Appendix 4: London Climate Budget Submission

Appendix B - Climate Budgeting

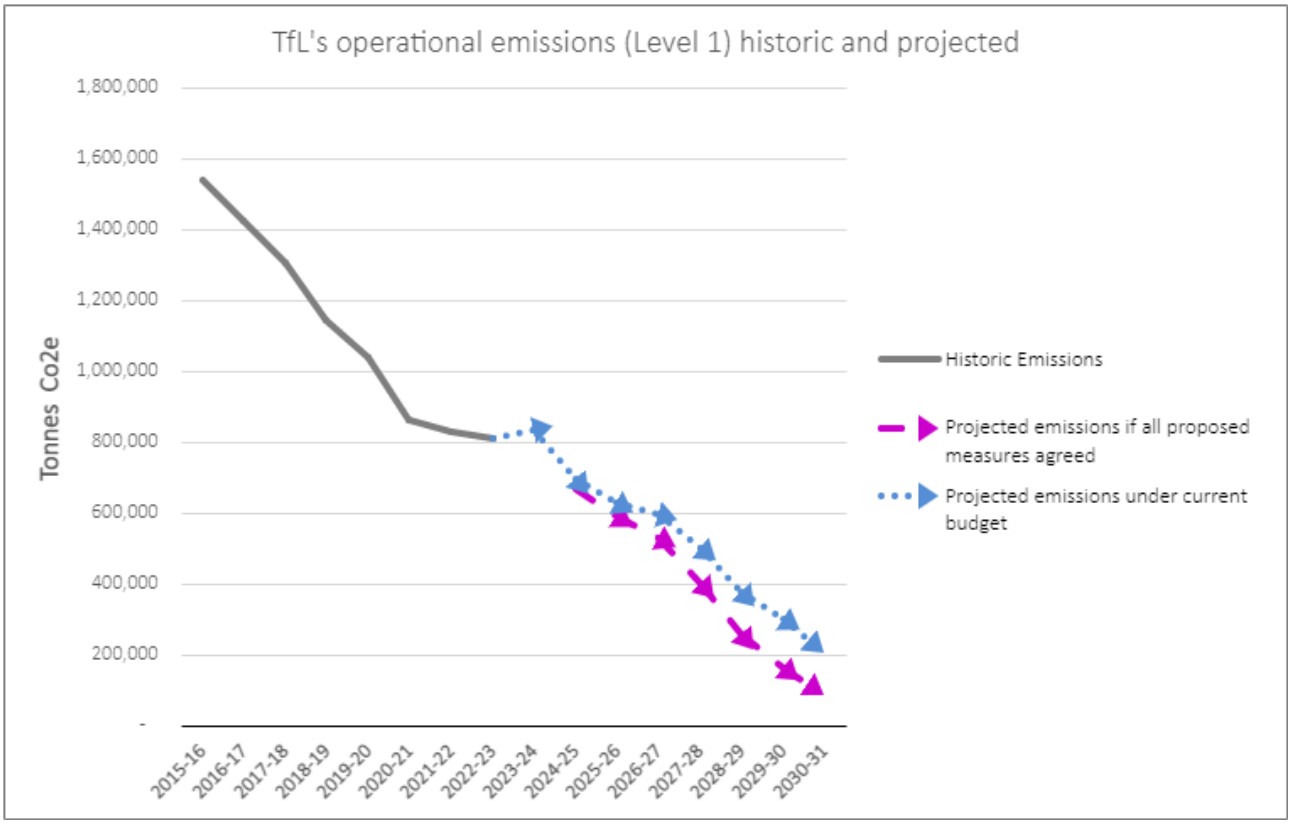
Climate Budget Scope

4.1 The scope of this year's Climate Budget includes:

- TfL's operational emissions – (Level1)
- Key measures that deliver or enable emission reductions in parts of London outside of TfL's direct operational emissions – (Level 2).
- initiatives that help us adapt to climate change – (Level 1 and 2).

Level 1 – TfL's operational emissions

4.2 For TfL's operational emissions, the target is to achieve net zero by 2030. This includes all energy and fuel that TfL purchases directly, along with the emissions associated with the operation of TfL-branded services. For example, this includes the emissions associated with the TfL bus network and London Overground, where TfL doesn't directly purchase the energy or fuel directly.



4.3 TfL has made and will continue to make significant progress in reducing its operational carbon emissions. TfL's funded plan is demonstrated in the projected emissions

scenario above, which represents an 87% reduction in emissions versus 2015-16 levels. With additional funding, TfL could go even further, closing almost all of the gap towards the ambition of net zero operations by 2030. Further assessment would be required to close the **remaining** gap beyond the 'with further funding' scenario. The slight increase in emissions this year is mostly due to an increase in the carbon intensity of the electricity TfL consumes. Electricity usage on TfL's rail services has also increased slightly as full service is resumed since the pandemic. The Elizabeth line also commenced full service this year.

Level 2 – TfL's impact on wider London emissions

5.1 Considering TfL's contribution to reduce wider London emissions, TfL has decided to include in the Climate Budget most of its investment programme. TfL also includes the operational cost of new services in the year they are introduced. This is because investment in improving London's active travel and public transport network, and in supporting vehicle electrification, is key to shift more people from car travel to sustainable modes and reduce the number of polluting vehicles on the road, thereby reducing the carbon footprint of London as a whole. It is therefore important to note that there are some items which will be included in both tables A and C, where actions have an impact both on TfL's direct carbon emissions and on wider London emissions. Comments are included in the tables where this is the case.

Progress this year

5.2 TfL has set out its Vision & Values, which has as its central vision ensuring TfL is the "strong, green heartbeat for London". This year the Our TfL Strategy was published, which sets out how we will achieve this vision. Green is one of five key themes and reaching net-zero carbon in our operations by 2030 is a key measure of success. Emissions of carbon per person for transport in London are much lower than in the rest of the UK, and have been decreasing in recent years, but TfL must go further and is setting itself up as an organisation to achieve this. Continuing progress on decarbonisation is set out in this Budget, and with more funding TfL could go even further.

Level 1 – TfL's operational emissions

5.3 This year TfL launched its 1,200th zero-emission bus, making it the largest zero-emissions bus fleet in western Europe, with one in nine buses zero-emission. In 2016 there were only three zero-emission Bus routes, and by the end of 2023 TfL is expected to have a total of 73 zero emission bus routes. In addition, all of TfL's other buses are low emission and meet or exceed Euro VI emission standards, the same emissions standard as the Ultra Low Emission Zone.

5.4 Since setting out its plan for decarbonising our buildings estate last year, TfL has created a programme with dedicated funding to go towards delivering it – both on its operational estate and on its commercial estate through its new subsidiary Places for London. This programme focuses on fossil fuel appliance removal prioritising the assets reaching end of life, those in poor condition and those that will payback within the period of the plan. The programme also looks at implementing energy efficiency upgrades to further reduce energy consumption and installing solar panels where other works are undertaken. This year TfL has completed feasibility studies to decarbonise heating at 14 buildings in 8 of its operational sites and it has secured £600k of government grant funding to deliver its first low-carbon depot at Therapia Lane Tramlink Depot. As per TfL's strategy, it is seeking external funding such as the Public Sector Decarbonisation Scheme in addition to existing business plan funding to accelerate decarbonisation initiatives at some of TfL's harder to decarbonise sites.

5.5 TfL has started to produce whole life carbon baselines for its Major Projects – this is the first time this has been done for all ten current Major Projects. This allows identification of carbon hotspots and reduction of the impact of these projects by management of carbon through the design process and in collaboration with TfL's supply chain. TfL is now working to expand the carbon baseline across its capital investment portfolio, which will support better decision making around carbon management throughout the whole project lifecycle.

5.6 In recognition that everyone has their part to play in cutting carbon the TfL Carbon Literacy Training was launched in summer 2022 with the Carbon Literacy Project. Over 2,400 employees have now taken the training (over 1,700 so far this Financial Year), which is delivered by a group of 75 volunteer trainers from all areas of TfL. TfL aims to train 3,000 TfL colleagues this financial year and is currently on track to achieve this, with 10 courses per week running from October through to March 2024.

5.7 TfL's first Power Purchase Agreement (PPA) tender is a vital step towards ensuring that TfL's operations can be net zero by 2030. The tender encourages the market to increase the volume of renewable energy supplying the national grid. The Invitation to Tender stage of the procurement process has now closed and TfL has entered into the evaluation and negotiation stages which are expected to conclude by the end of November 2023, with contract signature planned for early 2024.

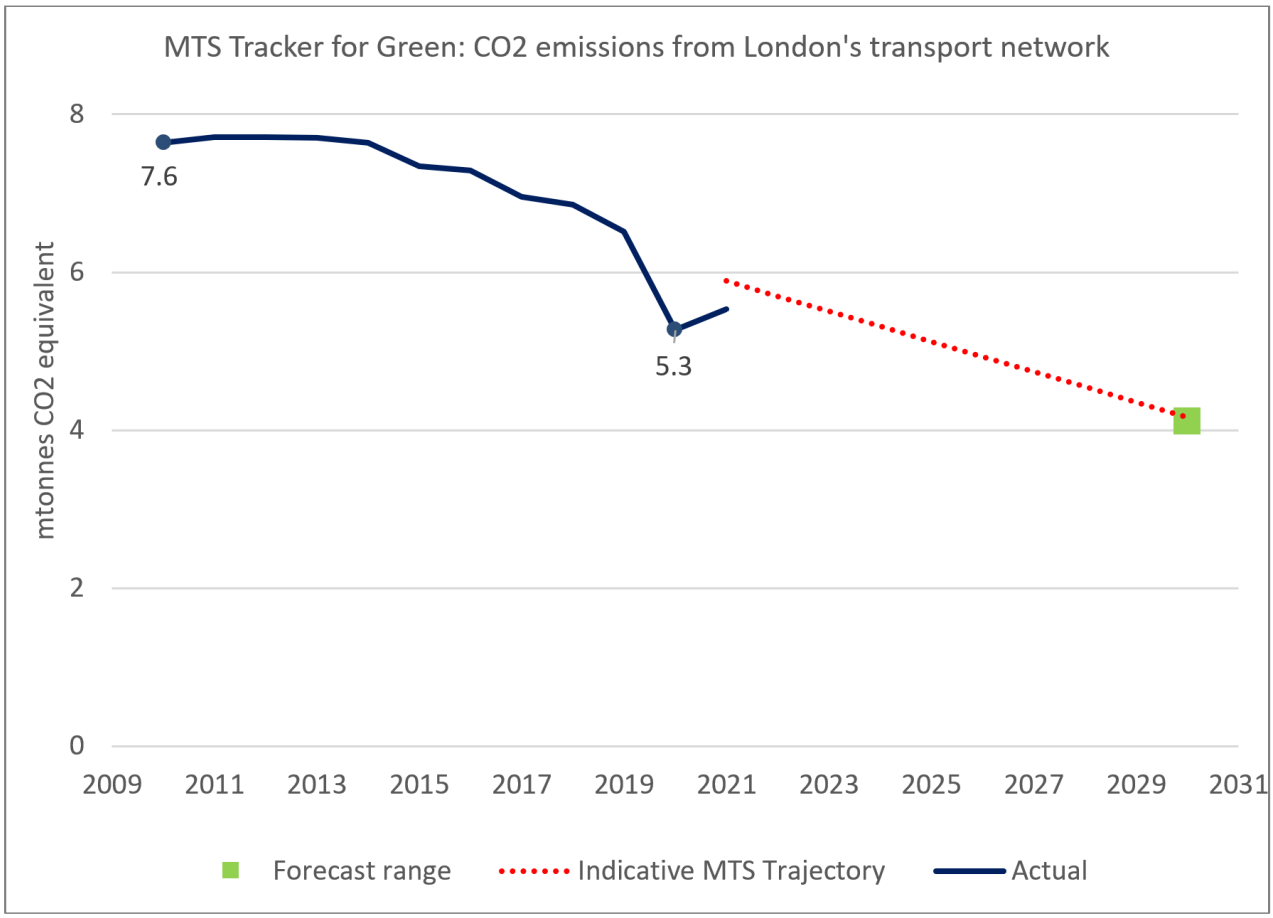
5.8 TfL is in the process of arranging further funding from the Mayor's Green Finance Fund (GFF) to finance the implementation and acceleration of carbon reduction projects. These include LED lighting on the Transport for London Road Network (TLRN) as well as in London Underground stations. LED lighting uses less energy than traditional

lighting reducing TfL's related energy consumption and emissions by up to 65 per cent whilst also providing a brighter and more secure network for customers. In addition to LED lighting TfL is also exploring the use of GFF funding to install solar panels and fossil-fuel free heating systems whilst improving the insulation and efficiency of depots and head office buildings.

5.9 TfL published its brand-new Climate Change Adaptation Plan in March 2023. Over the course of the financial year, TfL has allocated £500k to a range of adaptation initiatives aimed at improving its understanding of climate risk, including an interdependencies project and contributing to London-wide SuDS opportunity modelling. This will improve TfL's ability to make evidence-based decisions on where to focus future adaptation initiatives. Furthermore, TfL has now made Sustainable Drainage Systems (SuDS), which slow the release of rainwater into London's streets and sewer systems, the default option for all future renewal and enhancement projects that involve changes to surface water management. This will reduce flooding, improve water quality and enhance biodiversity.

Level 2 – TfL's impact on wider London emissions

5.10 TfL's continuous investment, alongside wider changes across the city, has led to a substantial reduction in transport emissions already which is forecast to continue. The Delivering the Mayor's Transport Strategy 2022/23 Report, published in November 2023, shows estimates for London's CO2 emissions from transport (graph below). While TfL is broadly on track to meet the original strategy aims (including London being a zero-carbon city by 2050), further large-scale action is needed to meet the accelerated net-zero 2030 target. TfL is exploring the options that could be considered to respond to the accelerated 2030 target which will inform future budgets.



5.11 In August 2023, the Mayor expanded the Ultra Low Emission Zone (ULEZ) London-wide to tackle the triple threats of air pollution, the climate emergency and congestion, and to ensure five million more Londoners can breathe cleaner air. The expansion operates across all London boroughs and uses the same boundary as the Low Emission Zone which has applied to heavy vehicles since 2008. It is estimated that, since 2019, the ULEZ has led to a reduction of around 800,000 tonnes of carbon dioxide emissions from vehicles across London over the four-year period compared to without the ULEZ, a saving of three per cent of road transport emissions. This reduction in emissions is a vital step closer to achieving the Mayor's aim of reaching net zero carbon emissions by 2030

5.12 Aside from the ULEZ, TfL has numerous other policies that aim to reduce emissions and improve air quality in London. These include healthy streets, taking action through taxi and private hire vehicle licensing requirements, rolling out electric vehicle (EV) charging infrastructure and working to reduce emissions from freight through TfL's Freight and Servicing Action Plan. Further detail on all of TfL's policies and on progress to date on reducing emissions in wider London are detailed within TfL's Delivering the Mayor's Transport Strategy 2022/23 Report: https://tfl.gov.uk/corporate/about-tfl/the-mayors-transport-strategy#on-this-page-6

Funded initiatives

Level 1 – TfL Operational emissions (projected scenario)

6.1 Around 98 per cent of TfL's operational emissions come from bus operations and the electricity used for TfL's rail operations (covering traction and non-traction, for example in TfL buildings). Therefore, TfL's primary focus has been on tackling these two issues.

6.2 Bus operations make up over 50 per cent of TfL's operational emissions. The MTS in 2018 set out an ambition for all TfL buses to be zero emission by 2037. In 2021, TfL confirmed that all new TfL buses entering service will be zero emission and that the plan to deliver a 100 per cent zero-emission fleet would be brought forward by three years, to 2034. At the same time, TfL set out that, with further funding, it would be possible to accelerate further, to achieve a fully zero-emission bus fleet by 2030. The TfL business plan maintains the 2034 zero emission bus plan, but confirms that investment is needed to keep the pathway open for an acceleration to 2030. Maintaining this trajectory towards a 2030 target beyond 2024/25 will require significant additional funding (see section on additional funding).

6.3 TfL continues to make progress on its plan for a cost-effective transition to zero carbon energy. Following on from the expected contract award for TfL's first PPA in early 2024, this year TfL will be reviewing and setting out its future energy purchasing strategy. This strategy will set out a plan to enable 100% of TfL's electricity to be from renewable sources by 2030, of which a significant proportion will be achieved thorough PPAs.

6.4 These two key initiatives are complemented by the following range of additional initiatives.

6.5 TfL is continuing to progress its plan towards decarbonising its buildings estate. This year TfL will be delivering on some of the feasibility studies it has already completed. It is also progressing a further tranche of feasibility studies for a minimum of 23 buildings across 14 sites. TfL will also continue to refine its assessment and prioritisation methodology to ensure that it is delivering interventions that deliver the greatest carbon savings soonest.

6.6 The MTS and London Environment Strategy outline commitments for all GLA Group fleets to be zero emission by 2030. To support this, TfL's Corporate Environment Plan sets out the following targets:

- All cars in TfL fleet must be zero emission by 2025;

- All vans in TfL support fleet must be zero emission by 2030;
- All heavy vehicles (greater than 3.5 tonnes) must be fossil fuel-free from 2030.

6.7 TfL operates approximately 1,000 fleet vehicles, with less than five per cent currently being Zero Emission Capable. TfL has funding to continue its plan to convert all cars and vans in its fleet to zero emission in line with its targets, with the leasing of new vehicles as well as the implementation of supporting infrastructure in the vehicle depots.

6.8 Solar Private Wire is a key project to enable TfL to directly receive zero-carbon electricity from new-build local solar assets, reducing the carbon emissions associated with the operation of the London Underground network. As well as the environmental benefits, there is the potential for financial savings based on the avoidance of costs associated with delivery of power via the grid, which typically makes up circa 40 per cent of the energy bill.

6.9 Energy efficiency is key to reducing TfL's carbon footprint. TfL has a rolling programme of LED upgrades across the network, including in stations, depots, and across TfL's strategic road network. These upgrades are currently phased to coincide with asset life expiry but with additional funding these upgrades could be accelerated and carbon savings realised sooner (see additional funding section).

6.10 Electricity used to power TfL's trains makes up 35% of TfL's emissions currently. Through introducing more modern and efficient trains and re-configuring its power network TfL is planning to reduce the amount of energy it is using. There is more TfL can do to optimise energy use across its network, which it will continue to explore.

6.11 TfL is investing £1.6m over the next three years in improving its understanding of its energy consumption. TfL will be purchasing and installing additional energy sub-metering on its recently awarded TfL submetering and energy data contract. These will help to provide a greater understanding of energy consumption across the network and enable TfL to better prioritise and articulate interventions that will reduce emissions.

6.12 Next year, TfL has allocated £1.7 million to progressing its maturity and delivery of climate adaptation measures, including £500k on adaptation delivery projects, including highways SuDS and Trams drainage capacity enhancements. Dedicated adaptation and green infrastructure funding, alongside adaptation measures delivered as part of projects, will support the delivery of TfL's new target for 5,000sqm of catchment draining into SuDS each year, as well as targets within TfL's forthcoming Green Infrastructure and Biodiversity Plan.

Level 2 – measures that deliver benefits for wider London

6.13 Carbon emissions per person for transport in London are much lower than in the rest of the UK, and TfL's sustainable travel offer plays a key role in this. However, there is more TfL can do going forwards to further reduce London-wide emissions from road transport. This year, TfL will continue to invest in improving London's active travel and public transport network and to support vehicle electrification in line with the MTS goals. This will shift more people from car travel to sustainable modes and reduce the number of polluting vehicles on the road, thereby reducing the carbon footprint of London as a whole.

6.14 TfL's investment in major projects which increase capacity, frequency and quality of public transport, such as the Four Lines Modernisation and Piccadilly Line upgrade, make public transport a more attractive mode choice and hence encourage the shift away from private car use. The same can be said for rail and station enhancements and rolling stock replacements, e.g. DLR, which all improve the customer's overall experience. Continued investment in maintaining and improving this public transport offer is essential to delivering wider carbon savings for London. (C.01, C.02, C.04, C.05, C.06, C.07, C.08, C.09, C.13, C.15, C.16)

6.15 To maximise the potential benefits of expanding the ULEZ and strengthen alternatives to private cars, the Mayor also announced a plan for improving the bus network with Superloop in outer London that will see over one million further kilometres added to the bus network. (C.18) Further information about enhancements to bus services can be found on our website.

6.16 TfL continues to invest in London's streets. The Healthy Streets programme ensures London's streets are safer and more pleasant, in turn making walking and cycling more appealing. E-bikes will also be a more viable option with the addition of 1,400 e-bikes being rolled out in Spring 2024. This further encourages the shift away from private car use, for those who are able to walk or cycle instead. In addition, the bus priority schemes facilitate more competitive and reliable bus journey times and make it a more viable option for Londoners to switch from using their private vehicles. (C.10, C.11)

6.17 TfL's EV Infrastructure Strategy supports the acceleration of the transition to zero emission vehicles. It sets out requirements for the provision of infrastructure, focusing on key user groups, including high mileage essential road users, such as taxi, private hire and commercial vehicle drivers. The strategy forecasts a need for between 40,000-60,000 public charge points by 2030, of which up to 4,000 will need to be rapid. As of October 2023, TfL has 16,960 public charge points, of which 987 are rapid. The key commitment in the strategy is to unlock Greater London Authority land

for EV charging. TfL's Electric Vehicle Infrastructure Delivery programme will deliver 100 EV charging bays on the TfL road network, with the first new rapid charge points operational in 2024. TfL will also tender later this year for a Joint Venture partner to deliver EV Charging Hubs on TfL land, with an initial five sites. (C.12) Further information is available in London's 2030 electric vehicle infrastructure strategy available online.

6.18 To support the thousands of new homes and jobs that London needs, TfL invests in expanding the active travel and public transport offer in areas of growth, increasing frequencies and capacity in the network. This is vital to ensure London grows sustainably, preventing an exponential increase in carbon emissions from road transport generated by new residents, workers and visitors. These projects are often third party funded, meaning projects can deliver mode shift and carbon benefits at a lower cost and risk to TfL. In addition, TfL is investing in accessibility improvements to the existing network, making it suitable for customers of all ages and abilities (who may otherwise have no other choice but to drive or be driven). (C.03, C.17)

6.19 Investment in infrastructure renewals and enhancements across the network such as track, lifts & escalators, bus infrastructure etc. overall provides the customer experience required to keep public transport options more attractive than private vehicles. (C.14)

6.20 TfL is also continuing to fund a project team to explore the delivery of waste heat opportunities that would provide carbon savings to London, by capturing and re-using thermal energy from London Underground ventilation shafts for use by external suppliers of local heat networks and buildings. An initial site has been identified to be progressed as a priority, with the learnings to then inform a longer-term strategy, to deliver additional sites across the network.

6.21 Whilst TfL can model the total likely impact of its interventions on carbon emissions, it would be inaccurate to break this down into the carbon impact of each business plan item. London's transport network works as a system and TfL's projects and interventions do not work in isolation, they work together and enhance each other's impacts. The figure in 2.3.1 demonstrates our best estimate of how London's transport emissions will reduce through to 2030 as a result of these actions.

Initiatives with additional funding – Level 1 – TfL Operational emissions

7.1 With additional funding, TfL could deliver additional improvements that would close the gap between its forecast and net zero emissions by 2030. Some of these options are at a very early stage of development, with costs and benefits estimated only at a high level. Further funding certainty in future would enable the development of some of these options for delivery through this decade.

7.2 With additional funding, TfL could lock-in the pathway to making the bus fleet zero-emission by its target of 2030. This would however require significant additional funding, although this cost would be spread over the lifetime of the new vehicles which extends beyond 2030.

7.3 In addition to making all buses zero emission, further funding would allow TfL to make its Dial-a-Ride fleet zero emission. The full Dial-a-Ride fleet of 256 buses was renewed with Euro VI vehicles between 2019 and 2021, in order to be compliant with ULEZ. While this considerably improved their emissions footprint, moving to electric vehicles would remove tailpipe emissions completely. It would also improve air quality and reduce noise in residential areas where many customers live. Infrastructure would need to be installed at each Dial-a-Ride depot to facilitate charging.

7.4 TfL has plans to make its operational support fleet of cars and vans zero emission. A more expensive intervention would be to make the 20 HGVs in the TfL support fleet zero emission, as options for such vehicles are much more limited. TfL has estimated costs only at a very high level, though as the market matures options may improve.

7.5 Energy usage and emissions from TfL's rail modes could be reduced through further improving traction efficiency. This could include measures such as regenerative braking, energy storage and enhanced signalling measures such as 'green CBTC', where driving style is designed to minimise energy usage.

7.6 TfL's current funding will reduce the carbon emissions from its buildings by one third, by focusing on the most technically feasible sites. With additional funding TfL could eliminate all of its building fossil fuel emissions, however the remaining two thirds will be progressively more expensive as TfL takes action on its more technically challenging sites. Through its dedicated building decarbonisation programme, TfL is building a pipeline of feasibility studies to produce detailed plans for its buildings, which is improving the accuracy of its estimated funding requirements over the coming years. TfL will be looking at addressing sites at increasing level of complexity and for the most technically challenging sites it will continue to look at external funding opportunities like the Public Sector Decarbonisation Scheme.

7.7 TfL is progressing the replacement of LEDs in its advertising infrastructure, street lighting and traffic signals as part of its current investment programme. With further funding this could be accelerated to bring forward emissions savings, as well as supporting cost savings in operations.

Uncertainty over funded initiatives

8.1 TfL's Government funding settlement ends in March 2024, and it is on track to achieve operational financial sustainability in 2023/24. However, there is currently no certainty on Government funding for capital investment beyond March 2024. The TfL Business Plan makes an assumption on the level of funding that will be made available for the capital programme, including rolling stock and signalling replacement. If this funding is not confirmed, TfL will not be able to complete all its planned capital investment, and therefore the benefits of that investment, including both direct and indirect environmental benefits, will not be realised. Investment in infrastructure is required not only to create new assets but also to maintain existing ones. If there is not sufficient funding available for renewals, the quality of existing assets decreases, which impacts on reliability and customer experience, and therefore could reduce mode shift away from private cars to sustainable transport modes.

8.2 Funding discussions with Government are ongoing. TfL also continues to seek out other funding opportunities, including the Mayor's Green Financing Fund and the Public Sector Decarbonisation Scheme.