

TFL: Impact of Ultra Low Emission Zone on small coach businesses

DRAFT FINAL

13th July 2017



As context for this study, it is important to note a number of limitations:

- The analysis has been provided as a company-by-company snap shot; it cannot currently be aggregated to produce an overview of impacts across the whole of the coach market, either in London or the UK.
- The analysis is predominantly based on two companies, as others were unwilling to provide the necessary information – we use the limited data provided by others as a cross check.
- We have undertaken engagement with companies – including checking our inputs and assumptions – although this has been limited due to time limitations. For the same reason, the inputs provided by the companies have not always been independently verified.
- We were offered differing views on the availability and pricing of retrofitting – which emerges as a critical factor in managing the impacts of the proposals.

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		<u>Slides</u>
0	Executive Summary	4 - 13
1	Introduction	14 - 18
2	Approach	19 - 21
3	Companies in our study	22 - 23
4	Summary of stakeholder views	24
5	CEPA results and analysis	25 - 39
6	Conclusions and implications for TfL	40
7	Suggestions for further work	41
8	Annexes	42 - 45

EXECUTIVE SUMMARY

Executive summary – Introduction

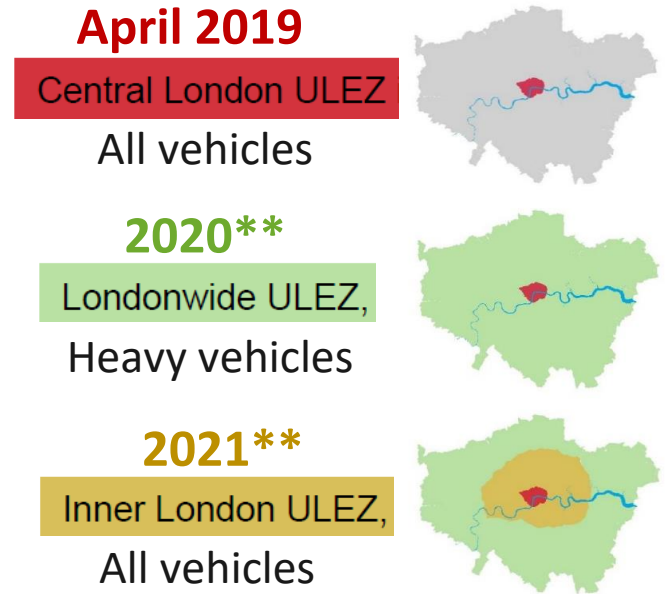
This study considers the impact of the ULEZ proposals on several small coach companies, accounting for their potential responses.

ULEZ PROPOSALS: In April 2017, the Mayor of London Sadiq Khan announced his intention to implement an Ultra Low Emission Zone (ULEZ):*

- “In central London in April 2019”.
- To “expand the ULEZ [London-wide] from 2020 for heavy vehicles [including] coaches”.
- “From 2021.. to expand [the ULEZ] up to the North and South Circular roads for light vehicles, including cars and vans.”

TFL ULEZ policy proposals****

- Heavy diesel vehicles that “do not meet Euro VI standards will have to pay a ULEZ daily fee [of] £100 to drive in the zone”.
- Most coaches which are newly registered from 1st January 2014 will meet the Euro VI emission standards, whilst most coaches registered before 2014 will not.



POTENTIAL OPTIONS FOR COACH COMPANIES....

‘Do nothing’



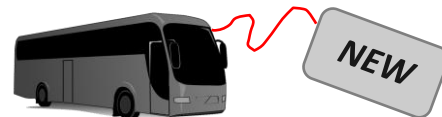
Pay charge on non-compliant vehicles

‘Retrofit’



Retrofit coaches to Euro VI equivalent

‘Buy compliant coaches’



Buy Euro VI coaches, with cash or via hire purchase

‘Reduce/change routes’



Stop serving markets that incur charges

‘Increase fares’



Pass on the full ULEZ charge to customers

‘Hybrid’***



Pass on 50% of the charge / pay the rest

* Source: Mayor of London press releases, 4th April 2017. ** Precise dates have not yet been set. *** ‘Hybrid’ combines of ‘increase fares’ and ‘do nothing’.

**** Sources: Same as above, and TFL, *Proposed changes to the ULEZ, Consultation and information document*, April 2017, p.8. Some coaches registered post 1st January 2014 were built to Euro V specification, but were permitted under derogation.



Meetings with four small coach companies:

- To understand company characteristics, activities, concerns and potential response to the ULEZ proposals.
- To seek data to model the impact of the proposals. *Companies 1 and 2* provided quality data. *Companies 3 and 4* provided only limited data, so this was used mainly as a cross-check. (Companies are anonymised.)



Discussions with TFL and the Low Carbon Vehicle Partnership (LCVP):

To understand the availability / cost of 'retrofit' options, that would enable existing coaches to be upgraded to the ULEZ Euro VI emission standards.



Development of a cashflow model:

To calculate the impact on cashflow* of the ULEZ proposals, versus the current state with no ULEZ in place. We modelled different potential company responses** and variations to the ULEZ proposals.

Key issues raised by companies

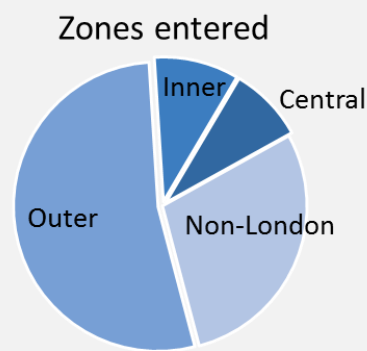
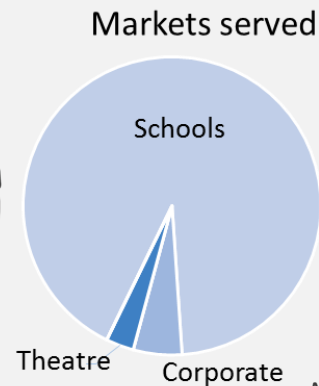
- **Euro VI availability.** 2nd hand Euro VI coaches are in short supply due to (1) Euro VI being a new standard, (2) high demand and (3) coaches being a niche market. This may persist until initial leases start to end, e.g. in circa 2019. Manufacturers' order books are relatively full for new coaches.
- **Geography.** The proposal to extend the ULEZ 'London-wide' by 2020 is significant – this is equivalent to the existing Low Emission Zone (LEZ), which covers most of the London area inside the M25. Whilst not all coach companies will undertake extensive trips into Central London, a high proportion (or all) of a company's trips will be within this 'London-wide' area.
- **Timing.** The previous Mayor of London suggested the Central London ULEZ would come into force in 2020. Euro VI coaches were introduced from 2013, so 'natural churn' of vehicles would have resulted in a relatively high level of compliance by 2020. Bringing the Central London implementation date forward to 2019, plus London-wide in 2020, would mean natural churn would not suffice.
- **Retrofit.** Companies are concerned around the availability of the retrofit option in time for the ULEZ. The technology to 'retrofit' existing coaches to Euro VI equivalent standard is highly likely to be available in 2018, but the Euro VI retrofit certification process is still a work in progress.

* We modelled cashflow as it illustrates the impacts for small companies more clearly than profit. Company data inputs for were obtained from discussions with companies to ensure that bottom-up inputs (journey numbers, fares, etc.) matched against revenue from accounts.

** For 'retrofitting' or 'buying Euro VI vehicles', volumes are based on how many vehicles the company required to ensure compliance with ULEZ.

Companies in our study

COMPANY 1*

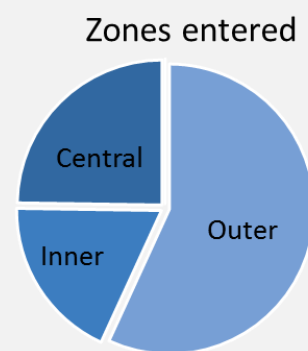
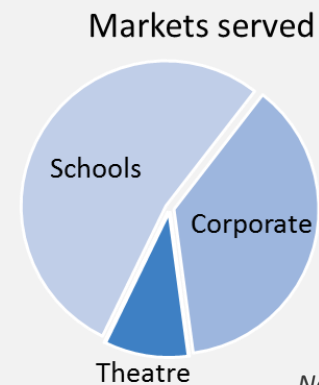


Note: Split based on number of trips

'ULEZ proposals expensive but Company will continue to operate'

- Typically purchases 2nd hand vehicles outright and on hire purchase.
- Fleet size = 25-50 coaches. Normal churn is circa 7% of fleet per annum, but this includes buying older 2nd hand vehicles so not all vehicles bought under 'normal churn' are Euro VI compliant. Under 'normal churn, would not have quite enough Euro VI to cover Central London trips in 2019 or 2020, and would be substantially short of achieving the 75% Euro VI required in 2020 for London-wide compliance.
- Low supply of 2nd hand Euro VI coaches makes compliance even more difficult.
- Company advised response is to retrofit vehicles needed to enter the ULEZ.

COMPANY 2*



Note: Split based on number of trips

Company already planning to meet central requirement but wider requirement is much more challenging.

- Typically purchases relatively new but 2nd hand vehicles.
- Fleet size = 25-50 coaches and 'normal churn' is circa 7% of fleet per annum, which would achieve circa 31% Euro VI in 2019, or 38% in 2020. Normal churn sufficient to cover Central London trips by 2019, not be sufficient to cover London-wide work by 2020, which would require 100% Euro VI.
- Low supply of 2nd hand Euro VI coaches makes compliance even more difficult.
- Company suggested it would seek to pass on some of the charge.

SPECIFIC ISSUES RAISED

Company 1

- Some companies (those with older owners) may stop trading.
- Deemed unfair that on some routes they are competing with TfL buses (which receive a subsidy for retrofitting).
- Unclear on availability dates / costs for retrofitting.

Company 2

- Felt prepared for Central London ULEZ but not for 2020 London-wide. Proposal is unclear / poorly communicated / costly. Unable to pass on the whole charge.
- Concerns: 2nd hand Euro VI vehicle supply is low and Euro VI retrofit standards not yet been set (although confident in company that provides the service).

* For confidentiality, companies are anonymised in this study. This includes company location, which is shown above based on approximate distance to the Central London. It does not represent North, South, East or West.

Analysis – consideration of all options for coach companies

If the Mayor’s proposals are implemented (2019 Central London ULEZ and 2020 London-wide ULEZ), we estimate:



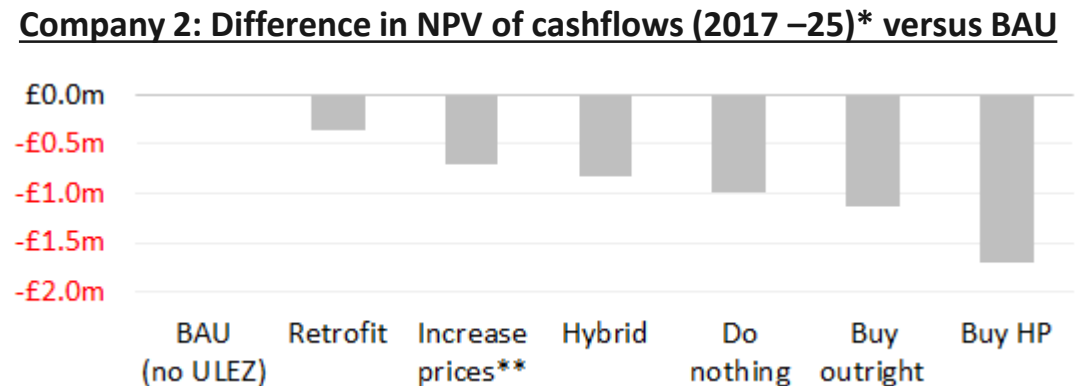
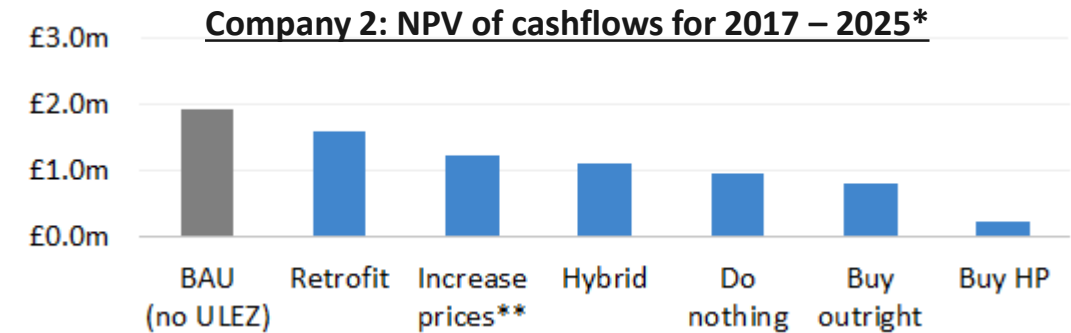
Retrofit option

In general, retrofitting is likely to be the optimal company response – it gives the highest NPV cashflows.*

- ‘Increasing prices’ (passing on the charge) is the next best option, shown right for Company 2. It is worse than retrofitting as we assume that companies lose business if they raise prices.**
- A ‘hybrid option’ – where companies pass on 50% of costs to the customer – is slightly worse as the company pays the remainder of the charge but still loses some business due to higher prices.
- BAU (business as usual) shows NPV cashflows* without the ULEZ.

Crucially, if retrofitting is not available, we estimate that ‘increasing prices’ is a better option than buying compliant coaches (either outright or on HP). If so, the potential benefits of lower coach emissions would not be realised. Our estimates are as follows (as shown right):

- If Company 2 can retrofit, it would lose £0.3m in NPV* cashflow relative to BAU.
- If retrofitting is not available, Company 2 would be worse off:
 - By ‘increasing prices’, it would lose £0.7m in NPV* cashflow.
 - By buying sufficient compliant vehicles to cover trip into the ULEZ, it would lose at least £1.0m in NPV* cashflow over the period 2017 to 2025 inclusive.



Implication: If retrofitting is not available, we estimate that companies would *not* choose to upgrade their fleets with compliant vehicles (any faster than ‘normal churn’), as passing on the charge would lose less cashflow. So the emission benefits from these companies would not be realised.

* NPV = Net Present Value. Cashflows are summed over the period 2017 to 2025 inclusive, with future flows discounted by 10% per annum to reflect the opportunity cost of investment.

** We assume the elasticity of demand (the responsiveness of demand following a change in price) for coach hire as -0.75 in this ‘central case’, based on available literature.

Analysis – focus on ‘retrofit’ versus ‘increasing prices’

----- In this slide we focus on the retrofit option compared to ‘increasing prices’ -----

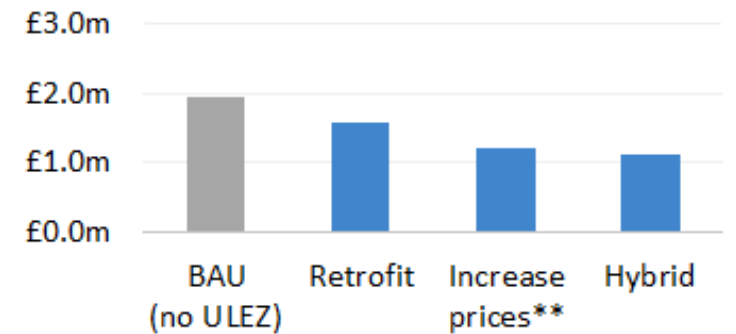


Retrofit option

As per the previous slide, in general retrofitting would be the optimal response if the Mayor’s proposals are implemented.

- Increasing prices (passing on the charge) would be the next best option.
- A ‘hybrid option’ would be slightly worse.
- The outcome would be roughly the same for Company 1 and Company 2.***

Company 2: NPV of cashflows for 2017 – 2025*

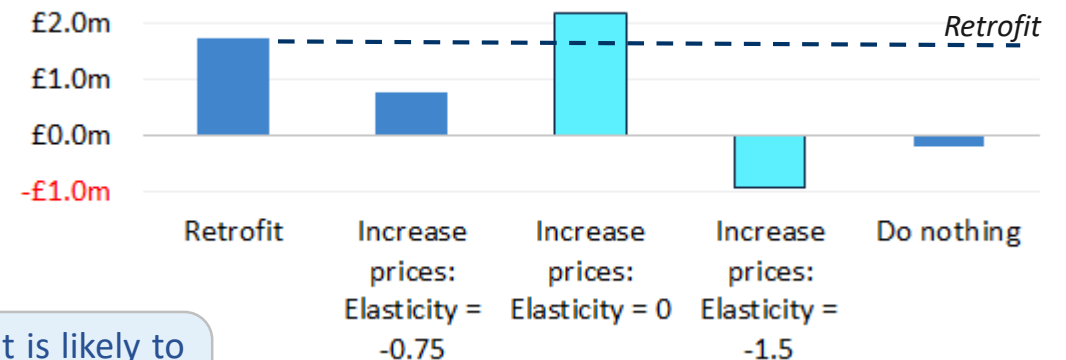


Passing on the charge

However, ‘increasing prices’ (passing on the full charge) could be optimal in some cases.

- If the elasticity of demand is low, increasing prices (passing on the charge) becomes an attractive option, e.g. if the elasticity is -0.2 or smaller, increasing prices becomes financially preferable even to retrofitting, as shown right for Company 2.
- In reality, companies would need to assess demand on a case-by-case basis – only some may be willing to absorb the charge.

Company 2: NPV of cashflows for 2017 – 2025*



Implication: If a company can pass on the whole charge without losing business it is likely to do so. However, opportunities for this may be limited. **If customers are price sensitive, retrofitting is the optimal response by some margin, so this option needs to be available.**

* NPV = Net Present Value. Cashflows are summed over the period 2017 to 2025 inclusive, with future flows discounted by 10% per annum to reflect the opportunity cost of investment.

** We assume the elasticity of demand (the responsiveness of demand following a change in price) for coach hire as -0.75 in this ‘central case’, based on available literature.

*** As per the previous slide, we received quality data for two companies, which we call ‘Company 1’ and ‘Company 2’ to preserve anonymity.

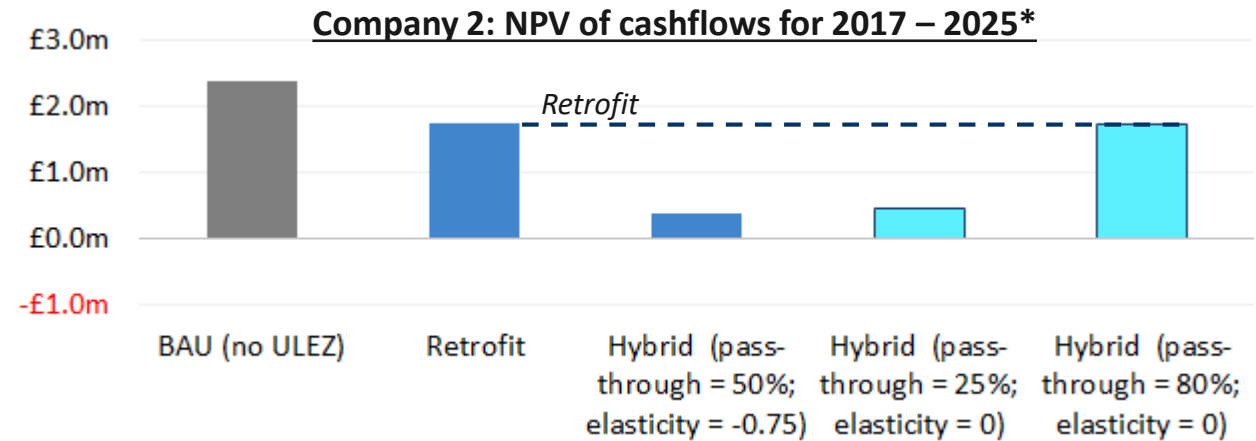
Analysis – further investigation of the hybrid option

If a company passes on *some* costs to *some* customers (i.e. to those customers who can bear the charge), what is the impact?



Hybrid option

- On the previous slide, in the hybrid option we assume that when the company passes through 50% of costs, it does so to all customers and therefore loses some demand.
- However, a company could try to persuade *some* customers to absorb *some* of the charge, whilst still buying the same level of services.
- Could this be an attractive / feasible option?



Analysis:

- In the chart above right, the *dark blue* columns shown the same results as on the previous slide. The *light blue* columns allow us to estimate the impact on NPV cashflows if the company targets price rises (passes on the full charge) only on customers that are willing to bear the charge.**
- The hybrid option with 25% pass-through and 0% elasticity illustrates the case where a company passes the full cost through to 25% of its customers without losing business. Alternatively, this would be equivalent to passing-through half of the charge to 50% of its customers without losing business.** As shown in the chart, this option does not compare well (in NPV cashflow terms) to the retrofit option.
- Under this ‘hybrid’ approach, to achieve NPV cashflows equal to the retrofit option, a company would need to pass on 80% of the charge to all customers, or the whole charge to 80% of customers, without losing any business. This does not seem like a realistic scenario.
- We have heard from companies that some customers may be less price sensitive (e.g. private schools, corporate private hire), but some customers are highly price sensitive (e.g. Local Authorities). So any cost pass-through would likely need to be partial, and confined to only some customers. We consider it likely that companies will seek to identify customers that will be able to bear some or all of the charge.

Implication: Passing on the charge to customers who can bear it is clearly attractive, but not all customers will be accommodating. Therefore, this option would likely be most effective as part of a mixed response, i.e. along with retrofitting to cover customers who will not / cannot bear the charge.

* NPV = Net Present Value. Cashflows are summed, with future flows discounted by 10% to reflect the opportunity cost of investment.

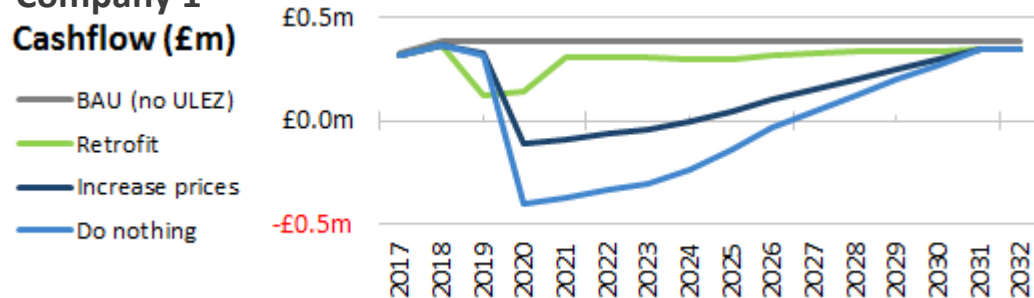
** The hybrid option shows the impact of passing on a proportion of the charge to all customers, but because the elasticity is zero the outcome is mathematically equivalent to passing on the *whole* charge to a *proportion* of customers.

Analysis – ULEZ proposals raise cashflow concerns

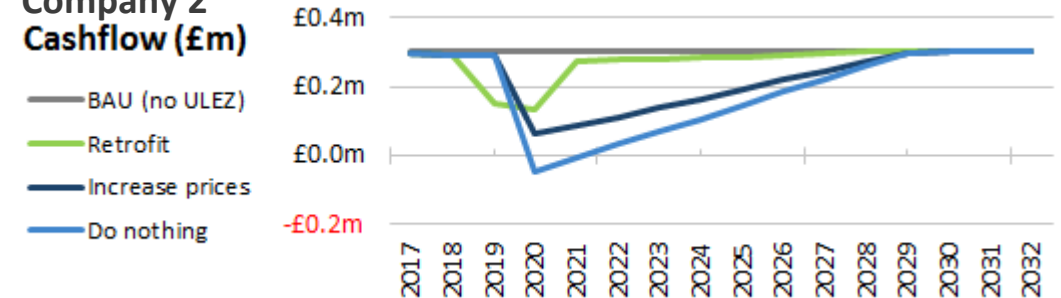
Companies are likely to endure a few difficult years of low cashflow under the ULEZ proposals

- As noted in previous slides, in response to the ULEZ proposals, the optimal strategy seems to be to retrofit vehicles to Euro VI equivalent standard (assuming this option is available), except for the case where customers are able to bear the charge being passed through.
- However, the retrofitting option requires some ‘lumpy’ up-front costs to prepare the fleet for the ULEZ. We have assumed companies would retrofit their vehicles in 2019 and 2020 to ensure that the portion of their fleet that enters the ULEZ is compliant in time.
- These charts show the annual profile of cashflow, for Company 1 and Company 2, under the ULEZ proposals, and under different company responses. The green line shows the outcome if companies only retrofit, and do not try to pass on any of the costs.

**Company 1
Cashflow (£m)**



**Company 2
Cashflow (£m)**



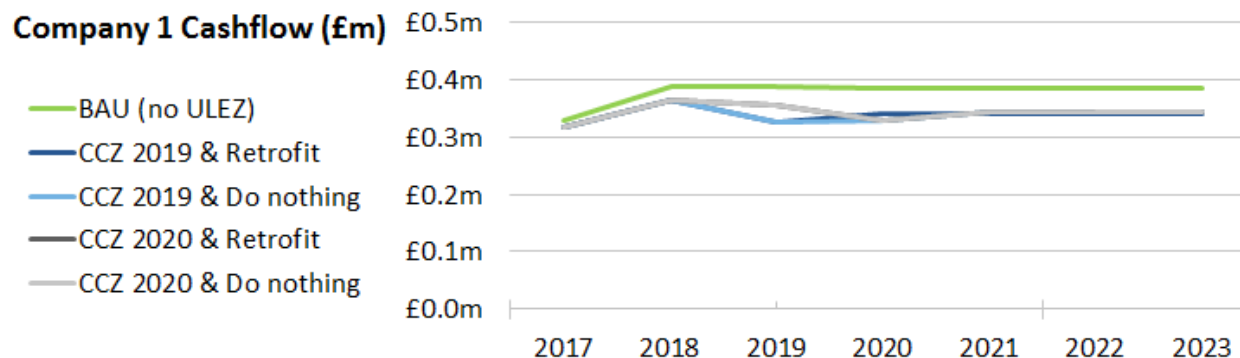
- The dip in cashflow under the retrofit option provides even greater rationale for companies to seek to pass on costs to the customers. In the first instance, companies would likely raise prices for their customers that can bear the charge the most, as noted on previous slides. However, if cashflow dips more sharply (e.g. for other external reasons), this could raise a risk of bankruptcy, and suppliers might have to risk raising the price for customers who have less ability to bear the cost, or seeking short term financing options. It is important to stress that the potential risk of negative cashflow / bankruptcy is significantly increased if the retrofit option is not available.

Implication: The ULEZ proposals, even with retrofitting available, generate a dip in cashflow, which gives companies greater reason to seek to pass on costs. The risk of negative cashflow – or potentially bankruptcy in the worst case – grows significantly if the retrofit option is not available.

Analysis – coach availability and timing implications

Although the London-wide ULEZ expansion has the greatest impact, the timing of the Central London ULEZ would also adversely affect companies if there continues to be a relatively low supply of Euro VI vehicles, particularly in the second-hand market.

- **The lack of availability of Euro VI coaches is a concern for companies.** For companies to refresh their fleet in the future in line with ‘normal churn’*, it requires that sufficient Euro VI vehicles are available, both new and second-hand. We have heard that the Euro VI market is tight, especially for 2nd hand coaches, which constrains companies’ ability to be ULEZ-compliant.** Companies are concerned that the Mayor’s proposal for a Central London ULEZ *in 2019* gives them even less time to identify and purchase coaches that are already in short supply.
- **The timing of the Central London ULEZ appears less relevant than the London-wide ULEZ, although subject to Euro VI availability.**
 - Based on the journeys that Company 2 undertakes into Central London, it only requires one additional Euro VI vehicle between now and whenever the Central London ULEZ is implemented to be compliant. Company 2’s normal churn is to buy two vehicles per annum on average, so even with Euro VI second-hand market constraints, the timing of the Central London ULEZ does not seem to be an important factor. Therefore the majority of the costs incurred by Company 2 as a result of the ULEZ proposals would be due to the London-wide ULEZ expansion in 2020.
 - Company 1 would need to accelerate uptake of Euro VI vehicles compared to its ‘normal churn’. If it did this by retrofitting, it would need to retrofit two vehicles if the Central London ULEZ were introduced in 2019, or one vehicle for 2020. We note that the impact on annual cashflow is relatively small – shown below – and it is the expansion of the ULEZ London-wide that generates the greatest costs. However, if Company 1 were unable to achieve ‘normal churn’ due to Euro VI availability constraints, the cost to the company would be even greater. We note that our analysis (shown below) takes into account a reduction in residual values of non-Euro VI coaches, as these would not be ULEZ-compliant.***



Implication: The impact of the proposed Central London ULEZ in 2019 could be large if Euro VI coach availability remains low. But the proposed London-wide expansion in 2020 creates the largest impact on company costs. If 2020 were a ‘hard’ deadline, other provisions might need to be considered to reduce the cost to businesses, e.g. companies given ‘credit’ for Euro VI vehicles on order.

* ‘Normal churn’ is based on what companies have told us about how they are refreshing their fleet each year. ** The lack of supply in the 2nd hand market seems to be a mix of (1) Euro VI being a new standard, (2) high demand (coaches preparing for the ULEZ) and (3) coaches being a niche market. *** There may be other (smaller) financial impacts, e.g. variations in running costs / fuel efficiency between older and newer coaches.

Conclusions and implications for TfL

1 The availability of the Euro VI retrofit option is crucial to ensure that the impact of the ULEZ on company cashflows is minimised and that benefits from emission reductions are realised.

- Companies may be able to pass some or all of the charge without losing business, but not always as some customers will be price sensitive. Given this, retrofitting seems to be by far the best response financially to the ULEZ, and companies have also indicated this is their expected response.
- If retrofitting were not available, the next best response is ‘increasing prices’ to all customers – this would significantly increase the risk of negative cashflow in some years and would mean that emission reductions would not be realised. So the availability of retrofitting appears **critical**.

Implication: TfL needs to provide clear assurance to companies on the availability and cost of retrofitting.

2 The London-wide ULEZ is the key driver of costs – the timing of the Central London ULEZ is relevant but less significant in terms of costs. But low supply of 2nd hand Euro VI coaches is reducing companies’ ability to update their fleet naturally (via normal churn).

- The companies in our study are naturally refreshing their fleet over time, and only a portion of their trips go into the Central ULEZ. The London-wide ULEZ would have a greater impact than the Central London ULEZ, although Company 1 would need to retrofit some vehicles for the latter.
- However, there is a lack of 2nd hand Euro VI vehicles available which makes it harder for some companies to become compliant via normal churn.
- Delaying the London-wide ULEZ would have a beneficial impact on company cashflow by giving companies more time to update their fleet naturally (via normal churn), and providing more time for the Euro VI 2nd market to develop / for companies to spread the costs of retrofitting. If 2020 is a ‘hard’ deadline for ULEZ expansion, other provisions could be considered, e.g. ‘credits’ for Euro VI vehicles on order.

Implication: TfL should be aware of the impact of the London-wide ULEZ expansion, and consider options for mitigating the impact, whilst still seeking the necessary air quality benefits as soon as possible.

3 The ULEZ proposals may have distributional impacts – small companies are more heavily affected by negative cashflow

- Small companies may find it difficult to raise finance, so negative cashflow is a potential concern, particularly if retrofitting is not available. Companies may cash reserves to draw on, but this is uncertain. Some older owners could decide to cease trading.

Implication: TfL should be aware that the ULEZ proposals may have a disproportionately large impact on small companies.

MAIN REPORT

Introduction

- In April 2017, the Mayor of London announced his proposal to bring forward and expand the Ultra Low Emission Zone (ULEZ) in London, in which vehicles that do not meet the Euro 6/VI emission standards would be required to pay a charge in order to enter the ULEZ.
- Coaches, being diesel vehicles, would be required to meet the Euro VI standard* and would be required to pay £100 for a daily entry into the ULEZ if the standard is not met.
- For coaches, the ULEZ is proposed to cover the current Congestion Charge Zone (CCZ) from April 2019, and to widen to cover the current Low-Emission Zone (LEZ) by 2020.

Objective of project

- To forecast the impact of the ULEZ proposals on a selection of small coach companies.
- To consider variations around:
 - Policy scenarios: Variations in the ULEZ proposals, both in terms of the geography and the timeline of implementation.
 - Company strategies: Variations in how the companies respond to the ULEZ proposals.

Outputs

- Forecasts of the impact of the ULEZ proposals on **company cashflow** under different policy scenarios and company strategies.
- A discussion of the key issues to help inform policy-making by TfL.

* The Euro VI standard specifies limits for emissions for nitrogen oxides (NOx) and particulate matter (PM). For heavy vehicles (including coaches) *steady state* emission limits are 0.4 g/kwh of NOx and 0.01 g/kwh of PM, whilst *transient* emission limits are 0.46 g/kwh of NOx and 0.01 g/kwh of PM. See TfL, *Proposed changes to the ULEZ, Consultation and information document*, April 2017, p.74.

Introduction – policy context

Announcement by Mayor of London Sadiq Khan to implement the ULEZ.

Subject to consultation the Mayor of London has stated his intention to introduce the following policies:

- “The Ultra Low Emission Zone in Central London in April 2019”.
- “Expand the ULEZ [London-wide] from 2020 for heavy vehicles such as buses, coaches and lorries”.
- “From 2021.. expand [the ULEZ] up to the North and South Circular roads for light vehicles, including cars and vans.”

Source: [Mayor of London press releases, 4th April 2017](#)

ULEZ proposals

- “Diesel vehicles that do not meet Euro VI standards will have to pay a ULEZ daily fee (...£100 for buses, coaches and HGVs) to drive in the zone, 24 hours a day, 365 days a year”.
- Most coaches newly registered from 1st January 2014 will meet the Euro VI emission standards, whilst most Coaches registered in 2013 or earlier (Euro V or lower) will not meet the standards and so would need to pay the £100 charge in order to enter the ULEZ.**

Sources: [Same as above, and Transport for London, proposed changes to the ULEZ, Consultation and information document, April 2017, p.8.](#)

* Precise dates have not yet been set.

** Some coaches registered post 1st January 2014 were built to Euro V specification, but were permitted under derogation.

April 2019

Central London ULEZ

All vehicles



2020*

Londonwide ULEZ,

Heavy vehicles



2021*

Inner London ULEZ,

All vehicles



Introduction – availability of Euro VI vehicles

Euro VI coach market is tight – full order books and limited second hand availability

New Vehicles

- We are told that manufacturers order books are full so there is limited availability of Euro VI coaches to buy new.
- However, as coach prices are high the smaller companies that we have talked to tend to buy second hand.

Second hand vehicles

- New Euro VI coaches first became available in 2014 (with the exception of a few sold in 2013).
- As with other commercial vehicle types that we have studied, the first purchaser tends to keep the new vehicle for at least the warranty period.
- We are told that National Express for instance, tends to hold new vehicles for 7 years.
- The implication is that by 2019/20 second hand coaches will only just be starting to become available for resale in any numbers.
- The lack of supply is compounded by:
 - Relatively high demand – there are suggestions that some companies are starting to prepare their fleet for the ULEZ.
 - Coaches being a relatively niche market, so supply is not extensive.
- The ULEZ and other low emission zones around the country may push up resale values on asset which already have a hefty price tag.
- Retrofitting is therefore the preferred option.

Implication: Market conditions make new and second hand Euro VI coaches difficult to obtain and could push up prices. Retrofitting is therefore the preferred option.

Introduction – availability of Euro VI equivalent retrofit solution

Background: A new Euro VI coach currently costs more than £200,000 – sometimes considerably more. There is historical evidence that, for heavy vehicles, it can be more cost effective to meet changing emission standards by ‘retrofitting’ existing vehicles than it is to buy a new vehicle, e.g. the retrofitting of coaches to Euro III / Euro IV equivalent standard following the implementation of the LEZ in 2008 / 2012 (respectively) and the current retrofitting of London buses to Euro VI standard.

The key issues: There are two main issues: (1) Will a Euro VI retrofit solution be available in time for coach companies to upgrade their fleets to Euro VI equivalent in time for ULEZ implementation? (2) How much will retrofitting an existing coach cost?

Approach: We have sought to understand the availability and cost of a solution to retrofit coaches to a Euro VI equivalent standard. We have held discussions with experts at TFL and the Low Carbon Vehicle Partnership (LCVP), as well as the coach companies.

Summary of analysis and discussions:

- *Is a retrofit option available now?* No – a certified retrofit solution to achieve the Euro VI standard is not yet available. A national retrofit scheme is being developed by LCVP which should enable vehicles retrofitted with technology to meet the ULEZ standards. Requirements for vehicles to achieve the Euro VI standard will be set out in the certification scheme. Once retrofit manufacturers are certified under the scheme, operators will be able to register their retrofitted vehicle and so not have to pay the charge. Retrofit manufacturers are already providing quotes to companies, but the certification scheme is not yet in place, so manufacturers cannot yet prove that their solution is certified.
- *Will a retrofit solution be available by 2019?* Experts deem it highly likely, but a lead time is required if demand is high.
- *Precisely when will it be available?* Unsure. LCVP is currently developing a nationwide scheme, and TFL is currently liaising with LCVP to ensure that the Euro VI equivalent emission standards for London are the same as the nationwide standards.
- *How much will it cost?* Estimates are in the range £15k-£20k upfront cost for the equipment and installation. LCVP’s estimate is £17k-£18k, regardless of the coach age. There could also be extra ongoing costs of up to £1.5k per annum, e.g. opex / servicing, although these have not been independently verified. Some coach companies indicated upfront costs would be higher for old vehicles, i.e. need to also install Ad Blue tank.

Implication: Retrofitting is very likely to be an option that is available to coach companies in time for ULEZ implementation. But it has not yet been formally approved by TfL. As noted in later slides, this is creating uncertainty for coach companies.

Approach – overall

Initial discussions to understand the policy and market context

- Discussions with TfL to understand policy proposals and coach sector.
- Discussions with TfL and the Confederation of Passenger Transport (CPT) to select 4 small coach companies who were willing to participate in this study.*
- Stakeholder engagement with these coach companies included understanding the sector, the markets served, key issues, etc.

Engagement with companies to understand company characteristics, profitability and strategies

- Stakeholder engagement with coach companies to understand company characteristics, including the markets served (type of work) and the areas of operation (geography), their current fleet composition / normal churn activities.
- Requested financial data to build up an estimate of current profitability. This included ‘bottom-up’ data (journey prices and volumes, vehicles purchases and sales, cost breakdown, etc. to calculate costs and revenues) and ‘top-down’ data (company accounts). We held discussions with companies to calibrate (adjust) the bottom-up data to match the top-down figures.
- Discussion of the range of potential strategies (responses) that companies could undertake following ULEZ implementation.

Phone interviews to understand whether a retrofit solution is likely to be available

- Calls with TfL and the LCVP to understand the availability and cost of ‘retrofit’ options, i.e. to enable existing coaches to be upgraded to meet the ULEZ emission standards (Euro VI).

Modelling and provision of results to inform TfL policy-making

- We developed a model to calculate the impact on cashflow of the ULEZ proposals (on previous slide), versus the current state with no ULEZ in place. We modelled different potential company responses, and also variations to the ULEZ proposals.
- We prepared this slide-pack, including a user-friendly public-facing executive summary with anonymised data, and a full (confidential) main pack containing additional details, including commercially sensitive data from companies.

* One company was not able to provide the data necessary for this project, so was excluded from our analysis. However, notes from our initial meeting with this company are included in Annex A.

Approach – modelling options and assumptions

Modelling approach – cashflow model

We model cashflow because it illustrates the impacts for small companies more clearly than profit. If profit is used, asset purchases (e.g. the cost of buying a new Euro VI coach) would be spread over a number of future years via depreciation. However, these costs would need to be financed in the short term, which is by no means a 'given' for small companies. If existing cash reserves are low, a period of negative cashflow could seriously harm a small company's ability to continue trading.

Modelling options

- **TfL policy scenarios:**
 - Business as usual (BAU): No ULEZ. This is the counterfactual.
 - Base case: Central London ULEZ in 2019 for all vehicles, London-wide in 2020 for heavy vehicles, Inner in 2021 for all vehicles.
 - Sensitivity: We have considered the impact of the Central London ULEZ in 2020 versus in 2019.
- **Company strategies:** These are explained in more detail on the following slide. In short, they include retro-fitting, purchasing Euro VI vehicles, reducing journeys to the ULEZ, and paying the charge but passing (on part of) the cost to the customer.
 - The different companies in this study all have unique characteristics (e.g. location, range of markets served, fleet composition, etc.), so the precise strategies differ between the companies. See slide 19.

Modelling assumptions / issues

- **Calibration.** The 'bottom-up' and 'top down' data received from the companies did not always match – the former tended to understate costs and revenues. Therefore we adjusted (calibrated) the 'bottom up' data / assumptions so as to match the top down data. We double-checked these adjustments with the companies.
- **Company strategies designed to ensure compliance.** For the company strategies that involve retrofitting or buying Euro VI vehicles, volumes are based on how many vehicles are required to ensure compliance, rather than what the companies can necessarily afford. By assessing volumes required for compliance, we can then test the likely affordability of these responses.

Approach – description of company strategies

We have considered five different company responses to the ULEZ, plus a ‘do nothing’ response. We compare these responses against a ‘Business as Usual’ (BAU) scenario, i.e. without ULEZ implementation. These various scenarios are explained below.

Scenario / Strategy	Description	Assumptions
Counterfactual: Company business as usual without implementation of ULEZ proposals		
Business as usual (BAU)	Companies are all maintaining constant fleet, with different purchasing profiles.	Unless specifically stated by the company, we assume Euro VI vehicles for all new purchases / hire purchases.
Company strategy (response) assuming implementation of ULEZ proposals		
(0) Do nothing	Does not make any changes but is affected by the ULEZ charges and by the changes in residual values of vehicles being purchased and sold.	Each company has its own residual value curves for pre-ULEZ Euro VI vehicles, post-ULEZ Euro VI vehicles (higher than pre-ULEZ), and post-ULEZ Euro V (and older) vehicles (lower than pre-ULEZ).
(1) Retrofit	By both 2019 and 2020 (for Central and London-wide), retrofit proportion of fleet that will need to be used to enter into chargeable regions.	Depends on retrofit being available, with an assumed cost of £17,500, spread over 2018-2020. Retrofitted vehicles become Euro VI equivalent, and we assume they now have a higher residual value (in line with Euro VI).
(2) Replace with vehicles bought on hire purchase (HP)	By both 2019 and 2020 (for Central and London-wide), replace proportion of fleet that will enter ULEZ; spread purchases out across 2017-2020 and lengthen the hire purchase period to spread the cost.	Sell older vehicles at same rate as take out new hire purchases, to keep the overall fleet number constant. If company gets second-hand hire-purchase (not new), also requires sufficient second-hand market.
(3) Replace with vehicles purchased outright	By both 2019 and 2020 (for Central and London-wide), replace proportion of fleet that will enter ULEZ; spread purchases out across 2017-2020.	Assumes second-hand market is available. Sell older vehicles at same rate as take out new hire purchases, to keep the overall fleet number constant.
(4) Reduce journeys to ULEZ to reduce charge incurred	Apply a reduction in journeys to the three area (Central, Inner, and London-wide), using a percentage vs BAU for each area, such that only as many vehicles enter the ULEZ at any one time as the company has compliant vehicles.	Variable costs and revenues will adjust accordingly, and the amount of ULEZ incurred will also fall. Does not consider reducing fleet size, as assume that this change is temporary – but assumes customer base can recover.
(5) Increase prices: Pass charge onto customers	Spread the costs across all trips on an ad-valorem basis (rather than fixed amount increase), as long as revenue lost is lower than ULEZ charge avoided.	Elasticity of -0.75.* Pass-through 100% of the charge. Spread the cost across all customers, not just those which enter the ULEZ.

We have also undertaken some initial analysis on a ‘hybrid’ option – where only 50% of costs are passed on, and the company absorbs the rest.

* Evidence on demand for coach travel has highlighted elasticities in the range -0.65 to -1.1 in general, although it could be as high as -1.5 for students and the retired. See Economic Research Centre, *Regular Interurban Coach Services in Europe*, 1999, p.99. We note this is slightly different to the elasticity of demand for coach hire, although it is a useful proxy because the two are related.

Companies

Company *	Company 1	Company 2	Company 3
Company characteristics			
Location	Just outside London-wide	Just outside Inner London	Just outside London-wide
Zones	Majority of trips in London-wide. Some to Central London and some outside London	Majority of trips in London-wide, but about a quarter to central London	The vast majority of trips undertaken within London-wide, with only a small proportion outside. Some Inner and Central London.
Markets	Mainly school (90%). Rest is private hire (e.g. theatre)	Majority school but also a large private hire (including theatre)	Mainly school (75%). The remainder is private hire, e.g. corporate / theatre.
Fleet composition**	45 vehicles, including 1 Euro VI. Each year buys 3 second hand vehicles, all on HP.	30 vehicles, 10 Euro VI. Purchasing 2 new ones on HP a year (target “monthly HP outgoings” rather than no. of vehicles)	50 vehicles, including 5 Euro VI in 2017. Each year buy 4 coaches (2 new on HP and 2 newish 2 nd hand coaches outright).
Data availability and modelling approach			
Data – detailed	Yes	Yes	Yes
Data – accounts	Yes	Yes	No
Uploaded in model?	Yes	Yes	Yes
Status	Model working and inputs have been double-checked with the company	Model working and inputs have been double-checked with the company	We did not receive total costs / revenues so BAU level is an estimate.
Modelling approach and assumptions	Some calibration of bottom-up inputs required to match with top-down data.	Some calibration of bottom-up inputs required to match with top-down data.	We do not have BAU data, so we can only assess <u>changes relative to BAU</u> rather than absolute levels.

* For confidentiality, companies are anonymised in this study. We originally aimed to analyse four companies, but one was not able to provide the data necessary for this project, so was excluded from our analysis.

** Fleet composition numbers have been rounded in order to provide anonymity.

Companies – modelling assumptions for strategies

This slide provides company-specific details in relation to the different scenarios and strategies.

Scenario / Strategy	Company 1	Company 2	Company 3
Counterfactual: Company business as usual without implementation of ULEZ			
Business as Usual (BAU)	Buy HP: 1 p.a., 4 years old, 3 year length. Buy outright: 2 p.a., 11 years old. Sell: 3 p.a., 17 years old.	Buy HP: 2 p.a., 3 years old, 4 year length. Buy outright: 0 Sell: 2 p.a., 15 years old.	Buy HP: 2 p.a., new, 3 year length. Buy outright: 2 p.a., 2 years old. Sell: 4 p.a., 12 years old.
Company strategy (response) assuming implementation of ULEZ			
(0) Do nothing	Incur charge 2019-2030	Incur charge 2020-2028	Incur charge 2020-2028
(1) Retrofit	Retrofit 27 between 2019 and 2020	Retrofit 13 between 2019 and 2020	Retrofit 27 between 2019 and 2020.
(2) HP vehicles (replaces, not additional to, BAU)	30 at 4 years old between 2017 and 2020	26 at 3 years old between 2017 and 2020 (includes BAU 8)	35 new HP (6 year length) between 2017 and 2020 (includes BAU 8)
(3) Buy vehicles outright (replaces, not additional to, BAU)	27 Euro VI between 2017 and 2020, reducing purchases between 2021-2023.	18 Euro VI between 2017 and 2020.	35 between 2017 and 2020, reducing 2021-2023 purchases slightly. (includes BAU 8)
(4) Reduce journeys to inner zone *	Small 2019 reduction to Central London. 2020 reduce to 30% and slowly rise back to 100% in 2031.	No 2019 change (will be compliant). 2020 reduce to 40% and slowly rise back to 100% in 2029.	No 2019 change (will be compliant); 2020 reduce to 40% and rise back to 100% in 2027.
(5) Pass full charge on **	Pass the full charge on through ad-valorem increase in <i>all</i> prices (including non-London journeys).	Pass the full charge on through ad-valorem increase in <i>all</i> prices (including non-London journeys).	Pass the full charge on through ad-valorem increase in <i>all</i> prices (including non-London journeys).

* We have not been able to model this in detail because the loss in revenue is extreme to the point of being unrealistic.

** We also model a hybrid option, in which the company passes through 50% of the charge but pays the remainder.

- **The financial impact of the ULEZ proposals on small coach companies hinges on the availability of the Euro VI retrofit option. Buying 2nd hand Euro V coaches and retro-fitting them could be a cost effective solution to meet the ULEZ requirements.**
 - Euro VI second hand market likely to remain tight for a few more years, possibly until 2020.
 - Coach companies noted that only very few 2nd hand Euro VI coaches are available. One company has purchased two, although this was only because of it having industry contacts.
 - National Express operate a 7-year cycle for vehicle replacement, so vehicles will take time to filter through to the 2nd hand market.
 - Various stakeholders: High demand for Euro VI in general, and manufacturers order books are full, which further limits supply for 2nd hand market. Plus there is a circa 6-month lead time between ordering a coach and delivery. As such, Euro VI prices likely to remain high. In contrast, Euro V prices likely to fall due to lack of demand relative to supply.
- **The timing of the ULEZ introduction is important – delaying implementation even slightly could make a big difference.**

Some coach companies indicated they would have managed to update their fleet to meet the 2020 Central London implementation date, but that 2019 reduces the time significantly. With ‘normal churn’ (or even bringing forward normal churn slightly), operators would have been more able to manage ULEZ implementation in 2020. 2019 provides less time, so requires a greater deviation from normal churn.
- **Alternative options.** Some coach companies suggested that they might *change their journey distribution*, e.g. taking school trips to Duxford instead of the Imperial War Museum in London. Difficult to pass on the charge for low value work, e.g. schools served via local authority contracts. Suggestion that companies might withdraw from Central London or just pay the charge if/when they go in. It was also noted that, within the 2nd hand market for Euro VI vehicles, there could be greater supply of buses than coaches (not yet confirmed). If so, coach companies could consider using double-decker buses for lower grade work, e.g. school run.
- **Views on how profits might be affected.** Coach companies suggested they would likely continue to operate post ULEZ implementation. However, they stated that some businesses might cease to operate, especially those with older owners.
- **View that coaches are environmentally friendly.** ULEZ proposals may be strengthened if analysis is provided in this area.
- **Request for ULEZ standards to long-lived.** e.g. 10-15 years, so that companies’ investments (new Euro VI coaches) are protected.

Introduction

We have estimated the impact on company cash flow of the ULEZ proposals (both Central London in 2019 and London-wide in 2020). We have calculated this impact under the various different potential company responses, as explained in slides 17 and 19.

We provide the results in two ways:

- **Change in cashflow relative to BAU.** We present the change in cashflow under the ULEZ proposals relative to the BAU scenario (i.e. if there is no ULEZ). This illustrates the impact of the ULEZ proposals relative to the current state.
- **Cashflow levels.** We show this for BAU and the various company responses. This allows us to assess the affordability of the different scenarios.

Presentation of results

For Company 1, our results are as follows:

- **Change in cashflow relative to BAU, for specific company responses** – we show the annual impacts of the different responses on slides 25 to 26.
- **Change in cashflow relative to BAU, comparing between responses** – to compare the different responses more clearly we show the average annual impact between 2017 and 2025. This is shown on slide 27.
- **Cashflow levels.** On slide 28 we show both the trend in annual cashflow over time and the net present value (NPV)* of cashflows between 2017 and 2025.
- **NPV of cashflows over different time periods.** See slide 29.

For Company 2, we present an equivalent analysis of **cashflow levels** (slide 30) and **NPV of cashflows over different time periods** (slide 31). In Annex C we provide charts showing the **change in cashflow relative to BAU** for Company 2.

For Company 3, due to a lack of data, we simply estimated the *difference* in NPV cashflows under different company responses, relative to BAU, for the period 2017-2025.

Analysis: Our analysis of the results is presented on slides 33 to 36.

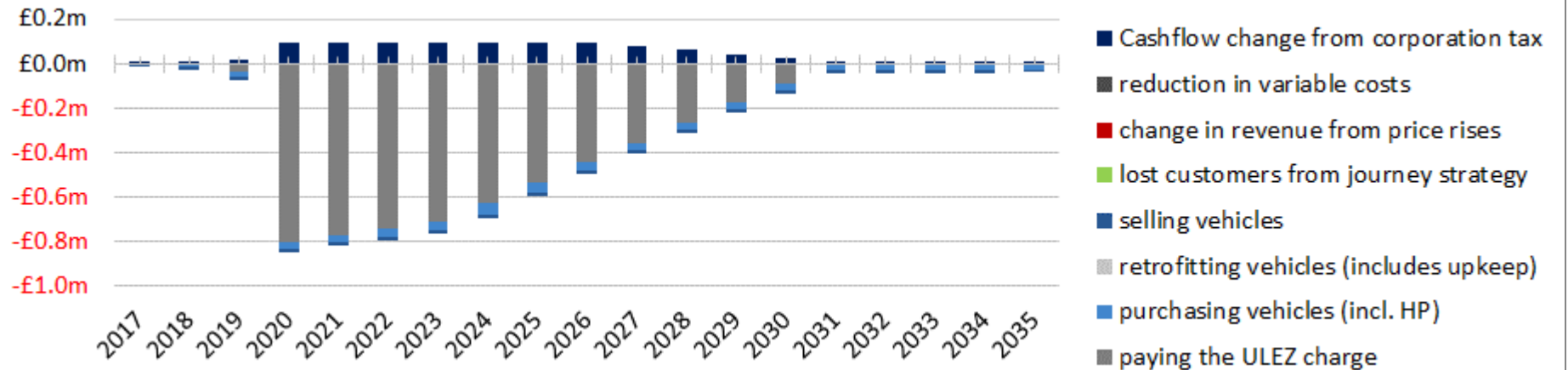
* In Net Present Value (NPV) analysis, annual cashflows are summed over a given time period, with future flows discounted by 10% to reflect the opportunity cost of investment.

Results – Company 1 – impact on cashflow relative to BAU

The charts below show the impact of the ULEZ proposals on Company 1’s annual cashflow, in terms of the difference to BAU, for specific company responses. The results across all potential responses for Company 1 are summarised on slide 27.

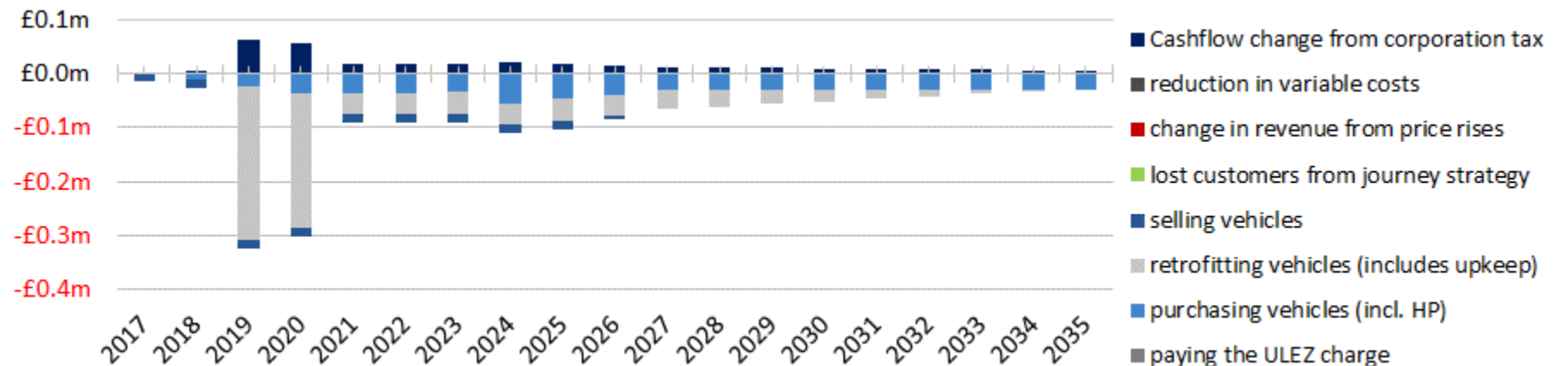
Do nothing

The company maintains its journey patterns but incurs the ULEZ charges on non-compliant vehicles. As these extra costs reduce cashflow, we assume profit will also fall and therefore tax costs fall slightly.



Retrofit

Retrofitting vehicles allows the company to avoid paying ULEZ charges, but the company needs to pay the retrofit costs. We assume that retrofitting occurs in 2019 and 2020, although there are some ongoing costs.

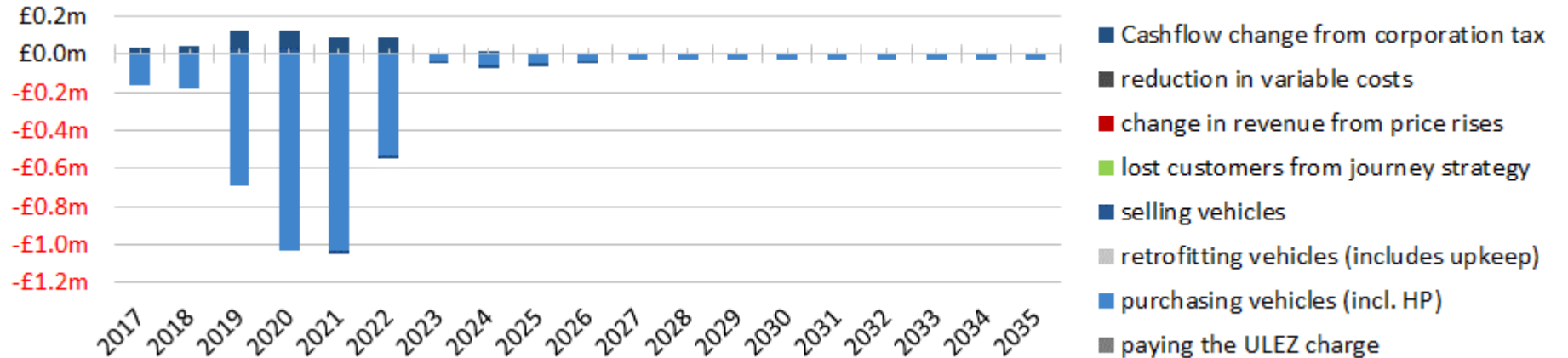


Results – Company 1 – impact on cashflow relative to BAU

The charts below show the impact of the ULEZ proposals on Company 1’s annual cashflow, in terms of the difference to BAU, for specific company responses. The results across all potential responses for Company 1 are summarised on slide 27.

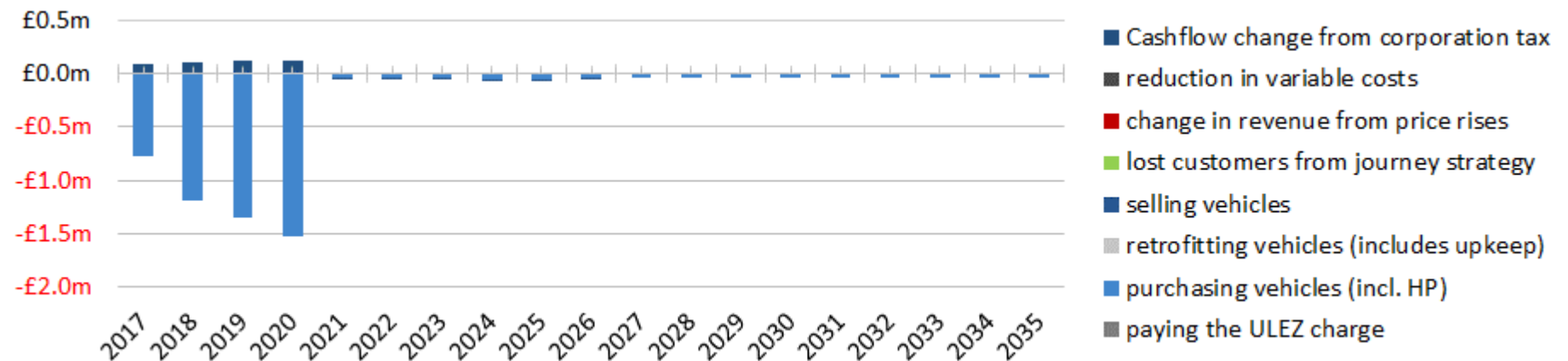
Buy Euro VI coaches on HP

The company incurs costs a high level of costs over a relatively short period. By buying Euro VI vehicles on hire purchase, the company is able to spread some costs post 2020 .



Buy Euro VI coaches outright

Buying Euro VI coaches outright results in even higher costs in the short term (compared to HP) as all costs are incurred in the run up to 2020.

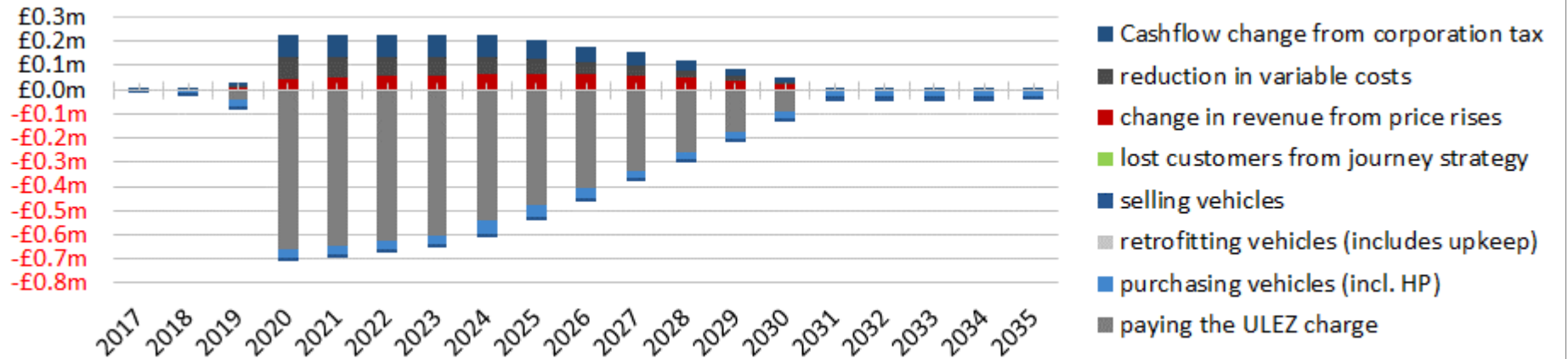


Results – Company 1 – impact on cashflow relative to BAU

The charts below show the impact of the ULEZ proposals on Company 1’s annual cashflow, in terms of the difference to BAU, for specific company responses. The results across all potential responses for Company 1 are summarised on slide 27.

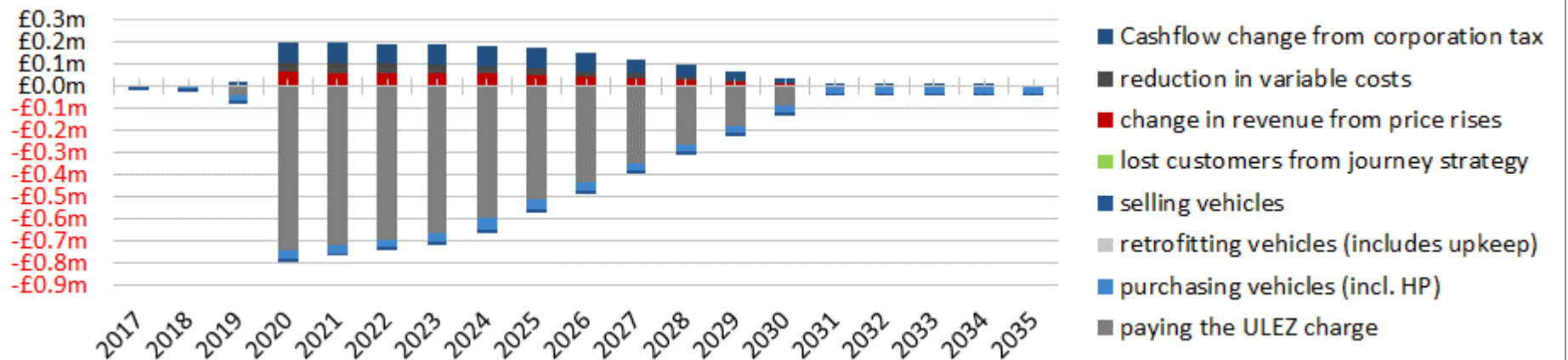
Pass on the whole charge

The company pays the charge and passes it on to customers. This increases revenue in one respect (higher prices), but the demand reduction partially offsets this, based on an elasticity of demand of -0.75 .



Hybrid: Pass on 50% of the charge/ pay the rest

The effect is very similar to passing on the full charge, except that the price rise is smaller, and the fall in demand is also smaller.



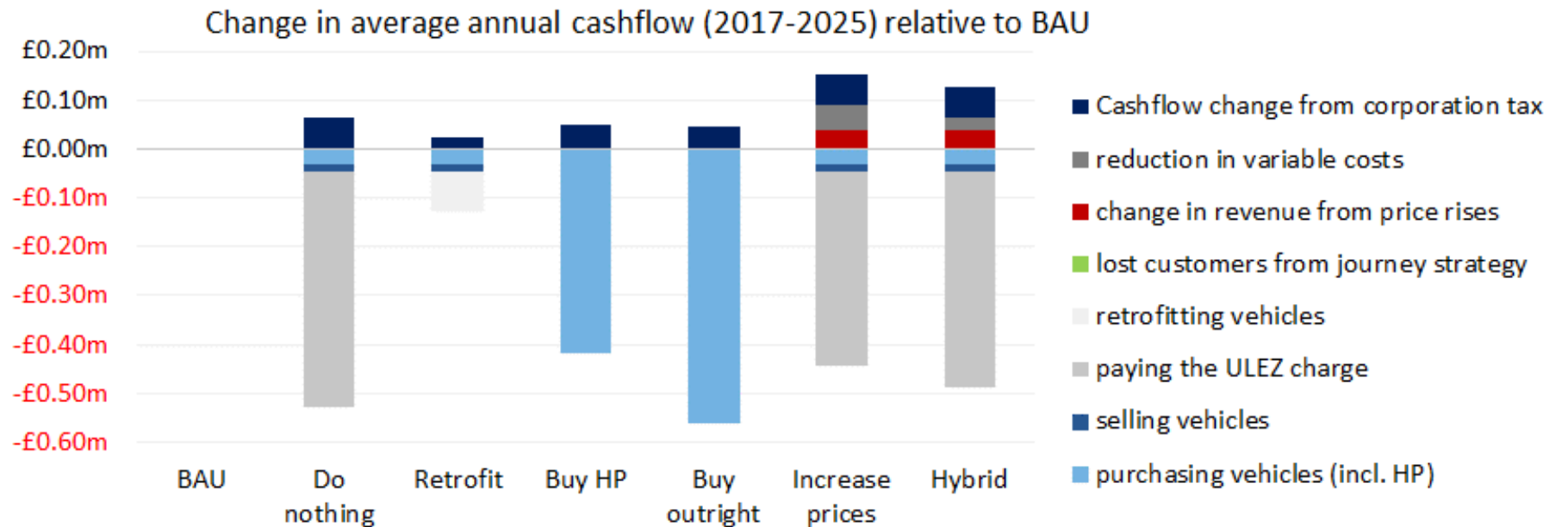
Results – Company 1 – impact on cashflow relative to BAU

The chart below show the **impact of the ULEZ proposals on Company 1’s average annual cashflow (for 2017 to 2025)**, in terms of **the difference to BAU**, for the different company responses.

Comparison of responses

Retro-fitting is the most cost effective option, as it results in the lowest fall in cashflow relative to BAU, compared to the other options.

If retrofit is not available, the next best strategy is to **pass on as much of the costs to the customers** as they are able to bear (we use 100% here).



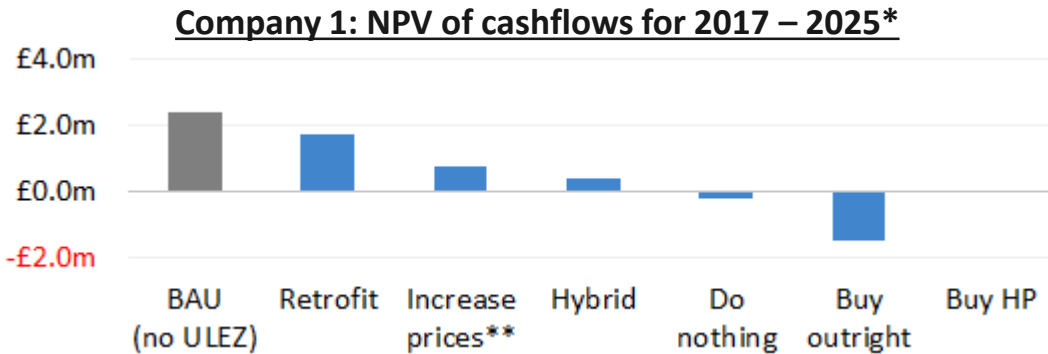
Implication: As shown above, retrofitting is easily the most cost effective option for Company 1, when considering the average of the period 2017 to 2025. However, this relies on the retrofit option being available. In addition, as shown on the following slide, it also relies on the company being able to bear the additional costs in the short term.

Results – Company 1 – cashflow levels

Below we show **cashflow levels for Company 1**, both BAU and the ULEZ proposals, considering different company responses.

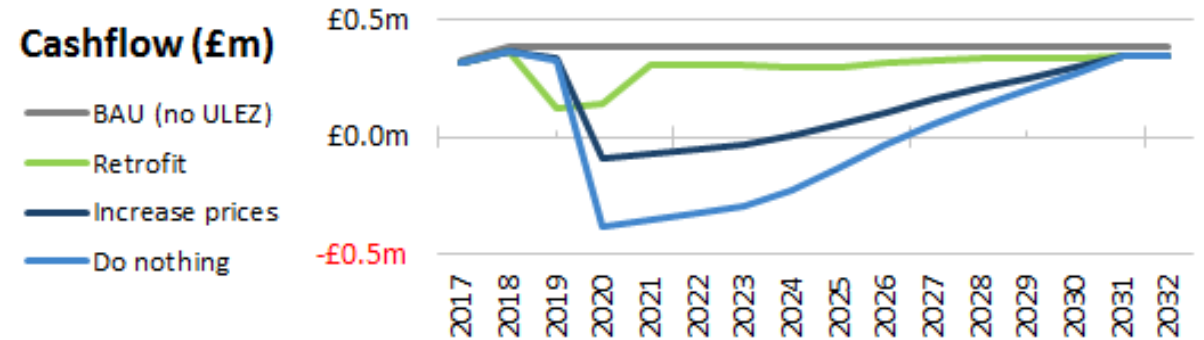
Sum of discounted future cashflows (2017 – 2025)

As shown on the previous slide, retrofitting is the most cost effective option. Of the possible responses, retrofitting, increasing prices and the ‘hybrid’ option allows positive NPV cashflows over the period 2017 to 2025.



Profile of annual cashflow

Under the optimal response (retrofit), cashflow falls close to zero in 2019 and 2020, although cashflow returns close to BAU levels by 2021. However, if the retrofit option is not available, the next best alternative (i.e. increasing prices) would have negative cash flow in some years. We also show the impact of ‘do nothing’, which would have negative cashflow from 2020 to 2027.



Implication: As per the previous slide, retrofitting is not only the most cost effective option for Company 1, but it is the only response that avoids negative cashflow in every single year. However, to retrofit coaches in time for the London-wide ULEZ in 2020, Company 1 will experience a noticeable reduction in cashflow in 2019 and 2020, so the company would need to prepare for this additional cost.

* NPV = Net Present Value. Cashflows are summed, with future flows discounted by 10% to reflect the opportunity cost of investment.

** We assume the elasticity of demand for coach hire to -0.75 in this ‘central case’. This is estimated based on available literature.

Results – Company 1 – net present value of cashflows

Below we consider whether the profile of future cashflows allows the owner of Company 1 to make a sufficient level of return. To do this, we sum the value of cashflows over three different time horizons (all starting in 2017), with future cashflows discounted to take into account the opportunity cost of investing in this business versus other alternatives.* If the sum of discounted cashflows is positive, we describe the outcome as ‘net present value positive’, or ‘NPV positive’, and this would indicate that it is worthwhile for the owner to continue running the business. If the sum of discounted cashflows is negative (‘NPV negative’) the owner could make higher returns by investing elsewhere. Below, we consider the NPV outcome under the different potential company responses.

	Time horizon for NPV calculations		
	5 years	Up to 2025 (9 years)	15 years
BAU (no ULEZ)	NPV positive	NPV positive	NPV positive
Do nothing	NPV positive	NPV negative	NPV positive
Retrofit	NPV positive	NPV positive	NPV positive
Buy HP	NPV negative	NPV negative	NPV positive
Buy outright	NPV negative	NPV negative	NPV negative
Reduce journeys	NPV negative	NPV negative	NPV negative
Increase prices	NPV positive	NPV positive	NPV positive
Hybrid	NPV positive	NPV positive	NPV positive

NPV outcome under different company responses

- *Retrofitting* coaches and *increasing prices* would both result in NPV positive cashflows over the three time horizons presented, which includes a short term horizon (5 years). These results demonstrate that it will still be worthwhile for Company 1 to continue trading if the ULEZ proposals are introduced.
- Responses involving buying coaches (outright or on HP) are NPV negative because the costs are upfront, whereas the benefits occur in the future and so are discounted more heavily.
- The *do nothing* response can be NPV positive, but it requires the company to take a long-term view of the business (15 years).

Implication: This NPV analysis is an alternative way of demonstrating that the, under the ULEZ proposals, the only options that appear worthwhile for the owner to pursue would be *retrofitting coaches*, *increasing prices* and the *hybrid option* (passing on some costs).

* We have discounted cashflows by 10% per annum. This is a high level estimate, based on a LEK report which calculated the cost of capital for the bus industry in the UK to be circa 8%-11%. (LEK report for DFT, *Review of Bus Profitability in England*, July 2010, p.7.)

Results – Company 2 – cashflow levels

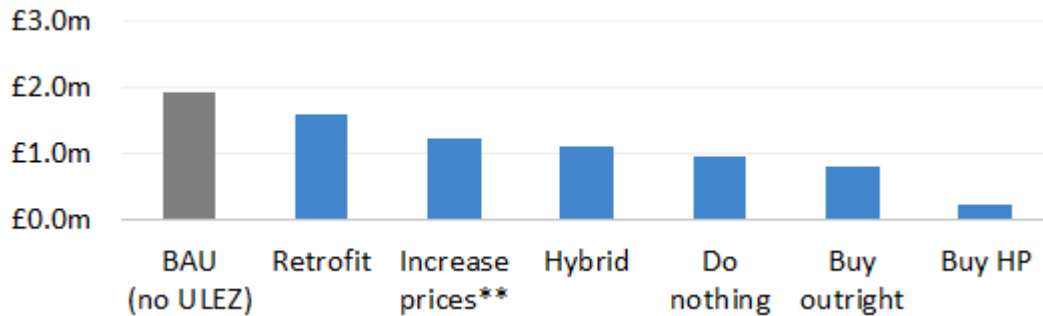
Below we show **cashflow levels for Company 2**, both BAU and the ULEZ proposals, considering different company responses.***

Sum of discounted future cashflows (2017 – 2025)

For Company 2, retrofitting is the most cost effective option, as per Company 1 on the previous slide. However, the majority of other responses generate positive NPV cashflows over the period 2017 to 2025.

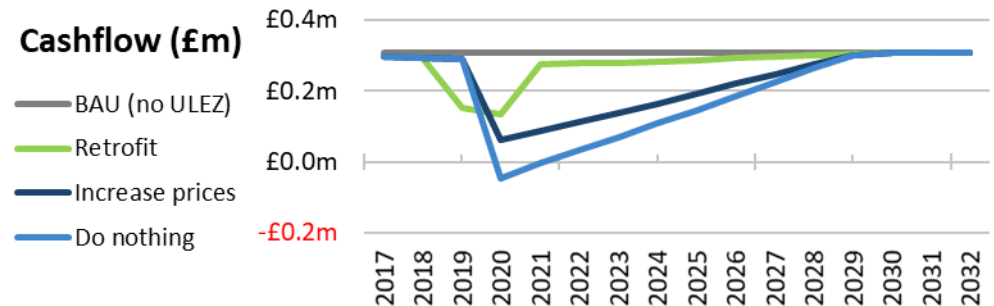
Company 2 is less affected than Company 1 because it has a higher proportion of Euro VI vehicles already.

Company 2: NPV of cashflows for 2017 – 2025*



Profile of cashflow

Under the optimal response (retrofit), cashflow falls by almost half for 2019 and 2020, although cashflow returns close to BAU levels by 2021. Even under a ‘do nothing’ (i.e. paying the ULEZ charges) the company remains cashflow positive, so which suggests the impact of the proposals may not be severe for Company 2. However, any other negative exogenous impacts on the coach market (e.g. improved rail transport) could send cashflow negative in some years.



Implication: Company 2’s cashflow stays positive under the majority of company response. It appears to be less impacted by the ULEZ proposals compared to Company 1 (due to having more Euro VI vehicles), and so is less dependent on the retrofit option. Nonetheless, the ULEZ proposals will still cause a dip in cashflow for Company 2 in 2019-20, and retrofitting is still the optimal response in general.

* NPV = Net Present Value. Cashflows are summed, with future flows discounted by 10% to reflect the opportunity cost of investment.

** We assume the elasticity of demand for coach hire to -0.75 in this ‘central case’. This is estimated based on available literature.

*** In Annex C we provide charts showing the annual change in cashflow relative to BAU for the different responses.

Results – Company 2 – net present value of cashflows

Below we consider whether the profile of future cashflows allows the owner of Company 2 to make a reasonable level of return. As discussed on slide 29, we calculate the net present value of cashflows over three different time horizons (all starting in 2017).* The NPV outcomes under the different potential company responses are shown in the table below.

NPV outcome under different company responses

- Under the ULEZ proposals, almost all of the responses generate NPV positive cashflows, over all three time horizons.
- Based on discussions with companies, we estimate that Company 2 will have more Euro VI vehicles in 2020 than Company 1, which is why more of Company 2’s potential responses are NPV positive compared to Company 1.
- The exception for Company 2 is the ‘*reducing journeys*’ scenario. For this response, we have assumed that Company 2 does not undertake trips to the ULEZ if it does not have a compliant (Euro VI) vehicle to make this trip, and this would cause a significant fall in revenue. Therefore, this response generates NPV negative cashflows.

	Time horizon for NPV calculations		
	5 years	Up to 2025 (9 years)	15 years
BAU (no ULEZ)	NPV positive	NPV positive	NPV positive
Do nothing	NPV positive	NPV positive	NPV positive
Retrofit	NPV positive	NPV positive	NPV positive
Buy HP	NPV positive	NPV positive	NPV positive
Buy outright	NPV positive	NPV positive	NPV positive
Reduce journeys	NPV negative	NPV negative	NPV negative
Increase prices	NPV positive	NPV positive	NPV positive
Hybrid	NPV positive	NPV positive	NPV positive

Implication: As per the previous slide, this analysis suggests that, in response to the ULEZ proposals, Company 2 has a range of options that it can undertake and still achieve a reasonable level of return based on its investment in the business.

* We have discounted cashflows by 10% per annum. This is a high level estimate, based on a LEK report which calculated the cost of capital for the bus industry in the UK to be circa 8%-11%. (LEK report for DfT, *Review of Bus Profitability in England*, July 2010, p.7.)

Results – Company 3 – impact on cashflow relative to BAU

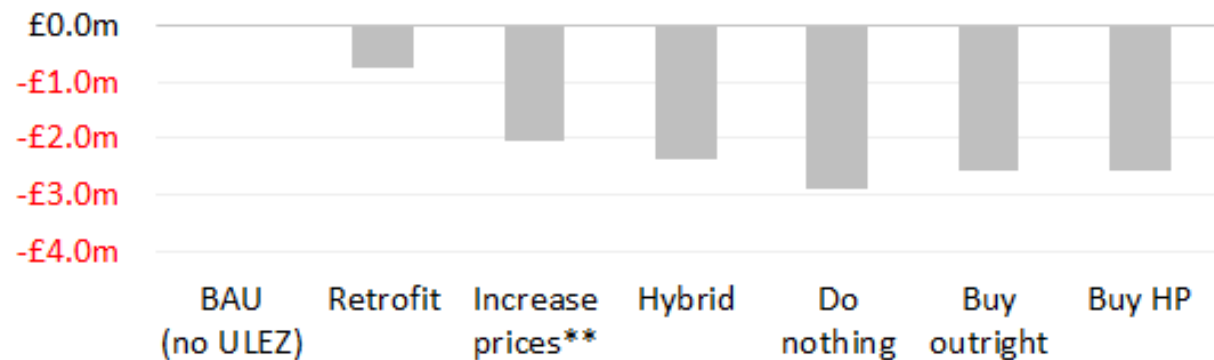
For Company 3, the data we received is not sufficient to determine precisely the level of the BAU position, so it would not be reliable to assess cashflow levels. However, we are able to estimate the changes to cashflow of the ULEZ proposals relative to BAU. Therefore, below we provide **estimates of the difference in NPV cashflows, relative to BAU, for Company 3 for 2017-2025.***

Change in average annual cashflow

For Company 3, we estimate that the retrofit option would have the smallest negative impact on cashflow, when comparing the different potential responses to the ULEZ proposals. We estimate that the next best strategy would be to pass on the ULEZ charges to customers.

These estimates correspond with our results for Companies 2 and 3, which shows that retrofitting would be the most cost-effective response.

Company 3: NPV of cashflows relative to BAU, for 2017 – 2025 *



Implication: Our estimates for Company 3 mirror the results for Companies 1 and 2 – that in general retrofitting would be the most cost-effective response to the ULEZ proposals. However, due to data reliability, we cannot say what the likely impact would be on Company 3’s cashflow levels, i.e. whether they would remain positive or become negative in some years.

* NPV = Net Present Value. Cashflows are summed, with future flows discounted by 10% to reflect the opportunity cost of investment.

** We assume the elasticity of demand for coach hire to -0.75 in this ‘central case’. This is estimated based on available literature.

Analysis – consideration of all options for coach companies

If the Mayor’s proposals are implemented (2019 Central London ULEZ and 2020 London-wide ULEZ), we estimate:



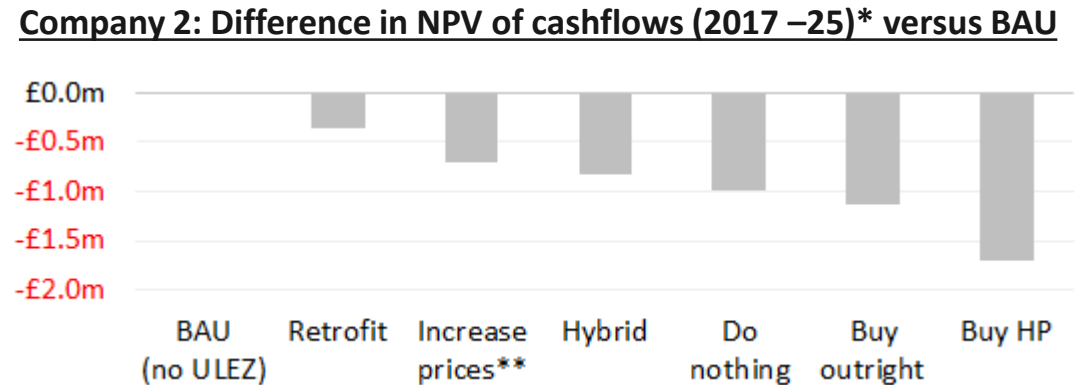
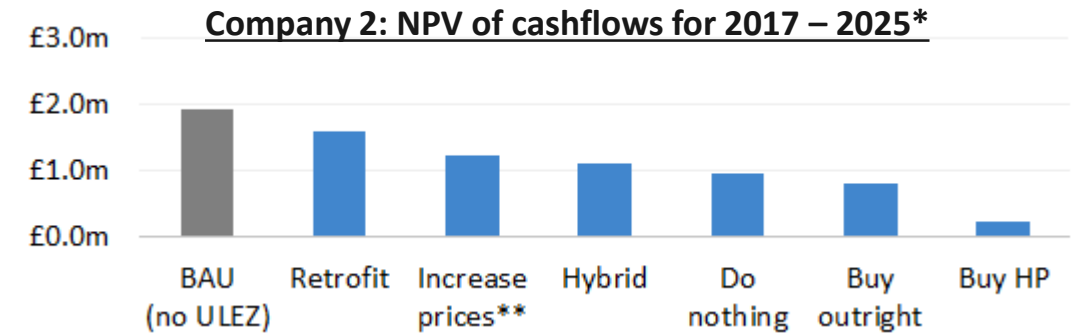
Retrofit option

In general, retrofitting is likely to be the optimal company response – it gives the highest NPV cashflows.*

- ‘Increasing prices’ (passing on the charge) is the next best option, shown right for Company 2. It is worse than retrofitting as we assume that companies lose business if they raise prices.**
- A ‘hybrid option’ – where companies pass on 50% of costs to the customer – is slightly worse as the company pays the remainder of the charge but still loses some business due to higher prices.
- BAU (business as usual) shows NPV cashflows* without the ULEZ.

Crucially, if retrofitting is not available, we estimate that ‘increasing prices’ is a better option than buying compliant coaches (either outright or on HP). If so, the potential benefits of lower coach emissions would not be realised. Our estimates are as follows (as shown right):

- If Company 2 can retrofit, it would lose £0.3m in NPV* cashflow relative to BAU.
- If retrofitting is not available, Company 2 would be worse off:
 - By ‘increasing prices’, it would lose £0.7m in NPV* cashflow.
 - By buying sufficient compliant vehicles to cover trip into the ULEZ, it would lose at least £1.0m in NPV* cashflow over the period 2017 to 2025 inclusive.



Implication: If retrofitting is not available, we estimate that companies would *not* choose to upgrade their fleets with compliant vehicles (any faster than ‘normal churn’), as passing on the charge would lose less cashflow. So the emission benefits from these companies would not be realised.

* NPV = Net Present Value. Cashflows are summed over the period 2017 to 2025 inclusive, with future flows discounted by 10% per annum to reflect the opportunity cost of investment.

** We assume the elasticity of demand (the responsiveness of demand following a change in price) for coach hire as -0.75 in this ‘central case’, based on available literature.

Analysis – focus on ‘retrofit’ versus ‘increasing prices’

----- In this slide we focus on the retrofit option compared to ‘increasing prices’ -----



Retrofit option

As per the previous slide, in general retrofitting would be the optimal response if the Mayor’s proposals are implemented.

- Increasing prices (passing on the charge) would be the next best option.
- A ‘hybrid option’ would be slightly worse.
- The outcome would be the same for Company 1 and Company 2.***



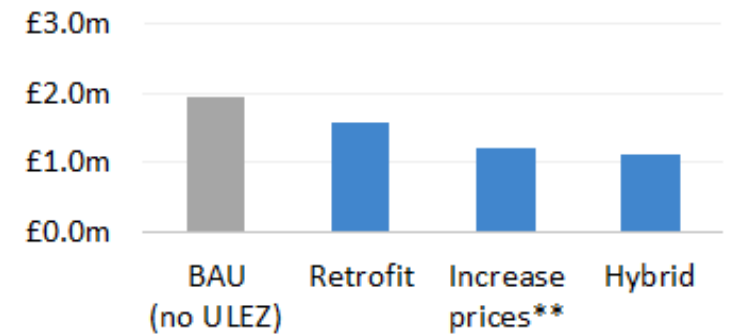
Passing on the charge

However, ‘increasing prices’ (passing on the full charge) could be optimal in some cases.

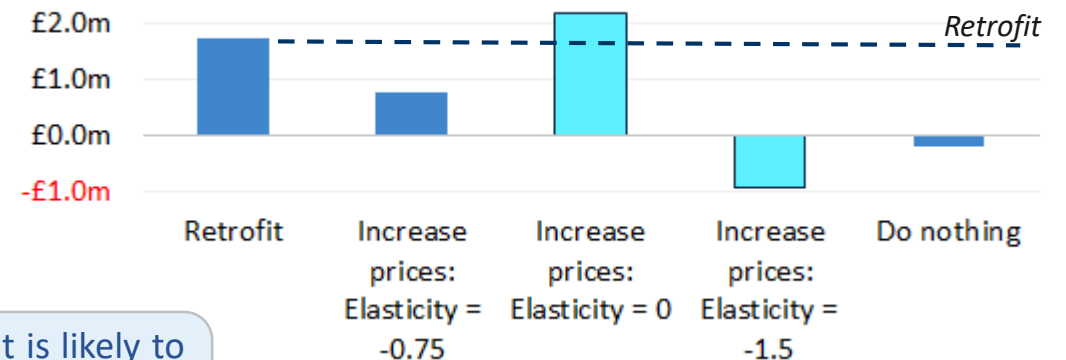
- If the elasticity of demand is low, increasing prices (passing on the charge) becomes an attractive option, e.g. if the elasticity is -0.2 or smaller, increasing prices becomes financially preferable even to retrofitting, as shown right for Company 2.
- In reality, companies would need to assess demand on a case-by-case basis – only some may be willing to absorb the charge.

Implication: If a company can pass on the whole charge without losing business it is likely to do so. However, opportunities for this may be limited. **If customers are price sensitive, retrofitting is the optimal response by some margin, so this option needs to be available.**

Company 2: NPV of cashflows for 2017 – 2025*



Company 2: NPV of cashflows for 2017 – 2025*



* NPV = Net Present Value. Cashflows are summed over the period 2017 to 2025 inclusive, with future flows discounted by 10% per annum to reflect the opportunity cost of investment.

** We assume the elasticity of demand (the responsiveness of demand following a change in price) for coach hire as -0.75 in this ‘central case’, based on available literature.

*** As per the previous slide, we received quality data for two companies, which we call ‘Company 1’ and ‘Company 2’ to preserve anonymity.

Analysis – further investigation of the hybrid option

If a company passes on *some* costs to *some* customers (i.e. to those customers who can bear the charge), what is the impact?

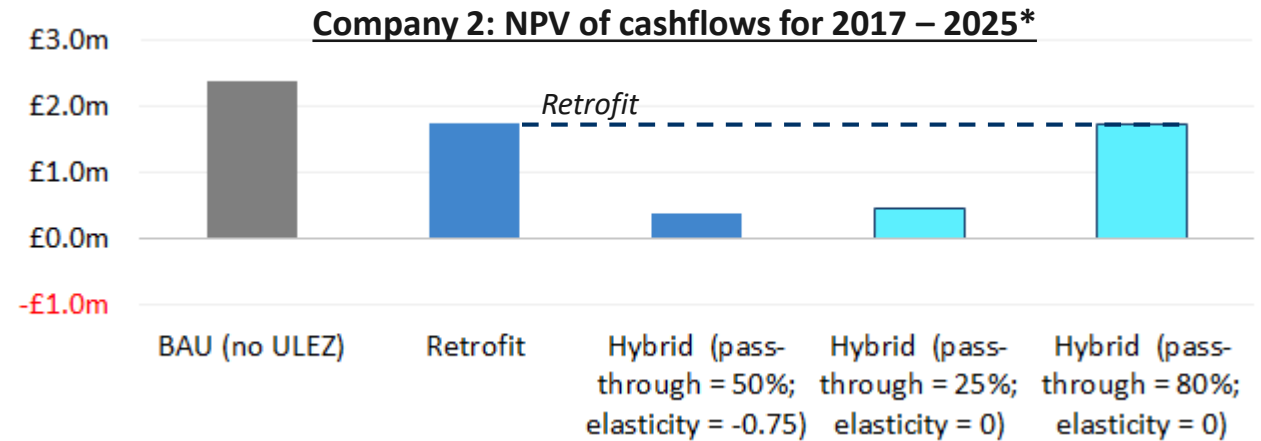


Hybrid option

- On the previous slide, in the hybrid option we assume that when the company passes through 50% of costs, it does so to all customers and therefore loses some demand.
- However, a company could try to persuade *some* customers to absorb *some* of the charge, whilst still buying the same level of services.
- Could this be an attractive / feasible option?

Analysis:

- In the chart above right, the *dark blue* columns shown the same results as on the previous slide. The *light blue* columns allow us to estimate the impact on NPV cashflows if the company targets price rises (passes on the full charge) only on customers that are willing to bear the charge.**
- The hybrid option with 25% pass-through and 0% elasticity illustrates the case where a company passes the full cost through to 25% of its customers without losing business. Alternatively, this would be equivalent to passing-through half of the charge to 50% of its customers without losing business.** As shown in the chart, this option does not compare well (in NPV cashflow terms) to the retrofit option.
- Under this ‘hybrid’ approach, to achieve NPV cashflows equal to the retrofit option, a company would need to pass on 80% of the charge to all customers, or the whole charge to 80% of customers, without losing any business. This does not seem like a realistic scenario.
- We have heard from companies that some customers may be less price sensitive (e.g. private schools, corporate private hire), but some customers are highly price sensitive (e.g. Local Authorities). So any cost pass-through would likely need to be partial, and confined to only some customers. We consider it likely that companies will seek to identify customers that will be able to bear some or all of the charge.



Implication: Passing on the charge to customers who can bear it is clearly attractive, but not all customers will be accommodating. Therefore, this option would likely be most effective as part of a mixed response, i.e. along with retrofitting to cover customers who will not / cannot bear the charge.

* NPV = Net Present Value. Cashflows are summed, with future flows discounted by 10% to reflect the opportunity cost of investment.

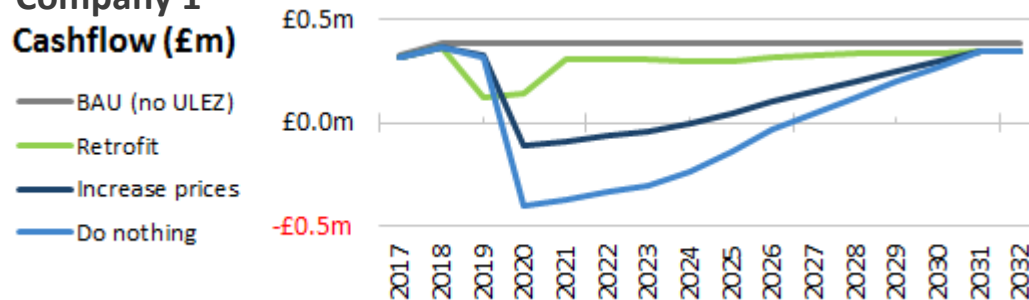
** The hybrid option shows the impact of passing on a proportion of the charge to all customers, but because the elasticity is zero the outcome is mathematically equivalent to passing on the *whole* charge to a *proportion* of customers.

Analysis – ULEZ proposals raise cashflow concerns

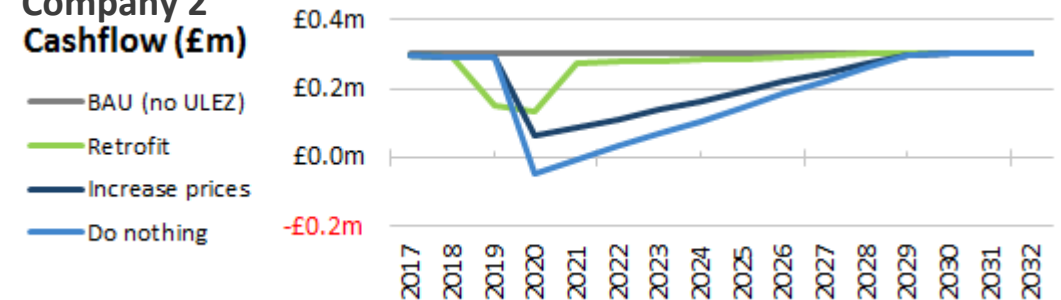
Companies are likely to endure a few difficult years of low cashflow under the ULEZ proposals

- As noted in previous slides, in response to the ULEZ proposals, the optimal strategy seems to be to retrofit vehicles to Euro VI equivalent standard (assuming this option is available), except for the case where customers are able to bear the charge being passed through.
- However, the retrofitting option requires some ‘lumpy’ up-front costs to prepare the fleet for the ULEZ. We have assumed companies would retrofit their vehicles in 2019 and 2020 to ensure that the portion of their fleet that enters the ULEZ is compliant in time.
- These charts show the annual profile of cashflow, for Company 1 and Company 2, under the ULEZ proposals, and under different company responses. The green line shows the outcome if companies only retrofit, and do not try to pass on any of the costs.

**Company 1
Cashflow (£m)**



**Company 2
Cashflow (£m)**



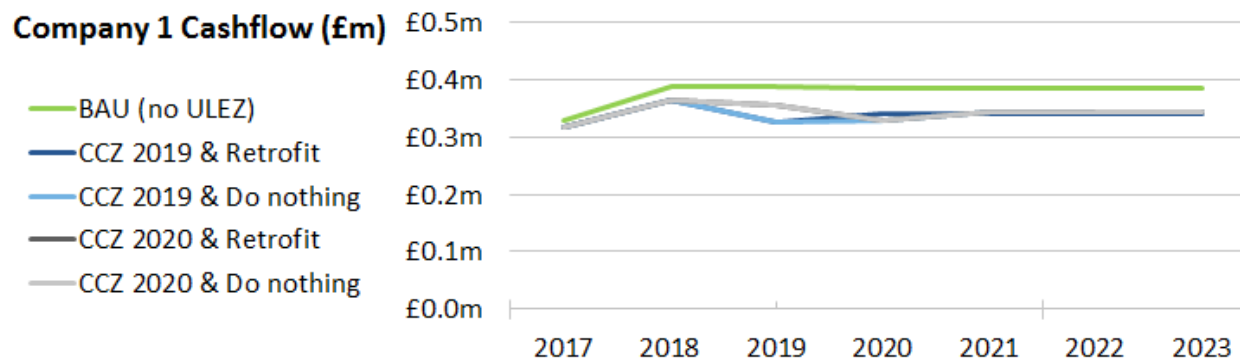
- The dip in cashflow under the retrofit option provides even greater rationale for companies to seek to pass on costs to the customers. In the first instance, companies would likely raise prices for their customers that can bear the charge the most, as noted on previous slides. However, if cashflow dips more sharply (e.g. for other external reasons), this could raise a risk of bankruptcy, and suppliers might have to risk raising the price for customers who have less ability to bear the cost, or seeking short term financing options. It is important to stress that the potential risk of negative cashflow / bankruptcy is significantly increased if the retrofit option is not available.

Implication: The ULEZ proposals, even with retrofitting available, generate a dip in cashflow, which gives companies greater reason to seek to pass on costs. The risk of negative cashflow – or potentially bankruptcy in the worst case – grows significantly if the retrofit option is not available.

Analysis – coach availability and timing implications

Although the London-wide ULEZ expansion has the greatest impact, the timing of the Central London ULEZ would also adversely affect companies if there continues to be a relatively low supply of Euro VI vehicles, particularly in the second-hand market.

- **The lack of availability of Euro VI coaches is a concern for companies.** For companies to refresh their fleet in the future in line with ‘normal churn’*, it requires that sufficient Euro VI vehicles are available, both new and second-hand. We have heard that the Euro VI market is tight, especially for 2nd hand coaches, which constrains companies’ ability to be ULEZ-compliant.** Companies are concerned that the Mayor’s proposal for a Central London ULEZ *in 2019* gives them even less time to identify and purchase coaches that are already in short supply.
- **The timing of the Central London ULEZ appears less relevant than the London-wide ULEZ, although subject to Euro VI availability.**
 - Based on the journeys that Company 2 undertakes into Central London, it only requires one additional Euro VI vehicle between now and whenever the Central London ULEZ is implemented to be compliant. Company 2’s normal churn is to buy two vehicles per annum on average, so even with Euro VI second-hand market constraints, the timing of the Central London ULEZ does not seem to be an important factor. Therefore the majority of the costs incurred by Company 2 as a result of the ULEZ proposals would be due to the London-wide ULEZ expansion in 2020.
 - Company 1 would need to accelerate uptake of Euro VI vehicles compared to its ‘normal churn’. If it did this by retrofitting, it would need to retrofit two vehicles if the Central London ULEZ were introduced in 2019, or one vehicle for 2020. We note that the impact on annual cashflow is relatively small – shown below – and it is the expansion of the ULEZ London-wide that generates the greatest costs. However, if Company 1 were unable to achieve ‘normal churn’ due to Euro VI availability constraints, the cost to the company would be even greater. We note that our analysis (shown below) takes into account a reduction in residual values of non-Euro VI coaches, as these would not be ULEZ-compliant.***



Implication: The impact of the proposed Central London ULEZ in 2019 could be larger if Euro VI coach availability remains low. But the proposed London-wide expansion in 2020 creates the largest impact on company costs. If 2020 were a ‘hard’ deadline, other provisions might need to be considered to reduce the cost to businesses, e.g. companies given ‘credit’ for Euro VI vehicles on order.

* ‘Normal churn’ is based on what companies have told us about how they are refreshing their fleet each year.

** The lack of supply in the 2nd hand market seems to be a mix of (1) Euro VI being a new standard, (2) high demand (coaches preparing for the ULEZ) and (3) coaches being a niche market.

*** There may be other (smaller) financial impacts, e.g. variations in running costs / fuel efficiency between older and newer coaches.

Conclusions and implications for TfL

1 The availability of the Euro VI retrofit option is crucial to ensure that the impact of the ULEZ on company cashflows is minimised and that benefits from emission reductions are realised.

- Companies may be able to pass some or all of the charge without losing business, but not always as some customers will be price sensitive. Given this, retrofitting seems to be by far the best response financially to the ULEZ, and companies have also indicated this is their expected response.
- If retrofitting were not available, the next best response is ‘increasing prices’ to all customers – this would significantly increase the risk of negative cashflow in some years and would mean that emission reductions would not be realised. So the availability of retrofitting appears **critical**.

Implication: TfL needs to provide clear assurance to companies on the availability and cost of retrofitting.

2 The London-wide ULEZ is the key driver of costs – the timing of the Central London ULEZ is relevant but less significant in terms of costs. But low supply of 2nd hand Euro VI coaches is reducing companies’ ability to update their fleet naturally (via normal churn).

- The companies in our study are naturally refreshing their fleet over time, and only a portion of their trips go into the Central ULEZ. The London-wide ULEZ would have a greater impact than the Central London ULEZ, although Company 1 would need to retrofit some vehicles for the latter.
- However, there is a lack of 2nd hand Euro VI vehicles available which makes it harder for some companies to become compliant via normal churn.
- Delaying the London-wide ULEZ would have a beneficial impact on company cashflow by giving companies more time to update their fleet naturally (via normal churn), and providing more time for the Euro VI 2nd market to develop / for companies to spread the costs of retrofitting. If 2020 is a ‘hard’ deadline for ULEZ expansion, other provisions could be considered, e.g. ‘credits’ for Euro VI vehicles on order.

Implication: TfL should be aware of the impact of the London-wide ULEZ expansion, and consider options for mitigating the impact, whilst still seeking the necessary air quality benefits as soon as possible.

3 The ULEZ proposals may have distributional impacts – small companies are more heavily affected by negative cashflow

- Small companies may find it difficult to raise finance, so negative cashflow is a potential concern, particularly if retrofitting is not available. Companies may cash reserves to draw on, but this is uncertain. Some older owners could decide to cease trading.

Implication: TfL should be aware that the ULEZ proposals may have a disproportionately large impact on small companies.

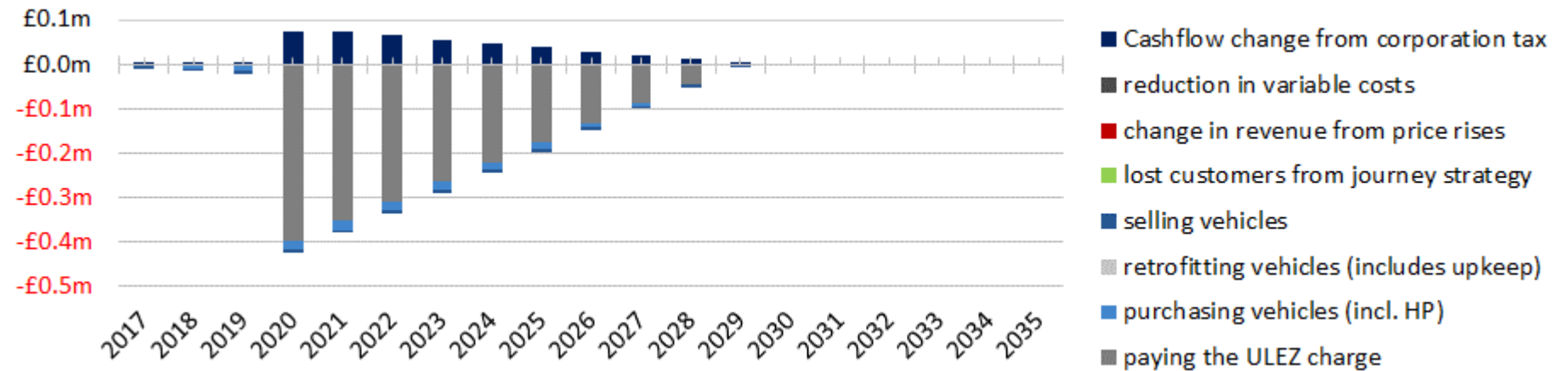
Limitations and suggestions for further work

- Identification of limitations, i.e. what the analysis will and won't tell us.
 - The analysis is currently a company-by-company snap shot and provides a more quantified analysis of the impacts that coach companies are concerned about. However, it cannot currently be aggregated to produce an overview of impacts across the whole coach market.
 - The analysis is predominantly based on two companies, as others were unwilling to provide the necessary information – we use the limited data provided by others as a cross check .
 - We have undertaken limited engagement with companies on the results for time and budget reasons. However, we have sought to test our analysis with them and they have access to the results in this slide pack.
 - We were offered differing views on the availability and pricing of retrofitting – which emerges as a critical factor in managing the impacts of the proposals. We use broadly the mid point of these views in our analysis, which is consistent with the narrow range suggested by the LCVP.
- Suggestions for further work
 - More time and engagement with the coach companies that have participated (some only in part) to encourage them to share more information and refine our analysis of the likely impacts of the ULEZ proposals on their business.
 - Wider engagement with the industry to understand different coach companies, small and large, which would enable extension of the analysis and allow TfL to better understand whole market impacts.
 - Updates to reflect progress on the timing and pricing of the retrofit option given its importance in the impact analysis that we have undertaken.

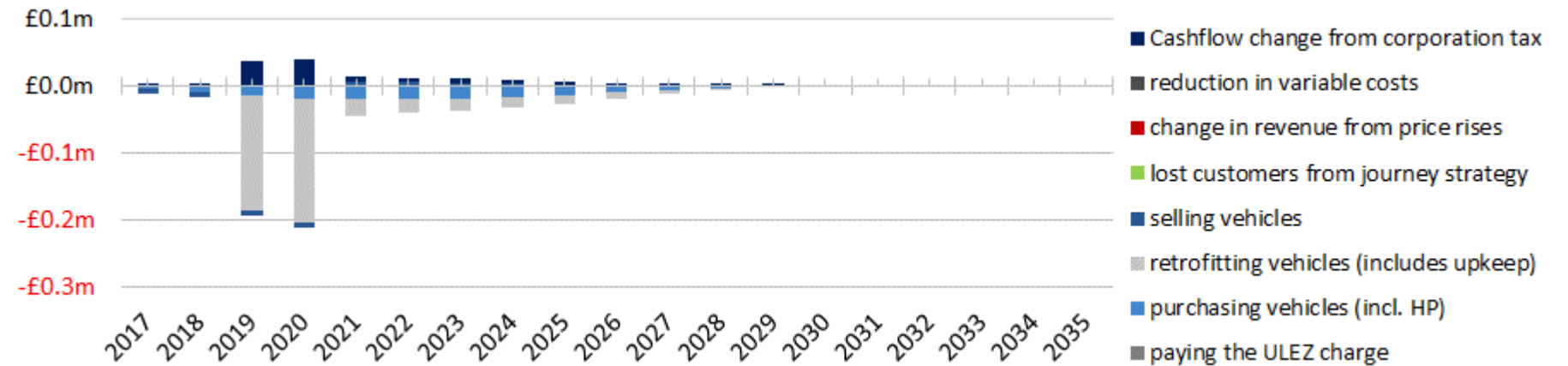
Annex A - Additional modelling results

CEPA analysis – Company 2 – impact relative to BAU

Do nothing

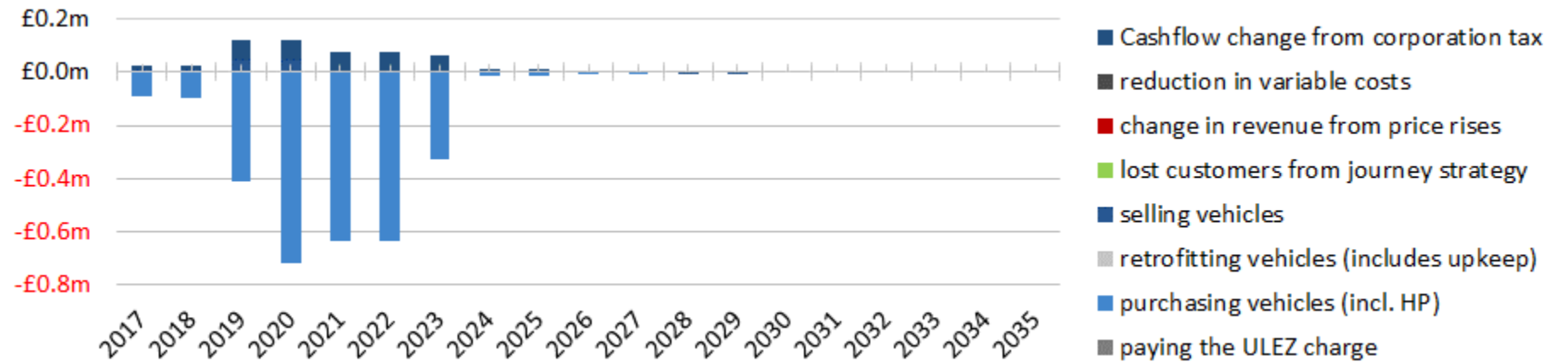


Retrofit

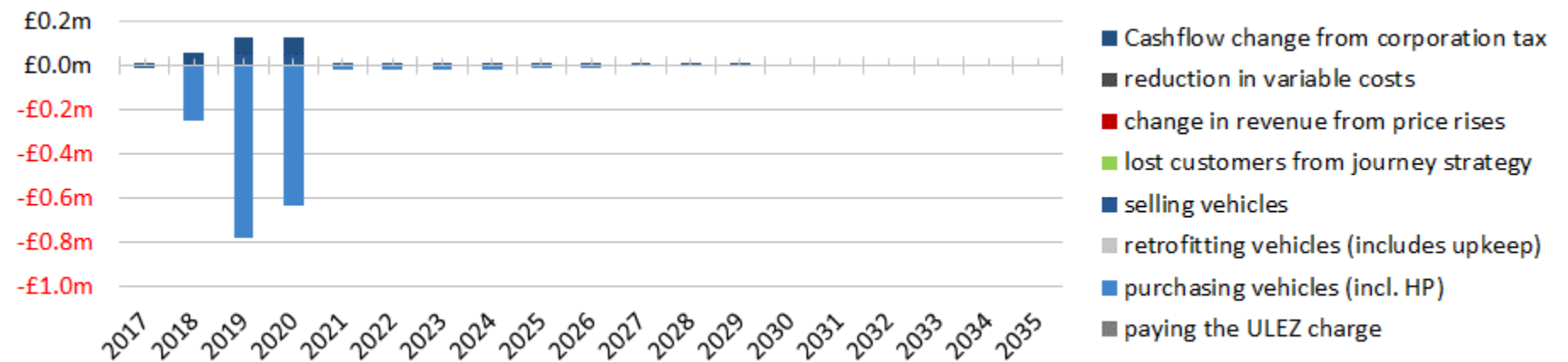


CEPA analysis – Company 2 – impact relative to BAU

Buy Euro VI coaches on HP

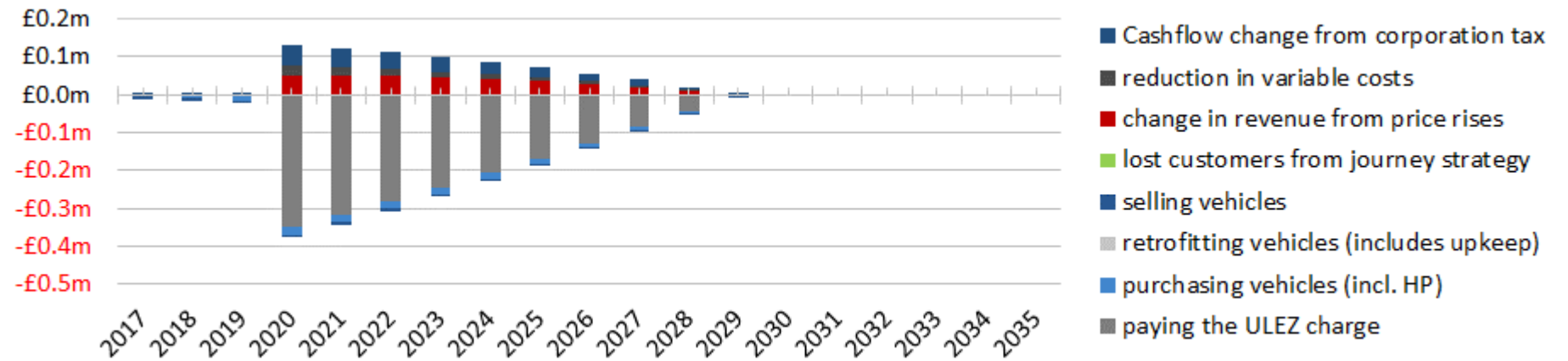


Buy Euro VI coaches out-right



CEPA analysis – Company 2 – impact relative to BAU

Pass on the full charge



Hybrid: Pass on 50% of the charge / pay the rest

