee would therefore like to propose to TfL a suite of alternative policy options, with the first four of these options being implemented in their entirety in a single policy framework. The final proposal requires further impact studies before it could be implemented.

- 1. phase out non-Euro 6 (diesel) and non-Euro 4 (hybrid petrol) PHVs. This would directly improve vehicle emissions for trips within the CCZ;
- 2. establish a rapid electric charger network in London and make the existing 'licensed taxi'-only electric chargers accessible to PHVs. This would support the adoption of electric vehicle technology across the wider PHV industry;
- raise standards across the PHV industry. This would address more general concerns about driver quality and, by extension, reduce the number of licences;
- adjust taxi licensing such that all vehicles have to be under 10 years old. This would eliminate older, more polluting, vehicles and increase safety;
- 5. While it does not form part of Addison Lee's core proposal, an increase in the current CCZ or an extension of the CCZ would raise millions to pay for rapid electric charging network. This would address congestion and pollution over a wider footprint.

Oxera understands that, within this suggested suite of policy options, Addison Lee would be able to support TfL in its objectives. These options would enable Addison Lee to invest £60m in 2019 alone and provide a greener, safer fleet of vehicles, as is required to meet Ultra Low Emission Zone (ULEZ) standards. However, this is dependent on there being sufficient returns within the industry and regulatory certainty about the Congestion Charge, ULEZ and licensing.

To improve air quality and reduce congestion in London, TfL could consider increasing the Congestion Charge to reduce travel among private road users. Alternatively, the CCZ could be expanded to the ULEZ (i.e. the North/South Circular roads in London), reducing traffic ingress across a wider footprint. A full impact assessment of these options would be required, and Addison Lee is offering to assist TfL to evaluate whether this suite of options would have a positive impact in London.

Oxera has assessed all of Addison Lee's policy proposals against a number of criteria obtained from our review of TfL's strategy documents (see table below).

Economic criteria and findings

Criteria	TfL's policy proposal	Addison Lee's policy proposal
Reduce congestion	1% reduction in total traffic is a negligible impact	Increasing the Congestion Charge by £1 would have a similar 1% traffic reduction. CCZ expansion could reduce entries into Inner London by 14–27%
Improve air quality	Volume reduction small. Policy could divert journeys to older, more polluting licensed taxis	Expansion of charging infrastructure supports more rapid adoption of zero emissions vehicle (ZEC) in the PHV market. Older taxis taken off the roads sooner
Be compliant with state aid rules, competition law and meet equality obligations	Incidence of exemption removal is skewed towards PHV drivers from minority groups. Risks in relation to both state aid and competition law	Proposals achievable within TfL's existing toolkit. Retains equality of treatment between drivers of licensed taxis and PHVs
Minimise negative wider economic effects	Could have unintended impacts on congestion outside the zone or near the boundaries, or on driver standards	Vehicle age standards may have positive safety benefits. Minimal licensed taxi/PHV market distortion
Cost-effective for TfL	CEPA suggests £20m–£40m p.a. revenue for TfL. Implementation costs small	Significant investment in electric vehicle chargers required, although could be recouped through charges to those using the facilities. Upfront investment could be funded by an increase in the Congestion Charge or geographic expansion of the CCZ.

Source: Oxera.

Oxera's independent economic review of Addison Lee's proposed policy options shows that together (and including the additional CC/CCZ modifications) they would be more effective in achieving TfL's objectives than TfL's current proposals.

1 Introduction

Addison Lee has commissioned Oxera to provide an independent economic review of the analysis conducted by CEPA and Mott MacDonald and to assess a package of policy options developed by Addison Lee as an alternative to TfL's proposals. This report is Oxera's contribution to TfL's consultation on proposed changes to the Congestion Charge.

Improving air quality through reducing emissions is a key aim in the Mayor's Transport Strategy 2018.⁸ The Congestion Charge is an important element in TfL's strategy to achieve less congestion and lower emissions in central London. To support the objectives of reducing congestion and improving air quality, TfL is consulting on two changes to transport policy in London: ⁹

- to remove the exemption from the Congestion Charge that is currently applied to private hire vehicles (PHVs), but retain this exemption for licensed taxis;
- to replace the Ultra Low Emission Discount (ULED) with a new, phased Cleaner Vehicle Discount (CVD).

These changes could have wide implications for Londoners, and therefore need to be assessed robustly. In this report Oxera details an economic framework for assessing policy options, and then evaluates TfL's and Addison Lee's policy proposals.

Structure of the report

- section 2 presents the policy context in which TfL has proposed changes to the Congestion Charge;
- section 3 sets out the economic framework for assessing policy options in order to meet TfL's objectives;
- section 4 provides an assessment of TfL's proposals;
- section 5 provides an assessment of Addison Lee's proposals;
- section 6 concludes.

⁸ https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf

⁹ Transport for London (2018), 'Have your say on proposed changes to the Congestion Charge', <u>https://consultations.tfl.gov.uk/policy/private-hire-charge-exemption/</u>. TfL also proposes a number of minor changes to the Scheme Order, which are not the subject of this report.

2 Policy context

2.1 The Congestion Charge

The Congestion Charge was introduced in 2003 to reduce congestion in Central London. The CCZ) is shown in Figure 2.1. From 2007 to 2010 the area covered by the charge was larger, incorporating the Western Extension Zone (WEZ).

Figure 2.1 The Congestion Charge Zone



Source: TfL (2018), 'Congestion Charge zone', <u>https://tfl.gov.uk/modes</u> /driving/congestion-charge/congestion-charge-zone, map data from Google.

Initially, the Congestion Charge was £5 per day, subsequently increasing to £8 in 2005; £10 in 2011 and £11.50 in 2014 (although drivers who use pay via the Auto Pay channel are charged £10.50).¹⁰ The charge applies Monday to Friday 7am–6pm. At present, licensed taxis, PHVs, motorcycles and bicycles, and buses are exempt.¹¹ Additionally, residents within the CCZ receive a 90% discount.

In the first year of the charge, traffic entering the CCZ fell by 27%, and has been broadly stable since.¹² The introduction of the WEZ in 2007 reduced traffic entering that zone by 14% (although the WEZ was subsequently removed on the basis of political considerations).¹³

2.2 Congestion and air quality in London

Congestion has been increasing in Greater London and within the CCZ, as shown in Figure 2.2, and congestion worsens air quality as vehicles at slower speeds produce more emissions per kilometre.¹⁴

¹⁰ The introduction of the Congestion Charge and the increase of the Congestion Charge from £5 to £8 per day both reduced congestion in the CCZ. For example, the elasticity from the price increase of £5 to £8 was found by TfL to be -0.16. The precise impact of the subsequent increases is unclear from publically available data. See TfL (2008), 'Demand Elasticities for Car Trips to Central London as revealed by the Central London Congestion Charge', Prepared by Reg Evans for the Modelling and Evaluation Team, September, available at: <u>http://content.tfl.gov.uk/demand-elasticities-for-car-trips-to-central-london.pdf.</u>
¹¹ Vehicles with nine or more seats that are licensed with the Driver and Vehicle Licensing Agency (DVLA) as

¹¹ Vehicles with nine or more seats that are licensed with the Driver and Vehicle Licensing Agency (DVLA) as buses.

¹² http://content.tfl.gov.uk/congestion-charge-factsheet.pdf

¹³ http://content.tfl.gov.uk/appendices-to-the-report-to-the-mayor.pdf

¹⁴ Greener Journeys (2017), 'Tackling Pollution and Congestion', <u>https://greenerjourneys.com/wp-content/uploads/2017/06/TACKLING-POLLUTION-AND-CONGESTION-15-JUNE-2017-FINAL.pdf</u>





Source: TfL Surface Transport, Outcomes, Insight & Analysis.

Source: Transport for London (2018), 'Travel in London' Report 10, Figure 6.18, February 23 Excess traffic is the main cause of congestion, as shown in Figure 2.3. Figure 2.3 The causes of congestion in London



Note: Excess traffic is recurrent traffic demand over the available supply or capacity of road space.

Source: TfL, http://content.tfl.gov.uk/travel-in-london-report-9.pdf

Most vehicle-kilometres within Central London are due to cars (including taxis and PHVs)—see Figure 2.4. However, it is not clear what proportion of carkilometres in the area are due to private cars, taxis or PHVs.

Figure 2.4 Vehicle-kilometres in Westminster and City of London



Note: The London boroughs of Westminster and City of London are provided as a proxy for the CCZ.

Source: Oxera analysis of Department for Transport road traffic statistics.

2.3 Competition between London licensed taxis and PHVs

Competition and regulatory authorities delineate markets using a tool called market definition. This defines the boundary of a market on the basis of supply and demand substitution. If consumers regard two products as substitutes then the prices of these products could constrain each other; it also implies that products that are in separate markets do not compete. Recent decisions by the Competition and Markets Authority have found that licensed taxis and PHV are in the same market.¹⁵

Despite the nature of competition between PHVs and licensed taxis, the latter receive a number of unique privileges and subsidies from TfL and the government. For example:

- licensed taxi vehicles can be up to 15 years old, whereas PHVs can only be 10 years old;¹⁶
- licensed taxi vehicles are eligible for a government-led Plug-in Taxi Grant (part-funded by TfL) of £7,500 towards a new zero emissions vehicle (ZEC). PHVs are not eligible for this, although they may be eligible for a category 1, 2, or 3 grant of up to £4,500;¹⁷

¹⁵ See Competition and Markets Authority (2015), 'Sheffield City Taxis / Mercury Taxis merger inquiry', Decision ME/6548-15, October 29

¹⁶ <u>https://tfl.gov.uk/modes/driving/ultra-low-emission-zone/cleaner-greener-taxis</u> <u>https://tfl.gov.uk/info-for/taxis-and-private-hire/licensing/private-hire-vehicle-licence</u>

¹⁷ https://tfl.gov.uk/modes/driving/ultra-low-emission-zone/cleaner-greener-taxis

 licensed taxi vehicles are eligible for TfL's taxi de-licensing scheme, whereby TfL pays drivers up to £5,000 to de-license vehicles that are at least 10 years old. PHVs are not eligible for this.¹⁸

The removal of the exemption just for PHVs appears to extend further advantage to licensed taxi operators. The imposition of additional charges on PHV operators and drivers may limit their ability to invest and switch to electric vehicles; we examine this further in section 4. Next, in this context we outline Oxera's economic framework for assessing policy options.

¹⁸ <u>https://tfl.gov.uk/modes/driving/ultra-low-emission-zone/cleaner-greener-taxis</u>

3 Economic framework for assessing policy options

In this section we outline an economic framework for assessing policy options to achieve TfL's objectives.

TfL's objectives 3.1

The primary objectives behind TfL's proposals in the consultation entitled 'Changes proposed to Congestion Charge to reduce traffic and improve air guality' are clear.¹⁹ TfL wishes to reduce congestion and improve air guality in central London:20

If we are to clean up the capital's toxic air and tackle congestion in central London, we need to have the appropriate incentives as well as the right interventions.

Additionally, as stated in the Mayor's 2016 Taxi and Private Hire Action Plan, the Mayor's overarching objectives are to: ²¹

Ensure the markets for licensed taxi drivers and private hire drivers are fair with special privileges built in, as they always have been, for those who become a licensed London taxi driver

Ensure driver safety standards are rigorously enforced across both industries Retain the exclusive right of licensed taxi drivers to use bus lanes and ply for hire

The Mayor's Transport Strategy 2018 also states an objective is to reduce car dependency.²²

3.2 Economic framework for assessing policy options

TfL's primary objectives behind the policy proposals are therefore clear; to reduce congestion and improve air quality. Thus, these two objectives form the first criteria in the economic framework. Of similar importance is that any policy is compliant with legal requirements, such as the Equality Act, competition law and state aid rules.

Best-practice policymaking, however, considers more than just the primary objectives and legal requirements. Wider economic impacts, such as changes to competitive market dynamics or the impact on consumers and business, should also be carefully considered. Equally, it is important that any policy is cost-effective for TfL to implement.

Oxera's economic framework for assessing policy options is shown in Figure 3.1 below. Primary objectives are those that must be met in order for a policy to be a viable option for TfL. Secondary objectives are those that should be met for the policy to be a viable option for TfL, but which may not be met under certain mitigating circumstances (if the impact is not excessive). Across all of these themes, any proposed policy should be evidence-based; policy conclusions should be based on robust methods and reliable data.

¹⁹ https://tfl.gov.uk/info-for/media/press-releases/2018/july/changes-proposed-to-congestion-charge-toreduce-traffic-and-improve-air-quality

https://tfl.gov.uk/info-for/media/press-releases/2018/july/changes-proposed-to-congestion-charge-toreduce-traffic-and-improve-air-quality ²¹ http://content.tfl.gov.uk/taxi-and-private-hire-action-plan-2016.pdf

²² https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf



Figure 3.1 Economic framework for assessing policy options

Next, we assess TfL's proposals within this economic framework.

4 Assessment of TfL's proposals

4.1 Introduction

TfL is proposing to:

- remove the Congestion Charge exemption for PHVs only. Currently, licensed taxis and PHVs are exempt from the charge;
- replace the ULED with a phased CVD.

The ULED at present provides a discount of 100% on the Congestion Charge to vehicles that meet all of the eligibility criteria. The ULED and CVD criteria and phasing are outlined below in Table 4.1.

Table 4.1	Current and proposed ULED and CVD criteria for 10)0%
	discount on Congestion Charge	

	ULED	CVD
Present criteria	Vehicles must weigh less than 3.5 tonnes, meet the Euro 5 standard, and emit less than 75g/km of carbon dioxide	
From April 8, 2019		Euro 6, emit no more than 75g/km CO ₂ , 20 mile ZEC range.
From October 25, 2021		Fully electric vehicles
From December 25, 2025		Discount expires for all vehicles

Source: Transport for London (2018), 'Why amend the Ultra Low Emission Discount (ULED)?', consultation document, available https://consultations.tfl.gov.uk/policy/dc2e118e/.

Vehicles must weigh less than 3.5 tonnes, meet the Euro 5 standard, and emit less than 75g/km of carbon dioxide. Under the CVD, the criteria will be tightened. From April 2019, vehicles will need to meet Euro 6 standards, emit no more than 75g/km, and have a minimum 20-mile zero emission capable (ZEC) range. From October 2021, these criteria will be tightened to apply only to fully electric vehicles. Finally, from December 2025, the discount will expire for all types.

Note that the current ULED criteria are already quite strict from the perspective of PHV operations. A review of the list of compliant vehicles shows finds that most are compact city cars, or premium luxury and SUV vehicles – either too small or too expensive to operate as a PHV.²³

In our assessment of TfL's proposals, Oxera has applied the economic framework to the policy, as discussed in section 3. We have assessed the proposals in terms of their likelihood to achieve the policy objectives, and in regard of TfL's other obligations in relation to competition law and equality.

²³ See for example <u>https://www.nextgreencar.com/congestion-charge-exempt/</u>, accessed September 20, 2018.

In section 4.2, we give an overview of the supporting material. In the remaining sections, we assess the policy proposals within the assessment framework illustrated in Figure 3.1.

4.2 Review of TfL's analysis

In support of its analysis, TfL has made available the following three documents:

- the TfL consultation document, setting out the motivation, policy context and high-level traffic analysis;²⁴
- CEPA's analysis.²⁵ This is an economic assessment of the impact of the proposed policies on vehicle traffic, prices, supply shares and revenue to TfL;
- the Mott MacDonald integrated impact assessment.²⁶ This is a qualitative review of the policy, looking at environmental, social, health and safety impacts.

The Mott MacDonald document is a qualitative assessment, and as such does not permit an assessment of costs and benefits. Most of Oxera's assessment presented within this section is therefore directed at the TfL and CEPA documents. We briefly comment on the evidence and methodology for this document (see section 4.8).

4.3 Impact on congestion

Oxera's review of TfL's proposed policy finds that the net impact of removing the exemption (under CEPA's analysis) is small in relative terms—a 1% reduction in traffic, and dependent on assumptions on how the PHV industry responds to the proposal. Furthermore, the policy may have relatively modest net consumer impacts—limiting the extent to which the policy can affect travel decisions and effect modal shift.

4.3.1 TfL's own analysis projects a 1% reduction in traffic

CEPA's main analytical finding is that the policy would reduce PHV traffic within the CCZ by 6% and overall traffic by 1%. This is small, relative to the scale of traffic, and the variation in journeys within the CCZ. To put this into context, the day-to-day volume of entries by Addison Lee is plotted in Figure 4.1.

²⁴ Transport for London (2018), 'Consultation on proposed changes to the Congestion Charge', consultation document, July 6, https://consultations.tfl.gov.uk/policy/private-hire-charge-exemption/

²⁵ CEPA (2018) 'TfL –PHV congestion charge study', analysis for TfL, March 27.

²⁶ Mott Macdonald (2018), 'Changes to the London Congestion Charge scheme – Integrated impact assessment', analysis for TfL, July 3.





Source: Oxera analysis of Addison Lee dispatch data.

The day-to-day variation in Addison Lee's entries to the CCZ is significant—on one measure, around an order of magnitude higher than those of CEPA's findings.²⁷ Vehicle delay (as shown in Figure 2.2) as a measure of congestion is also volatile in nature. Congestion is a dynamic phenomenon with interrelated strands including planned and unplanned events.²⁸ In this setting, a 1% reduction which is caveated as a 'broad estimate[s]' is likely to be imperceptible.

In addition, the proposed policy appears to ignore the bulk of the increase in PHV traffic entering the zone. TfL data suggests that the busiest part of the day in terms of PHV entries (during weekdays) is the late evening peak from 19:00–00:00.29 This part of the day has also experienced the largest growth in PHV traffic in recent years. The policy does not tackle this (which may explain the small impact) and could even exacerbate evening peak congestion. We discuss this further in section 4.3.4.

On the basis of CEPA's analysis, the policy would be negligible in terms of meeting TfL's objective on reducing congestion.

4.3.2 The traffic reduction relies on PHV specialisation

The finding that the policy reduces PHV traffic in the CCZ rests on the 'specialisation' assumption, whereby Addison Lee and Uber divide their fleets into vehicles that enter the CCZ and those that do not.³⁰ This assumption is not backed up by evidence within the industry.

²⁷ The standard deviation for 2018 is 169 entries, or around 10% of the average level.

²⁸ TfL's own analysis describes these factors. See, for example, ITP (2017), 'Understanding and Managing Congestion', report for TfL, November 11. ²⁹ Transport for London (2017), 'Travel in London' Report 9, Table 6.7, p. 188, May 5.

³⁰ CEPA's analysis assumes that only larger operators (Addison Lee and Uber) are able to do this.

First, evidence from Addison Lee's data suggests that PHV operators would find it difficult to specialise—a summary of Addison Lee's CCZ journeys is shown in Table 4.2.

Table 4.2Breakdown of Addison Lee's journeys within the CCZ

Year	Total journeys with a CCZ pick-up or drop-off	Journeys entirely within the CCZ	Proportion entirely within the CCZ
2015	1,526,185	442,235	29.0%
2016	1,307,235	356,936	27.3%
2017	1,154,954	301,897	26.1%
2018 (vear to date)	649,788	157,743	24.3%

Note: Data is based on the number of complete customer journeys.

Source: Oxera analysis of Addison Lee operational data.

Less than 30% of journey that have a drop-off or pick-up within the CCZ are journeys that stay within the CCZ. For the remaining 70% or more, Addison Lee is exiting the CCZ to complete the job. Examining trip distance, a measure more relevant to congestion, is shown in Table 4.3.

Table 4.3 Breakdown of Addison Lee's vehicle-km within the CCZ

Year	Total distance (km) with a CCZ pick-up or drop- off	Distance (km) entirely within the CCZ	Proportion of total distance entirely within the CCZ
2015	13,323,400	1,781,490	13.37%
2016	12,499,770	1,363,127	10.91%
2017	11,792,409	1,146,769	9.72%
2018 (year to date)	6,965,730	582,922	8.37%

Note: Data is based on estimates of total vehicle journeys.

Source: Oxera analysis of Addison Lee operational data.

For journeys with a CCZ component, the majority involve travel outside the zone. Only a small fraction of an average CCZ-originated or -destined journey is actually within the CCZ. To serve journeys of this type, most of the time a vehicle spends its time outside the zone. Specialisation is also likely to limit the capacity utilisation of operations similar to those of Addison Lee, by limiting the rides that a CCZ-designated vehicle can take while it is outside the zone. Oxera has reviewed capacity utilisation metrics, as shown in Table 4.4.

Table 4.4Capacity utilisation (passenger-km/total km) by area, 2018

0.00/ 770/	CCZ only	Outside CCZ only	All other	
81% 83% //%	81%	83%	77%	

Note: Data is based on estimates of customer distance divided by total journeys for these groups.

Source: Oxera analysis of Addison Lee operational data.

To calculate these measures, Oxera organised the data on vehicle trips by day, and separated those that stayed within the CCZ and those that stayed outside the CCZ (with a final category containing all other types—including those that travel between the regions). We then summed the customer and total vehicle distance for these vehicles.

Capacity utilisation is high and fairly consistent across the geographic regions. This suggests that, at present, Addison Lee is able to make efficient job allocations, regardless of location. However, if specialisation was imposed it is likely that this would go down, especially considering the large proportion of journeys that transit the zone. For example, after completing a drop-off at Heathrow, a CCZ-allocated driver may be instructed to return to a job in the zone, rather than take on jobs in West London outside the zone. This additional constraint in organising the fleet is likely to lead to a sub-optimal job allocation. Given that Addison Lee have developed its dispatch technology over years to take into account traffic, delays, distance and therefore emissions it is possible that specialisation could increase emissions per passenger mile and make congestion worse in some areas.

CEPA's analysis assumes that the largest operator, Uber, would be able to specialise in response to the policy. This ignores two important features of the ride-hailing model. First, ride-hailing platforms are not strictly 'dispatch'- oriented. Flexibly matching a casual driver supply to rider demand means that drivers can autonomously decide the time of day and location they wish to serve. The ride-hailing model does not centrally allocate a driver to an area or ride.

Second, ride-hailing drivers in general do not observe their rider's destination until they have accepted the job.³¹ They will not be able to determine whether a potential job enters (exits) the CCZ until it is too late. These features make it implausible that a ride-hailing platform would specialise within the CCZ in this way.

Despite these operational realities, and input from PHV operators stating that specialisation would be difficult, CEPA's analysis was based on an assumption that larger operators would be able to do this.

4.3.3 The net impact on end-users may be quite small

TfL's policy aims to reduce congestion and air pollution by increasing end-user pricing to induce a reduction in demand or a switch to an alternative mode of transport.

We assess this aspect of the impact by reviewing price elasticity of demand within the PHV and licensed taxi market.³² Recent evidence suggests that market-wide elasticity is moderate, with estimates ranging from –1.0 (as a licensed taxi-specific finding), to –0.16 (as per the 2008 Congestion Charge expansion study).³³ Where there are several PHV substitutes available to consumers, cross-price elasticity is likely to be high.³⁴ The CEPA analysis

http://sydney.edu.au/business/__data/assets/pdf_file/0003/185340/ITLS-WP-13-20.pdf. ³⁴ Cross-price elasticities measure the change in the demand for one good or service in response to the price

³¹ This is a measure to avoid drivers 'cherry-picking' by attempting to refuse less profitable journeys.

³² Elasticities estimate the percentage change in one variable in response to the change in another variable. In this setting we are interested in how the volume of demand (for PHV journeys) changes in response to a price change.

price change. ³³ Cohen, P., Hahn, R., Hall, H., Levitt, S, and Metcalfe, R. (2016), 'Using Big Data to Estimate Consumer Surplus: The Case of Uber', 30 August, <u>http://www.datascienceassn.org/sites/</u>

default/files/Using%20Big%20Data%20to%20Estimate%20Consumer%20Surplus%20at%20Uber.pdf. Evans, R. (2008), 'Demand Elasticities for Car Trips to Central London as revealed by the Central London Congestion Charge', September, <u>http://content.tfl.gov.uk/demand-elasticities-for-car-trips-to-centrallondon.pdf</u>. Rose, J.M. and Hensher, D.A. (2013), 'Demand for taxi services: New elasticity evidence for a neglected mode', ITLS WP 13-20, October,

³⁴ Cross-price elasticities measure the change in the demand for one good or service in response to the price of another good or service. As such, they can measure switching between services.

appears to support this, suggesting significant volume reallocation among the PHV sector in response to the Congestion Charge.

TfL's proposal retains the Congestion Charge exemption for licensed taxis. Academic studies indicate that there may be substitutability between licensed taxis and PHVs.³⁵ These is also evidence that PHV services may be a complement (rather than a substitute) to public transport in some circumstances.³⁶ For instance, users could combine a PHV journey with a tube journey to make a trip that that would not have made solely by tube or PHV. Under these conditions, users of PHV services could respond to the policy by switching to PHV operators charging lower fares, or to an older, more polluting taxi fleet. The combined effect on traffic congestion may be quite small.

4.3.4 Unintended consequences of the policy may increase congestion

Some supply-side and demand-side responses to the policy appear to have been ignored in the analysis. First, in some cases the policy may simply divert congestion onto roads that border and transit the CCZ. These boundary effects could arise as drivers seek to avoid entry—for example, by re-routing cross-city journeys or negotiating drop-off and pick-up locations that are just outside the zone. PHV drivers could also delay entry into the zone to arrive outside charging hours, which may have a similar displacement effect around the boundary.

On the demand side, TfL's own analysis shows that the busiest two hours within the CCZ are just after charging hours, from 18:00 to 20:00.³⁷ These are likely to be the most congestion prone times on the road network. If passengers (or drivers) respond to TfL's policy by delaying their trip such that it occurs just after 18:00, it will add further traffic to the most congested period of the day.

4.4 Impact on air quality

Oxera's analysis of the TfL proposal finds that road traffic volumes are unlikely to reduce significantly in net terms. We also find that alternatives (which may become cheaper in relative terms) use older vehicles which with higher levels of emissions. Finally, we assess PHV operators' incentives to switch to ZEC vehicles within the CVD scheme and find that this does not influence decisions.

4.4.1 Small changes in road traffic imply small first-order effects

Assessing air quality impacts is challenging, as pollution can be driven by sources outside of London (or non-transport emissions) and be affected by weather patterns. In reference to the policy objectives, TfL aims to address air quality by reducing road usage, and by encouraging road users to switch to less polluting transport alternatives. On the first of these, Oxera's analysis, presented in section 4.3, shows that the volume reduction in road usage is small, and difficult to distinguish from no effect at all. Oxera's analysis indicates

http://individual.utoronto.ca/jhall/documents/Uber_and_Public_Transit.pdf. OECD (2018), 'Taxi, ride-sourcing and ride-sharing services', Working Party No. 2 on Competition and Regulation, 4 June. https://one.oecd.org/document/DAF/COMP/WP2/WD(2018)26/en/pdf. Shim, H.S. and Mammen, K. (2017),

³⁵ Chang, H.-H. (2017), 'The economic effects of Uber on taxi drivers in Taiwan', *Journal of Competition Law & Economics*, **13**3, 1 September, <u>https://academic.oup.com/jcle/article/13/3/475/4429543</u>. Hall, J.D., Palsson, C. and Price, J. (2017), 'Is Uber a substitute or complement for public transit?' Working Papers,

University of Toronto, Department of Economics, 13 June,

https://one.oecd.org/document/DAF/COMP/WP2/WD(2018)26/en/pdf. Shim, H.S. and Mammen, K. (2017), 'New York City Taxis: Demand and Revenue in an Uber World', 31 December. 36 Loll. L. D. Dalager, C. and Drise, L. (2007). the Uberg substitute assessment and for sublic tenneit? Workin

³⁶ Hall, J.D., Palsson, C. and Price, J. (2017), 'Is Uber a substitute or complement for public transit?' Working Papers, University of Toronto, Department of Economics, 13 June.

³⁷ Transport for London (2018), 'Travel in London' Report 10, Figure 3.31, p. 77, February 23.

that the volume effect as a driver of air quality changes is likely to be minimal in the first instance.

4.4.2 Alternative modes such as licensed taxis may have higher emissions

In terms of encouraging people to switch to alternative transport modes, Oxera considers the fleet emissions of alternatives to PHV transport. We examine the treatment of PHVs and taxis, and review evidence on vehicle age.³⁸ First, data from TfL suggests that the fleet is significantly older than the PHV fleet.



Figure 4.2Vehicle age and emissions standards by fleet

Source: Oxera.

Older vehicles, typically being compliant with contemporaneous rules, will meet less stringent emissions standards. European emission limits are shown in Table 4.5.

Table 4.5Emission limits for diesel cars (mg/km)

	СО	THC	NMHC	NOx	THC + NOx	РМ	PN
Euro 3	0.64	-	-	0.5	0.56	0.05	-
Euro 4	0.5	-	-	0.25	0.3	0.025	-
Euro 5	0.5	-	-	0.18	0.23	0.005	6 x 10^11
Euro 6	0.5	-	-	0.08	0.17	0.0045	6 x 10^11

Source: https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A31998L0069 https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A31998L0069 https://eur-lex.europa.eu/LexUriServ.do?uri=OJ:L:2007:171:0001:0016:EN:PDF

³⁸ Transport for London (2015), response to FOI-1560-1516 from Mr M. Burke, 18 December 2015. Information as at 24 November 2015,

<u>https://www.whatdotheyknow.com/request/spread_of_ages_of_londons_black</u>. Transport for London (2017), 'Private hire vehicles by model and age - June 2017', <u>http://content.tfl.gov.uk/private-hire-fleet-information-june-2017.pdf</u>

When we weight the emissions by fleet composition we see that the average licensed taxi currently emits around 4 times the particulates of an average PHV and twice the NOx, as shown below in Figure 4.3.³⁹

Figure 4.3 Weighted average emissions standards by fleet, based on vehicle age, compared to Euro 6 (Euro 6 limit = 1)



Source: Oxera.

However, the difference between taxis and PHVs may be expected to gradually narrow over time, as newly registered taxis (which are ZEC) lead to lower average emissions.

4.4.3 TfL's proposed policy does not incentivise a switch to ZEC vehicles

Oxera has modelled the effect of the PHV exemption on a PHV operator's decision to switch to ZEC vehicles. The stylised assumptions are set out in Table 4.6.

³⁹ Oxera understands that Addison Lee's fleet vehicles are a maximum of three years old, and hence are all Euro 6 compliant. This is an approximate approach to map emission standard to the vehicle age data

Table 4.6Stylised fleet cost assumptions, as used in switching
analysis

Variable	Value	
Annual discount rate	5%	
Size of fleet	100 vehicles	
Diesel fleet		
Vehicle purchase cost	£20,000	
Vehicle purchase cost - annual real inflation	-5%	
Residual value after three years	25%	
Tax, MOT (annual)	£195	
Cost of diesel per litre	£1.32	
Cost of diesel per litre - annual real inflation	0%	
Congestion Charge per day (with AutoPay)	£10.50	
Electric fleet		
Vehicle purchase cost	£55,000	
Vehicle purchase cost - annual real inflation	-5%	
Residual value after 3 years	25%	
Tax, MOT (annual)	£55.00	
Cost of electricity per mile	£0.10	
Cost of electricity per mile - annual real inflation	0%	

Source: Oxera.

Oxera assesses the PHV operator's decision in terms of the year when it begins to replace end-of-life diesel vehicles with fully electric vehicles. This assumes that the PHV operator commits to a 3 year vehicle life cycle, and does not retire vehicles early. The results of the analysis are shown below in Figure 4.4.





The horizontal axis shows the switching options an operator faces—in effect, the year they decide to start buying ZEC vehicles rather than diesel ones. Each vertical bar represents the total discounted present value of making the switch at that time period. So when assessing over time, a rational operator would seek to reduce total costs. The best option is to choose the cheapest total operating costs.

The analysis shows that PHV operator's best option is to defer the switch to the ZEC vehicles, and maintain the current fleet type – never upgrading is the cheapest. The decision to switch would not be affected by the proposed policy.

The main driver of this analysis is the large upfront expense of electric vehicles. At present, there is no suitable electric vehicle on the market that could meet a PHV operator's size, range and other operational expectations. The cost is estimated using the ZEC London taxi as a benchmark, which is listed at £55,000, before any available government ZEC vehicle rebates. If a suitable vehicle were available, at a far lower price (e.g. £35,000 net of subsidy), the policy could influence the decision, as shown below in Figure 4.5.



Figure 4.5 Switching decision, assuming a £35k vehicle cost, cost of fleet (£m), 2019–30

Source: Oxera.

In this specific example, the best response when paying the Congestion Charge is to switch to ZEC immediately. If the Congestion Charge is not payable, it remains a better response to not switch. So in this example, the change of policy towards the CVD does influence the decision. With this model and assumptions, a vehicle price of around £35,000 (net of any grants and subsidies) is close to the inflection point for the policy – below this, and the CVD is effective; above this point and the policy does not influence decisions.

This highlights how the proposed policy's aim of accelerating the migration to other transport modes is unlikely to be achieved. It indicates a wider lack of market readiness for the TfL's proposals—the motor vehicle market is not yet able to supply a suitable ZEC vehicle for the PHV market. Moreover, the incentive to switch is too small and short-lived to affect participants' decisions.

4.5 Equality, competition law and state aid considerations

4.5.1 Equality

Oxera has examined evidence on taxi driver demographics, comparing the ethnicity of PHV drivers with the licensed taxi driver demographics.⁴⁰ Taxi and PHV driver ethnicity is shown in Figure 4.6.





Source: http://content.tfl.gov.uk/taxi-and-phv-demographic-stats.pdf

The PHV driver distribution has a much higher representation of BAME individuals relative to the taxi driver group. It is also significantly different to the broader population—86% of the people in England and Wales are white.⁴¹ To the extent that the incidence of the removal of the Congestion Charge exemption falls on drivers, it disproportionately affects specific ethnic groups. There is a duty on public authorities to consider how their policies or decisions affect people who are protected under the Equality Act. The Mott MacDonald report does identify this issue and highlights this disproportionate impact. TfL could be challenged by PHV drivers on this matter.

4.5.2 Competition law considerations

Oxera note that the CMA has responded to previous TfL consultations regarding the regulation of PHVs.⁴² It has highlighted the fact that PHVs and licensed taxis compete on price and non-price factors. The CMA has cautioned TfL against increasing the regulatory divergence between PHVs and licensed taxis, distorting the level playing field between them or favouring certain groups or business models. These factors are all present in the implementation and impact of this policy. As pointed out by the CMA, these kinds of intervention

⁴⁰ Transport for London (2018), 'Taxi and private hire demographic statistics', February 2018, <u>http://content.tfl.gov.uk/taxi-and-phv-demographic-stats.pdf</u> ⁴¹ Cancur 2011

⁴¹ Census 2011.

⁴² Competition and Markets Authority (2015), 'Competition and Markets Authority response to Transport for London's private hire regulations proposals', response to consultation, December 2.

are likely to reduce consumer choice, innovation and the opportunity to lower consumer prices.

TfL's proposals create a distortion of competition between PHVs and licensed taxis. TfL's proposals will clearly limit the ability and incentive of PHVs to compete against licensed taxis and will limit consumer choice. TfL's proposals therefore raise competition concerns which are not considered in further detail in this report but which are raised separately by Addison Lee in its response to the consultation.

4.5.3 State aid considerations

TfL's proposals should not involve illegal state aid, which could distort competition between EU Member States.⁴³ For TfL's proposals to be problematic, they would need to involve the transfer of state resources from it to an undertaking (or undertakings); affect competition between Member States; and be selective (affect one part of the market, but not another).

Retaining the Congestion Charge exemption for licensed taxis entails waiving a charge which would otherwise be payable to the state. As demonstrated in this report, PHV operators and drivers will face an increase in their operating costs, while operating costs for licensed taxis will stay the same. This will clearly put PHVs at a competitive disadvantage compared to licensed taxis in London. TfL's proposal therefore raise legal issues in relation to state aid concerns which are not considered in further detail in this report but which are raised separately by Addison Lee in its response to the consultation.

4.6 Wider economic impacts, competition and impacts to consumers and businesses

TfL's own analysis, conducted by Mott MacDonald, has assessed wider impacts. It finds that adverse impacts occur mainly within the PHV sector and its drivers. Within Oxera's analysis, we have already indicated the possibility of unintended consequences, such as users switching to older, more polluting taxis. To the extent that older vehicles have lower safety standards, this may also imply a wider impact on passenger and road user safety. Oxera has not been able to fully assess the extent of this impact.

To expand on this analysis, it is relevant to consider the possible impact on PHV profitability and the consequences of the proposed policy on the competitive supply of PHV services. We estimate that the Congestion Charge is likely to impose over £4m per annum in direct costs on Addison Lee and its supply chain (e.g. its drivers). This is likely to have a net impact on profitability.

Considering the impact on the wider PHV market, if all firms face a common marginal cost increase, economics tells us they would seek to pass this on in full in the form of higher prices. However in this case, if there is switching to taxis, the PHV operators may not be able to pass on the cost in full. CEPA's analysis suggests that smaller firms will be required to pass on more of the costs than the larger firms.

To the extent that PHV operators already have low profit margins, being unable to pass on the cost shock arising from the proposed policy could lead to firms exiting the market and reducing the competitive supply of PHV services. The

⁴³ A state aid regime will remain post-Brexit.

CEPA analysis itself suggests significant market share reallocations towards the larger operators.

4.7 Cost-effectiveness

CEPA's analysis finds that the proposed policy would generate between £20m and £40m in annual revenue for TfL. A significant driver of the CEPA analysis is the degree of specialisation. The evidence for specialisation is not strong (as discussed in section 4.3.2), and a 'low specialisation' is most likely. This will put the expected revenue towards the higher end of CEPA's range.

4.8 Robustness of evidence and methodology

Oxera has reviewed the credibility and robustness of the evidence base which supports the TfL's proposal. In addition to the challenges we have already identified, we note more general weaknesses throughout, as follows.

- Logical links within impacts. CEPA's analysis identifies vehicle entries into the CCZ as a key metric, and concludes that a 1% traffic reduction is possible. However, it does not clearly translate vehicle entries into vehicles trips and vehicle distance in a way that can support its conclusion. This is relevant, as vehicle distance is far more pertinent to congestion and pollution than the number of entries into the zone.
- Dependency on stakeholder views. The CEPA analysis appears to be overly dependent on stakeholder views. For important drivers of specialisation, cost pass-through and substitution, the approach appears to review stakeholder views and then arrive at a CEPA viewpoint. It does not make reference to theoretical models or relevant studies on these critical aspects of the policy's mechanism. In the example of cost pass-through, there are developed economic approaches that could frame the assumption with more robustness.
- Evidence on demand elasticity. CEPA references demand elasticity as a factor in its analysis, but does not identify the point estimates, the original sources, or context within which these were estimated.
- Narrow sample of respondents to the IIA. The Mott MacDonald study appears to rely on respondents within the PHV industry and associated bodies. The list of respondents includes few if any representatives of the general public, taxi drivers, users of taxi services, and businesses more widely. This would appear to limit the ability of the Mott MacDonald study in assessing the likely wider impacts.

More generally, the CEPA analysis is heavily caveated and flagged as not providing firm results. Evidence of this standard, with these weaknesses, is not sufficiently reliable as a source from which to draw policy conclusions.

5 Assessment of Addison Lee's proposals

5.1 Overview of Addison Lee's proposals

Addison Lee is proposing a suite of policy options for TfL's consideration. The greatest positive impact could be achieved if the suite of policy options is undertaken in its entirety.

The core proposal is that air quality in London could be improved by:

- 1. phasing out non-Euro 6 (diesel) and non-Euro 4 (hybrid petrol) PHVs;
- 2. establishing a rapid electric charger network in London;
- 3. raising standards across the PHV industry;
- 4. adjusting licensing for taxis, such that no licensed taxis can be over 10 years old.

Oxera understands that, within this suggested policy framework, Addison Lee would be able to support TfL in its objectives. This suite of options would enable the company to invest £60m in 2019 in a greener, safer fleet of vehicles, as is required to meet Ultra Low Emission Zone (ULEZ) standards. However, this is dependent on there being sufficient returns within the industry and regulatory certainty on the Congestion Charge, ULEZ and licensing.

Additionally, Addison Lee is keen to work with TfL to develop policies that would, in the longer term, have widespread benefits in improving air quality and reducing congestion across Inner and Outer London. For example, TfL could consider whether the CCZ should be expanded to the ULEZ (i.e. the North/South Circular roads), or TfL could increase the Congestion Charge by £1 per day. A full impact assessment of these options would be required, and Addison Lee would be interested in assisting TfL to evaluate whether these proposals would have a positive impact in London.

Next we assess Addison Lee's proposals within the economic framework.

5.2 Phasing out non-Euro 6 (diesel) and non-Euro 4 (hybrid petrol) PHVs

As from January 1 2018, all new PHVs in London were required to be Euro 6 (diesel) or Euro 4 (hybrid petrol). However, there remain many PHVs that do not meet these standards. PHVs in London can be up to 10 years old, meaning that while 57% of diesel PHVs meet Euro 6 emissions standards, 35% are Euro 5 and 8% are Euro 4—see Figure 5.1 below.





Source: Oxera; Transport for London (2017), 'Private hire vehicles by model and age - June 2017', http://content.tfl.gov.uk/private-hire-fleet-information-june-2017.pdf.

As shown in Table 4.5, older Euro standards are worse for air quality. For example, Euro 5 allows more than double the NOx emissions from diesel cars than Euro 6.

Therefore, air quality would be improved if TfL took action to prohibit the use of non-Euro 6 diesel PHVs in London. A similar logic applies to prohibiting non-Euro 4 hybrid petrol cars in London. This could be done by mandating that all PHVs are Euro 6 (diesel) or Euro 4 (hybrid petrol) by 2020, including those PHVs that are already licensed in London. In 2020 this policy would affect approximately 15% of PHVs (as 15% of PHV were 7-10 years old in 2017).

Therefore, this policy lever would remove the most polluting 15% of PHVs in London in one step (i.e. remove the most polluting from circulation). This would have positive effects outside of the CCZ (as these most polluting vehicles would no longer be making journeys outside the CCZ either). Also, to the extent that the older vehicles are re-used in the secondary market, the existing Congestion Charge and ULEZ policies would address these and penalise use from April 2019 onwards.

A full assessment is detailed in Table 5.1.

(diesel) and non-Euro 4 (hybrid petrol) PHVs			
Criteria	Assessment		
Reduce congestion	Minimal impact, if polluting vehicles are replaced by cleaner vehicles. Positive impact if polluting vehicles are not replaced by cleaner vehicles		
Improve air quality	Positive impact as the PHV fleet becomes cleaner more quickly, both inside and outside the CCZ		
Legal compliance	No obvious legal compliance issues		
Minimise negative wider economic effects	Negative effect on some PHV drivers who would have to replace their vehicle earlier		
Cost-effective for TfL	Cost-effective, as no substantial costs for TfL		

Table 5.1 Assessment against criteria: phasing out non-Euro 6

28

Source: Oxera.

5.3 Establishing a rapid electric charger network in London

As highlighted by the 2017 Energy Saving Trust study for TfL, the infrastructure facilitating the operation of an electric PHV fleet needs to be in place before PHV operators switch to electric fleets.44 The Energy Saving Trust recommended that TfL 'install infrastructure ahead of demand': 45

The PHOs interviewed have each expressed some degree of concern as to the perceived lack of progress made in improving the public chargepoint network in London. This is especially the case in the context of fast and rapid charging. This lack of confidence may not entirely prevent the adoption of ULEVs in London's private hire industry – the business case is arguably strong enough to overcome that - but it will certainly cause PHOs to act with a degree of caution. This may potentially slow the uptake of ULEVs, particularly BEVs. By installing infrastructure to outweigh early demand, some PHOs have stated that they would be likely to more rapidly convert their fleets to ULEVs. This is why TfL has commissioned this piece of work to inform its investment in charging infrastructure in London.

This concern was echoed by the 2017 Analytically Driven study commissioned by Addison Lee, which found that Addison Lee cannot justify investment in ULEVs until the supporting infrastructure is in place.⁴⁶ Analytically Driven estimated the required number of charging points and found that: ⁴⁷

Estimates suggest that realistically it would take a minimum of 330 rapid (43kW or 50kW) recharging points just to satisfy Addison Lee's recharging needs, if they were to switch their fleet to ULEVs. If only 25% of the 108,700 taxis and private hire vehicles operating in London were to convert to ULEVs then, assuming they face the same constraints as Addison Lee drivers, over 2,135 rapid chargers would be required just to meet the needs of this sector. If all 108,700 converted then 8,540 would be required, without considering the needs of other types of fleet operator or private users. In contrast, the current stock of rapid recharging points available in London is 75, and the plan is only to increase this to 150 by the end of 2018 and 300 by 2020.

It is also worth noting that, of the 150 rapid charging points installed by the end of 2018, 90 will be solely reserved for licensed taxis, further reducing the available rapid charging points for PHVs.⁴⁸ According to TfL, there are only 20 non-TfL-funded rapid charge points in London.⁴⁹ Therefore PHVs in London will have access to approximately 80 rapid charge points by the end of 2018, less than 1% of the required 8,540 (as estimated by Analytically Driven).

In short, meeting the ULEZ standards will require TfL to invest in the provision of rapid charging points that can be used by PHVs. This policy lever, while costly in the short run for TfL, is necessary to achieve a cleaner, greener PHV sector.

⁴⁴ Energy Saving Trust (2017), 'Mapping rapid chargepoint locations for private hire vehicles in London', January, http://content.tfl.gov.uk/chargepoint-infrastructure-for-the-london-private-hire-industry-draft.pdf. ⁴⁵ Energy Saving Trust (2017), 'Mapping rapid chargepoint locations for private hire vehicles in London',

January, p. 29. ⁴⁶ Analytically Driven (2017), 'The Provision of Rapid Charging Points in London: The case for government intervention', September, http://www.analytically-driven.com/uploads/2/

^{7/8/1/27818525/}electric vehicle charging infrastructure for london - sept 2017 - final v1.pdf. ⁴⁷ Analytically Driven (2017), 'The Provision of Rapid Charging Points in London: The case for government intervention', September, p.3.

⁴⁸ Transport for London (2018), 'Cleaner greener taxis', <u>https://tfl.gov.uk/modes/driving/ultra-low-emission-</u> zone/cleaner-greener-taxis. ⁴⁹ Transport for London (2018), 'Rapid Charge Points in London (non TfL funded)',

http://content.tfl.gov.uk/rapid-charge-points-non-tfl.pdf.

Table 5.2Assessment against criteria: establishing a rapid electric
charger network in London

Criteria	Assessment
Reduce congestion	Minimal impact
Improve air quality	Positive impact as PHV operators and drivers invest in hybrid technology
Legal compliance	No obvious legal compliance issues
Minimise negative wider economic effects	No obvious negative wider economic effects
Cost effective for TfL	Upfront investment required by TfL, although this may be recouped over time

Source: Oxera.

5.4 Consistency of licensing in the PHV industry

PHV licensees may currently licence themselves in one area with the intention of working 100 per cent of the time in another. Such practices undermine local efforts to raise standards, which differ from one licencing authority to another.

Addison Lee is therefore proposing that TfL work with other licensing authorities and Government to introduce mandatory national minimum standards for operators, drivers and vehicles, which could be implemented through a single legislative framework. Further, a nationwide database could be introduced to record all license refusals, revocations and suspensions on a central register. This would give local licensing authorities access to better information when making licence approval decisions.

These policies would improve passenger safety and may, in the long run, reduce the number of PHV licensees operating in London (as fewer licensees would cross the border into London from other areas).

Table 5.3 Assessment against criteria: raising standards in the PHV industry

Criteria	Assessment
Reduce congestion	In the long run there may be fewer PHV licensees
Improve air quality	Minimal impact
Legal compliance	Minimal impact
Minimise negative wider economic effects	Improved passenger safety
Cost effective for TfL	Minimal costs for TfL

Source: Oxera.

5.5 Adjusting licensing for taxis such that no licensed taxis can be more than 10 years old

TfL currently treats PHVs and licensed taxis differently, in that PHVs cannot be more than 10 years old, while licensed taxis may be up to 15 years old. As shown in section 4.4.2, in 2015 43% of licensed taxis vehicles were 11–15 years old.⁵⁰ These older licensed taxis are likely to be the most polluting

⁵⁰ Transport for London (2015), response to FOI-1560-1516 from Mr M. Burke, 18 December 2015. Information as at 24 November 2015.

https://www.whatdotheyknow.com/request/spread_of_ages_of_londons_black

vehicles, as air quality has improved over time with the introduction of successive Euro emissions standards.

In the absence of evidence showing how older licensed taxis are less polluting than older PHVs, TfL could consider reducing the age limit for licensed taxis to 10 years, in line with the age limit for PHVs. This would remove the most polluting 43% of licensed taxis from London's roads.

Licensed taxi drivers already have access to two subsidy schemes which lessen the cost of switching to electric vehicles—the Government Plug-In Taxi Grant and the TfL de-licensing scheme. This means that the economic impact of the policy on licensed taxi drivers would be lessened.⁵¹

Table 5.4Assessment against criteria: adjusting taxi licensing, such
that no licensed taxis are more than 10 years old

Criteria	Assessment	
Reduce congestion	Minimal impact if polluting vehicles are replaced by cleaner vehicles. Positive impact if polluting vehicles are not replaced by cleaner vehicles	
Improve air quality	Positive impact as the licensed taxi fleet becomes cleaner more quickly	
Legal compliance	No obvious legal compliance issues	
Minimise negative wider economic effects	Negative effect on some licensed taxi drivers who would have to replace their vehicle earlier. However, licensed taxi drivers have access to the Government Plug-In Taxi Grant and the TfL de- licensing scheme	
Cost-effective for TfL	Cost-effective, as no substantial costs for TfL	

Source: Oxera.

5.6 Additional options for consideration

In addition, Addison Lee would also be keen to work with TfL to design policies that may, in the longer term, have widespread benefits in improving London's air quality and reducing congestion beyond the CCZ.

For example, TfL could consider whether the CCZ could be expanded to the ULEZ, or TfL could increase the Congestion Charge.

A full impact assessment of these options would be required, and Addison Lee would be interested in assisting TfL to evaluate whether this policy would have a positive impact in London. Oxera's analysis of these scenarios is based on publicly available data, some of which dates from several years ago. A full impact assessment using more recent TfL data would give more precise figures.

Box 5.1 details Oxera analysis of the impact of expanding the CCZ to the North/South circular roads (i.e. the ULEZ).

⁵¹ Transport for London (2018), 'Cleaner greener taxis', <u>https://tfl.gov.uk/modes/driving/ultra-low-emission-zone/cleaner-greener-taxis</u>.

Box 5.1 Exploring the expansion of the Congestion Charge Zone

TfL could consider whether the CCZ should be expanded to the ULEZ (i.e. the North/South Circular roads). This policy would involve granting residents discounts (90%) to drive in the ULEZ, although anyone in the ULEZ would still pay the current Congestion Charge to enter the CCZ. The policy could be implemented after the introduction of the ULEZ, when the infrastructure is already in place along the ULEZ boundary.

While a full impact assessment would be required, it is possible to estimate the likely outcomes based on publicly available data, some of which dates from several years ago. However, it is useful to illustrate the broad order of magnitude impact that the policy could achieve. This method takes into account the fact that ULEZ residents will receive discounts, as it extrapolates from CCZ data where there is a residents' discount.

First, the number of chargeable vehicles crossing into the ULEZ boundary can be estimated. Data from 2011 on boundary crossings by car (TfL, 2012) can be updated to 2016 numbers according to the published data on trends in car crossings (TfL, 2017). Approximately 700k cars crossed into the ULEZ each day in 2016. Also available is the number of chargeable entries into the CCZ in 2008 (TfL, 2008b), which can be used to compute the proportion of all entries into the CCZ that were chargeable in 2008 (approximately 20–30%). Applying this percentage to the 2016 data on car crossings into the ULEZ provides a broad estimate of the number of chargeable entries into a new, expanded congestion zone (ULEZ)—approximately 140,000–210,000 per day.

Second, it is possible to estimate the reduction in traffic that the expansion of the CCZ would generate. The introduction of the Congestion Charge in 2003 reduced traffic by 27% (TfL, 2018b), while the WEZ reduced traffic into the WEZ by 14% (TfL, 2008a). A reduction of 14–27% of chargeable entries into the ULEZ would be approximately 20,000–55,000 fewer entries. This would have a substantial impact on reducing congestion and improving air quality in London (beyond the CCZ).

Third, assuming that the remaining chargeable entries each pay £10.50 per day, the lower-bound estimate (20% of traffic is chargeable, and there is a 27% reduction in traffic) is that TfL would generate approximately £390m in revenues annually. The upperbound estimate (30% of traffic is chargeable; 14% reduction in traffic) is that TfL would generate annual revenue of approximately £690m. For context, TfL generated revenue of £230m in 2017–18 from the Congestion Charge (TfL, 2018a). This additional revenue could be allocated to the necessary investment in a rapid charger network in London, enabling PHV operators and drivers to switch to electric vehicles, further facilitating improvements in air quality.

Source: Oxera; Transport for London (2008a), 'Report to the Mayor on the Congestion Charge Western Extension consultation Appendix 1 – Consultation materials', 1 September, available at: http://content.tfl.gov.uk/appendices-to-the-report-to-the-mayor.pdf; Transport for London (2008b), 'Impacts Monitoring: Sixth Annual Report', July, http://content.tfl.gov.uk/central-london-congestion-charging-impacts-monitoring-sixth-annual-report.pdf; (2012), 'Traffic Analysis Centre Traffic Note 3: TfL Cordon and Screenline Surveys 1971-2011', March, http://content.tfl.gov.uk/traffic-note-3-cordon-and-screenline-surveys-2011.pdf; (2017), 'Travel in London Report 10', http://content.tfl.gov.uk/traffic-note-3-cordon-and-screenline-surveys-2011.pdf; (2018a), 'Annual Report and Statement of Accounts 2017/18', 25 July, http://content.tfl.gov.uk/travel-in-london-report-10.pdf; (2018a), 'Annual Report and Statement of Accounts 2017/18', 25 July, http://content.tfl.gov.uk/tfl-annual-report-and-statement-of-accounts-2017/18', 25 July, http://content.tfl.gov.uk/tfl-annual-report-and-statement-of-accounts-2017/18', 25 July, http://content.tfl.gov.uk/tfl-annual-report-and-statement-of-accounts-2017/18', 25 July, http://content.tfl.gov.uk/centestion

Box 5.2 below details Oxera analysis of the impact of increasing the Congestion Charge by £1 per day.

Box 5.2 Exploring increasing the Congestion Charge

The Congestion Charge has remained constant at ± 10.50 per day (with Auto Pay) since 2014. TfL could consider increasing the Congestion Charge by ± 1 to ± 11.50 per day, given that prices have increased by 6.8% since 2014, the equivalent of an extra ± 0.72 (ONS, 2018).

A full impact assessment would be required on this policy, and Addison Lee is offering to assist TfL in evaluating the policy. However, it is possible to make broad estimates over the impact of increasing the Congestion Charge by £1. These estimates are based on publically available data, some of which dates from several years ago. However, it is useful to illustrate the broad order of magnitude impact that the policy could achieve.

First, it is possible to calculate the average cost of a trip in the CCZ in terms of fuel costs plus the Congestion Charge (cost of time and cost of parking are excluded). This requires a number of assumptions, detailed below.

Assumption	Input	Source
Average vehicle speed in the CCZ, 2016	12kmph	TfL (2017)
Average trip length, 2008	15.5km	TfL (2008)
Change in average trip length, 2008-17	-15%	TfL (2017)
Average number of trips into the CCZ per day by those incurring the Congestion Charge, 2008	2.5	TfL (2008)
Change in average number of trips, 2008-17	-15%	TfL (2017)
Petrol cost per litre, 2018 average	£1.24	BEIS (2018)
Petrol per kilometre based on average vehicle speed, 2017	0.14 litres	DfT (2017)

Multiplying petrol per kilometre by trip length gives the fuel per trip (1.84 litres). Multiplying petrol per trip by the cost of petrol equals the petrol cost per trip (\pounds 2.29). Dividing the Congestion Charge (\pounds 10.50) by the number of trips per day (2.13) equals the Congestion Charge per trip (\pounds 4.94). The sum of the petrol cost per trip and the Congestion Charge per trip is the average cost per trip, of \pounds 7.23.

Second, increasing the Congestion Charge from $\pounds 10.50$ to $\pounds 11.50$ per day equates to an increased cost per trip of $\pounds 0.47$, taking the average cost per trip to $\pounds 7.23$ (an increase of 6.51%).

Third, it is possible to estimate the impact of the 6.51% increase in average cost per trip on the number of trips taken. TfL (2008) calculated the elasticity of demand from the increase in the Congestion Charge from £5 to £8 as -0.16 (in terms of the number of trips made, when the trip cost is the sum of fuel costs and the Congestion Charge). The elasticity multiplied by the percentage increase in cost is 1.04%. Therefore there would be approximately 1.04% fewer trips as a result of the £1 per day increase in the Congestion Charge. If the elasticity was -0.11 then there would be a 0.72% reduction in trips as a result of the increase in the Congestion Charge. If the elasticity was -0.21 then there would be a 1.37% reduction in trips as a result of the increase in the Congestion Charge.

A £1 increase in the Congestion Charge which resulted in 1.04% fewer chargeable entries into the CCZ would increase TfL's revenue from the Congestion Charge by approximately 8.5%. In 2017-18 TfL generated £230m from the Congestion Charge—an additional 8.5% would be approximately £19m per annum.

Source: Oxera; TfL (2008), 'Demand Elasticities for Car Trips to Central London as revealed by the Central London Congestion Charge', Prepared by Reg Evans for the Modelling and Evaluation Team, September, available at: http://content.tfl.gov.uk/demand-elasticities-for-car-trips-to-central-london.pdf; TfL (2017), 'Travel in London Report 10', available at: http://content.tfl.gov.uk/travel-in-london-report-10.pdf; DfT (2017), 'Forthcoming Change to WebTAG', announced February, available at: https://assets.publishing.service.gov.uk/ government/uploads/system/uploads/attachment_data/file/594061/tag-data-book-forthcoming-change-may-2017.pdf; BEIS (2018), 'Weekly road fuel prices', 18 September, available at: https://www.gov.uk/government/statistical-data-sets/oil-and-petroleum-products-weekly-statistics; ONS (2018), 'CPIH INDEX 00: ALL ITEMS 2015=100', 19 September, available at: https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/1522/mm23.

5.7 Summary

Oxera's assessment of Addison Lee's combined policies indicates that they are more likely to be effective in tackling congestion and improving air quality in London than TfL's proposals. Analysis of Addison Lee's policies does not rest on flawed assumptions, as TfL's analysis does (see section 4). This means that Addison Lee's policies are more likely to be effective and avoid unintended consequences.

Together, the suite of policy options would:

- remove the 15% most polluting PHVs in 2020;
- accelerate the PHV switch to hybrid electric vehicles, ensuring that the ULEZ timescale can be met;
- remove the 43% most polluting licensed taxis by 2020;
- reduce congestion in the CCZ;
- reduce congestion across the ULEZ.

6 Conclusion

Oxera's assessment has found that TfL's proposed policy is unlikely to meet the stated policy objectives of reducing congestion and improving air quality in London.

Within Oxera's objective framework that assesses broader dimensions, we find that the policy could have unintended consequences on competitive supply of PHV services and equality among drivers. These shortcomings are compounded by weaknesses in the supporting analysis, which has logical flaws, assumptions that lack supporting evidence and an opaque methodology.

Oxera's review of Addison Lee's proposals finds that there are alternative policy solutions that could better meet the challenges of reducing congestion and improving air quality in London. Ultimately, these proposals tackle congestion over a broader scope than an asymmetric intervention on one segment of road users, and seek to address the most polluting vehicles.

These proposals put forward by Addison Lee are largely within TfL's existing current suite of interventions and entail fewer unintended consequences. The proposals focus on setting the right regulatory environment and delivering the infrastructure to enable the industry to adopt lower-emission fleets.

